



## EB 4.0 OHC EFI management onto Xflow.

Started by noobus m@x1mus, Jan 13 2009 03:43 PM

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noobus m@x1mus

Posted 13 January 2009 - 03:43 PM

Ok i have so far stripped an EB pre-smartlock MPI auto of all its goodies and have stripped back the loom and removed all unnecessary wires and so forth, Today i thought i would get into it again and came to the point where i could hook it up and do a test run. I dummied up the power and earth and connect the ISC, injectors, MAP, TFI and coil, I had all other sendors plugged in but not plumbed into the engine, Manifold air temp, CO2 sensor, Coolant temp, TPS and gearbox controllers. Removed the factory VAF pipework and turned the key and it started first pop, idled smooth and revved real responsive even though the TPS was not connected. After about 2-3 mins it started running richer as i guess the ECU was in warmup stage and was not getting a rich signal from the CO2 sensor So i assume from this bench test that the EB injectors and ECU will be sufficient for the extra 30 or so cubes of the Xflow.

Question is,

1: The EB dizzy has a hall sensor same as the Xflow but with 1 hall wider than the others, now i originally thought that this would act as a crank angle sensor and PIP sensor in 1 unit but it seemed to run fine with the stock EFI dizzy on the Xflow so i would like to know what others think about this. Is it something to be concerned about, should i mod the EB dizzy to fit the Xflow or Swap the Hall sensors over from the EB to the Xflow or just leave it as is?

2: The TPS is a bit difficult to adapt onto the throttle body of the Xflow so i was wondering the differences between the 2 and whether the EB one is more precise/better configured for the EB ECU or are they exactly the same output wise.

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[The Air Temp sendor, where would be its ideal location, In the manifold or at the Pod filter getting cold air rather than engine temperature air, On the EB it is plumbed into the maifold but the one on the xflow system is in the airbox and most latemodel systems read ambient air temps from the airbox aswell. Would it be better to get a colder reading as a hot reading would lean out or the other way around, dont forget this system was designed to run on a lesser cube engine so the more fuel the better IMO.](#)

I know this isnt the usual affair for this forumbut i cant see myself getting answers anywhere else than here so let us know if there is an easier/better way to sort this out.

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Cheers

**Edited by noobus m@x1mus, 13 January 2009 - 06:38 PM.**

82zkford

Posted 13 January 2009 - 03:48 PM

what are the advantages of using the eb ecu?

noobus m@x1mus

Posted 13 January 2009 - 04:05 PM

Biggest advantage is ditching the VAF (airflow meter) to eliminate the huge bottle neck it creates. And also the increased fuel economy and better fuel management though the use of better sensors and more of them. Also any cam upgrades are better handled by the MAP sensor than the VAF. I also had envisioned somehow slotting the EB 4speed auto behind the xflow aswell, thats if i dont get jack of it and just transplant the whole OHC engine and box setup in one hit.

Cruzr

Posted 13 January 2009 - 04:21 PM

If your going to all the effort of using the ECU I'd throw in the 4L as well!!

noobus m@x1mus

Posted 13 January 2009 - 04:27 PM

**Cruze said**

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Yeah i know but i have done a lot of work to the xflow now and nothing to the OHC engine( needs a major overhaul) and i would really like to see what this thing can do before i totally give up on it, hence the aftermarket EFI management (sort of 😊) And i think it will really shine if i get rid of the VAF so thats what i am going for atm, but it is all steps in the right direction for the transplant later on down the track.

Thom

Posted 14 January 2009 - 09:10 PM

how do you get 30 cubes between a 250 cubic inch xflow and a 243 cubic inch 4.0L, that equals 7 cubes man:weirdo:, the eb throttle body pulls in the wrong direction for use on a bb intake on a 4.0L so i would guess it would be the same here, but you could use a ef/ el throttle body and position sensor and the throttle body should be close to just bolting up to the xf intake, oh btw 6cyl throttle body's xe to el are the same size internally, and put your air temp sensor in the intake tub close to the throttle body so it gets the most accurate reading for the air going in

**Edited by Thom, 14 January 2009 - 09:16 PM.**

noobus m@x1mus

Posted 14 January 2009 - 09:54 PM

**Thom said**

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Cool, for some reason i had 221 cubes in my head ? I have looked into the eb TB when i first had the idea about a year ago but i didnt go with it for some reason, i have to look at it again, i think it was the position of the ISC and throttle plate vs the rocker cover, if i remember now i would have to make a spacer plate between the TB and the plenum but that would also be a good place to tap in a airtemp sensor so i will have another look. The eb TB has an oval inlet over the xf round one, prolly makes no diff but once again i will have another look. I was going to use the xf ISC but the eb built into the TB would be better too.

Cheers for the input.

xf\_ute\_250

Posted 14 January 2009 - 11:40 PM

Noobus,

Its running rich from the lack of the throttle position sensor. No big deal if the crossy is modded. Dont worry about the ISC, most have failed anyway, there is an idle screw on the eb (and xf) TB to set a base idle anyway.

Stick the air temp sensor into the plenum chamber.

As for your distributor question...maybe the thick film module has the same output?

David

noobus m@x1mus

Posted 14 January 2009 - 11:51 PM

Yeah i just had another look and i was going to machine down the EGR valve pipe inlet till its flush and tap it into the hole that is there but then i thought stuff that i will just tapp it in beside that where the rest of the ugly vacuum piping is, will hide it a bit. The TFI modules are identical so i guess the output might be the same as they get a 3 wire input and then decifer this into 8 or so wires so i dont know if it will make a diff, but it seemed to run pretty smooth without it so i will leave it for now. If i have to it is only drilling a gudgeon pin into the shaft to hold the drive gear at the right hight to match the cam gear and grinding a small amount of the base so it doesnt foul the block, not a hard job so i

will look into it later.

Gav

Posted 15 January 2009 - 03:20 AM

The ISC's can be a pain in the butt on manual cars. As has been mentioned they often fail (due to being gummed up with oily garbage) and cause the revs to hang as you change gear. On my EB I've kept the ISC valve on the throttle body but cut a gasket that seals it from the throttle body. This way the ECU still thinks it's there but it's not functional. I've just used the mechanical stop on the TB to set idle. Because the ISC has a role in maintaining a smooth idle...you may find the car has an inconsistent idle when cold but this is only an issue for the first minute of operation when cold. If the car is dual-fuel you'll find idle on gas is okay from start up. This arrangement, I reckon is far preferable than having the engine hold its speed as you attempt to shift gear....

noobus m@x1mus

Posted 15 January 2009 - 09:45 AM

Yeah thanks, its an auto but i dont know which setup i will go yet, the xf body with external ISC or the eb body with it built in, if its an issue i might try ur idea but with a tin gasket and might drill a 3-4 mm hole in it to allow it to affect idle speed but not hold revs on decelerate. I will look into it later.

The hall sensor on the EB dizzy has 1 hall wider than the rest so i would assume its to get a crank angle sense of some description but would only pickup on every second rev of the crank so i dont know the reason for it yet. The dizzy body is a fair bit shorter and the cap clips are orientated about 90 degrees from the xf ones so they are in a better position to advance the dizzy but worse if u need to retard. another diff is the lack of SPout connector on the EB loom so i guess u would have to set base timing another way so its probably easiest to leave the xf dizzy in set at 10 deg btdc now and not have to fiddle around too much to set base timing on the new dizzy.

Stretch

Posted 15 January 2009 - 07:35 PM

**noobus m@x1mus said**

Ok i have so far stripped an EB pre-smartlock MPI auto of all its goodies and have stripped back the loom and removed all unnecessary wires and so forth, Today i thought i would get into it again and came to the point where i could hook it up and do a test run. I dummied up the power and earth and connect the ISC, injectors, MAP, TFI and coil, I had all other sensors plugged in but not plumbed into the engine, Manifold air temp, CO2 sensor, Coolant temp, TPS and gearbox controllers. Removed the factory VAF pipework and turned the key and it started first pop, idled smooth and revved real responsive even though the TPS was not connected. After about 2-3 mins it started running richer as i guess the ECU was in warmup stage and was not getting a rich signal from the CO2 sensor

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Cheers

Sorry if its been answered but I cbf reading everything else.

Keep in mind that when you started it up with no sensors on the engine the values are all over the place so you cant really make a true judgment of whether it worked or not. The ecu is receiving contradicting values.

The EB injectors off the top of my head (actually a guess 🤔) are slightly bigger than the 19lb's on the xflow, they just run a lower duty cycle.

The vane in the dizzy, all windows the same = multipoint, one smaller tab = centerpoint.

You will find the distributor bodies and hall sensors are different between E-series and XF. Same principle of operation but they are actually shaped differently and wont retrofit.

With the tps, hook up an ohmmeter between the signal and ground (green and black) and turn the tps, compare the values. They will both be linear so you can use a fixed resistor to compensate for any difference.

The MAT sensor (air temp) is a really strange tapered thread, I had trouble finding a nut to weld into my intercooler piping and ended up using a nut with the correct thread but wasn't tapered. The thread was something like 1/4 BSPT or something.

In the manifold is the best place. Just before the throttle butterfly is fine too.

If you think about a turbo engine, putting it near the pod or before the intercooler is going to be a huge variance, not such an issue with a NA engine but you will notice Ford put it dead in the middle of the plenum on the ef/el then they went to t-map system.

I think eb runs a 3 or 4 wire lambda sensor doesn't it? Make sure it is as close to the merger as possible and that you don't use any silicon based gasket goo or adhesives in your engine or engine BAY.

Good on you for doing this mate, good project and if you need any help don't hesitate to ask 🙏

Cheers,

Ryan

**Edited by Stretch, 15 January 2009 - 07:37 PM.**

xd4.1efisc

Posted 15 January 2009 - 09:50 PM

The TPSs have the same values, I use an XF one on a Bronco throttle body with an A9L (mustang eec-4) and have no problem.

The multipoint engines are the ones with one smaller vane not the centerpoint.

The smaller vane tells the ecu that number 1 cylinder is on its compression stroke the ecu uses this on sequential injected (not sure why they have it on E series multipoint as they are not sequential) engines to time the firing of the injectors.

When the ecu sees this vane it knows you are at 10 degrees btdc (assuming base timing is at 10deg) all timing values in the ecu are referenced to 10 degrees btdc.

Therefore if the ecu has a programmed timing value of 30 degrees for a given engine condition it will add 20 degrees via the TFI module to the base of 10 degrees.

$20 + 10 = 30$ .

As the ecu knows the engine is at 10 degrees btdc on number 1 it knows that this is 10 degrees before the start (0 degrees or TDC) of the 720 degree engine cycle (4 stroke).

On sequential motors there is a table for the start of the injector pulse (somewhere around 350 degrees it starts when idling) this is the main reason for the ecu needing to know this.

Not sure why E series multipoint needs it when it is batch fired. Maybe it's for semi-sequential? (1 bank of 2 or 3 at a time)

There could be more to the way FORD set these computers up than we know. (we are learning though)

As for cam changes with this set up, there are volumetric tables (based on MAP sensor inputs) in the code, and changing cams (different vacuum levels) can and will affect these, and this will cause problems with spark and fueling the same as the AFM.

Run an EL (has same dizzy set up) ecu and you can get very good information about tuning various parts of the codes. (need other hardware to do this)

I have had a play with an EA manual ecu code. But this is low on my priority list and haven't done much about it.

The ISC is also the same electricaly (I still run XF one on A9L)

The vane can be modified in an XF dizzy to work.

To do this set the dizzy rotor to point where 10 degrees btdc is.

Take note of which vane is just passing through or just past (can't remember of top of my head) the hall effect pick-up. Then remove dizzy (if still in engine) and take the vane wheel off (just remove dizzy gear and push shaft out through top).

Then cut the vane that you noted to the required width making sure you cut it on the right side. (Get an E series one to make sure you cut in the right spot)

Also EA-EL injectors are very close to XF that I would not worry about it too much.

Sorry this is long.

Hope it helps.

Edited by xd4.1efisc, 15 January 2009 - 09:54 PM.  
add info

xd4.1efisc

Posted 15 January 2009 - 10:21 PM

If you wire in the SPOUT connector you can still use it to set base timing.(no need to put ecu into self test)  
This is because when the TFI module loses the SPOUT (spark output) it goes into a limp home mode.  
This is so if the ecu stops outputting a spark signal the engine will still run assuming its still getting fuel.  
This means that when there is no spout signal (disconnected SPOUT connector or fault in the ecu)the TFI will fire the coil at base timing (10 degrees).  
This is a simple explanation as the TFI module does some filtering and inverting of the PIP (profile ignition pickup) signal (from hall effect sensor) as well.

noobus m@x1mus

Posted 16 January 2009 - 02:10 AM

Cheers heaps for the input guys, really appreciate it. Rep points all round 🙌  
I am coming to a point were i am hungry for a bit more go about this thing and the VAF is the last thing restricting the whole system so it has to go.  
I will be having a crack at welding in the bung for the CO2 sender before i start anything and finishing off the loom first too. The MAT thread pattern is the same as the vacuum tree in the rear of the plenum so it might end up there and i will tig on a few nipples on the blank plate i have sealing up the old EGR valve piping to get the vacuum from there instead, would be the easiest approach and not have to remove the plenumn to drill and tapp.  
So would i get away with the xf dizzy?  
the xf TPS will stay i think,(though the EB one looks sexier) i might have another look.  
Will keep the xf ISC for now too.  
The SPout connector splice in is a good idea, will do it for sure.  
Stretch, the Lambda sensor, u mean CO2? It has just 2 wires. how critical is the silicone sealant use? I havent sealed any of the intake or exhaust, only used gaskets but did u some loctite bluemax on the rocker cover and waterpump/thermostat housing and sump gasket too. Keep in mind the sendor is proly as old as the hills and has all manner of different owners with varying exposures to such things in its life time.  
I also read that it only come into use to achieve a stoich mix at cruise in a closed loop fuel mix and is inoperable any other time. Is this true? then it would not be a major thing if it did not function at 100% its ability for now till i replace a few sendors over time.  
Again thanks heaps.  
Cheers Clint. 🙌

Dan347

Posted 16 January 2009 - 02:32 AM

the module on the side of xf dizzy is the same as cpfi ea but the hall effect sensor inside is slightly diff and can also tell you that cpfi and mpfi dizzy's for ea to ed are listed as different parts with ford so might be able to build one out of your xf and an e series . hope this makes sense and helps a bit

noobus m@x1mus

Posted 16 January 2009 - 09:15 AM

**Dan347 said**

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Yeah thanks, differences are the PIP rotor has 1 hall wider than the rest as described above but the dizzy base is about 20mm shorter in height compared to the xflow and also the cap is rotated 90 degrees so the clips are also 90 degrees different. The clamp down base is larger and has a larger cutout in the eb block which is nothing to machine back but main difference is the height of the cam gear so i would take the eb gear off and put the xflow one on and drill a gudgeon at the right height. No huge deal to modd the eb dizzy to fit the xflow block so i will sort this out but for now it seems the xflow dizzy will do its job with the batch injection from the eb not being sequential.  
Thanks for the input.

Stretch

Posted 16 January 2009 - 08:14 PM

**noobus m@x1mus said**

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Again thanks heaps.

Cheers Clint. 🙌

There is no such thing as a CO2 sensor, it is an oxygen/lambda sensor. It measures the oxygen in the exhaust stream not the carbons. 1 wire or 5 wire it is the same thing.

From memory EB runs a 3 wire.

It is used to alter the short and long term fuel trims to acheive a stoich AF ratio under light load and cruise. It will run without it but wont acheive as good fuel economy with a fouled/faulty sensor.

Ultra blue/blue max sealant is fine.

I remember there was a recall on a line of cars produced as they used a dot of silicon in the headlight assembly and the airbox was behind the headlight. That was enough to damage the O2 sensor and make the cars play up so just one of those things to be wary of.

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noobus m@x1mus

Posted 17 January 2009 - 02:36 AM

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LOL. Arent most k&n & equivalent nowadays using a silica percentaged rubber to form the elements? And what about silicone induction bends and reducers and such?

Surely it cant be that sensitive or products like these would not be on the market for lack of application on EFI gear.

Ahh well, With what i got i should be right for now so thanks for all the help.

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Stretch

Posted 17 January 2009 - 10:33 AM

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Im not a silicon expert but you put a dot of silicon on your pod filter and i guarantee your O2 sensor will be up the creek. there are O2 sensor safe silicons which are used in things like filters and adhesives.