The Backyard Speed Density to

Mass Air Conversion

The following was reprinted from
Joe's Mustang EEC-IV Page
courtsey of Cliff Koch

(original artivicle at http://www.iaw.com/~aubertin/88mgt/eec-iv/sd2maf.htm)

This covers the steps involved in converting a speed density Mustang to a MAF Mustang. One thing that should be mentioned is that the Cobra MAF system is a little different than the GT/LX MAF system. The Cobra EEC-IV and MAF have been recalibrated for use with 24# injectors rather than the 19# injectors that the 'regular' 5.0 EFI engines use. If you are installing a Cobra system, you should use a Cobra computer, Cobra MAF, and 24# injectors.

It is strongly recommended that all connections are soldered. Any sort of crimp only terminals are only asking for reliability problems down the road that will be very tough to troubleshoot.

Parts needed:
Mass Air Flow meter: Get a MAF calibrated for the injector size you are using. If you are using an aftermarket recalibrated MAF and are also installing larger injectors, keep in mind this can cause problems with ignition timing (leading to part throttle detonation) along with some drivability problems.

MAF mounting hardware: MAF bracket, 3 MAF mounting screws, and 2 sheet metal screws to mount the bracket to the shock tower.

MAF power/signal harness: This is the MAF connector, 4 wires that go to the EEC computer, and EEC-IV connector pins for two of the wires.

MAF Air tubes: These are the tubes which go between MAF meter and engine and MAF meter and air filter box plus the clamps.

(Optional): Three EEC-IV pins and wire to hook up VSS and FPM2 signals.

Step 1 ***Removing the speed density computer***
Remove the battery ground cable. Remove the passenger kick panel. You will probably need to remove the lower door strip to get the kick panel out. The kick panel is held on by a screw towards the back and a 'mushroom' fastener towards the front. Remove the EEC-IV retaining screw to the lower right of the computer. Remove the EEC connector using a 10mm wrench. Clear any wires/relays out of the way and slide the computer out.

Step 2 ***Install the Mass Air Flow meter***

Remove the air snorkel and the air filter box cover. Attach the MAF mounting bracket to the shock tower. I recommend attaching the snorkel and bracket to the MAF and looking for the correct holes in the shock tower to use (they will already be there on many vehicles. Once found, attach MAF bracket to shock tower and the MAF to the bracket.

Step 3 ***MAF wiring***

There are 4 wires that need to be run to the MAF, 2 signal wires and 2 power wires. If you do not have a prefabricated harness, you will have to come up with the MAF connector and two pins for the EEC-IV connector. The MAF can have two types of connectors on it, a 4 pin or a 5 pin connector. The pins are marked A B C D (E) on the MAF sensor. The chart below shows what wire needs to be connected to which pin number on the EEC connector:

4 pin		5 pin	
MAF	EEC-IV	MAF	EEC-IV
A	37 (power)	A	37 (power)
B	40 or 60 (ground)	B	No connection
C	9 (signal return)	C	40 or 60 (ground)
D	50 (signal)	D	9 (signal return)
		E	50 (signal)

Get the wires through the firewall via your favorite method. Mine was to slit the large rubber grommet that the EEC wiring goes through and push the wires through that. The power and ground signals will need to be tapped into the wires currently going to the EEC connector. It's easier to work on the wires if they are removed from the connector. To do this, you first have to remove the red locking bar on the front of the connector. The pins are then retained by a small tab which can be disengaged individually with a jewelers screwdrive or a paperclip. The signal wires will need to have EEC-IV type pins soldered to them and be inserted into the proper locations in the connector. The locations should be empty. Check your connections. If these are hooked up incorrectly, you will likely blow the electronics in the MAF and could also damage the computer.

Step 4 ***Thermactor pump wiring***

The EEC connector positions that control thermactor valve operations are different between Speed Density and MAF computers. The wire currently in position 51 should be moved to position 38. The wire currently in position 11 should be moved to position 32. You may have to splice in some extra wire for the pins to reach the new locations.

Step 5 ***Hooking up Vehical Speed Sensor (VSS) wires*****(optional)**

There is a differential signal called VSS (Vehicle Speed Sensor) which comes from a small sensor on the transmission where the speedometer cable is connected. In 1986-1988 MAP cars this signal was used only by the cruise control and the sensor may not be installed if your car does not have cruise control. In MAF cars, this signal is used by both the cruise control and the EEC-IV. The wires/pins for these signals are not physically equipped in a MAP car's wiring harness, which will yield an error code for NO VSS SIGNAL- (code 29) from the continuous memory codes in the EEC-IV. These signals are not absolutely needed, though some people have reported stalling when coasting to a stop without them. You can hook the VSS signals up to the EEC-IV connector by connecting the input pins of the EEC to the appropriate wires on the cruise control module (located just to the left of the clutch/brake pedals). You need to hook the dark green/white wire going to the speed control to pin 3 of the EEC, and the orange/yellow wire to pin 6 (these are the colors for an '88, anyway). These positions on the EEC connector are empty and will require 2 EEC-IV connector pins.

Step 6 ***Hooking up the FPM2 signal*** **(optional)**

There is a another signal called the FPM2 (Secondary Fuel Pump Monitoring signal). This signal monitors the voltage going to the fuel pump, essentially testing whether or not the fuel pump relay (located under the drivers seat) is operating correctly. Again, this wire is not in the harness. This shouldn't cause any problems, other than having code 95 generated in the EEC-IV self tests. Again, this wire can be connected to get rid of the error code. Connecting pin 19 of the EEC-IV connector to the output of the fuel pump relay located under the drivers seat (pink/black wire) will fix the problem. To really do this correctly, a wire should be run to the back of the car to tie in after the collision fuel cutoff switch, but that's a lot of work for a fairly useless test.

Step 7 ***Adding a "Check Engine" light*** **(optional)**

Another difference between the speed density and MAF cars is that MAF cars have a "Check Engine" light in the dash to alert you to possible serious problems and it makes reading out self test codes much easier. The MAF cars have the "Check Engine" light located in the light panel on the lower right of the instrument cluster. Speed density cars don't have this window, but there is a "Check Engine" position for a light in the tachometer face, though there is no bulb installed. The wire from the EEC to the bulb (via the flex connector) is also missing.

In the '88 harness (not sure of other years), there is a tan and a black/blue wire connecting up to the 'Check Engine' circuit on the instrument cluster flex circuit. For MAF models, the tan wire hooks to the EEC STO/MIL line and the black/blue is for the lamp test out when you start the car. I don't know what these are connected to in an '88, but the test out feature does not work, and the STO/MIL

line at the EEC-IV and self test connector is yellow/black. The wires connected to the check engine lamp probably end at some open connector somewhere, but I couldn't track it down, so I cut the tan and black/blue wires off the flex connector and ran a new wire to the STO/MIL wire on the self test connector under the hood (you could also tap in by the EEC-IV, but it was easier for me to go through the firewall. You can get a bulb socket from the HELP! rack at the local parts store, put in a N194 bulb, and voila, you now have a working check engine light.

Step 8 ***Install MAF computer***

Put the locking bar back on the EEC connector if you haven't already done so. Reinstall EEC-IV and reconnect the connector.

Step 9 ***Attach Hoses to MAF***

Attach the hose to connect the MAF to the engine throttle body and the hose that connects the MAF to the air filter box cover and tighten the clamps.

Step 10 ***MAP sensor modification***

Disconnect the vacuum hose going to the Manifold Absolute Pressure sensor located on the firewall on the upper drivers side. Leave the vacuum port on the sensor open and plug the vacuum line from the engine. Do *not* disconnect the electrical connector from the sensor.

Step 11 ***You're done!***

Check that everything is back in place and connected well, reconnect the battery and start the car. It is normal for the car to idle a little rough and you may feel some slight surging when driving until the computer relearns the fuel curves. A few hours of normal stop and go driving will usually be enough. If the engine has extreme idle problems, then something is probably wrong. Check the wiring from the MAF to the computer. Try to run KOEO and KOER tests and see what the problems are.

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