

Megasquirt II with V3.0 PCB – EF Falcon with standard coil packs.

Last Updated: 20/May/2008

Setting up your EF I6 engine to use a stock unmodified Ignition system with Megasquirt.

Read through all of the steps first before beginning. Tick each part off as you go. If you have any problems, please ask on the Megasquirt forums as you will probably get a faster response than messaging me directly. If something isn't clear or you've found a mistake, please let me know so that I can update the guide! You can contact me via PM to "devojet" on fordmods.com or Megasquirt forums.

This guide applies to:

- Megasquirt **v3.0 PCB** with the **MS2 daughterboard** fitted
- MS2Extra Firmware 1.x & 2.x
- Stock EF Falcon crank angle sensor and coil-packs.
- *May also work with other models that run coil packs, but has not been tested.*

Overview

- Changes needed to the build instructions
- Add extra Coil drivers
- Wire up the Crank sensor to the Megasquirt
- Wire up your coil-packs to the Megasquirt
- Configure your Megasquirt using Megatune

Megasquirt Assembly/Modifications:

If you are starting with a kit then follow the standard V3 PCB assembly instructions taking note of the following changes. If you have a prebuilt unit then you can refer to the assembly instructions and make the modifications in the following.

Step 22: You will want to install this jumper as the stepper IAC outputs can be used as spare outputs for driving relays, shift lights, etc. Refer to the MegaManual for details.

Step 50: You don't need to install the Hall circuit as it won't be used but it doesn't affect anything if you do. Just don't install C12 (0.001uf) as we will be using this in the next step.

Step 51: Install the VR circuit with the following changes. Change C32 to 0.001uf (use C12), Change C31 to 0.01uf (Use C32). *Make sure you check these values as some kits come with different values. I had troubles with the VR input until I changed to these values. The assembly instructions have details about reading the code numbers on capacitors.*

Step 52: Set the Jumpers for VR input. **VRIN** to **TACHSELECT** and **TSEL** to **VR0UT**.

Step 54: If you are setting this up as a piggyback with the factory computer and sharing the factory temp sensors then leave R4 and R7 out. If you are installing MS standalone using the ford sensors then install 27K resistors (you can also install the standard 2.49k resistors and use megatune to

calibrate the thermistor tables) or if you're using separate GM temp sensors for MS then install the standard 2.49K resistors. See appendix A for the resistance curve for standard Ford sensors.

Step 62: Install the PWM Idle Valve Modifications. This will be needed if you want MS to control the Idle. It can also be used for other options like boost control if MS is not used to control the idle. I mounted the TIP122 transistor on the end plate just above the DB37 connector using an insulator. See Picture.

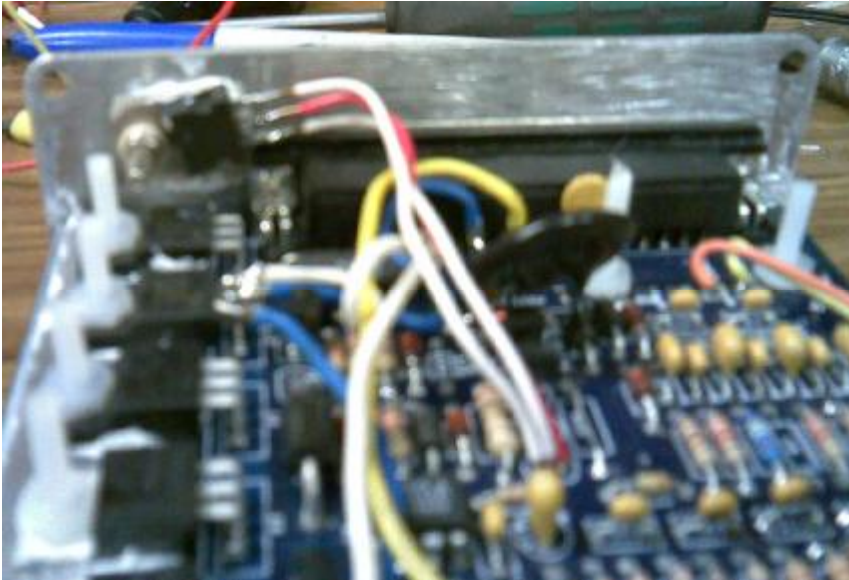


Figure 1: PWM mod placement.

Step 65: You will want to install the High current ignition driver. Don't install R43 just add a jumper instead. It won't cause any problems if you do install R65. Only install the jumper from IGBTOUT to IGN for now.

Step 69: Yes install the PWM flyback damping circuit.

Step 71: Do not install the current limit circuit as this will leave space on the heatsink for the extra ignition drivers which will be installed later.

Adding extra Ignition coil drivers:

You need to install an extra 2 ignition coil drivers to allow the MegaSquirt to control the 3 coils in the coil packs. Check that you already have the standard ignition coil driver installed **Q16**. You will need either an extra two VB921's or two BIP373's (DIYautotune.com's alternative, as the VB921's are out of production).

Start by mounting the Coil drivers in the spare heat sink spaces. If you are using BIP373's then don't forget the insulation pad. Refer to Figure 2 for the following wiring steps.

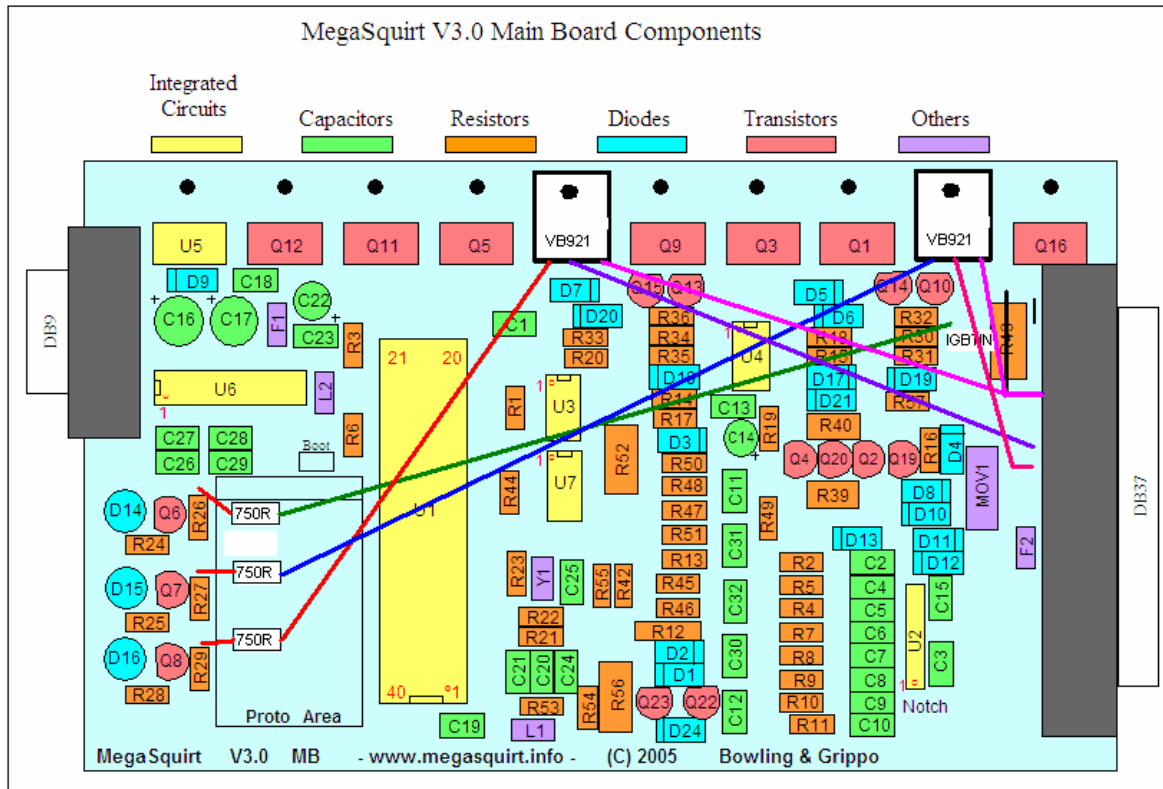


Figure 2: Coil Driver Wiring.

1. Solder three 750R resistors to the tops of R26, R27 and R29.
2. Run a wire from the 750R resistor on R26 to IGBTIN, That is Spark A wired.
3. Run a wire from the 750R resistor on R29 to pin 1 of the Coil driver in position R38 (middle of the Heatsink).
4. Run a wire from the same Coil driver pin 2 to the top IAC jumper, Pin 31 DB37. This is Spark B.
5. Run a wire from the 750R resistor on R27 to pin 1 of the Coil driver in position R37.
6. Run a wire from the same Coil driver pin 2 to the second from the top IAC jumper, Pin 29 DB37. This is Spark C.
7. Run wires from pin 3 of the two extra coil drivers to the bottom of R43. This will either be a resistor or jumper depending on how your MS is assembled.
8. On the underside of the PCB Jumper the bottom of R43 to the closest ground pins on the DB37 connector (Pins 15 and 16) using a cut of component lead. See Figure 3. This will help carry the current required for driving coils. *Note when connecting the external wiring, make sure these pins have a ground wire connected to them.*



Figure 3: Extra ground jumper.

Wiring up the VR sensor to your Megasquirt DB37 Connector

It's recommended that you use a shielded cable to connect to the CAS. Earth the shielding braid at the Megasquirt end **only!** (You can earth this to pin#9 (pins 8, 9, 10 and 11 should all be grounds and connected together)) If you are using the standard loom then the twisted brown and grey wires can be used.

Wiring the VR sensor:

Brown VR+ connects to **Pin24** of the DB37 Connector

Grey VR- connects to **Pin7** of the DB37 Connector

Wiring the Megasquirt to the coil-packs:

Next we need to wire up the coil packs. Figure 4 shows the pin out of the standard coil pack.

Coil A connects to **PIN36** on the DB37 plug

Coil B connects to **PIN31** on the DB37 plug

Coil C connects to **PIN29** on the DB37 plug

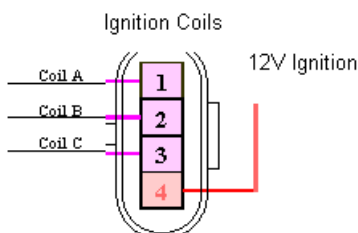


Figure 4: Coil Pack Wiring.

Harness Connections

You have probably seen this diagram before (Figure 5), or something quite like it. Note that the coils are wired up differently to other diagrams so if you have been following this guide, use this diagram, if not then double check that you are wiring things up appropriately for your setup. Depending on how you have connected jumpers, the output pins will differ and so long as the right signals make it to the right devices, everything will be ok. This is not necessarily the best way to do it, it is just How I have done it.

*If you are wiring the Megasquirt as a piggy back to the factory ECU make sure the temperature sensors and TPS sensor are grounded at the same point as the Megasquirt. Don't rely on the ground connection to the factory ECU. Also in this case **don't** connect the 5Vref to the TPS.*

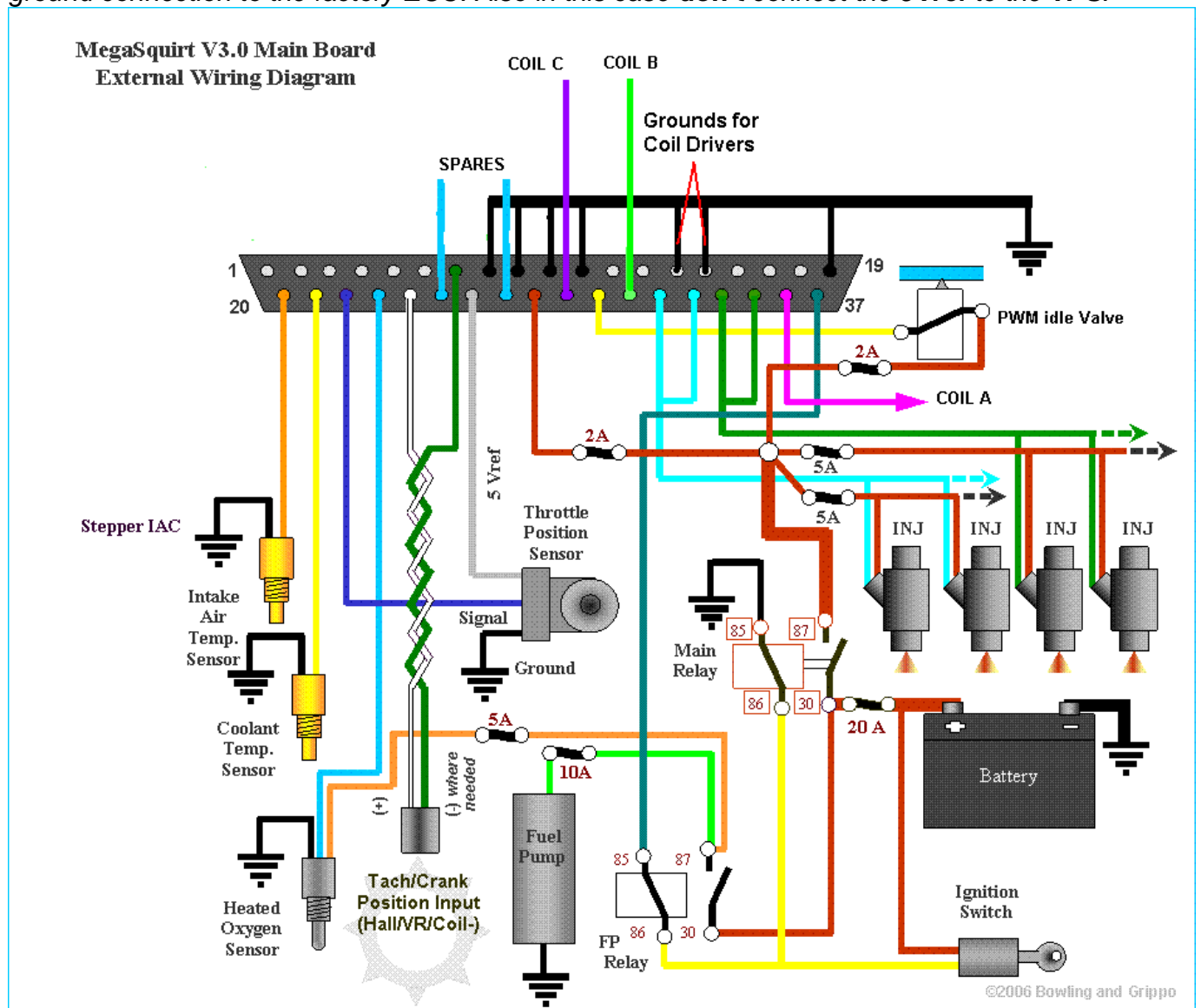


Figure 5: External wiring.

Configuring Megasquirt with Megatune.

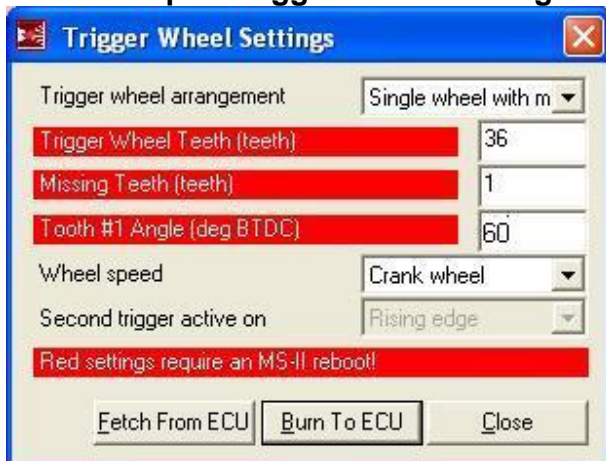
In this section I'll try to explain a bit about each option... I have only included the setting's specific to the EF Falcon. Refer to the Mega Manual for the details of the other settings. As I find out more or as people request it, I will update with more information here.

Basic Setup -> Tach Input/Ignition settings



- Trigger Offset does not do anything when in wheel decoder mode. I have left mine set to **0**, however this does not affect anything.
- Skip Pulses can remain at **3**.
- If you have wired TSEL to **VROUTINV**, then set Ignition Input Capture to **Falling Edge**.
- If you have wired TSEL to **VROUT**, then set Ignition Input Capture to **Raising Edge**.
- For Spark mode, you want **Toothed wheel**
- Spark output should be set to **Going High(Inverted)**
- Number of coils should be set to **Wasted spark**
- Spark A output pin should be set to **D14** if you have been following this guide.

Basic Setup -> Trigger Wheel Settings



- **Single wheel with missing tooth.**
- **36 Teeth**
- Tooth #1 Angle BTDC **60** –
- Wheel Speed – **Crank wheel**

Checking Timing: Once you have the engine running and idling, it is recommended that you check the timing with a strobe light. To do this go to **Basic Setup -> More Ignition Settings** and in the top box change it to fixed timing and set it to 10deg BTDC. Now start the engine and check that the timing is 10deg BTDC with the strobe light. If it is correct go back and set it back to use table and your ready to go.

That's it for now!

I have put together this guide to help others to install Megasquirt on an EF Falcon using the factory coil packs. The information contained within this document is based on my experience from installing a Megasquirt on my EF Falcon and most of the information can be found in the megasquirt manuals. This is to be treated as a guide only and I recommend you read the Megasquirt manuals so that you understand what is going on. Wrong settings or wiring can cause engine damage and I take no responsibility for the info contained in this document. Use this info at your own risk.

Please, if you find any **errors** or can think of **anything** at all that would be **worth adding** or **clarifying**, please contact me via PM to "devojet" on fordmods.com or Megasquirt forums.

Appendix A:

Air Charge Temperature Sensor			
Temperature		Voltage	Resistance
F°	C°	Volts	K ohms
302	160	0.12	0.54
267	131	0.20	0.80
248	120	0.28	1.18
230	110	0.36	1.55
212	100	0.47	2.07
194	90	0.61	2.80
176	80	0.80	3.84
158	70	1.04	5.37
140	60	1.35	7.60
122	50	1.72	10.97
104	40	2.16	16.15
86	30	2.62	24.27
68	20	3.06	37.30
50	10	3.52	58.75
32	0	3.97	65.85
14	-10	4.42	78.19
-4	-20	4.87	90.54
-22	-30	4.89	102.88
-40	-40	4.91	115.23
Values were calculated for VREF=5.0 volts. These values may vary 15 percent due to sensor and VREF variations			

Engine Coolant Temperature Sensor			
Temperature		Voltage	Resistance
F°	C°	Volts	K ohms
302	160	0.12	0.54
267	131	0.20	0.80
248	120	0.28	1.18
230	110	0.36	1.55
212	100	0.47	2.07
194	90	0.61	2.80
176	80	0.80	3.84
158	70	1.04	5.37
140	60	1.35	7.60
122	50	1.72	10.97
104	40	2.16	16.15
86	30	2.62	24.27
68	20	3.06	37.30
50	10	3.52	58.75
32	0	3.97	65.85
14	-10	4.42	78.19
-4	-20	4.87	90.54
-22	-30	4.89	102.88
-40	-40	4.91	115.23
Values were calculated for VREF=5.0 volts. These values may vary 15 percent due to sensor and VREF variations			