Engine Start – Part 2

(after the fluids leak all over)

Let's recap… Last time we talked about the methodical way to start a new motor in a kit car and went through the mechanical and fluid checks. Some of the more experienced out there probably thought it was pretty lengthy and redundant because after all you're pro's right! Ok, now for the rest of us who are newbee's or just smart enough to be careful, we'll go forward. Added to my list of found leaks and loose hardware I've got:

Fluid:

- Oil pressure tubing at the back of the oil pressure gauge under the dash – yeah this was messy and I recommend only using the brass type ferrules, the steel ones are just not soft enough to seal well
- Master cylinder at the lid – top the of master cylinder casting was defective so it leaked when I moved the car. Easy to see if you inspect before you install.
- Coolant leak at the bottom fitting of the overflow/fill tank – took it off and resealed the fitting

Ok, now that we're done looking at my faults, let's talk about the electrical system. If you were lucky, you received a wiring loom from the kit manufacturer or bought one from a respectable maker like Ron Francis or Wire One. If you did, and followed the instructions you're probably ok but it never hurts to check. Electrical is not very forgiving and can drive you crazy chasing gremlins for the life of the car if you're not careful. Heres a few basics when wiring up a fiberglass car.

1) Grounds, grounds, grounds! Fiberglass does not conduct electricity so you just can't screw a ground in anywhere. Overkill on good grounds. Make them to the chassis with either tapped #10" machine screws (minimum), 3/8" for a battery ground. Where ever you make a connection to the frame it must be stripped to bare metal. Use internal tooth washers to get a "bite" between the surface and the lug you're mounting. Run not only grounds for the actual device – lights, radio, gauges, etc. – but also connect adjacent metal parts so you don't accidently end up with something "floating" (meaning not quite ground but not quite 12v either). Ground wire size should equal the power going into the device so if the hot wire is 10 gauge, the ground should be 10 gauge. Between adjacent parts, use 10 gauge as a safety ground. You should have a heavy ground going between the motor block and the chassis along with one from the battery to chassis (or motor block if you're close enough.)
2) All connections should be soldered! Unless you have a professional crimper in your toolbox you risk a loose connection down the road so just solder the terminals and put heat shrink over them in place of the plastic housing normally there. Use multiple layers if you're worried about abrasion. A loose connection can create resistance which over time can become hot and melt things – or worse. They can also pull apart and cause shorts or intermittents – like going down Pacific Coast Highway at night and the headlights flicker off in a turn. Really bad…
3) If the wire goes through a surface, any surface, put some type of grommet in place so the wire cannot rub against the edge of the hole and eventually cause a short or cut the wire. The same goes for when you run a wire over an edge of a panel or around a corner. Remember, our cars will bounce as they are driven over the road so things like loose wires will rub.

Ok, I typically start the electrical verification by removing all the fuses in the panel BEFORE hooking up the battery. At this point the battery positive should only be hooked up to the fuse panel input and the normally open side of your starter solenoid. Since I was hand wiring my car from scratch - a different story and not for the weak – I actually started with a 12 volt bench source with a 5 amp fuse in the line. With all the fuses out, it's time to pull out your voltmeter, or trouble light and check to see if you have 12 volts at the fuse panel. If you do then you slowly start placing one fuse at a time in and checking the operation of that circuit. For example put in the fuse for the horn, does the horn work?

Leave the ignition circuit for last. DO NOT SUBSITUTE A LARGER FUSE. If you have one blow, you need to trace it down to the problem and fix it. At this point you really need an "ohm" or resistance meter to be able to find the point of least resistance. Don't go on until you fix the problem as you might find you'll fix multiple issues when you find it.
For the ignition you should start first by double checking the connections to all the "ignition" side of the key. Visibly check the connections. Before you insert the fuse and turn the ignition key to the "on" position. Do not turn it to "start" yet as you don't want the motor turning over.

Feeling better about start up yet? If you carefully went over everything, found and fixed the issues early you should be feeling pretty good. If it's kicking your butt, call for help. Friends, club members, forums, whatever works for you but everything you find before you start up is one less thing that can cause your very expensive motor and car from self destructing prematurely.

Start up prep. Here's where the rubber hits the road.

1) Emergency brake is engaged and you have blocks on both sides of the rear wheels – up on jack stands even better but make sure it's stable as a rock
2) Engine is set to Top Dead Center (0 degrees time) with the number one cylinder piston up at the top of travel – check by removing the spark plug and using a flashlight
3) Pull the distributor and prime the oil pump. We'll assume it's been at least a week since you did it last
4) Re-install the distributor and with the rotor point to #1 plug wire electrode. You can mark this on the distributor housing referencing the cap before you take the cap off. Double check the plug wires are in the right firing sequence for your motor. DO NOT ASSUME your motor is the same as your buddies – unless it's the same make and block it may not be.
5) If you have a carburetor with an electric fuel pump and an oil pressure switch you'll probably need to prime the carburetor
6) Make sure nothing is lying around the motor bay loose – tools, rags, wire, your hands, etc.
7) Fire extinguisher at hand? Buddy nearby to watch the motor as you're inside turning it over?

Start it!

If everything went well you now have a motor running. If you have an electric fan turn it on now manually as you'll need all the cooling you have during run in. If you bought your motor already run in by the builder, you're good to do the final timing and carburetor adjustments. If it's a new build you should be running the motor at around 2,000 rpm, varing it about 2-300 rpm either side. How long to do run in varies with mechanics but you should follow your builder's recommendation or about 20 to 30 minutes as a default. This is important to set the bearings and rings. Otherwise you may have premature wear at idle which will cause you headaches later. You should be monitoring the gauges to make sure you have the enough oil pressure, water temp is staying stable – might be a tad higher than normal with a tight engine – electrical system is charging. Your buddy on the outside should be feeding you words of encouragement like "Way to go buddy," "Sounds Sweet" and more important words of "no leaks so far dude (or dudette)" and "sounds solid man!" After run in is complete let it idle down and if the temperatures are looking ok set the initial time, adjust the carburetor and everything else that needs to be done. If the temp is reading high – which may be the case due to the fact that a car sitting in one place will run hotter than one traveling down the road sucking in cooler air you may want to shut it down to cool off – yeah the car too!

Congratulations! You now have a ride…

If you have any problems past this point solve them one at a time and remember your support network.