Trunk Mounted Battery – 1994 Mustang GT

This project came up as a result of the new turbo needing to be in the same under hood location as the battery. One of my basic criteria on my car projects is that they need to be reliable and not require special operational techniques. Although my lovely bride of 22 years thinks she hates this car now days, I feel it should be very simple for her to walk out and drive away without special training and drive the car. Also, I wanted to make as few changes to the stock wiring as possible. In other words, keep it simple and as reliable as the factory did.

At first it seemed like a very simple project, just run one big wire from the rear mounted battery (positive) up to connect in the engine compartment where the standard battery connects, ground terminal to unibody. At the time I had another unassociated electrical project going that involved fuses. That reminded me that wires carrying significant current should always have protection from short circuit. Well, I can't think of many circuits that carry more current than the positive wire feeding a starter motor. 150, 200 amps? More? Depends on your engine combo, could be much higher. So yes, the wire feeding the starter will really need some protection, either fuse or circuit breaker…

How about after engine start? Well, headlights, radiator fan, stereo, electric windows, wiper blades… 40 amps sustained? 60 amps? I don't really know but I do know that my alternator is capable of 100 amps. But I luck out here, since once running, the alternator actually carries the load unless the load exceeds the alternators output. And since the alternator is on the engine, the stock wiring will do. Right? Not if you want to be legal at the drag strip.

I discovered that Test and Tune night is a great way to enjoy a car like this and not get in trouble. So in theory, my car needs to be legal at both a NHRA and a IHRA track, both of which I have used. In the rulebooks they are specific about mounting a relocated battery and using a master cutoff switch on the positive side of the electrical system. This switch must stop ALL electrical functions of the car. That means it has to cutoff the alternator output too…See where we are going here? Now at least two large wires and some kind of fuse protection.

Of course I participate on several Yahoo Groups discussion lists. At this point I posted to several to see what others have done. Full range, from simple and possibly unsafe, to more involved and probably done right. One guy posted a great link:
http://www.madelectrical.com/
This guy had an interesting approach to rear mounted batteries, one protected wire forward to the always running loads and a solenoid 'protected' wire running forward to the starter. His theory is that since a starter can pull such high currents, it is not practical to fuse such a line, if only because of the cost of a 3-400 amp fuse. Solenoids to carry the current are only $20 retail. So the starter positive has a solenoid right by the battery that is actuated at the same time as the starter, energizes the positive cable to the starter for start and then is disconnected for the rest of the time. I liked that one. Now three large wires and fuse protection.

Another issue that came up from the discussion group was the ground path on a unibody car. Some folks have had lots of grounding problems on unibody cars, others never have had problems. I decided I want to do this particular project only once, so if possible, I would include a dedicated ground wire from the battery to the starter motor/engine block. Now we're up to four large wires and fuse protection.

Wire size. My first thought was to look up the "standard wire size" chart that exists everywhere on the internet. I think this chart comes from the National Electric Code. I took a look through the chart, started making some ASSumptions of current loads and began to scratch my head. If I ASSumed 200 amps for the starter, it started to be a very large wire. If my alternator really put out 100 amps, again a pretty large wire. Size "0" or larger. Looking at the commercial kits I saw anything from #4 to #8 wire being used. Looking at the factory cable, it was probably #4 to #6. Head scratch…Since I couldn't find the criteria for the "standard wire size" charts, I didn't loose a lot of sleep. Detroit actually builds good quality electrical systems, if my wires were bigger than theirs, I was OK.

Well, I found some nice industrial cable that had four #2 strands in the casing. These strands were properly insulated and of very fine wire structure, much like a welding cable. The price was right. Decision made. #2 cable, better than most aftermarket kits and I was very comfortable that they were capable of the loads they would see.

Finally, fusing? I found the marine community actually has fuses capable of protecting the starter cable but the cost was pretty high. I liked the $20 solenoid idea better, stuck with that. Looking at the Ford wiring diagram I found that the alternator discharge wire has two 12 gauge fusible links in parallel to protect that wire in its normal configuration. Since that wire has a power source at each end (alternator at one end, battery at other end) it needed a fuse next to each power source. So I used the stock fusible links at the alternator end and I added two 12 gauge fusible links at the battery end.

For the positive wire running from the cutoff switch to the main fuse panel by the engine, I needed to fuse this wire next to the cutoff switch (power source – by the battery). This wire has the potential to carry full alternator load and anything the battery needs to contribute. So at least 100 amps from the alternator and then some. I used two 10 gauge fusible links in parallel for this position.

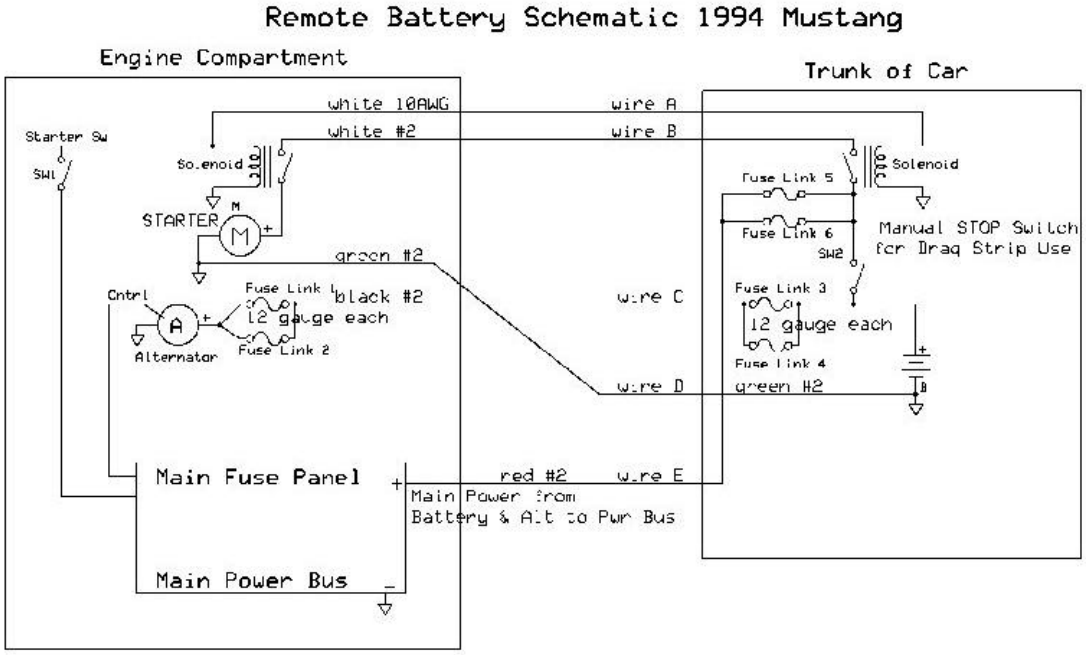
Cable routing. I ran all four cables up the right side of the car, inside the trunk, under tha back seat, along the right edge of the floor under the carpet, through the grommet that protects the main computer wire bundle into the right fender well. The Starter positive cable connects directly to the starter-solenoid positive terminal. The dedicated ground wire connects to a mounting bolt on the starter. The full-time positive cable crosses the back of the engine compartment and connects on the left side to the main fuse/distribution buss. The alternator output cable is disconnected from the main fuse/distribution buss and connects to the #2 wire leading to the rear.

Simple? In principle. Safe, YES. Easy, No. Reliable, should be. The only way to do this? No, just the way I was comfortable.

What would I do different next time? Build my own battery box! I bought the blue poly box that is sold by Moroso. Supposedly it is approved by both NHRA & IHRA. For about $100 it has to be one of their highest margin products! Get into the rule books and build your own box out of steel or aluminum, it HAS to be cheaper and will certainly be just as good.

I did also use the Moroso cutoff switch and one of their solenoids. They seem to work fine, no complaints on them.

I have posted my final circuit schematic below:



This is how I did it.

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