

## **Craven Speed Gauge Install for Obsessive-Compulsives**

This is intended to complement the excellent "Craven Speed Gauge Install for Dummies" written by NAM forum member KeithL. Some of this information and similar photos can be found elsewhere if you dig through the forums, some is new, I'm trying to not repeat too much of what is already documented and pass along what worked best for me on my 2012 R56 MCS. So I'm not going into detail on the installation of any of the sensors, as Craven and KeithL both cover that very well. Instead this concentrates on the wiring - getting it through the firewall, and tapping into the power and lighting circuits. Apologies in advance for the less than stellar quality of some of the photos.

I purchased the Craven dual gauge kit with Marshall gauges and adapters, I chose the boost and water temp. gauges. I'm really impressed with the Craven pieces, they are beautifully made and finished and everything fit perfectly. The Marshall gauges match the interior and the lighting is an exact match for the Mini's gauge lighting. As mentioned in KeithL's guide, you'll need to get the lighting module designed by NAM member RJB from Custom Mini Shop. Nicely done RJB, as an EE I can appreciate it!

My goal for the install was to be able to return the car to 100% stock - no new holes, and no crimp-on wire splices - those things just make me cringe. Also I wanted an installation that looked as close to "factory" as possible, even if I was the only one who would ever know the details. Yes I know it's obsessive-compulsive, but that's the way I am.

### **Getting the wires from the engine compartment through the firewall**

KeithL's method didn't work for me, plus I had the tubing for the boost gauge to deal with, so here's how I got everything routed through the firewall.

1) Remove both wipers (13mm nut and washer.) Mark the position of the wiper on the windshield with tape before removing it so it is simple to get it properly aligned when you reassemble it. You will have to wiggle and work at the wiper arm to get it to come loose, patience is the key. No you don't need to pry on it or get out the hammer, just keep gently wiggling and pulling and eventually it will come off.

2) Remove the screws (10mm) that hold down the panels covering the wiper mechanism - there are two on each side of the car. Then remove the rubber gasket that runs along the top of the panel. Open the access hatches and reach in to gently push up and unsnap the panel from the plastic bulkhead at the back of the engine compartment. On the 2012, the panel is in two parts. Remove the passenger side first as it overlaps the driver side panel. Once I had unsnapped the panel from the bulkhead I found it was very easy to remove by rotating from where the panels overlap towards the front of the car, then pulling each panel and up over the wiper drive.

3) On the driver's side, you'll see this:



Pop off the black plastic cap that covers where the wiring harness comes through the firewall, using a small screwdriver to carefully pry up the 3 locking tabs.

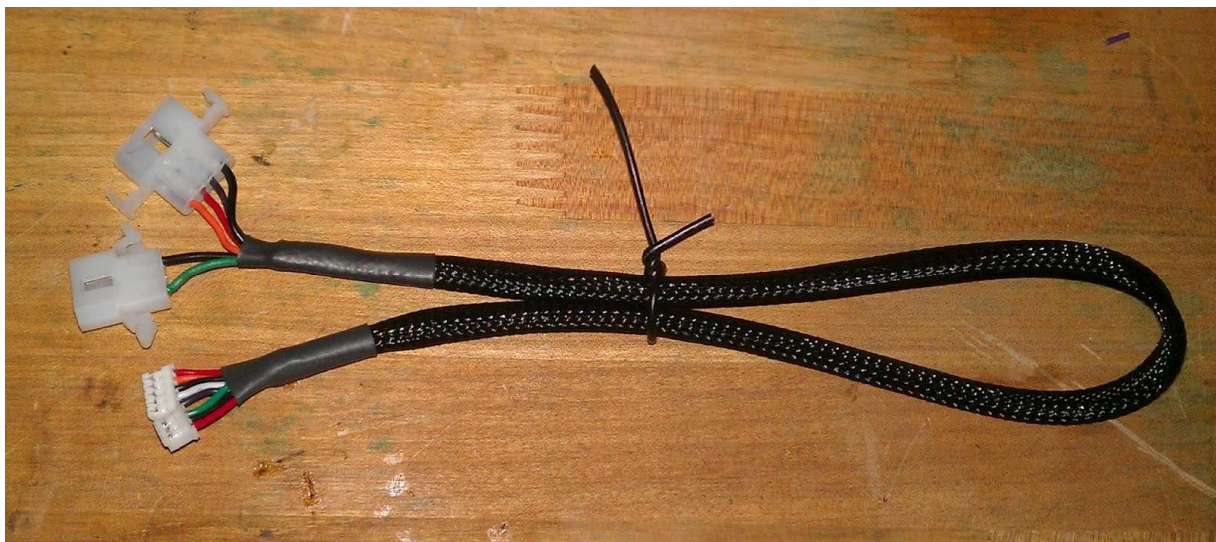


The rubber boot that seals around the wiring harness has an extra “finger” that in the photo is partially hidden behind one of the brake lines. (there’s a better picture of this somewhere on NAM.) I cut off the tip and routed the tubing for the boost gauge and the wiring for the temperature sensor through it, sealing it with a couple of wraps of electrical tape. Then I snapped the cap back on, routing the tubing and wiring alongside the wiring harness.

Putting everything back together is just the reverse of the disassembly, though getting the panels over the wiper mechanism lined up with the matching groove below the windshield is a little tricky. It is obvious when it is right, just go slow and careful.

## Wiring Installation

4) For the gauges and sensors, I built wiring harnesses using mesh sleeve material, heatshrink tubing, and modular connector kits. All of this was available at Fry's (a northern California electronics chain) or you can find the same thing online at Digikey, Mouser, Allied, etc. Since I'm O-C I didn't use the wire that came with the Craven kit as it was solid core wire, this was my only disappointment with the kit (and a very small one.) Instead I found stranded wire in the colors I wanted at a local electronics surplus store for pennies per foot. I also soldered all connections. Here's a picture of the harness for the temperature gauge, the small connectors are pre-wired and come with the Marshall gauge, the two larger connectors are the ones I assembled - one for power and lighting (black/purple/red/orange), the other (black/green) goes to the the temperature sensor.



I built similar harnesses for power/lighting to the boost gauge, for the temp sensor wiring through the engine compartment to under the dash, and then one to bring the power and lighting connections from the lighting module to where they all snap together under the dash beneath the steering column. The mesh sleeving protects the wires and matches similar sleeving used by the factory.

5) After a lot of research, looking at wiring diagrams, and head-scratching, I finally concluded that hooking into the switched power and the lighting circuit at the power outlet and Sport/DSC buttons was the best way to do it. The challenge was figuring out a way to make the connections without splicing any wires. Here's what I finally came up with:

First, remove the panel on the driver's side of the center stack, just pull gently to unsnap the panel. This picture shows panel removed, with the power and lighting harness running from under the dash to where it hooks to the lighting module and power connections.





6) remove the screws that hold down the center cover for the shift lever, parking brake, etc. Three T20 screws, one in each cupholder, if you have a center armrest you'll have to take out a few more screws for covers around that as well. Work the cover loose and raise it up, but be careful of the wires that go to the Sport/DSC buttons and power socket.

7) remove the panel at the back of the storage space below the switches. Just get the top edge with your fingers, and pull steadily until the snaps release. This will expose a T30 screw that fastens the front edge of the molded plastic piece that forms the bottom of the storage space.

8) Remove the T30 screw, then wiggle out the bottom plastic piece. You'll have to lift up the center console as high as you can. What you'll see looks like this: (yes, I was surprised to see

the surface corrosion on the steel brackets.) This is a perfect place to hide the lighting module and the wiring connections, you can see them in the pic below.



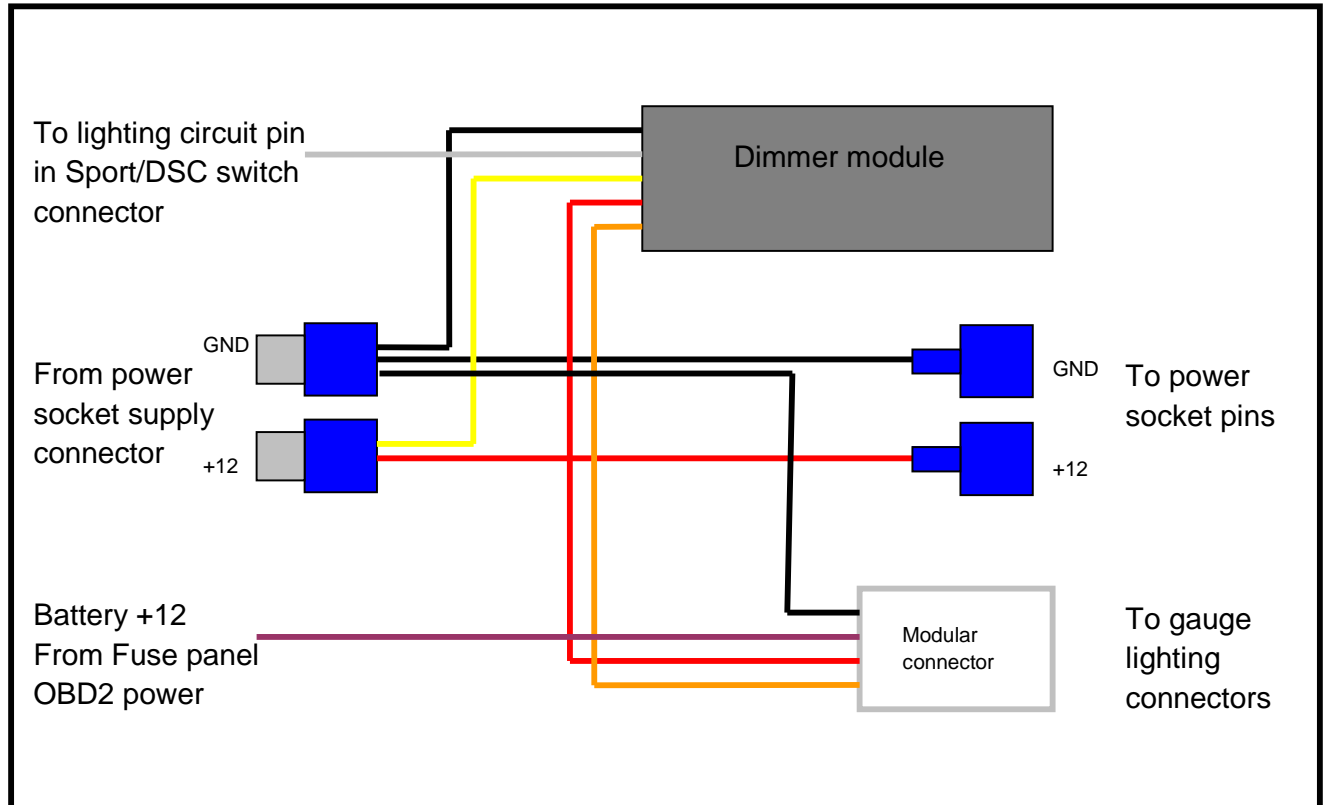
9) To tap the lighting circuit without any splicing: unplug the connector from the Sport/DSC switch. This is tricky and requires a mirror and flashlight to see up under the center console, as well as a lot of patience, dexterity, sweat, contortions, and cursing. There are tabs on each side of the connector that need to be released to get the connector unplugged. You just have to be able to see it to understand what has to happen, then comes the patience, dexterity, sweating, contorting, cursing, etc. Once you have the connector off, locate the grey/red wire. I found that a 22 gauge wire, tinned with solder, was the perfect size to insert into the top of the connector body alongside the grey/red wire and make contact with the internal signal pin. I zip tied the "tap" wire in place so it wouldn't pull out accidentally.

10) connecting to the switched power takes a few more parts - ¼ inch spade connectors, both male and female. You can find these at any hardware, electronics, or auto parts store. Unplug the connector from the power socket and plug the male spade connectors into it to tap the switched power and ground. Wire from those to the lighting module and also to female spade connectors to bring power to the socket. Use at least 18 gauge wire for the power connections. I put a few turns of electrical tape around the power connector to eliminate any possibility of a short to some part of the chassis.

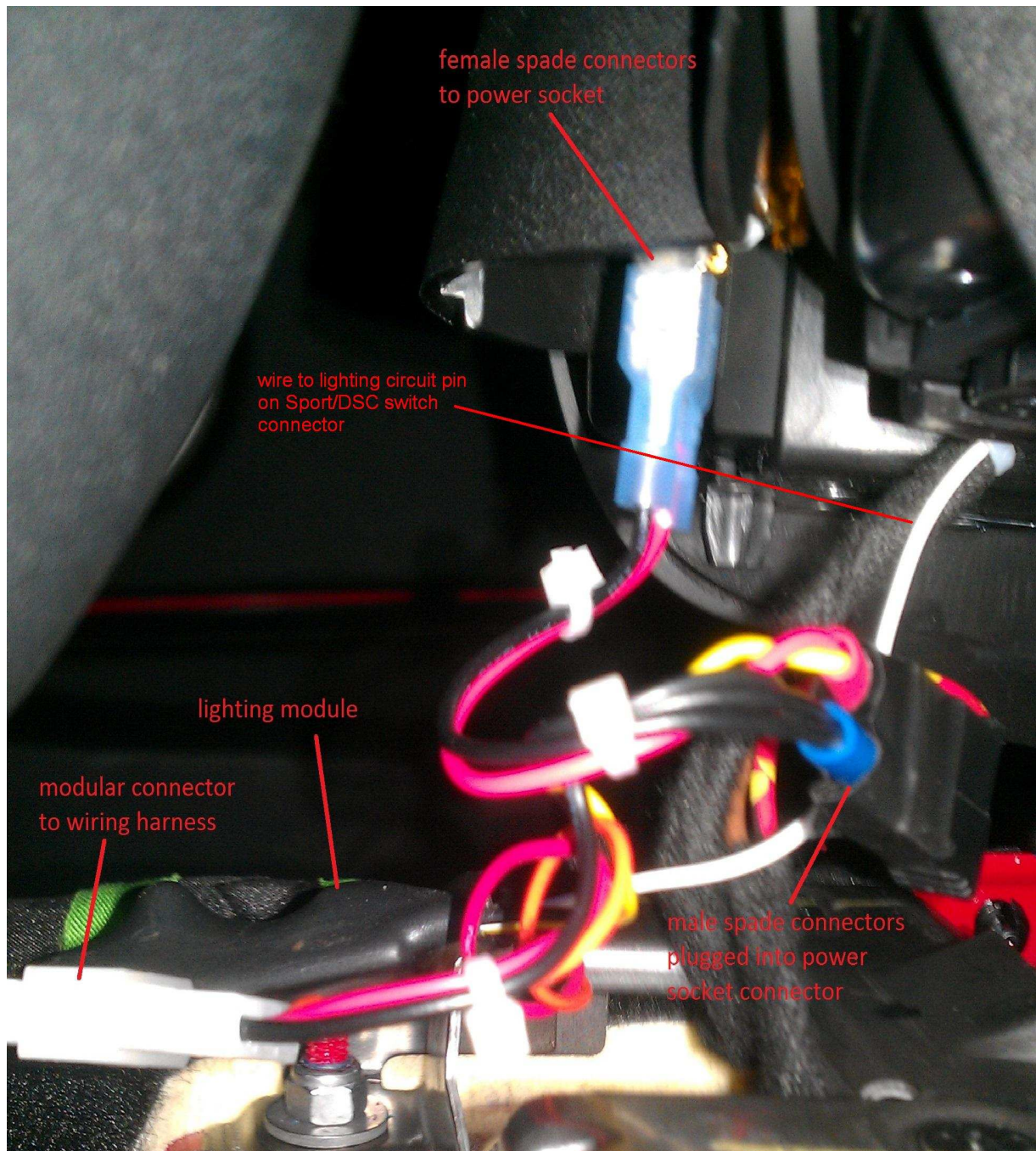


Finally for the unswitched power, I ran a wire to the fuse panel in the passenger side footwell and used an "add-a-fuse" to connect to the OBD-2 power circuit.

Once I finally figured out how all this was going to work, I wired up the lighting module, spade connectors, and a modular connector to the power/lighting harness that goes to under the dash so I had it all together. The schematic looks like this:



And here it is installed:



11) Put it all back together and make sure to secure the new wires so nothing rattles or gets tangled up in the pedal or steering mechanisms under the dash.

12) Finally, I found that I had to trim the ends of the gauge mounting studs for the water temp gauge so it wouldn't hit the vent on the dash behind it, I used my Dremel with a cutoff wheel.



**Conclusion:**

Success! A very clean installation, completely reversible, with no wire splices. The gauges look great and work perfectly.

**Tools:**

- Torx T20, T25, and T30 drivers
- wire cutters, wire stripper, needle nose pliers
- soldering iron
- dremel

**Materials: (total was less than \$20.)**

- expandable mesh sleeving, 10'
- modular connectors, Amphenol 0.156 series
- heatshrink tubing in various sizes.
- 22 gauge stranded wire, black, red, orange, purple, green, to match the colors used by the Marshall gauges.
- ¼ inch spade connectors, male and female
- nylon zip ties
- electrical tape