

Craven Speed Gauge install for Dummies (R56N)

I installed the Craven Speed kit for the Marshall oil pressure and coolant temperature gauges. I'm very happy with the product and the results.

I finished this up a few weeks ago, and thought I'd document it while I was doing it. There's a lot of information scattered about on NAM and the Craven Speed instructions are helpful, but not quite up to date. My car is a 2012 hardtop with no turbo, so these instructions apply to that model.

Your mileage may vary. However, this documentation may help people with an "S" as well...

First of all, allow yourself at least two solid days of time to do the work. It can be roughly divided into three phases: installing the coolant temp sensor, installing the oil pressure sensor, and mounting and wiring the gauges. About half your time will be spent under hood and the other half inside the cabin. I chose to work under the hood first. I was able install the sensors and route the wires into the car and put them aside until I had time to finish the job. I spent a lot of time studying things, and I work kind of slowly - hopefully, reading this will save you some time. Also, download "crgk-axxxxn-refresh-complete-gauge-kit.pdf" from Craven Speed and read it too - I'll try to note here where I deviated from those instructions.

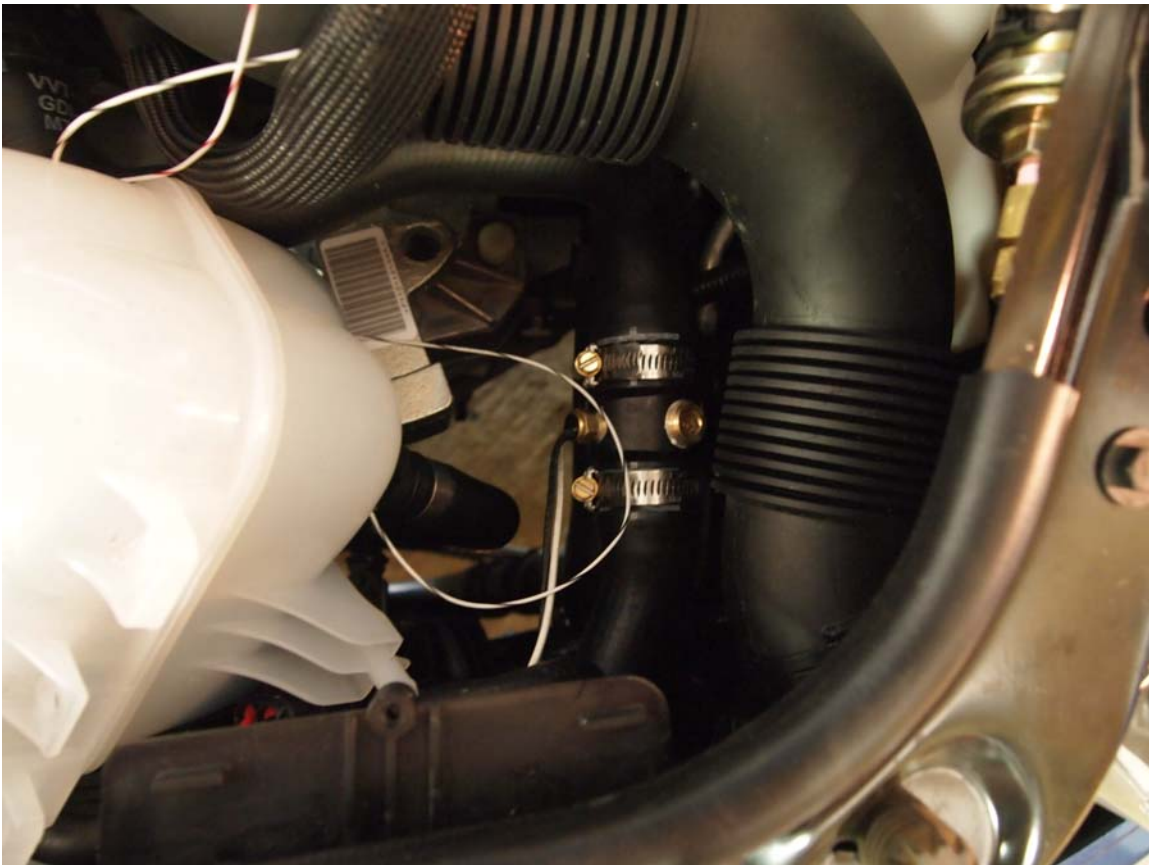
Things didn't start off well - even though I ordered the R56N setup, I got the wrong oil pressure tap. The R56 tap (and stock sender) goes into a port on the engine block, but the R56N's tap is just below the oil filter. The R56 tap won't work on the R56N - the tap on the engine block is still there, and it's simply plugged, but the cam timing adjustment motor partially covers it. Make sure you've got the correct tap:



(the above part is referred to as "part #2" in Craven Speed's instructions)

Craven Speed was very good about correcting my order – they shipped me the new part gratis (and a free return shipping label) before I even returned the wrong part.

I started by installing the coolant temp sensor. The Craven speed instructions say to remove the coolant reservoir, but I didn't find that to be necessary. I drained it using a small hand transfer pump (saving the coolant in another container), removed the (10 mm) bolt securing it, and laid it aside:



(There may not be room to do this in a turbo application, and in that case you may very well have to remove the reservoir.)

Then, it's pretty easy to access the union where you install the "hot link" adaptor that replaces it. I got the factory type spring hose clamps off using a vise grips, but re-using them without a purpose-made hose clamp pliers was impossible – luckily, two worm gear style hose clamps are included with the kit. There's a large brass plug that goes into one port, and the temp sensor goes in the other. I used automotive pipe dope on this one, but Teflon tape would've been easier and quicker.

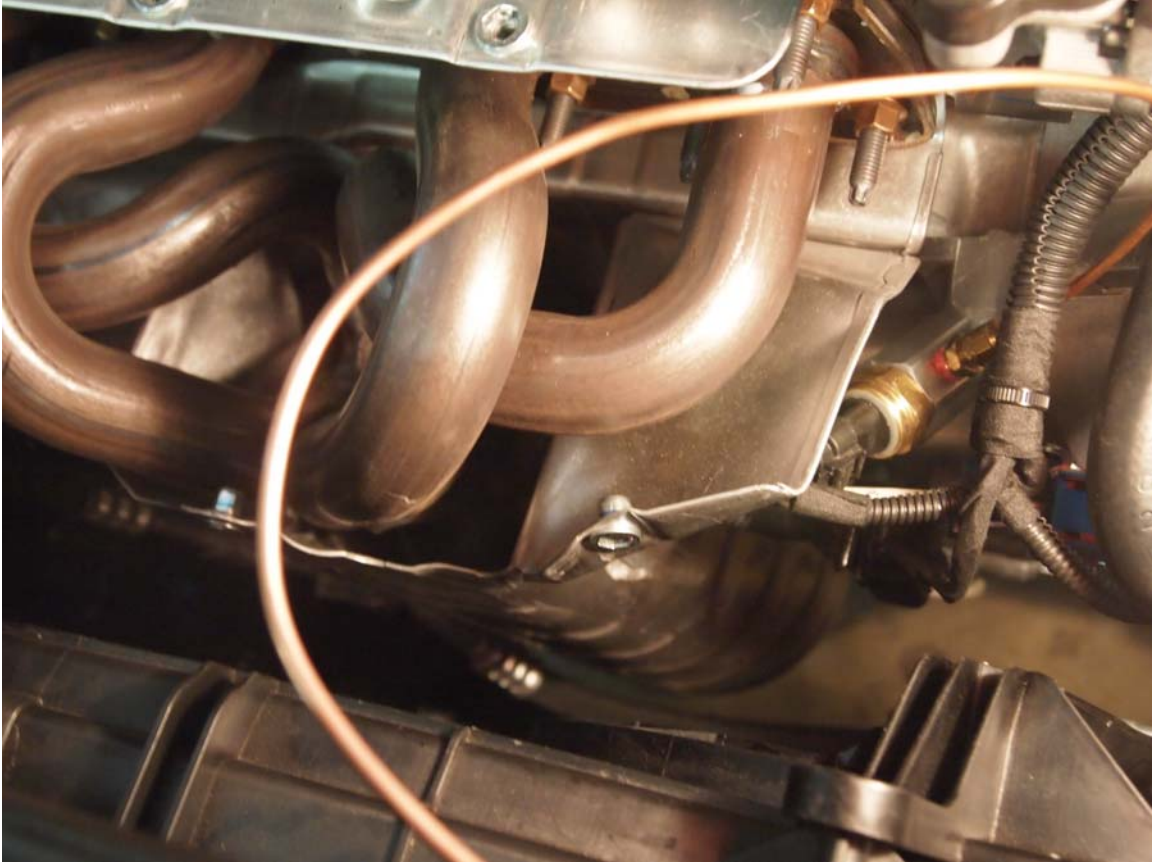
The Craven speed instructions say be prepared to spill a bit of coolant. By a "bit" they mean about a half-gallon. I was able catch a good deal of it by putting a catch pan under the car. Still, it's messy, so be prepared. Once you get the coolant bottle back in place, re-fill it, and then run the engine until its warm to check for leaks and to bleed the air out

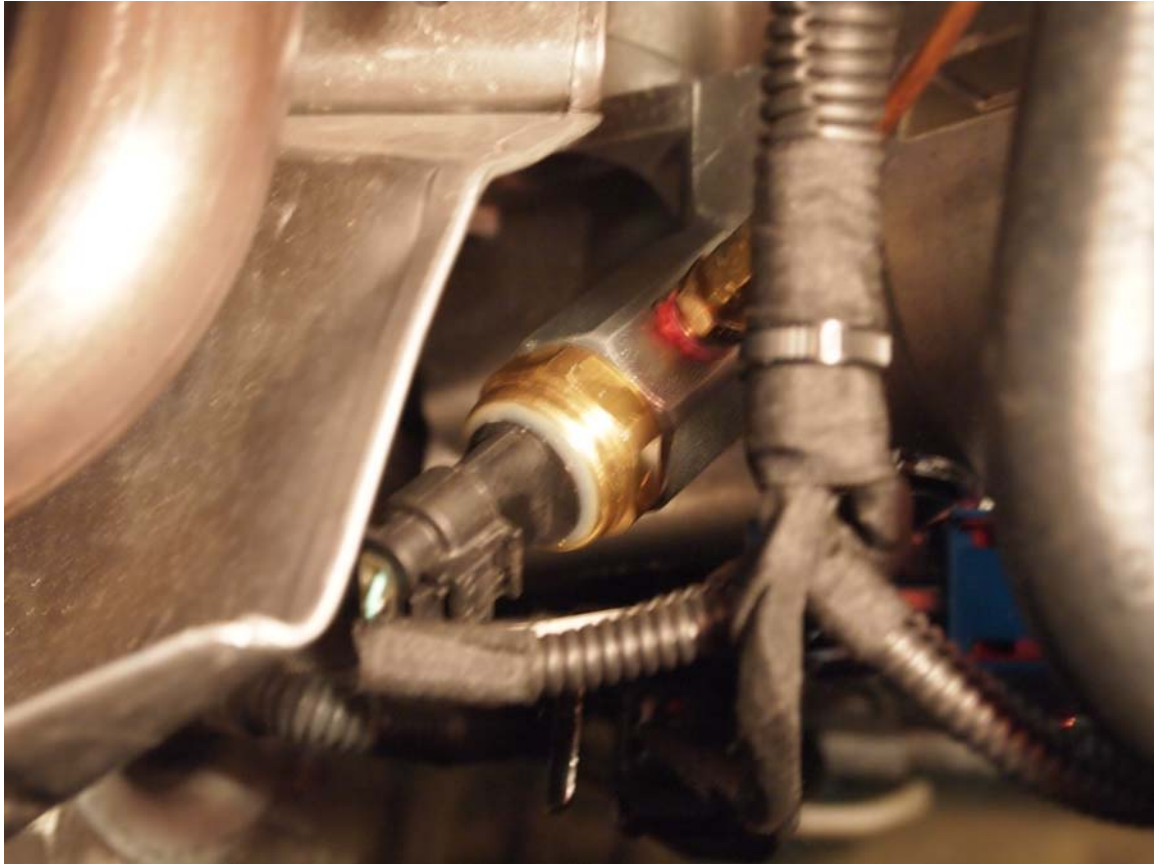
of the system – I did this twice, and topped off the coolant each time – I replaced the missing coolant with tap water. I'm pretty sure the coolant reservoir is the highest point in the system and thus there's no special bleeding procedure.

Next, remove the stock oil pressure-sending unit. I found it easiest to work in this area by removing the top shroud around the exhaust header. There are six 10 mm bolts (three on top and three on the sides) that secure it to the lower shroud. These have anti-seize on them. It's probably not necessary, but I put some more on before I re-installed them later. So, you might want to have a small bit of anti-seize on hand. The top shroud takes a little manipulation to disengage it after the bolts are removed – angle it up slightly and pull it towards the front of the car. Now it's much easier to access the oil pressure sender connection.

Disconnect the plug from it by sliding a small flat-blade screwdriver into the slot adjacent to where the wires enter the plug. This disengages the lock and the plug slides off easily. The Craven Speed instructions said to use a 24 mm socket to remove it, but I found a 1" deep well worked just fine. It didn't take much torque to loosen, and no oil dripped out when I did.

Craven supplies two, almost identical pieces which allow you to connect standard 3/8" NPT fittings to the oil pressure port. I found I only needed to use "part #1" referenced in Craven Speed's instructions. Luckily, the single 3/8" on this part faced in a direction that made it easy to route the copper line straight out from it. You may have to use "part #2" and plug five of the six 3/8" NPT ports in it... You'll have to test fit some things together to see what will work for you. Craven would have you install both pieces, but I found that to be unnecessary, and I'm not sure that the stock sender would fit if you did. Also, I found I didn't need to use the included 3/8" NPT 45° fitting either – the straight fitting worked fine for me – the less fittings and plugs you use, the fewer chances you'll have for leaks! I used Teflon tape on all the threaded joints (note, it's not necessary to use it on the compression fitting nuts that attach the copper line to the tap and new sending unit). Test fit everything together before you apply the Teflon tape and see what will work best in your particular application. Here's mine:







The compression fitting screws into the side of the tap, and the original sending unit screws into the top of it. I bent the bottom part of the exhaust heat shroud up to allow enough room for the factory sending unit's wiring. You need a gap there so that you don't melt the wiring or the plug!

I used two fairly large-radiused bends in the copper line from the tap to the new sending unit. The engine does move forward and back in its mounts somewhat, and you don't want to concentrate any stress in a right-angle bend (even though such a routing might look better). Another danger in using a sharp bend is that you can kink the tubing; easy does it. I routed the copper line in the manner suggested by Craven and mounted the new sensor under the support on the left side of the car:



After installing the oil pressure sensor and plumbing, I took the car out for a test run to check for leaks. I had no problems on the first try. Teflon tape is your friend!

Note that after you bend the heat shield up to accommodate the stock sending unit, you won't be able to install the last heat shield shroud bolt there when you re-install the top half of the shroud. I didn't notice any problem by doing this...

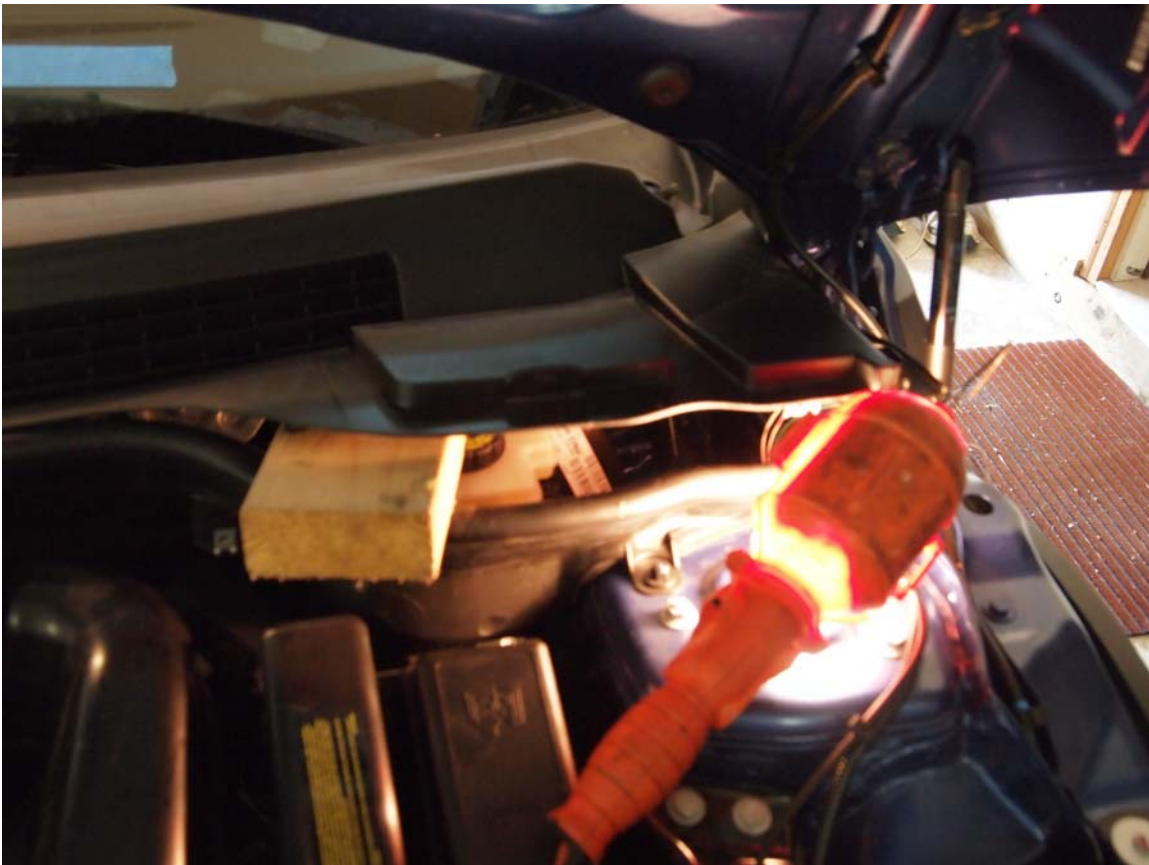
Next, you need to route the wires into the cabin. I got some 1/4" split-loom tubing, available here:

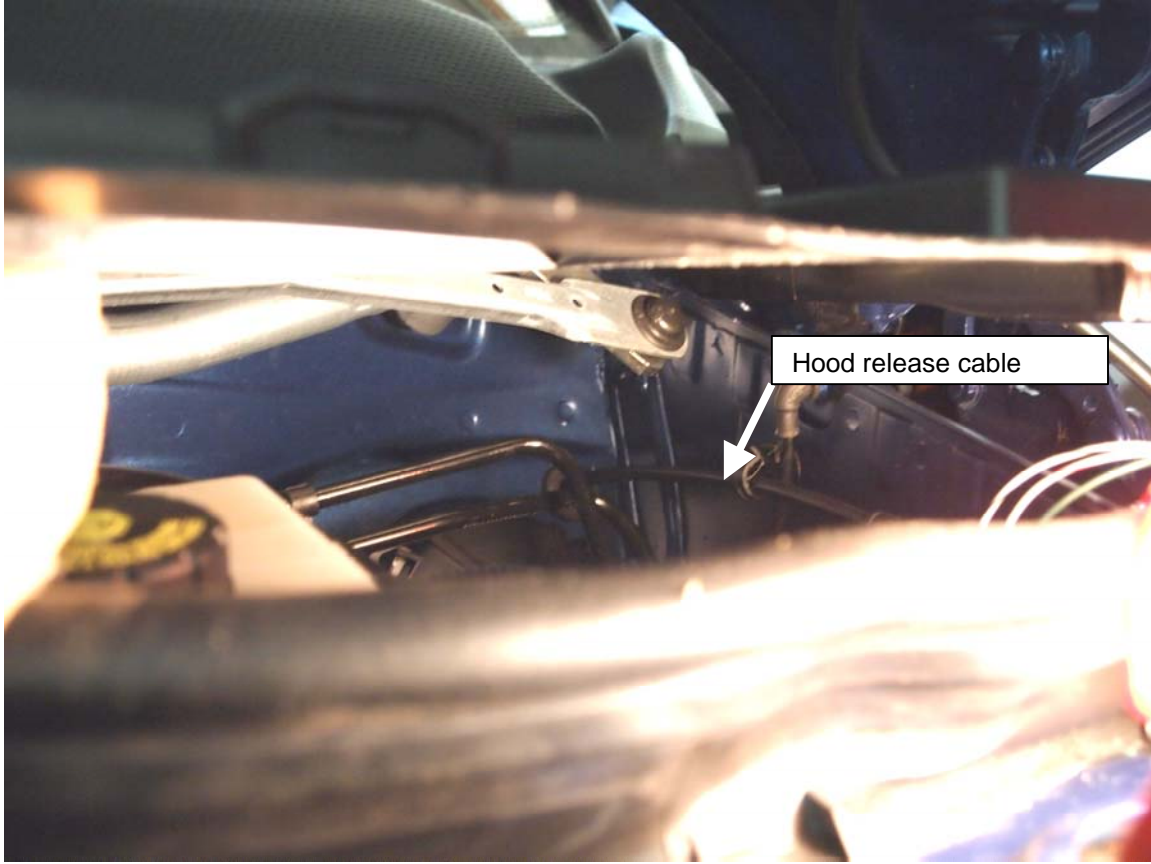
<http://www.allelectronics.com/make-a-store/item/SLT-14/1/4-SPLIT-LOOM-TUBING/1.html>

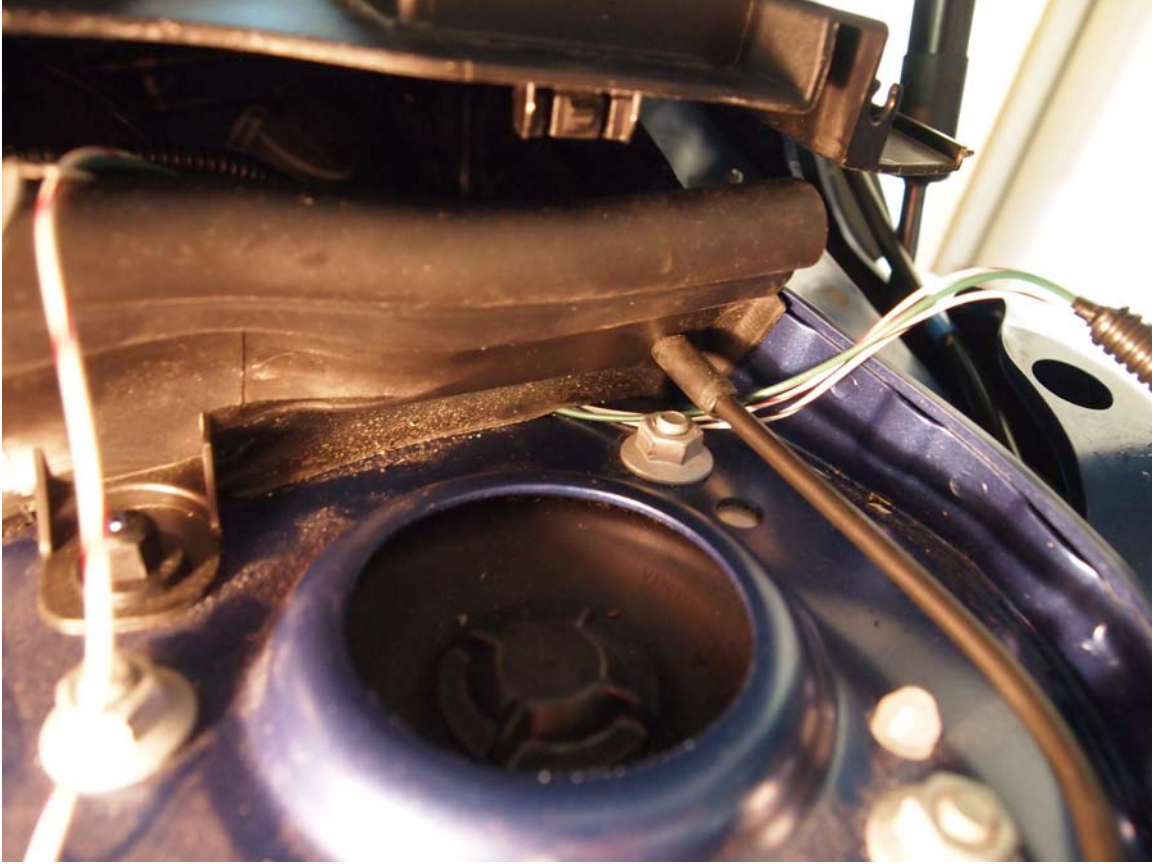
to hide the wiring both inside the cabin and under the hood – it looks a lot more professional. About 10 ft ought to do you. Also, the wire included with the gauge install kit isn't long enough, and some of it was sold and some is stranded. I prefer the latter, so

I discarded most of what was included with the kit and used my own. I'd advise you to have ~10-15 ft each of several colors (I used 6: black, green, orange, red, white/red, white/black) colors of 20 ga. stranded wire available to do the job. Plenty of wire ties (also available from All Electronics) will help you tidy things up.

Craven's instructions would have you remove the windshield wipers to access the area underneath the shroud in between the hood and the windshield. I guess in older models (the R56?) this was necessary, but on my R56N, it wasn't. There are two 10 mm plastic nuts securing the shroud on the left (driver's) side of the car. Once you remove them, you can snap the shroud loose by prying it up. On the R56N the shroud is in two pieces – one for the left and one for the right side of the car. You only need to lift up the left side. Once you've popped it up, you'll have access through the firewall. Craven's suggestion of routing the wires along the hood release latch cable worked well. I used a 2x4 to prop the shroud up and allow me to reach into the space where the hood release cable is routed:









I used a piece of coat hanger to push a length of 18 ga. “fish” wire through the firewall next to the hood release cable, then, I attached the wires from the sensors to the fish wire to pull the smaller 20 ga. signal wires through into the cabin. By the way, I ran a discrete ground wire from the coolant temp sensor to the gauge, so, there were two wires from the

coolant temp sensor to its gauge, and one wire from the oil pressure sensor to its gauge. You can ground the coolant temp sensor to the body of the car, if you wish, but I preferred to do it with a discrete wire back to the gauge. In the case of the oil pressure sensor, I found it was grounded through the copper line to the engine – not ideal, but I didn't want to set up a ground loop by running another ground from the sensor back to the gauge. So, there was only one signal wire from the oil pressure-sending unit to the gauge. It seems to work fine. I may yet add an additional ground from the body of the pressure sender to the frame of the car and see if it makes any difference... (I'm an electrical engineer and I'm anal-retentive about this stuff. <g>)

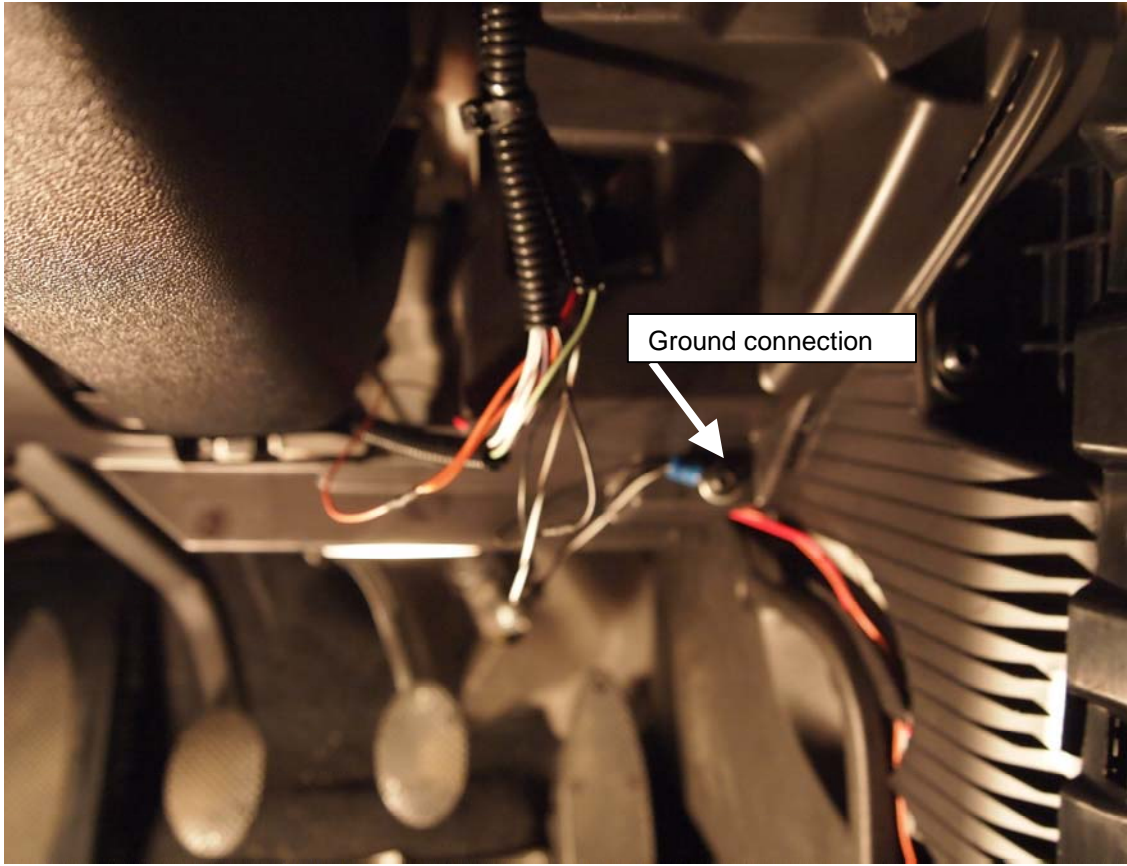
OK, so, you're half way there! Now for the work inside the cabin.

I started at the tach and ran the wires down half way to the area underneath the steering wheel. Removing the tach. Is pretty straightforward and the Craven Speed instructions are correct, except I found the tach. base was secured with T-27 Torx screws. The wires attached to the connectors supplied by Craven Speed are long enough to route down to the area beneath the steering wheel. I used the 1/4" split loom tubing once again. You want to make sure that when moving the telescoping steering wheel in and out (and up and down) that you don't pinch the wires. Here are some details of how I routed my wires.





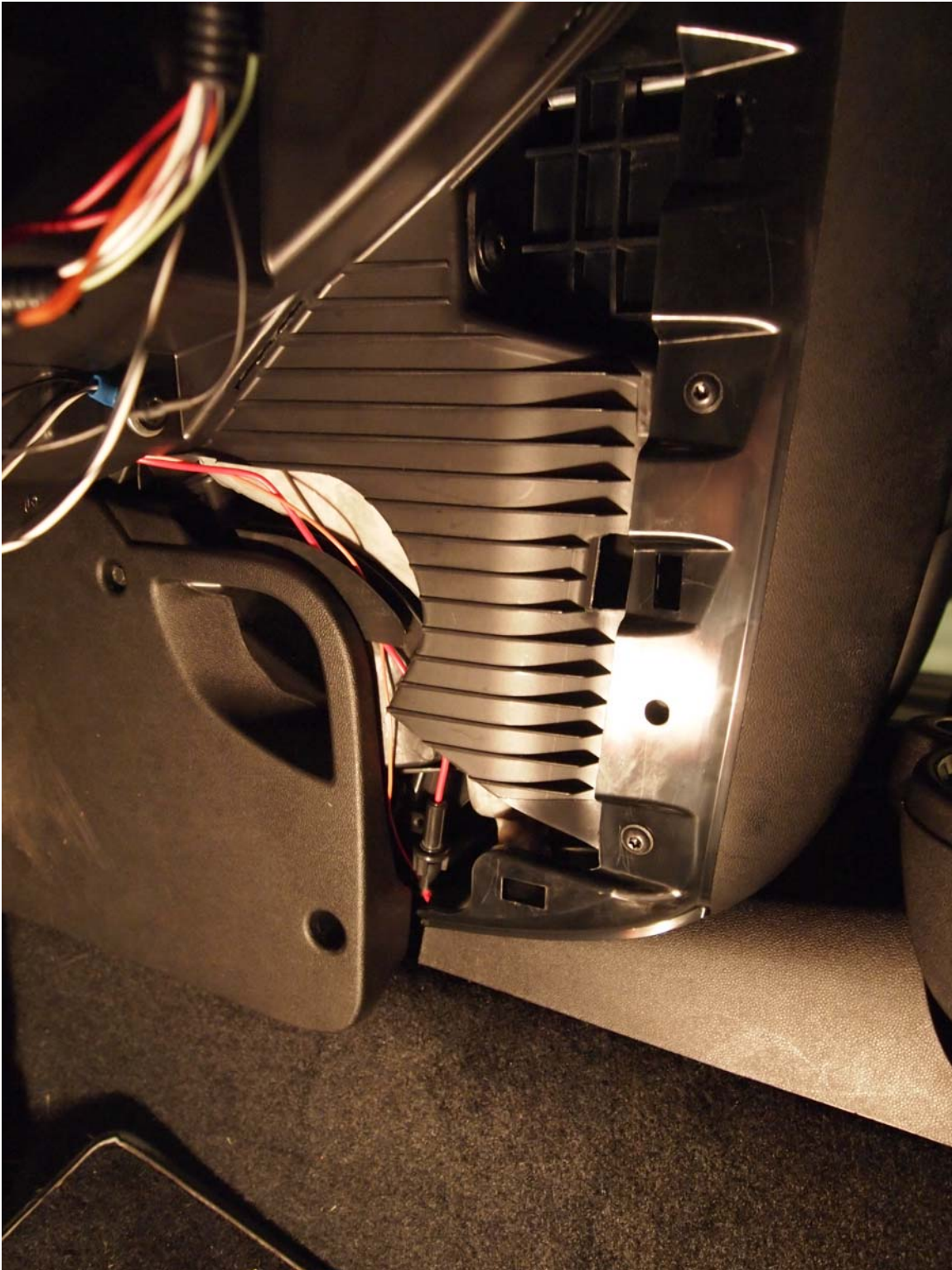
There's a panel underneath the steering wheel, with lots of room behind it, secured by three T-20 screws. Remove the three screws coming up vertically from underneath, then remove that panel by snapping it loose. There's also a good place to grab a ground there too (T-30 screw).



As Craven Speed suggests, I routed the wiring from the battery (always on) source on the OBD connector on the left:



and the switched (ignition) power and lighting circuit from the center console on the right. To access that I removed the panel next to the heater controls (it snaps loose, and there's a nice space to route wires there:



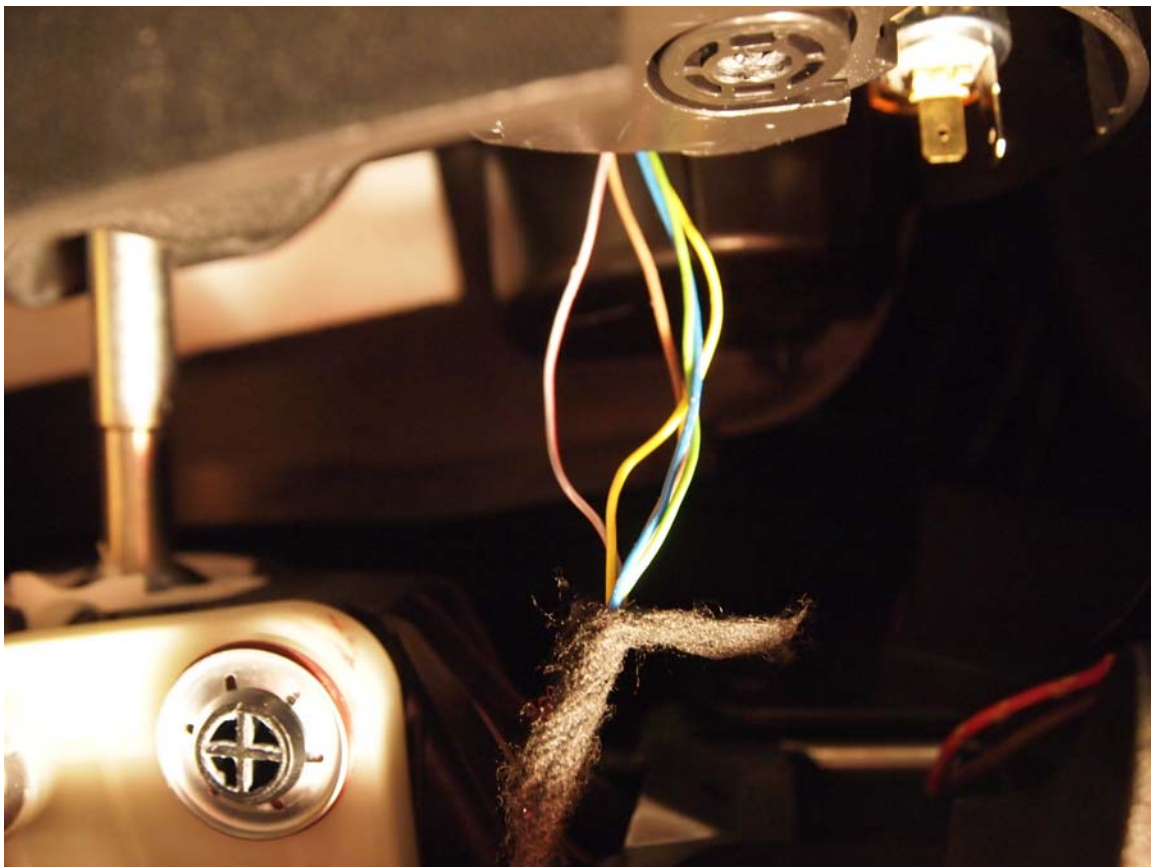
The Marshall gauge instructions recommend you use a fuse for the battery and ignition sources. I used this part:

<http://www.allelectronics.com/make-a-store/item/FHP-49/IN-LINE-GMA-FUSE-HOLDER-W/FUSE/1.html>

which comes with the inline fuse holder, a fair bit of wire, and a 1A fuse (bonus!).

The center console is secured by 3 T-20 screws in the bottoms of the cup holders, then it snaps loose from the floor vertically. Underneath that, per the Craven Speed instructions, you can access the switched 12V from the cigarette lighter (red wire) and the lighting circuit. I read that the red w/ yellow stripe wire cited by the Craven Speed instruction apparently only comes on when the car is in drive. I have 6-speed, so I don't know what it does in my car. I chose the red w/ the grey stripe cited by other NAM users...

Here's a picture of the wiring underneath the console:



I had no luck unwrapping the cloth covering over the wiring to the DSC / Sport switches to get to the red/grey wire. I finally cut it (very carefully) with an X-Acto knife.

There are caveats here. This circuit is attached to the dimmer circuit that supplies the backlight to the DSC and Sport buttons. These do come on when the parking lights are activated **and** the engine is running, but they **do not** come on when the parking lights are activated when the engine is off. IOW, if you turn on the parking lights while the engine is not running, the tach. backlight will come on, but not the DSC and Sport button backlights (and your new gauges, if you wire into the red/grey wire) will not. If you're really hung up on this, you'll need to identify which wire in the tach. head is the lighting circuit and wire into it there – I don't know which circuit that is. I discovered this after I finished the install and didn't feel it was a big enough deal to tear the car apart again.

Also, after wiring in to this circuit, I discovered that gauges will **not** dim properly – they flickered on and off, seemingly randomly. This is apparently true for the “stepper” (microprocessor) controlled gauges, but not the boost gauge. From what I've read, the boost gauge backlight circuit is apparently analog, so, it should function properly when tied into the Mini's PWM backlight circuit. The coolant temp and oil pressure gauges are controlled by microprocessors. To properly dim the gauges, they need to have a variable supply voltage (7-12V) through the switched (ignition) connection. The “backlight supply” wire (orange or white) going to the gauge is merely a trigger that tells the microprocessor in the gauge to turn on the backlight. The pulse-width-modulated method that Mini uses to dim the backlights confuses the gauge processor, and they switch on or off, seemingly at random times. If you want to dim your gauges properly, you'll need an additional module, designed by NAM user “RJB” (thanks for your help!) and supplied by the Custom Mini Shop:

<http://www.customminishop.com/index.html>

“Steve” is the tech. guy there, and you need to contact him to order the module (it's not listed as a standard product on their website). It's ~ \$45, including shipping. If you don't feel you need to dim your gauges, you can skip this and wire into the parking light circuit, so the gauges will come on at full brightness whenever the parking lights are on – this is documented somewhere on the NAM site – you'll have to search... Once again, I'm anal-retentive, so I preferred to have the gauges dim with the rest of the panel lights. In my book, the dimming module was well worth it, and easily hidden behind the panel beneath the steering wheel.

One last problem to solve was the brass post sticking out from the back of the gauge housing on the right-most side interfering w/ the dash vent surround. I ground off about 1/8” of the post to solve this problem. I was dissatisfied with the appearance of the posts and the thumb screws securing the gauges:



The posts are M4x0.7 threads. I found some black nylon acorn nuts here:

<http://www.mcmaster.com/#metric-acorn-nuts/=i6uw7k>

but instead, I opted for some vinyl “mocaps”

<http://www.mcmaster.com/#catalog/118/3749/=i6v3rw>

(p/n 9753K39) to cover the existing thumbscrews:



The 3/8”-7/16” x 1/2” deep size requires a bit of pre-stretching to get them to slip over the thumbscrews. I used a pair of needle-nose pliers to do that. You could try the next size up (1/2”-9/16”), but I was afraid that they wouldn’t be tight enough.

Here's a picture of the final result:



The backlighting on the gauges look more red in this picture than they actually are, I think this is due to the red dial pointers on the gauges. If the gauges had orange pointers, they would be a perfect match.

All in all, I was happy with the results. Oh, BTW, the “normal” water temperature range is 190 to 220 °F, and oil pressure at normal rpm’s (2000-3000) is in the 30 psi range, after the engine is warmed up. On a cold (~60-70 °F) start, it goes up to 60 psi, and then drops slowly to the normal range.

I hope this guide helps some other folks.