

With the engine and intake manifold mounted into the car it was time to start connecting/adapting various components. For me this (and the mounts) was the most tiresome part of the job though none of the connections was particularly difficult. I found it easier to reverse the fuel flow using the Fiat metal fuel lines. The old return line is now the supply line and vice versa. Note the inline fuel filter (top right) replacing the bulky Fiat unit.



The exhaust consists of a Bosul free flow catalytic converter welded to a Dynomax 2 ¼ " exhaust tilted for clearance. The ¼ " support bracket for the exhaust bolts to the torque mount and is welded to the muffler. I retained the top 2 Fiat hanger springs which attach to a piece of channel welded to the muffler and catalytic converter to minimize lateral movement and for additional support. The exhaust sounds great...not too loud or ricer like and it's also free flowing and compact. With tires mounted I have almost 5 inches of ground clearance. Note: While installing the B18c engine I got rid of this setup and now use a 2 ½ " dia. 24" long MagnaFlow exhaust and Catalytic converter that hang on springs.



The exhaust mounted in the car.



It's a lot easier to do this job with the engine out of the car! To mate the Fiat's metal piping for the slave cylinder with the Honda slave cylinder rubber hose I cut the flare on the end of the pipe to remove the existing Fiat threaded fitting and swapped it with the 1/4" fitting from a '92 to '95 Civic with a manual transmission. I slipped the Honda fitting over the line then used a flare tool (1/4") to flair the line. I then used a speed bleeder to then purge the system of air. If you don't own one I highly recommend getting one. Bleeding the clutch which used to take several frustrating hours, now takes about half an hour.



While it may be possible to extend the Fiat shift rod to the Honda universal shifter joint on the transmission, I elected to use the Honda linkages. The Honda shifter fits through the tunnel after cutting off the shift lever at the base. I drilled two holes to attach it at the front to the Fiat's tunnel. I then shortened the shift lever to my desired height and carefully centered the shift mechanism (held in place with a pair of vice grips) with the transmission in neutral and re-welded the shift lever to the base. After this photo was taken I JB welded a couple of guide plates (see drawing below) made from  $\frac{1}{4}$  " steel to keep the shift mechanism from rocking from left to right while still allowing it freedom to move fore and aft slightly as it is designed to do.. Note that the shifter arm is welded to the shifter mechanism. I modified this later on and now the shifter arm screws into the shift mechanism. This allows for easy removal and installation of the shifter mechanism without having to cut and re-weld the shifter arm each time.



With everything buttoned back up, the end result is a short throw shifter.



On the other end, the shift linkages to the transmission. There are two of them. One to keep the shifter in synch with the transmission as it moves and the other to change gears. I used the Fiat shift rod to extend the Honda's shift linkage. It conveniently slips right inside the Honda tube, then weld the two together and attach the shifter rod to the Honda's universal joint which is attached to the shift lever on the transmission. Check to make sure the shifter rod doesn't rub against anything during its full range of motion (1<sup>st</sup> through reverse).



This is one of those 'adaptation' jobs that really sucks. The accelerator cable travel required for the Honda is only about an inch. The Fiat's pedal pull is nearly 2 ½ ". I shortened the pedal's pull amount by lowering the linkage connection to slightly exceed the Honda's travel. After carefully measuring I cut mine with the angle grinder and bolted the two pieces together...I don't recommend welding as you may need to make adjustments. Missing in the photo is a ¼" spacer plate I put between the two pieces for clearance purposes. Currently I have mated the Fiat cable to the Honda cable in the engine bay. Eventually I'm going to replace that setup with a single cable. If you plan to do this, now's the time.

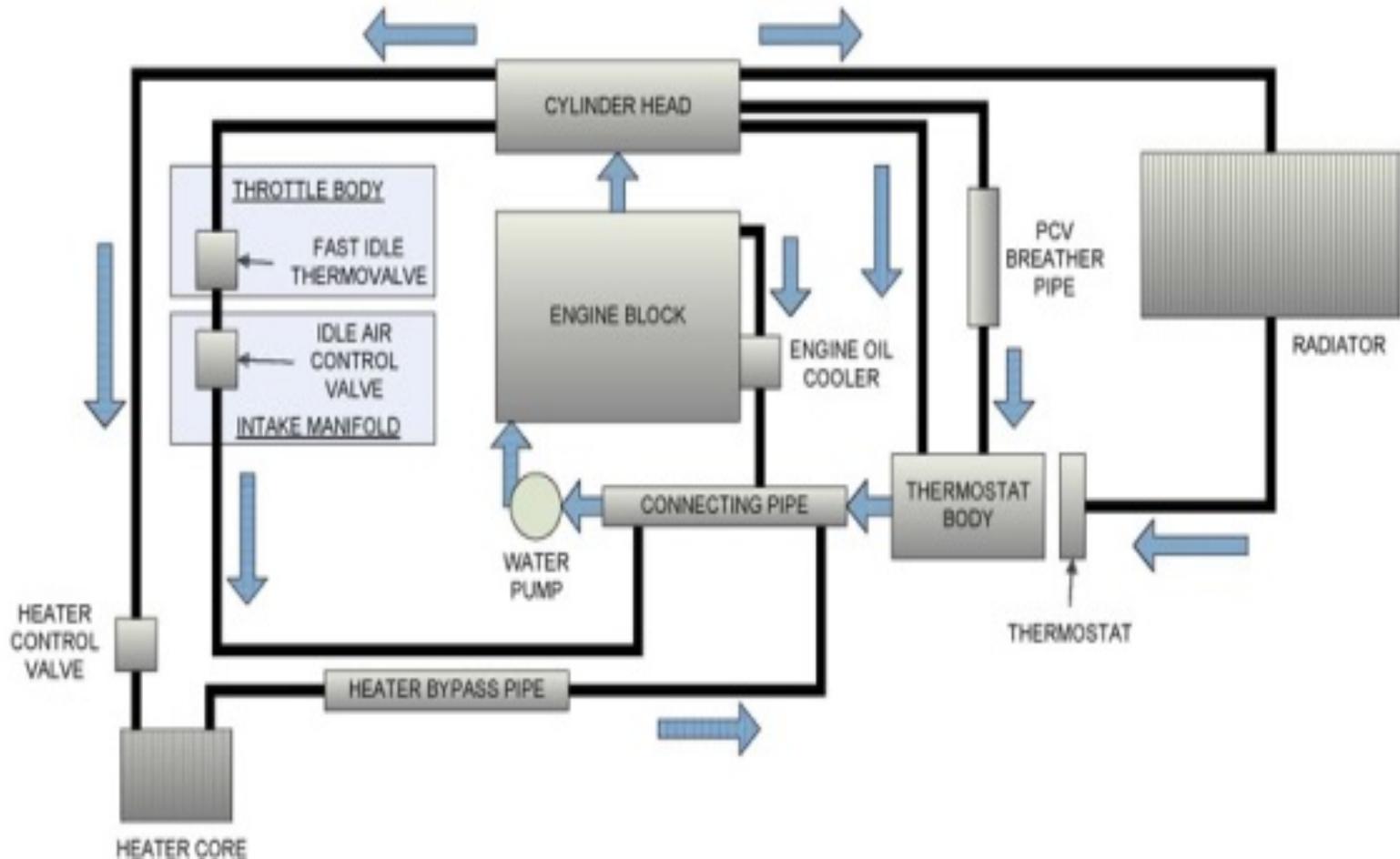


Another adaptation item – Old Fiat radiator hose mated to a flexible hose of slightly smaller diameter to mate with the Honda engine. I found a plumbing pipe adapter at Home Depot to make this connection possible. **Update:** I got rid of this troublesome connection by using a 30" and 35" 1 3/8" dia. flex hose. The flex hose ends will give enough to allow them to fit over the Fiat's 1 1/4" coolant pipes under the car. So one hose for supply, one for return.



This diagram applies to the B16 as well.

## B18C1 Cooling System



## Recommended things to do with the engine out of the car:

1. Clean the engine bay of old grease and grime. This will be your new home for a while. Now's the time to do any painting as well.
2. Cut off or drill out the Overflow tank brackets. Optionally, you can trim the dog bone mount and drill out the spot welds on the original Fiat Main engine mount (highly recommended).
3. Remove wiring that won't be used for the conversion.
4. Replace old fuel hoses. Drain gas tank of cheap 87 octane fuel. Use premium from now on due to the higher compression of the Honda motor.
5. Bend clutch slave cylinder metal line and fit Civic threaded fitting and flare.
6. Install aftermarket fuel pump and lines. I used the original Fiat bracket (modified) but relocated the fuel pump to the bottom left side of the firewall.
7. Cut access plate to shift linkage tunnel.
8. Cut out the metal plate that blocks full access to the engine via the trunk.
9. Grind off lug and front transmission mount on B16a tranny.
10. Cut notches in Fiat's passenger side wheel well lip and bend upwards for clearance.
11. Attach cable clamps to firewall to route the Fiat starter cable, and the clutch metal line to keep them close to the firewall and away from the Honda's exhaust manifold and secondary pipe. Both are routed towards the passenger side. The Fiat's starter wires will need to be extended to reach the Honda's starter solenoid.
13. Install the Honda shift linkage into the tunnel. Extend this after the motor is mounted in the car. You'll need to do some bending to get the tubes properly aligned. Not to worry though as they can be removed/installed even with the engine in the car as long as the gear shift lever is not welded back in place.

## Junkyard and/or Ebay items I bought

1. Wiring harness from a 92 to 95 Honda Civic with manual transmission (including under hood fuse box, MAP sensor (if necessary)).
2. Main relay from same.
3. Speedometer cluster from same (Make sure tach reads to 9k RPM, B16a redlines @ 8.200).
4. Shifter rod assembly for the B16 (ebay).
5. Clutch slave cylinder rubber flexible hose from same (or buy new at Honda).
6. ¼" diameter metal threaded clutch line fitting (attaches over Fiat's flexible metal clutch line) from same.
7. One spare 'A' or 'D' plug that plugs into the ECU. You may need these to re-pin the ECU connector plugs for VTEC operations.
8. Steel aftermarket motor mounts. Mine were from Innovative.
9. Haynes manual for 92 to 95 Civic. This is the primary guide for wiring and electrical troubleshooting. I also used a Haynes manual for the Acura Integra as it features a similar B18 motor and various engine sensors.
10. Aftermarket fuel pump. I chose a Walbro inline unit. The stock fuel injection pump might supply enough gas but I didn't want to chance it and it was due for replacement anyway.
11. B16 timing belt, pulley, and water pump kit, spark plugs, cap and rotor.
12. B16 Clutch kit (Exedy) with optional lightweight flywheel (Fidanza or Exedy).

- Note: wire colors may vary. This is a B16a OBD1 ECU pin guide I found on the Internet.

A		
Terminal	Color	Description
1	BRN	INJ. 1
2	YEL	INJ. 4
3	RED	INJ. 2
4	ORG/WHT	VTEC SOLENOID
5	LT. BLU	INJ. 3
6	ORG/BLK	HTR CTRL (HO2S)
7	GRN/YEL	FUEL PUMP CTRL
8	GRN/YEL	FUEL PUMP CTRL
9	GRN/WHT	IAC
10	BLANK	
11	BLANK	BLANK
12	YEL/GRN	RAD FAN
13	GRN/ORG	MIL CODE LIGHT
14	BLANK	
15	BLK/RED	AC COMP. CLUTCH RELAY
16	WHT/YEL	ALTER. OUTPUT
17	BLANK	(P72/H22 IAB-PNK/BLU)
18	BLANK	
19	BLANK	
20	RED	EVAP (IAB CONTROL IF REPIPED TO A17)
21	RED/GRN	IGNIT. OUTPUT SIGNAL
22	RED/GRN	IGNIT. OUTPUT SIGNAL
23	BLACK	GROUND
24	BLACK	GROUND
25	YEL/BLK	POWER INPUT
26	BLK/RED	GROUND

B		
TERMINAL	COLOR	DESCRIPTION
1	YEL/BLK	POWER INPUT
2	BRN/BLK	GROUND
3	BLANK	(AT)
4	BLANK	(AT)
5	BLU/RED	A/C REQ. INPUT
6	BLANK	
7	PNK/BLK	UPSHIFT LIGHT (CX ONLY)
8	BLANK	(P/S)PRESS. SW
9	BLU/WHT	START INPUT
10	YEL/BLU	VSS
11	ORG/BLU	CYP/P SENSOR
12	WHT	CYP/M SENSOR
13	ORG/BLU	TDC/P SENSOR
14	WHT/BLU	TDC/M SENSOR
15	BLU/GRN	CKP/P SENSOR
16	BLU/YEL	CKP/M SENSOR

COLOR LEGEND		
COLOR	DESCRIPTION	LOCATION
GREEN	VTEC WIRING	TERMINAL COLUMN
YELLOW	VAF C WIRING	DESCRIPTION COLUMN

D		
TERMINAL	COLOR	DESCRIPTION
1	WHT/BLU	BATTERY INPUT
2	GRN/WHT	BRAKE SWITCH
3	BLANK	(KS)
4	BRN	DIAGNOSTIC (TIMING)
5	BLANK	
6	ORNG/BLU	VTM/VTPS
7	LT BLU	DIAGNOSTIC (DATA LINK)
8	BLANK	
9	PNK	ALTER. FR SIG.
10	GRN/RED	ELD INPUT
11	MINT GREEN	TPS
12	BLANK	
13	RED/WHT	(ECT)
14	WHT/RED	O2 SENSOT INPUT
15	RED/YEL	IAT INPUT
16	BLANK	
17	WHT	MAP GROUND
18	PNK/GRN	TCM (AT RELATED)
19	YEL/GRN	MAP REF. VOLT
20	YEL/WHT	REF. VOLT
21	GRN/BLU	MAP INPUT
22	GRN/WHT	SENSOR GROUND

Connector "A"

1	3	5	7	9	11	13	15	17	19	21	23	25
2	4	6	8	10	12	14	16	18	20	22	24	26

Connector "B"

1	3	5	7	9	11	13	15
2	4	6	8	10	12	14	16

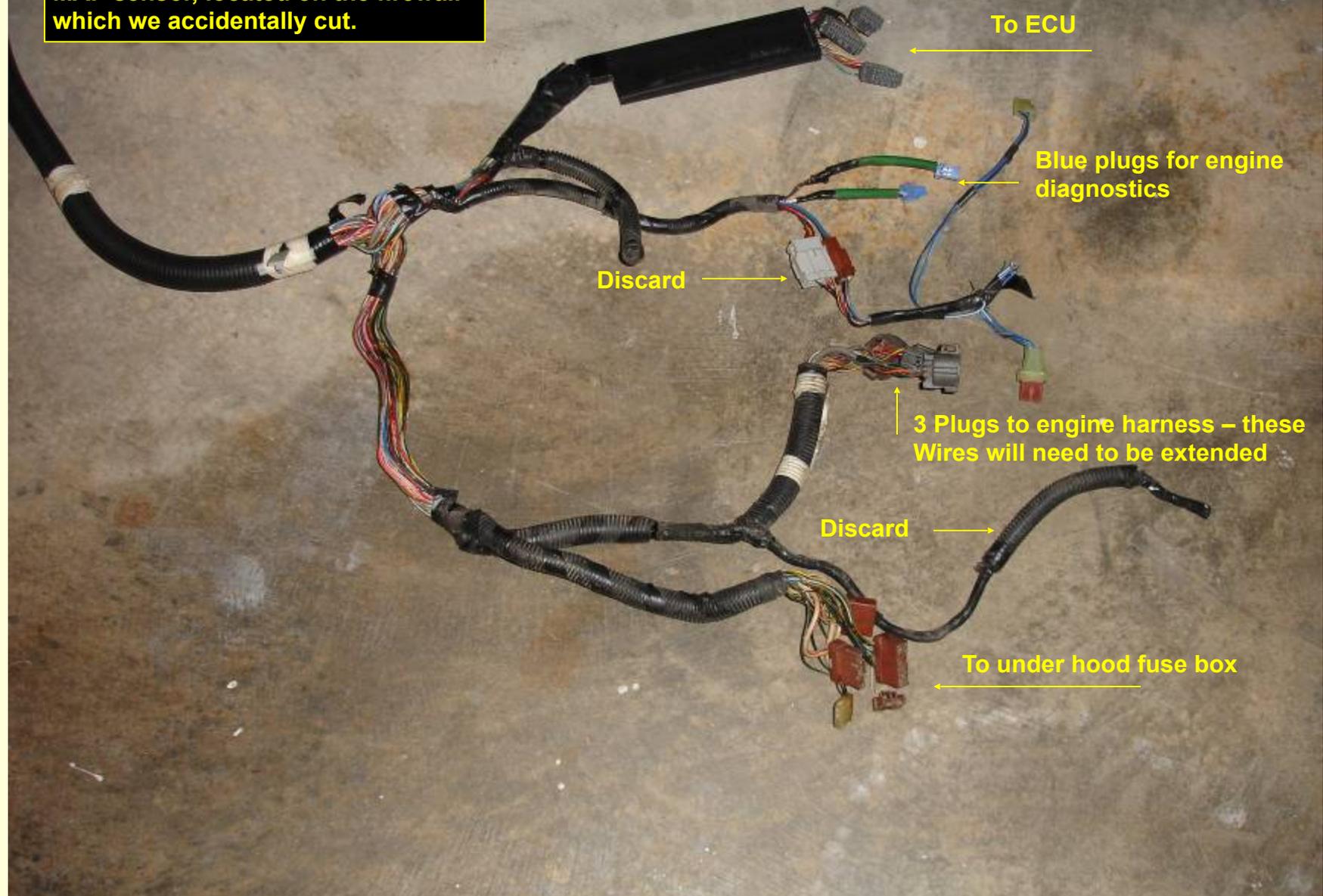
Connector "D"

1	3	5	7	9	11	13	15	17	19	21
2	4	6	8	10	12	14	16	18	20	22

This is the wiring harness salvaged from a junked U.S. '93 Honda Civic that will be used to run the motor, fuel pump, charging system and instrument cluster. It took a friend and myself about an hour and a half to remove it. Using schematics from a Haynes manual on the '92 to '95 Civic, we cut out the wires we didn't need for this conversion – which was most of them. The basic idea is to use the Fiat electricals for all chassis functions like starting the car, heater fan, lights, backup lights, etc. and tie in the Honda wiring to run the main relay, ECU and motor, charging system, fuel pump and associated gauges and idiot lights in the instrument panel. This particular harness didn't include the 3 wires for VTEC operation (see diagram). Those wires will have to be added later. Make sure you get the plug for the MAP sensor if applicable. This wiring harness includes the plugs to both sides of the engine harness, ecu plugs, under hood fuse box plugs, under dash fuse box and various plugs to run the Honda dashboard accessories. Most of those will be discarded. Although I dreaded the wiring part of this project it was actually the most enjoyable part of the swap for me – it's less about physical labor and more of a mental exercise. Having someone who can answer questions about electrical schematics is also very handy.



Not shown here is the plug from the MAP sensor, located on the firewall which we accidentally cut.



To ECU

Blue plugs for engine diagnostics

Discard

3 Plugs to engine harness - these Wires will need to be extended

Discard

To under hood fuse box

**3 Instrument Cluster plugs only  
Plugs 'C' and 'D' are necessary.**

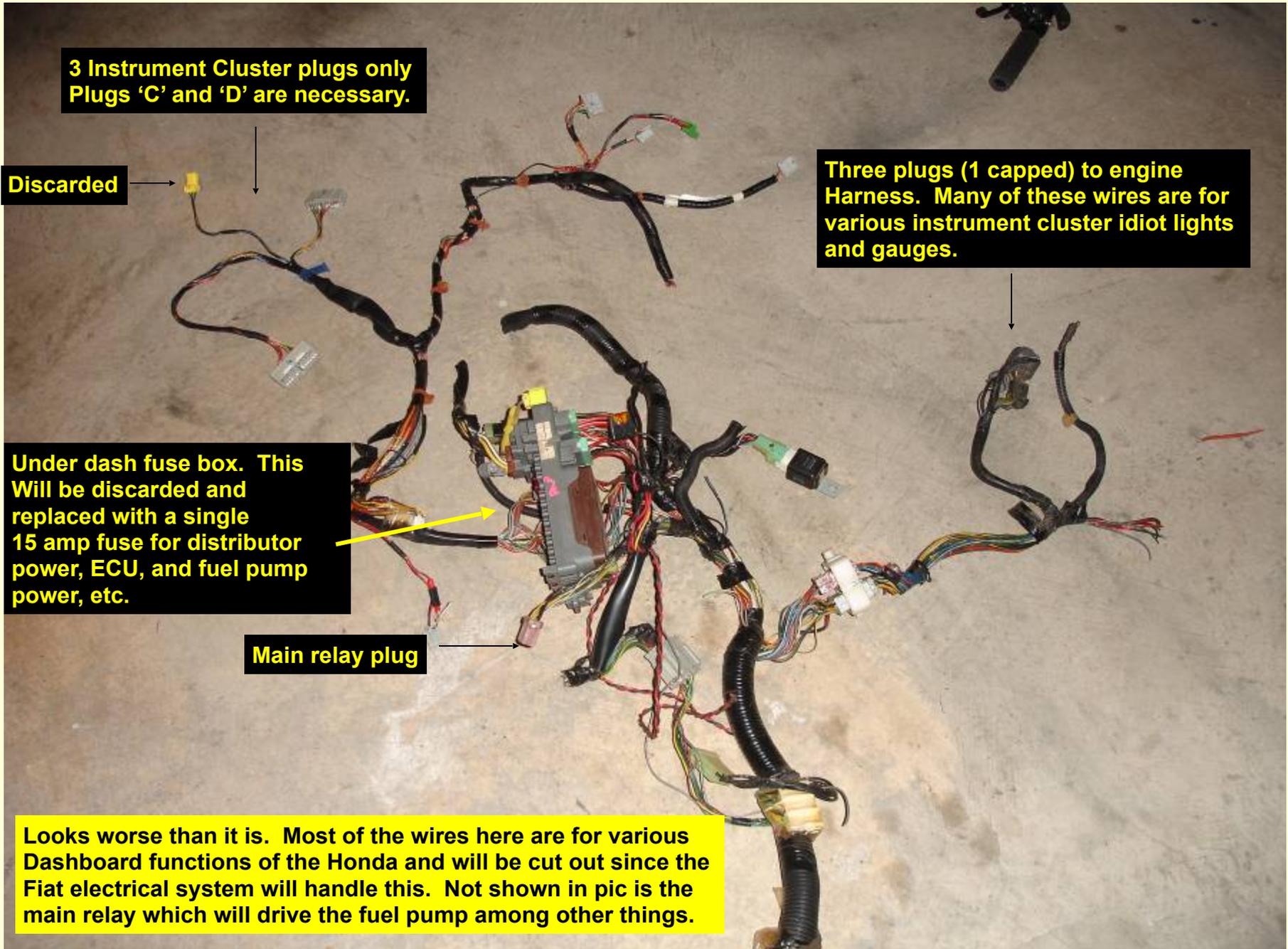
**Discarded**

**Three plugs (1 capped) to engine  
Harness. Many of these wires are for  
various instrument cluster idiot lights  
and gauges.**

**Under dash fuse box. This  
Will be discarded and  
replaced with a single  
15 amp fuse for distributor  
power, ECU, and fuel pump  
power, etc.**

**Main relay plug**

**Looks worse than it is. Most of the wires here are for various  
Dashboard functions of the Honda and will be cut out since the  
Fiat electrical system will handle this. Not shown in pic is the  
main relay which will drive the fuel pump among other things.**

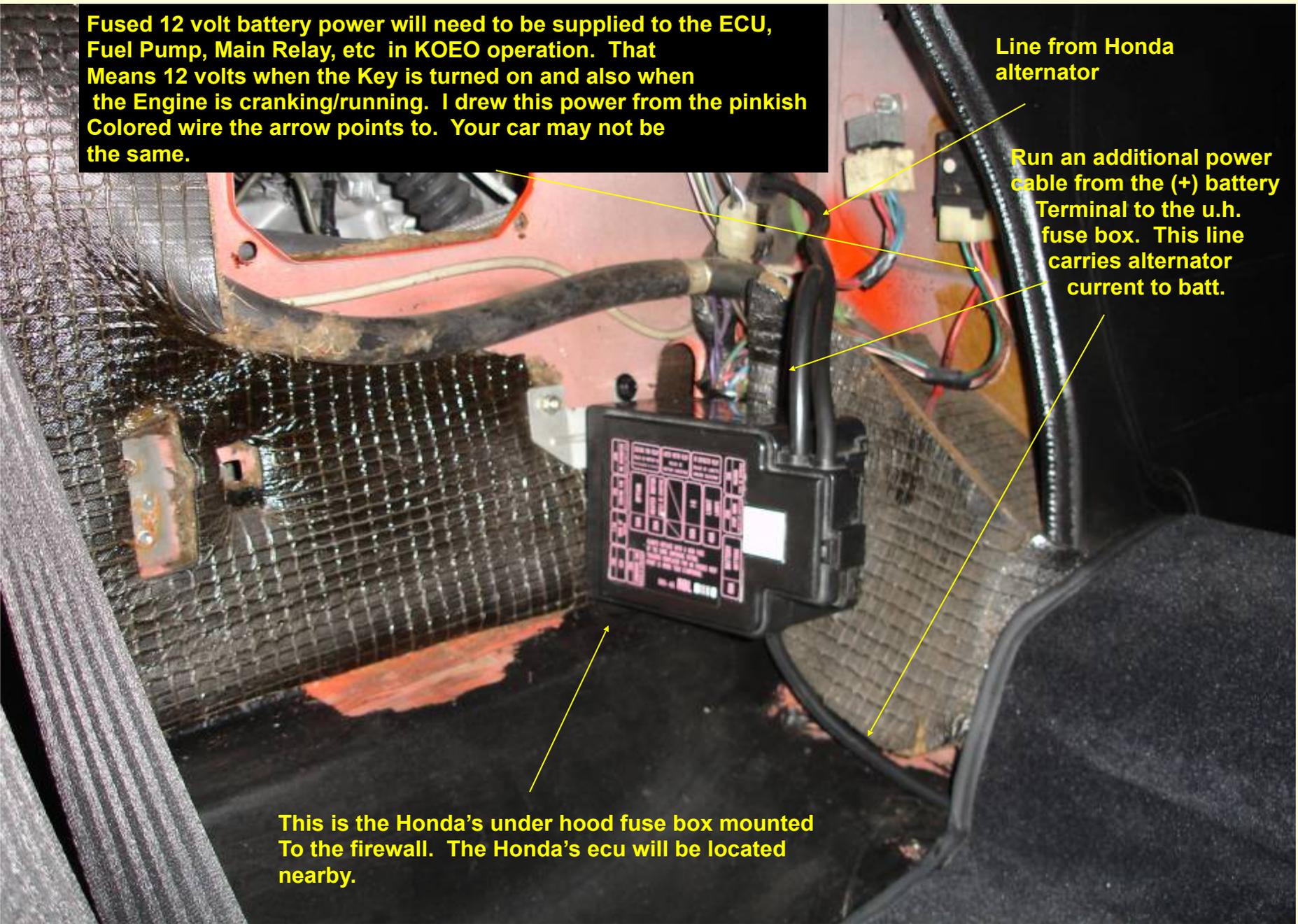


Fused 12 volt battery power will need to be supplied to the ECU, Fuel Pump, Main Relay, etc in KOEO operation. That Means 12 volts when the Key is turned on and also when the Engine is cranking/running. I drew this power from the pinkish Colored wire the arrow points to. Your car may not be the same.

Line from Honda alternator

Run an additional power cable from the (+) battery Terminal to the u.h. fuse box. This line carries alternator current to batt.

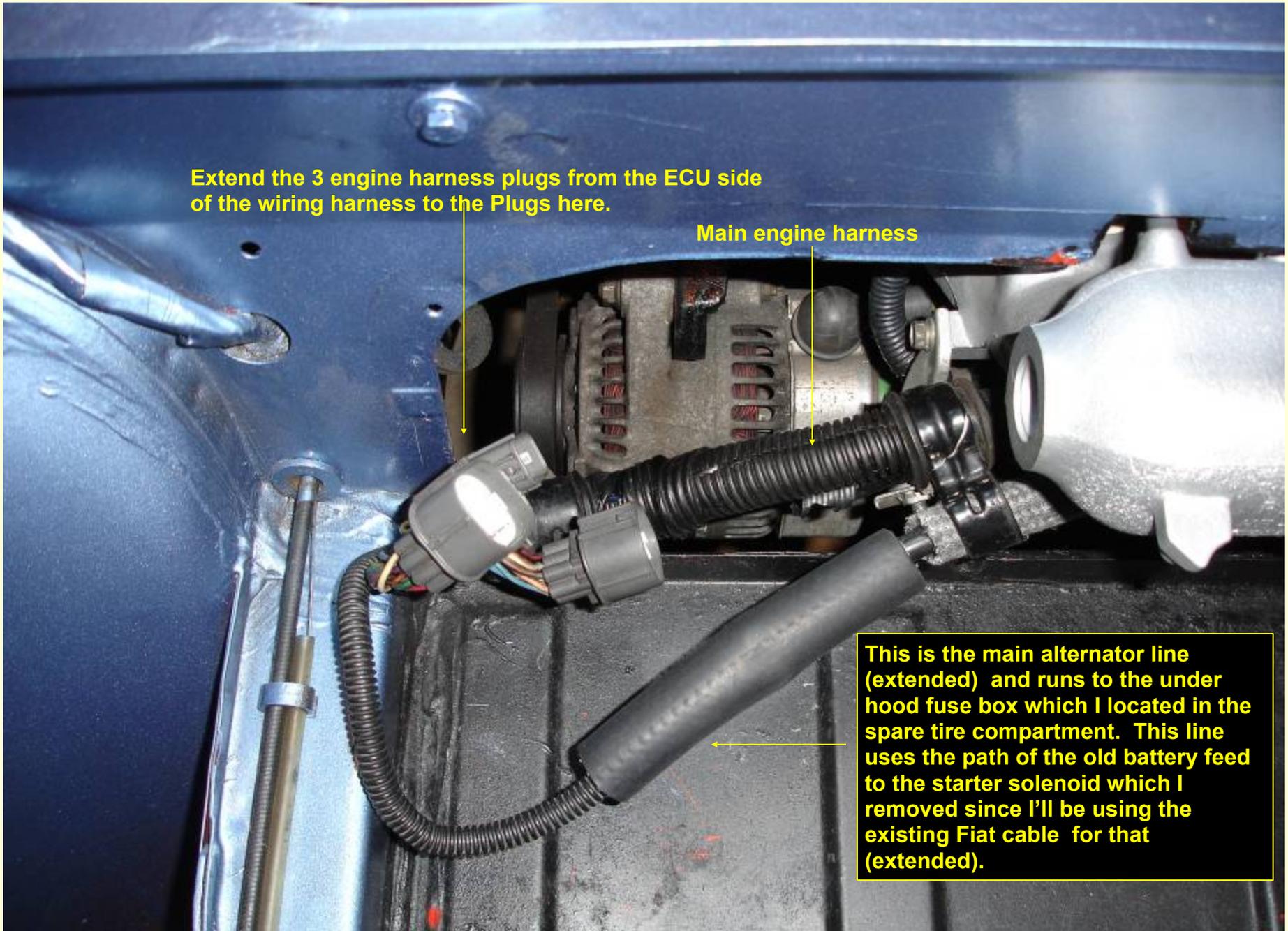
This is the Honda's under hood fuse box mounted To the firewall. The Honda's ecu will be located nearby.

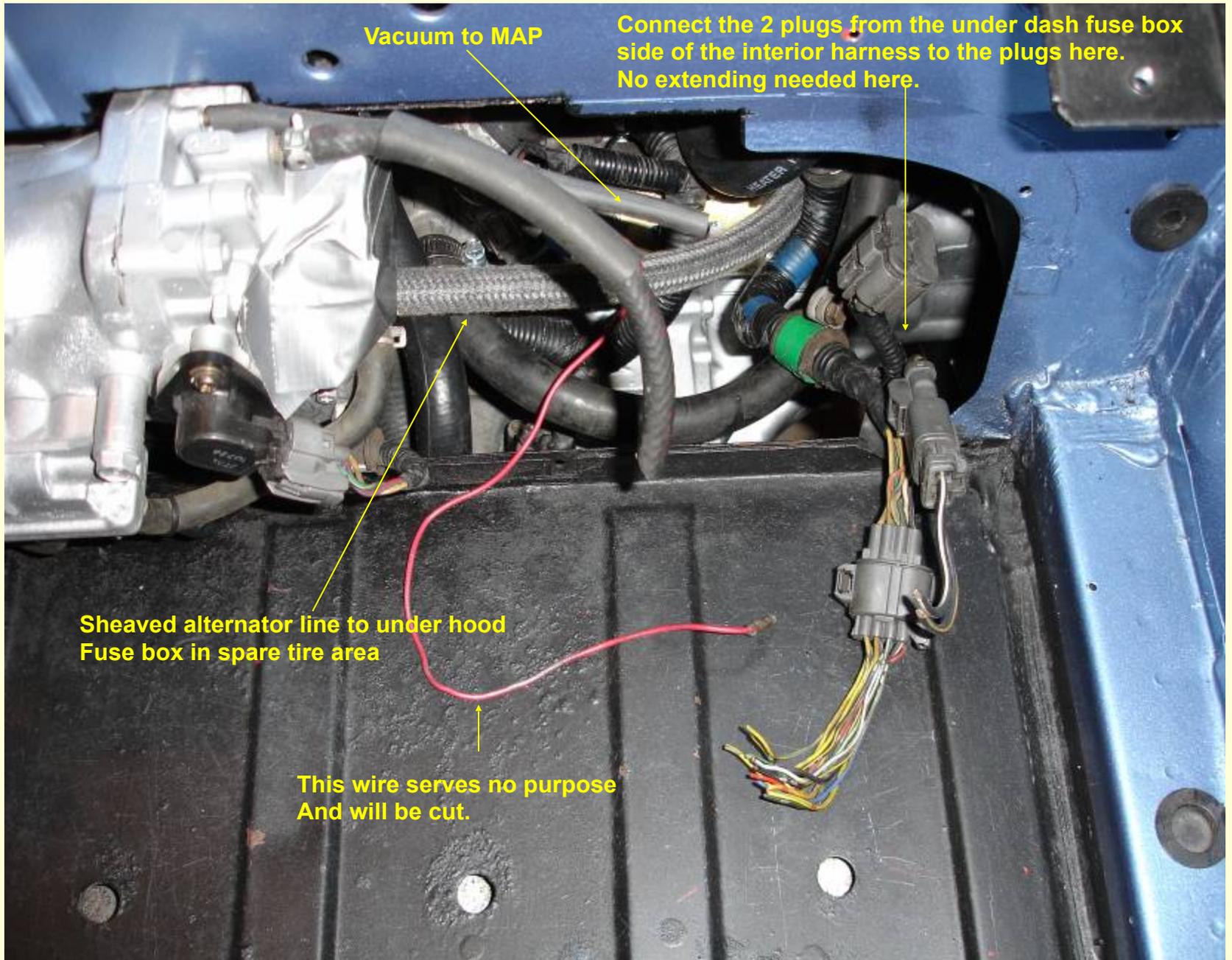


Extend the 3 engine harness plugs from the ECU side of the wiring harness to the Plugs here.

Main engine harness

This is the main alternator line (extended) and runs to the under hood fuse box which I located in the spare tire compartment. This line uses the path of the old battery feed to the starter solenoid which I removed since I'll be using the existing Fiat cable for that (extended).





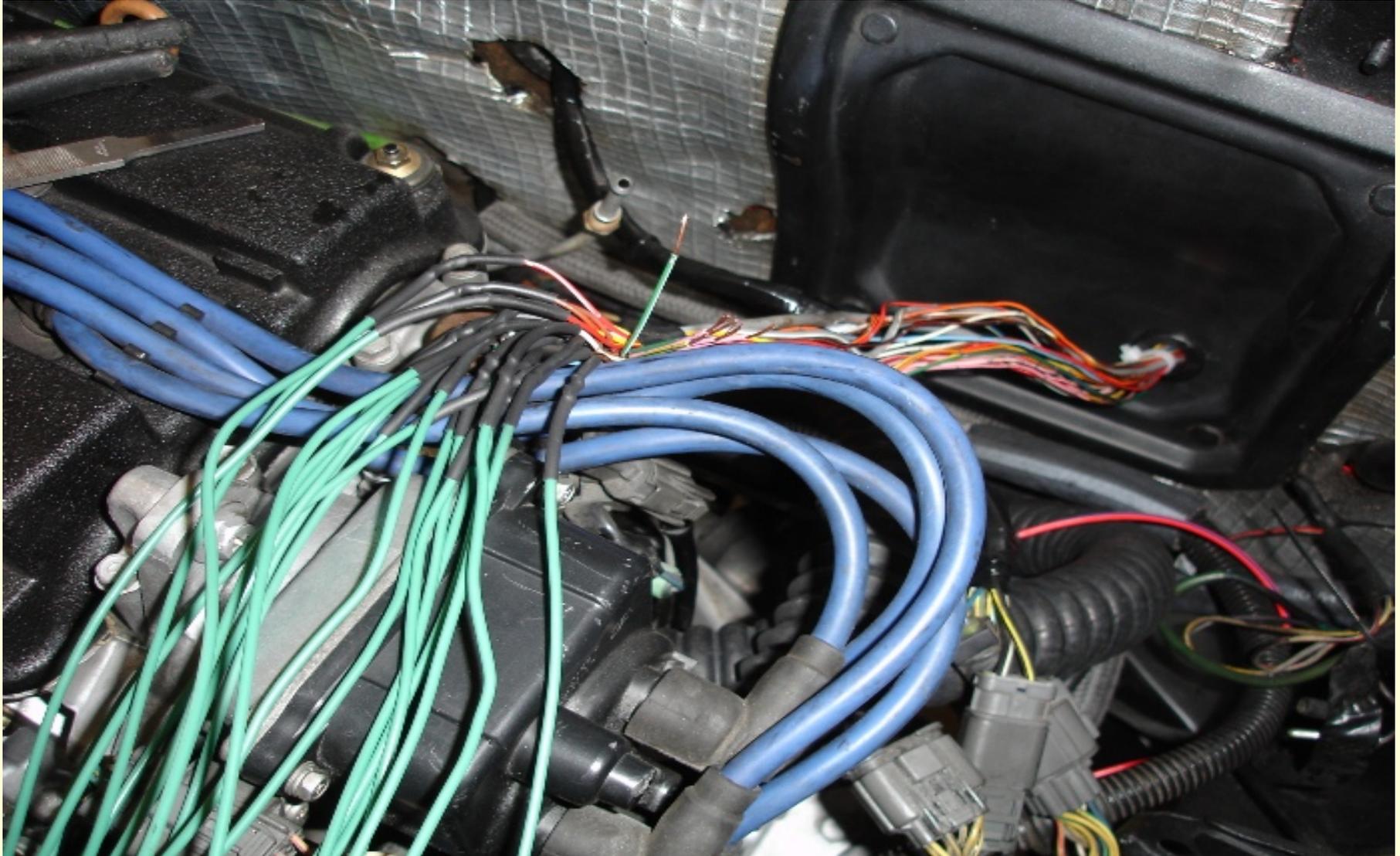
Vacuum to MAP

Connect the 2 plugs from the under dash fuse box side of the interior harness to the plugs here. No extending needed here.

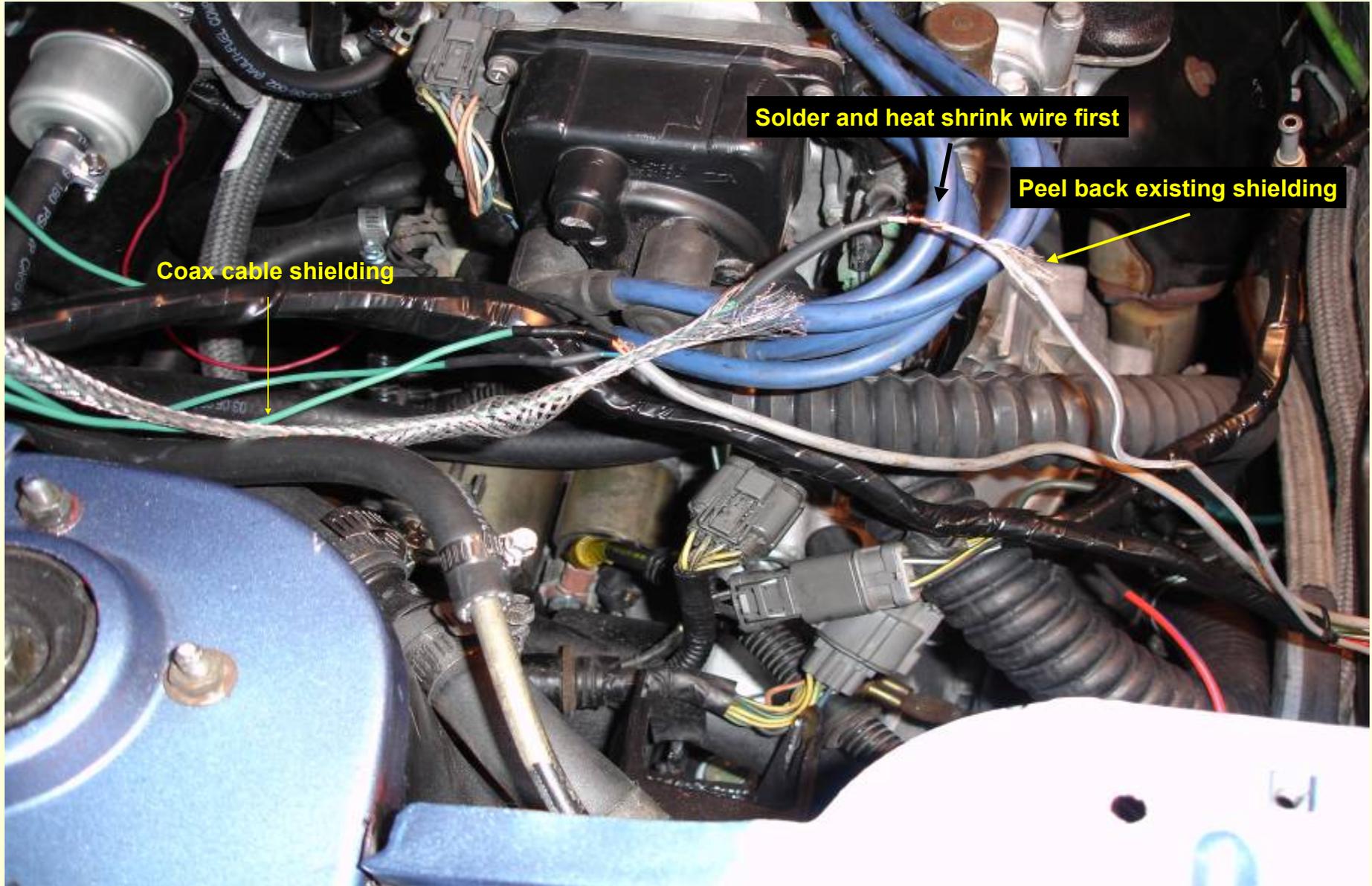
Sheaved alternator line to under hood Fuse box in spare tire area

This wire serves no purpose And will be cut.

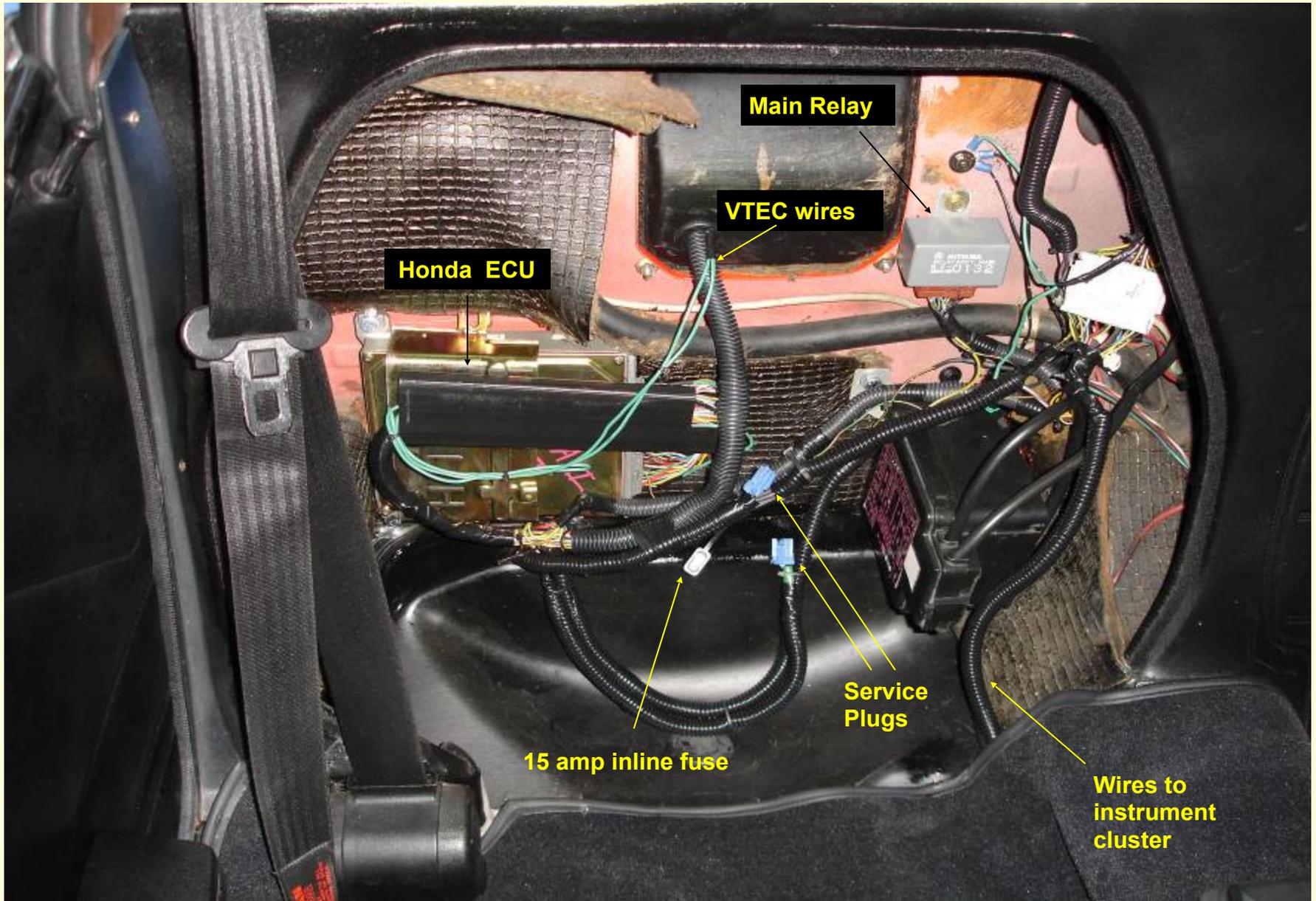
This photo shows wires I used to extend the wiring harness. Note that the connections are soldered together and then heat shrink is placed over the joints. The wires are then taped into a bundle and wrapped with flexible plastic ribbed electrical conduit tubing for an OE look. Before you do your final zipping of the wiring harness, run wires for VTEC if necessary. You may even want to wait until you get the car started and running. The wires for the fuel pump were run across the lower firewall – fuel pump operation is determined by the Honda's Main relay.



The wires leading to the cylinder sensors in the distributor are shielded. To extend the shield, I split open some coaxial cable (TV) and removed the shield. After soldering and shrink wrapping the wires together, I joined the shield at both ends to the existing shielding, pulling the shielding taut as I did. When finished, I wrapped the shielded wire with good quality (3M) electrical tape.



In this photo the wiring is pretty much completed. I had to run 3 additional wires for VTEC operation. I don't normally drive with a spare tire to save weight but if I do it will have to go in the front trunk. Of course it could go here too with a bit of re-arrangement. Other swaps have put the ECU in the trunk of the car.



Wiring VTEC (if your harness isn't already wired for this). Do a search on the Web about this...plenty of info out there.

