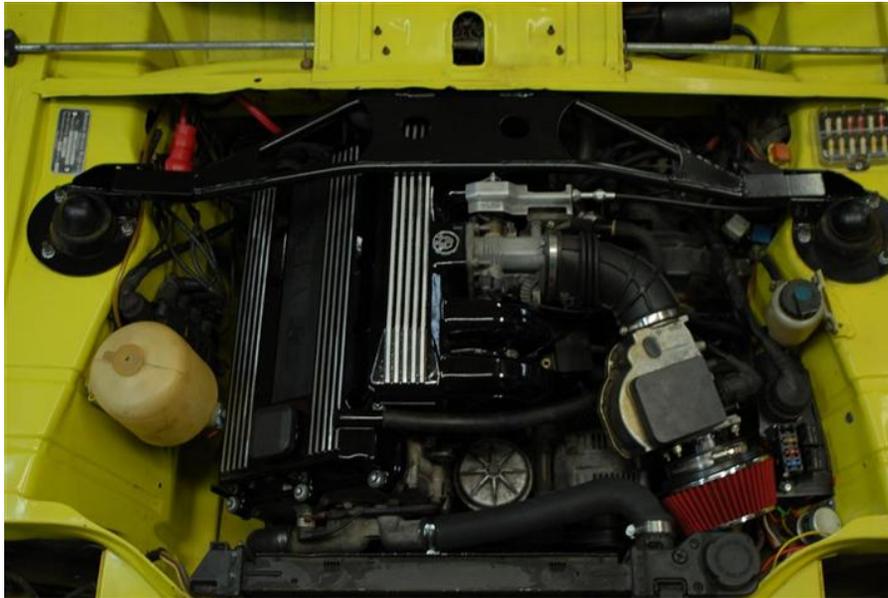


BMW 2002 M42 Swap Notes

This document is to help those that want to install an m42 into a BMW 2002. It is based around an e30 engine, trans, and wiring. You can use the e36 block/head/wiring and maybe trans but you **MUST** use the e30 oil pan and intake manifold. This can also be used with an e36 automatic transmission as well. All mounting and any measurements are assuming you have a set of mounts from jakeb which can be purchased by emailing or going to www.classicdaily.net. If you have any questions along the way feel free to email me at jake@classicdaily.net. I hope this answers a lot of questions and makes the swap a bit less scary for some. When getting an e30 engine get as much as you can. Here is a short list of what you need from the donor car.



Parts from Donor e30

- Engine
- Transmission
- All engine wiring
- DME (engine computer)
- chassis side c101 (if car is being parted, This is the round connector where the engine harness plugs into the chassis harness. It is located on the firewall of the e30 Make you you get 6-10" wire past the connect so you can tie into it.)
- Driveshaft
- Radiator
- e30 intank fuel pump and sending unit (wiring pigtails, again if car is being parted)
- transmission shifter linkage
- Battery Cable and associated brackets, etc (The battery needs to be moved to the trunk)

Mount information

My mounts use the stock 2002 rubber mounts. You can also use poly if you want a bit more rigid engine, you also get a bit more vibration in the car. The trans mount uses the e30 rubber mounts and is bolted

to the floor of the 2002. The best way to do this is get the engine in and on the engine mounts. Bolt the trans mount to the transmission and raise the trans and mount up so that the mount is touching the floor of the car. Drill through the body and run some bolts through from the top.

Modify e30 transmission

You will need to cut off the shifter linkage ears from the e30 transmission. This has to be done so the trans will get high enough in the tunnel to miss everything. You could also cut a little hole in the top of the tunnel and recover it from the inside if you don't want to cut the trans.

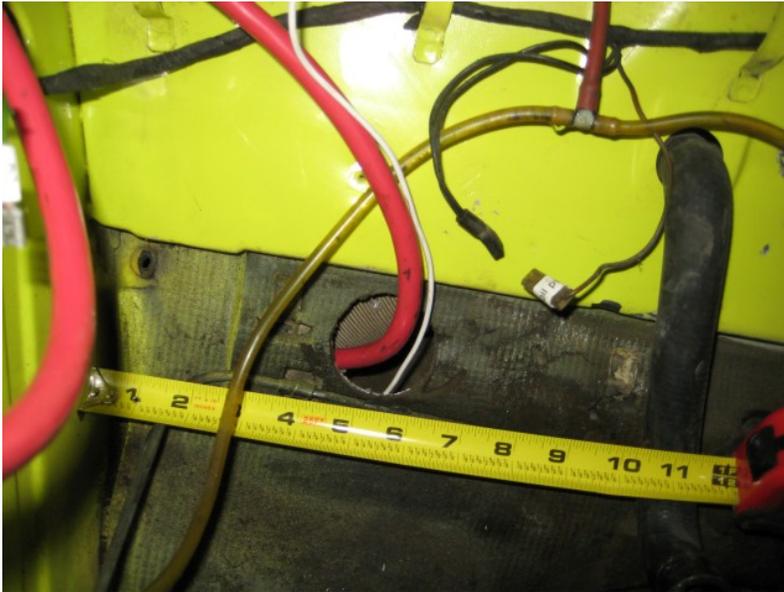
Before

After



Engine Bay Prep

Once you pull the m10 it is a good idea to get a few things out of the way before putting the m42 in. With the engine out there is a lot more space so do it all now. First...clean the bay. Working in a clean engine bay is so much nicer than dealing with dirt and grease. You need to remove the battery tray from the front and relocate the battery to the trunk. On the early 02s the tray just unbolts but on the older cars you need to cut it out. Now is also a very good time to make the hole for battery cable and engine wiring to the DME (engine computer). I normally use a hole saw around 2". Here is a picture of where to put the hole. When drilling the hole make sure there is nothing on the other side you might drill through. It is also a good time to track down all the 2002 wires, coolant, oil pressure, starter signal, tach, switched 12v, etc (refer to the wiring section below for more information)



Notes when installing the engine

When installing the engine you will bolt my mounts to the engine and then use stock 2002/m10 rubber or polyurethane mounts. Before putting the engine in bolt the rubber/poly mounts to my mounts. The engine will go into the 2002 with both the engine and trans as one unit. It is tricky but it works. Here is how I do it:

- Remove the upper and lower intake manifold (it helps a lot)
- You **must** remove the steering track arm, or at least drop it down while putting the engine in.
- Hang the engine from only the front ring (located at the front of the head)
- Lift the engine as high as you can and have a helper lift the trans up and over the nose of the 02
- Start to lower the engine some, when the oil pan is almost going to hit the front of the 02 you will need to twist the m42 so the oil pan is towards the drivers side.
- By doing this the head will clear the firewall and the oil pan will clear up front.
- While the engine is twisted lower the m42 some more.
- Once the engine clears the firewall and the front of the 02 you can let the engine twist back to normal.
- Continue to lower the engine and use a jack at the back to level out the engine.
- Just go slow and the mounts will line up.
- To get the trans mount on, I bolt it to trans, jack the trans up so the mount touches the body of the car, drill some holes and use bolts from above with some large fender washers.

Steering Rod Clearance

One of the troubles of this swap is the clearance between the track rod and the bottom of the trans. The best way to fix this is to trim some off the trans. There is only one rib that needs to be removed to clear the rod. You may have to take more out on your car. Just double check the full motion of your steering once it is all in.



Shifter Setup

There are a couple ways you can do this. It all depends on what you have on hand. I normally bolt the 02 shifter carrier directly to the body. Or I have used the e30 carrier and cut the part that goes to the engine off and bolt that to the body, using a bolt through the flat part and a U bolt around the round part at the back of the e30 carrier, normally wrapped it rubber hose to give a little cushion.

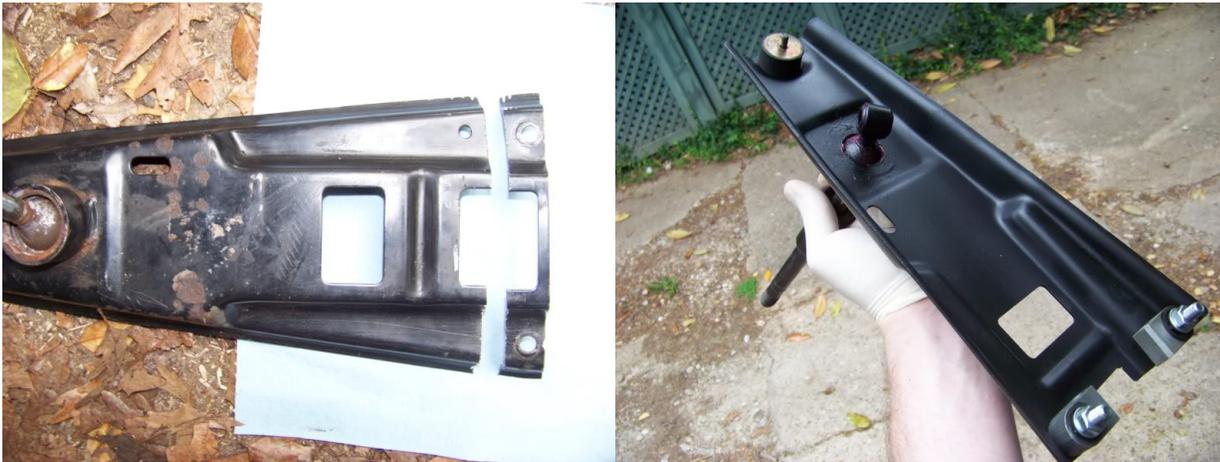
The shifter rod has to be shortened. I need to measure what the full length has to be but to check it just put the trans in neutral, shifter in the middle, and measure between the two points. I just cut the rod and sleeve it on the outside with some tube and weld.



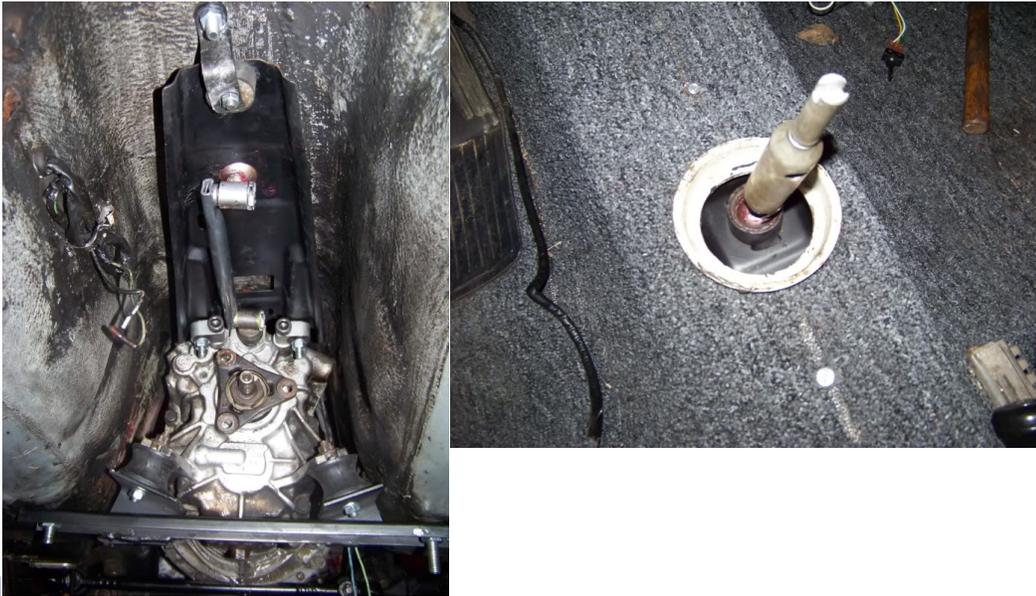
The other option (and better) is what Clay from <http://tx02.blogspot.com/> did. After cutting off the ears at the top of the trans he tapped the two bosses at the back of the trans for an standard m10 bolt. Be careful not to drill into the case too far. Doing this will create a possible leak. You will need to use allen bolts in these holes. You can see the two circled bosses needed to be drilled and tapped in this picture.



Then he shortened an e21 shifter platform (a 2002 one might work just as well for this) by 12-15mm and drilled new mounting holes. Then he bolted up the stock 2002 shifter carrier mounts and used a air box rubber mount from an 84 318i with a small bracket at the back to allow for some cushion.



He also found out that a selector rod from an e36 (95-99) 328/M3 will fit perfectly into the hole in the 2002 trans tunnel. Here is a link to the post about the entire process on his blog. <http://tx02.blogspot.com/2011/05/shifter-linkage-done.htm>



I have used the 1.9L Z3 shifter selector with the m42 swap for a short throw shift kit. They normally only run \$40 or less from many of the parts suppliers. I normally use blunttech.com for all of my parts.

Drive Shaft

I used the stock e30 driveshaft and just relocate the center support bearing mount. You will have to loosen the center nut on the e30 driveshaft and slide the shaft apart just a little bit to make it fit. This is the method I normally use to move the CSB. I have done it with and without the added little support back where the CSB actually is. Both worked fine without any vibration.



Exhaust

You will either need my (jakeb) modified exhaust manifold or will need to modify a 2002 long tube header welded to an m42 flange. This later will sit VERY low but it will clear the steering. With my modified manifold I include a flange to connect to a 2.25" exhaust. I normally use a 2.25" mandrel bend from summit or anywhere. <http://www.summitracing.com/parts/WLK-42321/> - \$15 - 2.25" mandrel J bend

Then it has to be cut pretty tight after the bend so it clears everything. Then you can tie into your stock exhaust or have something made up. You will also need a o2 sensor bung welded in. <http://>

www.summitracing.com/parts/HLY-534-49/ - \$6 - O2 sensor weld bung

Any exhaust shop should be able to make this up for not all that much money if you can't do it yourself. Here are a few pictures of how I do it.



Radiator / coolant lines

I used the e30 m42 radiator. You will need to make an upper mount and lower left mount. For radiator hoses I have went to the local auto store and asked to just look through the molded hoses to see what will fit. The upper one is really no problem the lower one can be a a bit more difficult because it is really tight. If you have an advance auto where you live ask for one of the following hoses 71500, 71244, or 71871. With a little cutting you should be able to get the lower hose out of one piece.

Upper radiator Hose



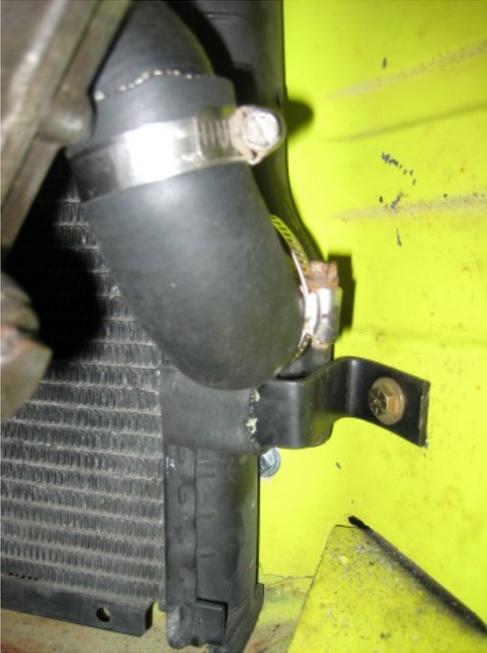
Lower hose after some trimming



You will need to make a small bracket for the upper left of the radiator. I jused 1" flat stock from Home Depot and bent it.



And one for the lower right corner. As you can slightly see in this picture I have done the lower rad hose in two pieces and then sleeved it together. One piece is better but this will work if you can't find the hose mentioned above.



For the heater hoses I normally just dig through the local auto store and find something that will work. I have used a combo of m10 and m42 hoses connected together with barb fittings as well. There will also be a long hose that connects to the bottom of the coolant tank and goes back to the plastic tube along the block.

I normally remove all the extra hose from under the intake and loop the throttle body heater hose around. Out of the head and then back into the plastic return pipe that runs along the block. Sorry no picture of that.

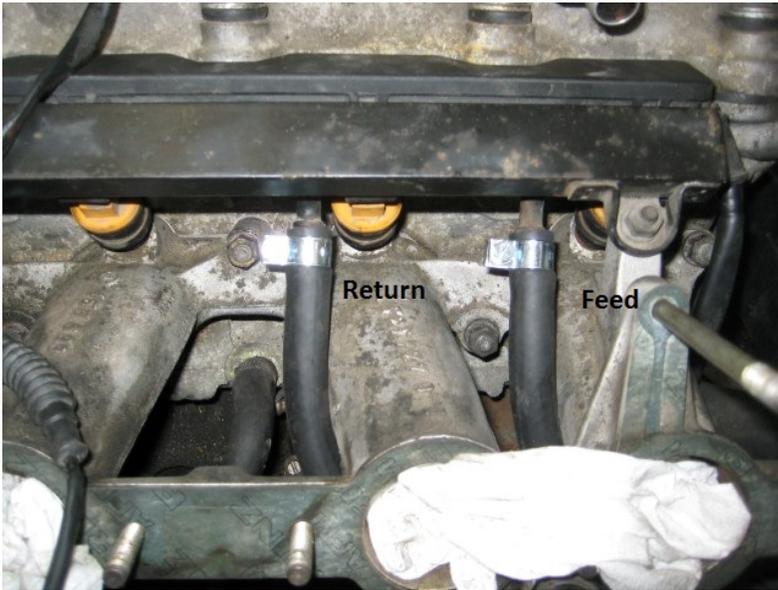
Here is a link to a thread on m42club about cleaning up the hoses under the intake.

<http://www.m42club.com/forums/showthread.php?t=2742>

Fuel System

I used the stock late model e30 in tank pump and sender with a stock e30 m42 fuel filter. Some 02s you have to add a return line and some you do not. I have used the plastic line that runs in the car for the return before. Other times I have bought aluminum line from summit and ran another line from the tank to the front of the car.

Make sure you use fuel injection rated hose and good clamps. One easy mistake is which is the feed and return on the m42 rail. The feed is the BACK of the rail and front is the return.



Throttle Cable

The throttle cable is a combination of both aftermarket parts and stock BMW parts. For the throttle cable I normally use a 36" lokar throttle cable. (LOK-TC1000U36)

<http://www.summitracing.com/parts/LOK-TC1000U36/> - \$42

This will connect down at the 2002 throttle arm and be supported by the trans with a small bracket.



The cable will mount to the throttle body in the same location as the stock BMW cable did. I usually add a couple washers.



Up at the throttle body you will NOT use the lokar cable end. You will use two BMW parts and then a crimp style cable clamp. The cable clamp can be gotten from a bike shop or home depot.

BMW parts that you need

13 54 1 288 013 - plastic throttle clip

35 41 1 152 372 - metal bar

Here is how it all goes together.



Tach

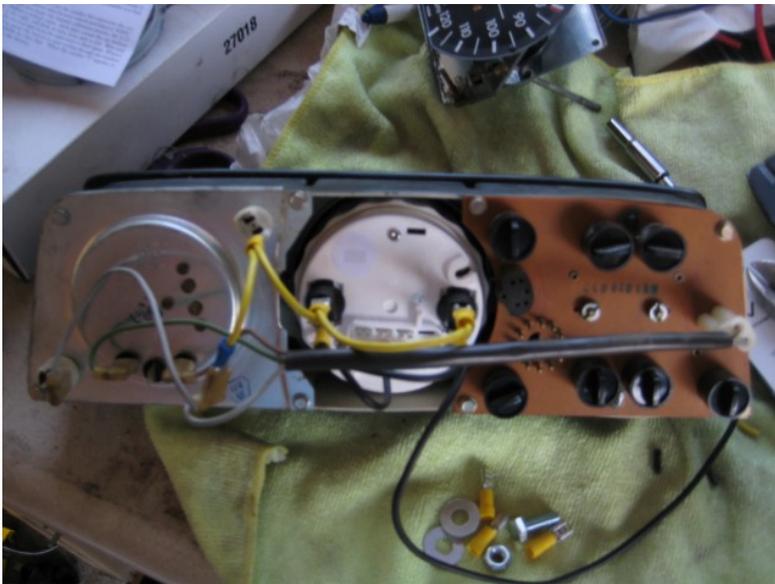
The 2002 stock tach will work but you will need to add an adapter to bring up the signal from the m42 computer. You need a MSD Tach Adapter - MSD-8920

<http://www.summitracing.com/parts/MSD-8920/> - \$58

Speedometer

The e30 transmission does not have a connection for the speedometer cable. You will need to add an electric speedometer. There is a VDO unit that will fit right into the stock cluster. I normally used the VDO Vision series in either 3-1/8" or 3-3/8". Both sizes work, with the 3-3/8" version you have to file a little bit out of the cluster housing and the 3-1/8" fits a little loose. Some people even pull the speedometer apart and swap the faces so it looks even more like stock. These pictures show the 3-1/8"

version.



VDO 3-3/8" Vision 0-120mph Speedometer - VDO-437153

<http://www.summitracing.com/parts/VDO-437153/> - \$130

VDO 3-1/8" Vision 0-120mph Speedometer - VDO-437151

<http://www.summitracing.com/parts/VDO-437151/> - \$130

Speedometer Sensor

You will then also have to add a speedometer sensor on the driveshaft. It says to only use 2 magnets for a rear wheel drive (RWD) car but I use 4 for a bit higher resolution on the speedometer.

Here is the sensor I normally use. - Rostra Precision Controls 250-4165

<http://www.summitracing.com/parts/RPC-250-4165/> - \$26



Coolant Sensor

The Stock 2002 coolant temp gauge sensor will screw right into the m42 head. It screws in the second port from the front of the head. Just hook it up as if it were still in the m10 engine. You will then leave the m42 sensor connector disconnected. It is the spade connector NOT the blue one.



Wiring

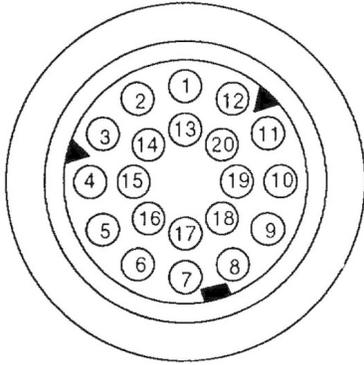
In any swap it seems like people are most worried about the wiring. The wiring part on the m42 is NOT hard at all. There are only 9 wires needed to be hooked up to make it all run. I normally try and get a chassis side c101 connector from an late e30 so the m42 just plugs in. I also normally use a relay to keep the 02 power separated from the m42. I normally trigger the relay with the switched 12v that used to go to the coil connection. When the key is in run/start there is 12v to coil side of the relay and switches power from the battery source to the m42 c101 connector.

Here are the wires you need to connect from the c101 to the 2002 wiring harness

c101 pin	connection on 2002	function
1	D+ at voltage regulator	Alternator excite connection
4	not needed as you will use 02 wire	coolant temp
5	wire from stock 2002 oil pres	oil pressure dummy light
6	12v in run/hot - power off relay, 15amp fuse	m42 DME power
7	12v in run/hot - power off relay, direct	Coil Power
9	connects to MSD tach adapter then adapter goes to tach	Tach Signal
12	hook to the wire going to the brake light off the brake fluid reservoir. Whichever one is not ground is the one you want to connect it to.	check engine light, dme grounds when it should be on
13	12v to fuel pump in, 15amp fuse	Fuel Pump power
18	wire that was connected to starter	Starter solenoid signal

There are little numbers on the c101 but here is also a picture of it. Sometimes it is a little confusing. Just know that pin 18 is black with a yellow stripe and then work off that.

B200002.00

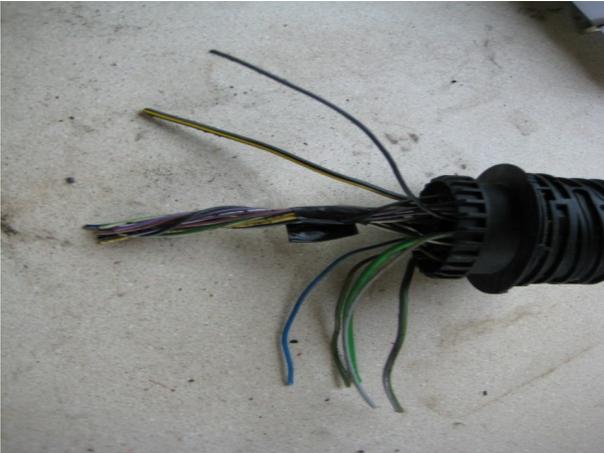


Wiring Face
C101

Here are the fuse box and relays I normally use. There is a spot for the ignition fuse, fuse pump fuse, fan fuse, and I normally add a fuse for the tach adapter and new speedometer. I run them both on the same circuit
<http://www.summitracing.com/parts/PRF-30002/> - \$9 - 4 place fuse block
<http://www.summitracing.com/parts/PCO-5591PT/> - \$6 - relay

Here are a couple pictures of how I lay it all out.

I start by finding the wires I need on the c101 and then taping back what I don't need.



Lay it all out and start connecting the power wires. The extra relay you see there is for the electric cooling fan.



It will look like this once all put together in the car.



I also mount the m42 diagnostic connector on the drivers side inner fender (m42 relays below, main, oxygen sensor, and fuel pump)

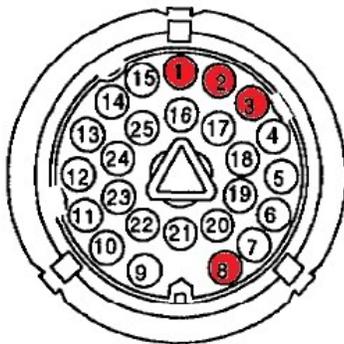


Just in case you are using an e36 wiring harness here are the wiring connections you need to make

x20 Engine Connector		
Pin	Connects To	
8	Check Engine light Ground	(dme grounds light)
13	Fuel Pump (through 15amp fuse)	
18	Starter	

20	Tach	
21	12power (run/start)	from relay
23	Oil Pressure switch	
25	Battery Charge, D+	

And a picture of the x20 connector



Connector X20-E36

Red-Not Used

With both of the harness you will have the evap control valve, make sure this is plugged in. If not you will get a CEL but don't hook it up. I had it connected and it sucked my tank down. If you use the e36 harness you will also have the intake valve thing connected to wiring but not installed. Leave it connected otherwise you will get a CEL.

Links

- www.classicdaily.net - my website, location of this walk through, purchase mounts, etc
- www.blunttech.com - excellent parts supplier, if what you need isn't listed email and they can get it for you
- www.bmw2002faq.com - BMW 2002 FAQ forum
- www.m42club.com/forums/ - Great M42 resource, maintenance, upgrades, etc
- Links to m42 builds I have done
 - http://www.bmw2002faq.com/component/option.com_forum/Itemid.57/page.viewtopic/t.345849/highlight/
 - http://www.bmw2002faq.com/component/option.com_forum/Itemid.57/page.viewtopic/t.361897/highlight/ - turbo m42 2002 swap
 - http://www.bmw2002faq.com/component/option.com_forum/Itemid.57/page.viewtopic/t.351361/highlight/ - automatic m42 swap, AC, cruise, etc

Remember if you have ANY questions at all feel free to email me at jake@classicdaily.net. Also if you

put together a swap send me a link to a build thread as I love to see m42 02 projects come to life.

