

Brake pipes and fuel system

Fuel Pipes: This will depend on the engine option that you have chosen.

Tools & materials Required: 1. drill & drill bits 2. Taps & Tap wrench 3. Pipe bender (not essential) 4. Pipe Flaring tool 5. Pipe cutter or junior hack saw, 6. 2 Rolls 3/16" or 5mm brake pipe (1 none ABS) 7. 16' to 20' 5/16" or 8mm pipe 8. 16' to 20' of 3/8" or 10mm pipe 9. P clips (pipe clips) and fixings. 10. 4 braided flexible brake lines or original 6 flexi hoses (braided hose details on note "6")

BMW engines and fuel injected engines:

If you are to use the engine from the donor E34/E32 these will all be fuel injected and will need a "Flow" and a "return" pipe the "Flow" from the fuel pump will need to be 8mm (5/16") and the return 10mm (3/8"), the return is larger as it is at a lower pressure than the flow, and therefore needs a larger volume to return the same amount of fuel to the tank, without causing a build up of pressure in the system when the engine demand is low.

Carburetor engines:

If you have an engine that has a Carburetor rather than injection, you first have to determine whether you have a mechanical or an electronic fuel pump.

For Electronic pump you will need the same as for the injection engine.

For Mechanical pump you will only need ONE "Flow" pipe, 8mm (5/16") for small engines 3.5 (low tune) 10mm (3/8") for large engines (American V8's)

Note; if your fuel pump does not have a built in pressure regulator you will need to fit an inline regulator to prevent the Carburetor from being over pressured, if you have a big block or a high consumption engine you will need a high flow pump and an inline regulator.

Electronic Pump mounting:

It is best to mount the fuel pump on the rearmost transverse 80x40 box section that runs across the rear of the differential, underneath the fuel tank.

It should be securely mounted and with rubber insulation between the pump and the mounting bracket (to prevent noise and vibration transmission), the best method is to bolt into the chassis with at least 2 M6 bolts, these can be drilled and tapped in to the box or for greatest results using "Rivnuts" and a Rivnut insertion tool, (these can be obtained at Most Kit Car shows and good tool stores)



1. Once the fuel pump is mounted run the “flow” and “return” (or just flow) as required, **Note:** the position of the return pipe on the chassis this is to line up with the pipe on the fuel tank, when it is in place later.
2. Fit flexible hoses where possible before fitting of the fuel tank and clip as far as possible to prevent movement and the pipes from rubbing or contacting any part of the chassis,
3. **Note:** You should try to maintain at least a 2mm gap between the chassis and any pipe work, as they may seem to be well supported with the car standing still in the garage! **BUT TRUST ME** they **WILL** move when you are thrashing around on track days, or you take that bridge or roundabout faster than you have before!!
4. Never run pipes close to moving parts such as alternator fans steering joints or any other rotating parts, ***I once had a west field come in to the workshop with the main front brake pipe mounted along the inside of the upper chassis rail between the rail and the alternator fan, when the engine rocked under load the 15mm gap was no more! And the fan had “sawn” half way through the pipe, as it was removed it fractured at the sawn point; it was that close to a potential disaster, in only a few 1000 miles!***



5. Note that the fuel gauge sender is on the same side of the tank as the return pipe, the left hand side of the chassis, this is also the side of the battery cable and the wiring loom run, if the pump is mounted on the left side of the diff it will make wiring easier later.
6. **Note:** If you use **braded hoses**, the lengths are as follows: **FRONT = 18” or 450mm** with **M10x1mm** banjo and bolt one end and a **M10x1** bulkhead fitting the other, **REAR= 35”or 890mm** with the same ends. As seen in the following pictures,

Pipe routing:

1. The position of the Fuel pipes will depend also on the Exhaust system to be finally fitted, If you plan to fit and “under floor” system and not “Side pipes” you will need to run the pipes along the inside and to the top of the center tunnel, to prevent the heat from the exhaust over heating the fuel or the brake fluid.
2. With “Side pipes” you have the option to run the pipes along the lower 80x40 center chassis rails.



3. If fitting along the top of the center tunnel you will need to fix strips of suitable material across the chassis rails to obtain 9” 225mm centers between pipe clips as required for UK SVA, these can be “pop riveted” to the chassis as required.
4. When running along the lower chassis rail the pipe clips can be riveted or drilled and tapped, then screwed down with at least **M4** screws,
5. **Note** make sure that at **no point** the (fuel or brake) pipes are mounted lower than the bottom edge of the box section, if they are mounted along the center tunnel, or on the under engine cross member, if they can be trapped between the road and the chassis or rubbed along the road at any point this could result in failure in operation.



6. With the use of the **ABS** system you will need to run pipes from all four wheels to the **ABS pump** motor, this can be mounted in two places one is the front cross member, on a bracket bolted to the opposite side to the steering box original engine mount holes, or if an under floor Exhaust is to be fitted in between the passenger foot well and the front wheel arch on a bracket to the chassis.
7. The pipes from the master cylinder and the ABS pump can be fitted after the body has been fitted, it is wise to drill most of the clip holes prior to body fitting.
8. If the **ABS** is not to be used then you can use a “Tee Piece” at the front and rear and run one single pipe up to the master cylinder, it is best to fit a brake proportion valve under the master cylinder, these are used on the 3 series none **ABS** cars or from any car that dose not have **ABS**, or you may have a problem of over braking on the front wheels.
9. On a **None ABS** system you will need to leave around 28” or 710mm from the lower chassis rail up from the chassis at the front edge of the bulkhead on the driver side (as the master cylinder is mounted on to the pedal box and not as in the donor car)



10. We recommend the use of stainless steel braded hoses for the flexible hoses, but it is not essential and the rubber hoses from the donor car are perfectly good to use as long as they are in good condition, and have no cracks visible when the pipe is bent through 90 deg's along the entire length and the treads at each end are not corroded or damaged, **If in doubt replace.**



11. Make sure that the flexible pipes are clipped along the swinging arm and pass through the eyes on the running gear with rubber grommets to prevent chaffing.
12. Check that the hoses do not contact any part of the chassis or the running gear over the full range of travel; this is best done by taking the springs from the shocks and lift the hub to the upper most point.
13. Turn the hub from lock to lock and ensure that the front hose does not contact any other part of the running gear or chassis & wheel rim.



14. Before fitting the tank it is wise to remove any lumps of zinc from the roll over bar sockets and file down and test fit the roll over bars in place, and drill the bolt hole from the bar through the socket.



15. Once these steps are complete, the fuel tank can be mounted to the chassis. This must be done before the body can be fitted, depending on whether you use a tank supplied for **RVD** or from a separate supplier there are two ways to hold down the tank.

16. One is to use straps around the tank, the other is to have “lugs” on the tank and bolt direct to the chassis.
17. The chassis can be drilled and taped or nut inserts, there should be at least **8 M6** high tensile bolts in at least **4 lugs** of 6mm aluminum or 3mm steel or 2mm stainless steel X 38mm (1 ½”) wide.



18. Now you can fit the flow and return pipes (or just flow) from the tank connections, when connecting from the outlet to the fuel pump it is best to fit a good filter to prevent any grit/swarf from fuel or the take from reaching the pump, as the high pressure pumps used for fuel injection can be jammed with very small particles microns in size, due to the very close tolerances in the pump rotors.



19. Tape over any open holes or pipes to prevent insects or dust and particles entering the systems, with electrical or masking tape. **Now find a cold beer(if u drink and are of legal age) you deserve it !!**