'Dave Bulman gets to work fitting out the bodyshell with the petrol tank, fuel, oil and brake pipes, brake servo master cylinders, bias bar, pedal box and hydraulic handbrake. Nice simple stuff.'

With the bodyshell prepared and roll cage installed last month, a start can now be made on fitting it out. First, a word of warning. Most of the screw threads on the body and its fittings are metric, on the V8 engine they are unified, and on the bell housing and gearbox metric again. This is not a great problem in itself, but does mean service crews have to carry a greater selection of spanners. It does become a problem when some specialist components are added, which are often unified threaded and have to mate with existing metric fittings.

An example of this is the braking system which has metric fittings as standard. Unfortunately the competition calipers have unified threads, so if any of the standard parts are retained for example, the servo-some of the pipes need to be made with metric fittings at one end and unified at the other. This is not good practice because the two types of fittings are meant to have a slightly different sized pipe. Luckily by using the unified pipe, which is the slightly smaller of the two, both types of fittings can be used. The result is that you got over the problem but finish up with a car which has become difficult to service. Therefore when building try to keep to one type of thread. It is not always possible, but it is worth making the effort and may help to save a few valuable seconds at a service point.

Start off by fitting the petrol tank. The early cars have a filler pipe which is fitted after the tank is put in place; the later ones (with the smaller petrol cap) need the filler pipe attached to the tank before installation. If you bought a write-off with the large cap and are using a new shell, a new pipe and cap will have to be purchased. The base of the tank can be covered with metal foil-covered asbestos, or just a layer of asbestos with a thin sheet of aluminium.
A good idea is to fit an asbestos blanket used for firefighting. This protects the tank from the exhaust pipe, and if the back axle hits the tank it prevents it splitting. Of course the axle should not actually go near the tank, but the impossible often seems to happen on a rally car, and the tank then deforms to fit the differential casing. Later tanks appear to be shaped to avoid this.

One small point concerns the straps for the spare wheels which may need to be fastened to the bulkhead behind the tank. If you want to do this, they should be put in place before the tank is installed. The wheels should be stood upright because if they are left flat they can become trapped if the wheel well is deformed on a rough stage.

The fuel can run up either inside the transmission tunnel or through the passenger compartment. If it is inside the car, it needs to be well protected. I have used a metal pipe; sheathed with wire reinforced Aeroquip hose. The works cars use the transmission tunnel and cover the pipe with ordinary rubber hose.

Clips should be used at regular intervals, and long lengths of unsupported pipe, which just invite failure, must be avoided. If it is inside the car, it can run along the left-hand inner sill and pass through the front bulkhead beside the strut brace. The free end is fastened to the front bulkhead.

The oil pipes for the dry sump system run along the right-hand side of the car which is the side with the oil pump. First position the dry sump tank and attach the pipes. They can then be positioned over the rear wheel arch, down the rear bulkhead, along the sill, and up through the front bulkhead just before the strut base. Two separate holes should be made and grommets used. The pipes are then fastened down the Inner front wheel arch and against the strut mounting just above the chassis rail.

The supply pipe from the bottom of the tank needs to be long enough to reach the oil
pump which will be about 30cms after the strut mounting. The return pipe will eventually go to the oil cooler, which sits in front of the radiator. Two lengths, each 5 metres long, leave plenty for the short lengths required later.

I have used a supply pipe with 5/8 in bore and the return has a ¾ in bore. BL use ¾ in pipe for both. It is preferable to use wire reinforced pipe; if you do not, the pipes need to be encased where they pass through the passenger compartment. The idea of this is to prevent hot oil reaching the occupants if a pipe bursts, and also to protect the pipe in the first place.

My advice is to pay the extra and use the wire reinforced piping both for safety and reliability. There is usually plenty of space between the seat and the sill, but this should be checked before the pipes are finally clipped into place.

Next the servo, balance unit and hydraulic handbrake cylinder need to be installed. Of course, you may prefer to use the works set-up with twin master cylinders and balance bar. This can be purchased from B.L. Motorsport under part number STR0420.

The pedal box has to be bolted in, and if you heel and toe it maybe necessary to weld an extension to the accelerator pedal. Many people do not like using a servo, but if you do install one there is nothing to stop you disconnecting it later.

The variable balance is achieved by using the existing balance unit and modifying it. This is a true balance system apportioning the pedal effort between the front and rear brakes; it is not just a cut-off unit as fitted to the Mini. To give a variable system, the end cap is removed by putting a saw through the depressed sections. Another end cap can be made to the dimensions shown in the drawing. By screwing the adjusting bolt in, the preload on the internal spring increases and the pressure in the rear brakes relative to that in the front will rise.
What this type of system cannot do is produce a pressure in the rear greater than that in the front. The accompanying graphs show the effect of the two possible systems. The actual braking effort is also dependent upon the type of brakes and the brake material. BL Motorsport can sell you quite a variety, and I will be discussing them later when talking about setting up the car to your own preference. As you can see from the photographs, I have kept the standard servo with the modified balance unit.

The hydraulic addition to the mechanical handbrake is remarkably simple. A clutch master cylinder, Girling part number 64067980 is fitted in the transmission tunnel just in front of the handbrake. A bracket has to be made and positioned so that the actuator rod just reaches the handbrake when in its fully returned position. It will be found that the existing cable fitting can be retained and all that is needed is a longer clevis pin.

The supply pipe to the rear brakes is connected so that the master cylinder is in series with it. If the footbrake is applied, the brakes work normally, the fluid being able to pass freely through the cylinder. If the handbrake is applied, the supply pipe is cut off and the rear brakes become pressurised. The supply pipe connects to the front of the cylinder (i.e., what would be the reservoir end if used as a clutch master cylinder). An adapter needs to be obtained to match up to the standard brake pipe fitting.

You will probably want to convert the handbrake to flyoff operation. To do this, grind off the head of the rivet which holds the pawl, tap out the rivet and remove the pawl with the rod and return spring. The slot in the pawl has to be extended and the rod fixed to the centre hole. The top hole is then used as the pivot point.

Unfortunately the pawl is made from very hard steel which cannot easily be sawn or filed, and the only way to extend the slot is to use an abrasive disc. Another hole needs to be drilled in the handle just above and forward of the existing pawl pivot point. The distance between this hole and the existing one should be equal to the distance between the holes in the pawl. The handbrake can now be reassembled with a rivet locating the paw through the new hole in the handle.
When doing this, make sure that the ends of the new rivet, which you will have had to use to locate the rod to the pawl, do not catch on the inner faces of the handle. The rod needs to be bent to locate it in the handle, and the spring and button replaced.

The front-right brake pipe is fitted in the same position as in the standard car. The front-left pipe runs along the bulkhead below the heater opening and then around the inner front wheel arch. The rear pipe can either pass through the passenger compartment or fit up inside the transmission tunnel. The latter technique is used by BL, but I have brought the pipe through the bulkhead beside the strut brace. It then goes along the sill and across to the transmission tunnel by fastening it to the cross member which supports the seat. A pair of holes has been cut in the transmission tunnel and the pipe goes through one of these into the end of the handbrake cylinder.

A further pipe from the outlet of the cylinder comes back inside the car and along the transmission tunnel to the rear bulkhead. The flexible pipe from the rear axle is fitted to the rear bulkhead at a point approximately 20cms from the centre of the car and 8cms from the floor pan. The pipe 1.9 Girling part number 74047446 and has a flexible protective steel coil around it.

When BL Motorsport fit the pipe in the transmission tunnel it is covered with rubber tubing, and the flexible pipe is fitted as standard.

The pipe from the fire extinguisher follows approximately the same path as the oil pipes, but along the left-hand side of the car. After passing through the front bulkhead, a T-piece splits the pipe to the right and left strut mountings. These pipes should be clipped about 6cms from the top of the struts and the extinguisher holes drilled so that they face over the top of the engine. One of the bowden cable outers is positioned over the rear wheel arch, across the rear bulkhead and along the transmission tunnel.
In my car I have terminated it alongside the gear lever aperture and fitted a small tube over the end. This has enabled a further short length to be used from the instrument panel, and allows the panel to be removed quickly (more on that later). The other cable fits in the recess behind the rear screen as described last month. Remember to oil the cables!

All of the cables and piping must be fastened down at regular intervals. The way I have done this is to use short strips of 0.75m thick aluminium pop-riveted over the pipes. If you find an engineering workshop with a guillotine, a good idea is to get them to cut a number of strips, 1 cm wide, off a large sheet. You can then trim them to the lengths required as and when necessary.