

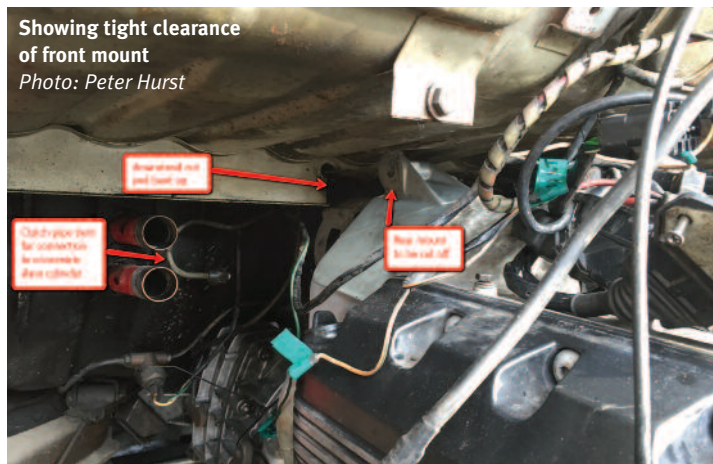
Confessions of a Beemer Imper! BMW conversion – Part Two

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With the new BMW engine/Imp gearbox combination ready to install I removed the old engine and 'box from the Chamois. As mentioned last month the idea was to install the BMW engine but at some time in the future convert back to the Imp power unit. Although this influenced some of the decisions I made it did highlight the beauty of the BMW conversion, i.e. that it need not be permanent, the car being fairly easy to return to original. The following sections describe my solutions to completing the changeover.

Physical installation.

In an Imp the BMW unit is very close to the underside of the rear luggage shelf. I cut and carefully bent up the downstand metal between the holes for the clutch and fuel pipes and positioned the BMW engine level but found I only had about 20 mm clearance above



the throttle bodies and that attaching the flexible air intakes and the throttle cable attachment would be difficult. After much thought I did cut a section out the rear parcel shelf reasoning it can be easily welded back in and it's not as though my car hasn't been altered over the years with pipes through the car, no internal trim, roll cage and so on. However, for those not wishing to make carry out this surgery there is room, it's just tight that's all. Another solution which I gather some have adopted is to lower the rear engine mount and angle the engine down at the rear to gain clearance. Others have fabricated 90-degree elbows to turn the throttle bodies from vertical to horizontal. Many, however, have cut the parcel shelf like I did and one person cleverly raised the shelf so it still looks standard until you're told otherwise.

In a Clan there is, perhaps surprisingly, more height clearance and the standard BMW plastic air box that sits above the engine can be used and no bodywork cutting is required.

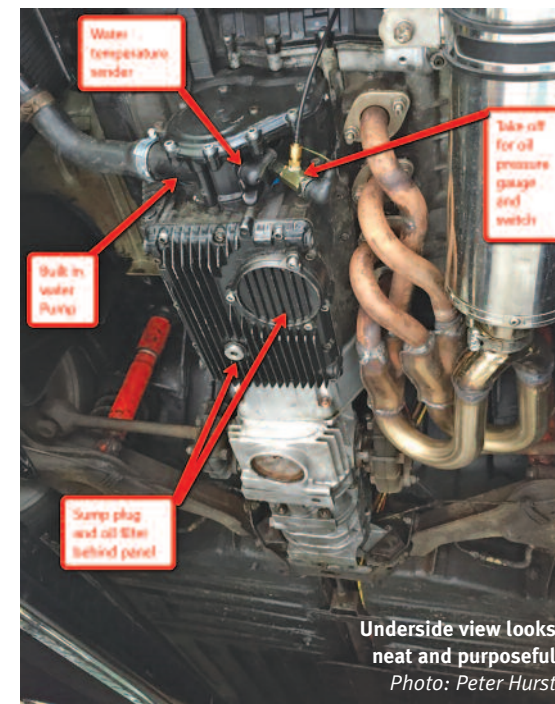
While on the subject of clearance, on the BMW bellhousing there is a fixing point used in the bike installation which is redundant when installed in an Imp or Clan. This just makes contact with the underside of the rear shelf so I cut it off.

Fuel supply. The fuel injection system requires a high pressure supply and a relief valve maintains the pressure at 36 psi by returning the excess fuel back to the tank. The easiest solution would be to cut and inset a high pressure electric pump in to the existing fuel line under the car and restore the returning fuel back into the tank by taping a hole into the top of the fuel gauge sender. I wanted to keep the existing pipe complete so used it as the return and employed brass

plumbing fittings to add another outlet to the bottom of the tank. The inner fitting was positioned with long-nosed pliers through the hole the fuel gauge sending fits into. The high pressure pump was mounted where the wheel well once was (it was cut out years ago when the front radiator was fitted). I had some 8 mm copper micro-bore heating pipe that I used to run the length of the car. Everything was joined up with flexible fuel pipe and clips with inline fuel filters fitted both before and after the pump. My first installation used 8mm bore to the pump and a 10 micron pre-filter but the pump was very noisy. From advice at the Imp National I re-plumbed everything before the pump in 12 mm and used a larger 100 micron pre-filter. The pump is now inaudible from within the car. Also, on the high pressure side make sure all connections have barbed or flares on the rigid pipes to stop the flexible hoses blowing off due to the high pressure.

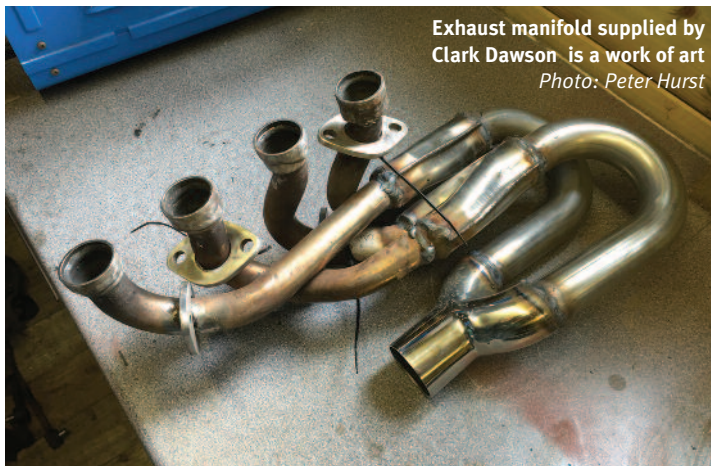
Cooling. My car already had a front radiator and 28 mm copper pipes though the car. A header tank of some sort was required at the rear so, like others, I used an aluminium Mini radiator mounted sideways on the nearside chassis rail. These radiators are available at an excellent price. Some people also mount an electric fan on them to provide additional cooling.

On the bike, the thermostat is installed within the radiator itself so Clark provides a fabricated



inline thermostat housing with an outlet for the bypass circuit. Currently the bypass when the thermostat is closed is plumbed via the heater which needs to be kept open. When up to temperature and the thermostat opens the water flows via the copper pipes to the front radiator then back to the top connection of the Mini radiator (which, as stated, acts as a header tank) and from the bottom hose connection to the engine intake. Done back in the 'eighties my front radiator and fan were donated by an Allegro (commonplace then) and seems fine. (I'm told a Fiat Cinquecento radiator fits well and is easily and cheaply obtainable. GP)

Throttle cable. My Imp had a Sport throttle cable connected to Strombergs (longer than the standard Solex cable) and, being a 1964 model, no choke lever by the gear lever but an after-market one fitted under the rear seats. Being a modern engine, the BMW has no choke as such but does have a connection that allows you to adjust the fast idle by opening the butterfly valves. This seemed unnecessary so I didn't use this.



Exhaust manifold supplied by Clark Dawson is a work of art
Photo: Peter Hurst

For the throttle cable at the engine end I used a bike screw nipple on the very end of the cable which fits the BMW throttle linkage quadrant. At the pedal end I cut the end bracket off the cable and used the bolt with cable hole in it from a Solex set up to attach it to the pedal lever to enable the slack to be adjusted out.

Gauges and warning lights. Thankfully, to be able to convert the car back to Imp power in the future none of the Imp wiring loom needed to be cut or altered to get the lights and gauges to work. The original red ignition warning light wire was connected to the wire from the BMW alternator and the wire from the BMW oil pressure warning switch was simply connected to the equivalent wire in the Imp loom with a spade connector. Likewise, the output wire from the BMW temperature sender was connected to the Imp wire and the Smiths gauge reads the same as if supplied by an Imp sender!

The bike does not have an oil pressure gauge but the Chamois' dash has one so I connected that up quite simply. The oil pressure switch is low down on the engine where the oil and water pumps are located and at the very back when located in the Imp. With the switch removed and a T-piece inserted a new section of pressure pipe was connected from the T and joined to the original pipes with a connector. Oil pressure is 75 psi when cold and generally well above 50 psi when up to temperature except when at idle of course.

I haven't yet sorted a rev-counter but the signal comes from the coil pack so I assume my gauge (which takes its feed from the Imp coil) isn't suitable and didn't want to try in case I blew something or damaged the rev-counter. I need to research this further.

Wiring the engine. The BMW comes with an engine wiring loom connecting all the engine components to the Motronic control unit via a large connector. This Motronic unit takes inputs from the throttle body potentiometer, coolant and air temperature sensors and a Hall effect transmitter in the engine to calculate what the engine is doing. Outputs control the fuel injectors and coil packs to give the correct fuel and spark. A separate plug connects the control unit to the fuel pump, ignition, rev-counter, fan relay temperature coolant light and ABS. I believe different

engines and years differ slightly, for example the K100 8V has an airflow sensor rather than a throttle position sensor. Some later models have a Lambda sensor in the exhaust.

In my case, having purchased a complete bike I was able to remove various relays from the bike as required and made up a board to mount all the components on which I fixed where the coil would be mounted on an Imp.

Clutch. Connecting up the hydraulic clutch

was simple and even used the standard Imp flexible hose though I did carefully bend the metal piping to point in right direction. Unlike an Imp, bleeding was easy and a couple of pumps on the pedal had the clutch working.

Exhaust. The BMW system is an all in one system from head to exhaust which is obviously not suitable for the Imp. Also on the 1100 the flanges on each pipe that fix the exhaust to the head are integral to the exhaust. Because of the exposed position on the bike they were rusting away and seized to the head studs. I had to cut the studs to remove the exhaust and then put all new stainless studs cut from threaded bar into head and had made four stainless-steel flanges. The parts were sent to Clark who made me a four-into-two-into-one exhaust manifold which simply bolts to the head with copper ring gaskets. An aftermarket bike silencer was sourced from eBay to fit the 50 mm manifold.

Air intake. This was the hardest bit. Others with welding skills have fabricated up an airbox arrangement. I used flexible ducting to connect to an airbox made from a biscuit tin (yes, really!). To the lid of the tin I fixed a K&N filter intended for a Weber DCOE. The first flexible ducting I used was a plastic/foil/paper construction but flooring the throttle during the first road trial I found the ducting was collapsing due to the suction. I now have stiffer but still flexible tubing that's used for suction pipes on garden pond pumps.

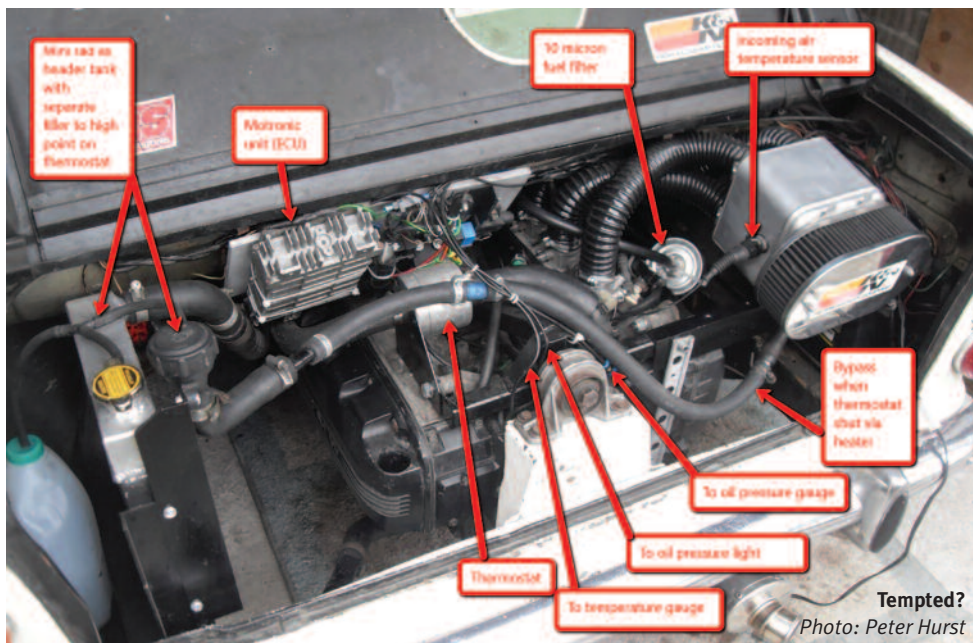
I had a few niggling problems but nothing to do with the fundamental conversion. The main problem I suffered from was rough running at low revs and part throttle. I suspected air leaks and lived with this for a while but at the Wicked Welsh Weekend the consensus of opinion was indeed



Perished throttle body rubber seals cause of rough running. Cheap and easy to replace
Photo: Peter Hurst



Sorted!
Photo: Peter Hurst



an air leak in the inlets. There are rubber connections between the throttle bodies and the fuel injection housings that are bolted to the head. Inspection showed these were perished and badly split. New rubbers at less than £2 each were supplied by Motorworks who specialise in BMW bikes and when fitted cured the problem.

Driving impressions. I need to do more miles in the car especially now I have sorted the problem with leaks in the inlets. With these leaks it got progressively rougher at low throttle settings but still ran.

The car starts easily and can be a bit rough when cold at idle hence, presumably the 'choke' on the bike. The transfer gears make it a bit noisier than an Imp engine at idle especially when cold but again I'm told careful balancing of the throttle bodies will smooth this out. The engine has lots of torque and you can pootle around in top gear at low revs and is better than my 875 Sport engine was. When you put your foot down it's just a smooth, seamless delivery of power with no flat spots. At higher revs – I haven't hit the rev limiter yet – it seem to quieten down more than an Imp, remaining very smooth and at 70 mph on the motorways is very relaxed with plenty of power in reserve.

All in all I'm very pleased with the conversion. In my opinion it is a much better option for everyday road use than an all singing, all dancing tuned 998/1040. I've been there with my Clan and the novelty wore off so I changed back to a more standard 875. Perhaps it's an age thing! The BMW unit gives you best of all worlds.

So, in conclusion, if you're not too precious about not having an Imp engine but want more power coupled to modern reliability, the BMW K-series engine is the way to go, especially if money is tight.

My thanks to Clark Dawson and other club members for their help with my conversion.

