

MY ENGINE REMOVAL PROCEDURE

Having removed the engine a couple of times I thought it would be a good opportunity to write a guide for others who might want to take on the job.

You would be well advised to read through this a couple of times before you start

You are going to remove fuel pipes, have a fire extinguisher standing by.

The engine is heavy, you will need an engine crane or overhead gantry and somewhere to put it when it is out, maybe a sheet of plywood with some blocks of wood forming a cradle to stop the engine falling over.

You will need a 5/16 Whitworth socket spanner.

A hardwood stick about 25 x 50 x 500 will be useful as a drift and lever on some of the tighter bits and pieces; it will not damage the paintwork or the ends of threads when drifting out tight bolts. Take a felt tip pen and write the words "very useful stick" on the side of it and hang it up in the workshop - you won't regret it.

You will need new clips for the petrol pipes. The jubilee type of clip is not very good on small sizes due to the inflexible tightening device, you should look for the ones with a nut and bolt through the ends, they are numerous on e-bay and inexpensive.

You will need some cable ties to replace ones cut off when dismantling.

You would be well advised to have some new (better quality) mounting rubbers for exhaust pipes and rectifier mountings. I get mine here [vibration-mounts](#)

After removing the bonnet and disconnecting the battery earth lead (when you re-connect there will be a slight sparking from the current draw of the elektronikery be aware of any petrol fumes or leaks from the disconnected fuel pipes). I lifted the front of the vehicle and supported it on axle stands under the forward chassis members. Don't forget there is only one wheel at the back so the vehicle is quite unstable if you jack it in the centre at the front!

The next task is to remove the oil pipes and if you are ready for an oil change drain the oil out into an old container. The lower one is the feed and this is where most of the oil drains from. Don't get them the wrong way round when refitting. If not changing the oil put plugs (14 mm diameter wood with a taper at one end worked for me) in the ends of the pipes and tighten the clips.

Take out the two bolts holding the cooling fan and after unplugging the cable (note which wire goes where, I am not sure if they are interchangeable) lift it off being careful not to lose the aluminium sleeves from the bolts or the bits of rubber hose which hold the fan housing away from the cylinder fins. You can now use the fixing bolts to hold some sort of lifting bracket of your own devising, I use a chain with the end links bolted down with big washers. The chain needs to be at least 600 mm long to avoid putting too much sideways force on the bolts, we don't want to be bending them. A rigid bar with a ring welded in the centre might be a stronger option but the chain works for me. Whatever you use make sure the bolts are tight and don't forget, this is a heavy engine.

Use a small chisel to flatten the locking tabs on the exhaust pipe flange nuts and remove the nuts. You will get one more go out of the locking tabs. It is now that you will discover the poor quality of the rubber mounts used for the exhaust pipes and for the rectifier heat sink. It would be best to have some better quality ones standing by. It is worth the effort of removing the pipes completely to get some space. Unplug and unclip the gas analyser cables first. I have replaced the flange studs and nuts with 5/16 18tpi UNC x 1 1/4 long socket cap screws in stainless; they make a neater job and there is not really enough clearance for the socket spanner to undo the hex nuts. Drill and wire them - no need for fancy tab washers then.

Next is the steering rack, remove the bolts through the rose joints from the front wheel steering arms and turn the wheels outwards. Remove the two bolts which hold the rack to the sloping support members. It is a good idea to check how easily they come out, especially if you have the retro fitted cross member which actually forces the supports on my machine further apart. I have drilled them a bit over size to make up for this, otherwise it can be almost impossible to get them back in. Take out the bolts and nuts from the upper and lower ends of the supports, you will need to take the top nut off the suspension unit bolts to get the bolts out. Then push the supports backwards at the bottom to get them off the

chassis eyes. Juggle them out to the side and allow them to hang on the brake pipes. Remove the steering column clamp taking the bolt right out, as it goes through a groove in the rack input shaft as an added safety measure. When you replace the clamp you may want to set the steering wheel up with one spoke vertical at the top so that you can see the tachometer and fuel gauge. Now for the tricky bit, the rack will come out even with the retro fitted cross member in place; swivel the rack back(anticlockwise from the right hand end) till the input shaft is underneath pointing forward and slightly down, the rack can then be massaged out to the right (drive side) - persevere it will come out!

To the top of the engine now, remove the fuel pipes, marking them left and right for re fitting, you will need new clips. The jubilee type of clip is not very good on small sizes due to the inflexible tightening device, you should look for the ones with a nut and bolt through the ends, they are numerous on e-bay and inexpensive. The third, smaller, pipe has no clip, just pull it off and spit on it before pushing it back on later. No fuel will run out if you don't let the pipe ends fall down to the ground. For safety you might like to plug them off.

Remove all of the electrical plugs, they are numerous but with one exception, all different so it is not possible to get them wrong on re assembly but a photo might speed things up. Don't forget the ones on the alternator/rectifier and oil filter housing or the feed to the starter solenoid. Most of them have a security clip which has to be lifted with a thumb nail before pulling them out, don't use force! Pull the HT leads off the spark plugs. Remove the knock sensor from behind the inlet manifold on the right cylinder, don't loose the thick seating washer behind it. The two wires on the fuel injectors have a wire clip which can be slid out with the tip of a screwdriver, don't launch them across the workshop never to be seen again (tie a length of thread round them to be sure) and mark the plugs left and right; these are the ones that can be fitted to the wrong side.

The throttle cable is a fiddle, take out the two screws holding the fixing bracket, leaving the outer cable wired in place. Use a length of string with a loop in the end to loop over the little knob on the disc and pull the throttle wide open, tie it in place. You can now feed the slack cable inner down far enough to twist and remove the nipple, note which hole it goes in, there are two.

Remove the earth strap from the top starter motor bolt but leave the starter in place. Strangely this bolt and those in the bell housing require a 5/16 Whitworth

spanner. The live feed will be easier to remove when the engine is moved forward an inch.

Remove the rectifier and its mounting plates (there must be a lighter way of fixing this thing to the vehicle). The powder coating on mine, and also on the headlamp brackets is completely shot and I will have to repaint them. I have removed a bit of steel from the lower half of the intermediate plate to get some weight off. A better mod would be to make a new rectifier back plate in aluminium with the top fixing hole built in.

Remove the oval plastic sensor from the front bottom right of the crankcase and put a wad of paper in the hole to stop any dirt getting in.

Tie all the cables and pipes back out of the way with a length of string.

Take the weight of the engine on your engine crane or block and tackle being very careful not to lift the vehicle and dislodge the axle stands. Now remove the engine mounting bolts - three each side in the bell housing, two each side holding the engine to the mounting plates and two through the rubber mounts in the chassis. The plates will not come out at this stage but will fall out on their own when you lift the engine later, remember this when you come to reinstalling and be prepared for a struggle getting them in place.

The bell housing bolts come next, place a jack under the gear box just sufficiently to take the weight of the box and no more (don't lift the whole vehicle off the axle stands) two socket cap screws are fitted from the front at the bottom. The rest are hex head bolts, 5/16 Whit. again. The long one goes in the top hole. To reach the one on the left side and the two on the right side I took a hole saw to the plastic body panel (see picture). The mechanics at Brands Hatch Morgans did it without resorting to this but it was beyond my ability with the tools available.



drill here with a30mm hole saw
to get the spanner on the bell housing bolts,
you need two holes on the right side.

If you do this be careful not to hit brake cables or fuel pipes as the saw breaks through. It also helps to unbolt the pedal box and move it to one side as best as you can and remove also the access panels above the foot wells. The heads of the hex bolts in the bell housing did not seem too clever and I will probably replace them with socket cap screws. It would have been thoughtful of the factory to have fitted a couple of access panels here.

I, later, took out the screws holding the two side panels and discovered how the dealer mechanic does the job. They remove the first two screws and then prise the panels back breaking them at the point where the very strong mastic seal commences; when the screws are replaced the break is almost invisible - good

eh? If you look carefully at the picture above you can just make out the cracks extending up from the bottom edge of the panel.

The engine can now be pulled forward and slightly lifted (don't lift the whole vehicle off the axle stands). The two tubular dowels are quite tight and may require a bit of CAREFUL leverage. Don't loose them if they fall out. Remove the starter motor cable now.

If you are doing an oil change it is easier to change the filter while the engine is on the bench.

If you are to remove the clutch and the plate to expose the crankshaft shock absorber coupling this can be done by loosening the fixing bolts a bit at a time through the holes in the starter gear. There are three jacking screw holes in the flange to help pull the coupling rubbers out but I did it with my fingers.

Putting it all back together is just a reversal of these operations but be prepared for a bit of time wasted juggling the engine mounting plates, these need to be got in place before the engine is bolted back up to the gearbox bell housing. When replacing the engine swivel it a bit to allow the starter motor to go between the chassis members first. The steering rack with its support bars are also a faff. It helps to put the top bolt in LOOSELY to act as a guide when locating the tubular dowels.

Don't forget to fit the starter cable before the engine is all the way in.

Replace any cable ties which you may have cut off. Don't replace the battery earth lead till last and be sure there is no petrol about when you do it.

The clock will need to be reset but the mileage and trip meter readings are unchanged.

If you drilled holes in the bodywork a simple fix is to stick a bit of plywood over the holes with silicone sealer, hopefully you will not have to take it off again for a long time and when you do, a sharp flexible blade will do the trick.

When tightening the engine plate bolts leave the ones through the rubber mounts till last.

don't forget to tighten the top suspension unit bolt.