Jaguar 6.0 V12 starter motor replacement

Diagnostics

If your starter motor is not responding to your ignition key there may be other issues that are the cause. Look online for gearshift neutral safety microswitch diagnostic information, as your car will not start without these electrical permissions. There is plenty of information on Jaguar forums to diagnose these electrical variables but little detailed information on removal and replacement.

Make sure you have a fully charged battery and grounding, as without these you won't have enough power to fire your starter.

Assuming your starter motor has failed, before removal you can attempt to shock the solenoid back into temporary operation with a length of metal rod and a hammer. This can be useful to move the car to a location to replace the starter.

If your starter motor electric motor is audible but nothing happens it's possible the fasteners attaching it to your bell housing have come loose so it isn't engaging your flywheel.

Starter motor trigger wire

Where is the starter motor?

The starter motor is located under the right side front wheel well. There is a small rectangular opening behind the wheel into the engine bay above the exhaust down pipe. By inserting a metal rod through this aperture to the left of the exhaust it is possible to position it against the solenoid, which you can identify by the starter wiring on the right side of the unit, and give it sharp taps with a hammer. You may be able to start the car by hitting and attempting to crank the ignition.

Also check that all wiring is connected. If the trigger wire (marked by the red arrow in the picture on the left) has come off the tab on top of the solenoid or is broken, this is an electrical issue rather than a mechanical one. You will probably only be able to see this from directly below the car.

Accessing the starter motor

Assuming your starter motor is dead, or running but not engaging, you will need to lift up the front of your car and remove the exhaust down pipe to access it to assess the problem.

I Loosen the lug nuts on your right side front wheel.

Jack up your car. If you don't have a low rise jack, first use the jack you have with your spare tire to lift the right side front up enough to get your heavier jack under your front axle plate. Use a sturdy piece of wood to spread the load across the entire front axle plate

Jack stand locations

and raise the front of your car up so you can easily get underneath the passenger side door area.

Place two jack stands under the front suspension and put whatever safety measures you feel comfortable with under the car before you go under it - wooden blocks etc.

Remove wheel.

Put plenty of cardboard down under the car to catch falling oily dirt.

Remove the negative connector from your battery in your boot/ trunk. If you are working in a public place (drive, yard etc) use your key to lock the car when not attended.

2 Put safety glasses on and get underneath car and look directly up at the exhaust down pipe. Dislodge as much roadkill and oily debris as possible with degreaser, shop towels and a brush so you won't be wearing it later.

3 Acclimatize yourself with where everything you will working on is located. Although there are only a few fasteners, they are almost all difficult to access and loosen.
You can see the starter motor above your exhaust down pipe, visually check the trigger wire is connected and not broken.

There are four bolts connecting your exhaust down pipe to the engine manifold, an easily accessible single bolt and nut connecting the other end of the exhaust downpipe to the rear exhaust clamping a donut/olive to seal.
There is a heat shield over the steering rack held on by two E16 torx bolts that will need to be lessened before removal.

Clean the area and thread of the four exhaust stud nuts and apply penetrant, ideally soaking each bolt in a small plastic cap of

penetrant for as long as possible. You access three of the nuts from under the car, the front fourth one through the aperture in the wheel arch from outside the vehicle.

Location (Three new exhaust nuts and one new stud)

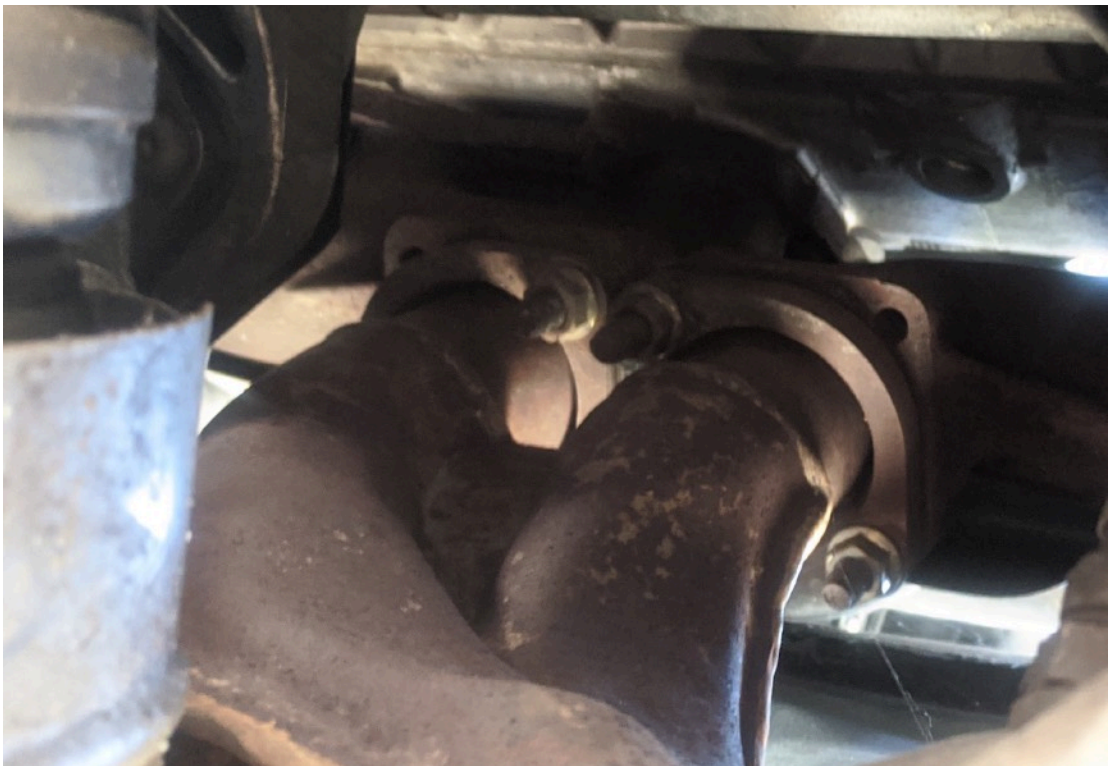
You will be using a combination of **9/16th** sockets and wrenches to remove these four fasteners. Be sure your battery is disconnected - if you touch the 12 volt live wire with a wrench you'll blow fuses and give yourself a fright.

The two middle bolts will require a 9/16th deep socket on a good quality universal joint. The impact type is best.The Two outer bolts will need 9/16 wenches of various lengths. You can bring your arm up the gap on the 'other side' of the exhaust from under the car to get more control.

The fastener closest to the front of the car is accessible via the gap by your alternator from the wheel arch with a short wrench.

These nuts have been through countless very high heat cycles and will take some effort to move. Soak and repeat. Take your time, which could be days, you don't want to damage your manifold. You may wind up pulling a stud or two if the nuts are baked tight.

Once you have all four bolts loose clean the stud threads again before taking three of them off, leaving one to hold the down pipe in place. Loosen the heat shield E16 female bolts (the thread on these is quite fragile, especially if someone has attempted to use an



Your studs will look like this unless recently replaced.

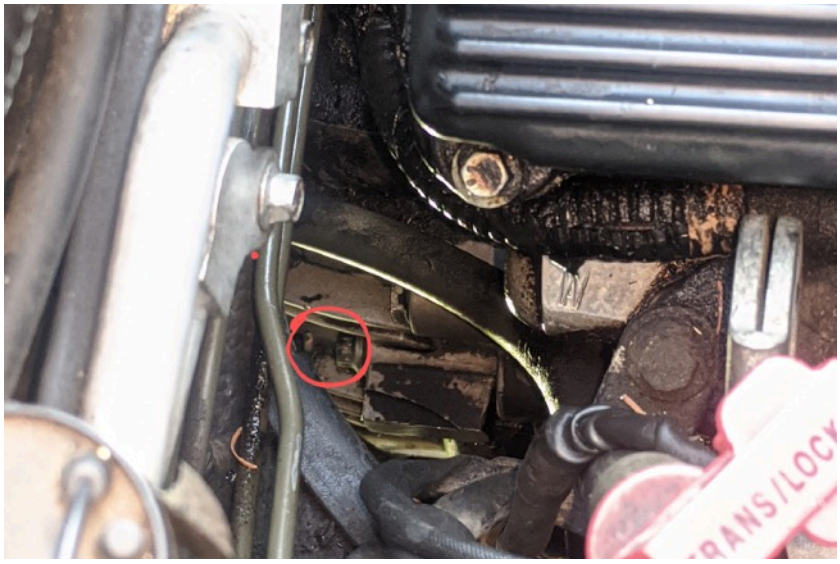
Fourth front stud visible from wheel arch

Allen key on them). The upper fastener is in a deep recess in the axle assembly, the rear one is very easily accessible. Now remove the fastener across the rear of the exhaust and prise it loose, keeping the Olive joint/donut.

Now remove the last downpipes to manifold bolt and watch which way the downpipe comes out. If you twist the rear section to point at the opposing rear tire the pipe has enough room to drop.

You can with disconnect the oxygen sensor or leave the wire in place, but try not to let it get stretched and stressed by tying the downpipe out of the way under the car.

4 Clean the area as much as possible and take a good look at your starter motor to see



E18 bolt from above

if the bolts are backed off or there are other reasons for it not working other than failure.

Assuming you are replacing your starter, disconnect the wiring and examine condition, particularly your trigger wire. Tuck the wiring up and out of the way under the manifold.

5 The starter is held on by two bolts through the bell housing, (See first image on page one) with the heads at the rear and the thread tightened within the stater motor. There is no other thread other than within the starter body. Take some time to figure out where these bolts are, they are well hidden.
The upper bolt is an E18 male that is only accessible blind from the

rear of the gearbox. You can just see its head if you look directly down the firewall under your automatic transmission fluid dipstick. If you have thin arms and long fingers you may be able to touch it from above, but you can only get a socket on it from below.

The lower six point bolt is more accessible. First remove the bolt holding the metal oil line stabilizer, slide the stabler towards the front of the car out of the way and replace the transmission pan bolt. The starter motor bolt requires a wobble extension to get a 9/16 socket onto it, your ratchet will need to be directly by the exhaust pipe to be able to crank it.

Before you attempt to loosen this bolt, squirt some penetrant into the recess where the bolt thread is on the starter motor housing and let it soak.

Wobble extension on lower starter motor bolt

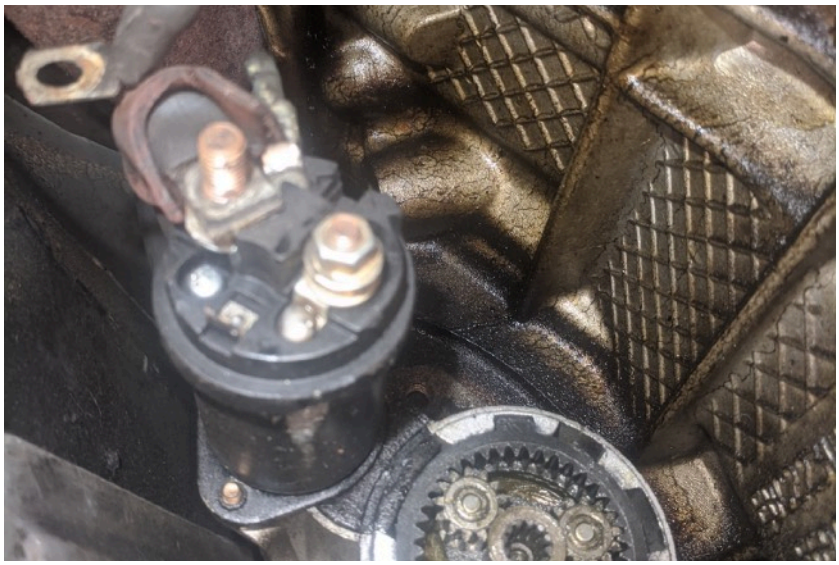
Lower bolt tool

Now take a a balloon and place a couple of rare earth magnets inside it, then put your arm around the back of the starter past the solenoid to blindly feel where the E18 bolt is. It is very far back and you may need to support your shoulder. Feel the magnets jump onto the E18 bolt and leave it there to magnetize it. Now glue a couple of rare earth magnets to the socket end of a good quality short extension.

6 Put a female E18 socket on your short extension so the magnets are near the end of the opening. Now remove the balloon the same way you put it on and try the E18 socket on the end of the bolt from below. You can wrap your other arm around the back of the solenoid to help attract the socket onto the bolt. If you are getting a positive reaction and connection put a 90 tooth ratchet on the short extension and see if you can move the bolt a fraction. You will only have a very short swing but if you can get the bolt moving a fraction you are well on your way.

The E18 bolt head is more like a nipple, so be aware it is easy to chew it up thinking you are turning it, keep pressure on it. If you have your car on a lift get it up higher so you can put a longer bar on it to get more torque.

If this approach does not work, the next option is to partially disassemble the starter motor to get access to the upper bolt thread to lubricate it.



Starter with motor on right removed

To do this, locate the two bolts on the larger electric motor part of the starter to the right of the solenoid and loosen them. The motor and loose gears should now be removable after you disconnect the power wire. Clean the area as it is usually clogged up with dirt and oil accumulation.

If you use a mirror you should be able to see the recessed hole in the top of the starter Motor 'dog ear' the threaded end of the bolt is in. Either squirt penetrant into this recess or use a syringe and slowly pump penetrant or 50% acetone and 50% atf into the threaded area and let sit.

Insert a length of metal rod parallel with the solenoid and tap the end of the bolt with a hammer on the end of the bolt in the thread recess.

Upper bolt thread end visible for lubrication

Try to loosen again. If unsuccessful, another option is to use a very long extension and a breaker bar, accessing the E18 bolt with a joint from under the passenger door adjacent to the rear exhaust pipe left open by downpipes removal.

It will be helpful to have a spotter for this approach as the weight of the tools makes it hard to keep the socket on the E18 bolt. It is worth lightly hammering it on to try to lock it into place.

If the bolt still won't move, some people opt to lower the gearbox by loosening the rear mount. Put a piece of cardboard between the radiator and engine and count the number of rotations to loosen the transmission mount to allow the entire engine and gearbox to open up enough clearance to get the extension onto the E18 bolt. Be very careful if you take this approach not to stress components, have a spotter look as the engine moves to make sure nothing breaks or is stretched. I have not tried this approach.

7 If you are unable to get the bolt to move (the combination of inaccessibility, a life of very high heat and cooling cycles and a small bolt head that is hard to torque prevent a brute strength approach) the solution is to cut the starter motor out by shearing off the dog ear just below the bolt. (The dog ear is pot metal, while the bolt shaft is grade eight).

To do this you will need to attach a mirror to the manifold (duct tape magnets to the rear surface) so you can see the work area. Using an oscillating multi tool with a new, good quality metal blade, you can squeeze the tool in upside down to put the blade horizontally across the dog ear. If you have a new starter motor replacement ready to put in, measure the depth of the dog ear and put a piece of tape on your blade so you don't damage the bell housing it is threaded into place against.

Wear closed safety glasses as you will be generating a lot of metal flake debris that will be falling.

Taking your time, carefully cut away the starter motor after loosening the lower bolt off or removing it. The starter motor will drop out leaving the bolt and dog ear when you have cut through, leaving a lot more space to then cut the dog ear away from the

bolt, which once weakened may respond to your socket and ratchet and opposing torque with channelocks .

Thoroughly clean up the metal filings with a magnet, the exposed accumulated oil and road dirt, and the two tunnels through the bell housing the bolts slide through.

Caption

Installation

Examine the condition of your two starter motor bolts before deciding to reuse them. If the E18 head is chewed up replace with a longer new six point bolt, and a sleeve for future easier access.

Caption

Examine the condition of the exhaust ports on the manifold and remove any rust or debris with 200 grit sand paper. Examine the condition of the two exhaust seals on your downpipe, clean or replace as necessary.

Look carefully at the starter motor wiring before reattaching, and if you have any doubts splice in new starter trigger wire and connector to the loom.

Trial fit your new starter, then use a metal rod through the top bolt hole to suspend it while you tighten the lower bolt so it is easier to get the top bolt in. Use copperslip on the upper bolt to make it easier to remove in future if needed. Tighten both bolts, then reattach the wiring.

Next lightly copperslip the exhaust studs and reattach the downpipes, which needs to be slid into place at a forty five degree angle so the rear of it points to the opposite rear tire, then straighten and put one bolt on loosely to suspend it while you coax the donut/Olive going back into position. Use muffler cement on the donut/Olive if it is pitted or replace. Tighten the fastener then tighten the four manifold stud bolts.

Connect battery and start car to verify you have no exhaust leaks. Retighten as necessary.

- Feel free to contact me if you're having issues. om at olivermarks dot com