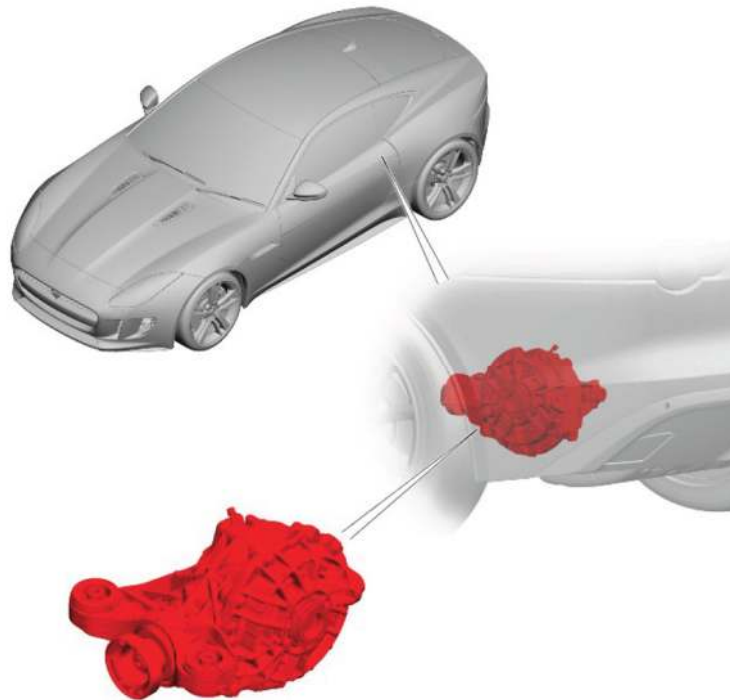


Jaguar / DANA™ 44 AdvanTEK® Rear Axle Removal & Installation

Objective

To successfully remove and reinstall a rear differential into a late model Jaguar car, with a process that is within a home mechanic's capability.



E161608

Figure. Jaguar repair manual, component location, E161608

Starting Point

This document describes a simplified process to remove and re-install a rear differential. It assumes all other vehicle parts are in good working order and do not need replacement.



[picture of the rear axle on the ground or dolly]

Jaguar Applications

This document is primarily focused on the 2014 to 2020 Jaguar F-Type V6. The F-Type V8 with electronically controlled rear differential will be similar. The process will generally apply to other Jaguar models.

Simplifications

DRAFT - The following procedure is under development.

The below suggested process simplifies the Jaguar published method which requires special tools and equipment. The Jaguar published method often calls on sub-routines to remove components which may not need to be removed if they are in good working order.

Preparations

To prepare for the Rear Axle swap, the following items are recommended.

- Tools
 - Floor jack & transmission jack (at least 18" of lift each)
 - Jack stands (at least 16 inches in height, at quantity 6)
 - Ratchet set and assorted sockets
 - deep and shallow hex sockets (8 mm to 19mm)
 - Torx style socket, E12
 - Torx style bits, T-20 to T-50
 - Assorted open and boxed end wrenches
 - Torque Wrench, up to 160 [Nm], 120 [ft-lbs]
 - Marker pen
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- Materials
 - Penetrating Oil
 - Hypoid Gear Oil
 - Thread locking compound
- Parts
 - Rebuilt rear differential or parts to repair a faulty differential
 - Differential drain plug with sealant
 - Rear Half Shaft circlips (x2) Jag part number:
 - Other bolts? xN

Process

Disassembly

1. Prepare the Vehicle
 - a. Unlock doors
 - b. Open rear boot/trunk to gain access to the rear mounted battery
 - c. Release the hood/bonnet latch
 - d. Place EPB in Service Mode (rear calipers will be removed later in process)
 - i. Ignition On (Engine Off)
 - ii. Press and hold the parking brake switch in the release position
 - iii. Wait 2 seconds
 - iv. Press and hold the accelerator pedal in the wide open throttle position
 - v. Wait 2 seconds
 - vi. Turn the Ignition Off (with free hand) ~~and back On immediately.~~
 - vii. A noise from EPB should last for 3 seconds (retracting motion)
 - e. Disconnect 12V Battery



2. Raise the Vehicle
 - a. Raise vehicle onto jack stands so it is at least 40 cm (16 inches) off ground level
 - i. Preference for having front and rear equally high (car level)
 - ii. Preference for raising car alternately from Left and Right sides
 - iii. Note: center of mass and best lifting point is below side view mirrors
 - iv. Locate the rear jack stands forward of the fuel tank shield & cross brace bolts



- b. Update to " Raise vehicle on car lift"
- 3. Remove rear lateral braces
 - a. Remove rear most lateral brace, (13mm x2)
 - b. Remove next rear lateral brace
 - i. First remove 10 mm x2 with clips to the heat shield
 - ii. Second remove T-50 x4 middle fasteners
 - iii. Last remove 13mm x4 outer fasteners



- 4. Remove exhaust pipes
 - a. Disconnect four O2 sensors from connectors and clips
 - b. Loosen middle exhaust pipe clamps (13 mm x2) to allow for rotation of the cat pipes
 - c. Unfasten left and right catalytic converters to engine manifolds (15mm x4)
 - i. may need to lower steering rack (15 mm x2) to access RHS cat bolt
 - ii. do not need to remove the steering coupler bolt (10 mm)
 - d. Unfasten rear of exhaust pipes from hanger (rubber donut)
 - e. Separate rear exhaust pipes from rear muffler
 - i. Loosen clamps (13mm x2)
 - ii. Push muffler rearward and pipes forward (about 2 inches of overlap)
 - f. Remove the center cross brace and drop exhaust pipes (13mm x4)



- 5. Remove rear muffler
 - a. Disconnect the pneumatic lines to the exhaust valves (x2)
 - b. Unfastened the decorative cover behind the exhaust tips, V6 model (T-30 x2)
 - c. Unfastened muffler hangers (13mm x6)



6. Remove the heat shields (10mm x16)
 - a. Two front heat shields
 - b. One Rear heat shield
 - c. One middle heat shield (captive by front and rear heat shields)



7. Remove the driveshaft
 - a. Optional: Mark the drive shaft orientation to the yokes
 - b. Unfastened the bolts to the rear differential and to the transmission (Torx socket E12 x12)
 - c. Unfastened the drive shaft center support (13mm x2)
 - d. Slide driveshaft fore & aft to release from yokes (or tap out with hammer and wedge)



8. Remove the rear wheels and inner wheel well shields (T-30 x11 per side)



9. Drain the rear differential of oil

- a. approx. 0.75 liters for the V6, and 1.1 liters for V8 e-diff.

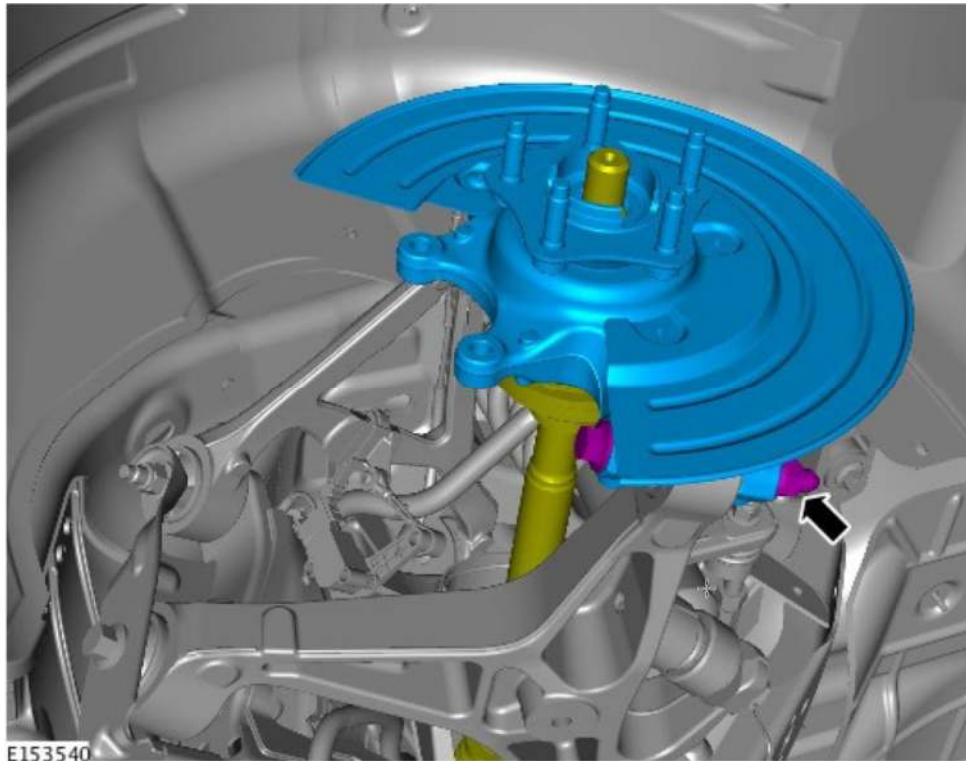


10. Remove Rear Cross Brace

- a. Loosen rear muffler heat shield to access cross brace bolts (10mm x2)
- b. Support sub frame with 2 jack stands near rear differential
 - i. Two front sub frame bolts need to be removed to release cross brace
- c. Disconnect the air control line in the left rear corner of cross brace
- d. Disconnect the clip to a wire harness in the right front corner of the cross brace
- e. Remove Cross Brace bolts, and drop it to the ground
 - i. 15mm x2
 - ii. 19mm x6
 - iii. T-50 x2
 - iv. 13mm x4
- f. Reinstall the two front Sub Frame bolts (15mm x2), and remove the support stands.

11. Remove the rear half shafts from differential in this order (apply to both sides of car)

- a. Keep half shaft nut fastened to wheel hub (no need to remove this)
- b. Place support stand below lower control arm
 - i. it will drop during the next few steps due to spring & shock tension
- c. Remove rear brake caliper and hang to one side (15mm x2)
 - i. Ensure the EPB was previously put into Service Mode
 - ii. Be mindful of the EPB wires and the caliper's hydraulic line
- d. Remove the brake rotor by unfastening the star washers (x2)
- e. Optional: Remove the dust shield (T-30, two Aluminum rivets)
 - i. Rivets can be drilled out and replaced with M6 x 25mm
- ~~f. Release the axle speed sensor from the wheel hub (T-20)~~
- g. Release tie rod arm from wheel hub (13mm & 15mm)
- h. Loosen lower control arm bolt (19mm & 21mm)
- i. Release upper control arm ball joint from wheel hub (18mm & 8mm)
 - i. Use two wrenches to prevent ball joint from spinning
- j. Pull wheel hub and axle half shaft assembly away from Differential
 - i. It may require a few sharp pulls to release half shaft form diff

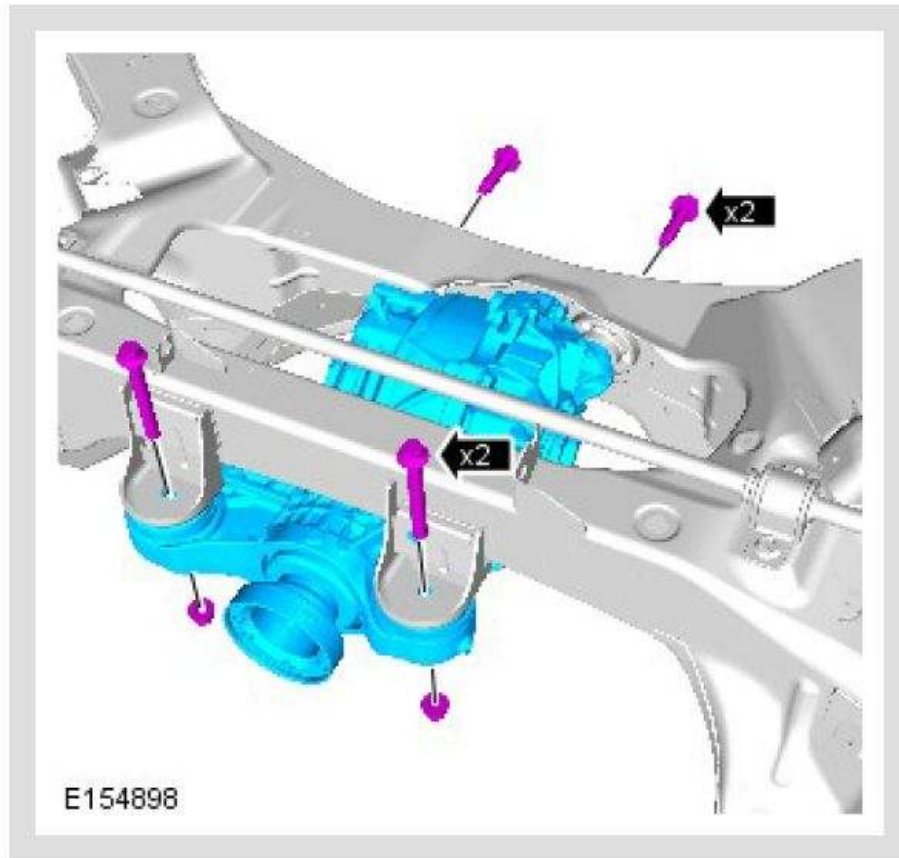


12. Lower Rear Suspension SubFrame

- a. Under Development
- b. Loosen a bunch of stuff.. including shock tower tops?
- c. Loosen the four main bolts securing subframe to chassis
- d. Look out for wires, fuel lines, 12V battery cable...
- e. Lower no more than 4 in (10cm)

13. Remove Rear Differential

- a. Support differential
- b. Loosen differential mounting bolts – rear (mm x)
- c. Loosen differential mounting bolts – front (mm x mm x)
- d. Lower unit out of the car



Torque:

M12 **90 Nm**

M14 **163 Nm**

14. Final steps before reassembly
- First step
 - Second step

Reassembly

The reverse of Disassembly

- Install rebuilt rear differential into subframe
 - front mounting bolt torque = 90 Nm
 - rear mounting bolt torque = 160 Nm
- Reconnect SubFrame to chassis
 - Front and rear bolts... torque sequence here
- Insert the half shafts into the rear differential
 - Reposition the wheel hub and half shafts
 - Connect upper control arm to wheel hub (two wrench method)
 - Connect tie rod to wheel hub
 - Connect brake rotor and caliper
 - Tighten the lower control arm bolt and all others attached to the hub
- Install rear suspension cross brace
 - Torx bolts = 25 Nm
 - M10 bolts = 45 Nm
 - Connect wire harness clip on forward RHS
 - Connect pneumatic exhaust valve line to control unit on rearward LHS
- Reconnect driveshaft to rear differential
 - Align the shaft with the marking on the yoke
 - Torx bolts = 75 Nm (x6)
- Install the rear under heat shields
 - torque = 10 Nm ?? clips
- Install exhaust pipe components
- Install rear muffler
- Install the rear suspension lateral braces
 - Torx bolts = 25 Nm
 - M10 bolts = 45 Nm
- Refill Differential with Oil
 - See details below
- Install rocker panel moldings
- Install wheels

Rear Differential Oil Fill

- Prepare rear differential for oil fill after axle halves have been inserted
 - Remove fill port hex head bolt on side cover (various locations)
 - Confirm drain port hex head bolt torque on lower casing (8mm Allen)
 - Drain Bolt = 27 Nm
- Fill rear differential with oil
 - Suggest use of a hand pump, see fill quantity below
 - Caution: Do not fill rear differential to fill port level, it is not for level setting.

F-Type Model	Differential Type	Recommended Oil	Fill Quantity
V6 base	OEM Open Diff	Castrol BOT 750B	0.75 l (wet) 0.85 l (dry)
V6 various	Quaife Helical ATB upgrade	GL-5 synthetic gear oil	0.75 l (wet) 0.85 l (dry)
V6 S model	OEM Friction LSD	Castrol BOT 720	0.75 l (wet) 0.85 l (dry)
V8 various	OEM Friction E-Diff	Castrol BOT 720	1.1 l (wet) 1.2 l (dry)

- Replace fill port hex head bolt (8mm Allen)
 - Fill bolt = 27 Nm



Other Jaguar Models

- The XF/XE/F-Pace models have similar rear suspension cradles and mounting methods
- The amount of access to rear differential bolts may vary between models.

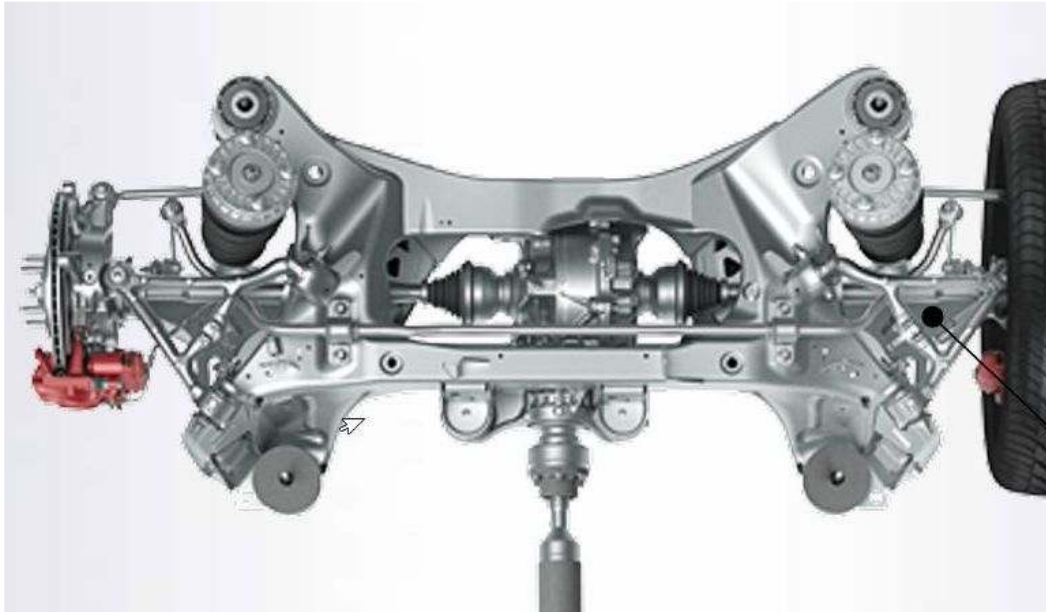


Figure 1. Top down view of F-Type V6 rear suspension assembly with highlights, fuel tanks not shown.

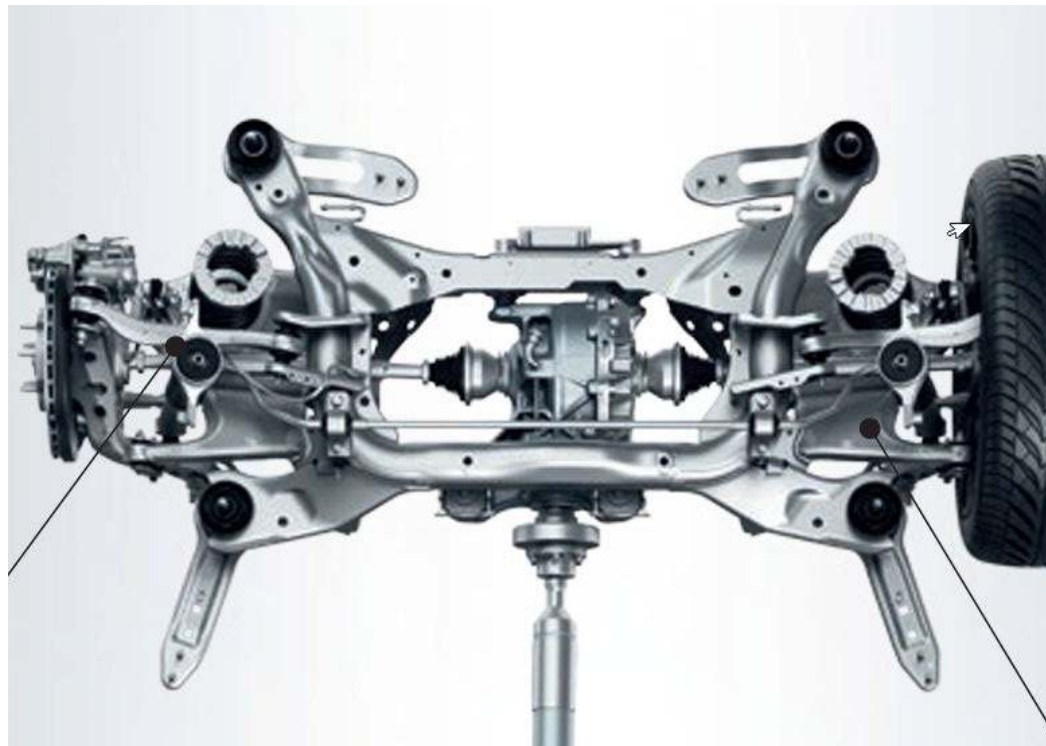


Figure 2. Top down view of XE/XF V6 rear suspension assembly with highlights, fuel tanks not shown.

Diagnosing Rear Differential Issues

From 2016 Jaguar XF manual: section 205-00, 2016

GEAR HOWL AND WHINE

Howling or whining of the ring gear and pinion is due to an incorrect gear pattern, gear damage or incorrect bearing preload

BEARING WHINE

Bearing whine is a high-pitched sound similar to a whistle. It is usually caused by worn/damaged pinion bearings, which are operating at driveshaft speed. Bearing noise occurs at all driving speeds. This distinguishes it from gear whine which is speed dependent.

As noted, pinion bearings make a high-pitched, whistling noise, usually at all speeds. If however there is only one pinion bearing that is worn/damaged, the noise may vary in different driving phases. A wheel bearing noise can be mistaken for a pinion bearing noise.

CHUCKLE

Chuckle that occurs on the coast driving phase is usually caused by excessive clearance between the differential gear hub and the differential case bore. Damage to a gear tooth on the coast side can cause a noise identical to a chuckle. A very small tooth nick or ridge on the edge of a tooth can cause the noise.

KNOCK

Knock, which can occur on all driving phases, has several causes including damaged teeth or gearset. A gear tooth damaged on the drive side is a common cause of the knock.

CLUNK

Clunk is a metallic noise heard when the automatic transmission is engaged in REVERSE or DRIVE. The noise may also occur when the throttle is applied or released. Clunk is caused by transmission calibration, backlash in the driveline or loose suspension components and is felt or heard in the vicinity of the rear drive axle.

BEARING RUMBLE

Bearing rumble sounds like marbles being tumbled. This condition is usually caused by a worn/damaged wheel bearing. The lower pitch is because the wheel bearing turns at only about one-third of the driveshaft speed. Wheel bearing noise also may be high-pitched, similar to gear noise, but will be evident in all four driving modes