



# Technical Service Bulletin

No.S211-04v6  
08 September  
2006

Reissue

**Please replace the previous edition of this bulletin.**

This bulletin supersedes TSB S211-04v5/2006 dated 17 January , which should either be destroyed or clearly marked to show it is no longer valid (e.g. with a line across the page).

**Subject/Concern :** Squeaking Noise from Servotronic Power Steering System

**Models :**  
S-TYPE | | Vin range : Up to N38511

**Markets :** All  
**Section :** 211-00

**Summary :**  
This bulletin addresses the possibility of a squeaking noise being emitted from the power steering system.  
  
**Version 6 of this bulletin has been issued due to a change in the Parts Required (Petroleum Jelly), and the Service Instruction.**  
  
**Cause :** The lower power steering pinion seal lacks lubrication and dries out.  
**Action :** Should a customer express concern, a modified lower pinion oil seal should be installed. Follow the Service Instruction outlined below.

**NOTE :** Castrol LM or Petroleum Jelly is classed as a workshop consumable and should be locally sourced.

Parts Required :		
Description	Part Number	Quantity
Transmission fluid - Mobil ATF (1 Litre bottle)	JLM 21703	As required
Power steering gear pinion oil seal kit	XR8 55205	1

**NOTE :** The SROs are complete and include time taken for carrying out all checks and tests.

Labour Time :		
Operation Description	Operation No.	Time
Power steering gear pinion oil seal rework - VIN M45255 to N13088	57.91.33	3.9 hours
Power steering gear pinion oil seal rework - VIN N13089 to N38511	57.91.33	3.4 hours

Repair/Claim Coding :	
<b>Causal Part :</b>	XR8 55205
<b>ACES Condition Code :</b>	N/A
<b>Defect Code :</b>	N/A

# Service Instruction

## Remove

**NOTE :** Illustrations shown in this Service Instruction are for left-hand drive vehicles; right-hand drive is similar.

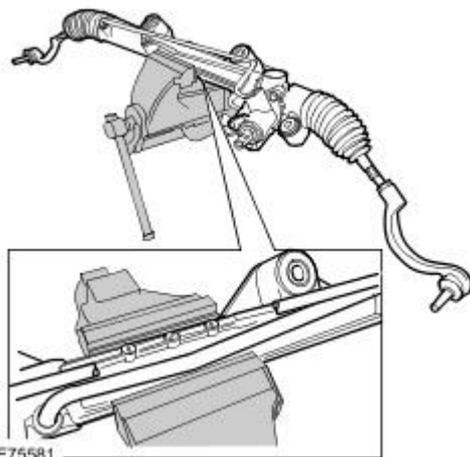
**NOTE :** Under no circumstances should this procedure be undertaken with the steering gear in the vehicle.

- 1 . Remove steering gear (see Global Technical Reference GTR Workshop Manual, section: 211-02).

- 2 .  **CAUTION : Before disconnecting or removing components, ensure the immediate area around the joint faces and connections are clean. Plug open connections to prevent contamination.**

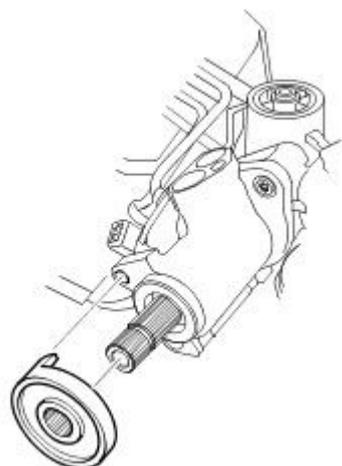
 **CAUTION : Ensure that working surfaces are thoroughly clean, to avoid contamination of the hydraulic components.**

Position the steering gear in a vice equipped with soft jaws. Ensure the gear is clamped on on the body ribs to reduce potential damage to the body gear (see E75581).



- 3 .  **CAUTION : Avoid excessive skin contact with mineral oil. Mineral oils remove the natural fats from the skin, leading to dryness, irritation and dermatitis.**

Remove and discard the pinion shaft dust cap/centralization device (see E75638).

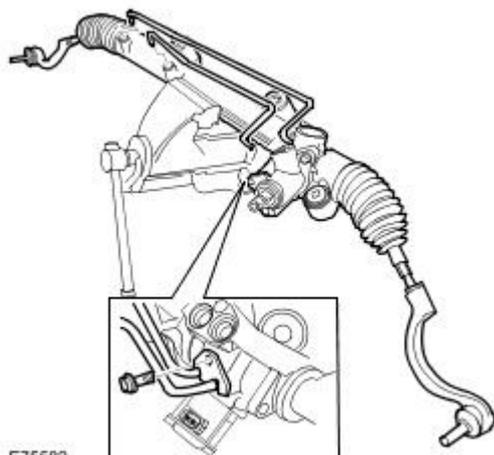


E75638

- 4 .  **WARNING : A small amount of fluid loss is unavoidable; position an absorbent cloth or container to collect the fluid.**

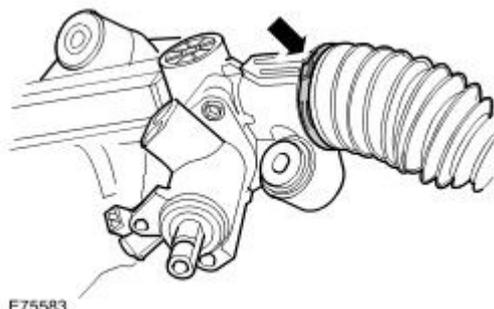
 **CAUTION : Always install clean plugs to open connections to prevent contamination.**

Remove external fluid pipes securing plate bolt and plate at pinion housing, and undo pipe union connections to rack body, and remove pipes. Remove and discard the four O-ring seals (see E75582).



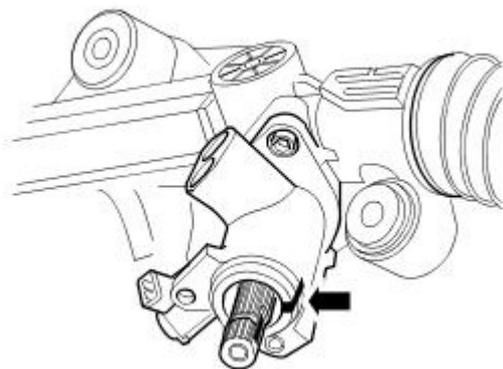
E75582

- 5 . Remove and discard the gaiter securing clip on the pinion end of the rack body, and release gaiter (see E75583).



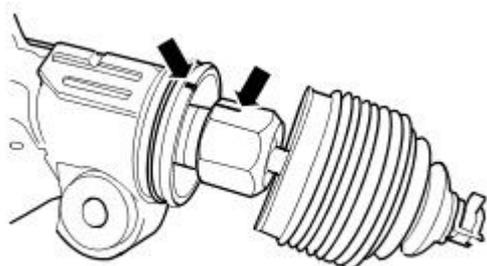
E75583

- 6 . Align the split in the tool to the centre of the flat on the pinion input shaft. The special tool should be installed flush to the pinion housing. Attach the special tool 211-329/01 to the pinion shaft and tighten the Allen bolt to 10Nm (see E75584).



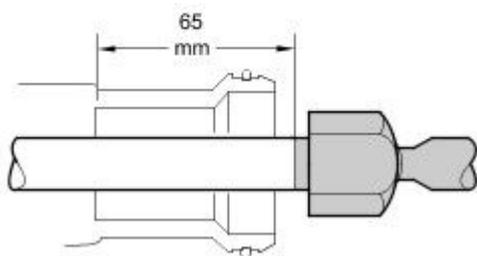
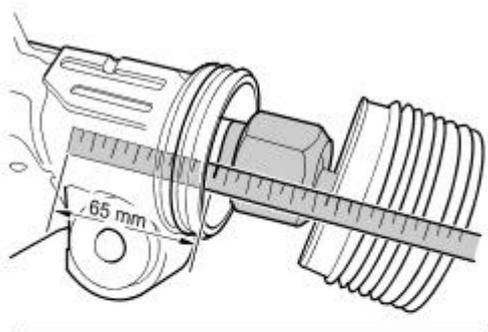
E75584

- 7 . Note the orientation of the rack bar to the rack bar housing, and mark the position of the rack bar in relation to the rack bar housing. This will aid re-assembly of the pinion housing to the rack housing after the seal has been replaced, by ensuring that the rack bar teeth, are in the correct position to allow meshing of the pinion when the pinion housing is reinstalled (see E82326).



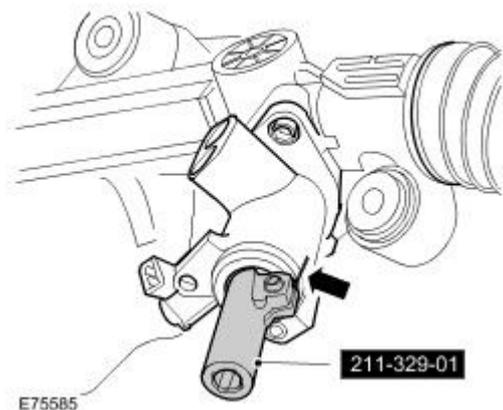
E82326

- 8 . Taking care not to damage the pinion splines, and using the special tool, align the steering gear to measurements shown in illustration E74331. This will centralize the steering rack/pinion assembly.



E74331

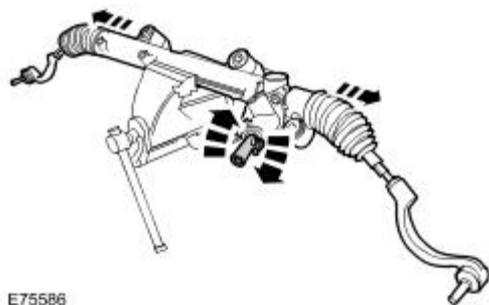
- 9 . Note the position of the split in the special tool 211-329/01 and place a corresponding mark on the pinion housing to the split in the special tool. This will align all items to the central rack position (see E75585).



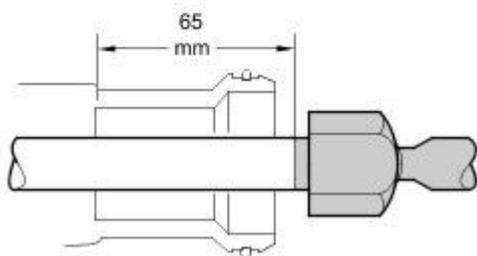
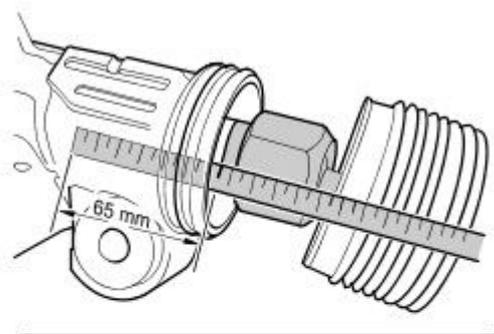
- 10 .  **CAUTION : Position lint free cloth over the hydraulic ports and position suitable container to collect fluid.**

-  **CAUTION : Cycle the steering gear slowly, to avoid excessive hydraulic pressure being generated.**

Using a ratchet in the special tool, manually operate the steering gear to expel any residual fluid from the steering gear (see E75586).



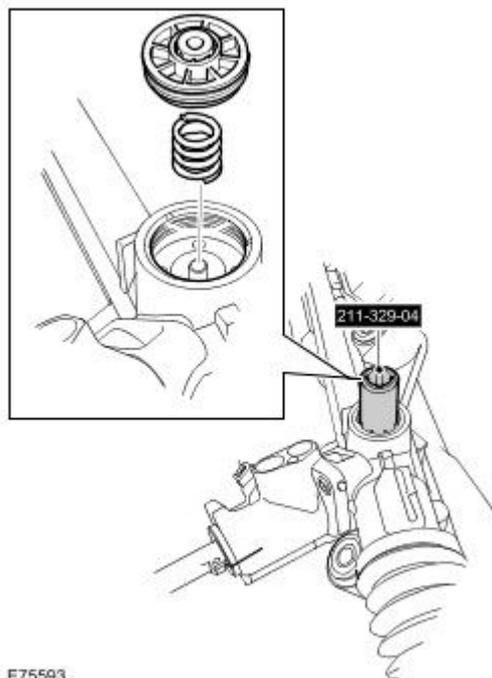
- 11 . Reposition the steering gear to align the painted marks on the steering gear pinion housing. Check the rack travel measurement is 65mm (E74331).



E74331

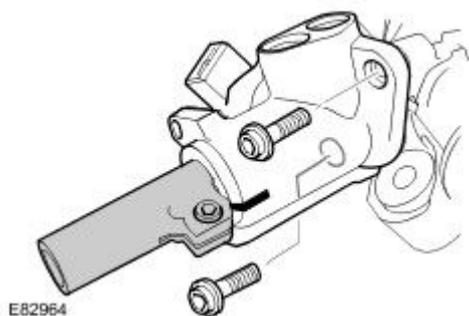
12 . **NOTE :** Do not remove the O-ring seal at this stage.

Remove the pinion pre-load nut using special tool 211-329/04, and collect the pre-load tension spring (see E75593).



E75593

13 . Remove and discard the two pinion housing securing bolts (see E82964).



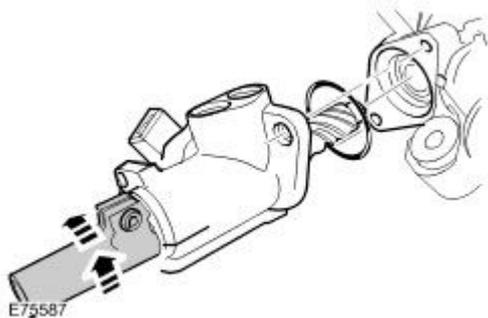
E82964

- 14 .  **CAUTION : Make sure the working surfaces are thoroughly clean to avoid contamination of the sensitive hydraulic components. Before the disconnection or removal of any components, ensure the area around joint faces and connections are clean. Plug any open connections to prevent contamination.**

 **CAUTION : Do not tap on the servotronic solenoid as this will cause internal solenoid damage. Do not use a lever in this operation as it will damage the housing.**

**NOTE :** On removal the pinion shaft will rotate approximately 90 degrees (clockwise on right-hand drive (RHD) assembly and anti-clockwise on left-hand drive (LHD)).

Using a nylon mallet, carefully rotate the housing to the side to release the seal and carefully release the pinion housing. Once the pinion is removed from the housing, remove and discard the O-ring seal (see E75587).

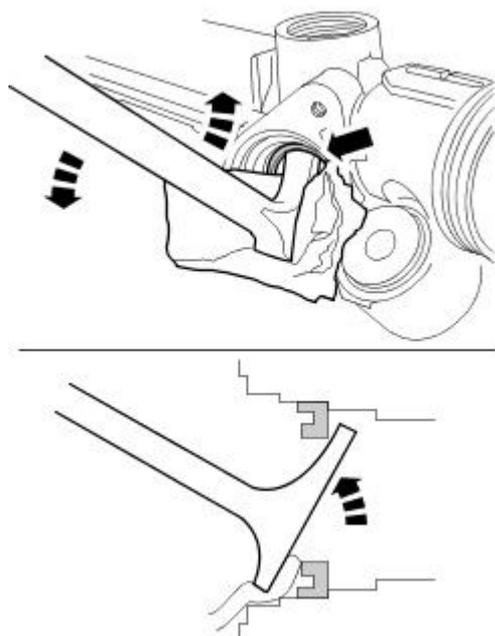


- 15 . Place the pinion housing assembly in a clean plastic bag, and seal to prevent contamination. Place the pinion away from the area to avoid damage occurring during the following operations.

- 16 .  **CAUTION : It is imperative that no damage/scoring, occurs to the seal register when removing the seal. Both the heel and the toe of the bar must not come into contact with the register/housing. If scoring occurs, oil will track past the new seal when replaced. It is imperative that no damage is caused to the seal register when removing the seal.**

 **CAUTION : Protect the seal register using lint free cloth.**

Carefully remove the pinion shaft inner seal. Take care not to score the seal register. This will result in an internal leak to the bellows, if damaged (see E75588).



E75588

17 . Clean the seal register and thoroughly inspect for damage.

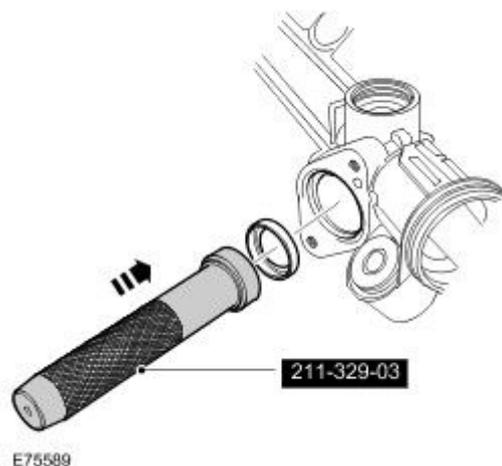
**Installation**

18 .  **CAUTION : A soft faced hammer should be used to avoid damaging the special tool and creating debris.**

**NOTE :** Ensure that the flat part of the seal is installed into the rack, and the spring is facing you.

**NOTE :** Lightly apply lubricant (Petroleum Jelly or Castrol LM), to the seal lip and outer surface to assist seal installation.

Lubricate and install the new steering gear pinion housing seal, using special tool 211-329-03 (E75589).

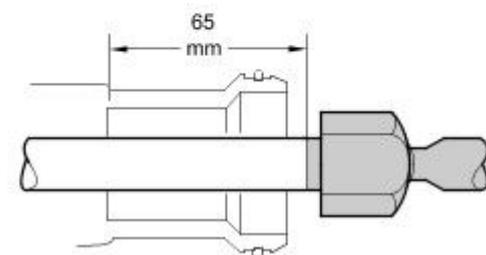
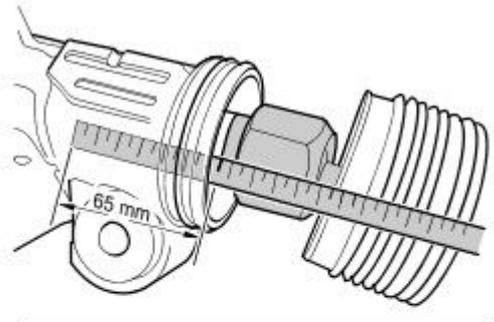


E75589

19 . Install guide pins (see E82325 Special tool 211-329-07) to the steering rack housing at the pinion fixing locations.

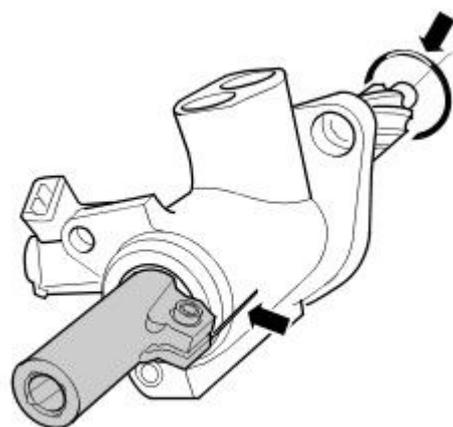


20 . Align the steering gear to measurements shown in illustration E74331.



E74331

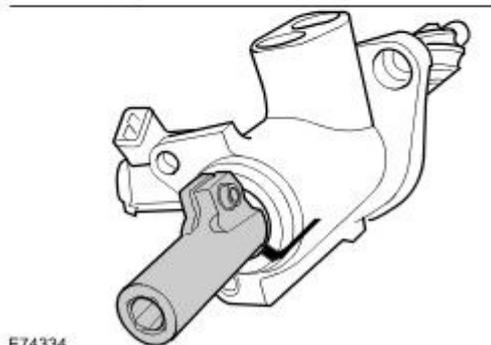
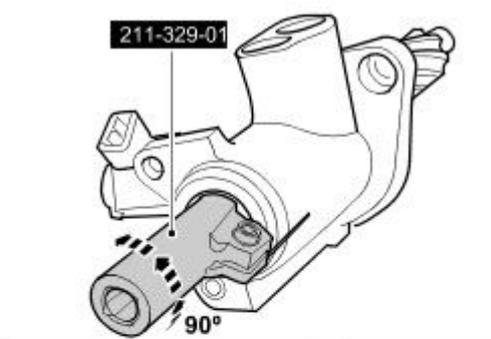
- 21 . Remove the steering gear pinion housing from the plastic bag.
- 22 . To avoid damage to the new seal, ensure the pinion shaft at point of contact with seal is clean from all old seal material. Lubricate and install the new O-ring seal, rotate the pinion and align the painted marks on the steering gear pinion housing (see E75590).



E75590

- 23 . **NOTE :** Ensure that the rack bar to rack housing orientation marks made at step 6 are aligned before attempting to install the pinion housing.

Align the paint marks, and then, for RHD, rotate the steering gear pinion clockwise so that the alignment paint marks are 90 degrees apart. For LHD rotate the steering gear pinion anti-clockwise so that the alignment paint marks are 90 degrees apart (see E74334).



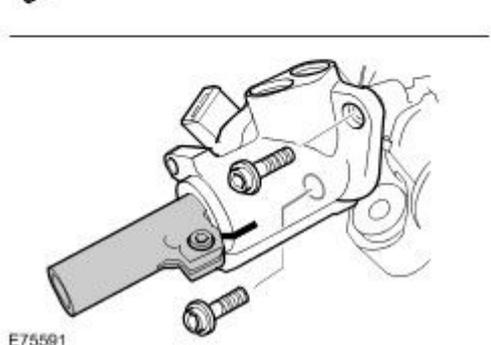
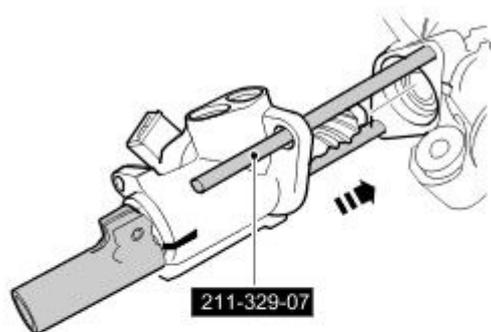
E74334

24 .



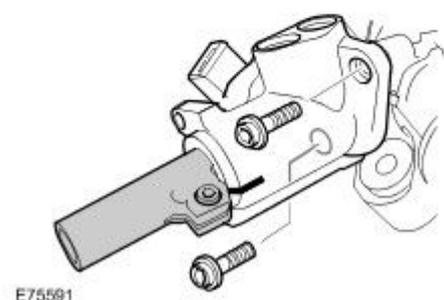
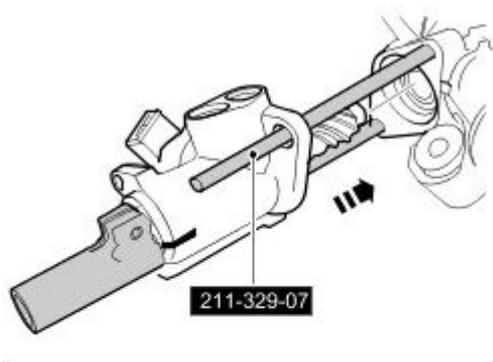
**CAUTION : Care must be taken when locating the pinion housing assembly to avoid damaging the new seal (if the pinion housing has to be removed for re-alignment, the seal must be checked for damage and replaced if necessary).**

Install the pinion housing to the steering gear body allowing the pinion shaft on RHD to rotate anti-clockwise as it enters the body (LHD rotate clockwise as it enters the body). Ease the rack bar upwards by hand against the body as this operation takes place to reduce the tension on the pinion shaft and help assembly (see E75591).



E75591

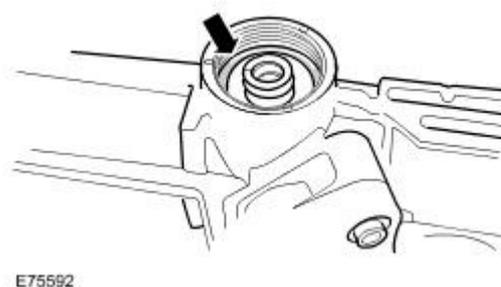
- 25 . Check that the paint marks on the pinion and the 65mm measurement are all aligned at the end of the installation.
- 26 . Install the two new bolts securing the pinion housing and tighten to 17Nm (12lb.ft) (see E75591).



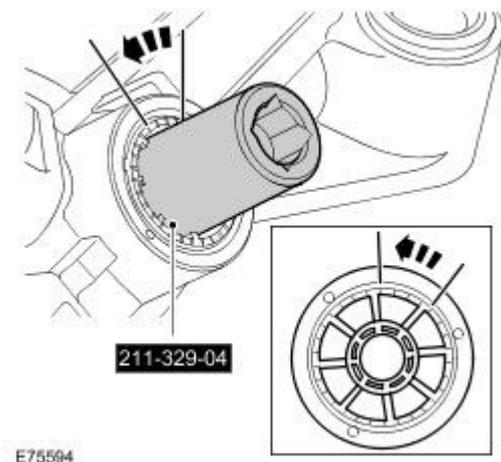
- 27 .  **CAUTION : Ensure any open connections are plugged to prevent contamination.**

Using a M35 x 1.5 tap, clean the pinion pre-load nut thread, remove any debris from the steering gear and remove and discard the O-ring seal.

- 28 . Lubricate and install the new O-ring seal. Install the steering gear pre-tension spring to the steering gear body (see E75592).

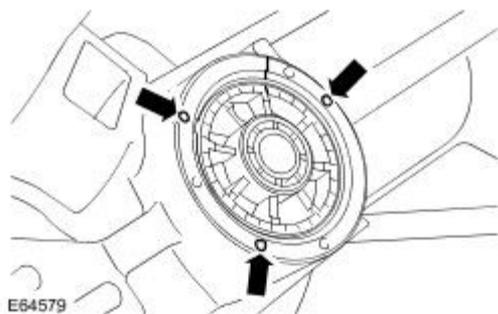


- 29 . Using special tool 211-329-04, install the new pinion pre-load adjusting nut and tighten to 20Nm (15lb.ft). Mark a division to the smooth face of the steering gear body and then back-off four small divisions (see E75594).

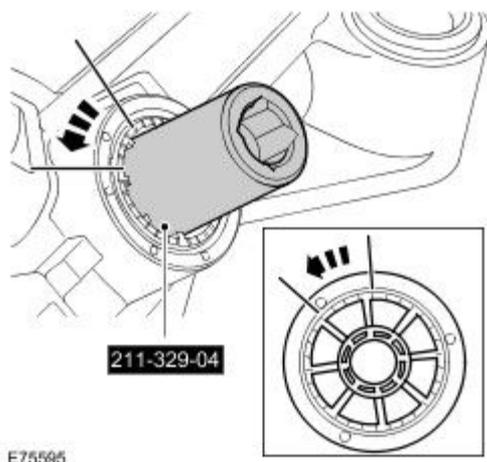


- 30 .  **CAUTION : Ensure that the center punch operation is carried out in the middle of the material to ensure no fragmentation of the housing occurs.**

Center punch the adjusting nut housing at three equidistant points (see E64579).

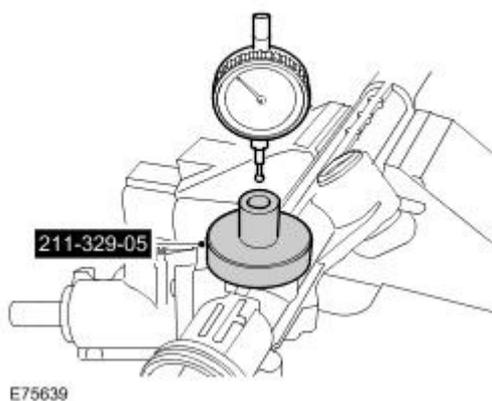


- 31 . Using special tool 211-329-04, back-off the pinion pre-load adjusting nut a further four small divisions (see E75595).



- 32 . **NOTE :** The next step should take place with all marks aligned, to ensure the rack and pinion are in the central position.

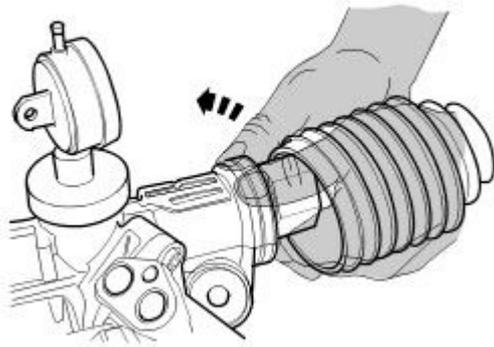
Install a suitable dial test indicator to the steering gear dial gauge with an extension to the needle through special tool (211-329-05) directly onto the back of the pre-tensioner pad (see E75639).



- 33 . **NOTE :** Should the clearance not be correct, the pre-load adjusting nut must be moved by a single division at a time to achieve the correct clearance.

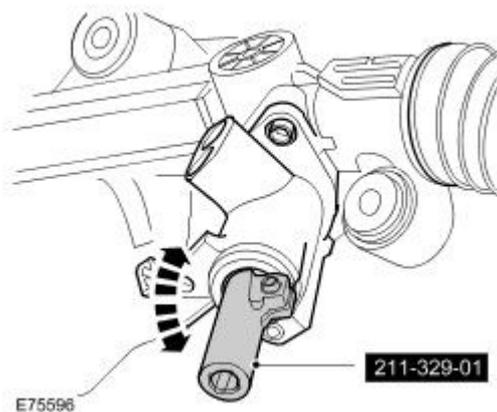
With care so that the steering gear body does not move during the operation, check

the pre-load by lifting the rack bar by hand using the inner ball joint nut to avoid damage to the ball joint itself (see E75907). The clearance must be minimum 0.05mm and maximum 0.1mm.



E75907

- 34 . Using the tool on the pinion shaft (211-329-01) rotate the steering gear lock-to-lock to ensure there is no significant resistance or rough motion felt. From the central position the turns should be equal lock-to-lock. If there is any roughness or resistance felt, the clearance must be rechecked, adjusted, and the check carried out again (see E75596).



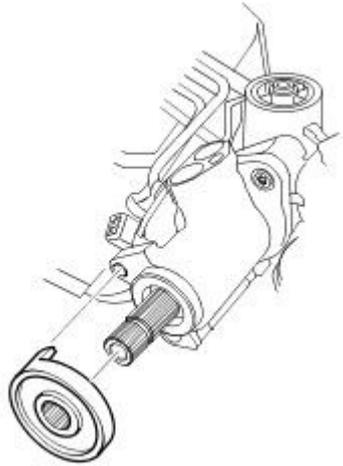
E75596

- 35 . Once the correct clearance is achieved, remove the dial test indicator gauge and special tools, and install the new sealing plug to the adjustment nut.
- 36 . Lubricate the O-ring on the end of the steering gear body and re-install the gaiter with the new clip.
- 37 . Check the external pipes are clean, install the new O-rings to the pipes and install pipes to the steering gear body. Tighten pipe unions to body to 10Nm (7lb.ft) and the pinion pipe retaining plate to 12Nm (9lb.ft).
- 38 .



**CAUTION : Take care when installing the seal dust cover, as it is tight on the splines.**

Recheck the paint marks on the pinion shaft to housing, and then install the new pinion shaft seal dust cover, ensuring the centralizing pin on the cover locates in the pinion housing recess (see E75638).



E75638

- 39 . Install steering gear (see Global Technical Reference GTR Workshop Manual, section: 211-02).

#### **When carrying out the road test**

- 40 . Check that the steering wheel is in the straight ahead position, self-centering ability coming off left and right-hand lock, smooth operation from lock to lock, and freedom from noise while turning lock to lock.

#### **After the road test**

- 41 . **NOTE :** These checks must be completed prior to the vehicle being returned to the owner.

Open hood and install fender protectors.

- 42 . Check the power steering system fluid reservoir level (major level drop without any sign of external leakage may indicate that the replacement pinion seal lip area has been damaged during installation or the seal has been installed incorrectly/reversed).
- 43 . Raise vehicle on 'twin-post' ramp.
- 44 . Check for power steering system fluid leaks from hydraulic connections on fluid transfer pipes and pinion housing to rack housing security of rack end bellow fit to rack bar housing (components disturbed during seal replacement).
- 45 . Check for power steering system fluid migration into the rack bellows causing them to expand/balloon/inflate (associated with major fluid loss from reservoir without external fluid loss).
- 46 . Lower ramp.
- 47 . Remove fender protectors and close hood.

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