MANUAL TRANSMISSION/TRANSAXLE

SPECIFICATIONS

MAINTENANCE

DESCRIPTION	INTERVALS
Normal maintenance	Filled for Life
Severe duty maintenance	Change the fluid at 150, 000 miles, 10 year intervals.

CAPACITIES

-	LITERS
Transmission Fluid	1.2

LUBRICANTS, FLUIDS, SEALERS AND ADHESIVES

CAUTION: Use only Pentosin FFL-3 Manual transmission oil. Use of any other fluid may result in a transmission malfunction or failure.

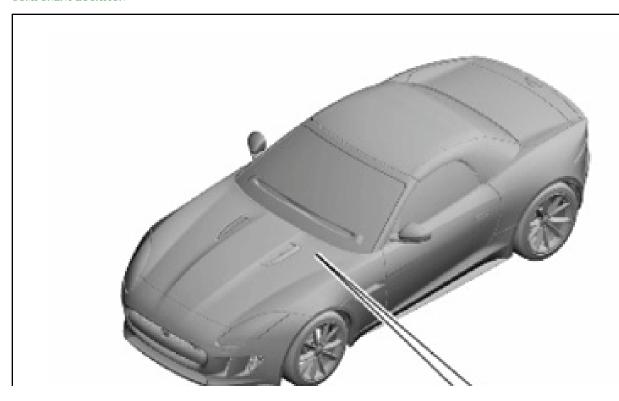
DESCRIPTION	SPECIFICATION
Manual Transmission fluid	GX73-M1R564-AA
Input shaft Grease	GX73-M1R561-AA
Metal surface cleaner	WSW-M5B392-A
High temperature grease	Molecote FB180

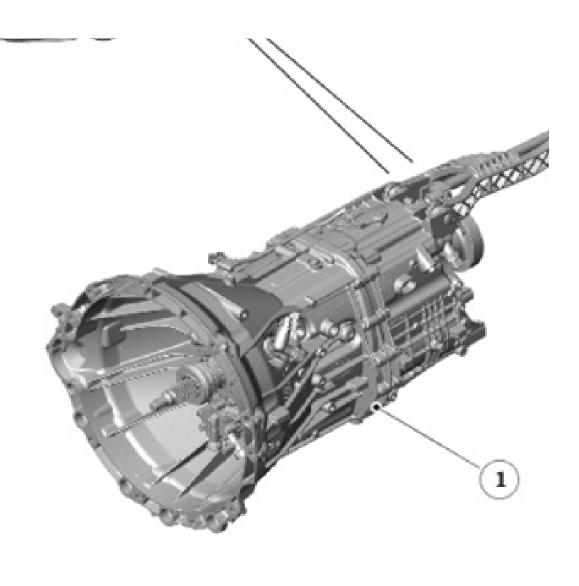
TORQUE SPECIFICATIONS

DESCRIPTION	NM	LB-FT	
Transmission retaining bolts	48	35	
Transmission mount retaining bolts	45	33	
*Transmission fluid level plug	43	38	
Transmission fluid drain plug	43	38	
Slave cylinder bolt	10	-	
Reverse gear switch	16	12	
Prop-shaft flange retaining nut (Always replace the nut)	60	44	
Gear selector position sensor retaining bolts	10	7	
Slave cylinder hydraulic lines support bracket bolts	12	9	
Gear selector lever retaining bracket bolts	12	9	

DESCRIPTION AND OPERATION

COMPONENT LOCATION





E174876

ITEM	DESCRIPTION
1	Manual transmission
2	Selector lever assembly

OVERVIEW

The S6-45 manual transmission is a 6 speed unit manufactured by ZF. The transmission features aluminium casings and drilled shafts to minimise weight.

The transmission is operated by a single rod from the selector lever.

Maximum input torque capacity is 450 Nm. Dry weight of the transmission is 43.5 Kg (96.0 lb).

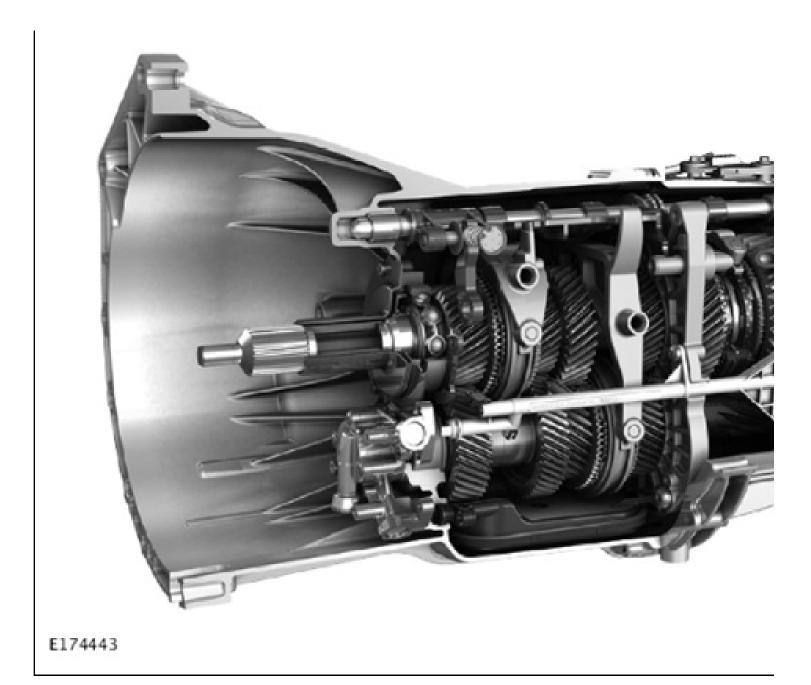
Lubrication is by a wet sump spray system to minimise drag losses. An oil pump is driven by the transmission lay shaft and produces oil pressure up to 1 bar (14.5 lbf/in²).

The lubricating oil is contained in the transmission casing and is drawn into a filter at the bottom of the transmission casings when the transmission input shaft is rotating. Oil

Oil is drained via the drain plug on the underside of the transmission casing. An oil filler and level plug is located on the side of the transmission casing.

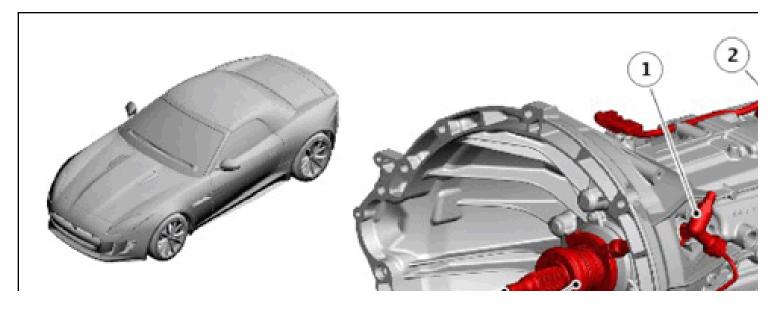
DESCRIPTION

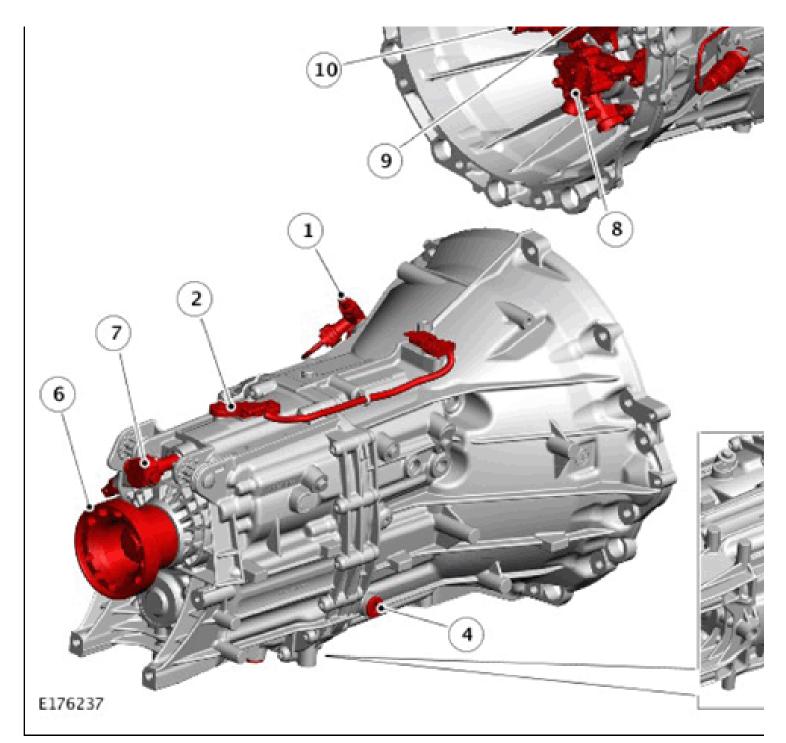
S6-45 MANUAL TRANSMISSION SECTIONAL VIEW



For selector lever description refer to $\underline{MANUAL\ TRANSMISSION/TRANSAXLE\ EXTERNAL\ CONTROLS}$.

For additional information, refer to: External Controls - $\underline{\textbf{DESCRIPTION}}$ and $\underline{\textbf{OPERATION}}$.

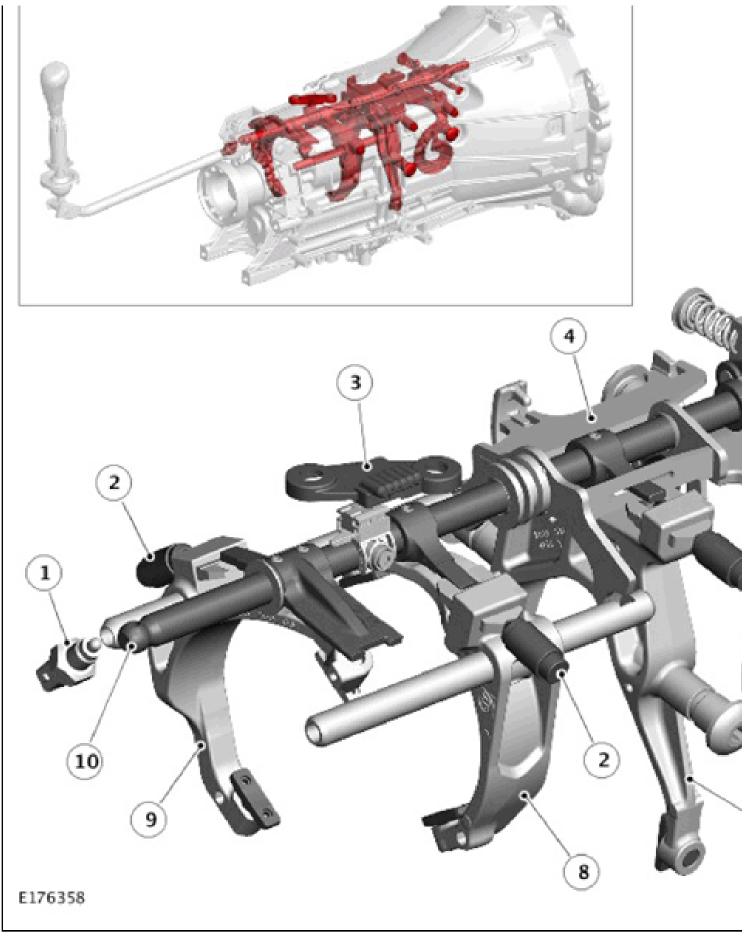




ITEM	DESCRIPTION
1	Hydraulic clutch bleed adaptor
2	Gear selector position sensor
3	Reverse switch
4	Oil level/filler plug
5	Drain plug
6	Output flange
7	Selector shaft
8	Oil pump
9	Clutch slave cylinder
10	Input shaft

SELECTOR MECHANISM





ITEM	DESCRIPTION
1	Reverse switch

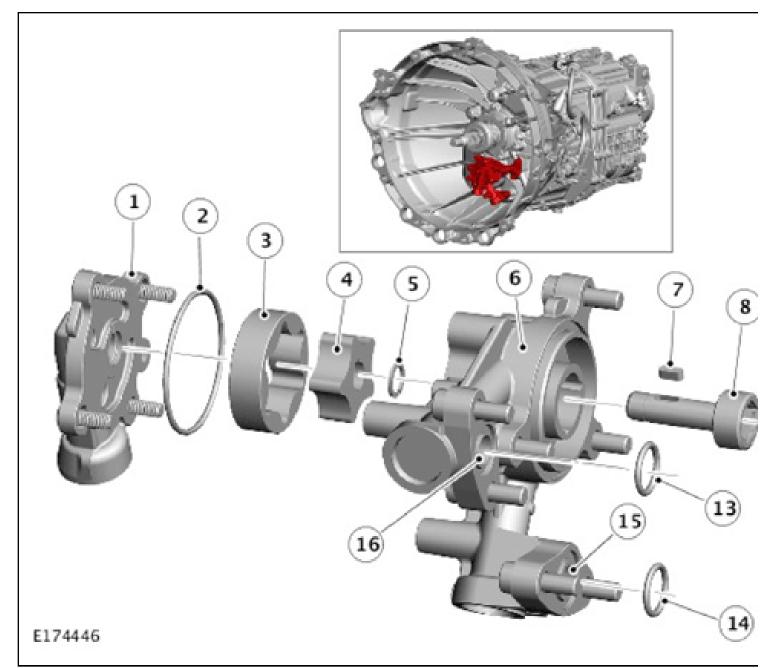
	ITEM	DESCRIPTION
2		Detent
3		Gear selector position sensor
4		Gear interlock assembly
5		Selector shaft detent assembly
6		Shift fork - 5th/6th gear
7		Shift fork - 3rd/4th gear
8		Shift fork - 1st/2nd gear
9		Shift fork - reverse gear
10		Selector shaft

The selector mechanism comprises four selector forks. Three selector forks are attached to shift rods with roll pins. The central selector fork is attached to the transmission ca Each selector fork transfers movement of the selector lever to the relevant shift coupling sleeve.

The transmission is operated by selector rod which is attached to the selector lever. Linear movement of the selector lever is passed via the selector rod to the selector shaft. T transmission to select the requested gear ratio. Synchromesh is used to ensure smooth gear change transition.

A hall effect gear selector position sensor is located externally on the top of the transmission casing. The sensor detects the position of the selector shaft in relation to the selector connected to the Engine Control Module (ECM).

OIL PUMP



ITEM DESCRIPTION		
	III EM	DESCRIPTION

ITEM	DESCRIPTION
1	Oil pump cover
2	O-ring seal
3	Outer rotor
4	Inner rotor
5	Circlip
6	Oil pump body
7	Woodruff key
	Drive shaft
	Circlip
	O-ring seal
11	Drive pin
	Adapter
	O-ring seal
14	O-ring seal
	Inlet from filter
16	Pressure outlet to spray bar

The oil pump is a positive displacement, gerotor type oil pump. The pump is capable of producing oil pressure of up to 1 Bar (14.5 lbf/in²).

The oil pump is located in the transmission housing, adjacent to the input shaft. The pump is secured to the transmission casing with seven torx screws.

O rings seal the low pressure inlet, high pressure outlet and the oil pump body to the transmission casing.

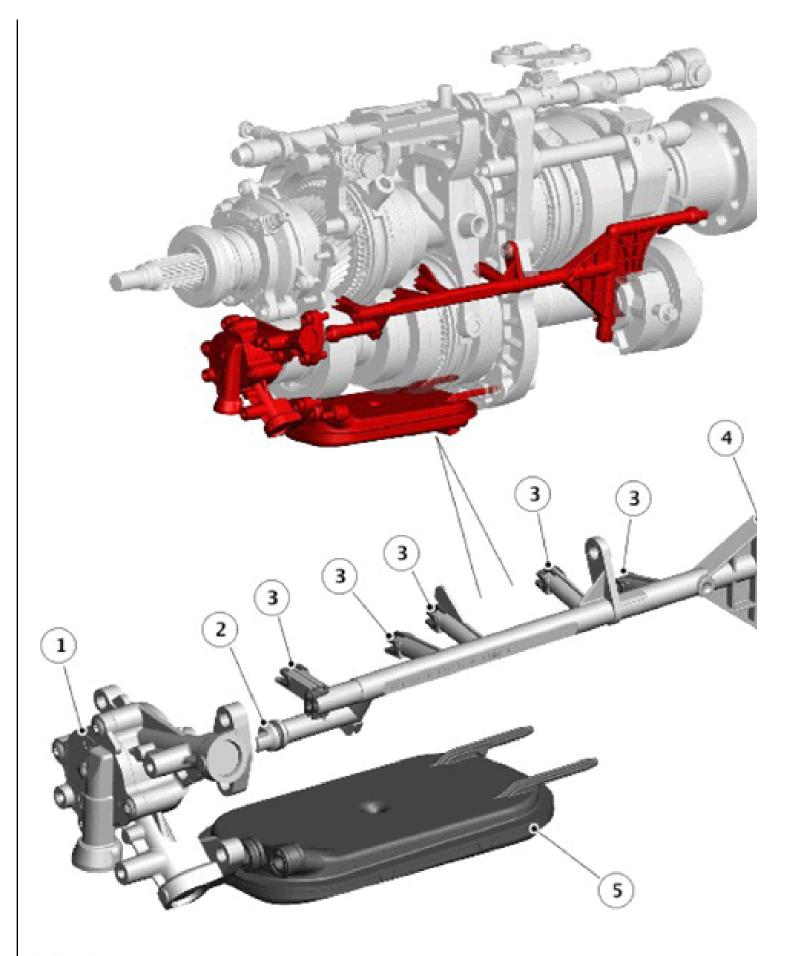
The oil pump comprises an oil pump body, an oil pump cover, an outer rotor, an inner rotor and a drive shaft.

The oil pump body contains a pressure relief valve to ensure the output pressure does not exceed the optimum value. The pump cover is sealed to the oil pump body with O-r

The outer rotor rotates within the oil pump body, driven by the inner rotor. The inner rotor axis is offset to the axis of the outer rotor. A drive shaft is located in the inner rotor key. The outer end of the drive shaft has an internal hexagon, which mates with a hexagon on the adapter.

The oil pump is driven by the transmission lay shaft. The adapter is fitted with a drive pin which engages in two internal slots in the end of the lay shaft.

OIL DISTRIBUTION



ITEM	DESCRIPTION
1	Oil pump
2	Pressure inlet
3	Spray orifice
4	Spray bar
5	Filter

The oil is drawn into the pump via a filter located in the bottom of the transmission casing. Pressurized oil is supplied from the oil pump, through a drilling in the transmission along the length of the transmission main shaft and delivers oil onto the gears, bearings and synchromesh.

GEAR SELECTOR POSITION SWITCH

The gear selector position switch is located on the top of the rear transmission casing. The switch is secured to the casing with two screws. An electrical connector provides fe also power and ground.

The ECM provides a 5V power supply and also a ground. The remaining connections provide signal and angle feedback relative to the gear selector lever position.

A magnet is located on the selector shaft within the transmission. The magnet rotates and moves fore and aft with the selector shaft. The hall effect gear selector position sens to the ECM.

REVERSE SWITCH

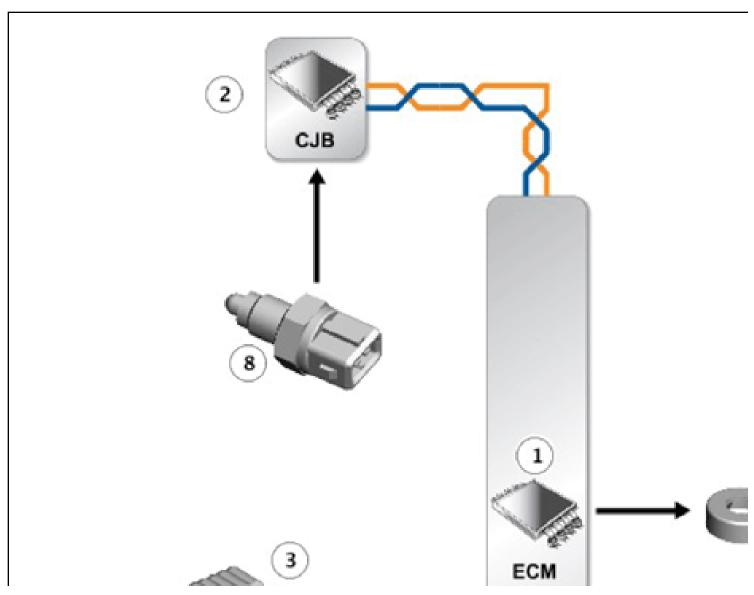
The reverse switch is located on the left rear of the rear transmission casing. The switch is a plunger type switch.

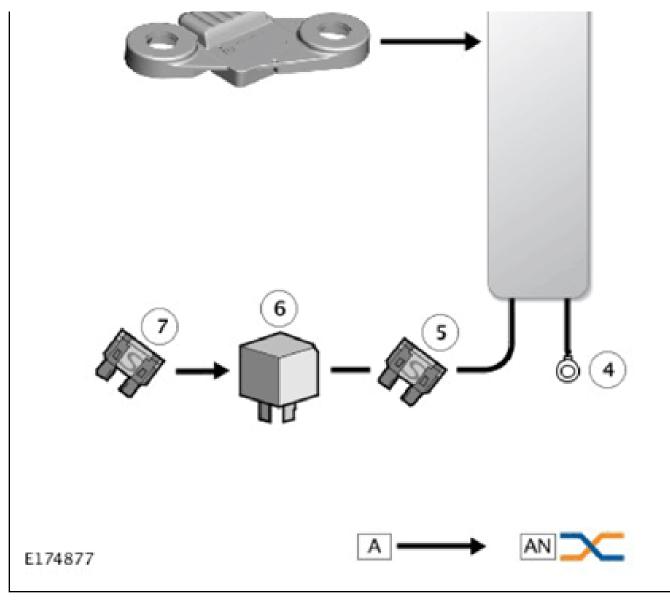
The switch is connected to ground and also the Central Junction Box (CJB) assembly.

When reverse gear is selected using the selector lever, the switch plunger is operated by contact with the reverse shift rod. When the switch is operated a ground path to the C illuminate the reverse lamps and also broadcasts the information on the high speed Controller Area Network (CAN) bus powertrain systems bus and also the high speed CAN systems, for example rear parking aid.

CONTROL DIAGRAM

NOTE: A = Hardwired; AN = High speed CAN powertrain systems bus





ITEM	DESCRIPTION
1	Engine Control Module (ECM)
2	Central Junction Box (CJB)
3	Gear selector position sensor
4	Ground
5	Fuse - Engine Junction Box (EJB)
6	Relay - ECM
7	Fuse - Auxiliary Junction Box (AJB)
8	Reverse switch

GENERAL PROCEDURES

TRANSMISSION DRAINING AND FILLING (G1821607)

Draining

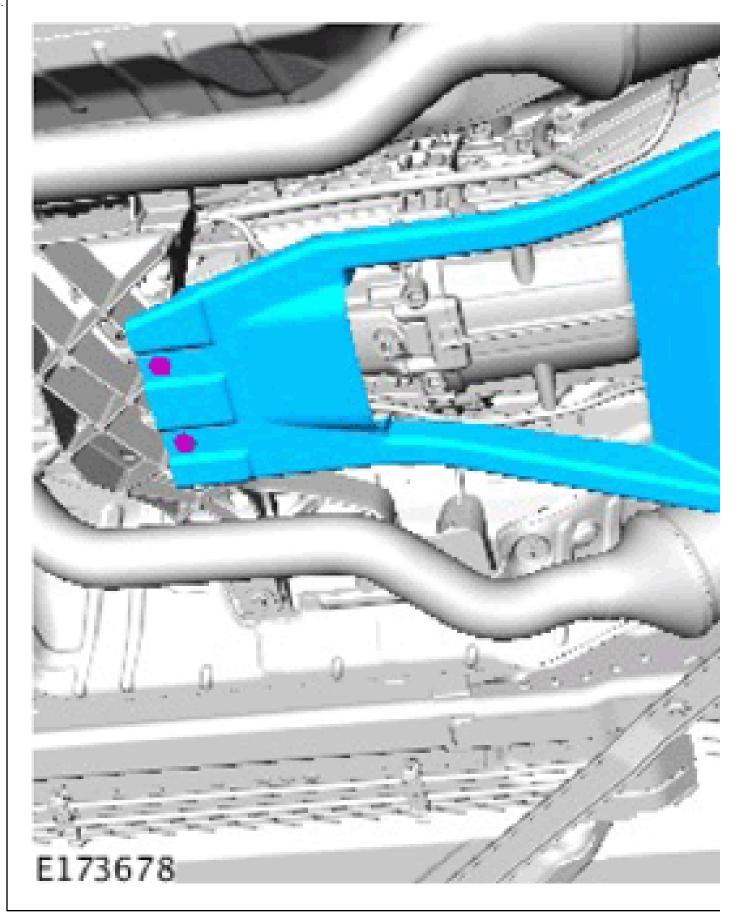
WARNING: Observe due care when draining, as the fluid can be very hot.

NOTE:

- Some variation in the illustrations may occur, but the essential information is always correct.
- Some components shown removed for clarity.
- Removal steps in this procedure may contain installation details.

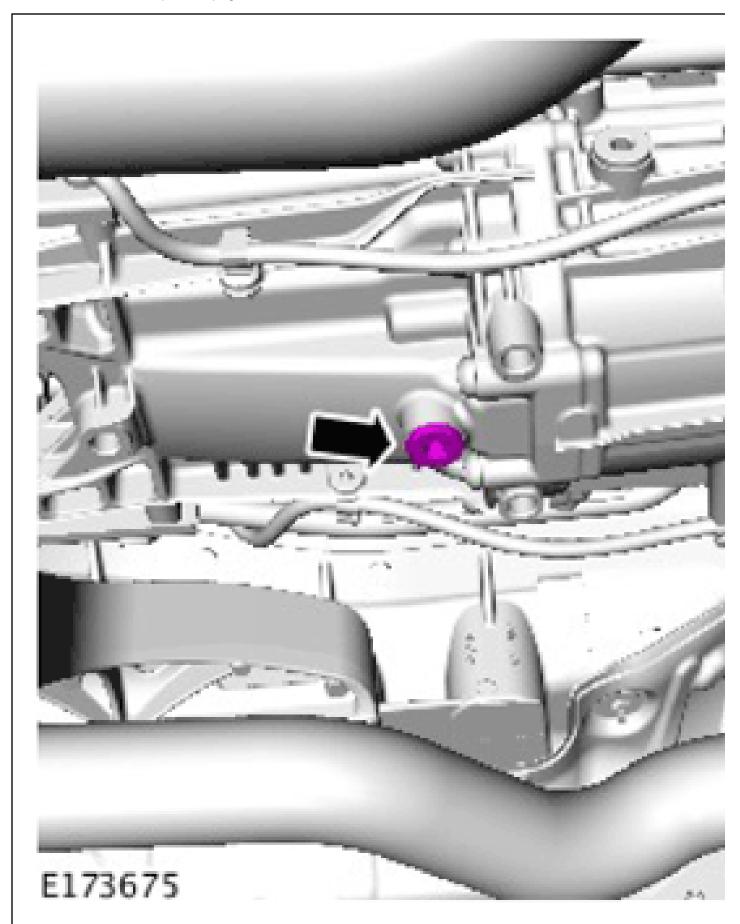
1.

- Make sure to support the vehicle with axle stands.
- Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.
- Raise and support the vehicle.
- 2. Refer to: Air Deflector (Removal and Installation).



Torque Specification: 9 Nm

- 4. Clean the area around the transmission fluid drain and filler plugs.
- 5. Place a container under the transmission.

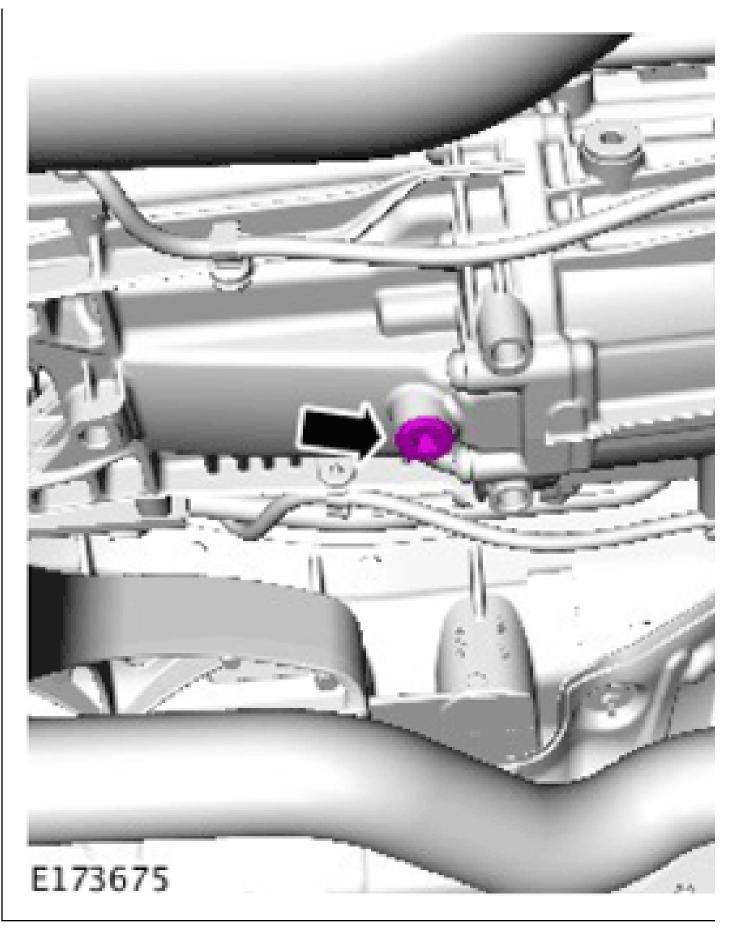


WARNING: Observe due care when draining, as the fluid can be very hot.

NOTE:

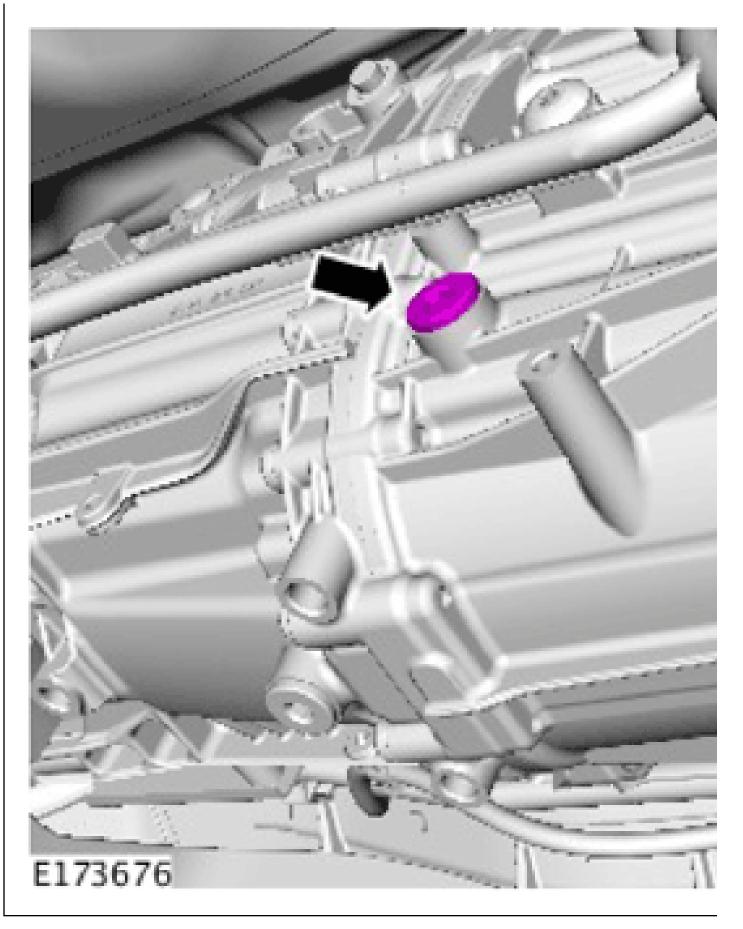
• Some variation in the illustrations may occur, but the essential information is always correct.

	Removal steps in this procedure may contain installation details.		
OTE:	Remove the oil pan drain plug.		

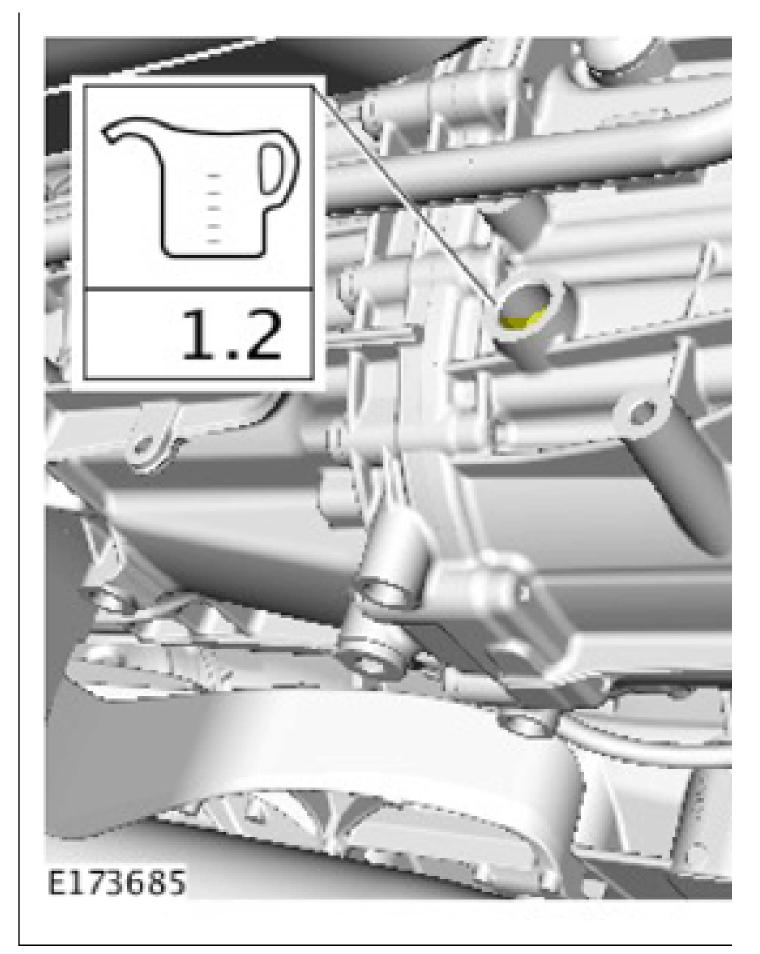


Torque Specification: 43 Nm

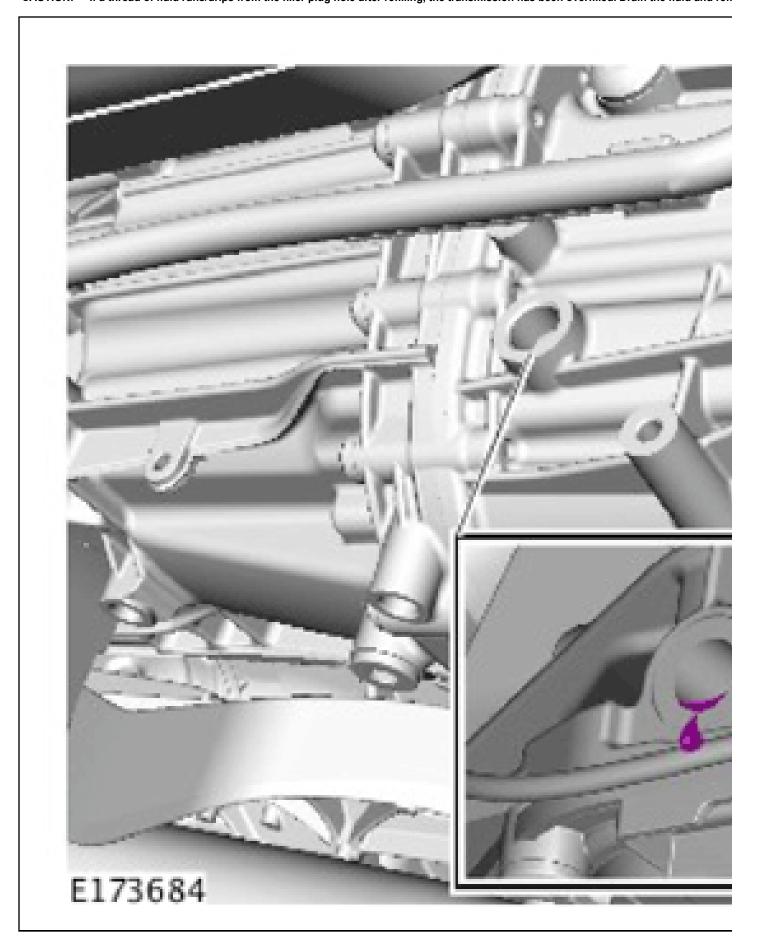
2. NOTE: Discard the sealing plug.

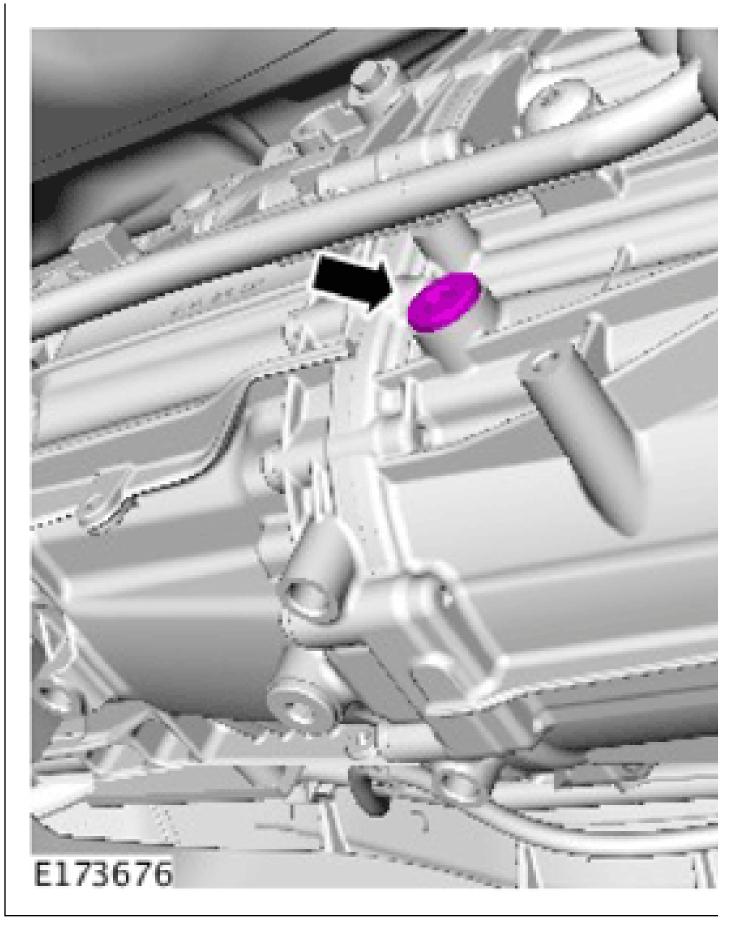


3. NOTE: Fill the transmission with the correct specification of fluid, to the valve indicated.



Refer to: $\underline{Specifications}$.

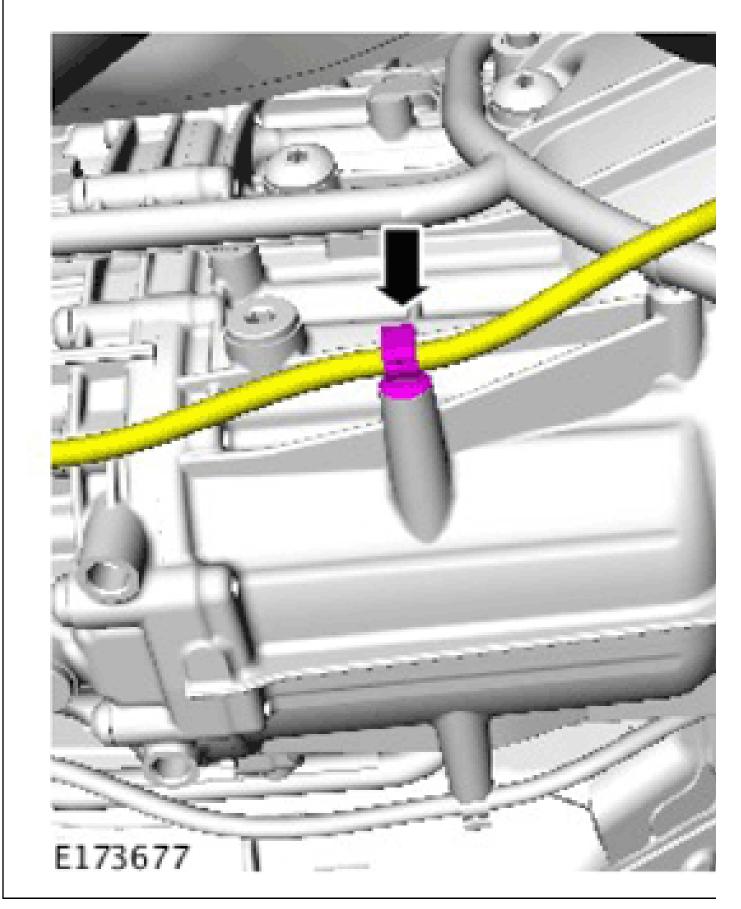




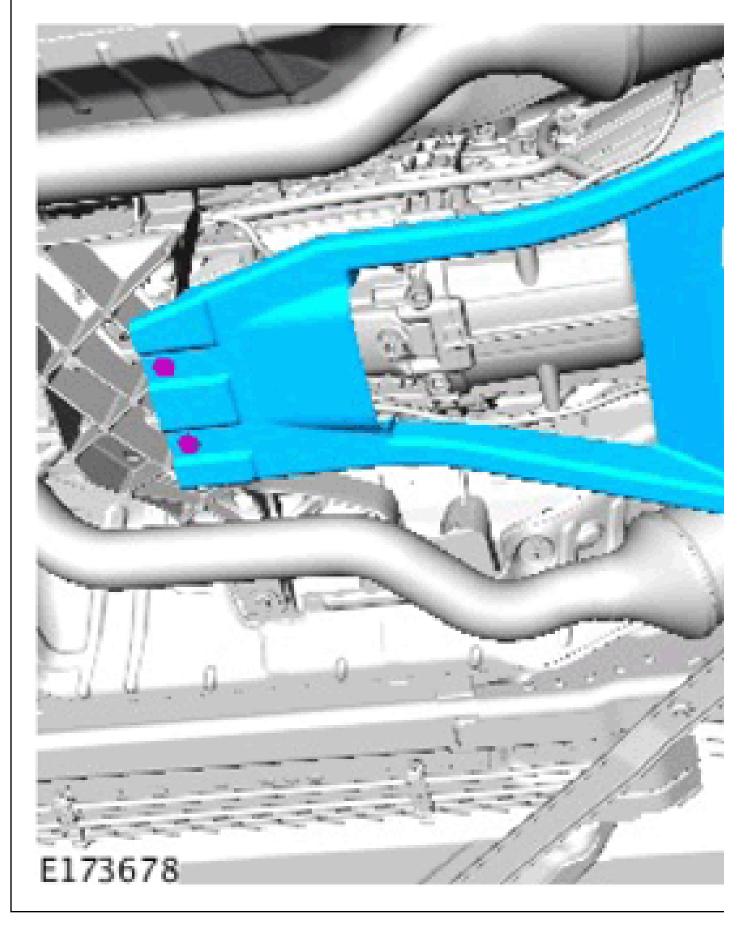
Torque Specification: 43 Nm

^{6.} Clean the area around the transmission fluid drain and filler plugs.

^{7.} Remove the container.

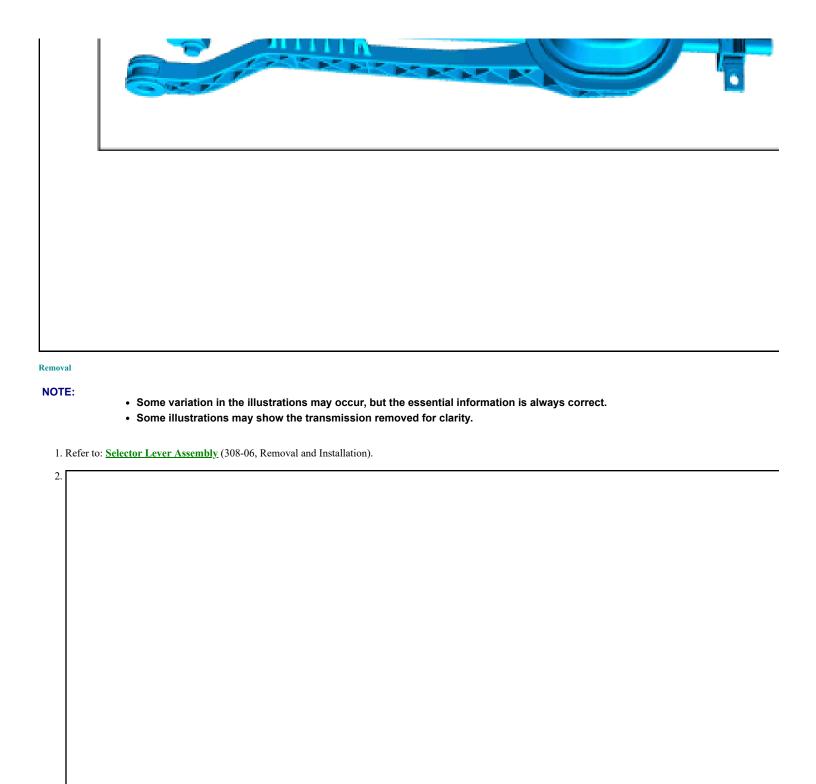


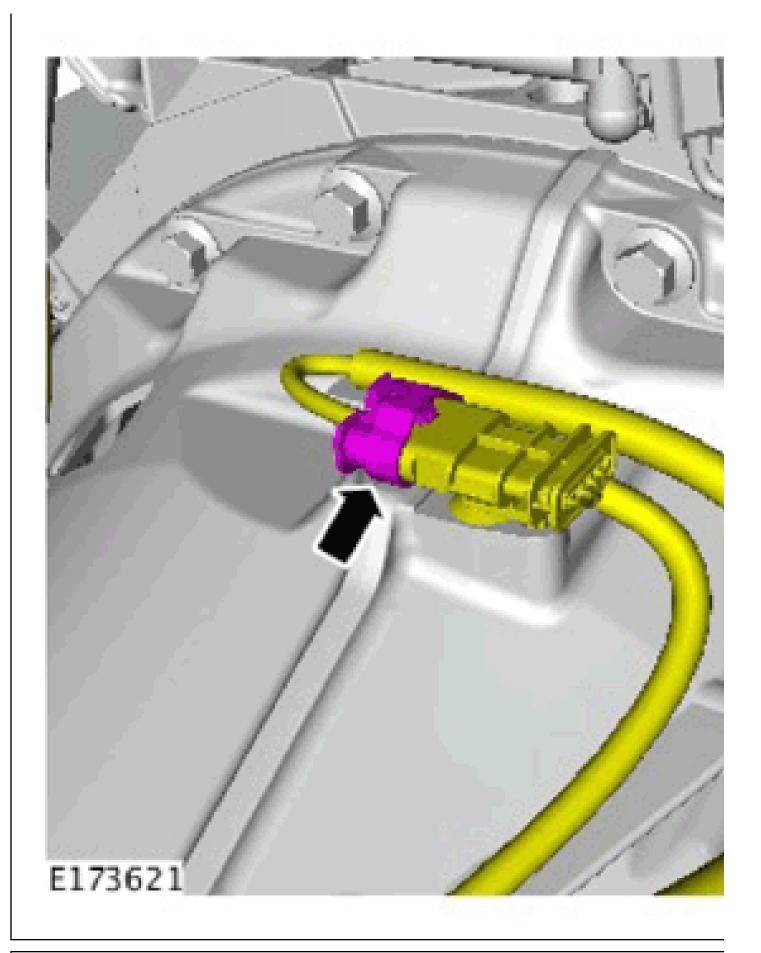
• If necessary, install new clips.

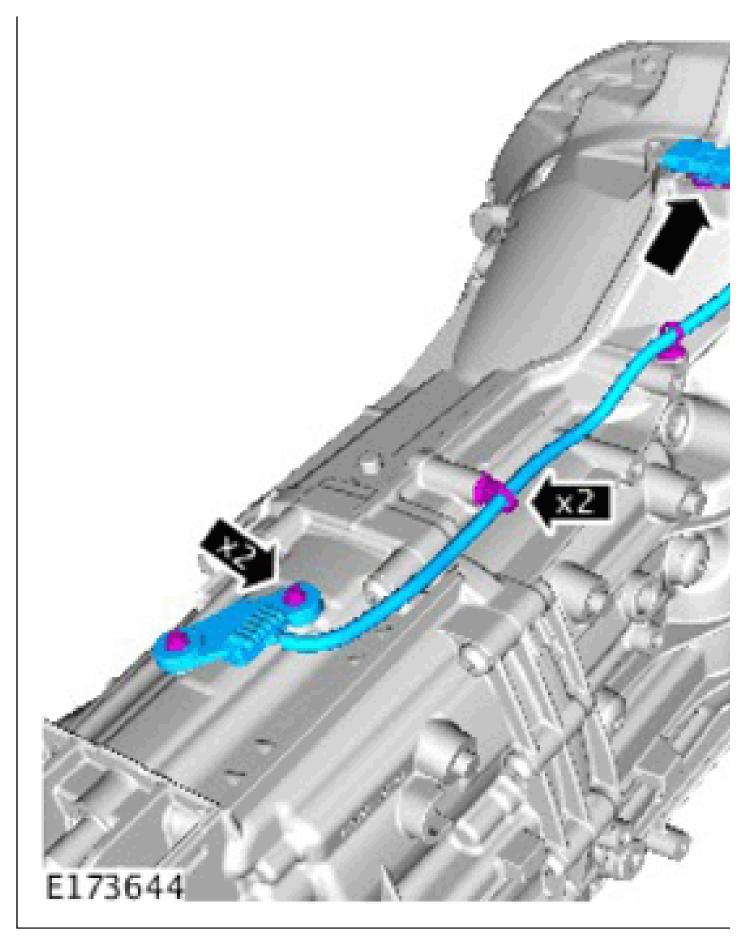


Torque Specification: 9 Nm

37.27.12	GEAR POSITION SENSOR - RENEW	3000 CC, AJ V6 (AJ126)
	37.23.06	37.27.01
33.35.01 33.35.01/02		37.27.12
	37.16.30	37.20/01/90



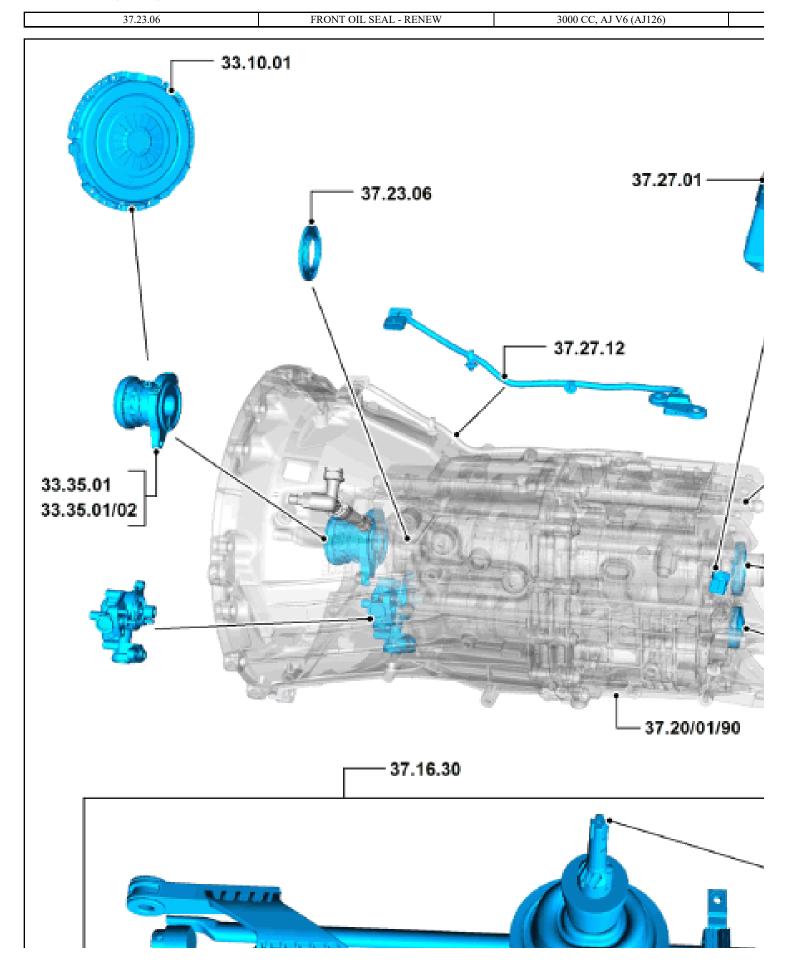




Torque Specification: 3 Nm

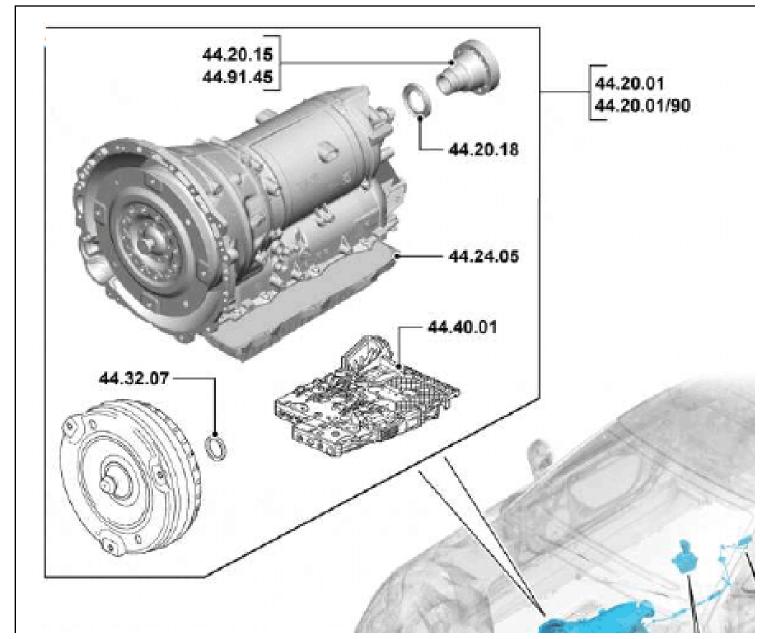
Installation

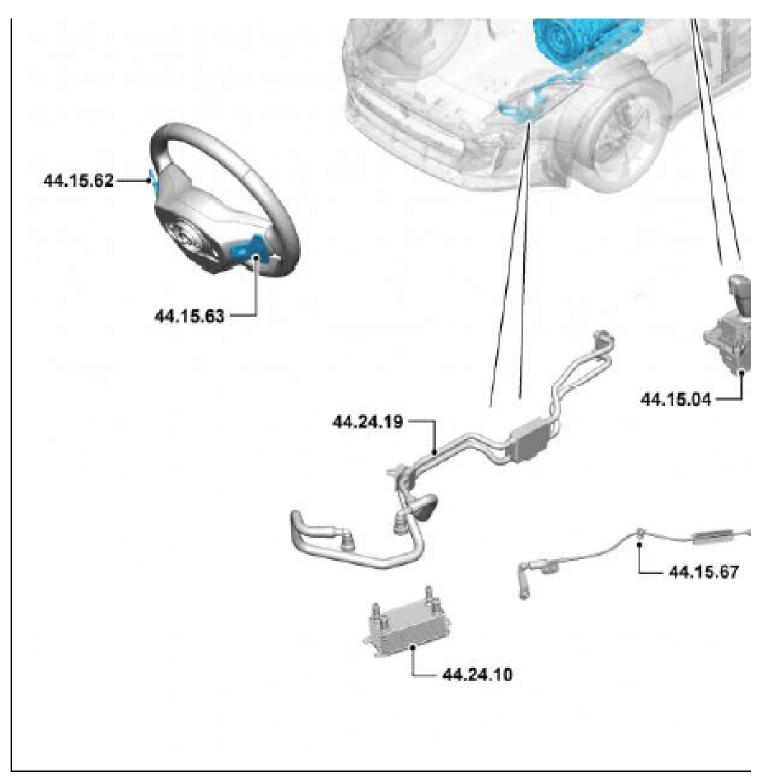
 $1. \ To \ install, \ reverse \ the \ removal \ procedure.$

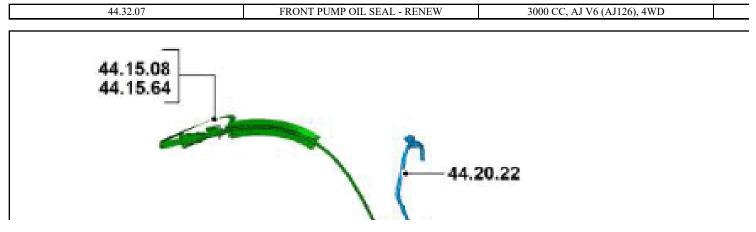


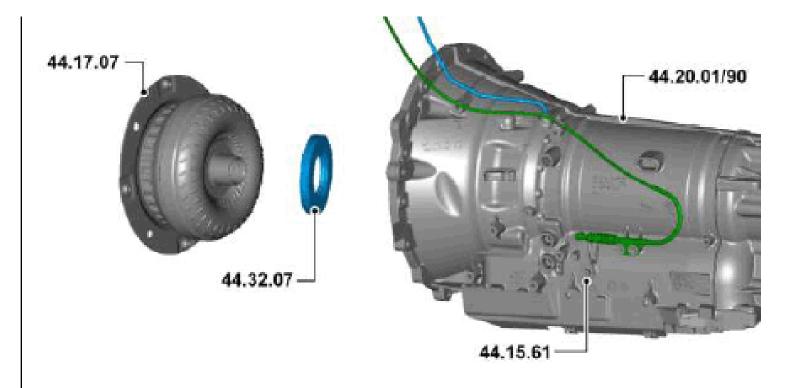


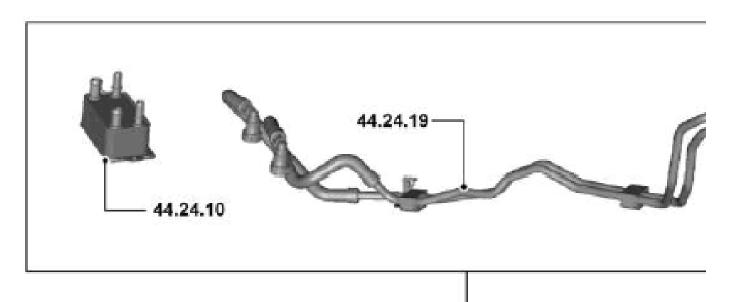
44.32.07 FRONT PUMP OIL SEAL - RENEW 3000 CC, AJ V6 (AJ126), 2WD



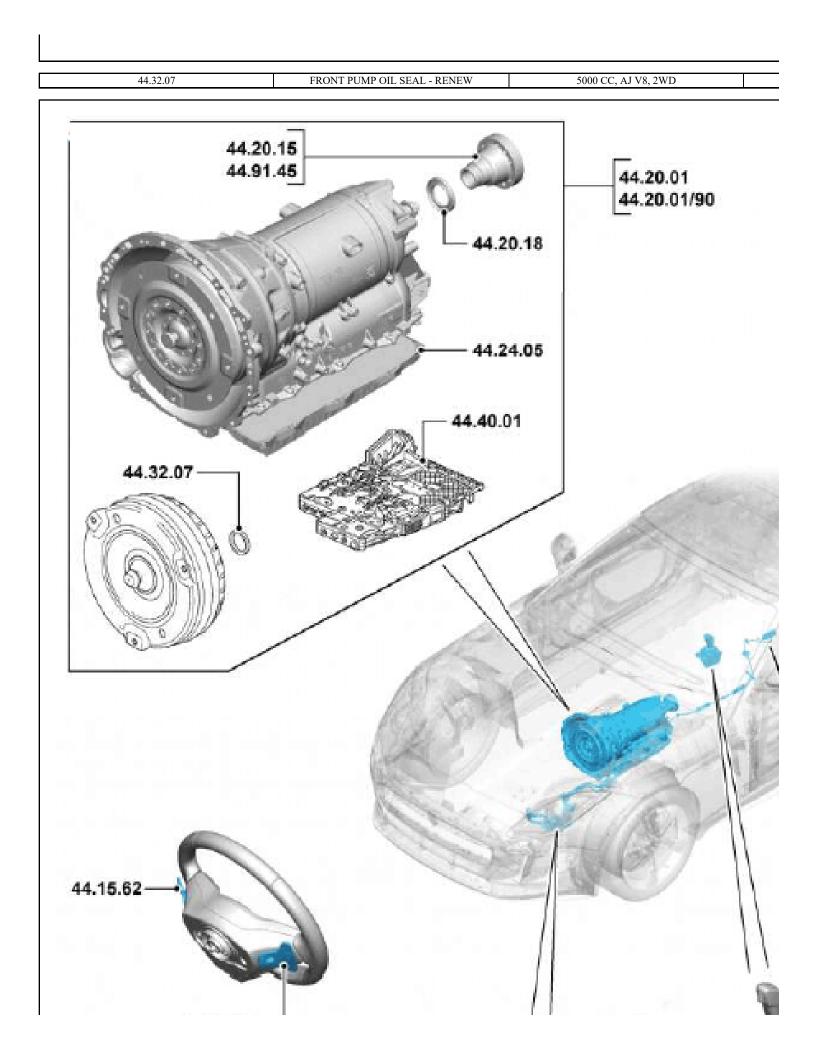


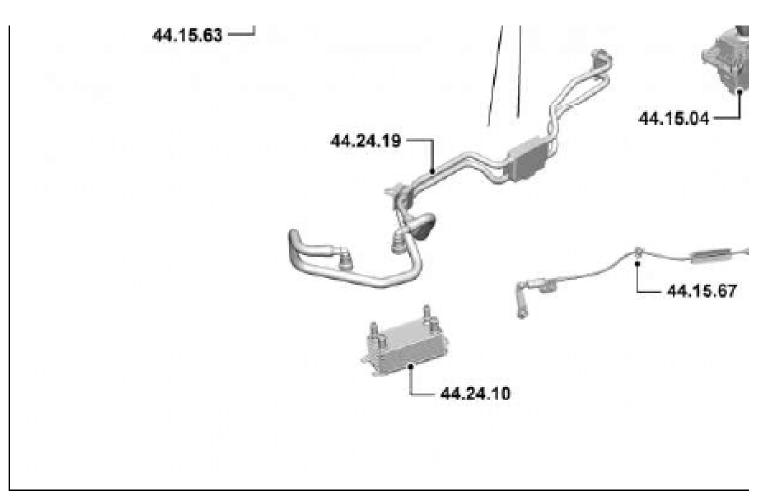


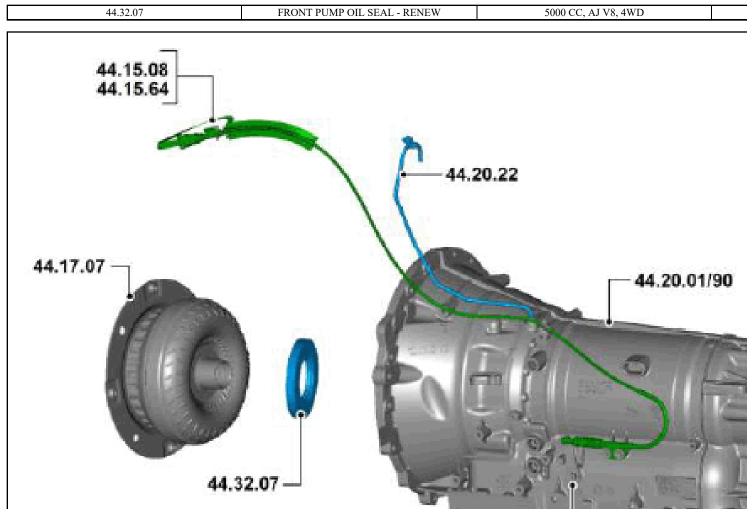




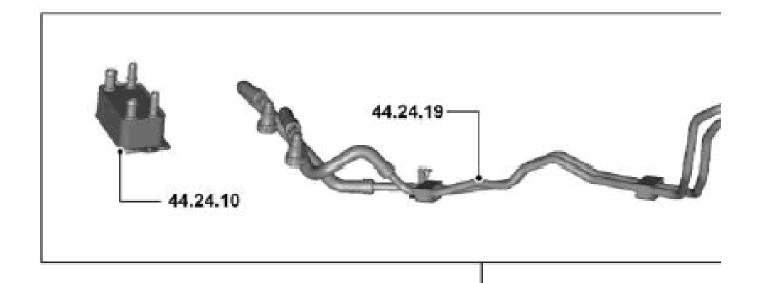
44.91.36







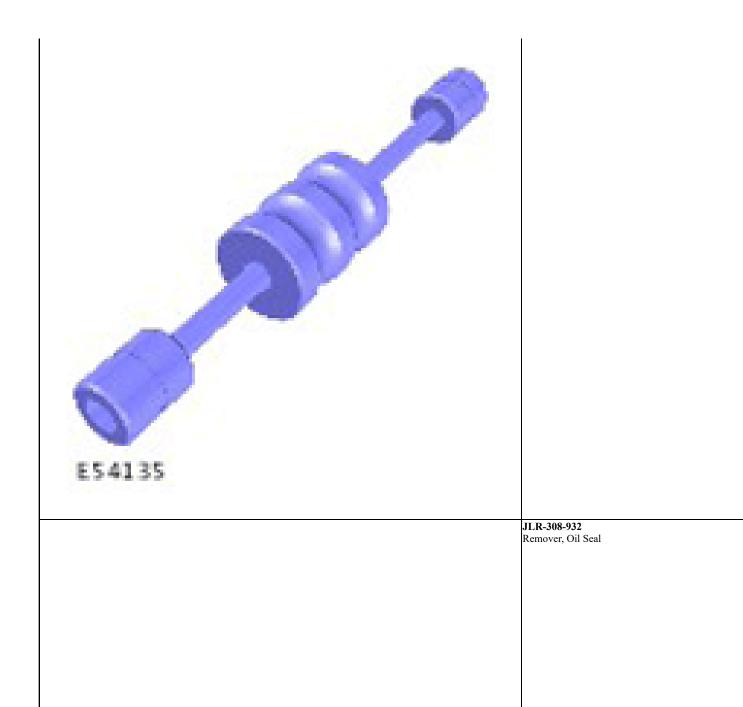




44.91.36

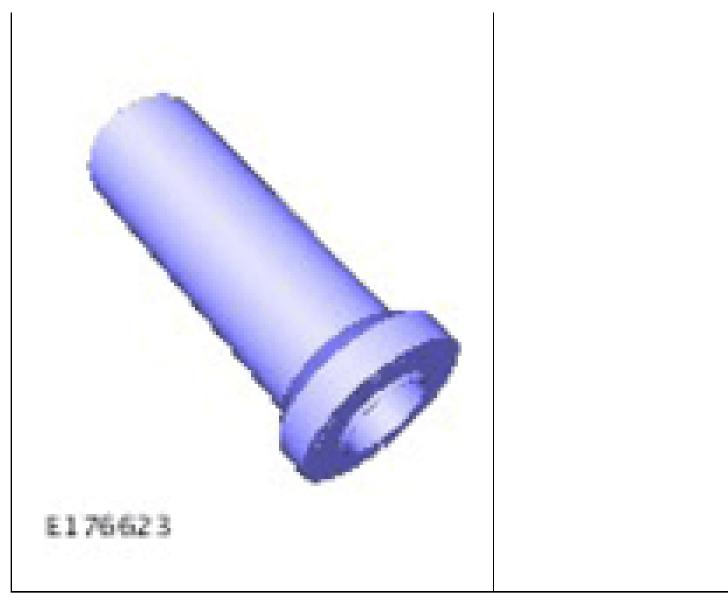
Special Tool(S)

100-012 Slide Hammer





JLR-308-936 Installer, Input Shaft Seal



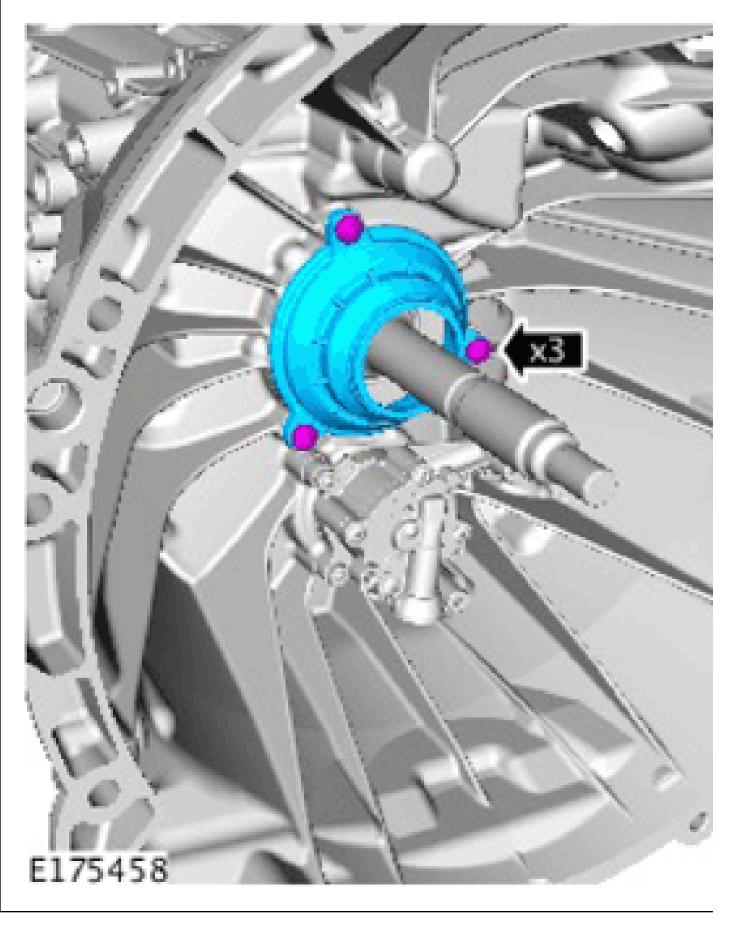
Removal

WARNING: Be prepared to collect escaping fluids.

NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

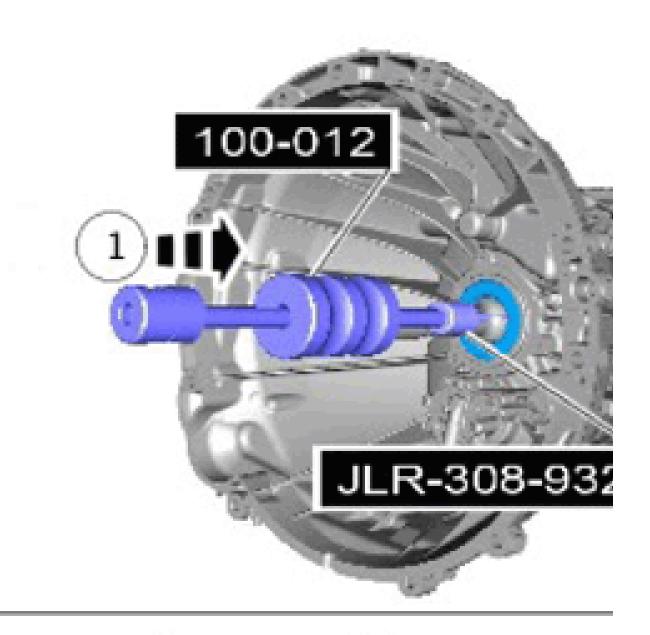
1. Refer to: Clutch Slave Cylinder (Removal and Installation).

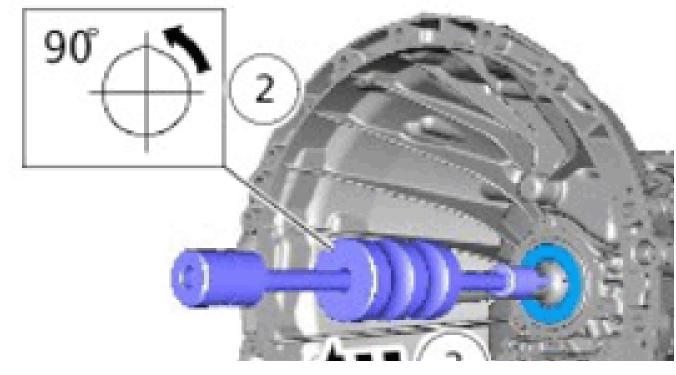
2.

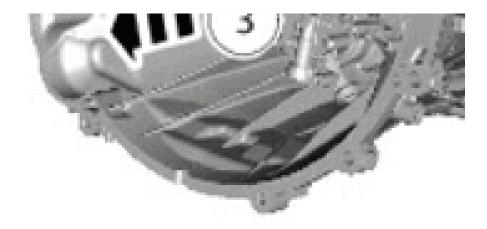


3. CAUTION:

- Take extra care when removing the component, prevent damage to the mating faces.
- Discard the seal.



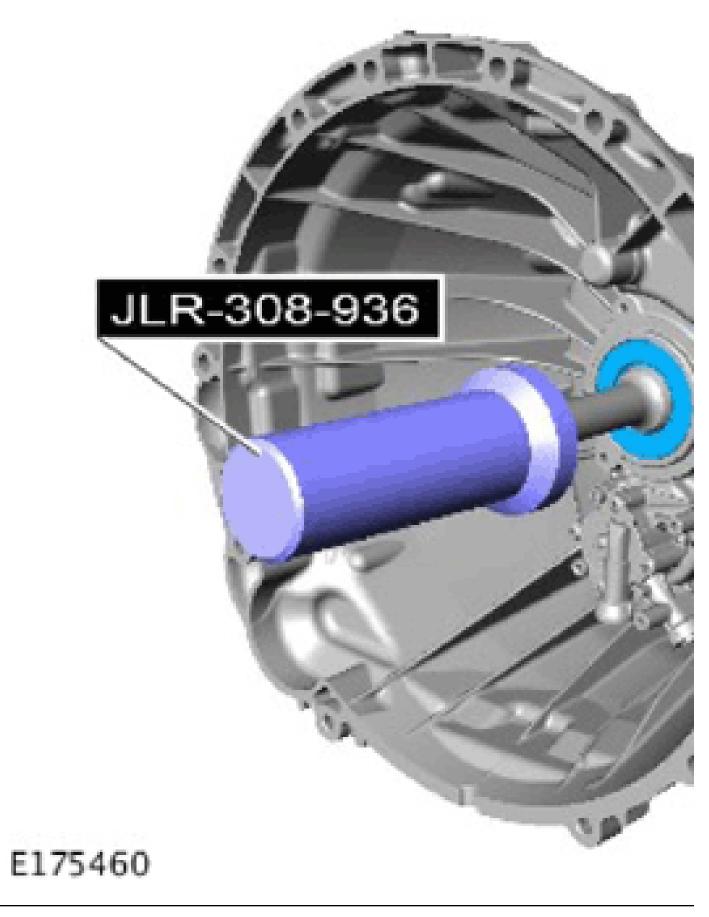




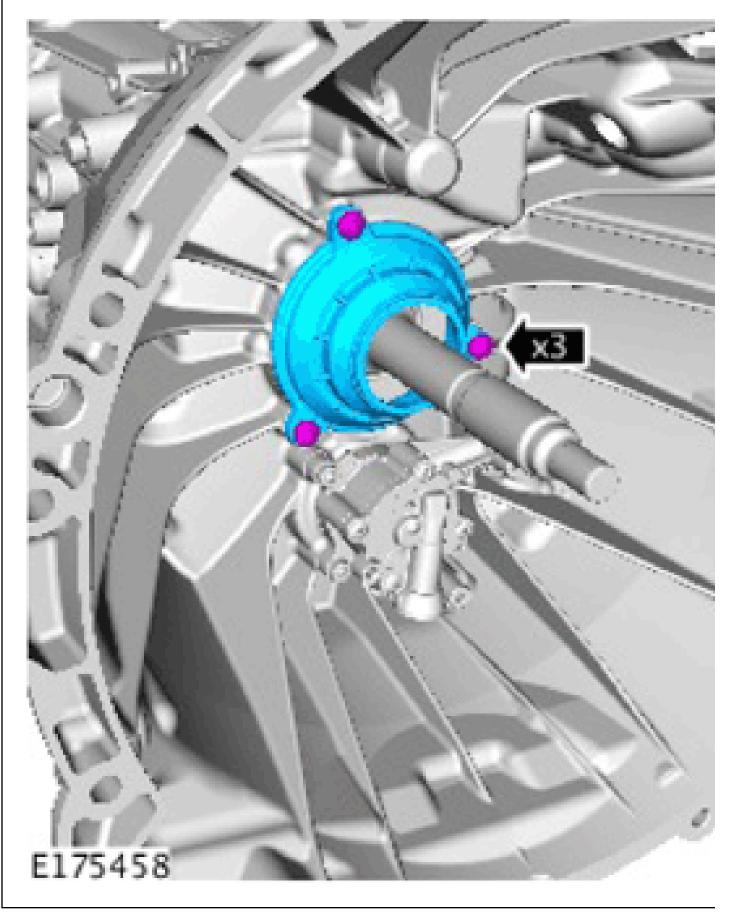
• Special Tool(s): 100-012, JLR-308-932

Installation

- 1. CAUTION:
- Make sure that the mating faces are clean and free of foreign material.
- The oil seal must be installed dry.
- Install a new seal.

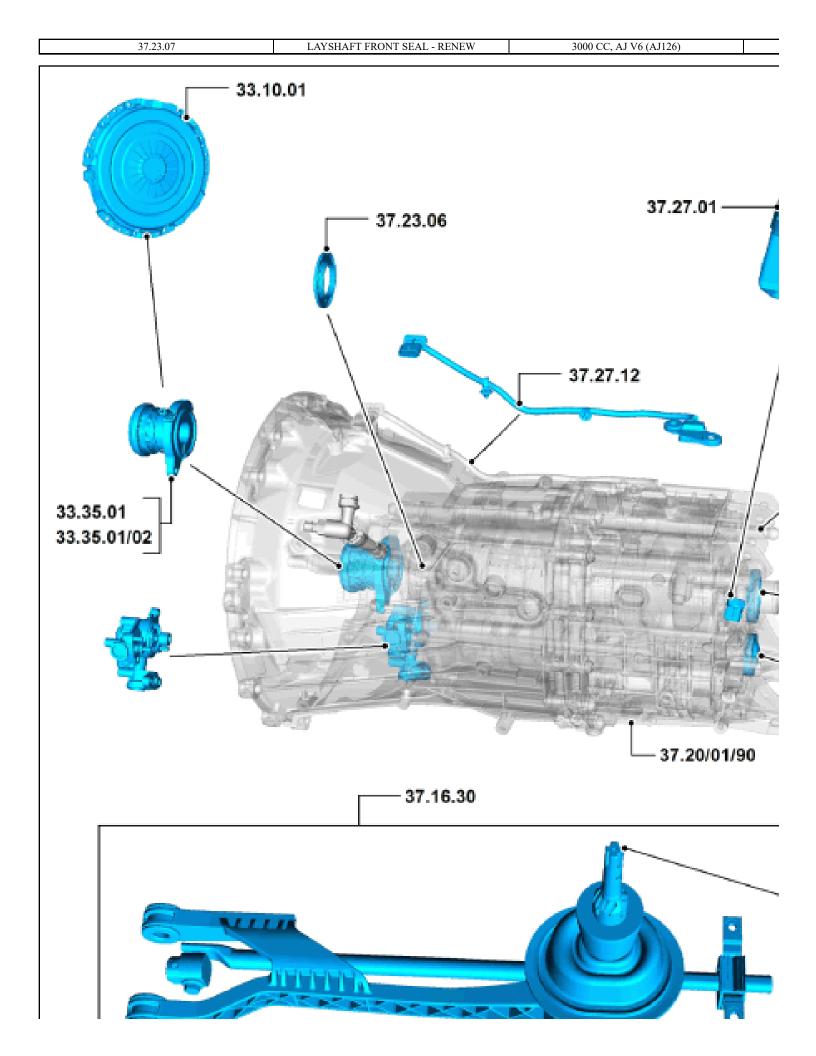


Special Tool(s): JLR-308-936

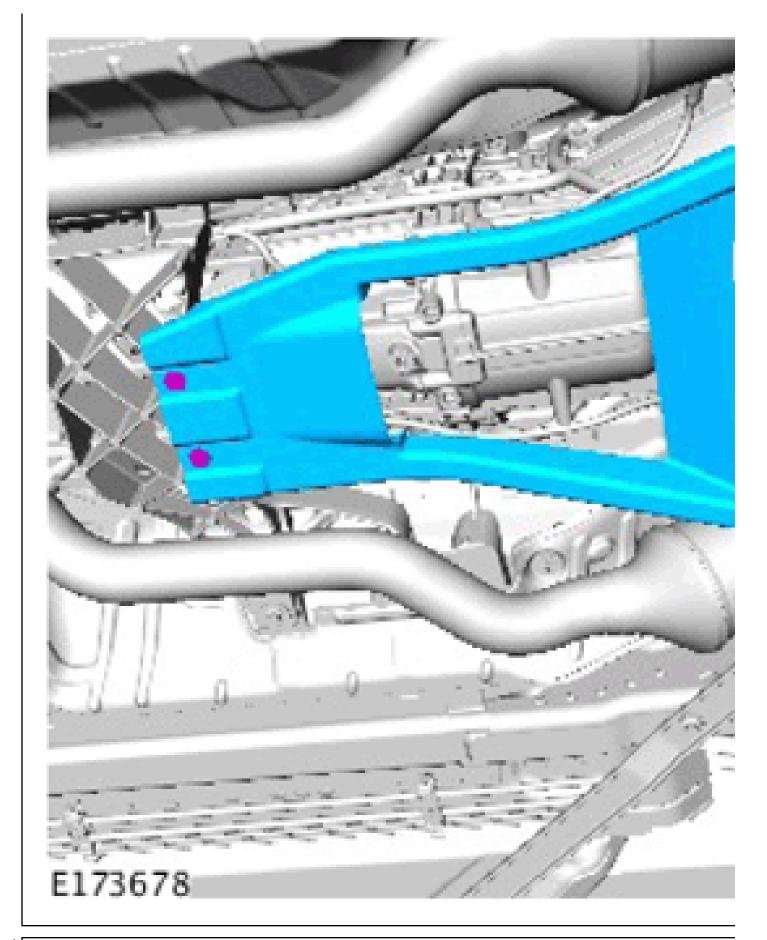


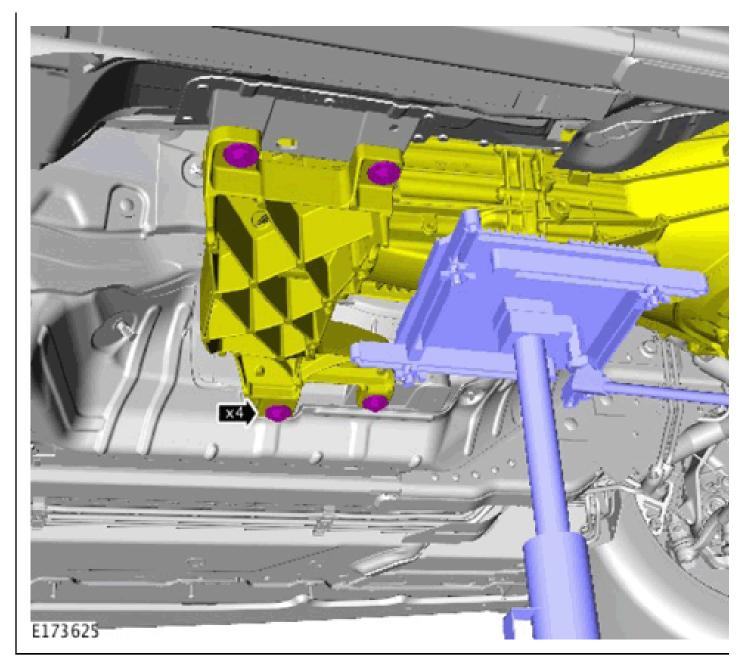
Torque Specification: 8 Nm

3. Refer to: Clutch Slave Cylinder (Installation).

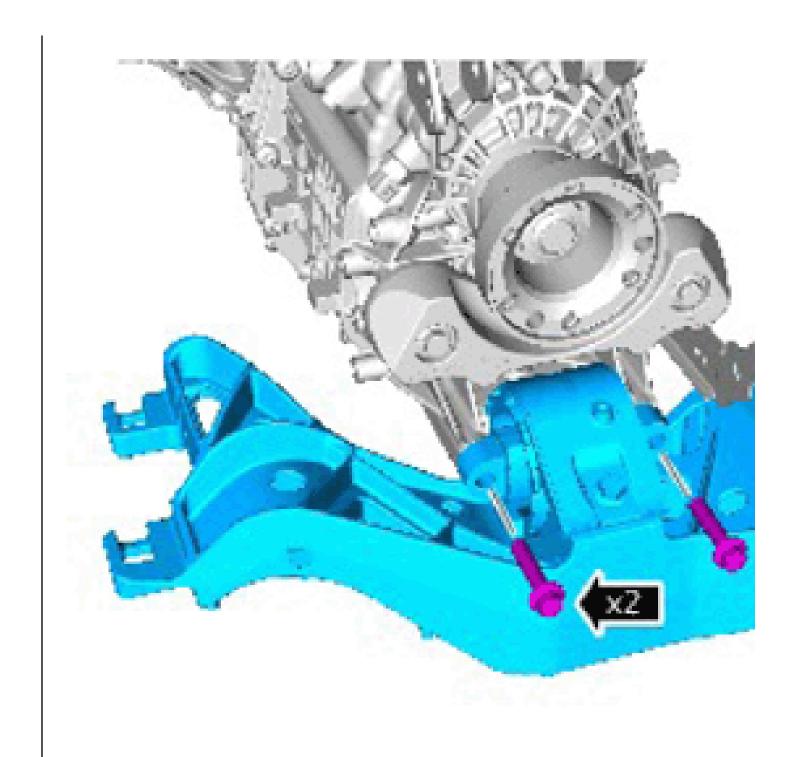


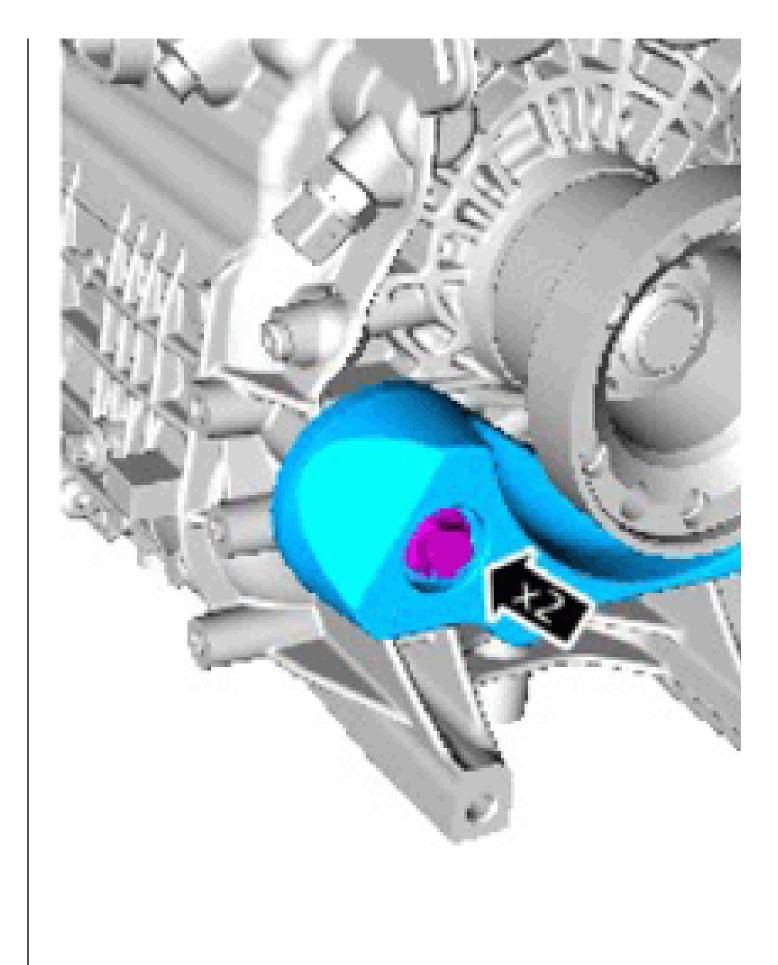
	- 95		Pad 1
General Equip	ment		
Transmission	niack	EQUIPMENT NAME	
Removal	- June 12		
NOTE:	Come variation in the illustrations may easily but the	accountied information in abuseus assured	
	Some variation in the illustrations may occur, but the	essential information is always correct.	
	o: Battery Disconnect and Connect (General Procedures).		
2. WAR	NING: Make sure to support the vehicle with axle stand	s.	
Raise a	and support the vehicle.		
3.			



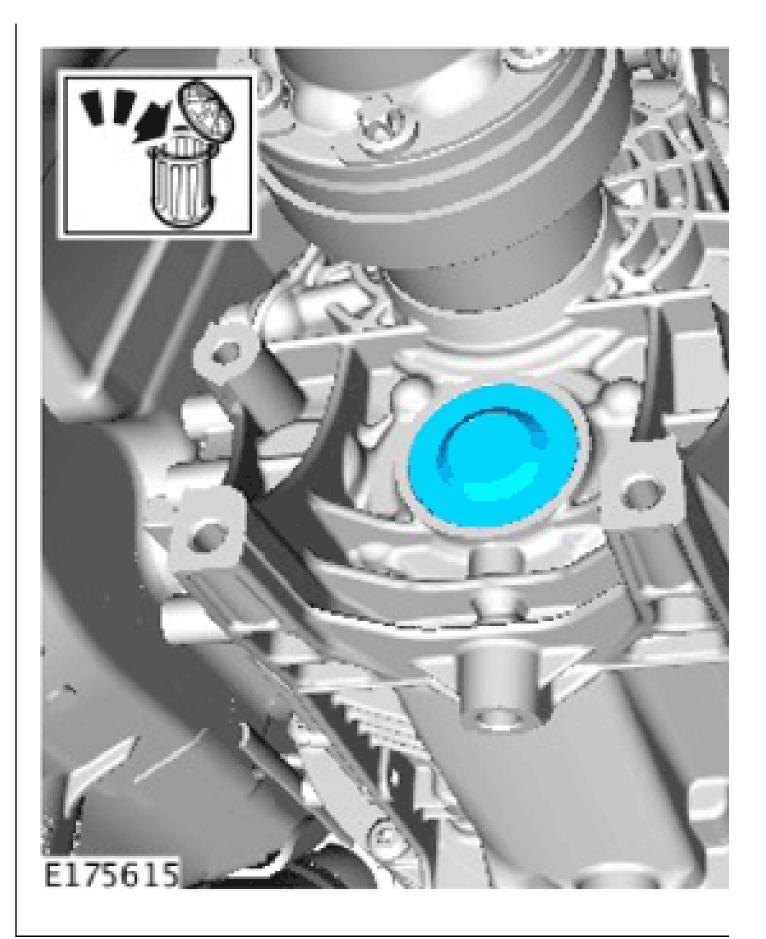


- General Equipment: Transmission jack
- Support the transmission.





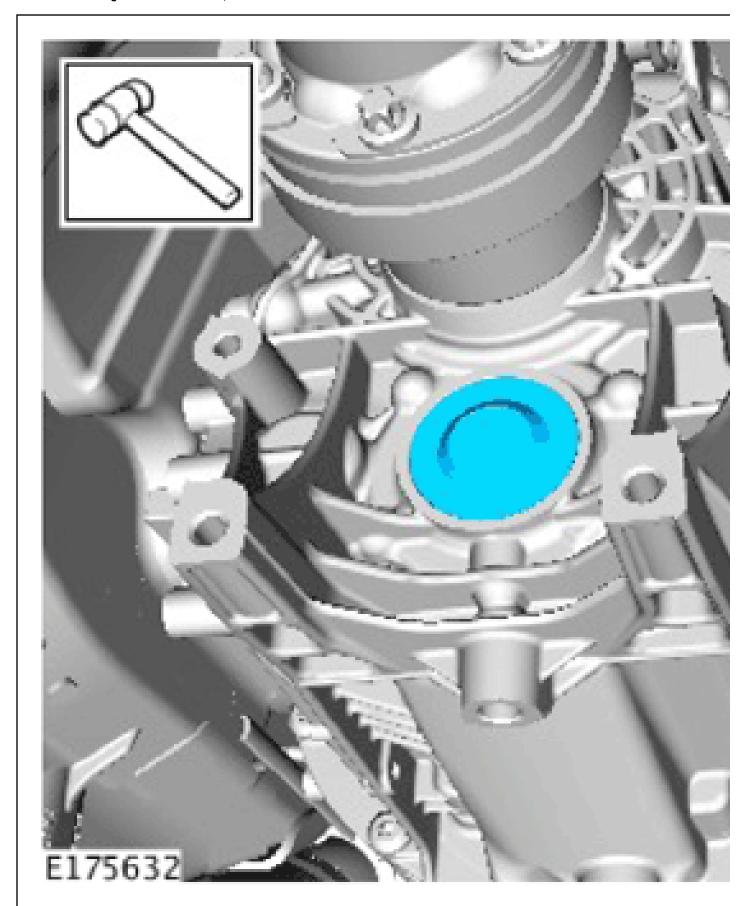
7.	CAUTION:	Take extra care when removing the component, prevent damage to the mating faces.			
	NOTE:	Using a suitable tool, remove the oil seal.			
	1				

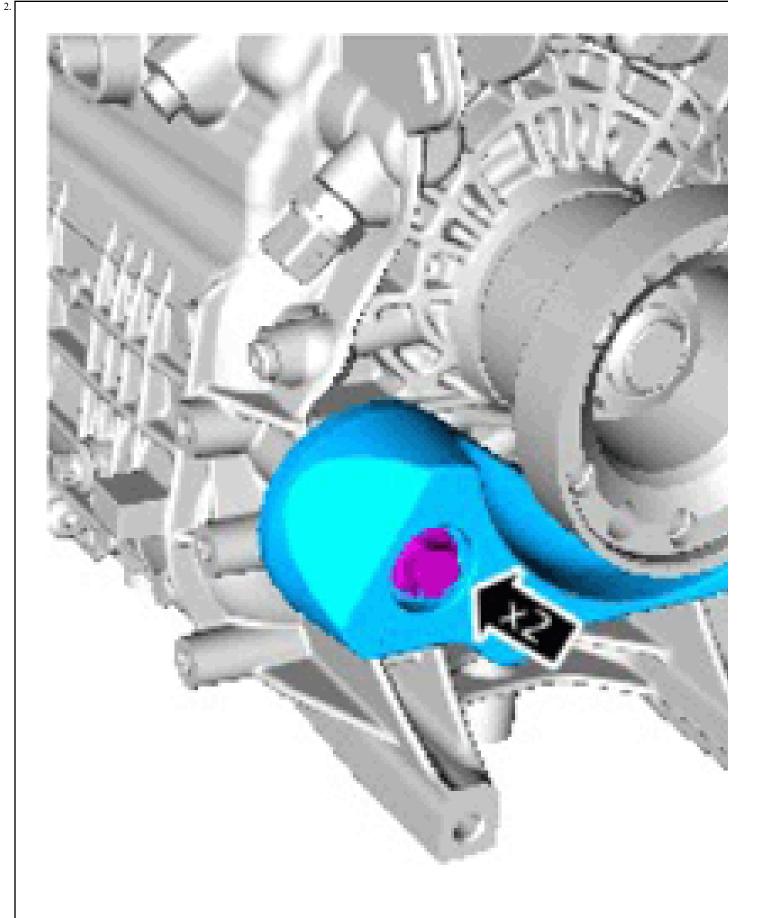


Installation

- $1. \ \, \text{CAUTION:}$
- Take extra care not to damage the seal when installing the component.
- Care must be taken to avoid damage to the seal register and running surface.

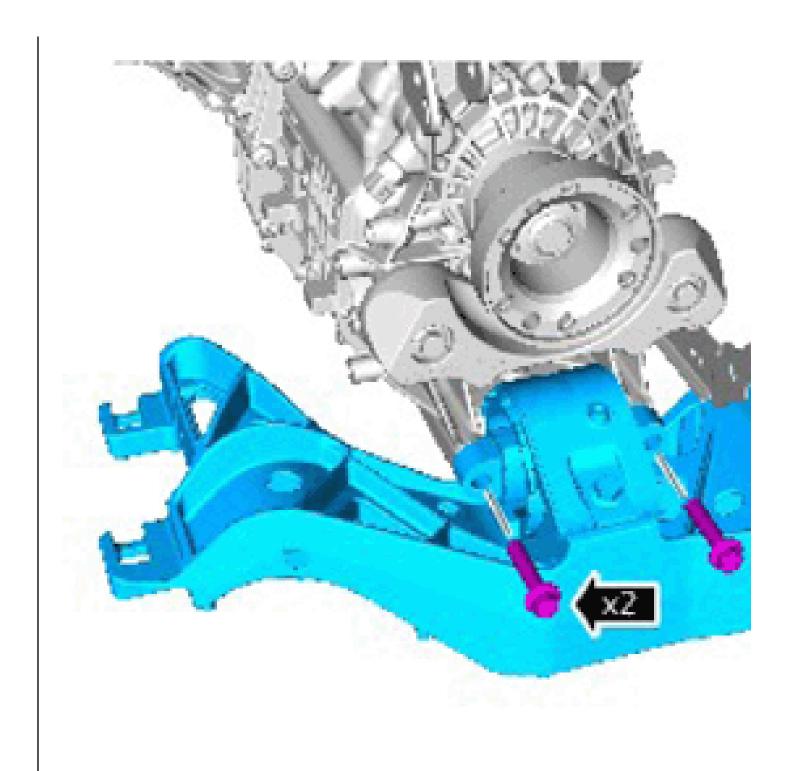
NOTE: Using a soft faced hammer, install the seal.

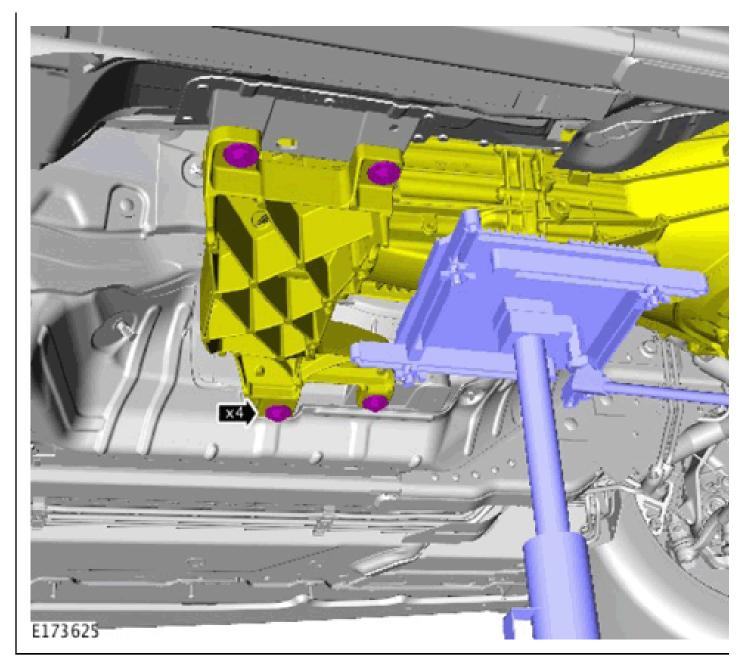




Torque Specification: 48 Nm

3

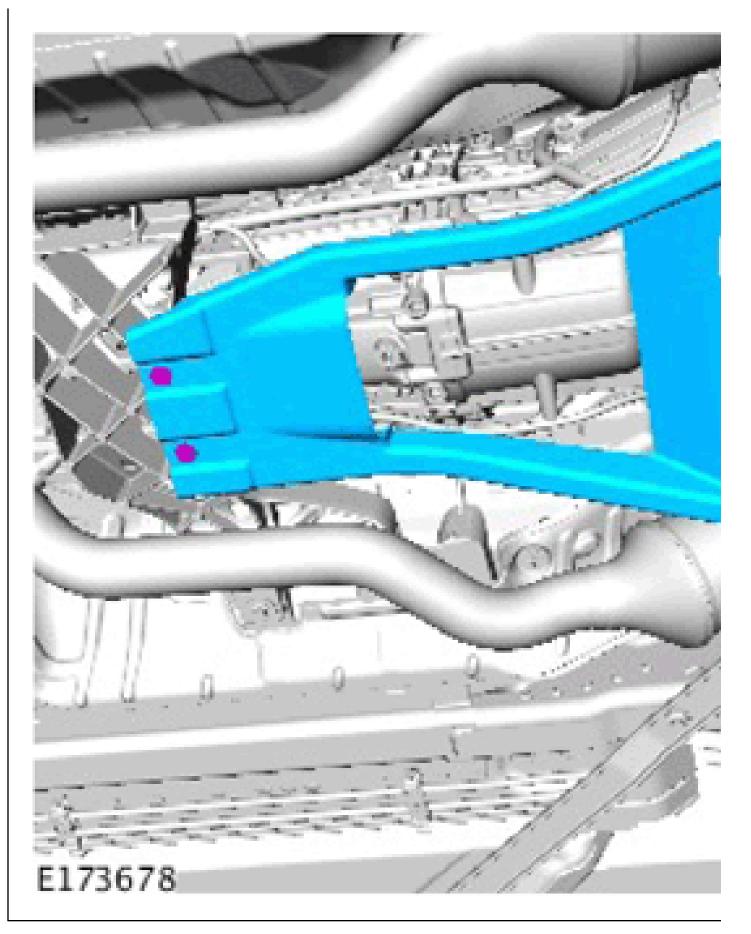




Torque Specification: 45 Nm

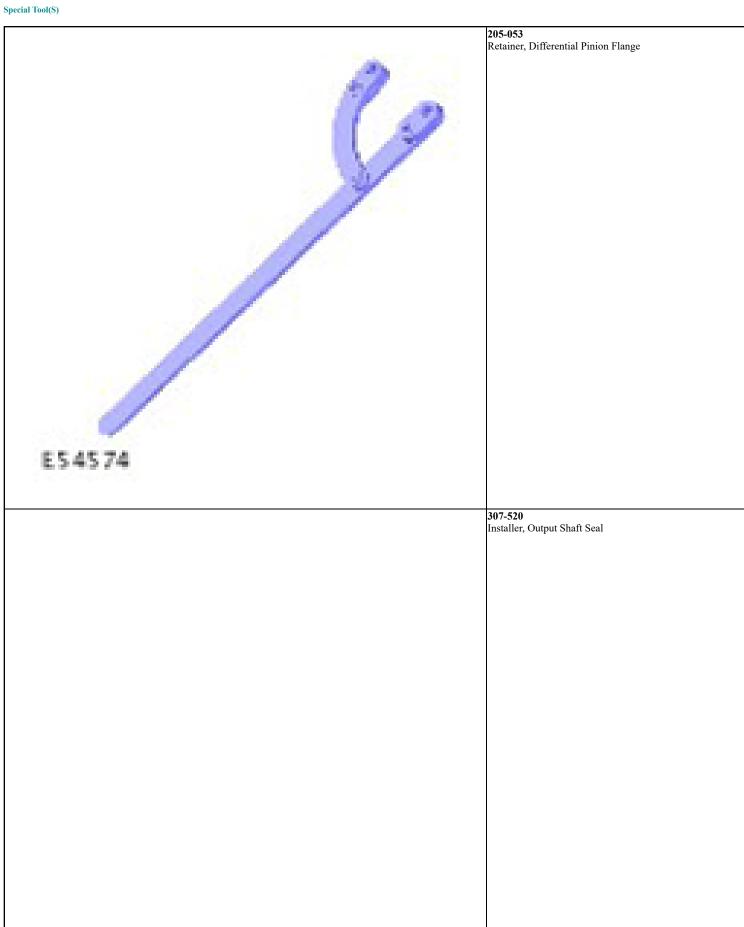
5. Remove the transmission jack.

6



- 7. Lower the vehicle.
- 8. Refer to: <u>Battery Disconnect and Connect</u> General Procedures).

37.23.01	REAR OIL SEAL - RENEW	3000 CC ALV6 (AI126)	







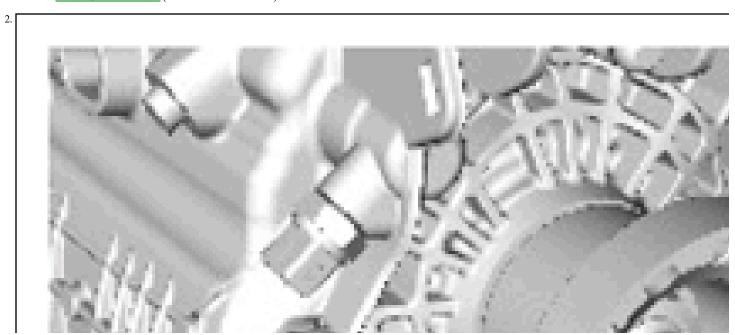
General Equipment

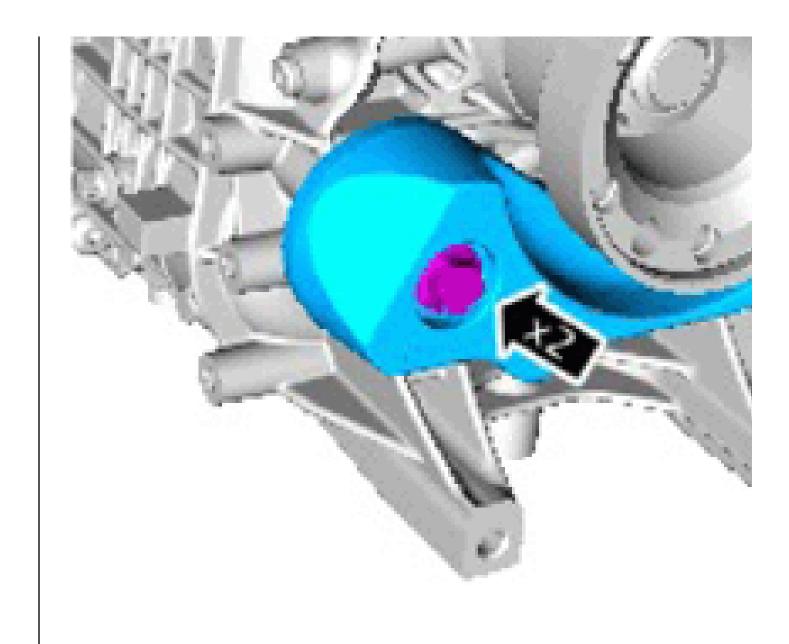
EQUIPMENT NAME
Puller

Removal

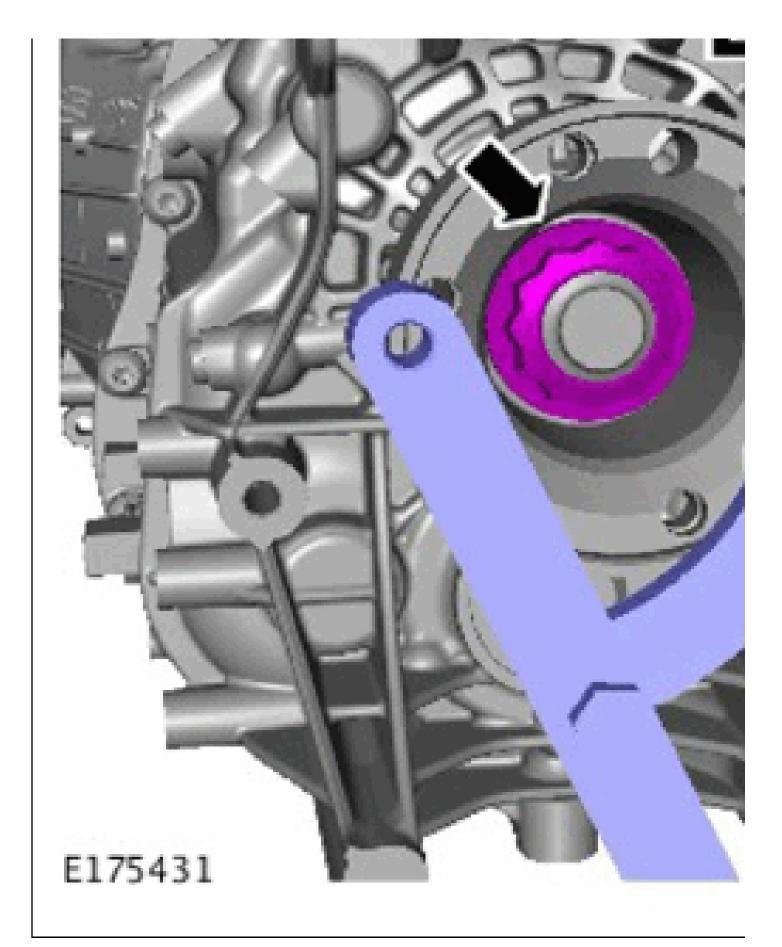
NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: **DRIVESHAFT - RWD** (Removal and Installation).



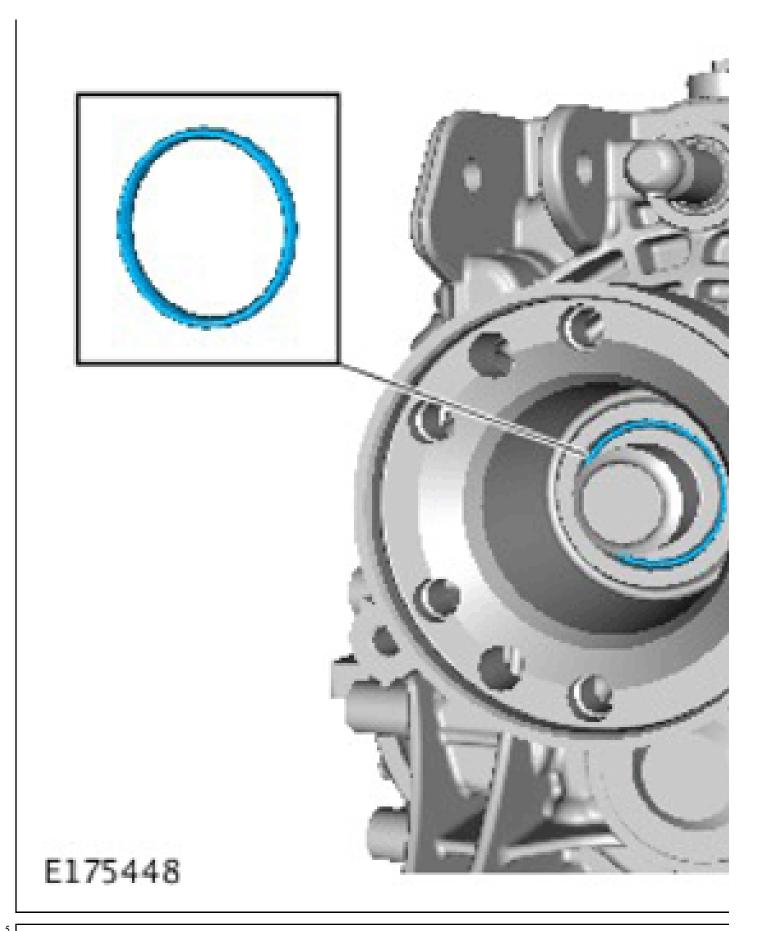


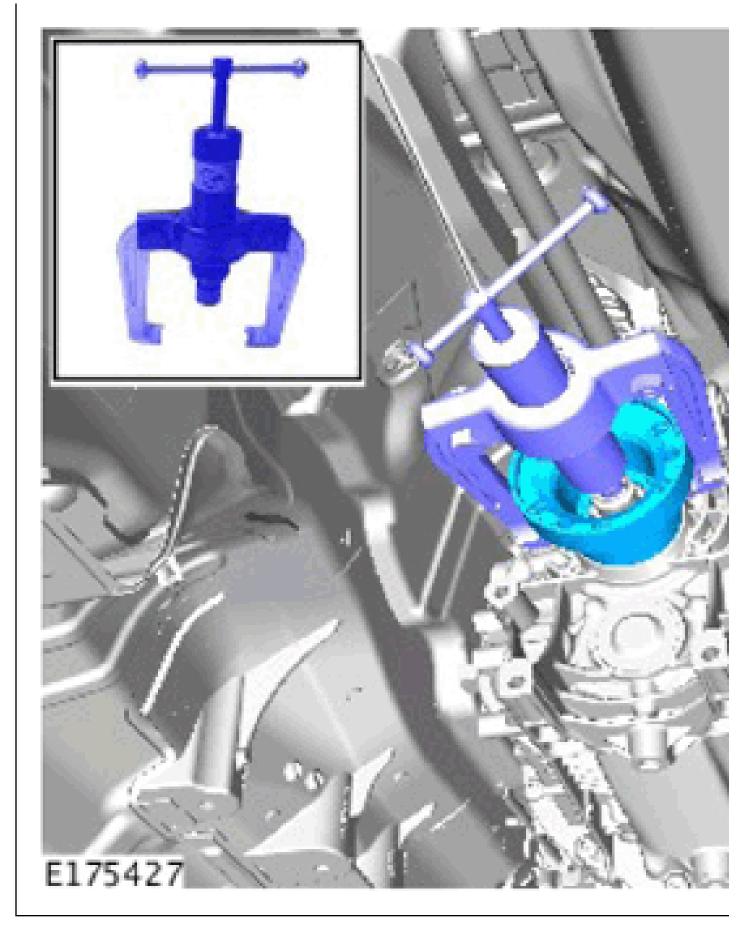




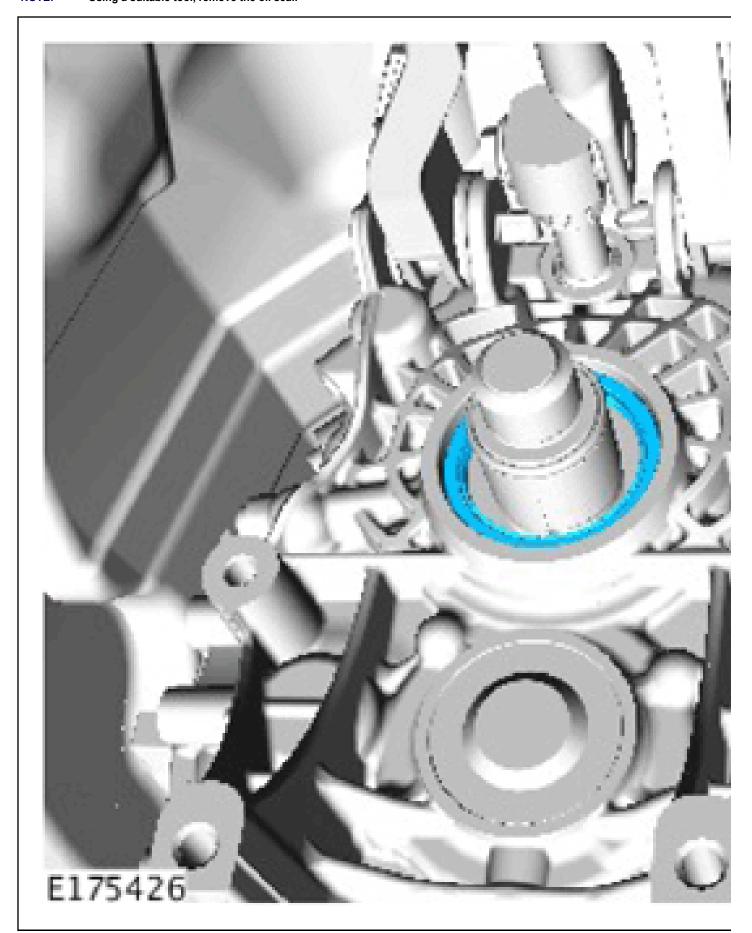
Special Tool(s): 205-053

4. NOTE: Note the orientation of the component prior to removal.

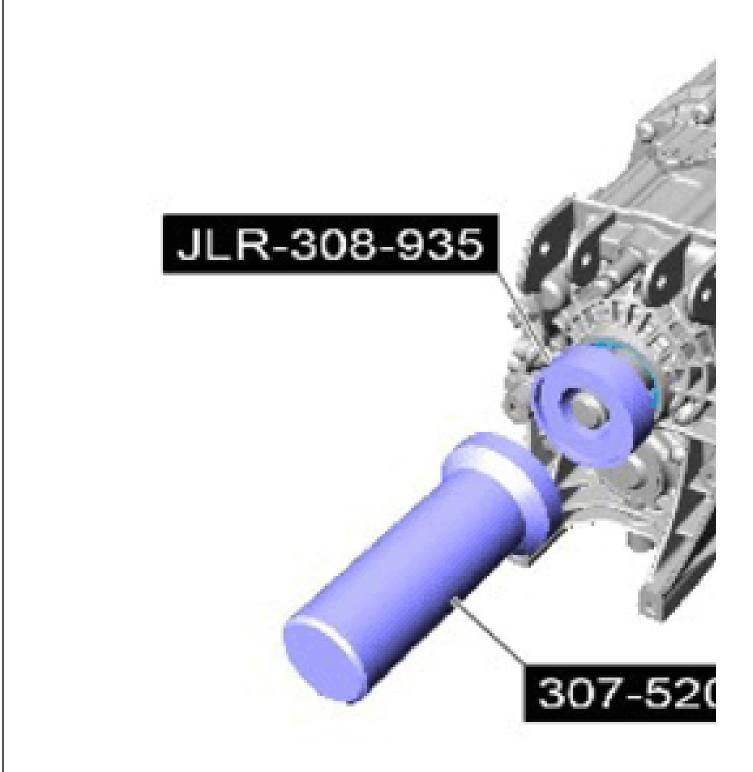




General Equipment: Puller

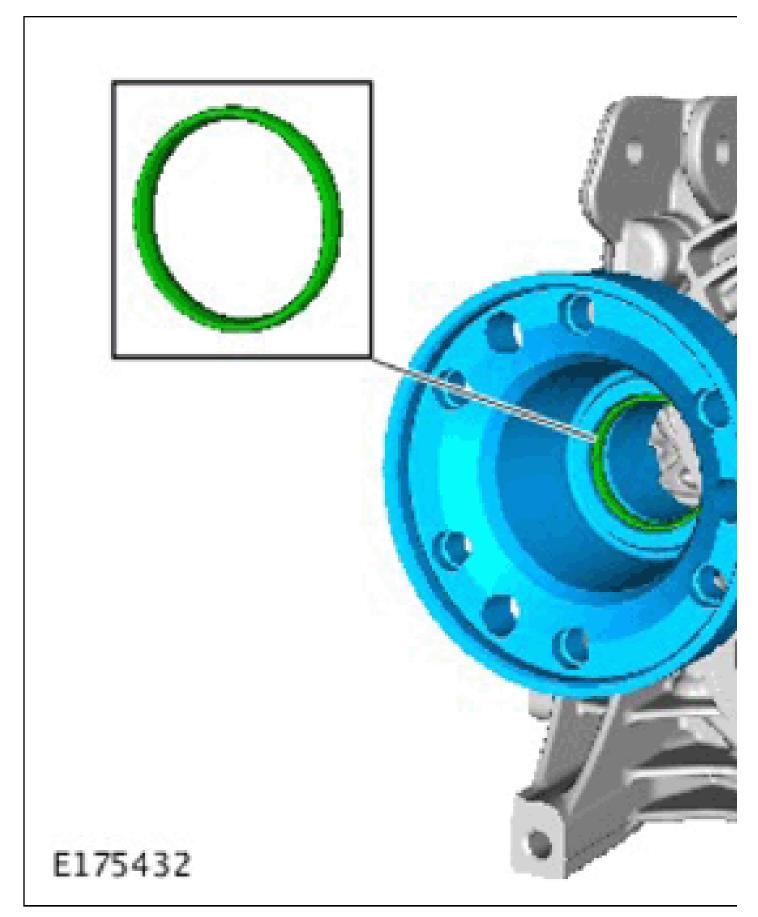


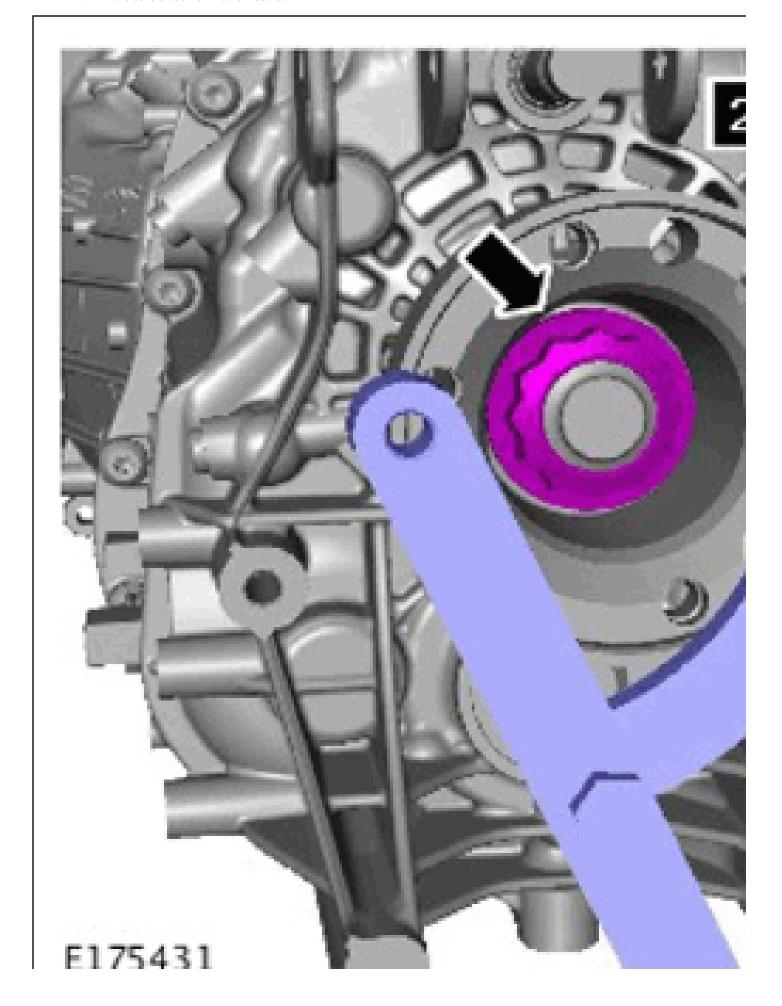
- Make sure that the mating faces are clean and free of foreign material.
- · Install a new seal.



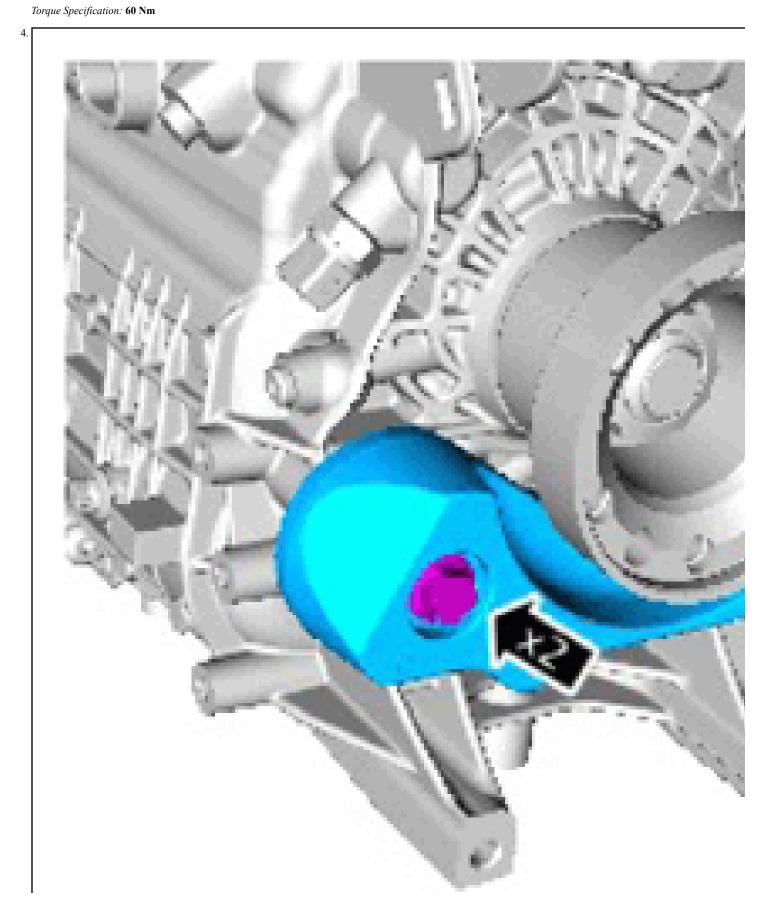
2. CAUTION:

- Make sure that the seal is correctly located.
- The O-ring seal is to be reused unless damaged.





Special Tool(s): 205-053



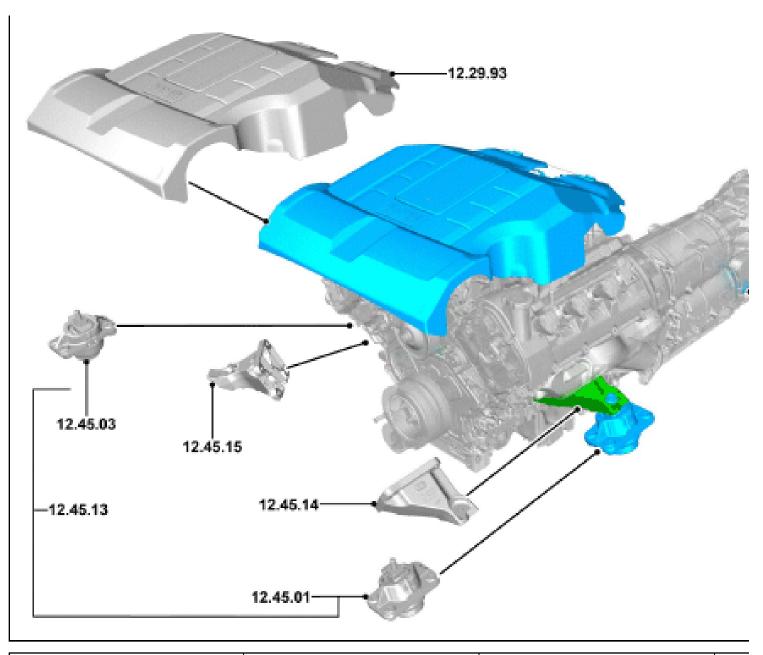


Torque Specification: 48 Nm

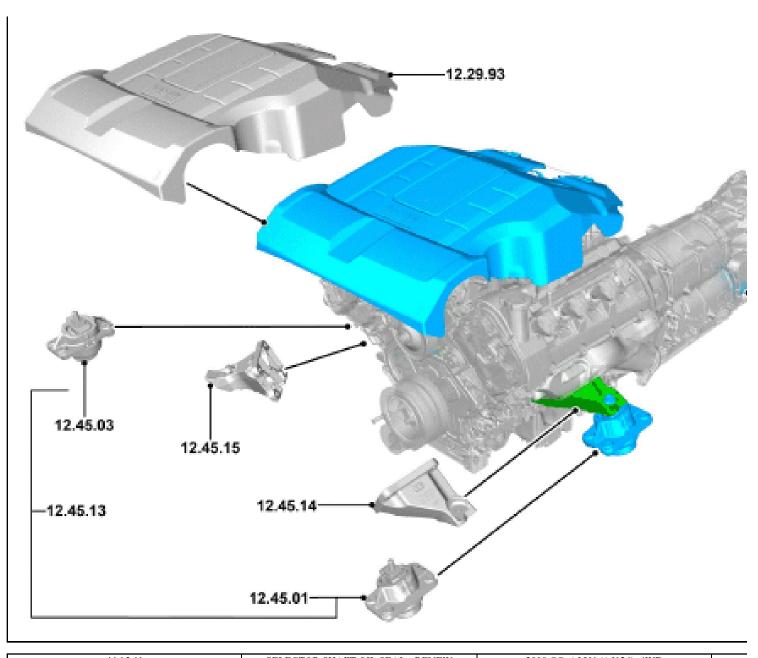
5. Refer to: $\underline{\mathbf{DRIVESHAFT}}$ (Installation).

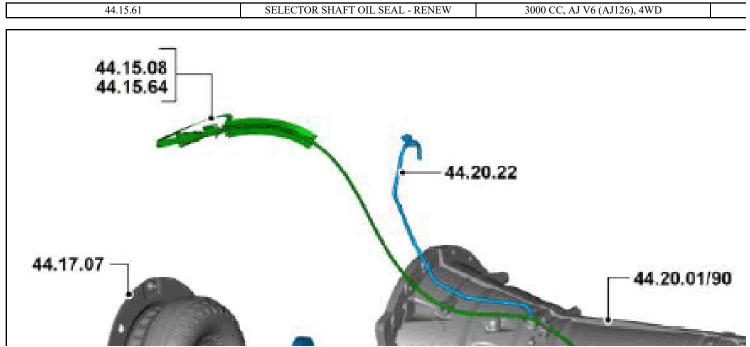
TRANSMISSION SUPPORT INSULATOR (G1823835)

12.45.35	TRANSMISSION REAR MOUNTING RUBBER -	AUTOMATIC TRANSMISSION	
	RENEW		1

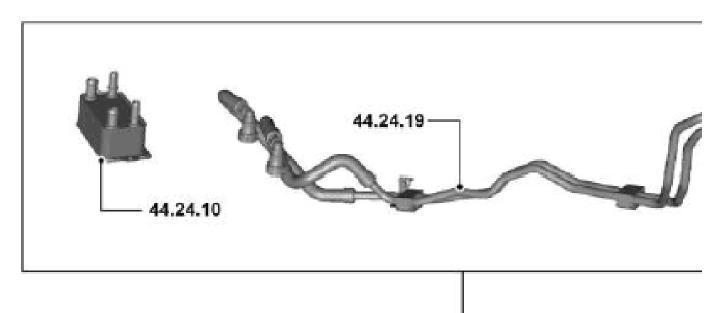


12.45.35	TRANSMISSION REAR MOUNTING RUBBER -	MANUAL TRANSMISSION	
	RENEW		
•	•	•	









44.91.36

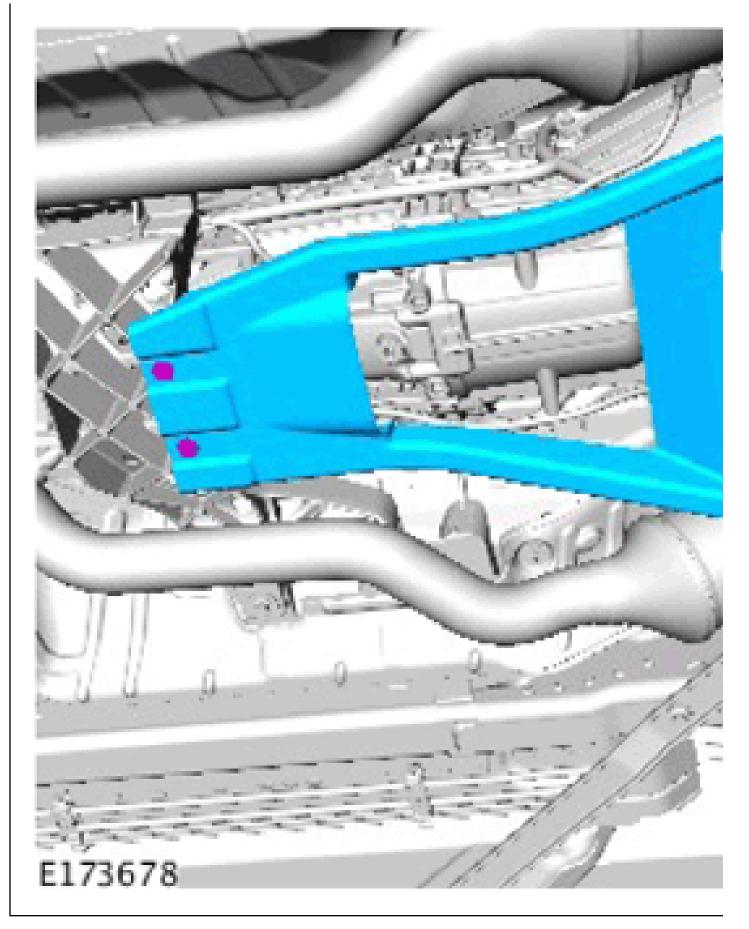
General Equipment

EQUIPMENT NAME	
Transmission jack	

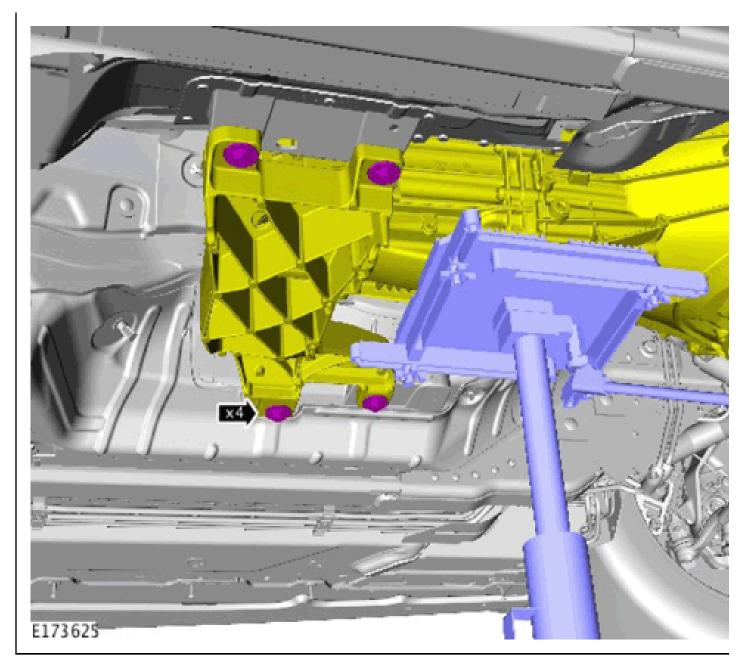
VARNING: Make sure to support the vehicle with axle stands. axis and support the vehicle.		Some illustrations nRemoval steps in th	is procedure may con	tain installation det	ails.		
nise and support the vehicle.	WARNING	3: Make sure to suppo	rt the vehicle with axlo	e stands.			
	Raise and si	upport the vehicle.					

• Some variation in the illustrations may occur, but the essential information is always correct.

NOTE:



Torque Specification: 9 Nm

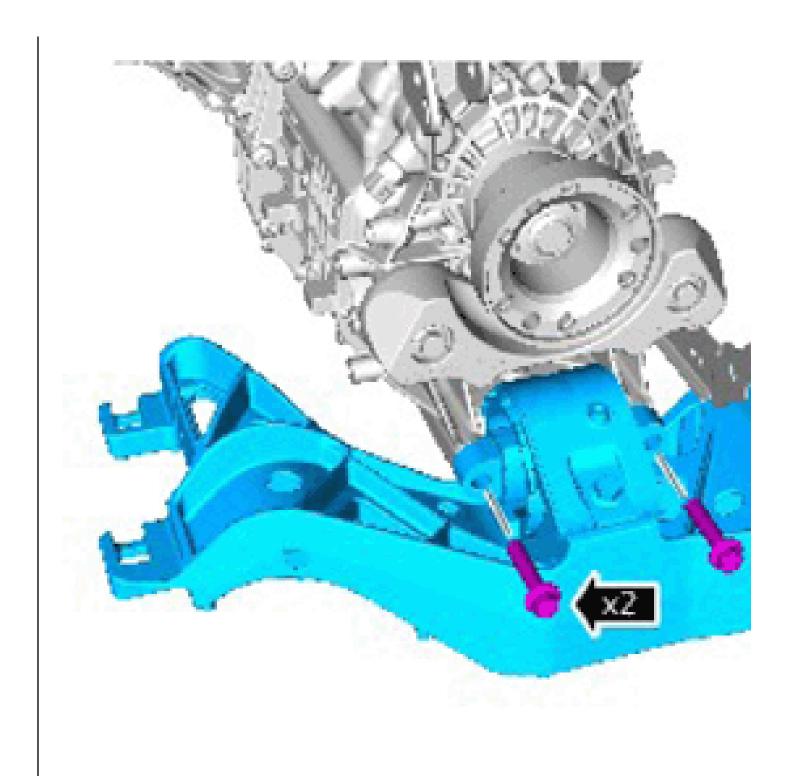


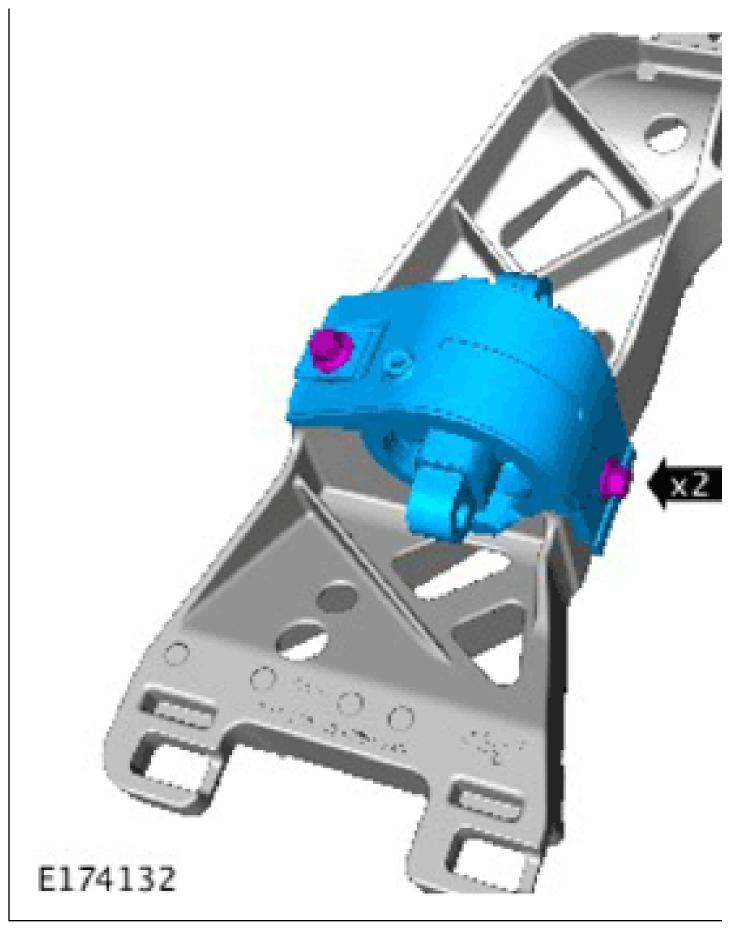
Support the transmission.

General Equipment: Transmission jack

Torque Specification: 45 Nm

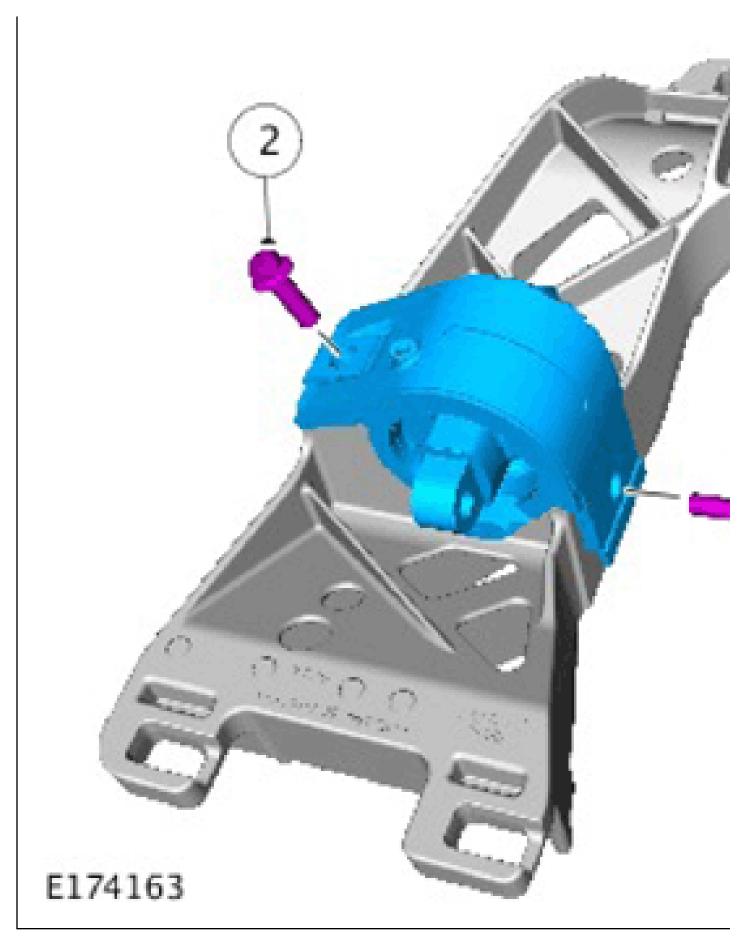
4.





Installation

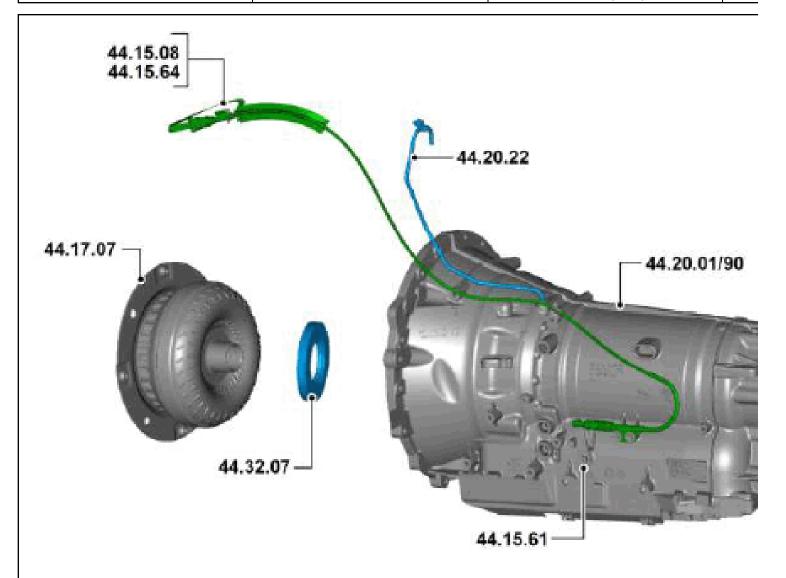
 $1. \;$ CAUTION: $\;$ Tighten the bolts in the sequence shown.

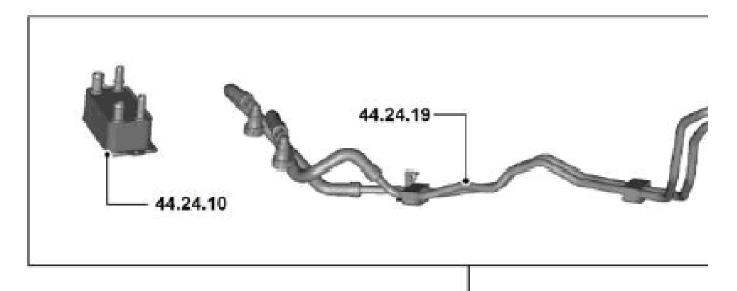


Torque Specification: 70 Nm

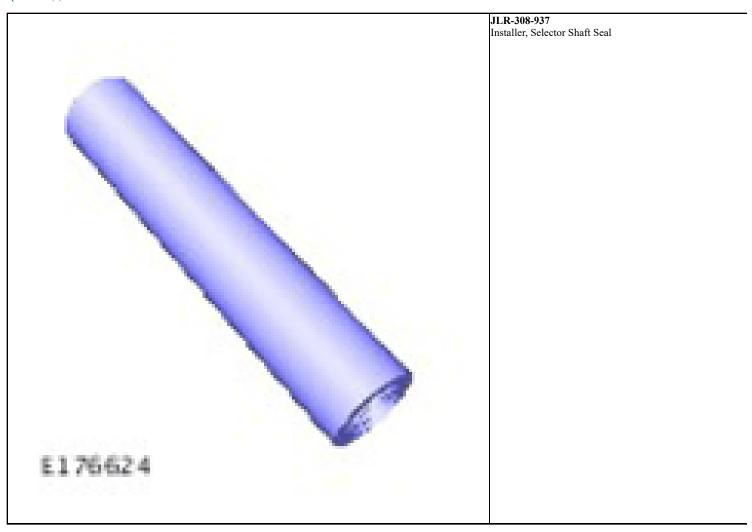
2. To install, reverse the removal procedure.

37.23.08	SELECTOR SHAFT OIL SEAL - RENEW	3000 CC, AJ V6 (AJ126)	
44.15.61	SELECTOR SHAFT OIL SEAL - RENEW	3000 CC, AJ V6 (AJ126), 4WD	





Special Tool(S)

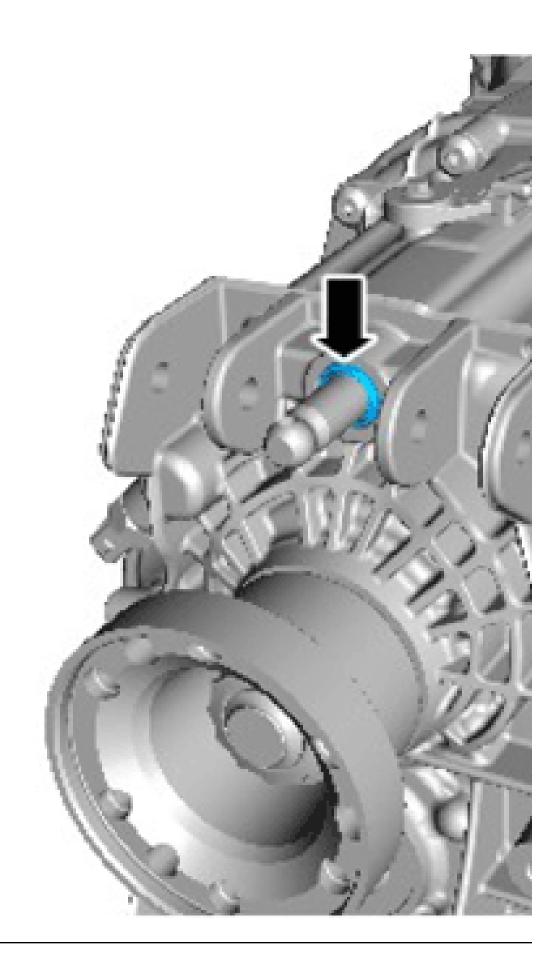


Removal

NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

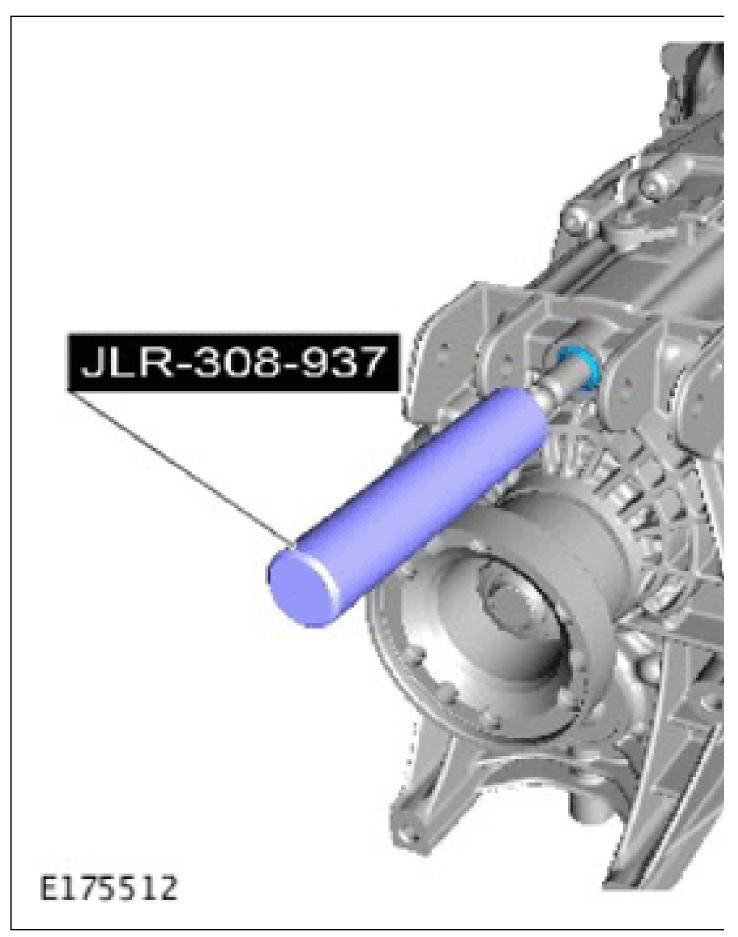
- 1. Refer to: <u>Selector Lever Assembly</u> (Removal and Installation).
- 2. CAUTION:
- Take extra care when removing the component, prevent damage to the mating faces.
- Discard the seal.

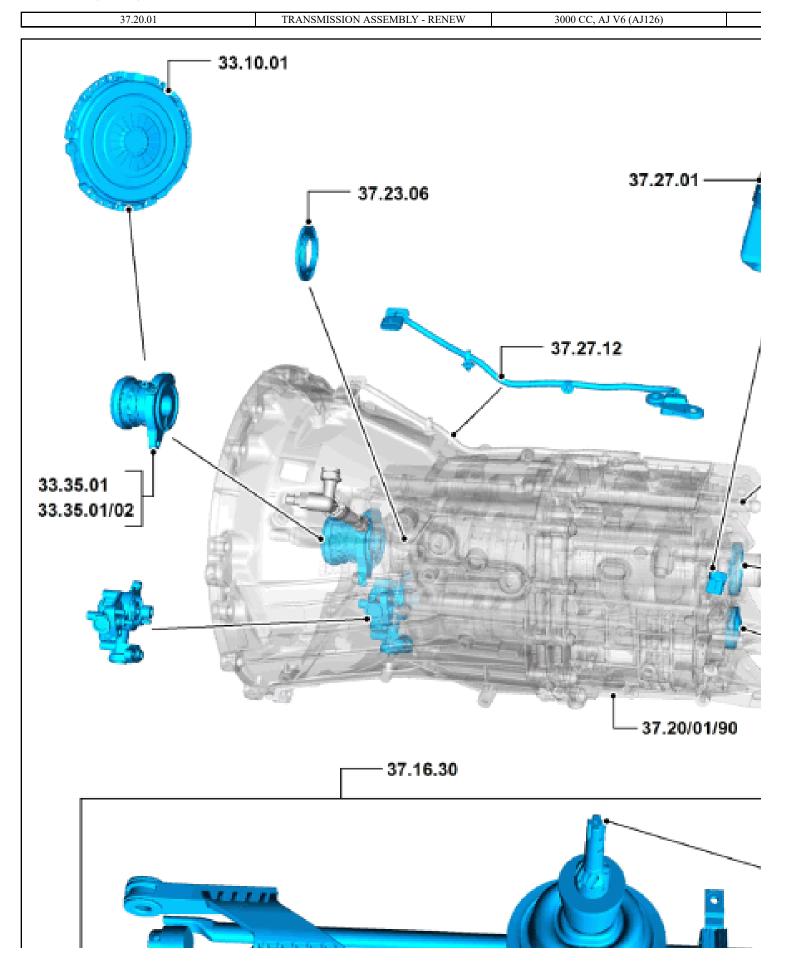
NOTE: Using a suitable tool, remove the oil seal.



Installation

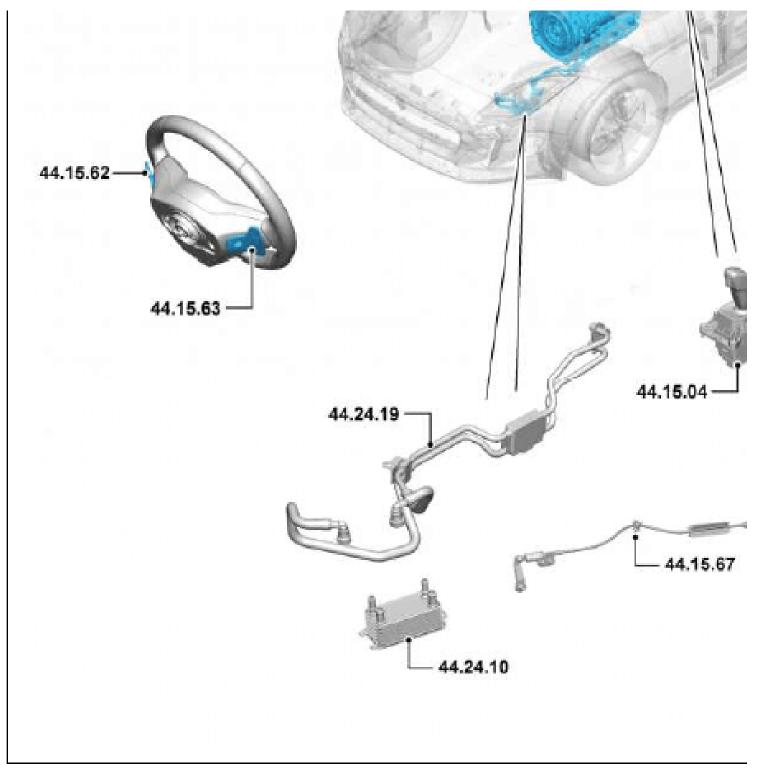
- 1. CAUTION:
- Make sure that the mating faces are clean and free of foreign material.
- Install a new seal.

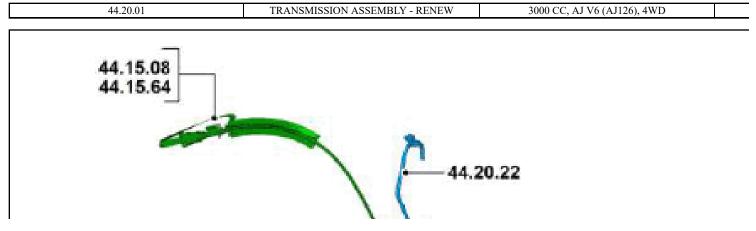


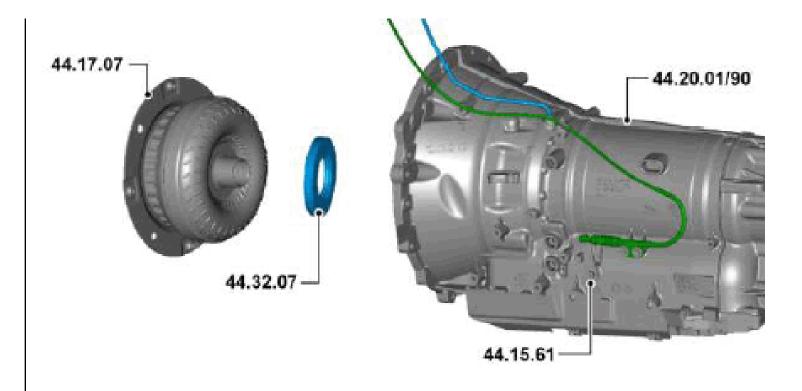


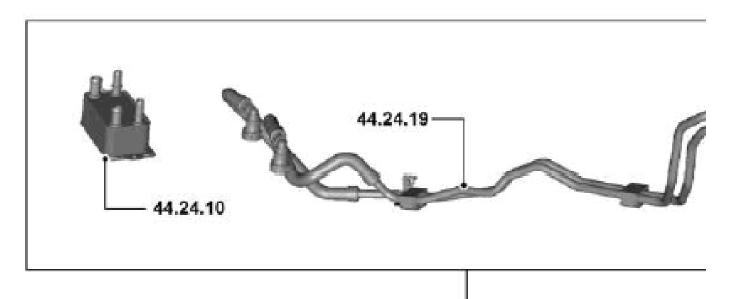


44.20.01 TRANSMISSION ASSEMBLY - RENEW 3000 CC, AJ V6 (AJ126), 2WD 44.20.15 44.91.45 44.20.01 44.20.01/90 44.20.18 44.24.05 44.40.01 44.32.07

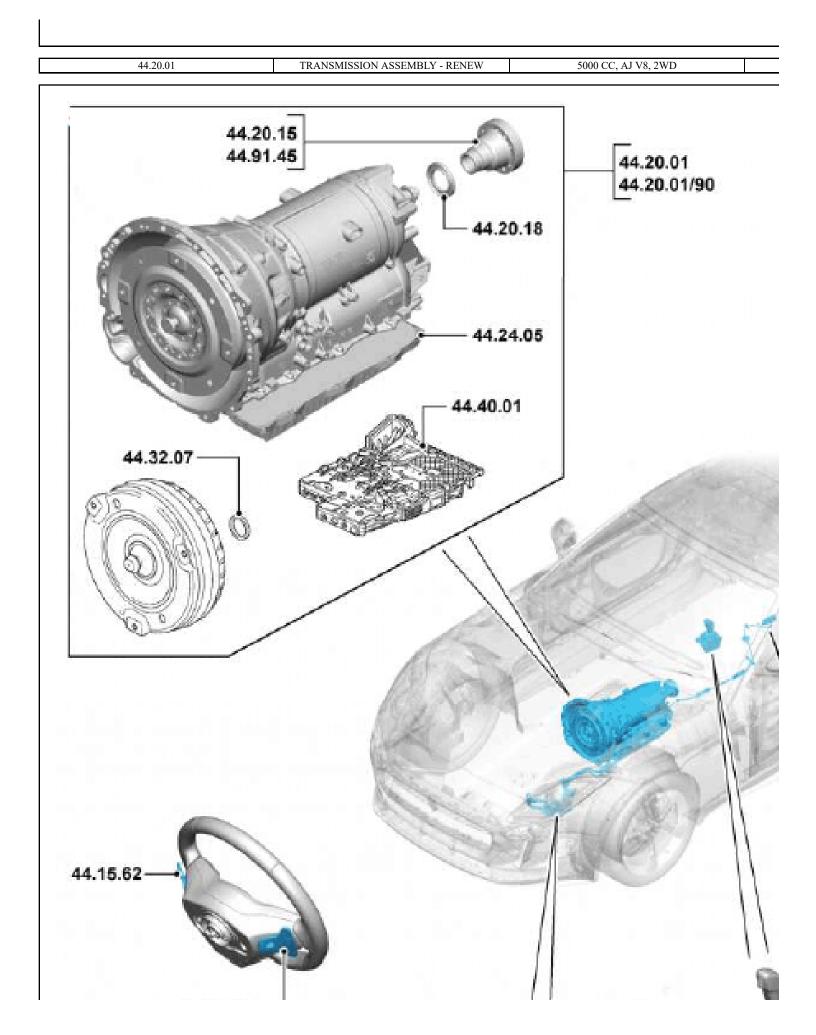


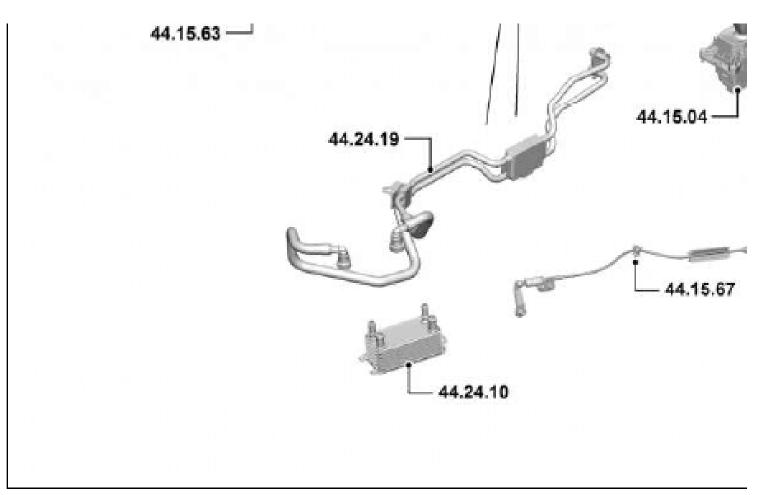


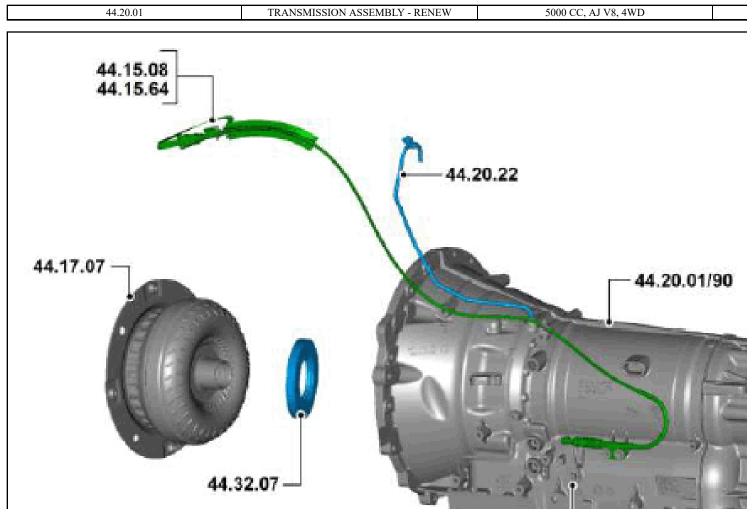


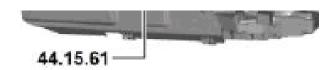


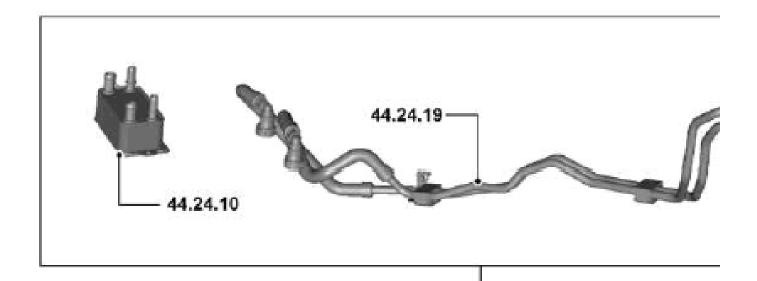
44.91.36





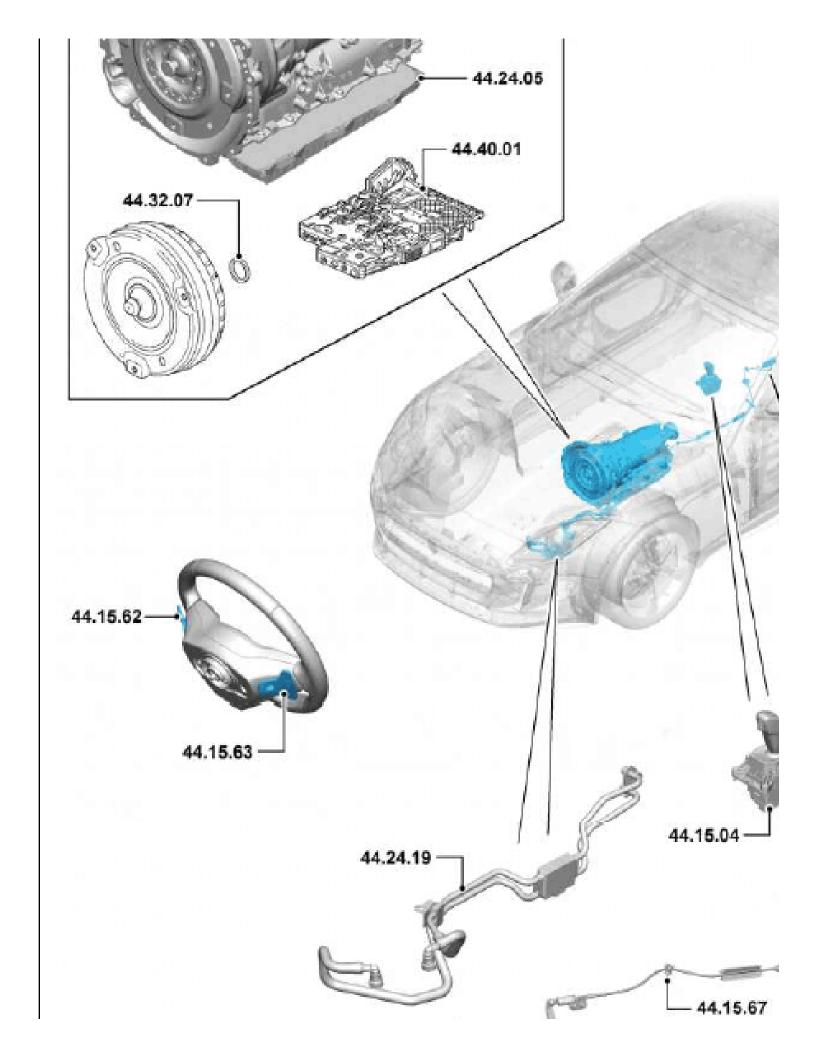


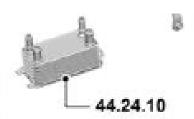




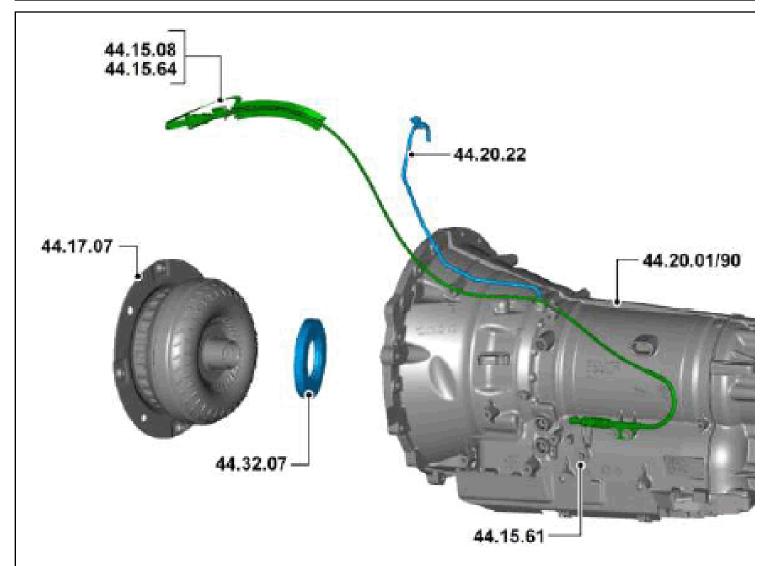
44.91.36

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	44.91.45		-50	E
	44.31.45		U OMBA	44.20.01
	9	11 12	Y	44.20.01/90
A COURSE OF	200	3/18	44.20.18	



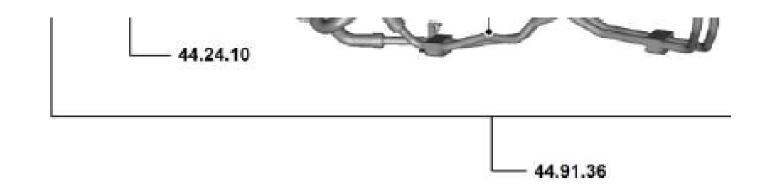


44.20.01.90	TRANSMISSION ASSEMBLY - REMOVE FOR	3000 CC, AJ V6 (AJ126), 4WD	
	ACCESS, AND INSTALL	1	İ

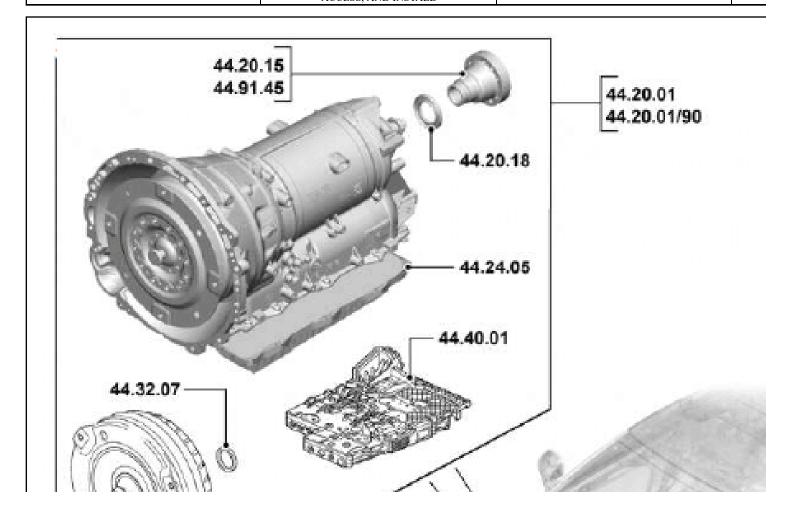


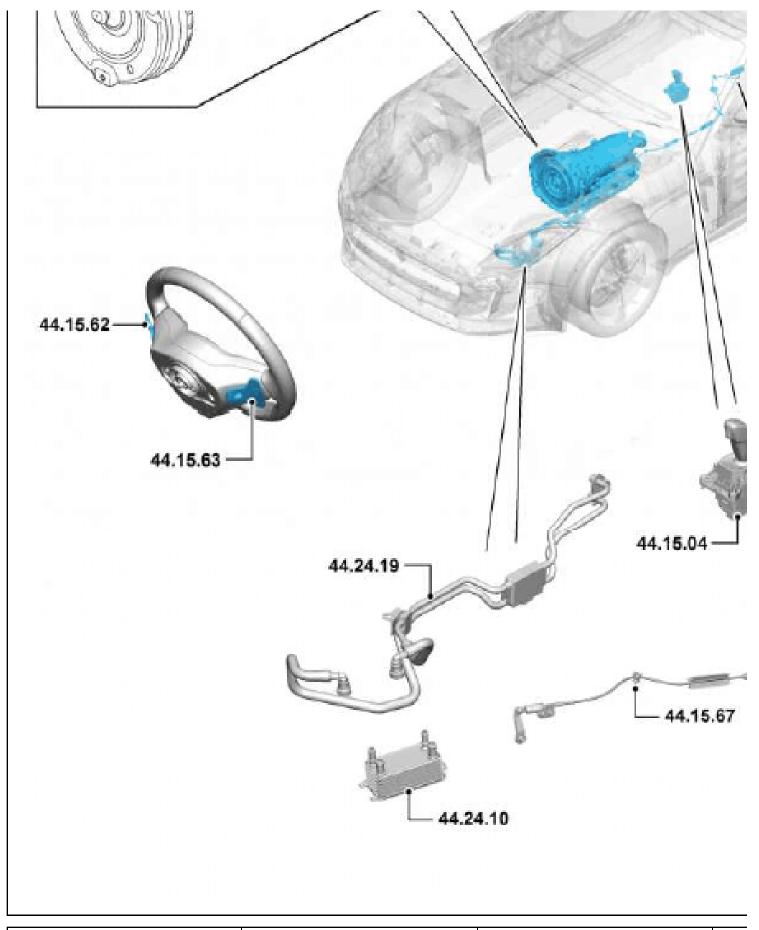




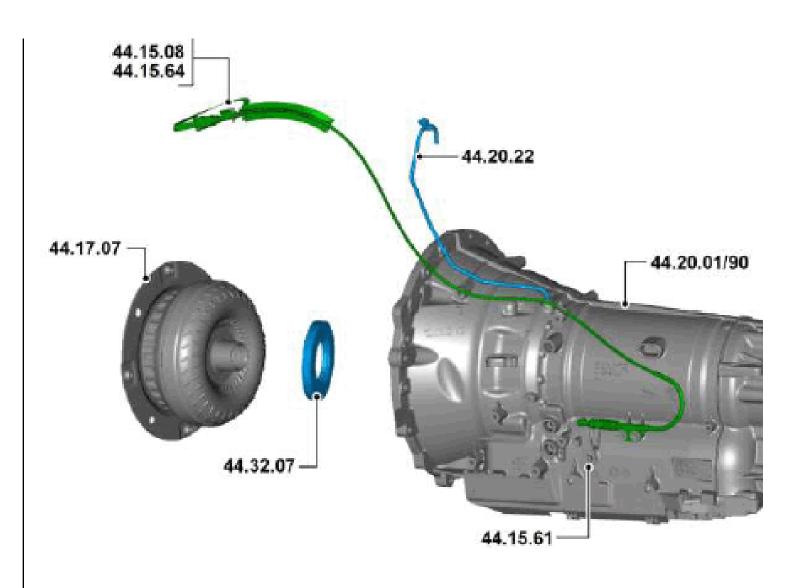


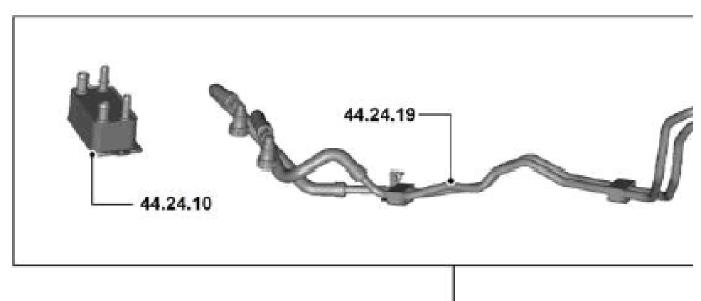
44.20.01.90	TRANSMISSION ASSEMBLY - REMOVE FOR	5000 CC, AJ V8, 2WD	
	ACCESS, AND INSTALL		l



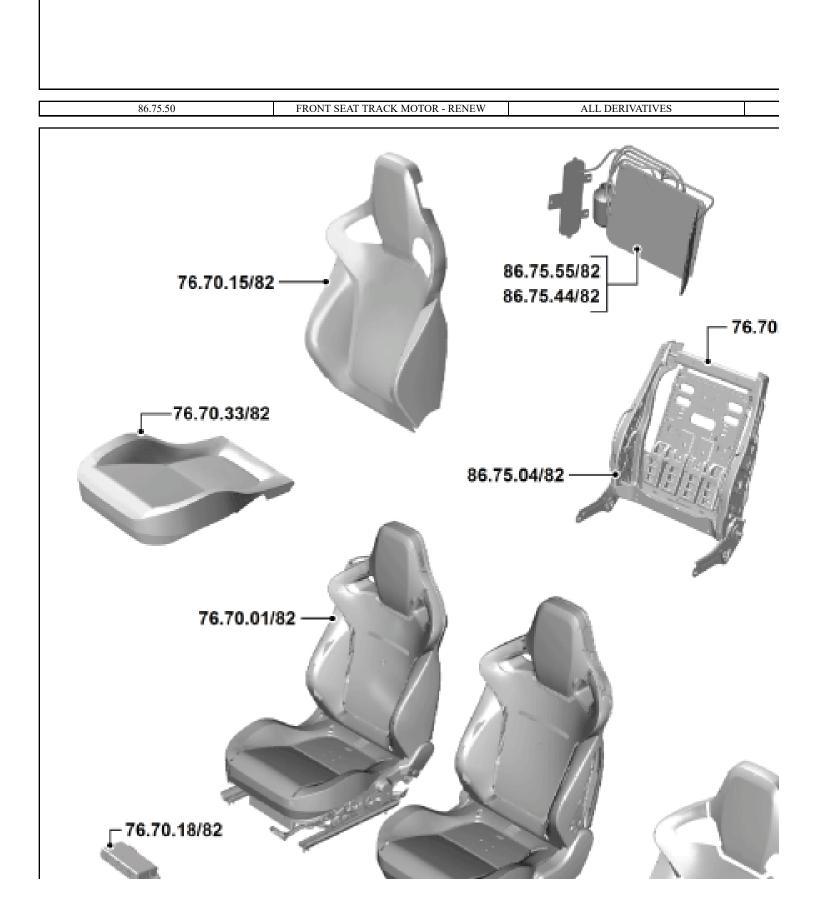


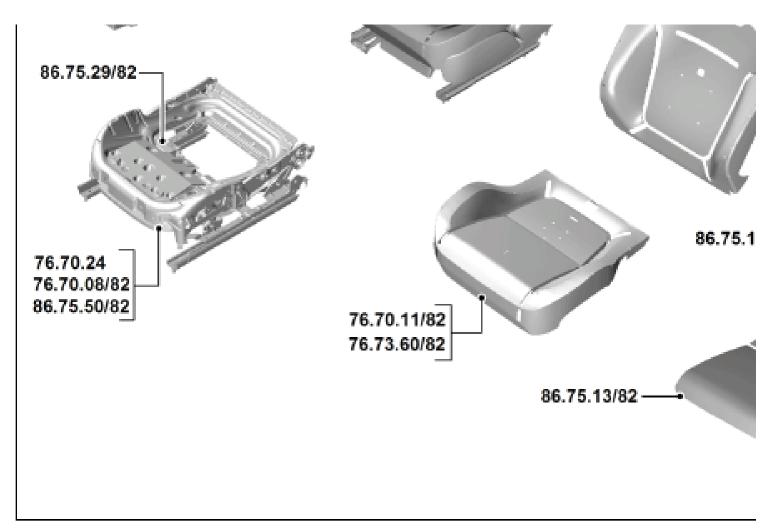
44.20.01.90	TRANSMISSION ASSEMBLY - REMOVE FOR ACCESS, AND INSTALL	5000 CC, AJ V8, 4WD	





44.91.36





General Equipment

EQUIPMENT NAME	
Transmission jack	

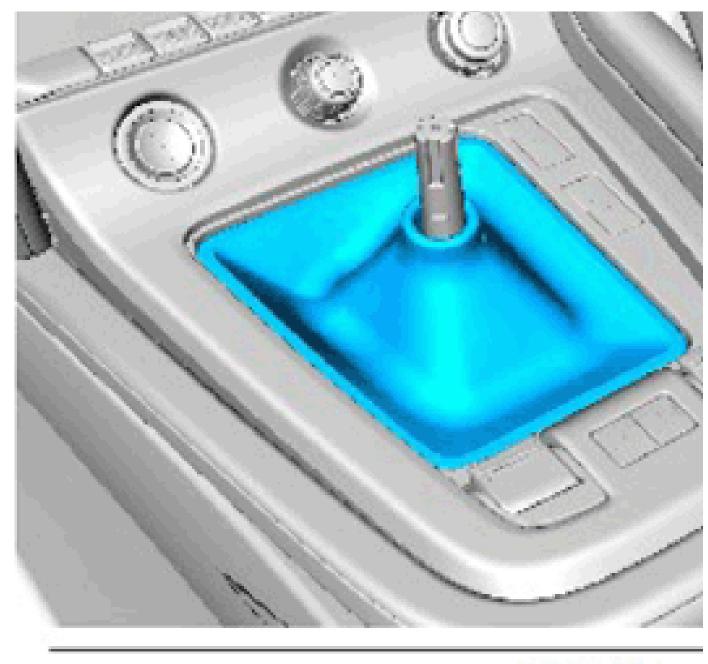
Removal

NOTE:

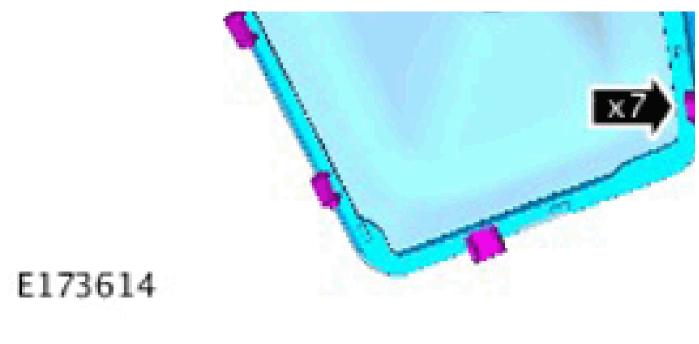
- Some variation in the illustrations may occur, but the essential information is always correct.
- Some illustrations may show the transmission removed for clarity.
- 1. Refer to: <u>Battery Disconnect and Connect</u> (General Procedures).
- 2. WARNING: The selector lever knob will be released suddenly, keep face clear during removal.



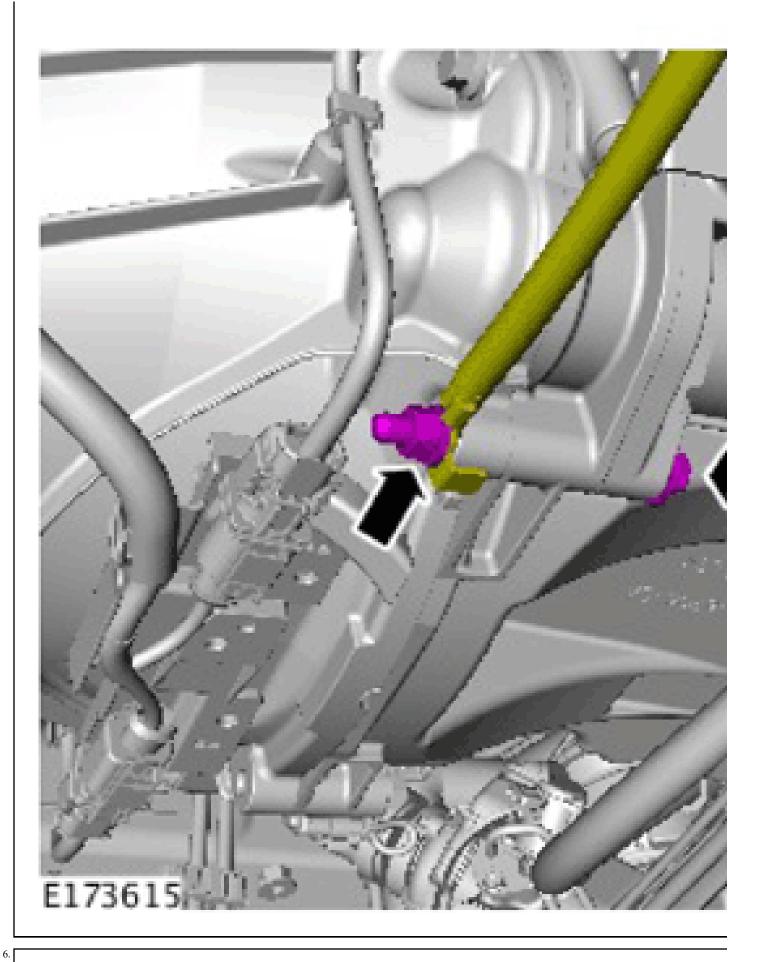
 $3\cdot$ CAUTION:

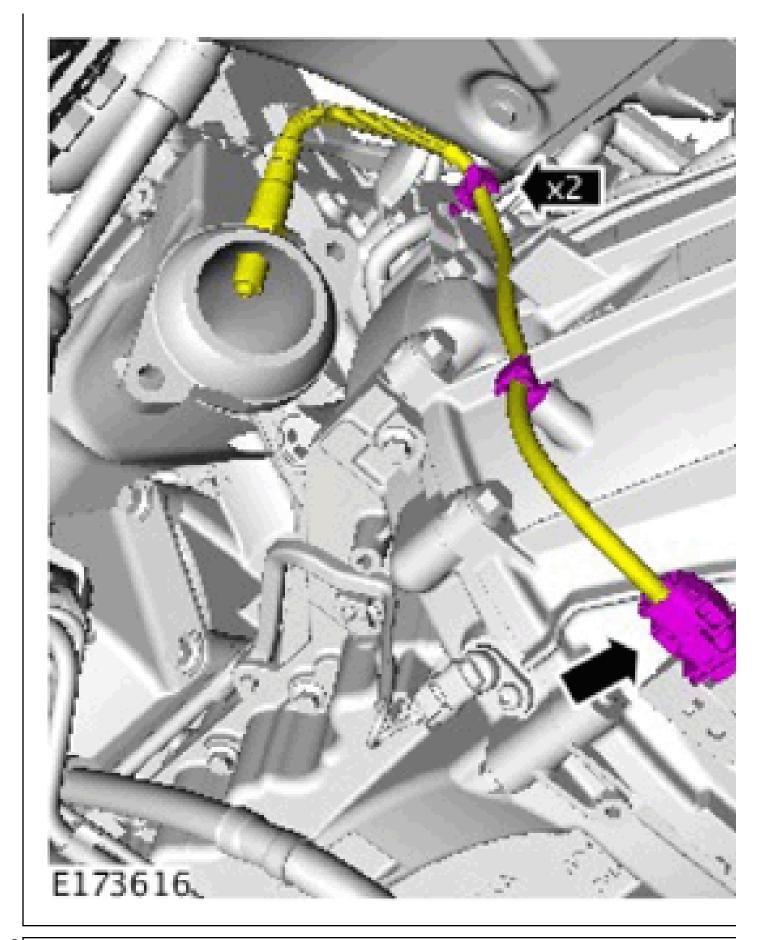


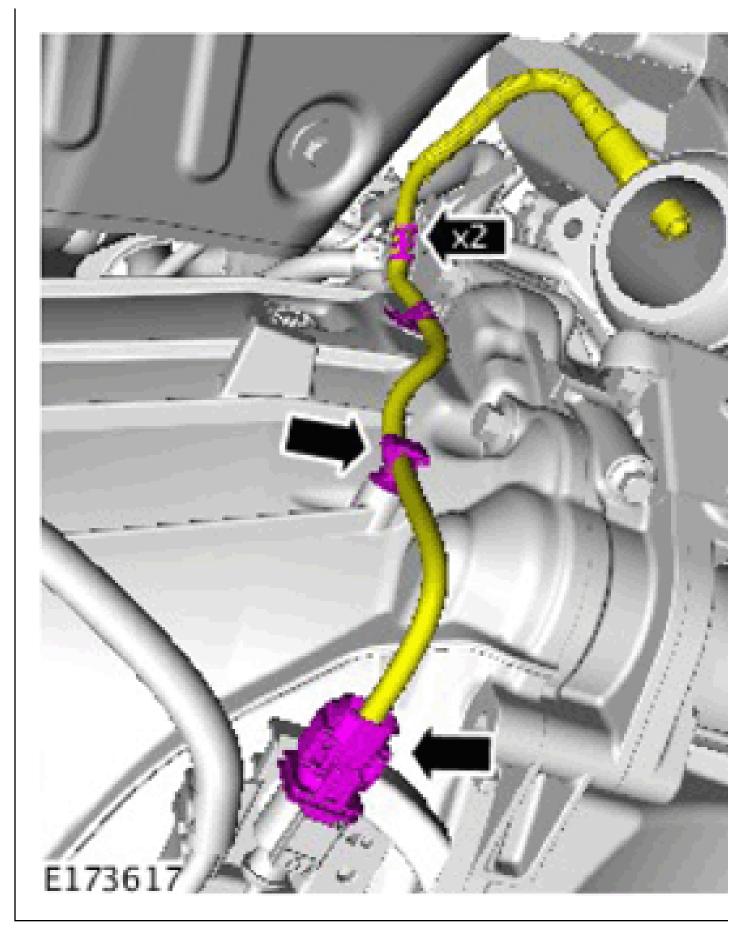




4. Refer to: **DRIVESHAFT - RWD** (Removal and Installation).



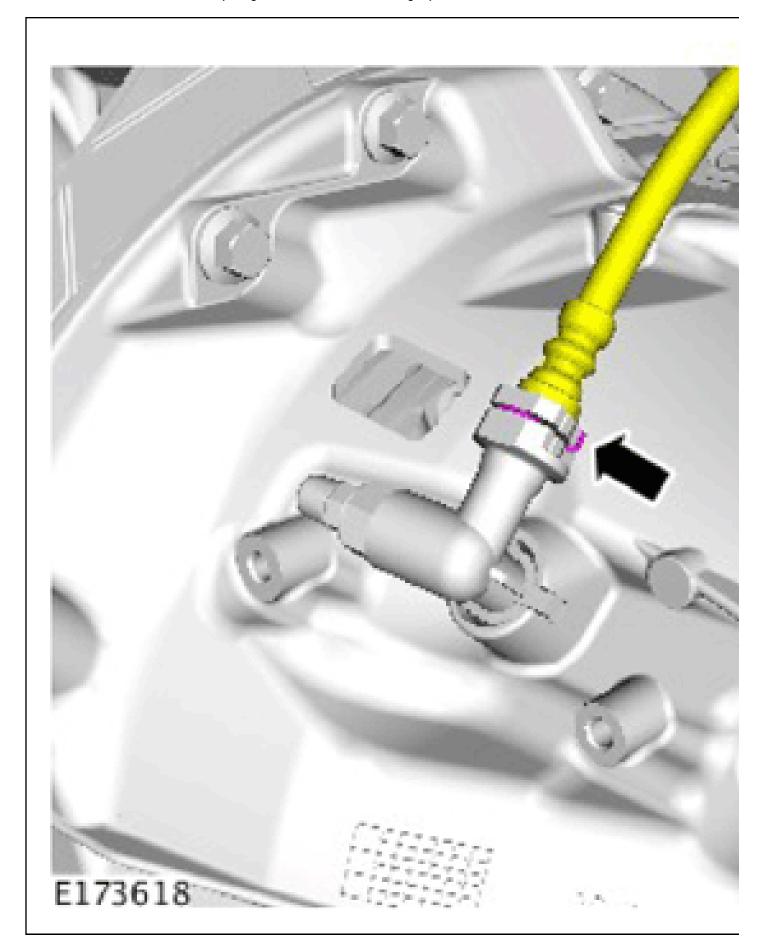


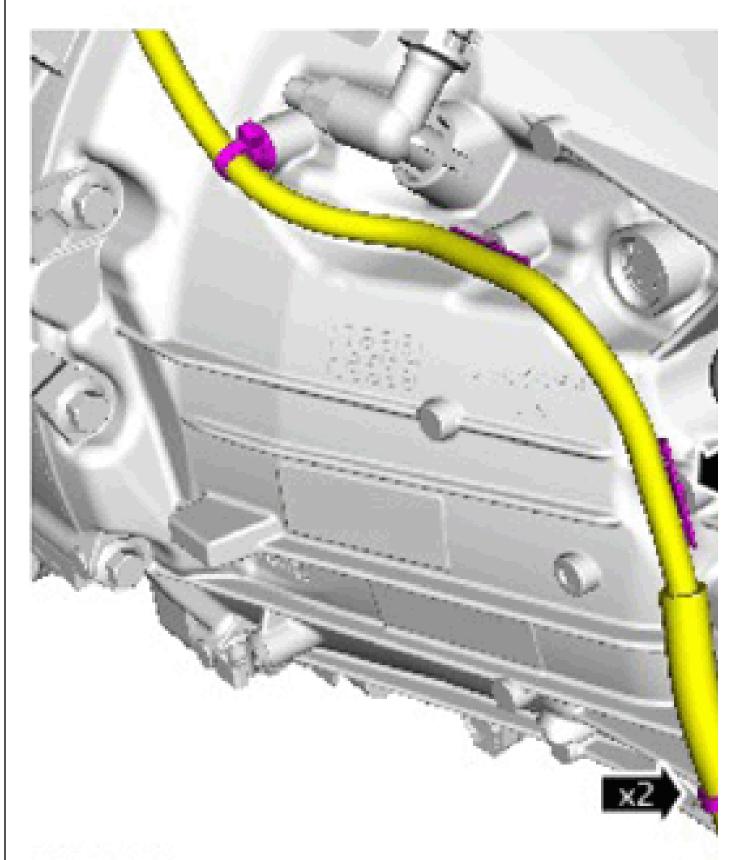


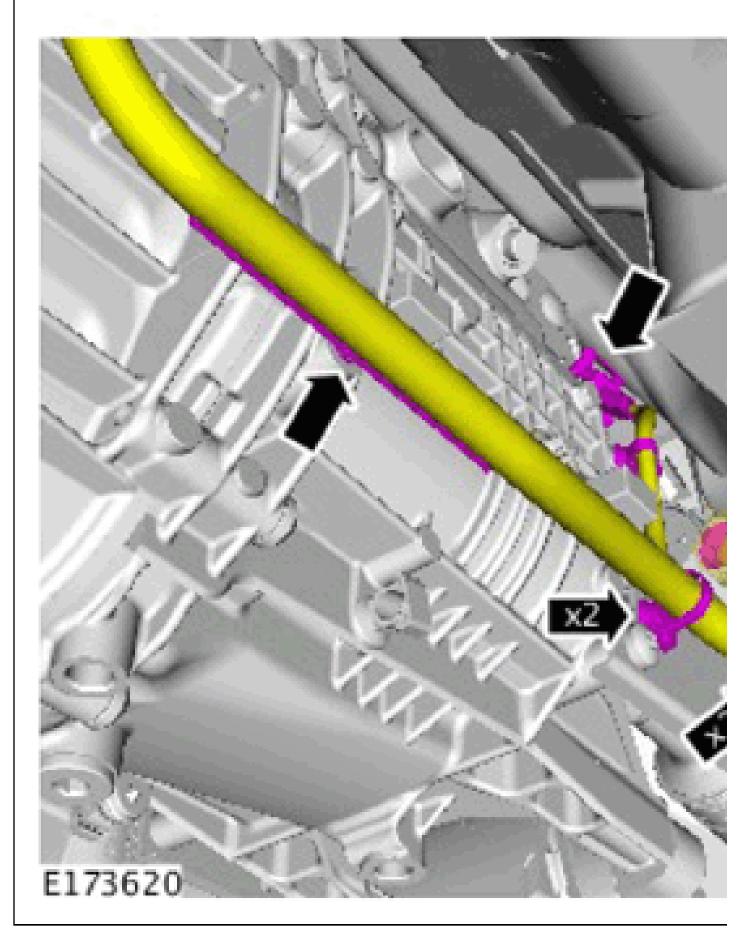
8. WARNING: Be prepared to collect escaping fluids.

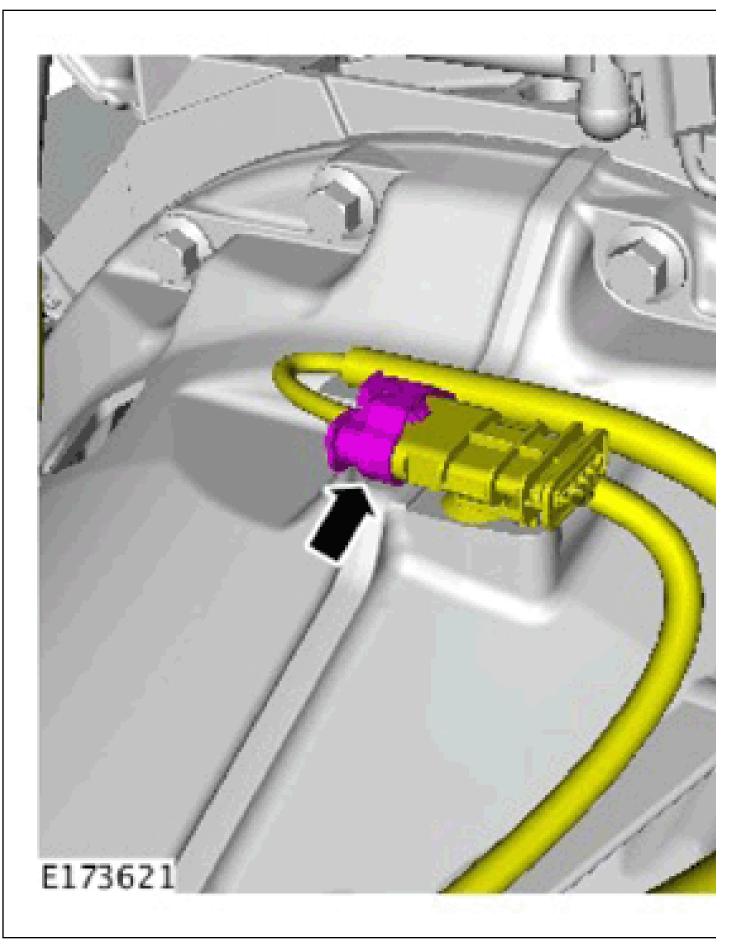
CAUTION: Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.

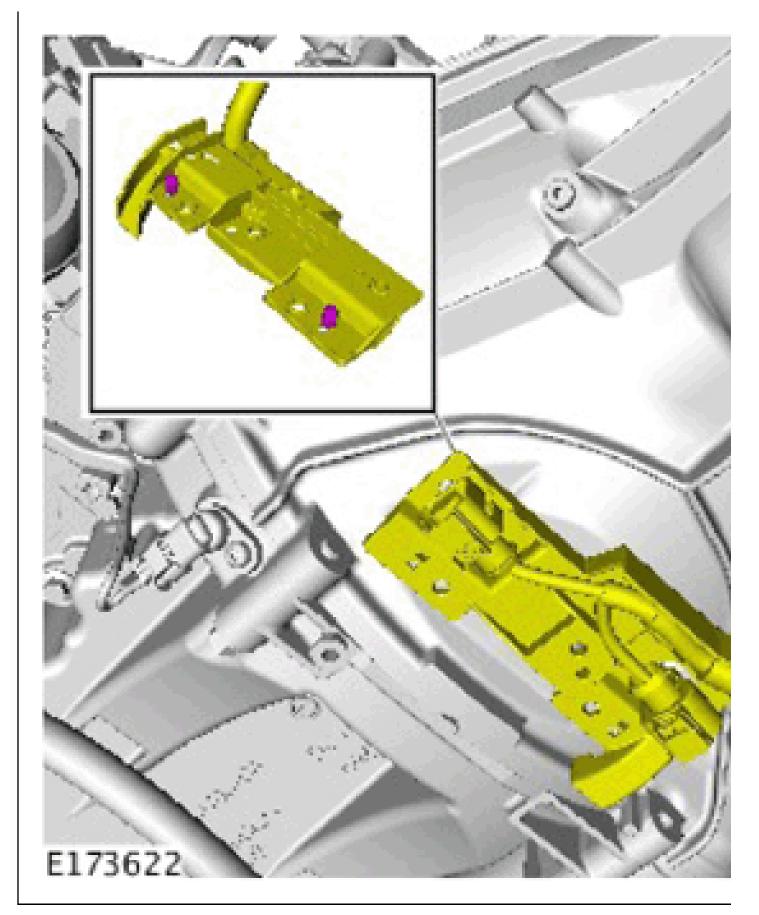
- Ensure the retaining clip is not removed.
- Make sure that all openings are sealed. Use new blanking caps.

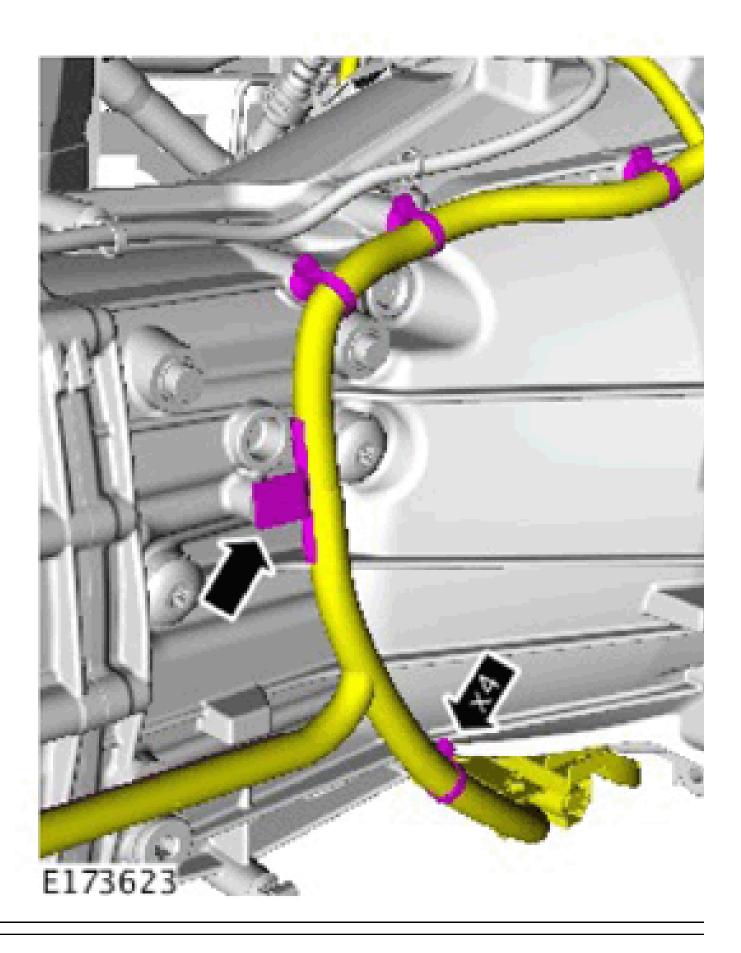


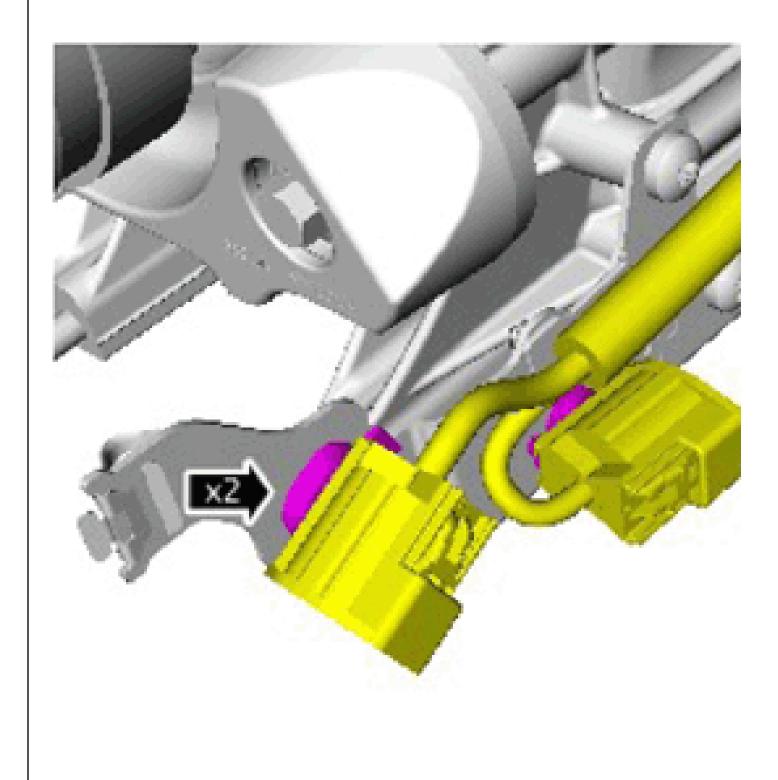


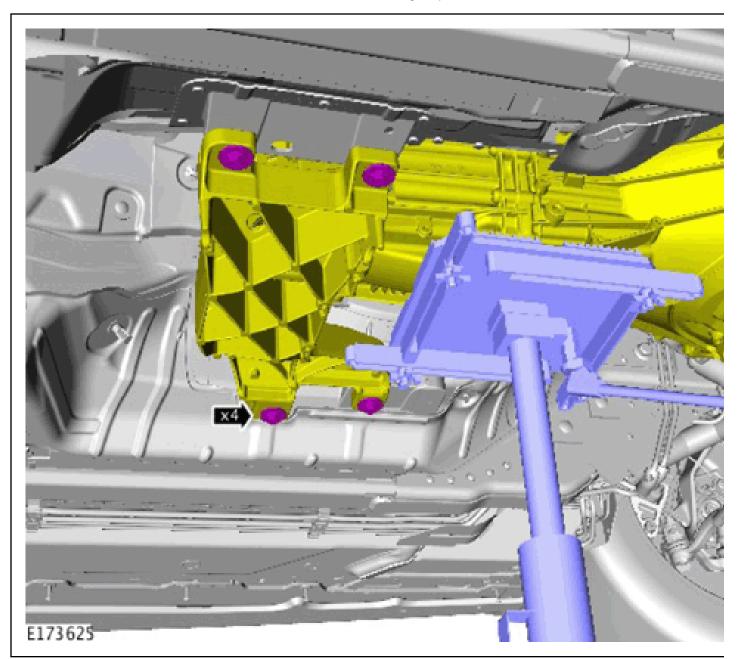






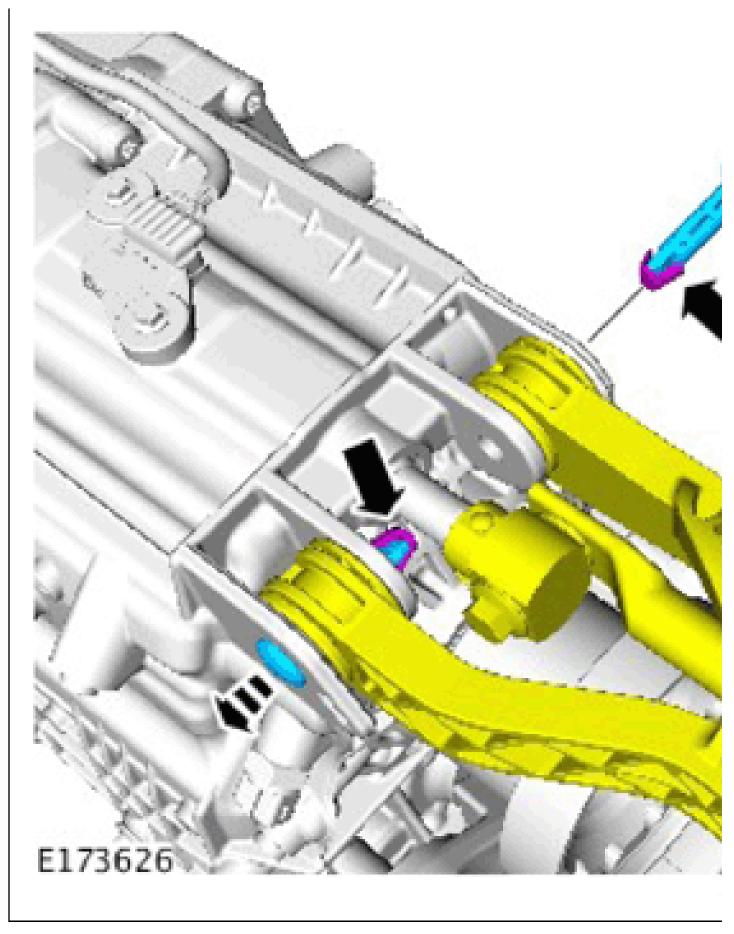




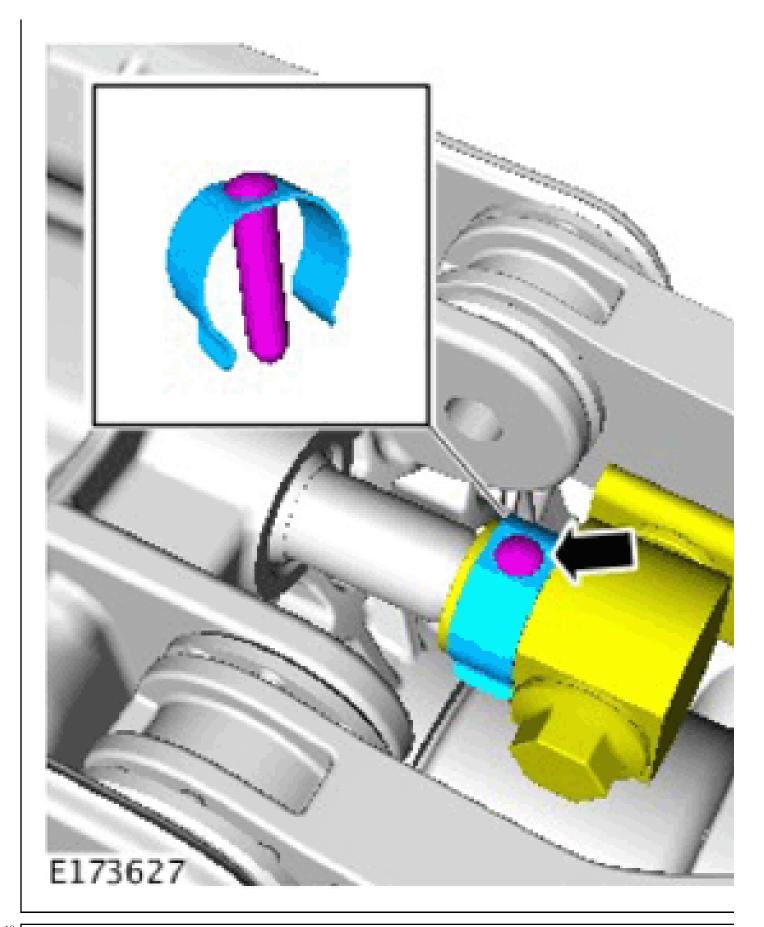


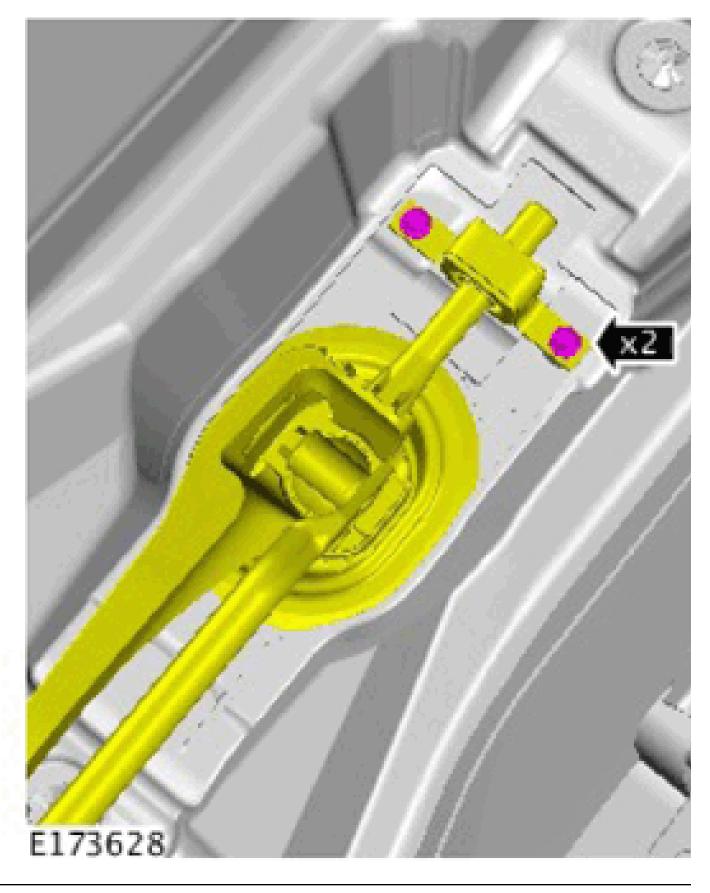
• General Equipment: Transmission jack

 $16. \ \ \, \text{CAUTION:} \quad \, \text{Discard the components.}$

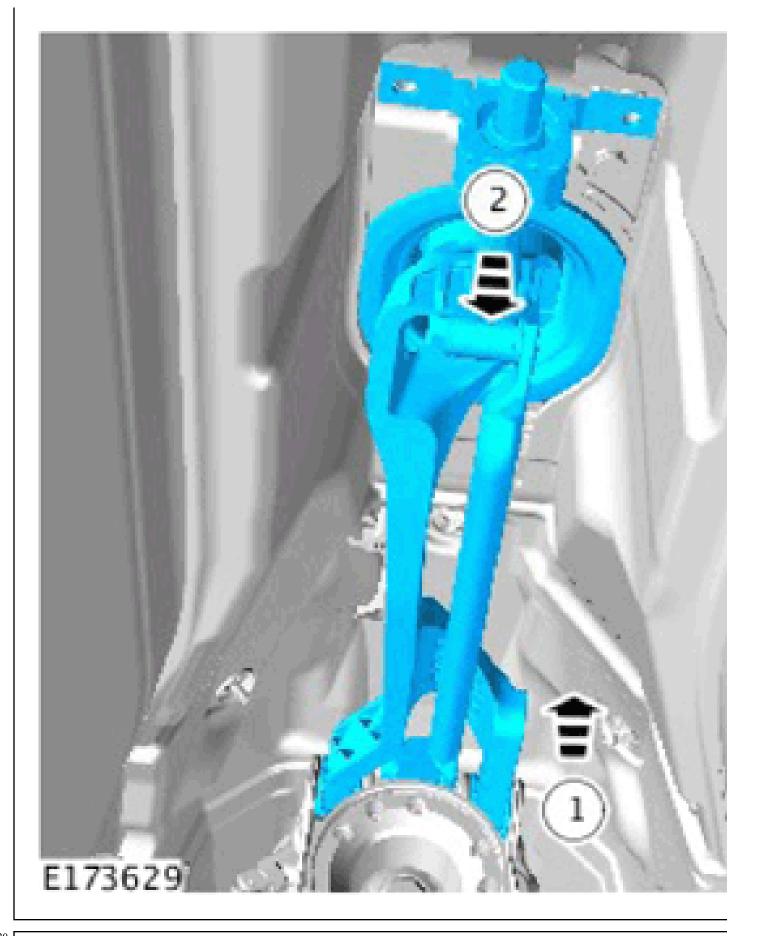


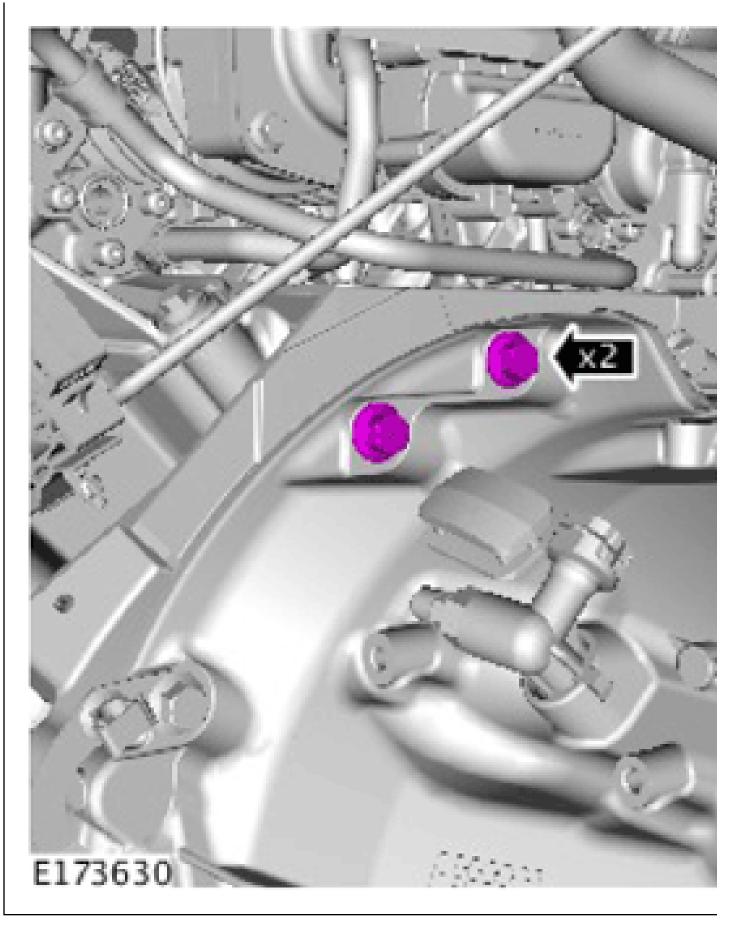
17. CAUTION: Discard the component.



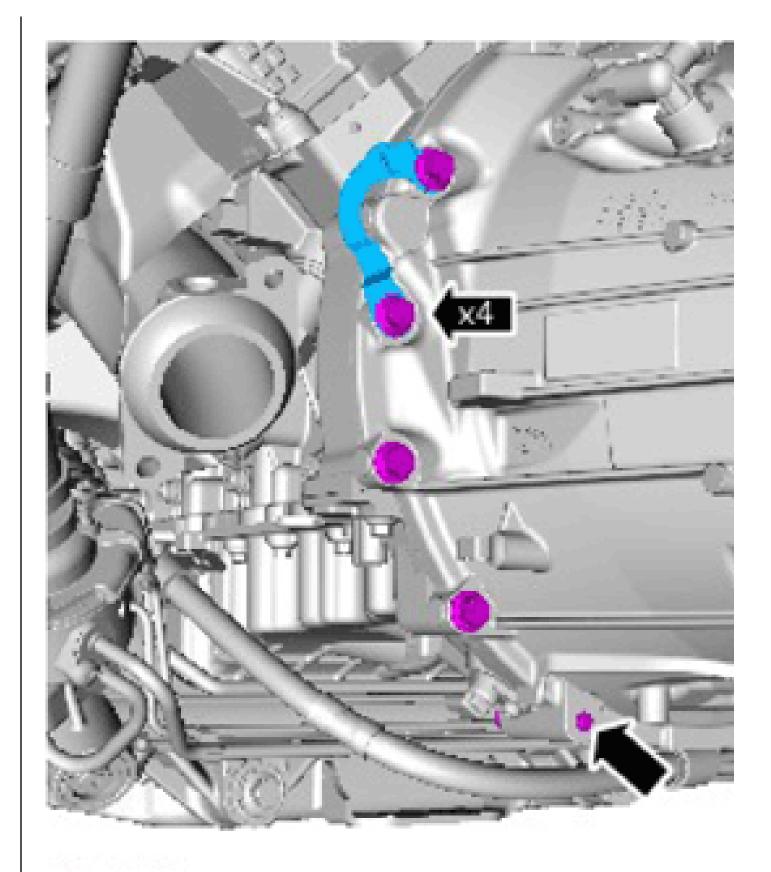


19. NOTE: Note the fitted position of the rubber mounts.

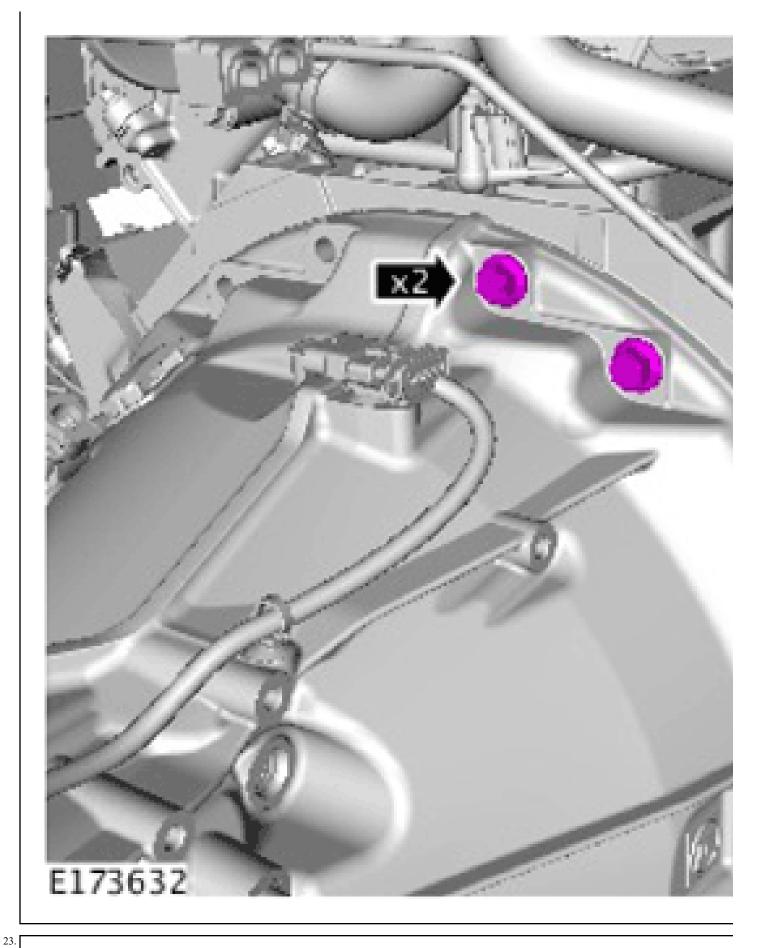


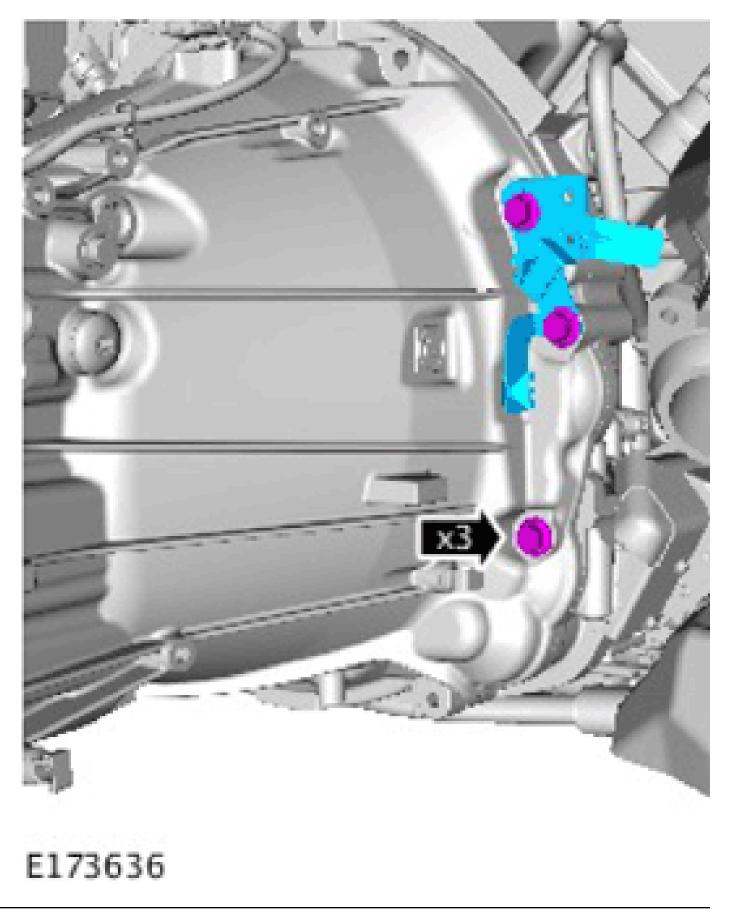


21. NOTE: Note the orientation of the component prior to removal.



E173631

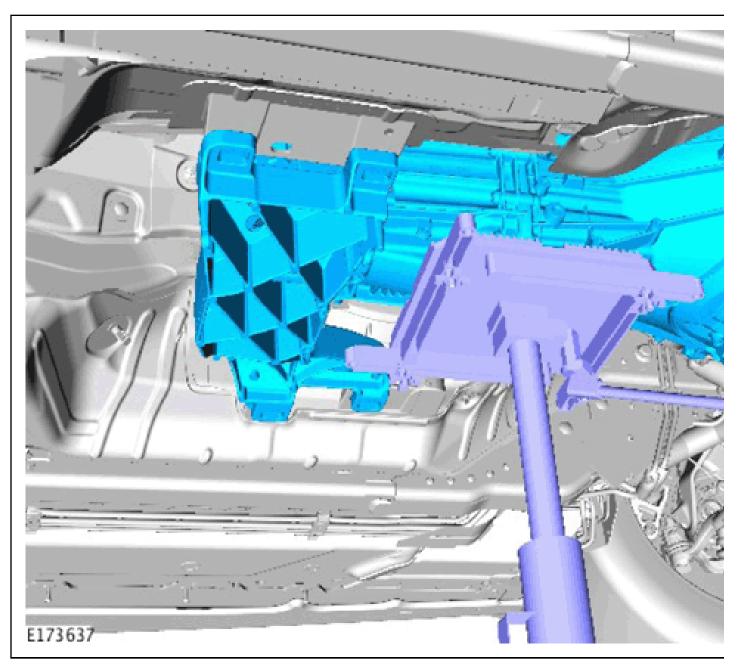




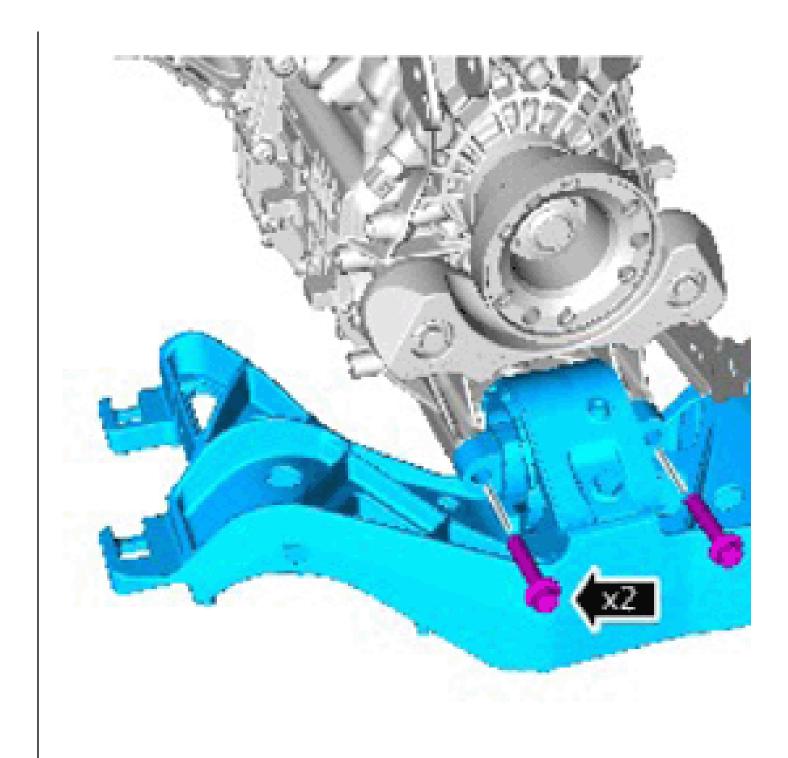
 $24. \ \ \text{WARNING:} \ \ \text{This step requires the aid of another technician.}$

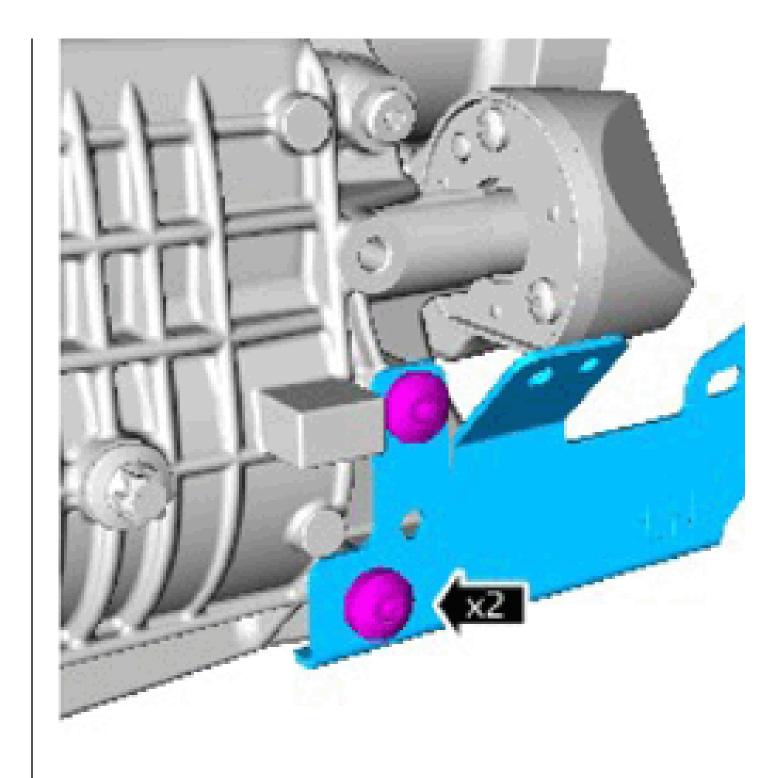
• Make sure that the dowels are still located on the engine and not the transmission.

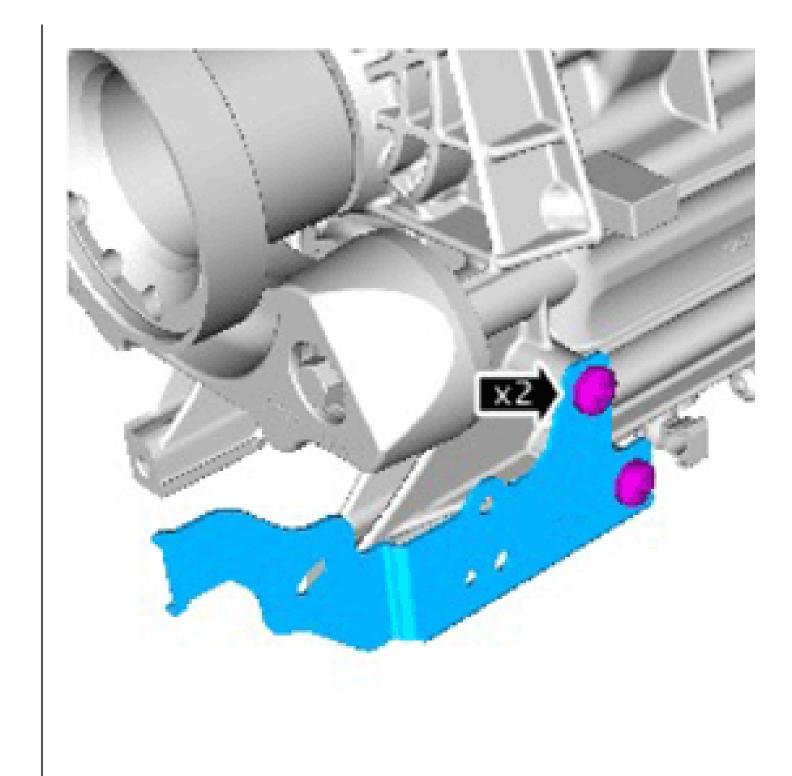
• Care must be taken to avoid damaging the surrounding components.

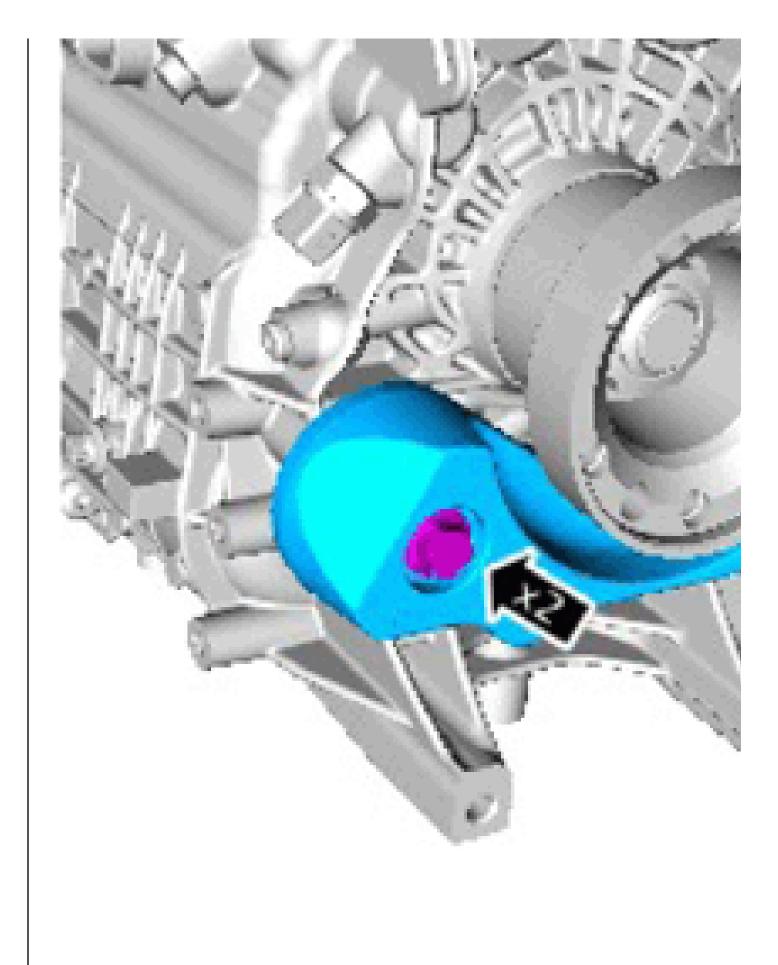


25. NOTE: Do not disassemble further if the component is removed for access only.

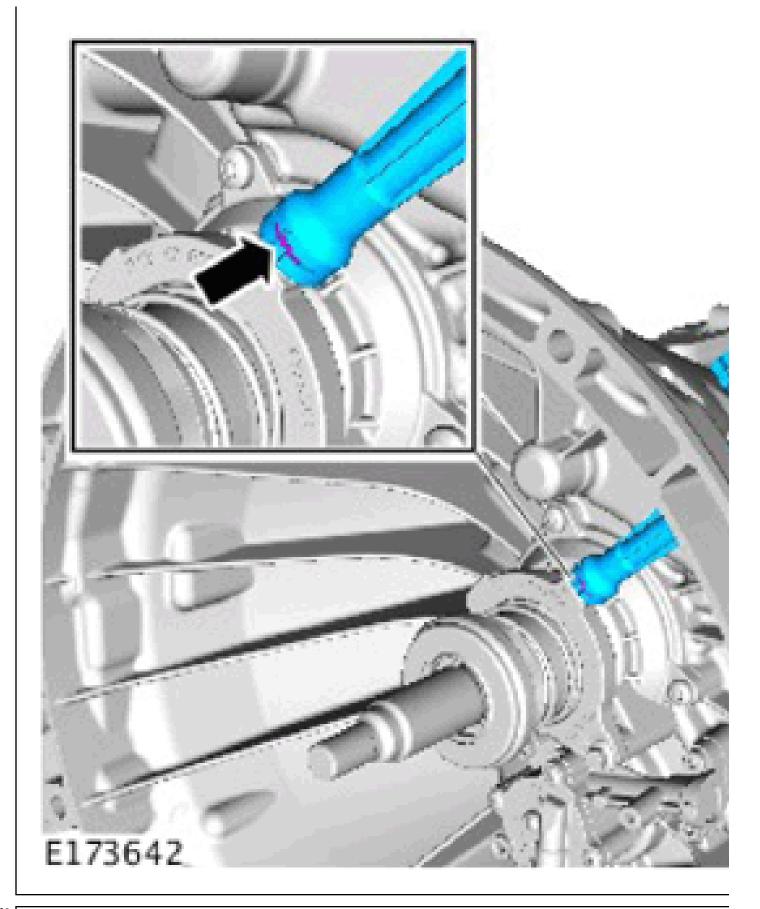


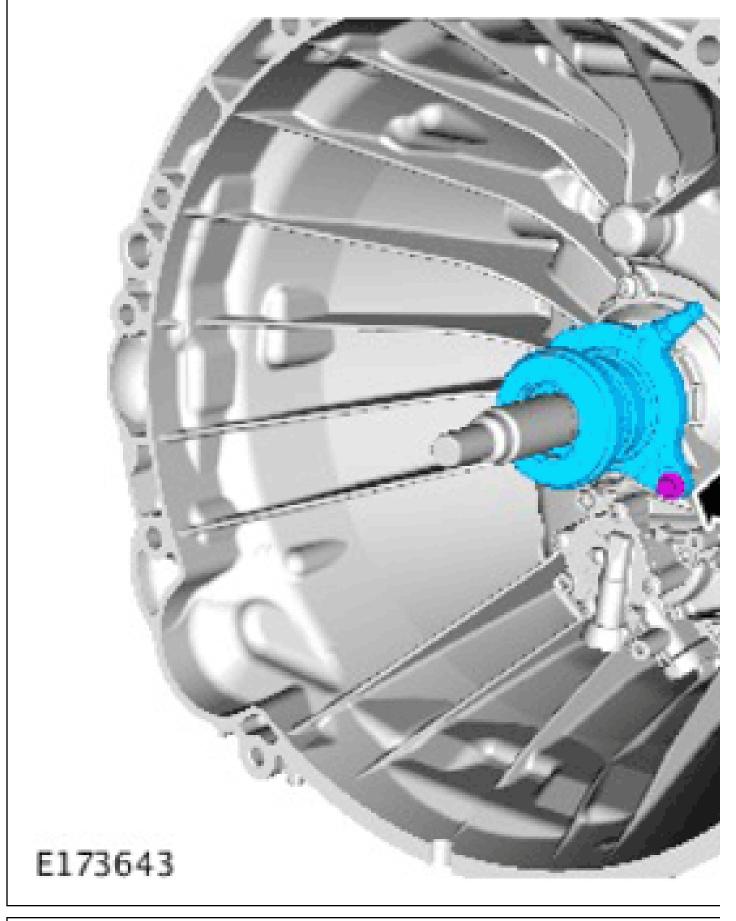


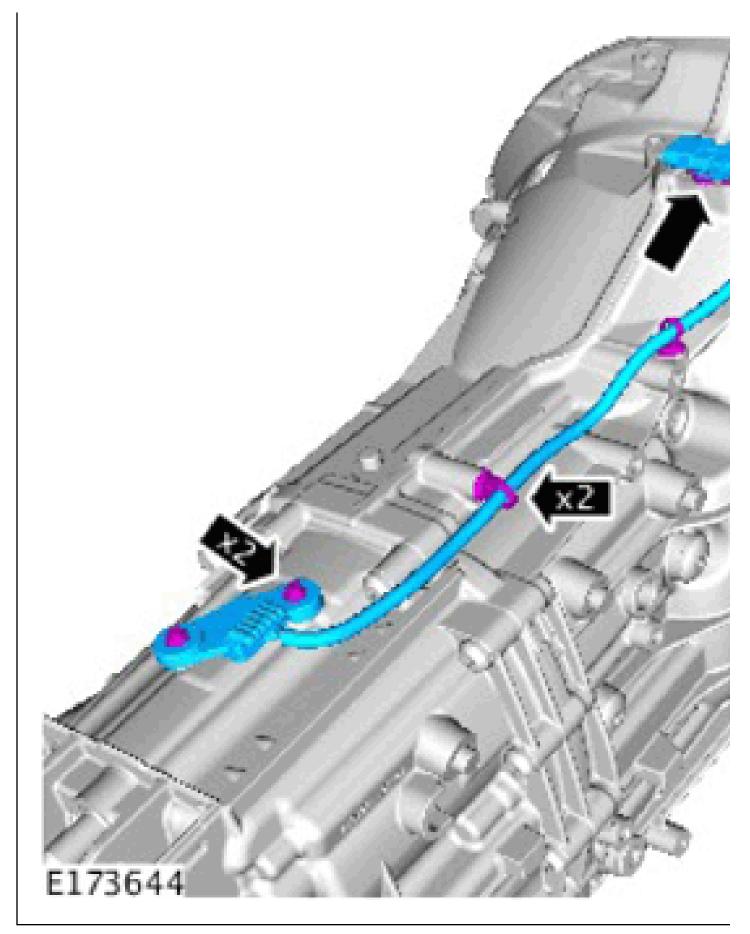


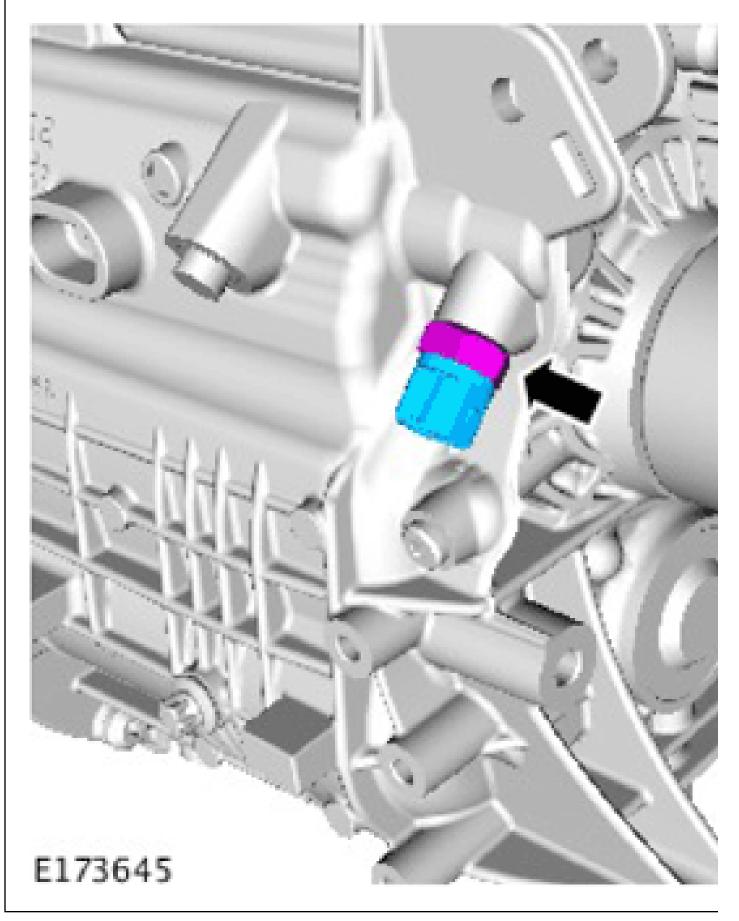


29.	WARNING:	Be prepared to collect escaping fluids.						
	CAUTION:	Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.						









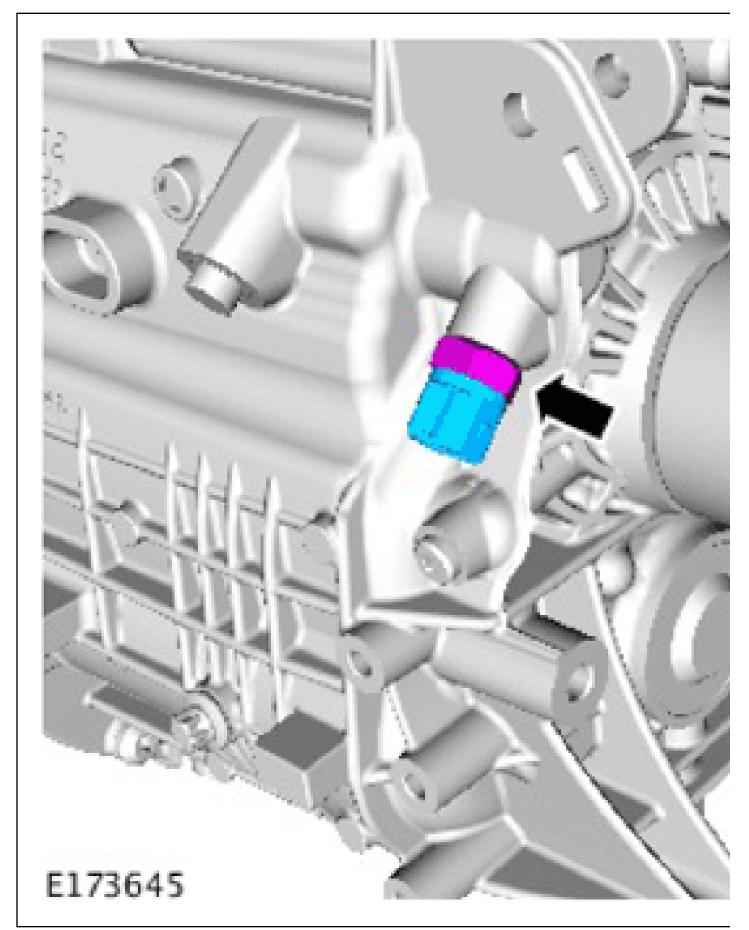
Installation

NOTE:

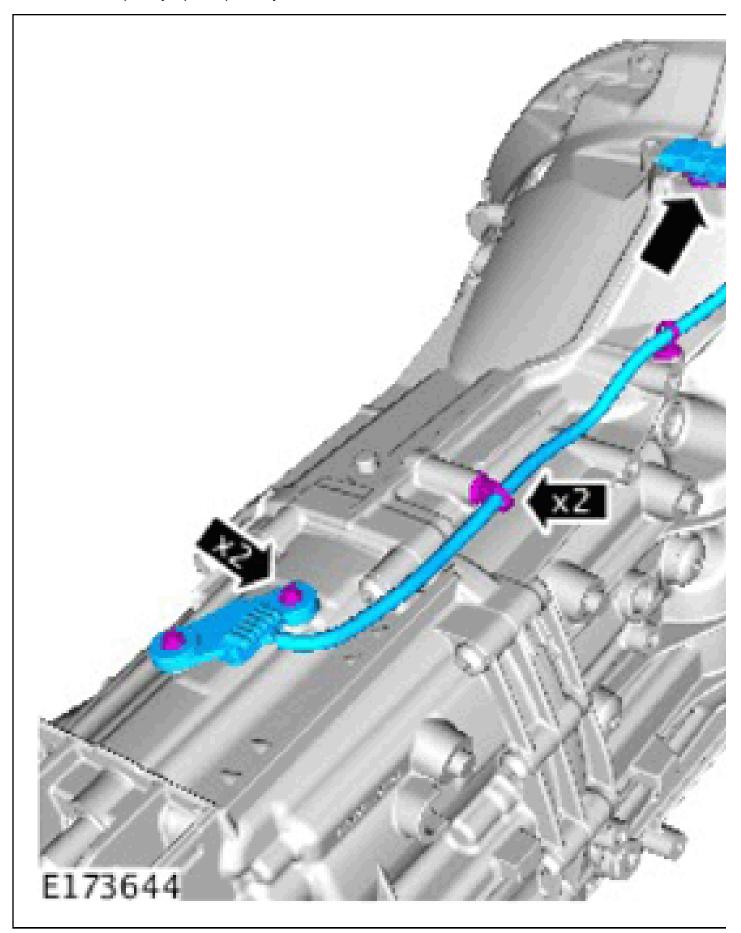
• Some variation in the illustrations may occur, but the essential information is always correct.

• Some illustrations may show the transmission removed for clarity.

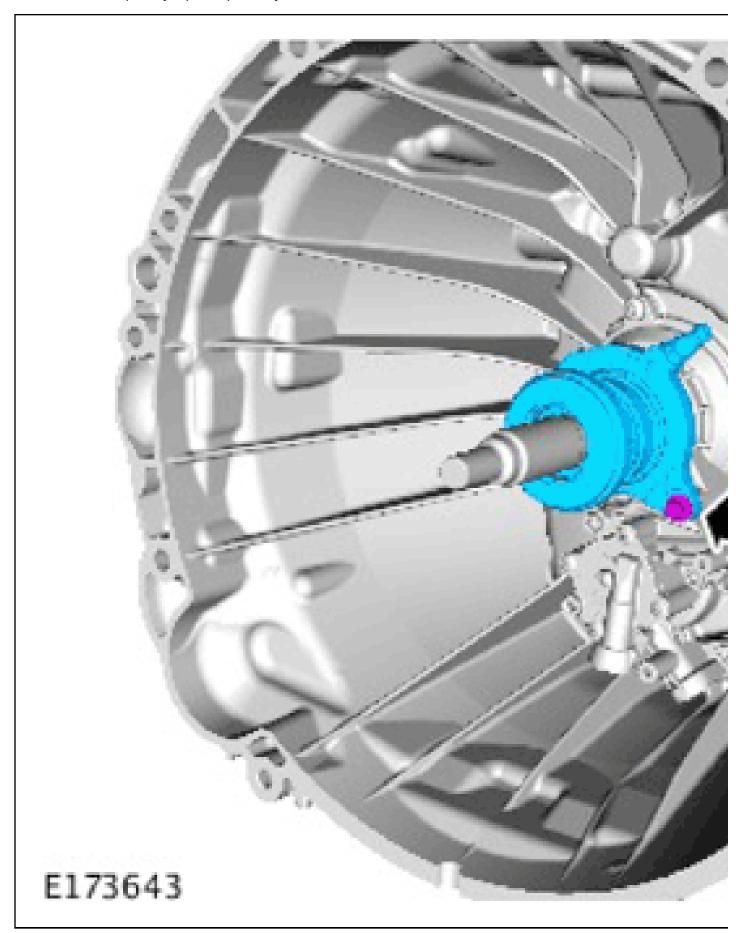
1. NOTE: This step is only required if previously removed.



2. NOTE: This step is only required if previously removed.

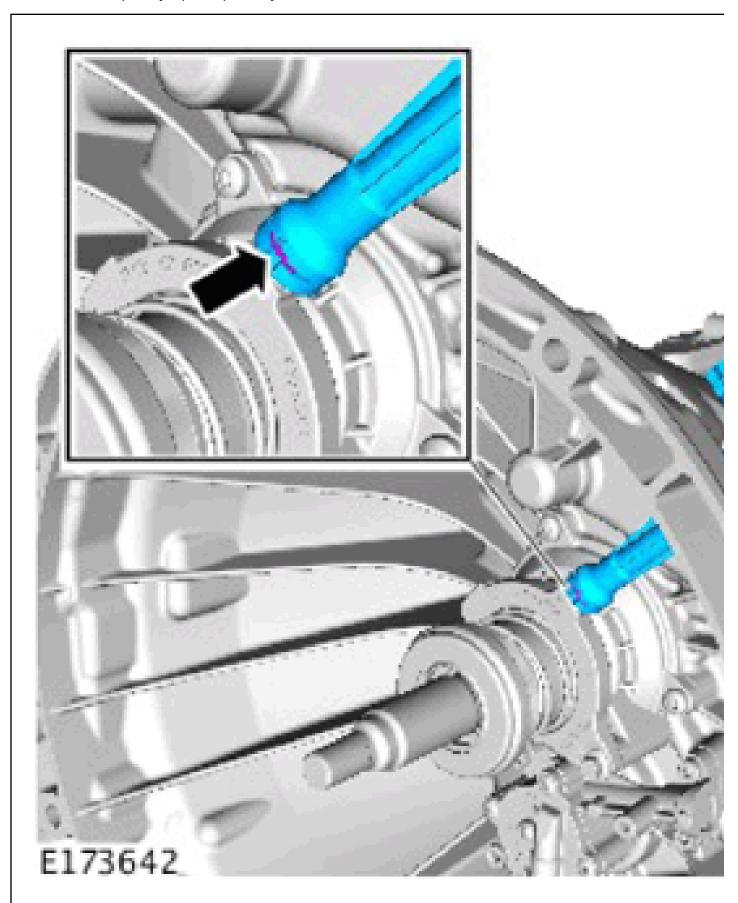


3. NOTE: This step is only required if previously removed.

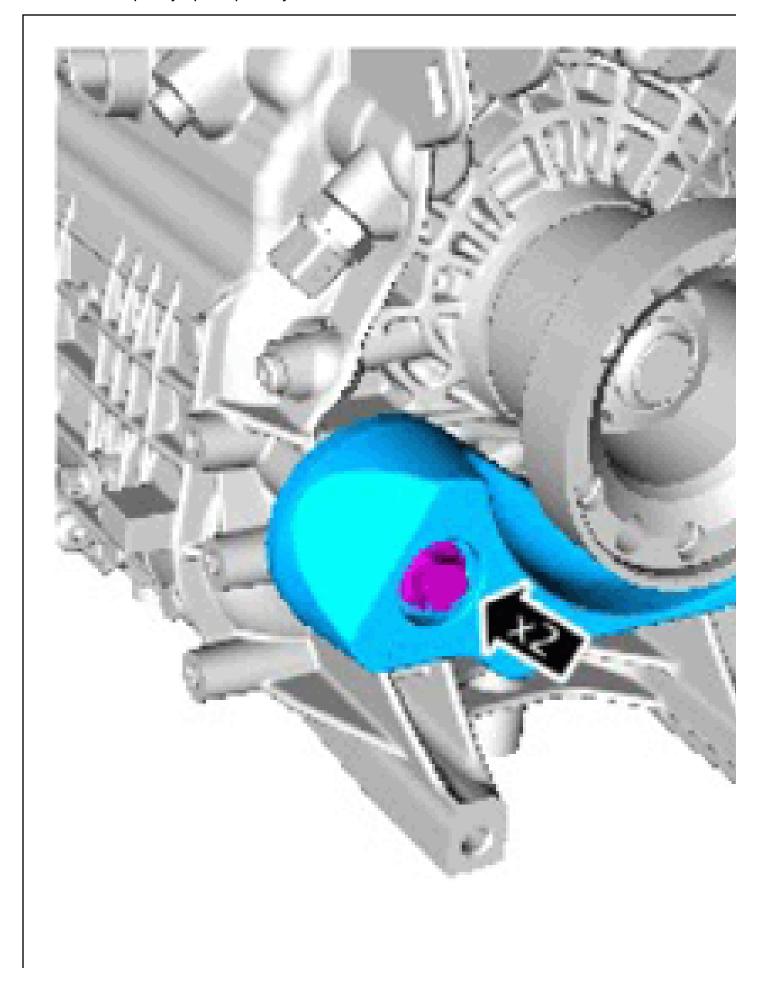


4. CAUTION: Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.

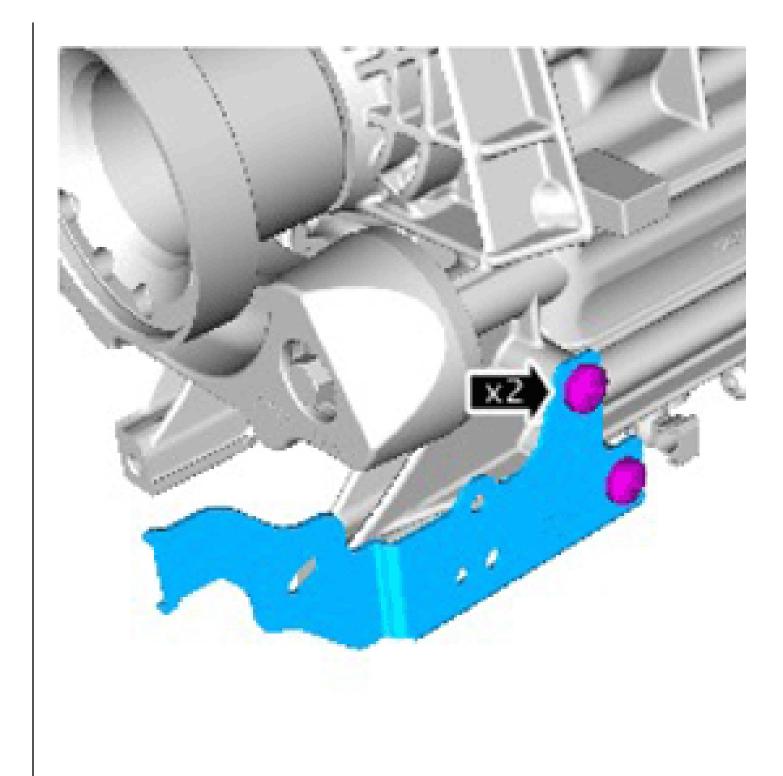
NOTE: This step is only required if previously removed.





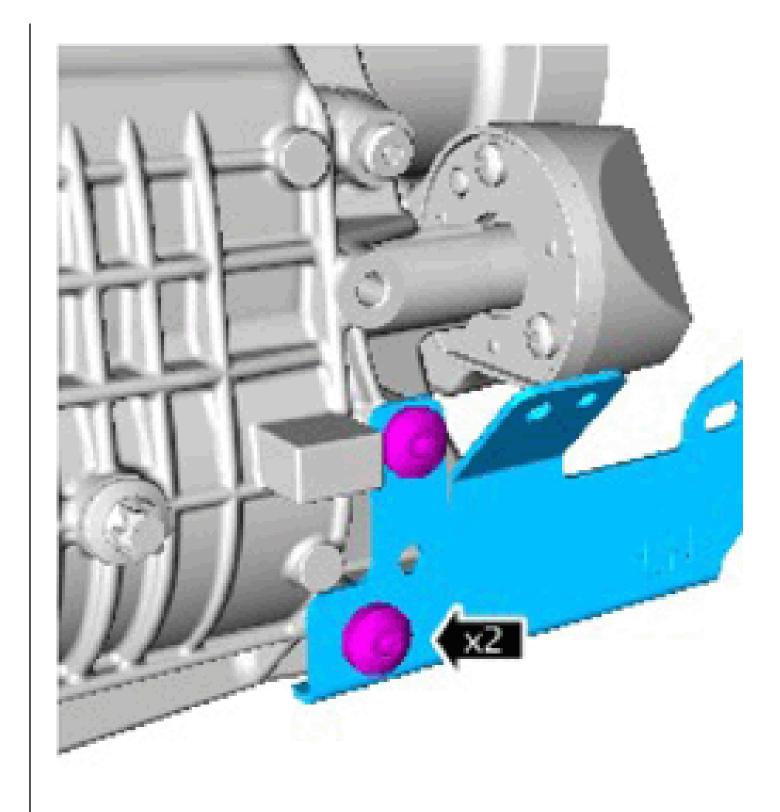


Torque Specification: 48 Nm									
OTE:	This step is only re	quired if previously r	emoved.						

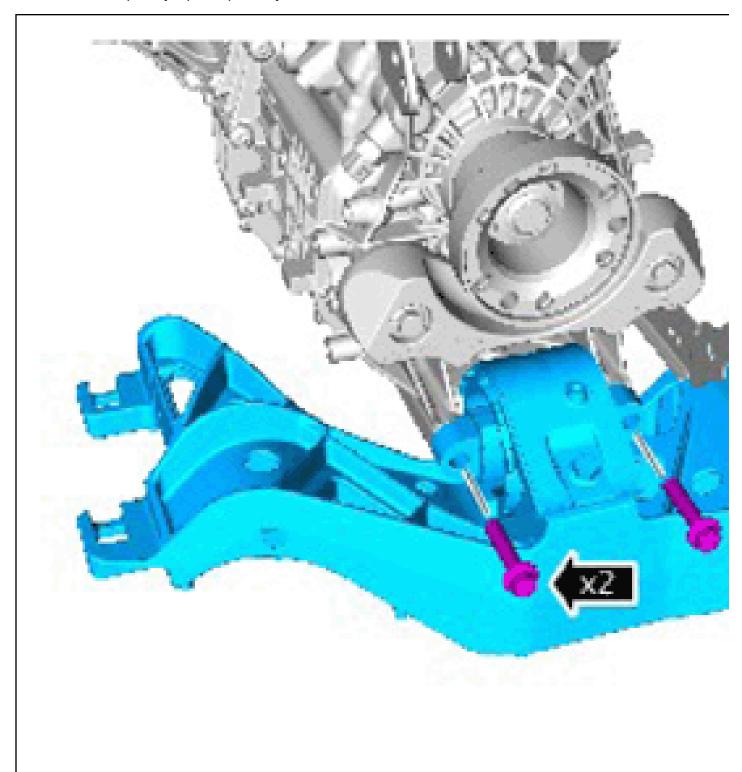


Torque Specification: 12 Nm

 $^{7.}$ NOTE: This step is only required if previously removed.



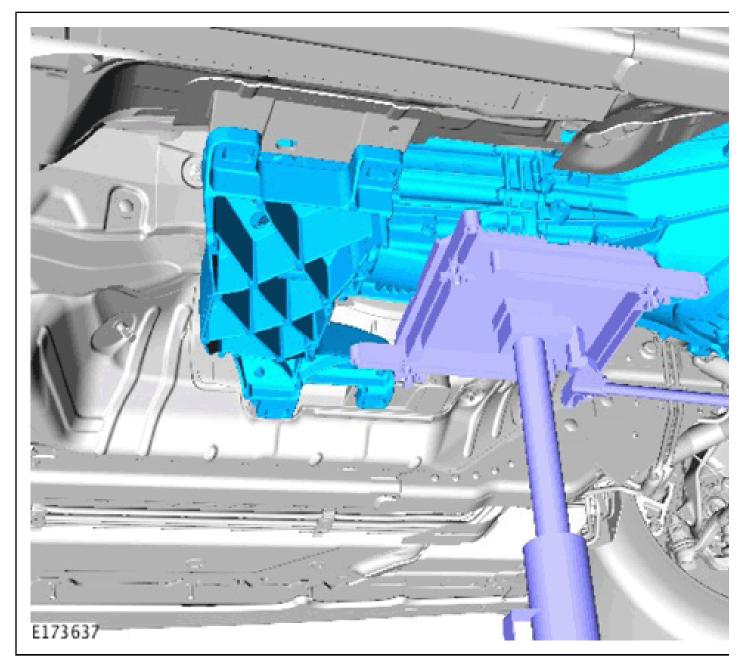
$8. \ \, \text{NOTE:} \hspace{1.5cm}$ This step is only required if previously removed.

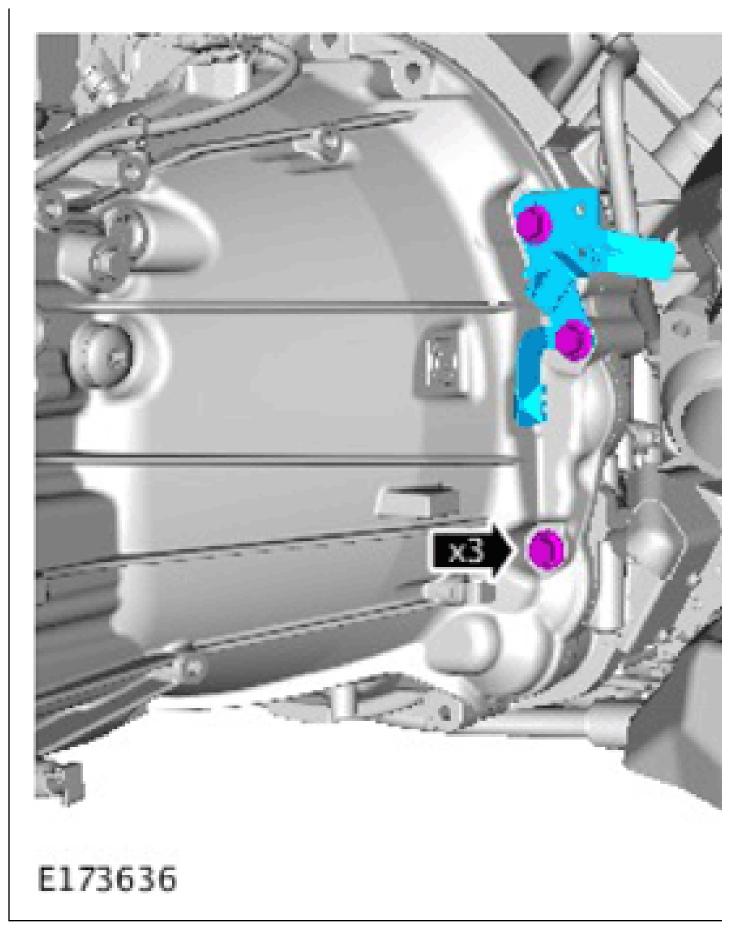


9. WARNING: This step requires the aid of another technician.

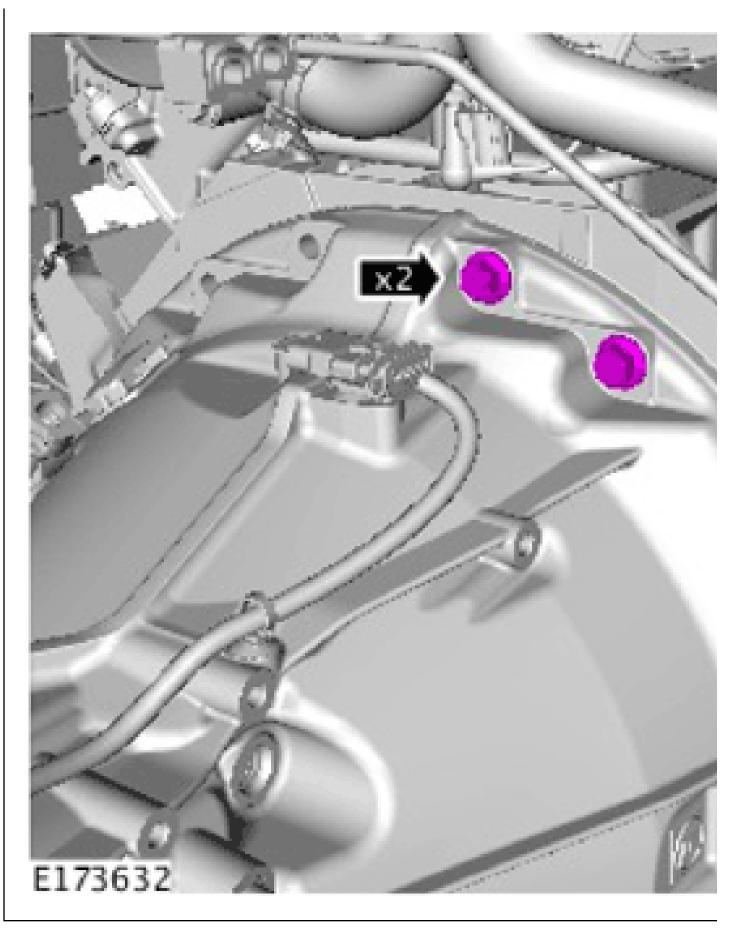
CAUTION:

- Care must be taken to avoid damaging the surrounding components.
- Apply grease of the correct specification to the input shaft.

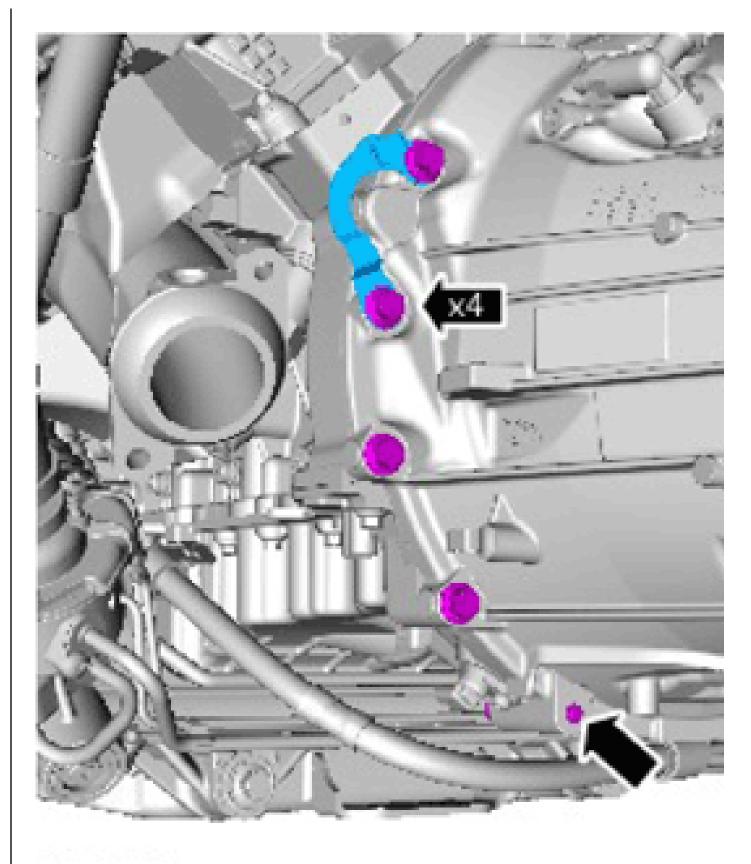




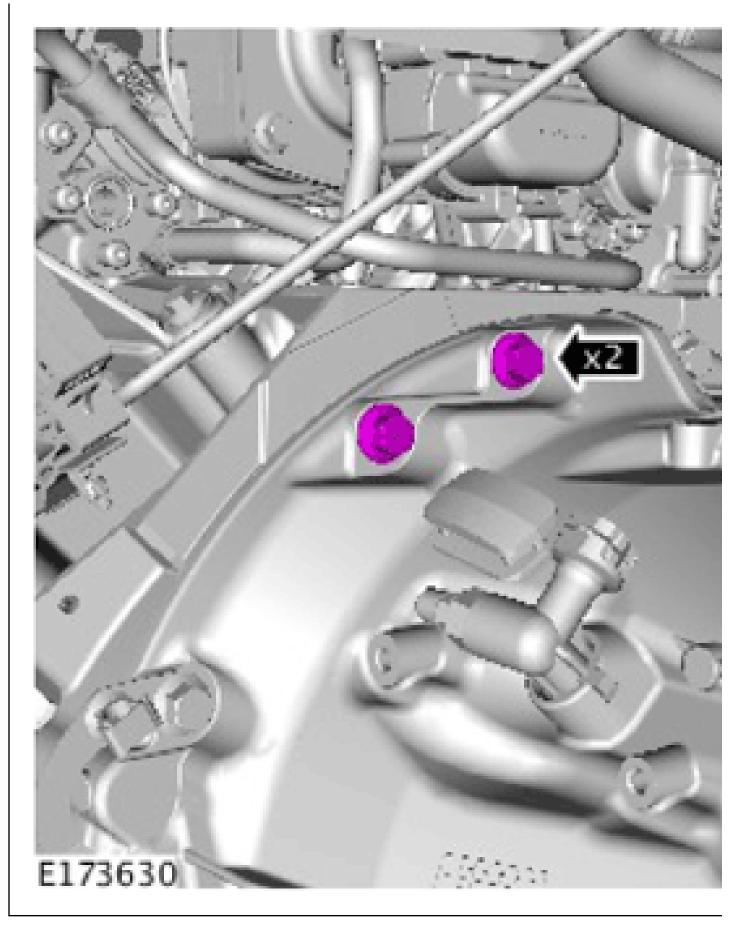
Torque Specification: 48 Nm



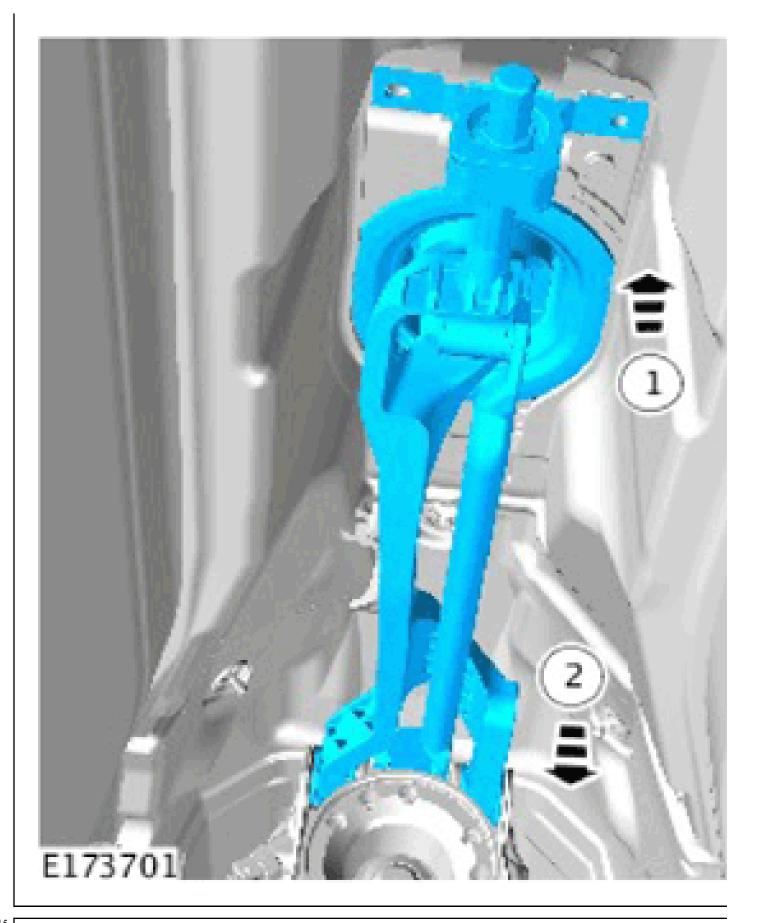
Torque Specification: 48 Nm

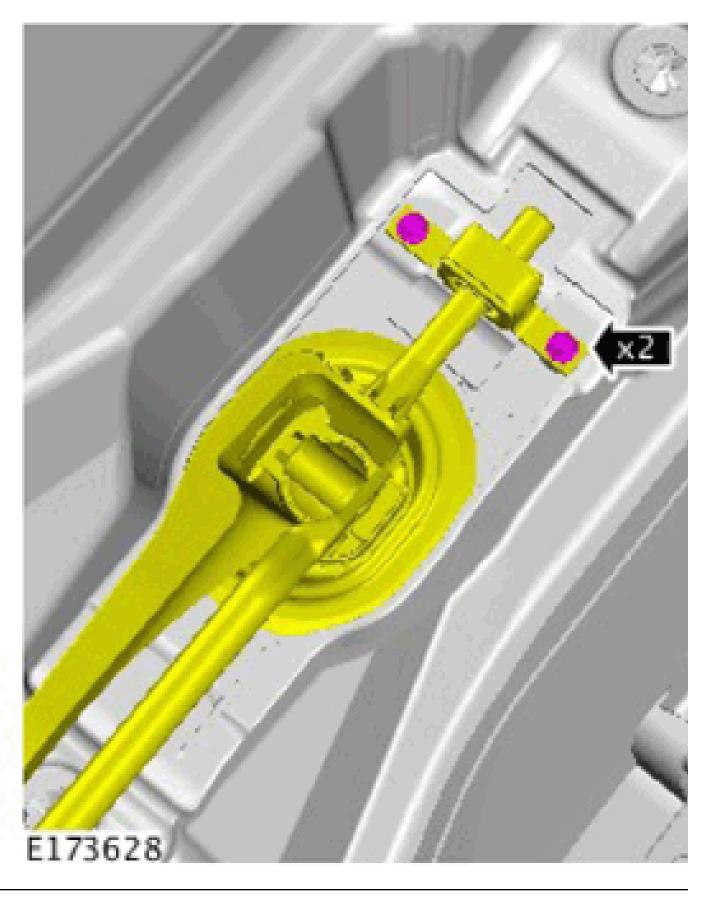


Torque Specification: 48 Nm



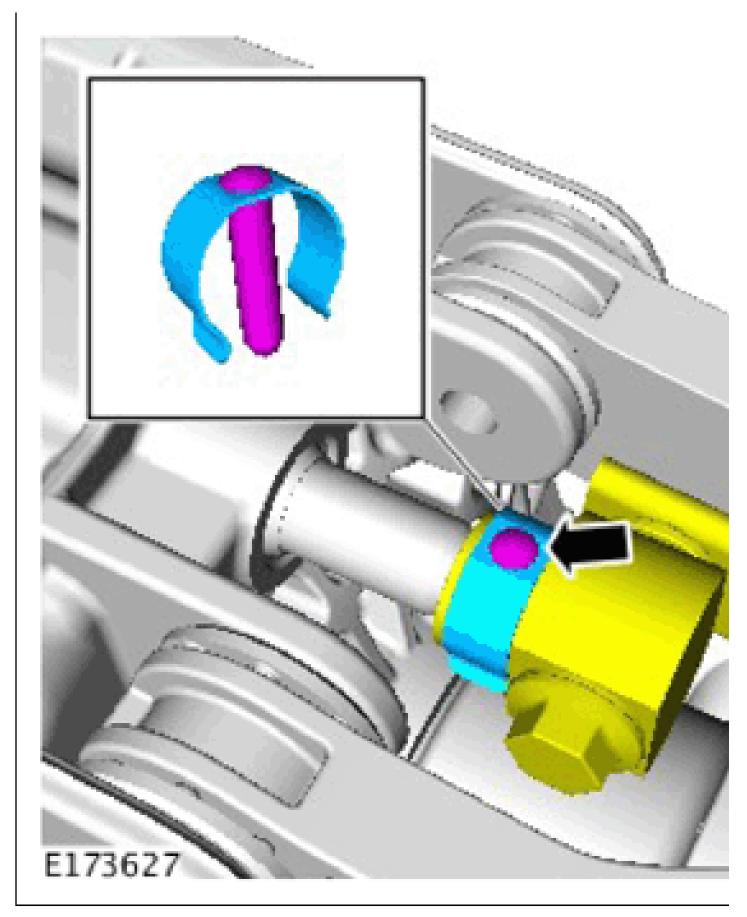
Torque Specification: 48 Nm

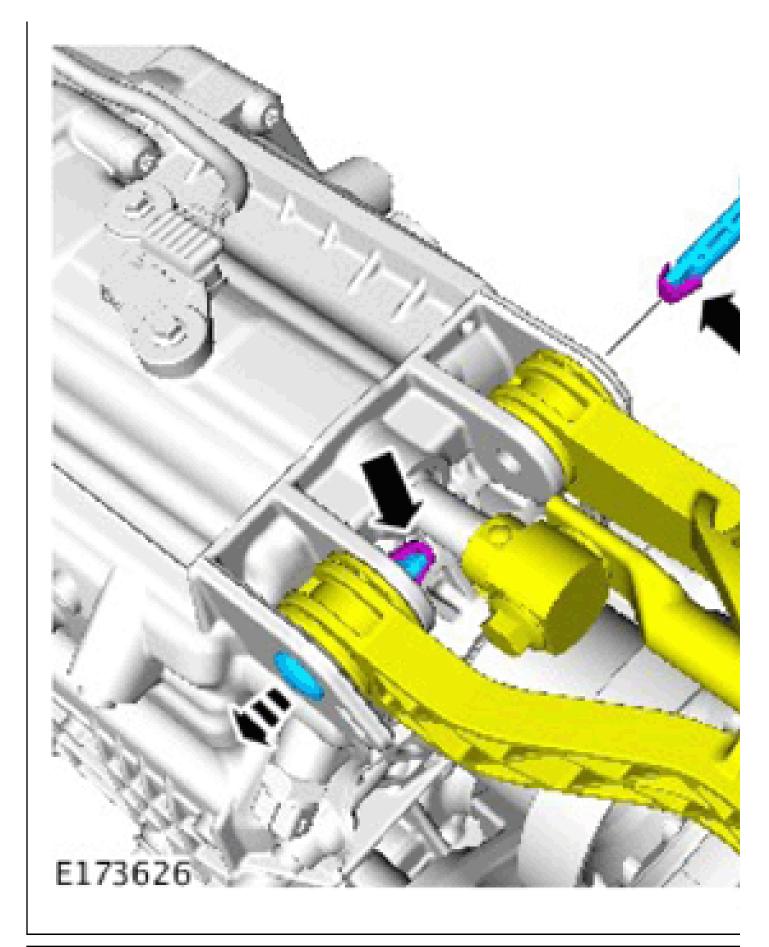


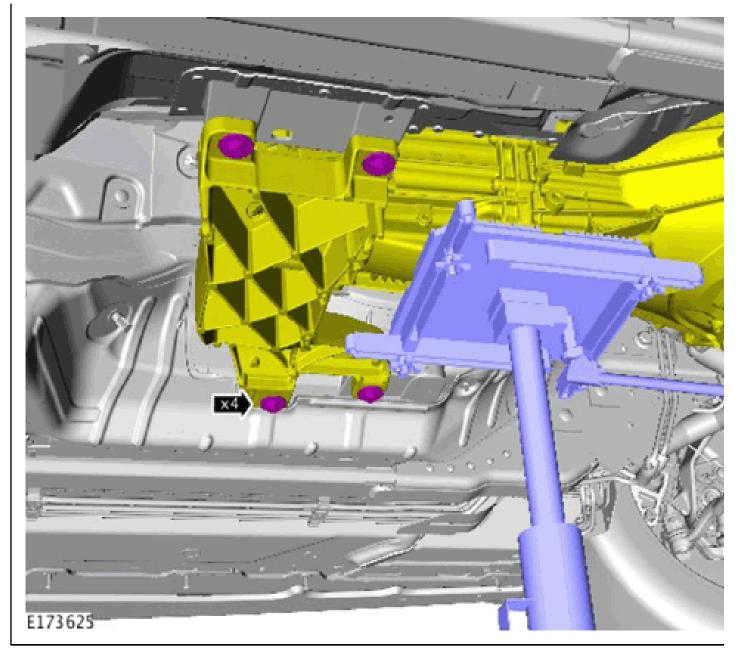


Torque Specification: 12 Nm

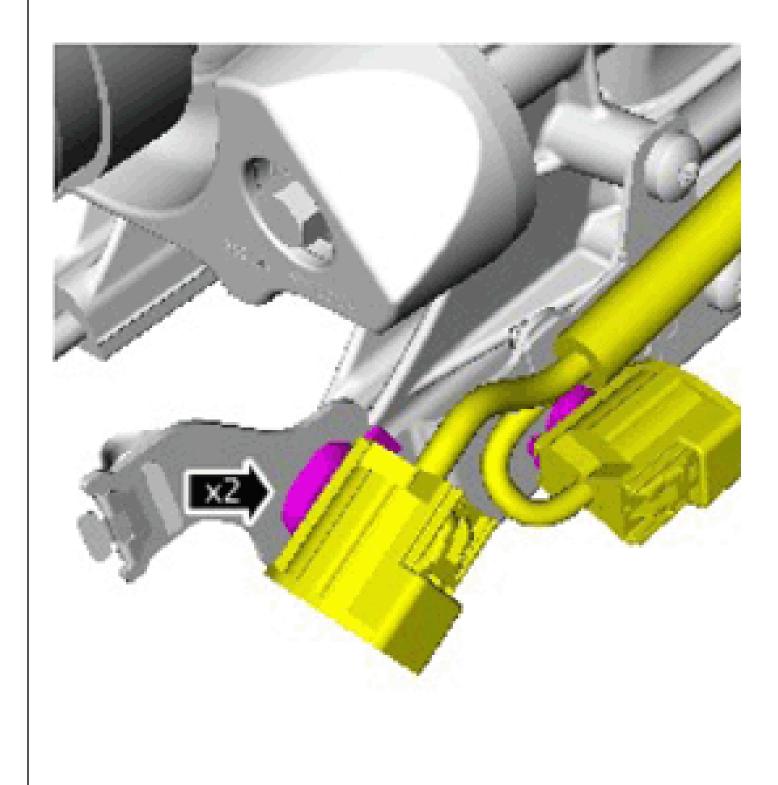
 $16. \ \ \, \text{CAUTION:} \quad \, \text{Make sure that a new component is installed.}$



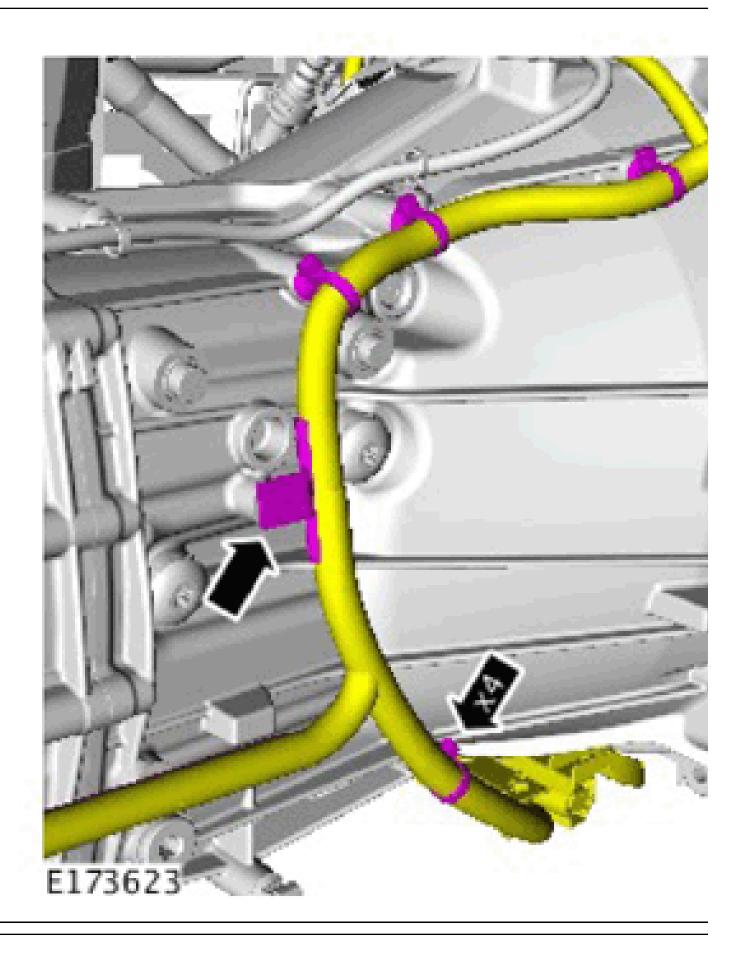


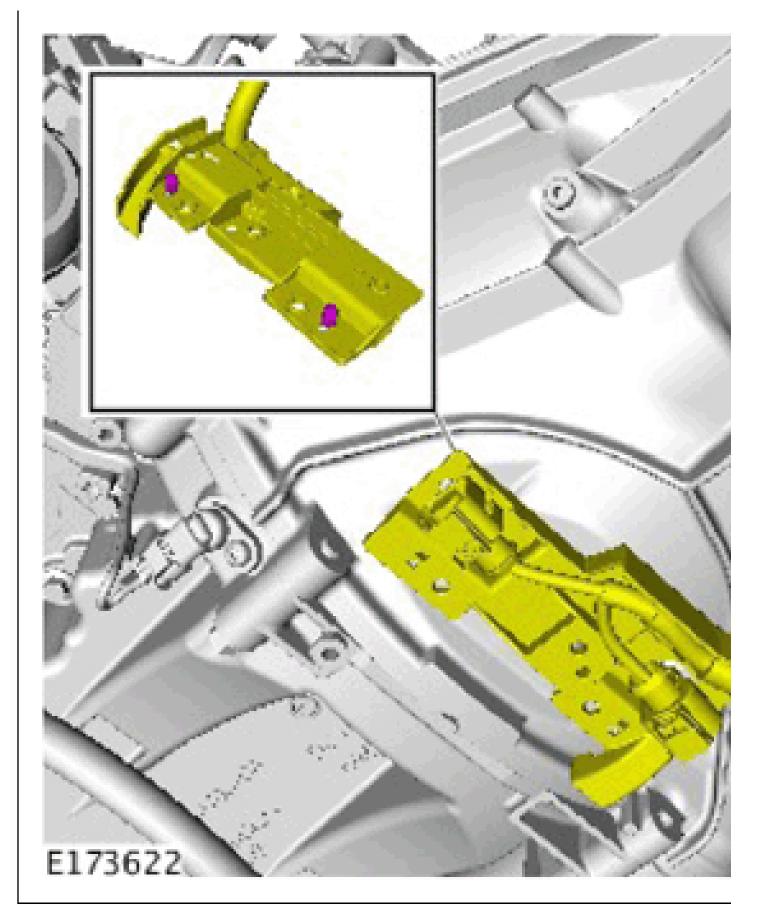


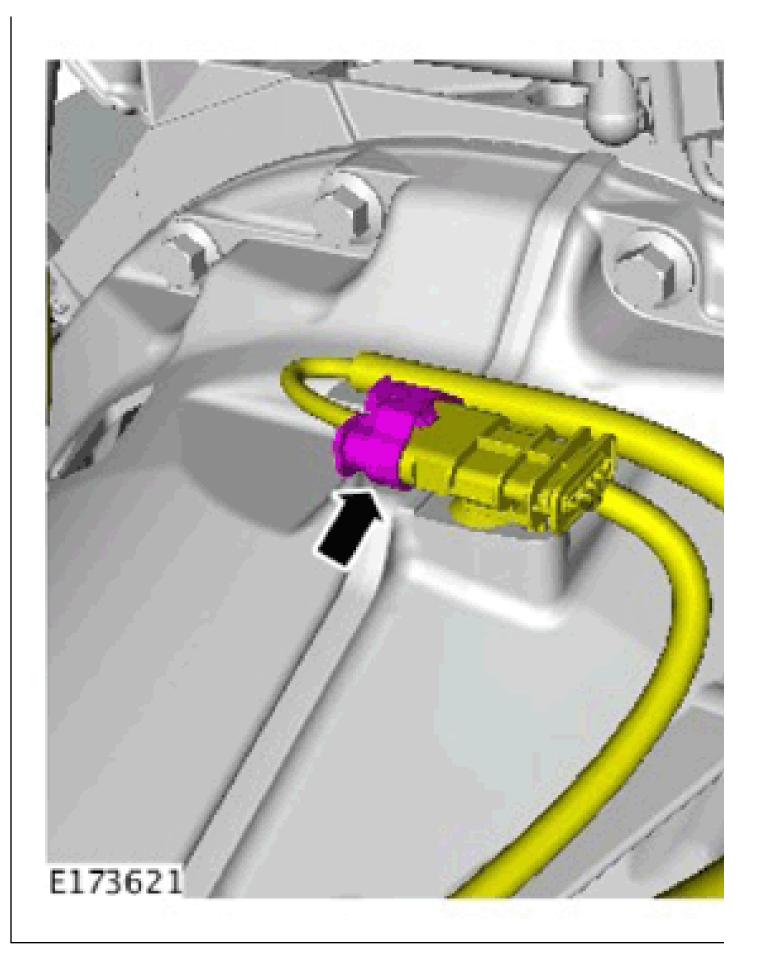
Torque Specification: 45 Nm



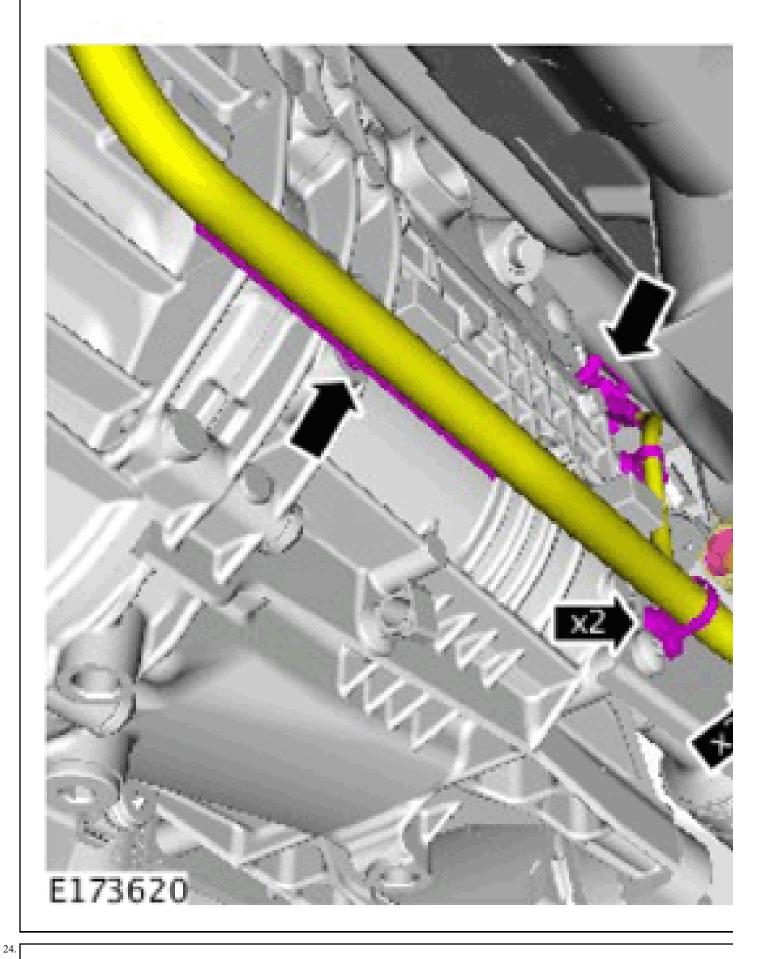
E173624

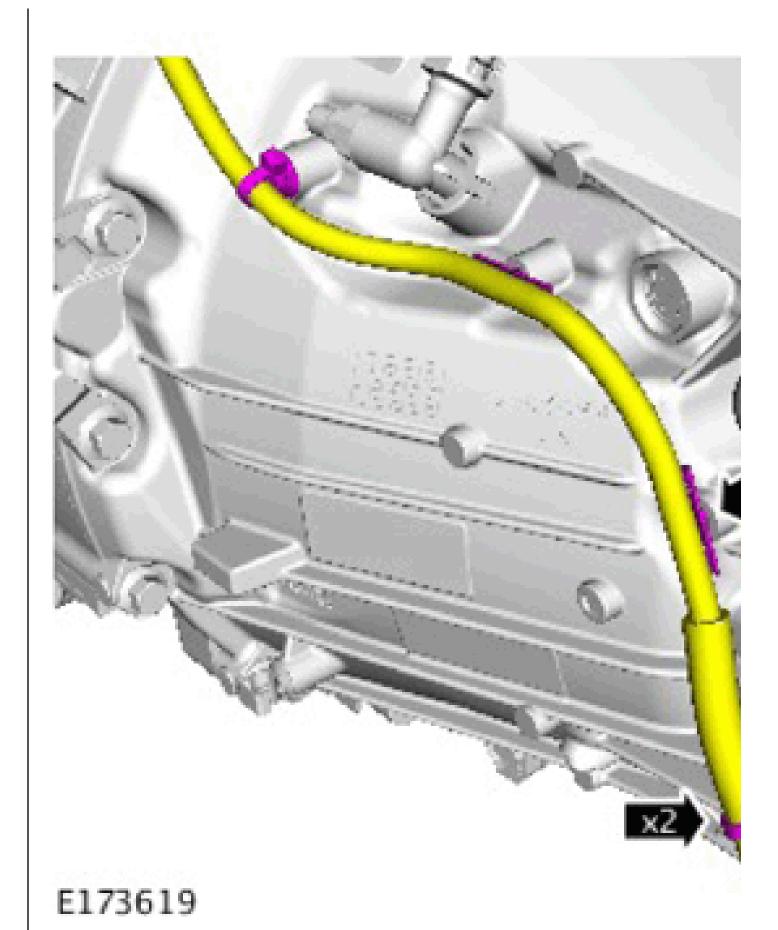






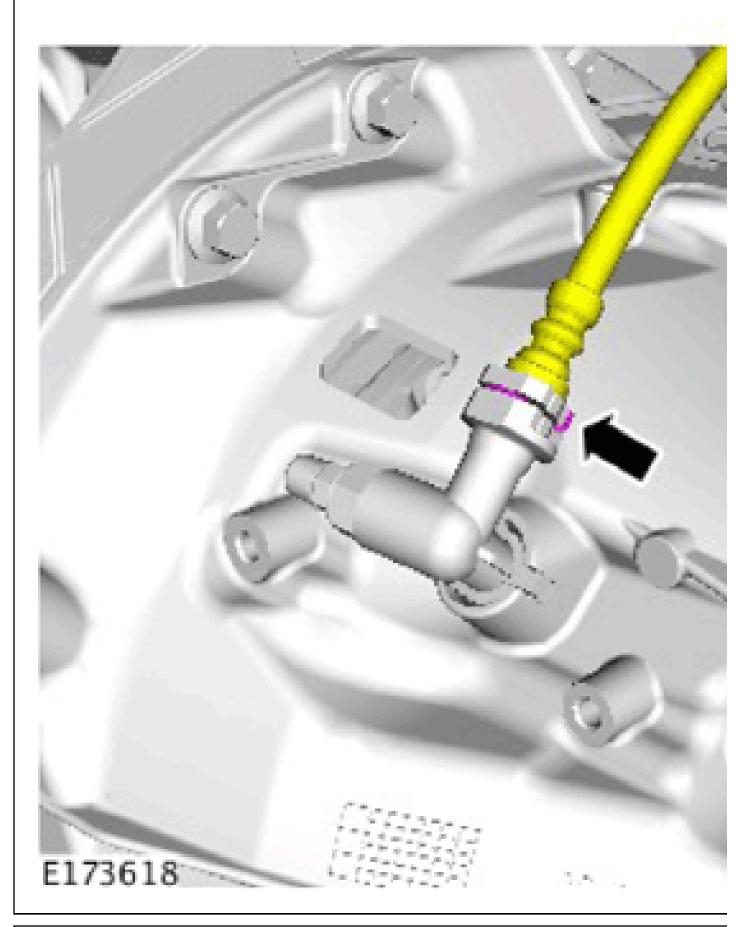
23. NOTE: Remove and discard the cable ties.

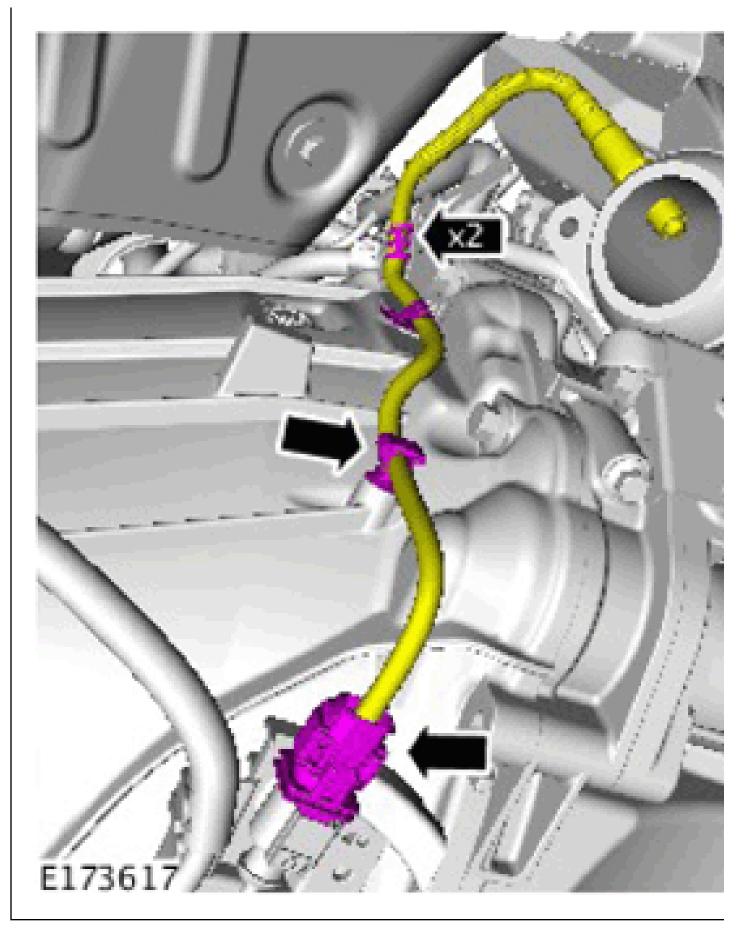




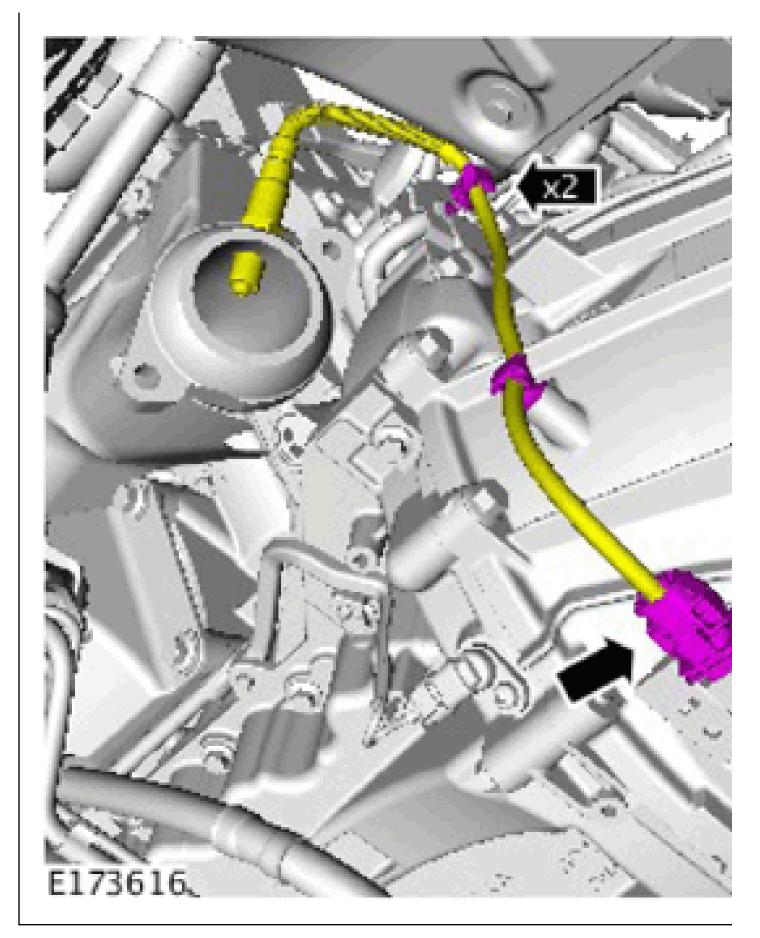
25.

WARNING:	Be prepared to collect escaping fluids.
CAUTION:	Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.
NOTE:	Remove and discard the blanking caps.

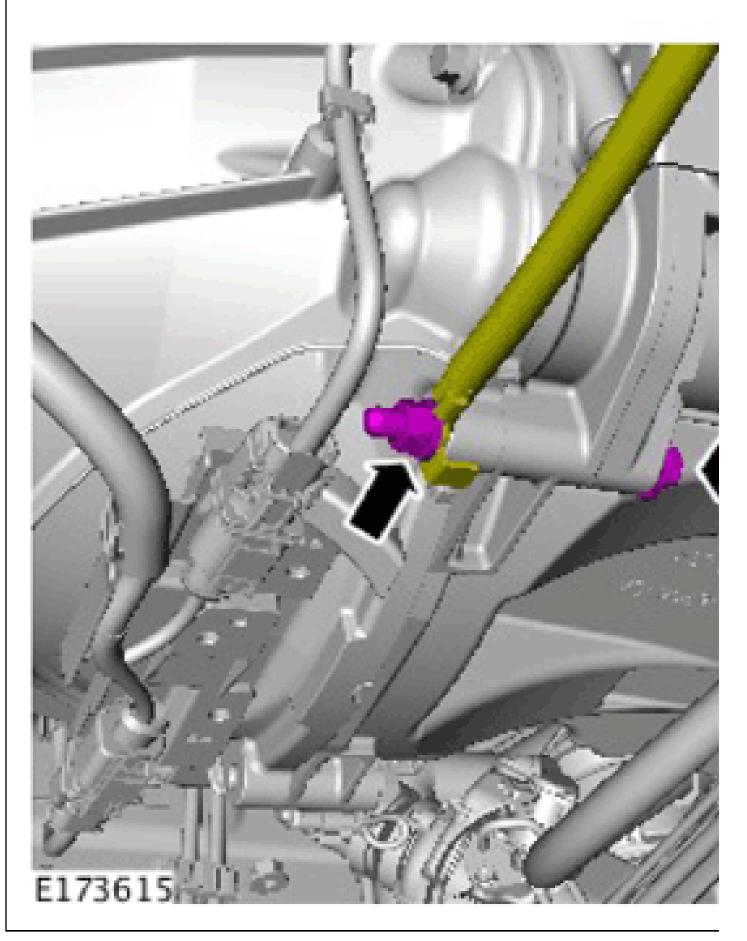




NOTE: • If necessary, install new clips.

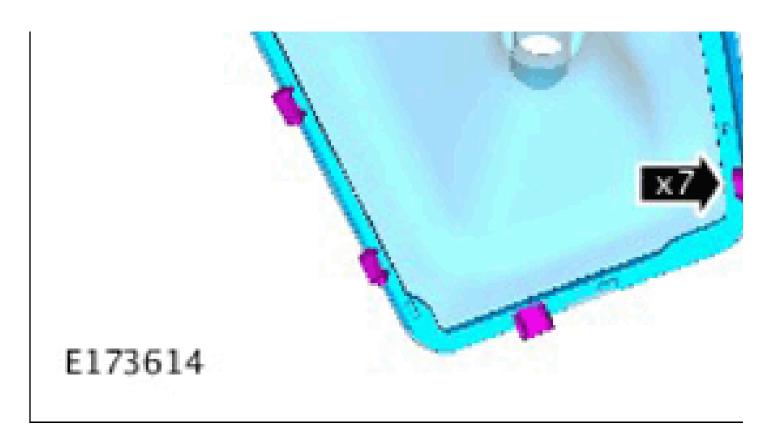


NOTE: • If necessary, install new clips.









31.



- 33. Refer to: Transmission Draining and Filling.
- 34. Refer to: Clutch System Bleeding (General Procedures).