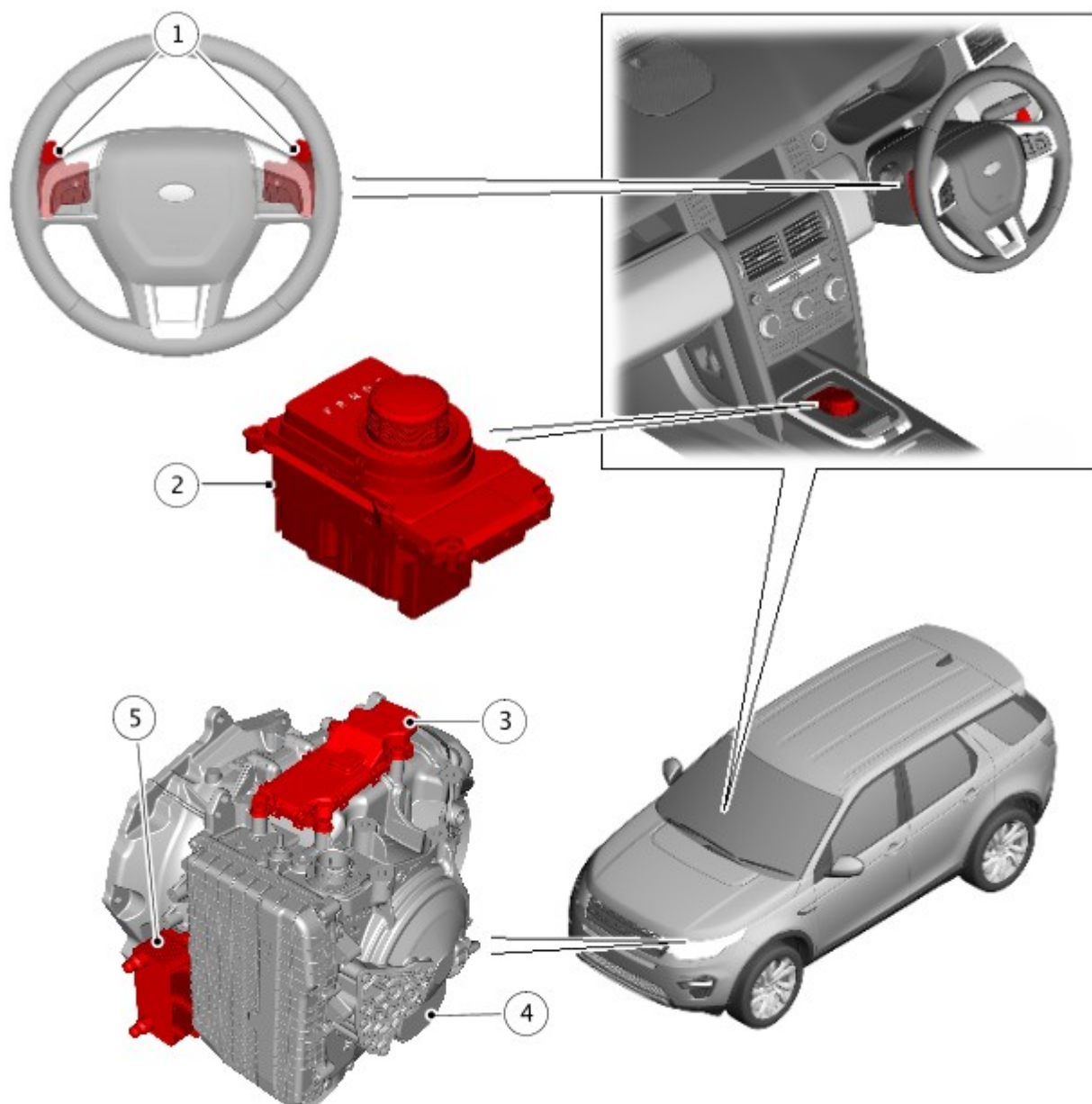


Automatic Transmission/Transaxle - Transmission Description

Description and Operation

COMPONENT LOCATION



E181074

Item	Description
1	Paddle switches - upshift / downshift
2	Transmission Control Switch (TCS)
3	Transmission Control Module (TCM)
4	ZF 9HP48 Automatic transmission
5	Automatic Transmission Fluid (ATF) cooler with integrated thermostat

OVERVIEW

The ZF 9HP48 automatic transmission is a 9 speed, electronically controlled unit manufactured by ZF. The transmission represents the latest in automatic transmission technology for a transverse, [AWD \(all-wheel drive\)](#) unit. The transmission features lock-up slip control, 'CommandShift™' functions and automatic and driver selectable modes to give the optimum on and off road performance.

The automatic transmission is controlled by a [TCM \(transmission control module\)](#) which contains software to provide operation as a semi-automatic 'CommandShift™' transmission. Driver selections for P, R, N, D and S on the rotary [TCS \(transmission](#)

[control switch](#)) are received by the [TCM](#) . The [TCM](#) operates solenoid valves and clutches to control transmission gear shifts, allowing the system to operate as a 'shift by wire' system, with no mechanical link to the transmission for drive selections.

The [TCM](#) allows the transmission to be operated as a conventional automatic unit by selecting P, R, N, D, S on the [TCS](#) . Rotation of the [TCS](#) to the 'S' position puts the transmission into electronic 'Sport' mode. Operation of the steering wheel mounted + or – paddle switches puts the transmission into electronic manual 'CommandShift™' mode. For additional information, refer to: External Controls (307-05 Automatic Transmission/Transaxle External Controls, Description and Operation).

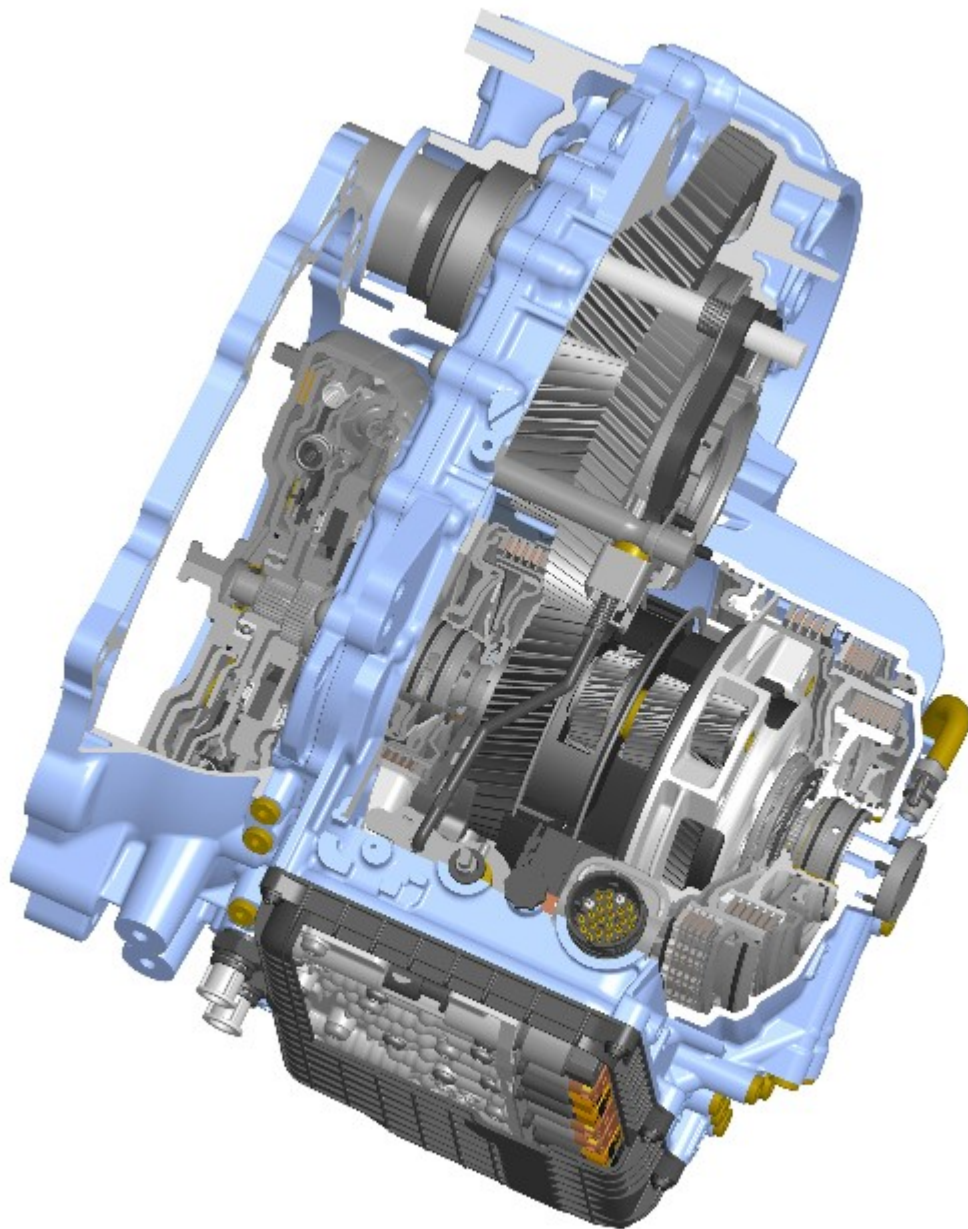
The ZF 9HP48 transmission has the following features:

- Designed to be maintenance free
- Transmission fluid is fill for life
- The torque converter features a controlled slip feature with electronically regulated lock-up control on gears 1 to 9
- Planetary gearset with 9 speeds, 4 planetary geartrains, and 6 shift elements
- Wide transmission ratio spread with small ratio steps
- The first-ever use of interlocking dog clutches in a passenger car automatic transmission
- Shift programs controlled by the [TCM](#)
- [TCM](#) has an adaptive capability to ensure efficient gear shift quality throughout the service life of the transmission
- Diagnostics available from the [TCM](#) via the high speed [CAN \(controller area network\)](#) Powertrain systems bus.

COMPONENT DESCRIPTION

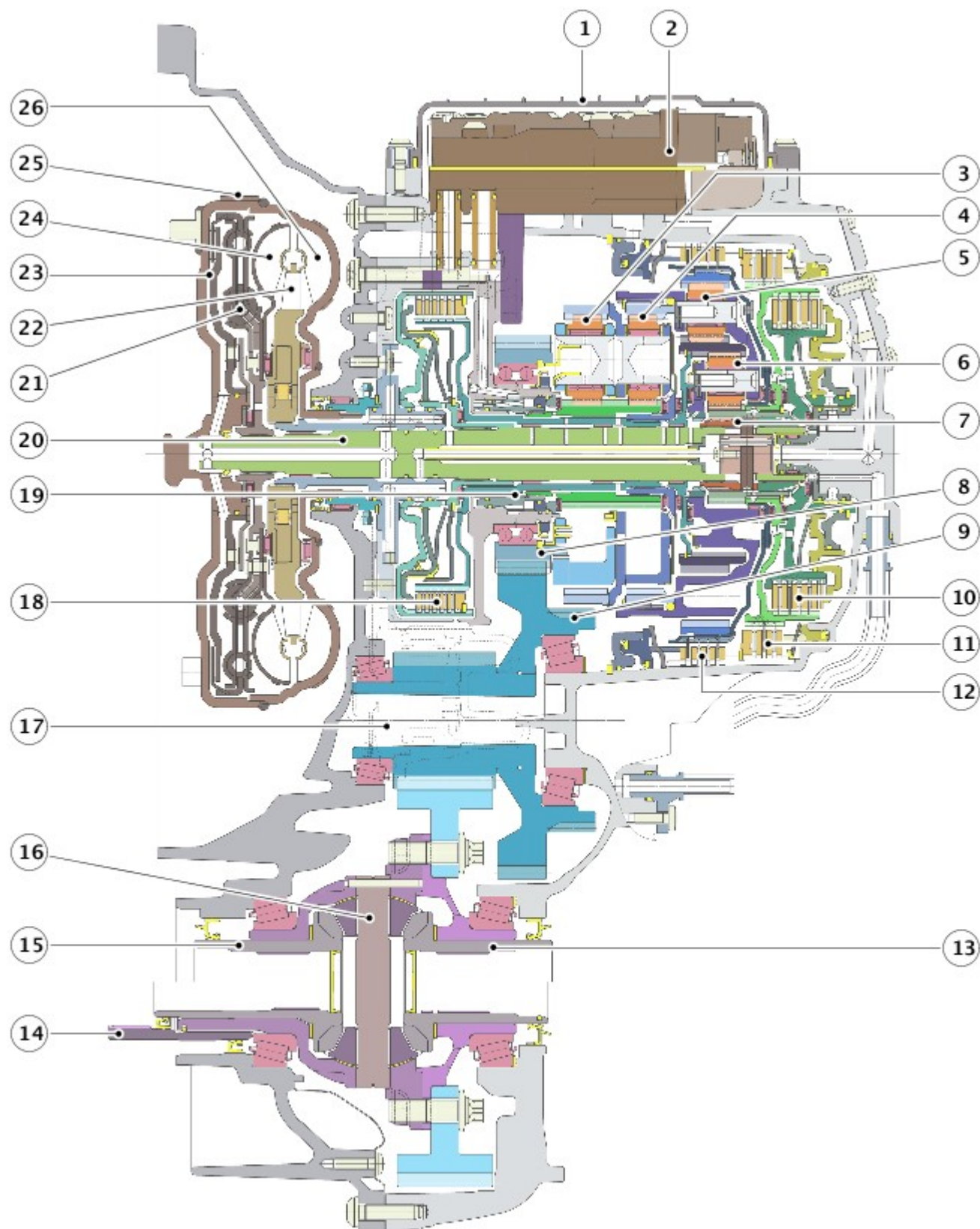
The transmission comprises the main casing which houses all of the transmission components. The torque converter is located in a separate converter housing, bolted to the main casing.

ZF 9HP48 Cut-Away View



E160559

ZF 9HP48 Sectional View



E160560

Item	Description
1	Fluid pan
2	Valve block
3	Planetary gear set 4
4	Planetary gear set 3
5	Planetary gear set 2
6	Planetary gear set 1
7	Dog clutch A

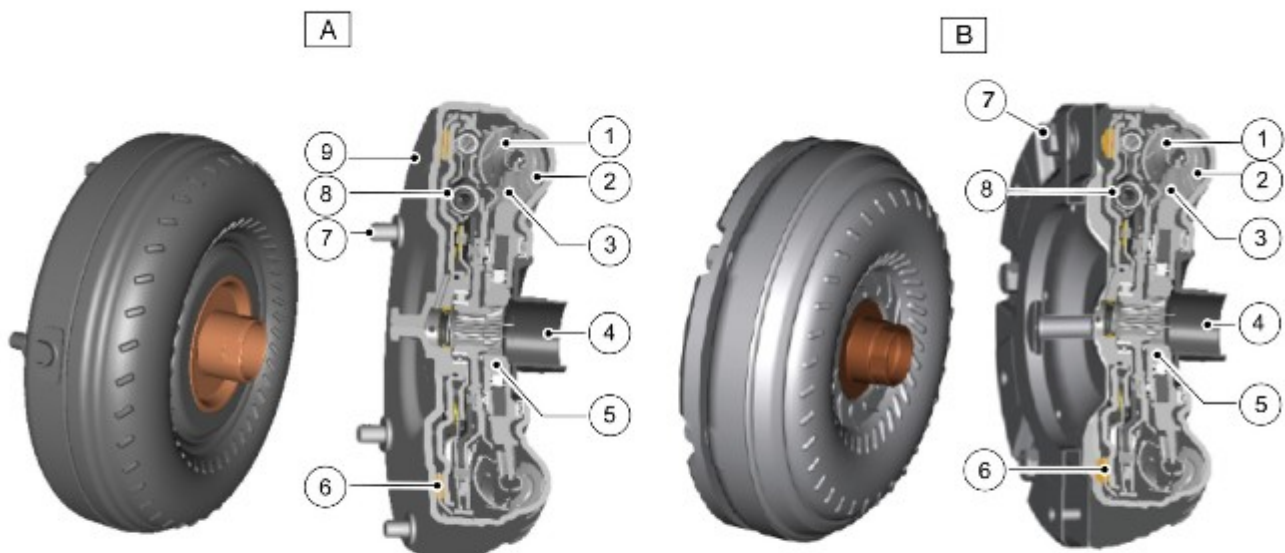
8	Spur pinion
9	Park interlock gear
10	Multiplate clutch 'B'
11	Multiplate brake 'C'
12	Multiplate brake 'D'
13	Left splined output shaft (connection to halfshaft)
14	Right splined output shaft (connection to Power Transfer Unit (PTU))
15	Right splined output shaft (connection to halfshaft)
16	Differential
17	Automatic Transmission Fluid (ATF) pump
18	Multiplate clutch 'E'
19	Dog clutch 'F'
20	Input shaft
21	Torsional damper
22	Torque converter stator
23	Torque converter lock-up clutch
24	Torque converter turbine
25	Torque converter assembly
26	Torque converter impeller

The main casing retains the **ATF (automatic transmission fluid)** at the bottom. A drain plug is located in the main casing. The oil level is checked by removal of a level plug, with the engine running and the transmission fluid at a temperature of between 37 to 45°C (99 to 113°F). The level is correct when the oil flow becomes a drip from the level plug hole.

The transmission has a fluid cooler which is located at the front of the transmission, adjacent to the fluid pan. The cooler is connected to the transmission casing by two sealed connections. The fluid cooler is connected into the engine cooling system and cools the transmission fluid by heat transfer through the cooler to the engine coolant.

For additional information, refer to: Transmission Cooling (307-02 Transmission/Transaxle Cooling, Description and Operation).

TORQUE CONVERTER



E181182

Item	Description

A	Torque Converter fitted to GTDi 2.0L and TD4 2.2L Engines
1	Turbine
2	Impeller
3	Stator
4	Transmission connection
5	One-way clutch
6	Lock-up clutch
7	Engine drive plate attachment studs
8	Torsional damper
9	Torque converter housing
B	Torque Converter fitted to Ingenium I4 2.0L Diesel Engine
1	Turbine
2	Impeller
3	Stator
4	Transmission connection
5	One-way clutch
6	Lock-up clutch
7	Engine drive plate attachment bolts
8	Torsional damper - including pendulum masses

The torque converter is the coupling element between the engine and the transmission and is located in the torque converter housing, on the engine side of the transmission. The driven power from the engine crankshaft is transmitted hydraulically and mechanically through the torque converter to the transmission. The torque converter is connected to the engine by a drive plate.

The torque converter comprises an impeller, a stator and a turbine. The torque converter is a sealed unit with all components located between the converter housing cover and the impeller. The two components are welded together to form a sealed, fluid filled housing. With the impeller welded to the converter housing cover, the impeller is therefore driven at engine crankshaft speed.

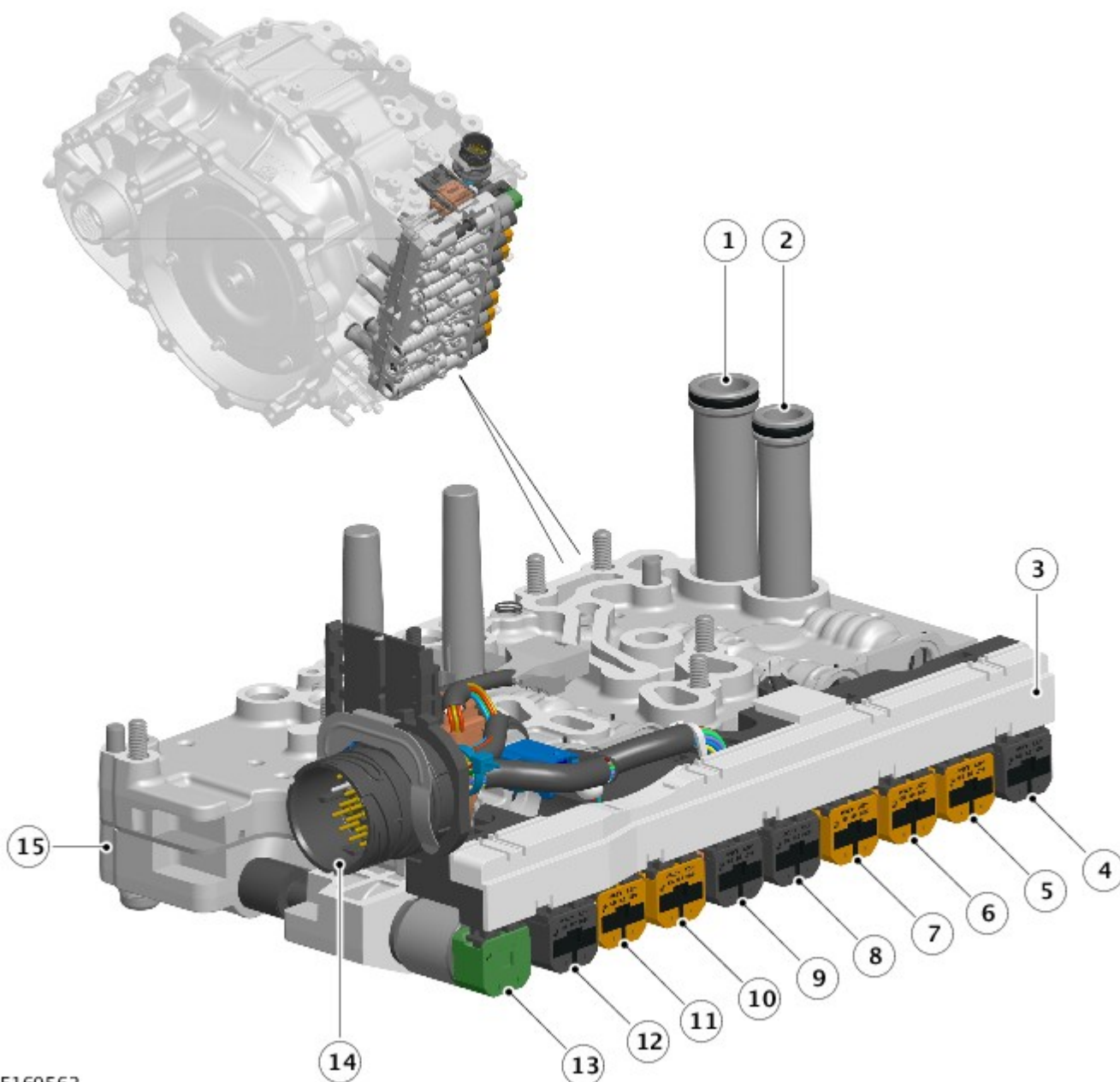
The torque converter contains a hydraulically operated lock-up clutch which is controlled by the [TCM](#) via a solenoid in the valve block. The solenoid actuates spool valves to control the hydraulic pressure applied to the clutch. This allows the [TCM](#) to provide 3 modes of converter operation; unlocked, partially locked and fully locked.

VALVE BLOCK

The valve block is located in a vertical position at the front of the transmission main casing, behind a sealed cover. The valve block contains a number of solenoids and spool valves to control the transmission operation. The solenoids are controlled by the [TCM](#) to provide gear changes and smooth transition between ratio changes.

If the [TCM](#) or the valve block is replaced, a diagnostic routine using an approved Land Rover diagnostic system will be required to calibrate the [TCM](#) .

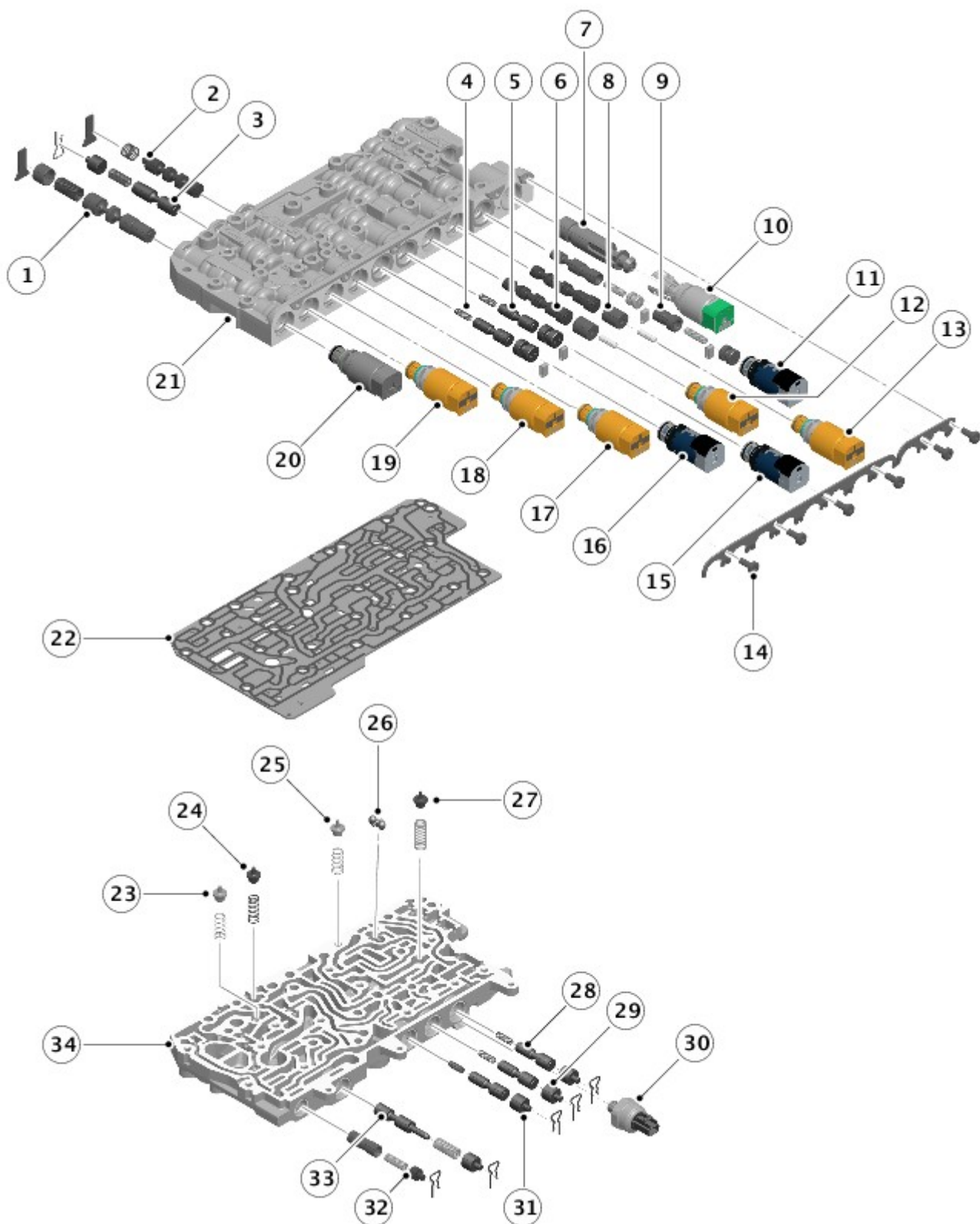
Valve Block Assembly



E160562

Item	Description
1	Automatic Transmission Fluid (ATF) pump intake
2	ATF pump pressure outlet
3	Sensor unit
4	System Pressure Control Valve (PCV)
5	Torque converter lock-up clutch PCV
6	Multiplate clutch 'B' PCV
7	Multiplate clutch 'E' PCV
8	Dog clutch A solenoid valve
9	Dog clutch F solenoid valve
10	Multiplate clutch 'D' PCV
11	Multiplate clutch 'C' PCV
12	Park lock solenoid valve
13	Magnetic valve control solenoid - park lock actuator
14	Electrical connector
15	Valve block

Valve Block Components

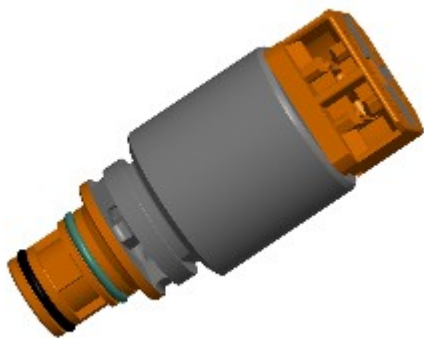


E160563

Item	Description
1	System pressure spool valve
2	Torque converter pressure spool valve
3	Lubrication spool valve
4	Dog clutch 'A' spool valve
5	Dog clutch 'F' spool valve
6	Multiplate clutch 'D' spool valve

7	Magnetic holding valve piston
8	Multiplate clutch 'C' spool valve
9	Park lock spool valve
10	Magnetic valve control solenoid - park lock actuator
11	Park lock solenoid valve
12	Multiplate clutch 'D' Pressure Control Valve (PCV)
13	Multiplate clutch 'C' PCV
14	Retainer
15	Dog clutch 'F' solenoid valve
16	Dog clutch 'A' solenoid valve
17	Multiplate clutch 'E' PCV
18	Multiplate clutch 'B' PCV
19	Torque converter lock-up clutch PCV
20	System PCV
21	Valve housing
22	Intermediate plate
23	Valve and spring
24	Valve and spring
25	Valve and spring
26	Ball rocker
27	Valve and spring
28	Multiplate clutch 'C' spool valve
29	Multiplate clutch 'D' spool valve
30	Pressure sensor
31	Torque converter lock-up clutch spool valve
32	Shift system pressure spool valve
33	Pressure reduction spool valve
34	Valve plate

Pressure Control valves



E160565

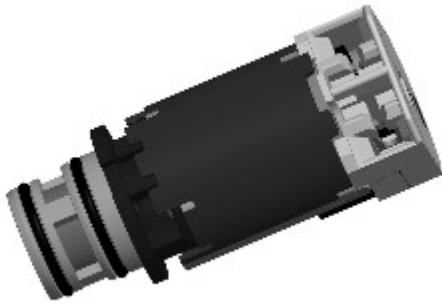
Six PCV's are located in the valve block. The solenoid operated PCV's are controlled by **PWM (pulse width modulation)** signals from the **TCM**. The solenoids convert the electrical signals into hydraulic control pressure proportional to the signal to actuate the spool valves and clutches for precise transmission operation.

Five PCV solenoids for the multiplate clutch and the torque converter lock-up clutch supply a higher control pressure as the signal current increases and can be identified by an orange connector cap. The **TCM** operates the solenoids using **PWM** signals. The **TCM** monitors engine load and clutch slip and varies the solenoid duty cycle accordingly. The solenoids have a 12 V operating voltage and a pressure range of 0 - 4.7 bar (0 - 68 lbf.in²).

One PCV solenoid for the system pressure control supplies a lower control pressure as the signal amperage increases and can be identified by a gray connector cap. The **TCM** monitors engine load and clutch slip and varies the solenoid duty cycle accordingly. The solenoids have a 12 V operating voltage and a pressure range of 4.7 - 0 bar (68 - 0 lbf.in²).

The resistance of the solenoid coil winding for all PCV solenoids is 5.05 Ohms at 20 °C (68 °F).

Solenoid Valves



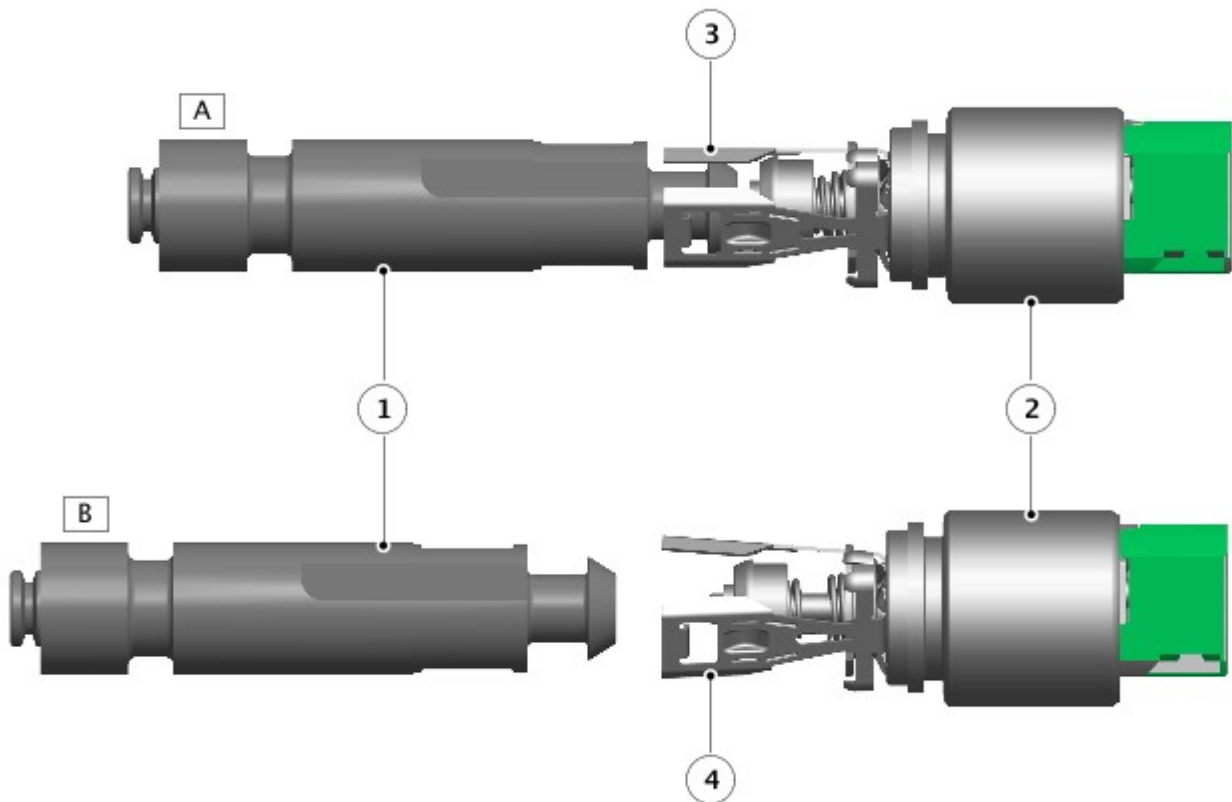
E160564

Three solenoid valves are located in the valve block. The solenoid valves are controlled by the **TCM** and converts electrical signals into hydraulic control signals to control dog clutch application.

The solenoid valve is an open/closed, on/off solenoid which is controlled by the **TCM** switching the solenoid to earth. The **TCM** also supplies power to the solenoid. The **TCM** energises the solenoid in a programmed sequence for clutch application for gear ratio changes and shift control.

The resistance of the solenoid coil winding for solenoid is between 10 to 11 Ohms at 20 °C (68 °F).

Park Lock Actuator - Magnetic Valve Control Solenoid



E160566

Item	Description
A	Solenoid in locked (energized) condition - park lock released
B	Solenoid in unlocked (de-energized) condition - park lock engaged
1	Park lock spool valve
2	Control solenoid
3	Claw locked
4	Claw unlocked

A control solenoid is located in the valve block. The solenoid is controlled by the **TCM** and converts electrical signals into hydraulic control signals to control the electronic park lock function.

The control solenoid is an on/off solenoid which is controlled by the **TCM** by switching the solenoid to earth.

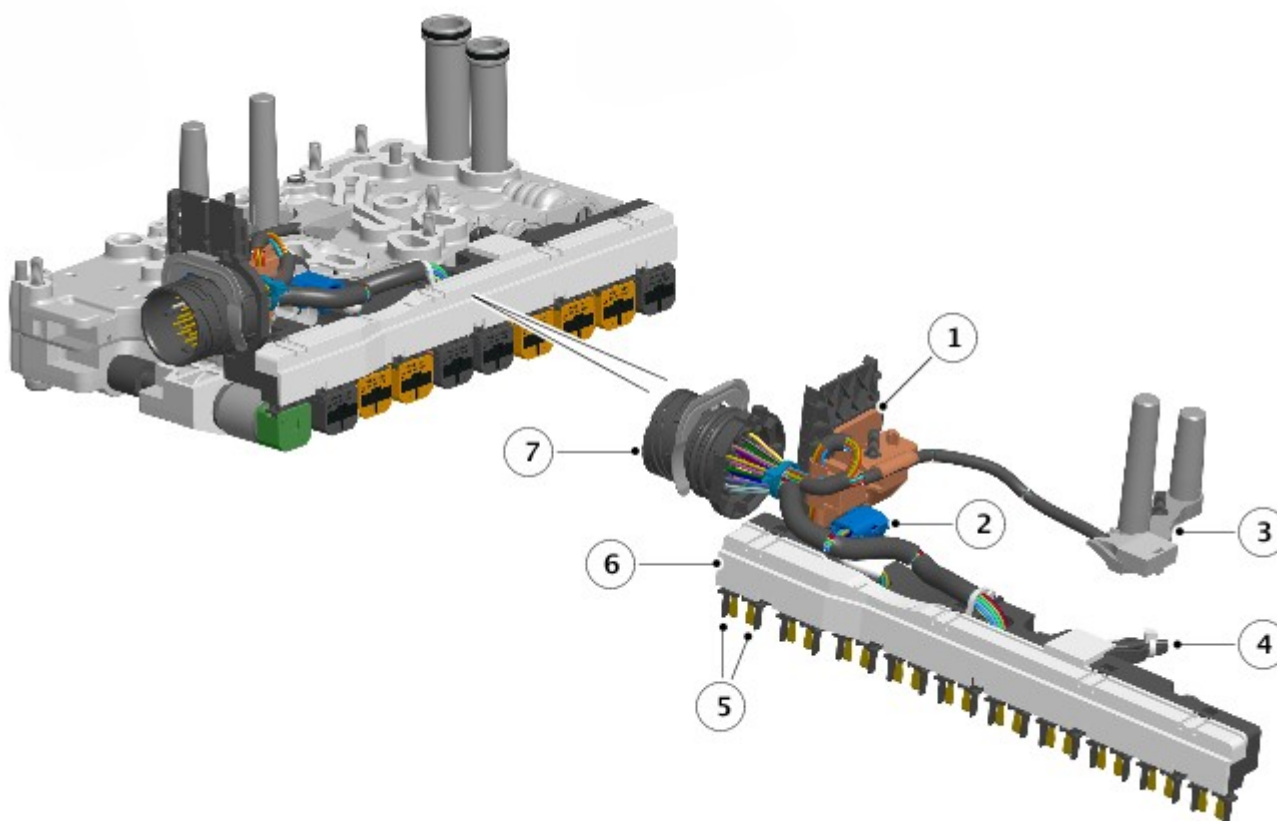
When the Park lock is to be released, the park lock solenoid valve sends **ATF** pressure to the spool valve and moves it into contact with the claws of the solenoid. Movement of the spool valve moves the park rod and releases the park pawl from the park interlock gear. The control solenoid is energised by the **TCM** and the claws close to retain the spool valve in the unlocked position. A shuttle valve retains **ATF** pressure on the spool to prevent inadvertent park lock operation in the event of an electrical failure until the engine is stopped.

When the Park lock is to be engaged, **ATF** pressure is released from the spool valve and the **TCM** de-energises the control solenoid. The claws are released, the spool valve returns under spring pressure to the park lock position and the park lock is engaged. A Service Park Release (SPR) procedure must be performed to release the parking lock manually if an electrical failure occurs or the engine is not running.

To allow the vehicle to roll through a car wash, the control solenoid remains energised if the engine is stopped with the **TCS** in neutral. This holds the transmission out of park without hydraulic pressure for 10 minutes. After this time the control solenoid is de-energised, releasing the claws and allowing the spool valve to return to the park position.

The resistance of the solenoid coil winding is 25 Ohms at 20 °C (68 °F).

Sensor Unit



E160567

Item	Description
1	'PARK' (P) sensor
2	Pressure sensor connector
3	Speed sensor (torque converter turbine and output shaft)
4	Automatic Transmission Fluid (ATF) temperature sensor
5	Connector pins for pressure control valves, solenoid valves and park lock control solenoid
6	Connector board
7	Transmission electrical connector

The sensor unit is mounted on the valve block and secured with three screws. The sensor unit comprises a 26 pin electrical connector, a 'PARK' sensor, a pressure sensor connector, two speed sensors, ten solenoid connectors and an **ATF** temperature sensor.

The electrical connector is fitted with seals through a hole in the transmission main casing and secured with a spring clip.

The 'PARK' (P) sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw. The 'PARK' sensor comprises a sliding switch which is operated by the selector shaft when it is moved by the park lock actuator.

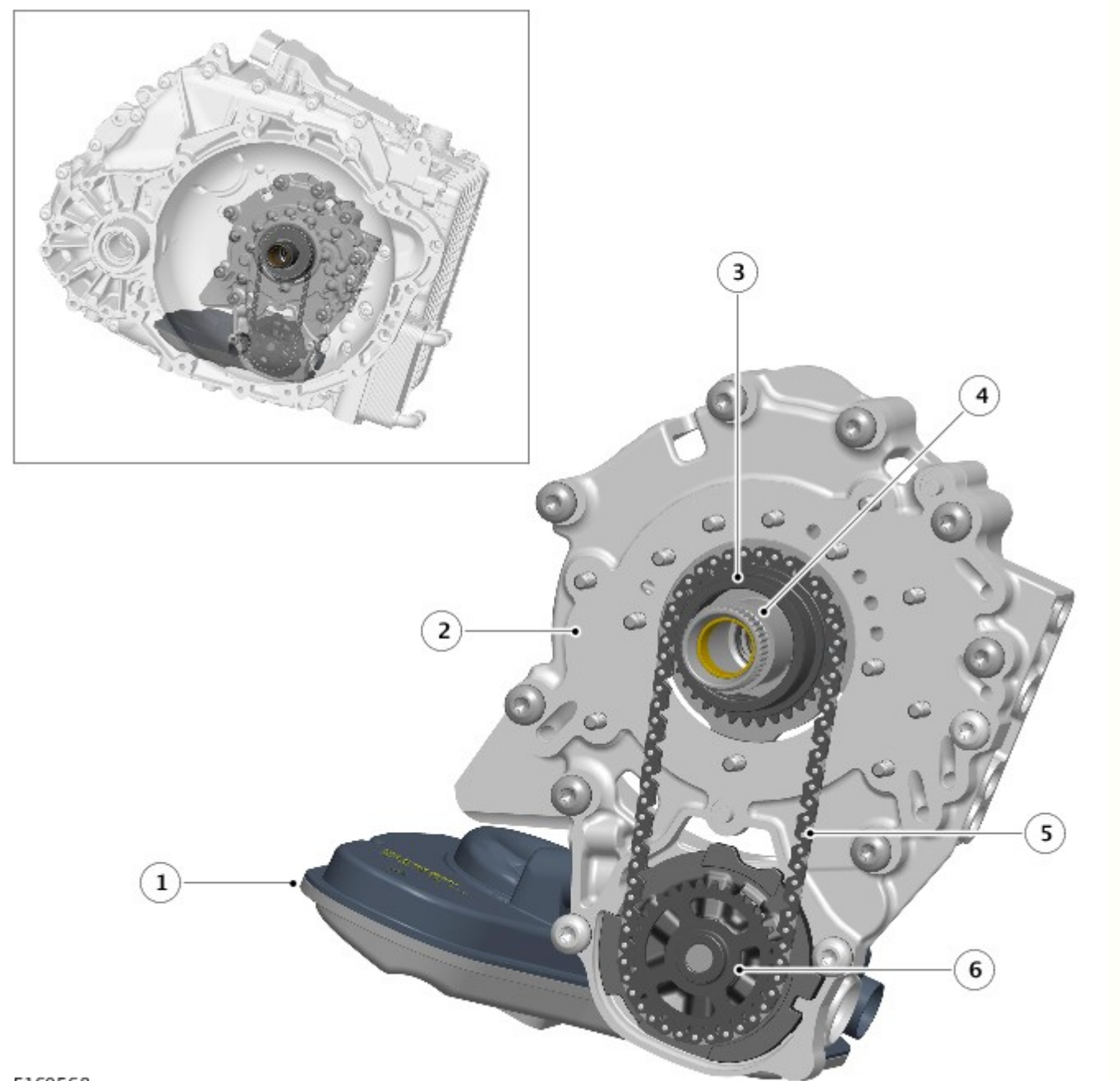
Two speed sensors are used in the transmission and are located within the transmission housing and are connected to the sensor unit. The sensors take their speed reading from the slots in the clutch basket of the multiplate clutch E and the gear

teeth of the spur pinion. The sensors provide input and output speed signals to the **TCM** . Both speed signals are received by the **TCM** which uses the signals to calculate engine torque output, shift timing and torque converter lock-up.

The fluid temperature sensor is integrated into the internal wiring harness within the transmission sensor unit. It detects the **ATF** temperature in the transmission and transmits a signal corresponding to the temperature to the **TCM** . The **TCM** monitors the temperature and adjusts clutch and brake application to provide smooth gear shifts across a wide range of temperatures and **ATF** viscosities.

Each solenoid is connected by two pins integral with the connector board. Each solenoid pins is connected via a harness to the electrical connector.

AUTOMATIC TRANSMISSION FLUID (ATF) PUMP



E160568

Item	Description
1	ATF filter
2	Intermediate plate
3	Drive pinion
4	Stator shaft
5	Drive chain
6	ATF pump

The ATF pump is located in an intermediate plate within the transmission main casing. The intermediate plate is attached to the inside of the transmission main casing with studs and nuts, behind the torque converter. The intermediate plate contains

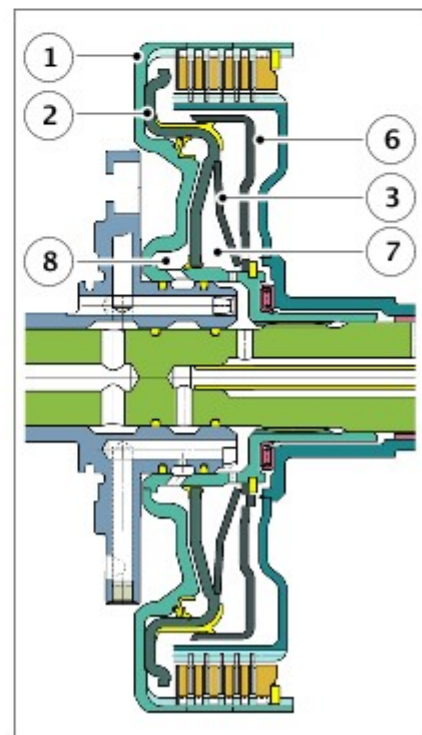
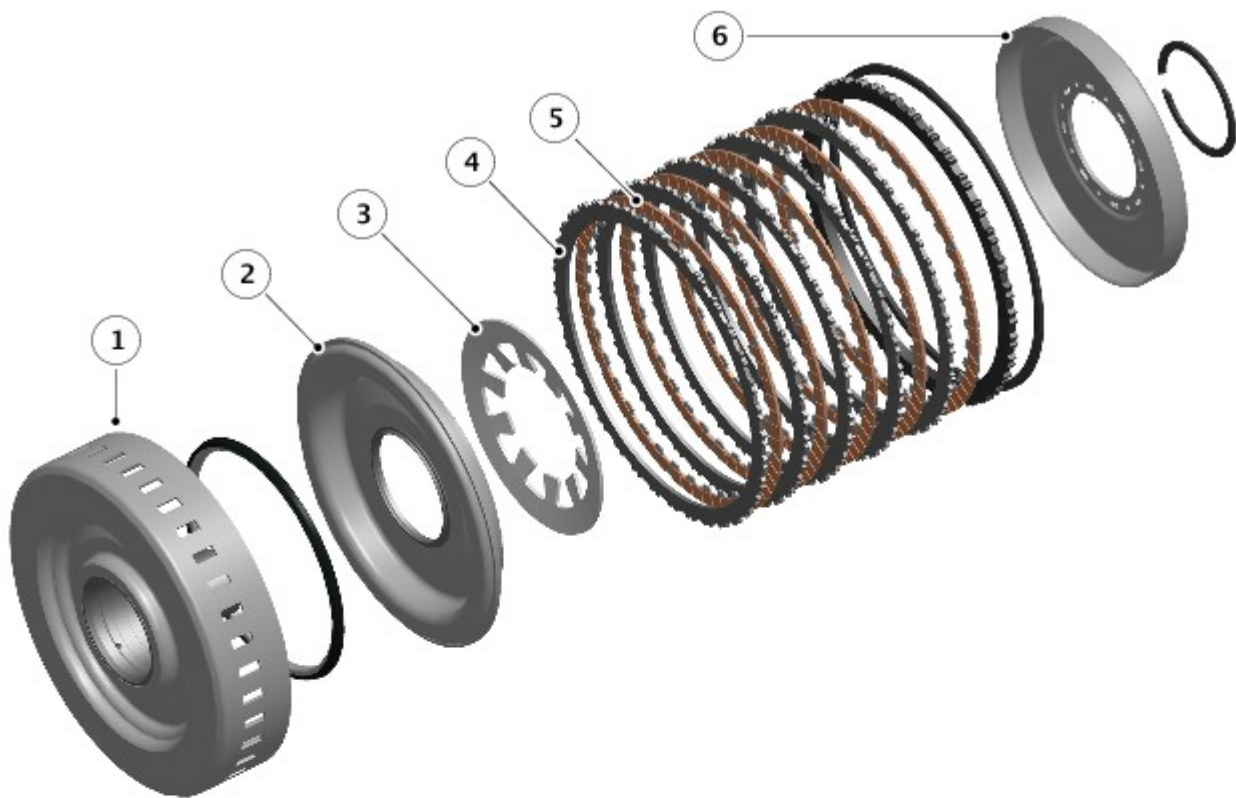
the splined stator shaft, to which the torque converter stator is connected. The torque converter shell extends into and drives a drive pinion with an integral sprocket, which operates a roller drive chain to drive the ATF pump. The drive pinion is therefore rotated at engine speed.

The pump is located at the bottom of the transmission main casing and is attached to the housing with screws. An ATF filter ensures that any particulate matter is collected by the filter before the ATF enters the ATF pump.

The ATF pump is a vane cell pump which can produce a pressure of between 3.5 and 44.0 bar (50 and 638 lbf/in²) and a flow of 14.7 cm³ (0.9 in³). The pump can operate at speeds from 700 to 7800 Revolutions Per Minute (RPM) with a maximum speed of 8600 RPM.

DRIVE CLUTCHES

Multiplate Drive or Brake Clutch – Typical



E160569

Item	Description
1	Cylinder
2	Piston
3	Disk spring
4	Metal plates
5	Friction plates
6	Baffle plate
7	Pressure equalization chamber

There are two multiplate drive clutches and two multiplate brakes used in the ZF 9HP48 automatic transmission. Each clutch or brake comprises a number of friction plates dependent on the output controlled. A typical clutch or brake consists of a number of steel outer plates and inner plates with friction material bonded to each face.

The drive clutches have both the friction plate and the metal plates rotating when the clutch is open. Multiplate brakes have either the friction plate or the metal plate rotating, with one fixed stationary.

Clutch / Brake	Operation
Multiplate clutch 'B'	Connects the input shaft to sun gear 'S1'
Multiplate clutch 'E'	Connects the input shaft to planet carrier 3 and ring gear 4
Multiplate brake 'C'	Locks sun gear 'S1'
Multiplate brake 'D'	Locks ring gear 2

The multiplate clutch and brake plates are held apart mechanically by a disk spring and hydraulically by ATF pressure. The ATF pressure is derived from a lubrication channel which supplies ATF to the transmission components. The ATF is passed via drillings in the input shaft into the chamber between the baffle plate and the piston. To prevent inadvertent clutch application due to pressure build up produced by centrifugal force, the fluid in the pressure equalization chamber overcomes any pressure in the piston chamber and holds the piston off the clutch plate assembly. The multiplate brakes do not require a baffle plate and pressure equalization chamber to compensate for centrifugal pressure which occurs in a rotating piston.

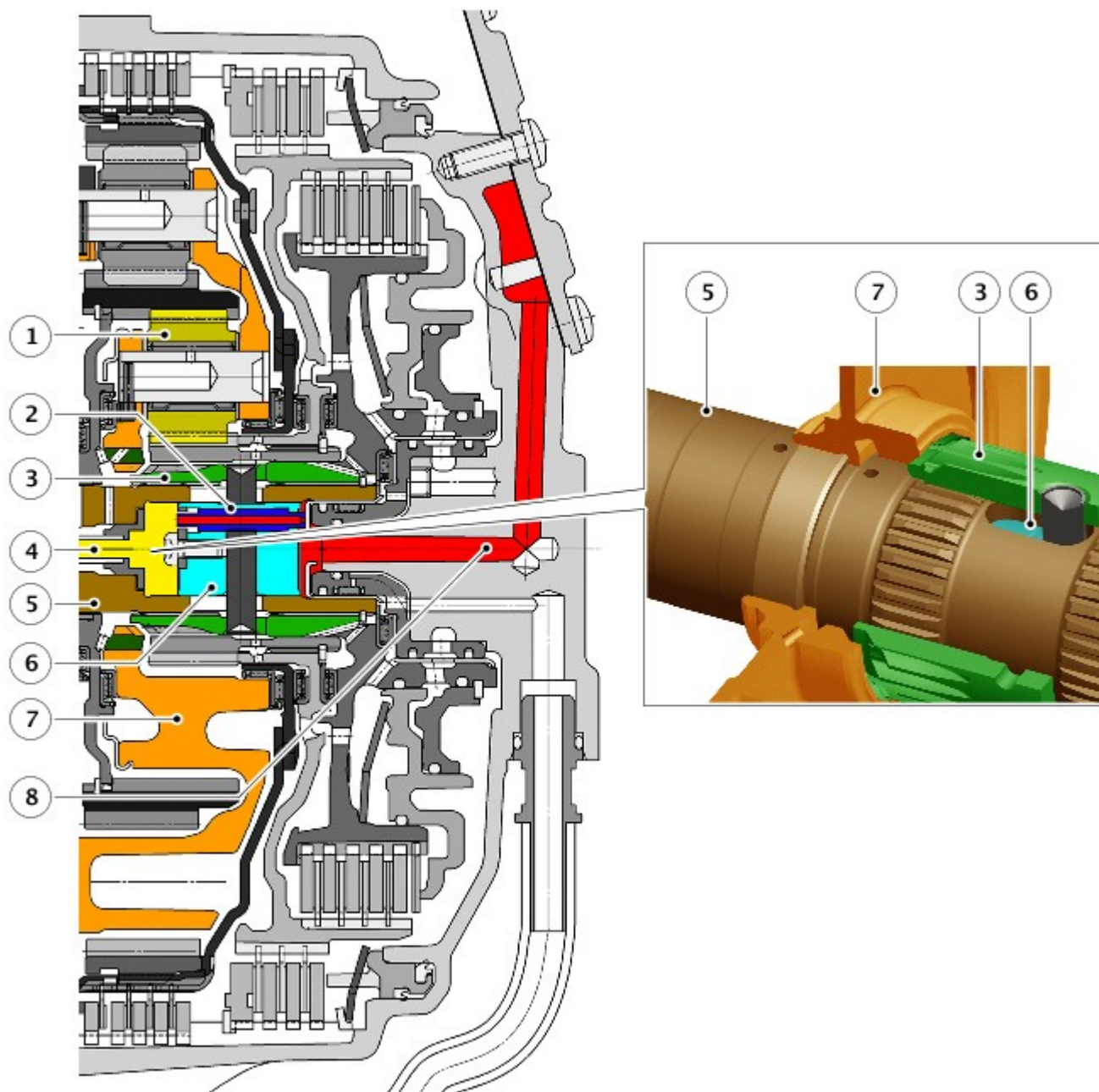
When clutch application is required, pressure from the ATF pump is applied to the piston chamber from the supply port. This pressure overcomes the low pressure fluid present in the pressure equalization chamber. The piston moves, against the pressure applied by the disk spring, and compresses the clutch plate assembly. When the pressure falls, the disk spring pushes the piston away from the clutch plate assembly, disengaging the clutch.

DOG CLUTCHES

Two dog clutches are used on the transmission; dog clutch 'A' connects the input shaft to sun gear S2 and ring gear R1, and dog clutch 'F' connects sun gears S3 and S4 to the centering plate mounted in the transmission casing.

Both dog clutches are similar in their operation. Each clutch is operated by ATF pressure acting on a double acting piston to move the dog clutch into and out of engagement.

Dog Clutch 'A'



E160570

Item	Description
1	Planetary gear set 1
2	Sensing piston
3	Dog 'A'
4	ATF pressure supply for dog clutch 'A' release
5	Input shaft
6	Piston
7	Planet carrier
8	ATF pressure supply for dog clutch 'A' engagement

Dog clutch 'A' is located at the end of the input shaft and is controlled by a double acting piston located within the input shaft.

A double acting piston is located internally in the input shaft and can move within the shaft when ATF pressure is applied to either side of the piston. The piston is connected to the dog 'A' by a pin which moves in a slot in the input shaft.

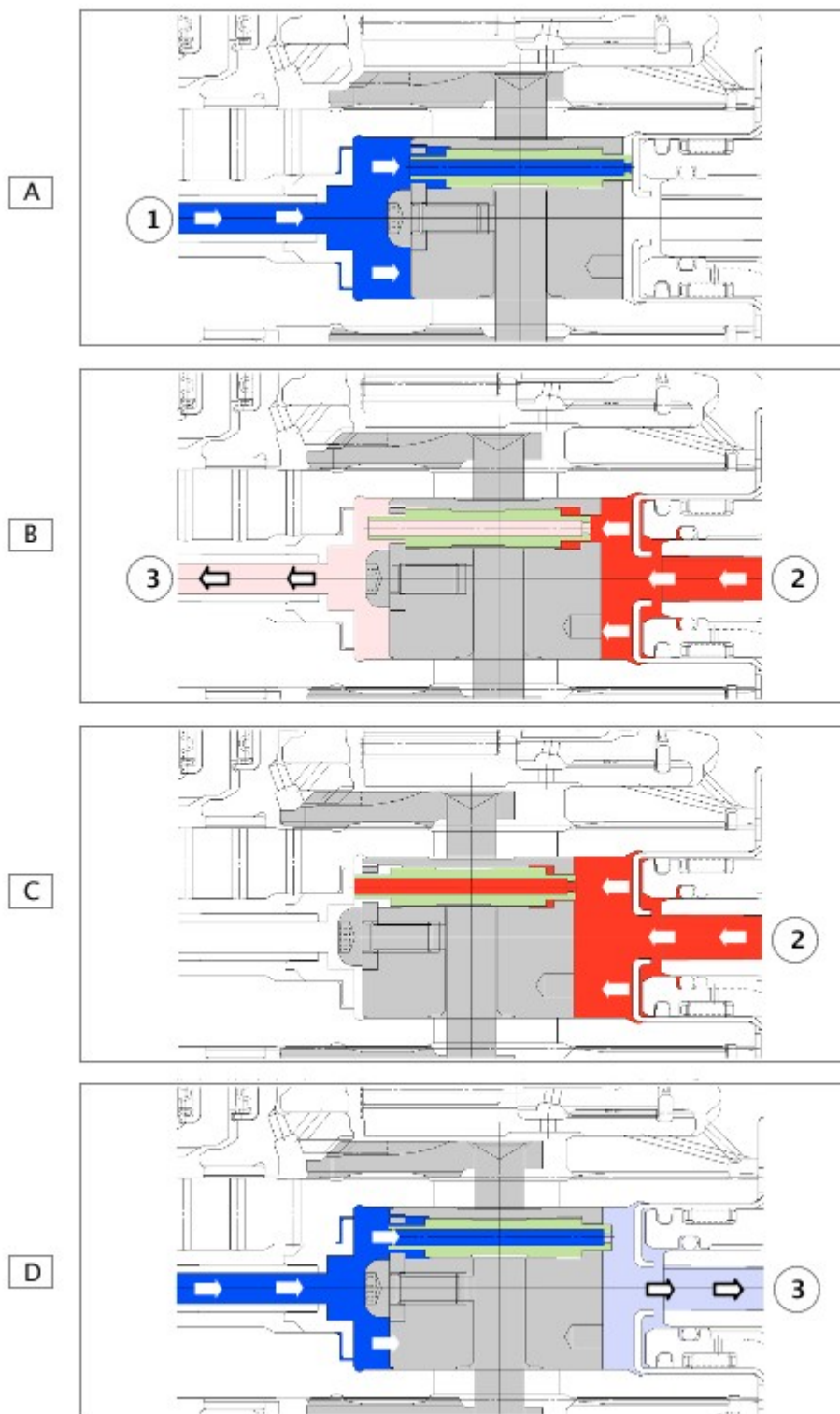
Dog 'A' is a sleeve with internal and external splines. Dog 'A' is permanently engaged with the input shaft via the internal splines. When the piston moves dog 'A' along the input shaft to the 'closed' position, dog 'A' engages with splines on the gearset 1 and 2 planet carrier, transferring drive from the input shaft to the gear set 2. When the dog 'A' is to be disengaged to the 'open' position, ATF pressure is applied to the opposite side of the piston and dog 'A' is moved along the input shaft and is disengaged from the planet carrier. Dog 'A' is in the 'closed' position in gears 1 through 7.

The dog 'A' has two states; open and closed. The piston cannot determine if the dog 'A' has travelled its full distance into or out of engagement with the ring gear carrier or has remained in an intermediate position. The piston is fitted with a sensing piston and the ATF pressure leakage through the sensing piston can be measured by the pressure sensor in the sensor unit.

The sensing piston is hollow and moves axially within the piston. Referring to the below illustration, if ATF pressure is applied to the right side of the piston, the piston and the sensing piston are pushed to the left. During the movement of the piston, a small amount of ATF pressure is passed through the sensing piston. This leakage pressure is measured at the left side of the piston by the pressure sensor. When the piston has moved fully to the left and reached its end position, the leakage through the sensing piston is blocked. The pressure drop on the left side of the piston is sensed and the TCM can determine the dog clutch 'A' is fully disengaged with the ring gear carrier.

If the pressure on the left side of the piston does not drop within a specified shift time, the TCM can determine that the dog 'A' has stopped in an intermediate position.

The dog clutch 'A' has four possible states of operation as follows:

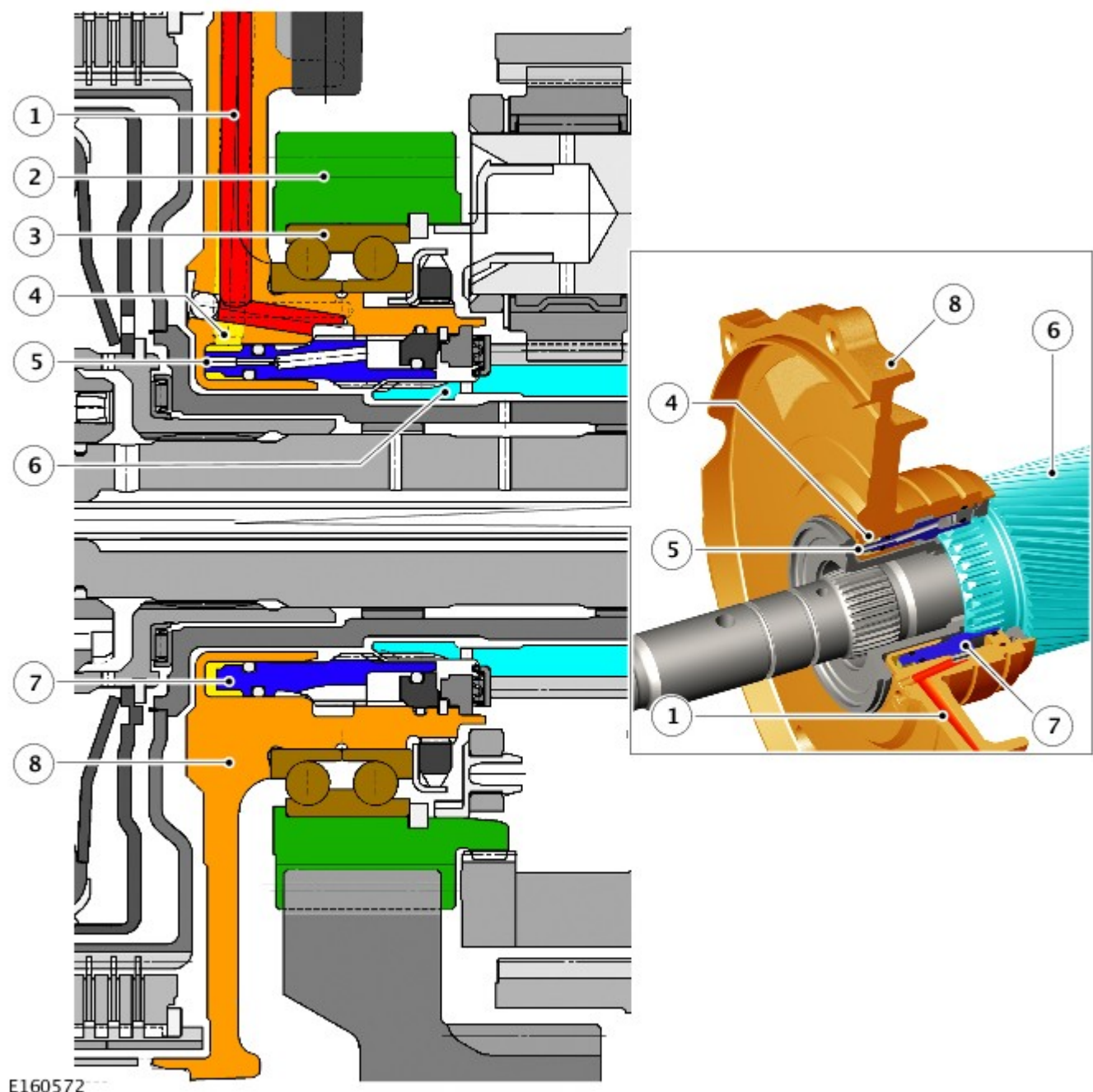


E160571

Item	Description
A	Dog 'A' open - piston at end position
B	Dog 'A' closing - piston at intermediate position
C	Dog 'A' closed - piston at end position
D	Dog 'A' opening - piston at intermediate position
1	ATF Pressure applied - dog 'A' open
2	ATF pressure applied - dog 'A' closed
3	Leakage through sensing piston for pressure sensing.

- A. Dog 'A' Open** - ATF pressure is applied to the piston from the left side chamber and the dog clutch 'A' is open. The ATF pressure in the right chamber is almost zero because the sensing piston is pushed to its limit of movement and leakage through the sensing piston is prevented.
- B. Dog 'A' Closing** - ATF pressure is applied from the right side chamber which starts the piston moving to the left into engagement with the ring gear carrier. The piston is now in the intermediate position and leakage pressure is passed through the sensing piston into the left side chamber. Pressure in the left side chamber can be measured and will be approximately 2 bar (29 lbf in³).
- C. Dog 'A' Closed** - ATF pressure is applied to the piston from the right side chamber, the dog 'A' is closed and fully engaged with the ring gear carrier. The ATF pressure in the left chamber is almost zero because the sensing piston is pushed to its limit of movement and leakage through the sensing piston is prevented.
- D. Dog 'A' Opening** - ATF pressure is applied to the piston from the left side chamber which starts the piston moving to the right and disengaging from the ring gear carrier. The piston is now in the intermediate position and leakage pressure is passed through the sensing piston into the right side chamber. Pressure in the right side chamber can be measured and will be approximately 2 bar (29 lbf in³).

Dog Clutch 'F'



E160572

Item	Description
1	ATF pressure supply - open
2	Spur pinion
3	Angular contact ball bearing race

4	ATF pressure supply - close
5	Pressure sensing leakage hole
6	Sun gear 3 and 4
7	Dog 'F'
8	Bearing support housing

Dog clutch 'F' is located between the multiplate clutch 'E' and planetary gear set 4. The dog clutch is controlled by a double acting piston located within the bearing support housing.

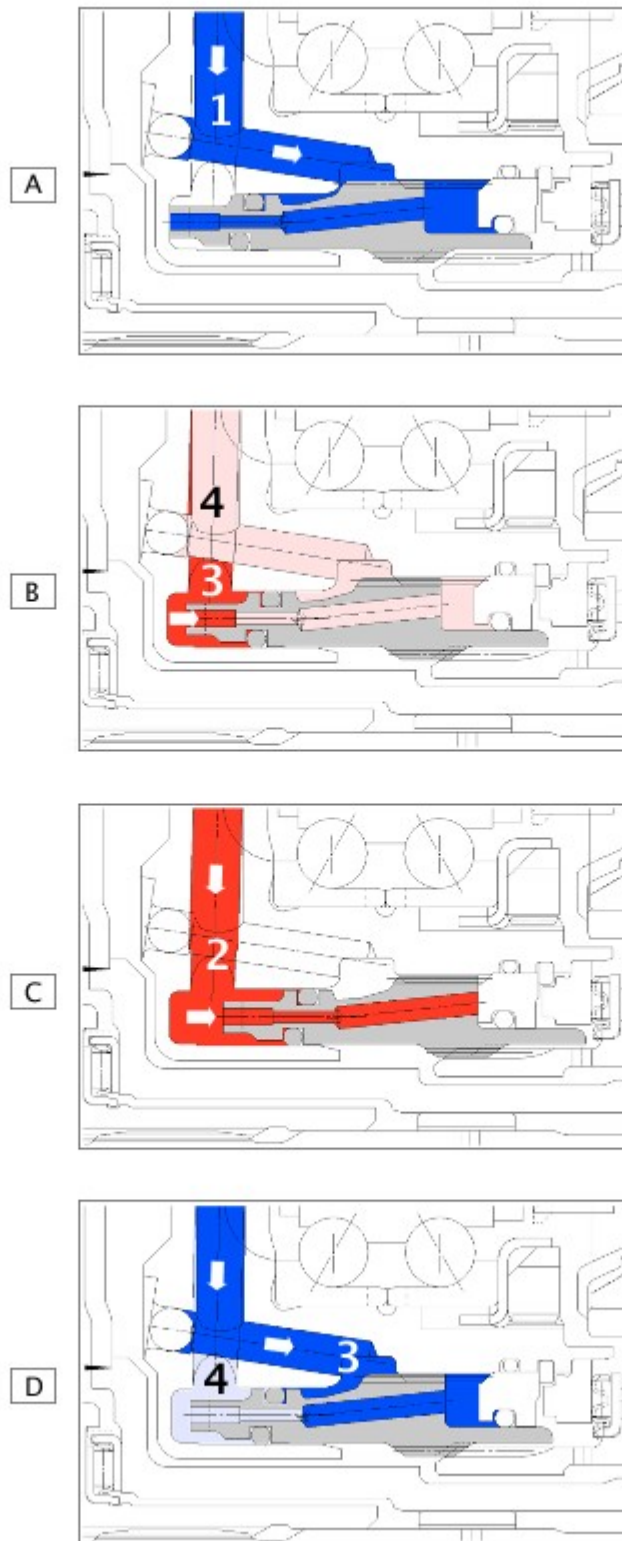
Dog 'F' is a sleeve with internal and external splines. Dog 'F' is permanently engaged on the splines with the bearing support housing, which in turn is fixed and static within the transmission casing. When dog 'F' is moved to the closed position, it acts as a brake for sun gears 3 and 4 in planetary gear set 4.

The dog 'F' has two states; open and closed. Dog 'F' employs a more simple sensing system than dog 'A'. Dog 'F' is also the piston itself and does not use a sensing piston. The piston of dog 'F' has a leakage sensing hole which is used to detect its current position via pressure sensing.

Referring to the below illustration, if **ATF** pressure is applied to the right side of the piston, the piston is pushed to the left. During the movement of the piston, a small amount of **ATF** pressure is passed through the leakage sensing hole. This leakage pressure is measured at the left side of the piston by the pressure sensor in the sensor unit. When the piston has moved fully to the left and reached its end position, the leakage through the leakage sensing hole is blocked. The pressure drop on the left side of the piston is sensed and the **TCM** can determine that dog clutch 'F' is fully engaged with sun gears 3 and 4.

If the pressure on the left side of the piston does not drop within a specified shift time, the **TCM** can determine that the dog 'F' has stopped in an intermediate position.

The dog clutch 'F' has four possible states of operation as follows:



E160573

Item	Description
A	Dog 'F' open - piston at end position
B	Dog 'F' closing - piston at intermediate position
C	Dog 'F' closed - piston at end position
D	Dog 'F' opening - piston at intermediate position
1	ATF Pressure applied - dog 'F' open
2	ATF pressure applied - dog 'F' closed
3	ATF pressure applied - dog 'F' in intermediate position

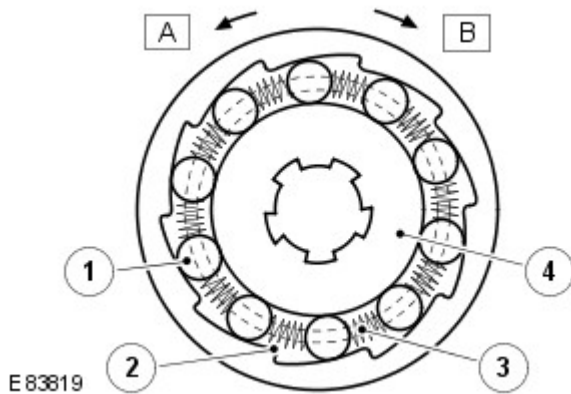
A. Dog 'F' Open - ATF pressure is applied to the piston from the right side chamber and the dog clutch 'F' is open. The ATF pressure in the left chamber is almost zero because the piston is pushed to its limit of movement and leakage through the leakage sensing hole is prevented.

B. Dog 'F' Closing - ATF pressure is applied from the left side chamber which starts the piston moving to the right into engagement with the sun gears 3 and 4. The piston is now in the intermediate position and leakage pressure is passed through the leakage sensing hole into the right side chamber. Pressure in the right side chamber can be measured and will be approximately 2 bar (29 lbf in³).

C. Dog 'F' Closed - ATF pressure is applied to the piston from the left side chamber, the dog 'F' is closed and fully engaged with the sun gears 3 and 4. The ATF pressure in the right chamber is almost zero because the piston is pushed to its limit of movement and leakage through the leakage sensing hole is prevented.

D. Dog 'F' Opening - ATF pressure is applied to the piston from the right side chamber which starts the piston moving to the left and disengaging from the sun gears 3 and 4. The piston is now in the intermediate position and leakage pressure is passed through the leakage sensing hole into the left side chamber. Pressure in the left side chamber can be measured and will be approximately 2 bar (29 lbf in³).

One-Way Clutch - Torque Converter

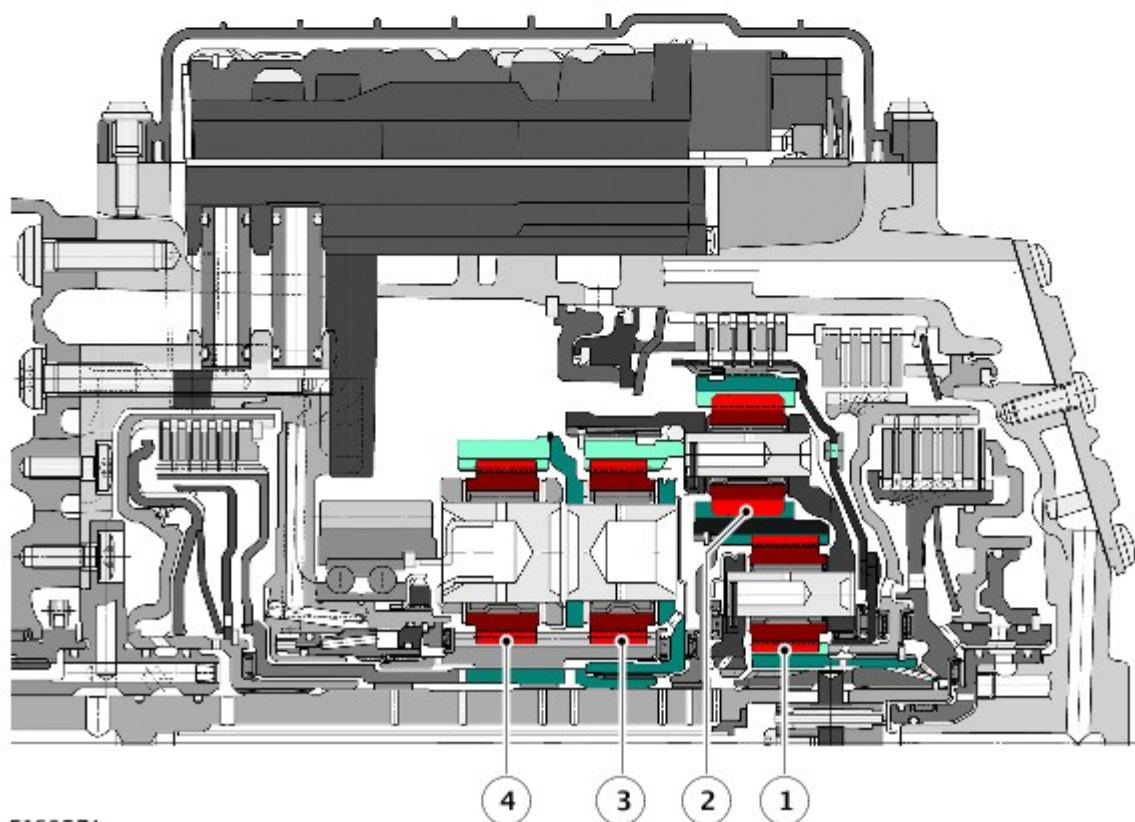
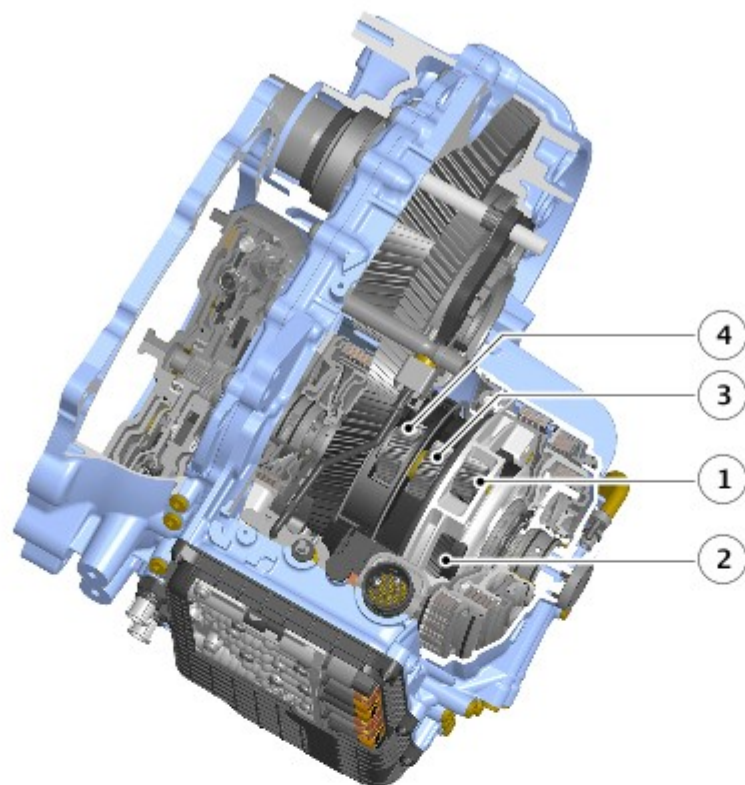


Item	Description
A	Unlocked condition
B	Locked condition
1	Roller
2	Cage
3	Spring
4	Inner race

The roller clutch uses parallel rollers, located between the smooth, cylindrical inner race and the inclined cam faces of the clutch body. Springs are used to hold the rollers in position between the two contact faces.

When the clutch is rotated in a clockwise direction, the rollers become trapped between the inner race and the inclined cam faces of the clutch body, providing positive (locked) rotation of the inner race, locking the clockwise rotation of the stator. When the clutch is rotated in a counter-clockwise direction, the rollers are moved away from the inclined cam faces and can rotate freely (unlocked) with the clutch body, this allows the torque converter stator to rotate freely when the vehicle is decelerating.

PLANETARY GEAR TRAINS



E160574

Item	Description
1	Gear set 1
2	Gearset 2
3	Gear set 3
4	Gear set 4

The planetary gear trains used on the 9HP48 transmission comprise four planetary gear sets; GS1, GS2, GS3 and GS4.

Engine torque is transferred, via operation of single or combinations of multiplate clutches, multiplate brakes and two dog clutches, to the four planetary gear trains. The gear trains are controlled by reactionary inputs from the multiplate clutches to produce the nine forward gears and one reverse gear. The gear ratios are as follows:

Gear	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	Reverse
Ratio	4.713	2.842	1.909	1.382	1.00	0.808	0.699	0.580	0.480	3.830

Sun gear S2 of gear set GS2 has additional internal gearing and also operates as the ring gear R1 of gear set GS1.

Ring gear R3 is connected to planet carrier PC1 and PC2 and therefore rotates in the same direction and speed as the planet carrier.

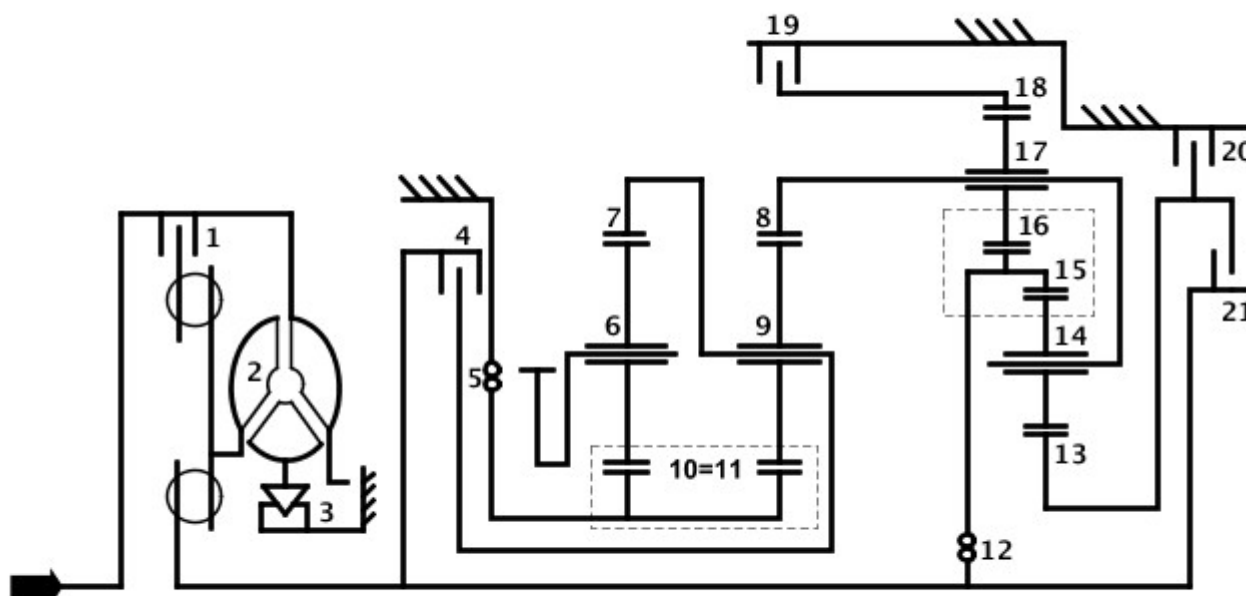
Gear sets GS3 and GS4 are connected via a joint sun gear S3/S4 as a Simpson planetary gear set.

Ring gear R4 is connected to planet carrier PC3 and therefore rotates in the same direction and speed as the planet carrier.

Final output from the transmission occurs via gear set GS4 via a spur gear to the differential.

POWER FLOW

Operation of the transmission is controlled by the **TCM** which electrically activates various solenoids to control clutches to achieve the required transmission gear selection. The sequence of solenoid activation is based on programmed information in the **TCM** memory and physical transmission operating conditions such as vehicle speed, throttle position, engine load and the **TCS** position.



E160575

Item	Description
1	Torque converter lock-up clutch
2	Torque converter
3	Torque converter one-way clutch
4	Multiplate clutch 'E'
5	Dog clutch 'F'
6	Planetary gears P4
7	Ring gear R4
8	Ring gear R3
9	Planetary gear P3
10	Sun gear S4
11	Sun gear S3

12	Dog clutch 'A'
13	Sun gear S1
14	Planetary gear P1
15	Ring gear R1
16	Sun gear S2
17	Planetary gear P2
18	Ring gear R2
19	Multiplate brake 'D'
20	Multiplate brake 'C'
21	Multiplate clutch 'B'

Solenoid Operation

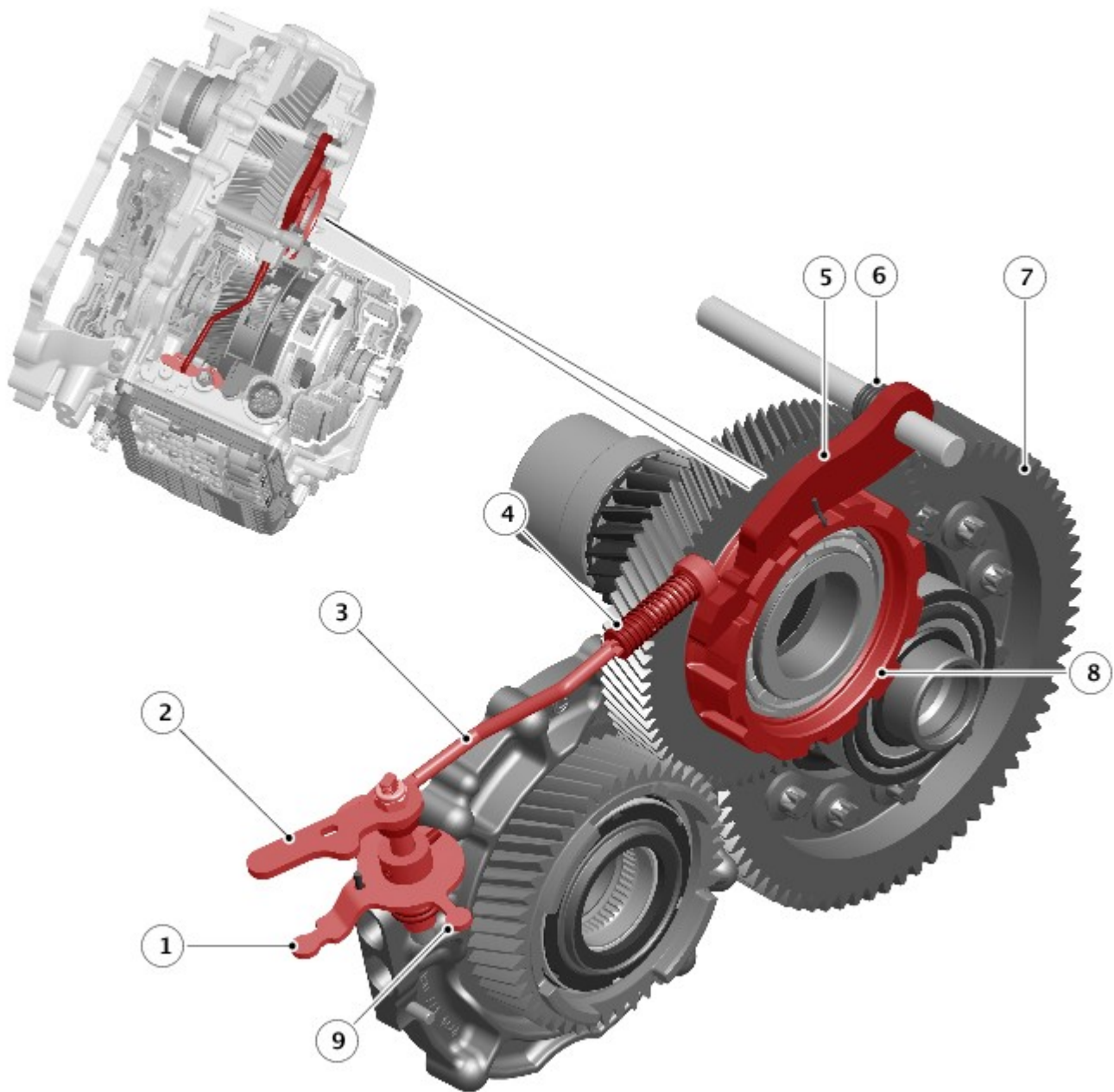
The following table shows the clutches that are closed to achieve the required gear ratios.

Gear	Multiplate Clutch 'C' (Brake)	Multiplate Clutch 'D' (Brake)	Multiplate Clutch 'B'	Multiplate Clutch 'E'	Dog Clutch 'F'	Dog Clutch 'A'
1		X			X	X
2	X				X	X
3			X		X	X
4				X	X	X
5			X	X		X
6	X			X		X
7		X		X		X
8	X	X		X		
9		X	X	X		
R		X	X		X	

X = Clutch closed

In neutral, all of the solenoids are de-energized and the clutches and brakes are all disengaged, with the exception of dog clutch 'F' which is engaged when the transmission is in neutral. This allows rotation from the input shaft to rotate the planetary gear sets without transferring any drive to the differential.

PARK LOCK



E160576

Item	Description
1	Park lock lever - Connection with park lock actuator spool valve
2	Selector shaft Service Park Release (SPR) lever
3	Park rod
4	Spring
5	Park lock pawl
6	Spring
7	Differential spur gear
8	Park lock gear
9	Park lock lever - Connection with PARK (P) sensor

The park lock comprises a selector shaft, a park lock lever, a shift rod, a park lock pawl and a park lock gear.

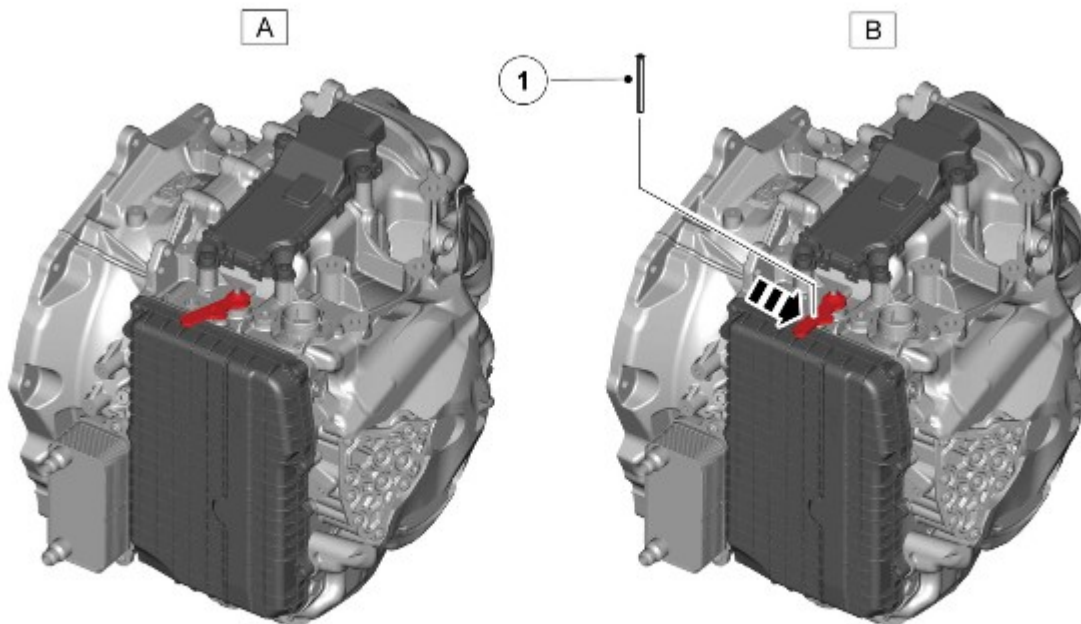
The park lock is electronically and hydraulically actuated via a control solenoid and a spool valve, which are located in the valve block. A slot in the spool valve engages with a connection with a lever on the selector shaft. A second connection on the lever engages with the PARK (P) sensor which is part of the sensor unit. Refer to the 'Valve Block' and 'Sensor Unit' sections in this section for details of the individual components.

When the control solenoid is actuated, the park lock spool moves, rotating the park lock lever. The rotary motion of the lever is converted to linear movement of the shift rod which moves in the required direction to apply or release the park lock pawl from the park lock gear.

Service Park Release (SPR)

The SPR is a mechanical procedure which requires removal of the air filter housing for access. The procedure is required when there has been a loss of vehicle electrical power or a failure to the automatic transmission preventing release of the park lock.

The following procedure must be used to release the park lock before moving the vehicle. The vehicle must be held by either the electric park brake or wheel chocks to prevent it unintentionally moving when the park lock is released.



E181004

Item	Description
A	SPR engaged
B	SPR released
1	5mm locking pin

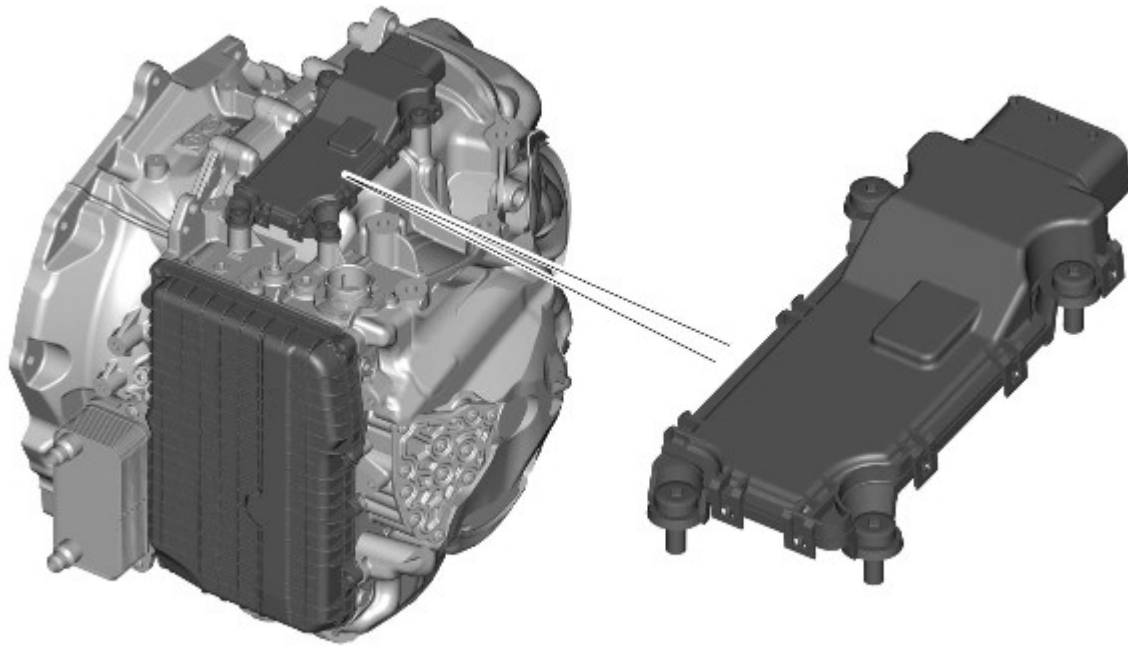
Apply SPR

- Make sure that the ignition is off (power mode 4)
- Remove the air filter assembly to get access to the SPR lever on the automatic transmission
- Rotate the SPR lever in a counter clockwise direction until the slot in the SPR lever aligns with a corresponding hole in the automatic transmission casing
- Hold the SPR lever in this position and insert a suitable 5mm diameter locking pin (Allen key for example) through the slot in the SPR lever and into the hole in the automatic transmission casing
- The vehicle can now be moved.

Release SPR

- Remove the 5mm diameter locking pin from the SPR lever
- Make sure the SPR lever has moved fully clockwise and the park lock is engaged
- Replace the air filter assembly.

TRANSMISSION CONTROL MODULE (TCM)



E181024

The **TCM** is located on the top of the automatic transmission casing and is connected on the high speed **CAN** powertrain systems bus to send and receive information to and from other system modules.

The **TCM** outputs signals to operate the transmission solenoid valves to control the hydraulic operation of the transmission.

The **ECM (engine control module)** supplies the engine management data on the high speed **CAN** powertrain systems bus. The **TCM** requires engine data to efficiently control the automatic transmission operation, using for example; crankshaft torque, engine speed, accelerator pedal angle, engine temperature etc.

The **TCM** processes signals from the transmission speed and temperature sensors, **ECM** and other vehicle systems. From the received signal inputs and pre-programmed data, the **TCM** calculates the correct gear, torque converter clutch setting and optimum settings for gear shift and lock-up clutch control.

The steering angle sensor and the **ABS (anti-lock brake system)** module also supply data to the **TCM** on the high speed **CAN** powertrain systems bus. The **TCM** uses data from these systems to suspend gear changes when the vehicle is cornering and/or the **ABS** module is controlling braking or traction control.

The transmission is controlled by a 'shift by wire' system. The **TCS** is connected to the **TCM** on the high speed **CAN** powertrain systems bus. Driver selections made on the **TCS** are passed via **CAN** messages to the **TCM**.

If the **TCM**, the transmission or the valve block is replaced, a diagnostic routine using an approved Land Rover diagnostic system will be required to calibrate the **TCM** to learn the Touchpoint Adaptions. Refer to 'Touchpoint Adaptions' and 'Clutch Adaptions' later in this section.

INSTRUMENT CLUSTER



NOTE: The following illustration shows the display when the transmission is in CommandShift™ mode. PRNDS is displayed during normal transmission operation.



E160578

Item	Description
1	Malfunction Indicator Lamp (MIL)
2	Gear indicator (Dynamic mode)
3	Transmission indicator

The instrument cluster is connected to the **TCM** via the high speed **CAN** powertrain systems bus. Transmission status is transmitted by the **TCM** and displayed to the driver in the instrument cluster.

For additional information, refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation).

Malfunction Indicator Lamp (MIL)

The **MIL (malfunction indicator lamp)** is located in the upper right side of the instrument cluster, within the tachometer. Transmission related faults which may affect the vehicle emissions output will illuminate the **MIL**.

The **MIL** is illuminated by the **ECM** on receipt of a relevant fault message from the **TCM** on the high speed **CAN** powertrain systems bus. The nature of the fault can be diagnosed using a Land Rover approved diagnostic system which reads fault codes stored in the memory.

Transmission Status Display

The transmission status display is located in the central Thin Film Transistor (TFT) message display in the instrument cluster. The display shows the selected P R N D S position and the current selected gear in normal transmission modes. In Drive 'D' the current gear is not displayed unless the paddle switches are operated.

In Dynamic (Sport) mode, the selected transmission gear is displayed in a central position in the TFT display.

DRIVING MODES

A number of different driving modes are available. Some can be selected by the driver and some are automatically initiated by the **TCM** to adapt to different driving conditions.

- Normal
- Sports
- Manual 'CommandShift™'
- Cooling
- Hill Descent Control (HDC)
- Cruise
- Limp home
- Coast
- Fast off recognition
- Uphill and Trailer
- Downhill

- Wide Throttle
- Terrain Response
- Reverse lock-out
- Kick-Down
- Shift Adapt Under Braking
- Corner Recognition
- Road Gradient Recognition
- Driver Type Recognition

Normal

Normal mode is automatically selected by the **TCM** when the ignition is switched on (ignition mode 6). In this mode all automatic and adaptive modes are active. Normal mode uses gear shift and lock-up maps which provide the optimum of fuel consumption, emissions and driveability, depending on the driving style.

If the transmission is operated in sport mode or 'CommandShift™' mode and the **TCS** is moved back to the drive 'D' position, then normal mode operation is resumed.

Sports

Sports mode provides enhanced acceleration and responsiveness by the use of sports shift maps. This mode allows the transmission to down shift more readily and hold gears for longer at higher engine speeds.

Manual 'CommandShift™'

Manual 'CommandShift' mode allows the transmission to operate as a semi-automatic transmission. The driver can change up and down the nine forward gears with the freedom of a manual transmission provided the requested gear is within the allowed engine and vehicle speed range.

Shift maps are provided to protect the engine at high speeds. The **TCM** will automatically change up to a higher gear ratio to prevent engine overspeed and change down to a lower gear ratio to avoid engine laboring and stalling.

When kick-down is requested the **TCM** shifts down to the lowest available gear. When the vehicle is stationary, the driver can select 1st or 2nd to start off.

Upshifts (+) are optimized for performance via the short shift function, resulting in firmer feeling shifts than in automatic mode. Downshift requests (-) utilize a throttle 'blip' during the shift, resulting in an improved shift feel.

Temporary Manual Gear Selection

With the **TCS** in the 'D' position, manual mode can be directly accessed by the single action of operating one of the steering wheel paddle switches. This allows immediate, but temporary use of the shift paddles when the **TCS** is in 'D'. If continued use of manual mode is required, the **TCS** must be moved to the Sport 'S' position to enter permanent manual mode in the currently selected gear.

If the **TCS** remains in the 'D' position, temporary manual mode will be held while the driver is accelerating, decelerating, cornering or continuing to request shifts using the paddle switches. The transmission will revert back to automatic operation after a short period of driving at a steady speed. Alternatively, the upshift (+) paddle can be held for approximately 2 seconds to return to automatic mode in **TCS** position 'D'.

Permanent Manual Gear Selection

Select the 'S' position on the **TCS**, permanent manual mode is then accessed by the operation of the steering paddle switches. The instrument cluster message center will show the currently selected gear. To exit from manual mode, pull and hold the upshift (+) paddle switch for approximately 2 seconds to return to automatic operation in Sport (S) mode. Alternatively, rotate the **TCS** to the 'D' position; the transmission will revert to 'D' automatic mode.

Manual Operation

Upshifts are performed using a brief operation of the upshift (+) paddle switch. Downshifts are performed using the downshift (-) paddle switch. The message center will display the selected gear.

The transmission will inhibit upshifts and downshifts if the requested shift would result in an engine speed outside the engine's operating range.

Commandshift™ - Additional Features

Kick-Down: - Operation of kick-down mode will override the currently selected gear. The lowest available gear will be selected for maximum acceleration and will be highlighted in the message center. Subsequent manual shifts may then be selected as usual.

Positive Torque: - Provides throttle 'blips' on downshifts, improving transmission shift quality and response.

Shift Assist: - The transmission will automatically upshift at the engine speed redline in CommandShift mode, as if operated manually. The transmission will automatically downshift, when the engine speed falls below the range for the currently selected gear. When the vehicle approaches, or comes to rest, second gear is automatically selected. Subsequent starts from standstill will occur in second gear, unless accelerator pedal demand is high or a downshift is manually selected, in which case first gear will be selected. In all cases the message center will show the currently selected gear.

During sustained braking, if a downshift is selected at a speed which would result in an engine speed outside the engine's operating range, the downshift will be delayed until the vehicle speed has reduced sufficiently for the gear selection to be made, without causing the engine speed to exceed its normal operating range.

Cooling

Cooling mode is activated when the **TCM** detects excessively high **ATF** or engine coolant temperatures. When this mode is active, torque converter lock-up is activated earlier to minimize a further rise in **ATF** and/or engine coolant temperature and assist **ATF** cooling.

Hill Descent Control (HDC)

The HDC mode assists the **ABS** control module in controlling the downhill speed of the vehicle. When HDC is active, the **TCM** selects the most appropriate gear for the descent to maximize engine braking.

Maximum engine braking is applied using a shift map which initiates later upshifts and early downshifts.

Cruise

When speed control is activated, the **TCM** receives a speed control active message on the high speed **CAN** powertrain systems bus. The **TCM** activates a speed control map which minimizes up and down shifts.

Cruise mode is active when speed control is selected to 'on' and the transmission is in drive 'D', Sport 'S', HDC or a Terrain Response Grass/gravel/snow program. Unique cruise maps override the current mode to provide a smooth driving feel and mode reselection.

Limp Home

If a transmission fault is detected by the **TCM**, the **TCM** adopts a limp home strategy and a message 'TRANSMISSION FAULT LIMITED GEARS AVAILABLE' is displayed in the message center. If the fault has an effect on engine emissions, the **MIL** in the instrument cluster will also be illuminated.

In limp home mode, P, R and N functions operate normally (if the fault allows these selections) and the **TCM** locks the transmission in an available gear to allow the driver to take the vehicle to a Land Rover dealer or approved repairer. Torque converter lock-up is disabled and reverse-lock-out will not function.

If the vehicle is stopped and subsequently restarted in the limp home mode condition, the **TCM** operates normally until the fault which caused the condition is detected again.

Coast

Coast mode provides earlier downshifts during coasting dependant on output shaft deceleration rate to improve driveability and refinement by avoiding negative to positive driveline torque reversal transmissions during the downshifts.

Fast Off Recognition

Fast off recognition is activated when the **TCM** detects that the driver has released the accelerator pedal quickly. This is detected by the **TCM** monitoring for a high level of negative pedal angle from **ECM** signals on the high speed **CAN** Powertrain systems bus. If this condition is detected, the **TCM** holds the current gear ratio to allow the driver to complete the manoeuvre without the need for a downshift. The mode can remain active for a predetermined length of time or if the driving style remains passive.

Fast off recognition mode assists vehicle stability and is used in conjunction with a lateral acceleration input during cornering to maintain the current gear until the corner is negotiated.

Uphill and Trailer

Uphill and trailer mode can be active when the transmission is operating in normal, sport or Terrain Response modes. When the vehicle is pulling a trailer or driving up an incline, the **TCM** detects the increased resistance by monitoring engine torque and speed signals received from the **ECM** on the high speed **CAN** powertrain systems bus and also transmission output shaft speed sensor signals. Uphill and trailer mode will provide downshifts to prevent a drop in transmission torque output and maintain driving force.

Downhill

Downhill mode can be active when the transmission is operating in normal, sport or Terrain Response modes. When the vehicle is descending an incline, the **TCM** detects a reduction in resistance by monitoring engine torque and speed signals received from the **ECM** on the high speed **CAN** powertrain systems bus and also transmission output shaft speed sensor signals. Downhill mode assists engine braking by selecting an appropriate gear reducing the load required on the brakes.

Wide Throttle

Wide open throttle mode operates for part throttle upshifts and kick-down upshifts. It provides consistent wide open throttle upshift performance under all driving conditions. The full engine speed range is used in all driving modes; normal, sport, hill modes and CommandShift™. Compensation is used for delays (hydraulic and electronic) in gear change request to gear change start to provide smooth changes and correct shift point correction.

Terrain Response

The Terrain Response system has a unique set of shift maps for each of the Terrain Response programs. These programs override existing modes; for example when HDC is active and the 'Sand', 'Mud and Ruts' or 'Grass/Gravel/Snow' programs are selected, a specific Terrain Response map is used, not the HDC mode shift map detailed previously.

Reverse Lock-Out

If the **TCS** is moved from N to R and the vehicle is travelling forwards, reverse selection is prevented if the vehicle speed is 5 km/h (3 mph) or more.

The same strategy is applied if the vehicle is moving backwards and D or S are selected on the **TCS**, the selection will be prevented if the vehicle speed is 5 km/h (3 mph) or more.

Kick-Down

When D is selected and the accelerator pedal is fully depressed, the transmission will down-shift to the lowest appropriate gear. Once the accelerator pedal is returned to a normal driving position, the transmission will upshift to the highest appropriate gear. Kick-down will vary according to road speed, current gear selection and accelerator pedal movement.

Shift Adapt Under Braking

Under braking, the transmission will vary the downshift point in proportion to braking effort and road gradient. This feature works in conjunction with the positive torque function, resulting in a smoother down-shift. If Sport mode S is selected, driver type recognition will vary the activation of this feature according to driving style.

Corner Recognition

Corner recognition inhibits up-shifts during cornering to provide improved vehicle balance. If Sport mode S is selected, driver type recognition will vary the activation of this feature according to driving style.

Road Gradient recognition

When the vehicle is driven on an uphill gradient, the transmission adapts the shift pattern to make better use of the engine power.

When the vehicle is driven on a long downhill gradient, the transmission may automatically select a lower gear to increase engine braking. Selecting Sport mode S will increase the tendency of the transmission to select a lower gear in these conditions, further increasing engine braking.

It is also possible to select a lower gear to increase engine braking using the gear shift - paddle switch.

Driver Type Recognition

In Sport mode S, the transmission monitors driving style and in combination with other vehicle systems, varies the shift schedule, fast off, corner recognition and shift adapt under braking functions according to the driving style.

TRANSMISSION FAULT STATUS

If the **TCM** detects a fault with the transmission system, it will enter a default (limp home) mode to prevent further damage to the transmission and allow the vehicle to be driven. If possible reverse gear will be available and also 3rd gear only.

When a fault is detected, a high speed **CAN** powertrain systems bus message is sent from the **TCM** and is received by the instrument cluster. The instrument cluster illuminates the **MIL** (if required) and displays an applicable message in the message center.

For additional information, refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation).

Some transmission faults may not illuminate the **MIL** or display a fault message, but the driver may notice a reduction in shift quality.

TOUCHPOINT ADAPTIONS

The transmission is supplied by ZF with Touchpoint Adaptions set in the Transmission Control Module (TCM) at the factory which match the transmission to which the TCM is attached.



CAUTION: TOUCHPOINT ADAPTIONS MUST ONLY BE PERFORMED WHEN A NEW TCM OR A TCM FROM ANOTHER VEHICLE HAS BEEN FITTED. UNDER NO OTHER CIRCUMSTANCES MUST TOUCHPOINT ADAPTIONS BE PERFORMED. Resetting Touchpoint Adaptions for any reason other than replacing the TCM could result in poor shift performance if the procedure is carried out unnecessarily.

Before performing a diagnostic Touchpoint Adaption reset procedure using an approved Land Rover diagnostic system, ensure the following conditions are applied:

- the Automatic Transmission Fluid (ATF) is at a temperature greater than 30 degrees C (86 degrees F)
- the Transmission Control switch (TCS) is in the 'Park' position
- the vehicle is stationary
- the engine is running at idle speed
- Brake pressure applied using the foot brake
- the Electric Parking Brake (EPB) is applied and held on manually to ensure it does not release when 'Drive' is selected
- no faults or Diagnostic Trouble Codes (DTCs) are present in the TCM.



NOTE: If the EPB is allowed to release, the Touchpoint Adaption reset procedure will be terminated.

When the transmission is built, it is tested at the ZF factory to determine how much electrical current is required by each Pressure Control Valve (PCV) to attain a datum engagement point. The engagement (Touchpoint) is determined by a predefined level of friction in the clutch plates.

This data is stored with the serial number of the transmission and the same data is written to the TCM fitted to that transmission. This ensures that each transmission has a uniform performance.

If the Touchpoint Adaption data is not available because the TCM or the transmission has been replaced, the Touchpoint Adaptions contained in the TCM will be incorrect for the transmission. This will result in harsh clutch engagements and could cause damage to the transmission.

Using the Touchpoint Adaptions learning routine in the approved Land Rover diagnostic system, enables the TCM to establish the Touchpoint for all the clutches. Once the Touchpoint Adaptions have been learnt, the Clutch Adaptions routine must be performed to further refine the transmission operation.

CLUTCH ADAPTIONS

When the vehicle is driven, the TCM monitors and refines the clutch pressures and engagement points to maintain smooth transition between gear changes.

After certain service operations, the Clutch Adaptions may need to be reset to restore optimum performance of the transmission.

When the vehicle is driven, the TCM monitors the gear changes. When the TCM determines that smooth and reliable changes are occurring, it initiates a Clutch Adaptions learning cycle. The learning cycle determines if higher or lower PCV pressures are required or if PCV timing can be improved to apply smoother gear change transitions. The dynamic behaviour of each clutch is monitored and can be compensated for. The TCM will also monitor static engagement when the vehicle is stationary.

The Clutch Adaptions are initially started after a reset with drive cycles including the ability to cruise at various speeds. The fully Clutch Adaptions are achieved gradually over many drive cycles.

The Clutch Adaptions ensure that the transmission provides smooth gear changes without slip for the life of the transmission. The Clutch Adaptions compensate for wear providing that the Touch Adaptions were correct for the static calibration of the transmission.

The Clutch Adaption process compensates for assembly build tolerances in the hydraulic system, mechanical tolerances of the transmission components to include friction and electrical tolerances for example resistance and inductance. All of these can affect the dynamic behaviour of the transmission.

The Clutch Adaptions ensure that the TCM is operating at its optimum operating parameters adjusted to suit the individual characteristics of the transmission. The TCM to a lesser extent, also adjusts to the characteristics of the driver and vehicle.



NOTE: Some drivers and their driving style may inhibit the Clutch Adaption process, which can lead to transmission driveability issues over a period of time.

ENGINE SPEED AND TORQUE MONITORING

The **ECM** constantly supplies the **TCM** with information on engine speed and torque through messages on the **CAN** powertrain systems bus. The **TCM** uses this information to calculate the correct and appropriate timing of shift changes.

If the messages are not received from the **ECM**, the **TCM** will implement a back-up strategy to protect the transmission from damage and allow the vehicle to be driven.

In the event of an engine speed or torque signal failure, the transmission will adopt the electrical limp home mode with the transmission operating in a fixed gear.

TOWING FOR RECOVERY



WARNING: Ensure that the remote handset remains in the vehicle whilst the vehicle is being recovered. Removing the remote handset will engage the steering lock, which will prevent the vehicle from steering correctly.

If the engine cannot be run whilst the vehicle is being recovered, there will be no power assistance for the steering or brakes. This will result in greater effort being required to steer or slow the vehicle.



CAUTION: The vehicle should not be towed more than required to load to a trailer or recovery vehicle.

NOTES:



The recommended recovery method is by trailer or recovery vehicle.



Where recovery to a vehicle or trailer is not possible (for example vehicle is off-road), the vehicle can be towed with all 4 wheels on the ground for a distance of up to 10 km (6.2 miles) at a speed no greater than 25 Km/h (15 mph). The Service Park Release (SPR) procedure must be used to disengage the park lock.

Secure the towing attachment from the recovery vehicle to the front towing eye.

Ensure the remote handset is in the vehicle and switch on the ignition (power mode 6) by pressing the start/stop button once.



NOTE: Leaving the ignition switched on for extended periods will cause the battery to drain.

The Service Park Release (SPR) procedure must be used to disengage the park lock.

Release the electric park brake.

Tow the vehicle onto the trailer or recovery vehicle.

Apply the electric park brake and manually disengage the SPR, remove the pin and ensure the park lock lever is in the correct position to engage the park lock.

Switch off the ignition (power mode 4) and remove the remote handset from the vehicle.



CAUTION: The vehicle cannot be towed in a reverse direction.

SYSTEM OPERATION

Operation of the transmission is controlled by the **TCM**, which electrically activates various solenoids to control the transmission gear selection. The sequence of solenoid activation is based on programmed information in the **TCM** memory and physical transmission operating conditions such as vehicle speed, throttle position, engine load and rotary **TCS** position.

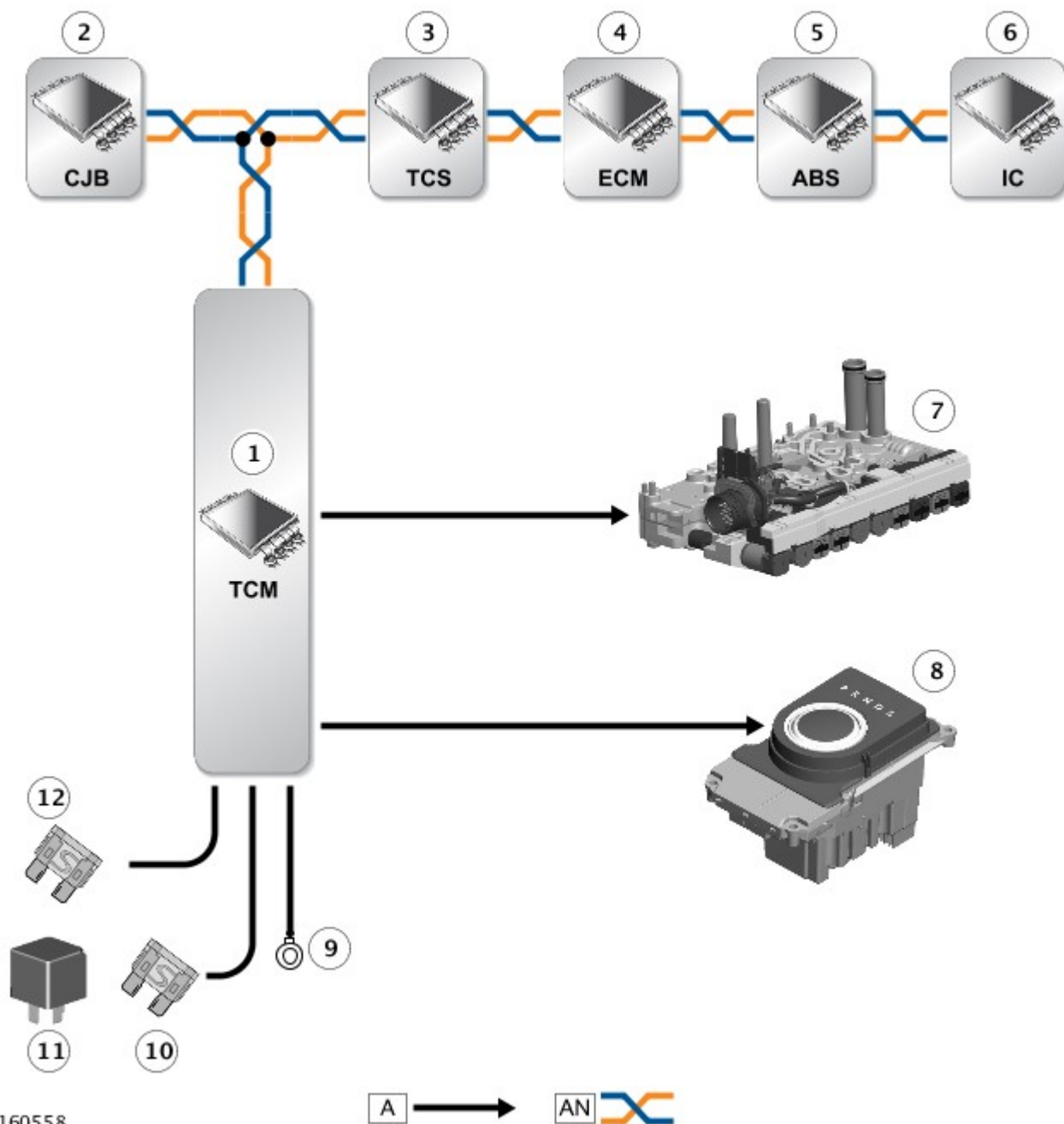
Engine torque is transferred, via operation of combinations of clutches to the planetary gear trains. The gear trains are controlled by reactionary inputs from brakes and clutches to produce the 9 forward gears and 1 reverse gear.

The shift elements (clutches and brakes) are actuated hydraulically. Fluid pressure is applied to the required clutch and/or brake, pressing the plates together and allowing drive to be transmitted through the plates. The purpose of the shift elements is to perform power-on shifts with no interruption to traction and smooth transition between gear ratios.

CONTROL DIAGRAM



NOTE: **A** = Hardwired; **AN** = High speed CAN Powertrain systems



Item	Description
1	Transmission Control Module (TCM)
2	Central Junction Box (CJB)
3	Transmission Control Switch (TCS)
4	Engine Control module (ECM)
5	Anti-lock Brake System (ABS) control module
6	Instrument cluster
7	Valve block
8	Transmission Control Switch (TCS)
9	Ground
10	Fuse - ignition supply from ignition relay
11	Ignition relay (CJB)
12	Fuse - Permanent battery supply

Automatic Transmission/Transaxle - Diagnostics Vehicles With: 9HP48 9-Speed Automatic Transmission - AWD

Diagnosis and Testing

Principles of Operation

For a detailed description of the Automatic Transmission, refer to the relevant Description and Operation section in the workshop manual. REFER to: [Transmission Description](#) (307-01 Automatic Transmission/Transaxle, Description and Operation).

Inspection and Verification

CAUTIONS:



Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.



The vehicle should not be driven if the fluid level is low as internal failure can result.



When the wheels are free of the ground (for example, when the vehicle is on a lift), do not drive the vehicle in any gear higher than 4th gear. Failure to comply with this instruction may cause DTCs to set or damage to the automatic transmission.

NOTES:



If a control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.



When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.



Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern
2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

Mechanical	Electrical
<ul style="list-style-type: none">• Automatic transmission casing• Automatic transmission fluid leaks• Emergency park release lever	<ul style="list-style-type: none">• Fuses• Wiring harnesses and connectors• Transmission control module• Transmission control switch

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index

5. Check DDW for open campaigns. Refer to the corresponding bulletins and SSMS which may be valid for the specific customer complaint and carry out the recommendations as required

Symptom Chart

Symptom	Possible Causes	Action
Warning message: TRANSMISSION	<ul style="list-style-type: none">• Engine system fault• Powertrain control module software fault	<ul style="list-style-type: none">• Using the manufacturer approved diagnostic system, check the powertrain control module for related DTCs and refer to the relevant DTC index• Using the manufacturer approved diagnostic system, re-configure the powertrain control module with the latest level software

FAULT	<ul style="list-style-type: none"> Transmission system fault Transmission control module software fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the transmission control module for related DTCs and refer to the relevant DTC index Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software
Gearshift quality poor	<ul style="list-style-type: none"> Engine system fault Powertrain control module software not at the latest level Transmission system fault Transmission control module software not at the latest level Transmission adaptations insufficient for smooth gearshifts 	<ul style="list-style-type: none"> GO to Pinpoint Test A.

Fluid Level and Condition Checks

Fluid Level Check



NOTE: The transmission fluid temperature must be between 37°C (99°F) and 45°C (113°F) whilst checking level. Should the temperature rise above this figure, abort the check and allow the transmission fluid to cool.

This automatic transmission is not equipped with a fluid level indicator. An incorrect level may affect the transmission operation and could result in transmission damage. For fluid level checks refer to the relevant section of the workshop manual. REFER to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

Fluid Condition Check

Use the following procedure to check the fluid condition, which is a good indicator of the internal condition of the transmission:

1. Check the fluid level.
2. Observe the colour and the odour of the fluid. Unused fluid is honey colored and becomes dark or blackish after the vehicle is driven a few hundred miles.
3. Allow the fluid to drip onto a facial tissue and examine the stain.
4. A small quantity of fine debris is normal (due to normal wear). Large metal particles may indicate excessive wear or internal damage.

Transmission Terminal Assignment

Transmission Control Module 58 Way Connector

Terminal Number	Circuit Reference	Description
1	GND	Control module ground
3	UDRMV1	Pressure control valves power
5	VBATT	Control module power
6	UDRMV2	Solenoid valves power
8	SENSOR GND	Sensors ground
9	IGN	Ignition status signal
10	VS_5V	Sensors power (5 V)
12	VS_9V	Sensors power (9 V)
13	L3	Park position sensor
15	L4	Park position sensor
17	T_OIL+	Automatic transmission fluid temperature sensor signal
19	VOUT_PR	Pressure sensor signal
30	T_OIL-	Automatic transmission fluid temperature sensor ground
31	N_T	Input shaft speed sensor signal
34	HS CAN H (PT)	High speed CAN high (powertrain)
35	OUT8	Park lock solenoid valve drive
36	OUT7	Dog clutch 'F' solenoid valve drive
38	OUT6	Dog clutch 'A' solenoid valve drive
39	OUT4	Torque converter pressure control valve drive

40	OUT2	Multiplate clutch 'D' pressure control valve drive
43	N_OUT	Output shaft speed sensor signal
47	HS CAN L (PT)	High speed CAN low (powertrain)
48	P-SIG	Park lock engaged signal (output to the transmission control switch)
51	OUT9	Park lock control solenoid drive
52	OUT5	System pressure control valve drive
53	OUT3	Multiplate clutch 'E' pressure control valve drive
54	OUT0	Multiplate clutch 'B' pressure control valve drive
55	OUT1	Multiplate clutch 'C' pressure control valve drive

Transmission 26 Way Connector

Terminal Number	Circuit Reference	Description
1	UDRMV1	Pressure control valves power
2	OUT6	Dog clutch 'A' solenoid valve drive
3	OUT0	Multiplate clutch 'B' pressure control valve drive
4	UDRMV2	Solenoid valves power
5	OUT1	Multiplate clutch 'C' pressure control valve drive
6	OUT2	Multiplate clutch 'D' pressure control valve drive
7	OUT3	Multiplate clutch 'E' pressure control valve drive
8	OUT7	Dog clutch 'F' solenoid valve drive
9	OUT5	System pressure control valve drive
10	OUT4	Torque converter pressure control valve drive
11	OUT8	Park lock solenoid valve drive
12	OUT9	Park lock control solenoid drive
15	VS_5V	Sensors power (5 V)
16	VOUT_PR	Pressure sensor signal
17	SENSOR GND	Sensors ground
18	L4	Park position sensor
19	L3	Park position sensor
22	N_OUT	Output shaft speed sensor signal
23	N_T	Input shaft speed sensor signal
24	VS_9V	Sensors power (9 V)
25	T_OIL-	Automatic transmission fluid temperature sensor ground
26	T_OIL+	Automatic transmission fluid temperature sensor signal

Routines



NOTE: Before performing any of the following routines, ensure that the manufacturer approved diagnostic system has been updated with the latest level software.

The following routines are available:

Configure New Module - Transmission Control Module - Including Transmission Replacement



NOTE: A new automatic transmission is supplied complete with a new transmission control module.

The Configure New Module (Including Transmission Replacement) routine is used to configure a new transmission control module with the latest level software and to store the vehicle identification number. This Configure New Module routine must be performed after installing a new transmission control module and automatic transmission. After performing the Configure New Module routine, the Transmission Control Module Adaption routine must be performed.

Configure New Module - Transmission Control Module - Without Transmission Replacement

The Configure New Module (Without Transmission Replacement) routine is used to configure a new transmission control module with the latest level software and to store the vehicle identification number. This Configure New Module routine must be performed after installing a new transmission control module to the existing automatic transmission. After performing the Configure New Module routine, the Transmission Control Module Adaption routine must be performed.

Configure Existing Module - Transmission Control Module

The Configure Existing Module routine is used to re-configure the transmission control module with the latest level software. The adaption counters will be reset to zero but the existing adaptations will be retained. After performing the Configure Existing Module routine, it is not necessary to perform the Transmission Control Module Adaption routine.

Transmission Valve Block

The Transmission Valve Block routine is used to calibrate the transmission control module to the valve block. The Transmission Valve Block routine must be performed after installing a new valve block. The adaption counters will be reset to zero. After performing the Transmission Valve Block routine, the Transmission Control Module Adaption routine must be performed.

Transmission Control Module Adaption



WARNING: The Transmission Control Module Adaption routine requires one person to drive the vehicle and another person to monitor the progress of the routine. Failure to follow this instruction may result in personal injury.

NOTES:



The Transmission Control Module Adaption routine is also known as the Gearshift Quality Adaption routine.



Before performing the Transmission Control Module Adaption routine, ensure that any engine system faults have been rectified.



Before performing the Transmission Control Module Adaption routine, ensure that the powertrain control module has been configured with the latest level software.

The Transmission Control Module Adaption routine is used to teach the transmission control module the characteristics of the automatic transmission components. The quality of the gearshifts will improve as each adaption is completed. Adaptions will occur automatically during normal driving without the use of the manufacturer approved diagnostic system, but the process will take longer.

The Transmission Control Module Adaption routine should be performed:

- After installing a new transmission control module.
- After installing a new automatic transmission.
- After installing a new valve block.
- If one or more of the adaption values for each gear is equal to or less than 3.

When performing the Transmission Control Module Adaption routine, it will be necessary to drive the vehicle at speeds between 20 and 60 mph (32 and 96 kph). A suitable road test area should be identified where the vehicle can be driven, ideally without stopping, for up to 5 miles (8 km). If a dynamic adaption cycle is interrupted (for example, by slowing down or stopping), re-select the relevant gear and continue driving. It is not necessary to restart the routine. Before performing the Transmission Control Module Adaption routine, drive the vehicle normally to raise the automatic transmission fluid temperature to at least 50°C.

After driving to the road test area, perform the following steps:

1. Using the manufacturer approved diagnostic system, perform routine - Transmission Control Module Adaption.
2. Dynamic adaption - Clutch E (3rd gear):
 1. Drive the vehicle at a speed of between 20 and 30 mph (32 and 48 kph).
 2. Using command shift, select 3rd gear and drive with light throttle inputs and a steady engine speed between 1150 and 2300 rpm.
 3. Using the manufacturer approved diagnostic system, monitor the 'Engine Torque' and 'Engine Speed' displays - Increase or decrease the throttle input as necessary to keep the values within range.
 4. Monitor the 'Adaptions 1', 'Adaptions 2' and 'Adaptions 3' columns for clutch E.
 5. Continue driving until a green tick is displayed in each of the three columns for clutch E.
3. Dynamic adaption - Clutch D (6th gear):
 1. Drive the vehicle at a speed of between 40 and 50 mph (65 and 80 kph).
 2. Using command shift, select 6th gear and drive with light throttle inputs and a steady engine speed between 1150 and 2500 rpm.
 3. Using the manufacturer approved diagnostic system, monitor the 'Engine Torque' and 'Engine Speed' displays - Increase or decrease the throttle input as necessary to keep the values within range.
 4. Monitor the 'Adaptions 1', 'Adaptions 2' and 'Adaptions 3' columns for clutch D.
 5. Continue driving until a green tick is displayed in each of the three columns for clutch D.
4. Dynamic adaption - Clutches C and B (7th gear):
 1. Drive the vehicle at a speed of between 55 and 60 mph (88 and 96 kph).
 2. Using command shift, select 7th gear and drive with light throttle inputs and a steady engine speed between 1150 and 2500 rpm.
 3. Using the manufacturer approved diagnostic system, monitor the 'Engine Torque' and 'Engine Speed' displays - Increase or decrease the throttle input as necessary to keep the values within range.
 4. Monitor the 'Adaptions 1', 'Adaptions 2' and 'Adaptions 3' columns for clutches C and B.
 5. Continue driving until a green tick is displayed in each of the three columns for clutch C.
 6. Continue driving until a green tick is displayed in each of the three columns for clutch B.
5. Static adaptions:
 1. Stop the vehicle.
 2. Apply the brakes. Keep the brake pedal depressed until the static adaptions are complete.

3. Set the transmission control switch to 'Drive' and wait for 5 seconds.
4. Set the transmission control switch to 'Neutral' and wait for 5 seconds.
5. Perform sub-steps 3 and 4 a total of five times.
6. Set the transmission control switch to 'Reverse' and wait for 5 seconds.
7. Set the transmission control switch to 'Neutral' and wait for 5 seconds.
8. Perform sub-steps 6 and 7 a total of five times.

Automatic Transmission Total Adaption Display

The Automatic Transmission Total Adaption Display routine is used to display the transmission adaption status. The values in the 'Filling Count Total Adaptions' column should all be greater than 3. If any value is equal to or less than 3, perform the Transmission Control Module Adaption routine. Gearshift quality will improve at the values increase.

Transmission Control Module Functionality Verification



WARNING: The Transmission Control Module Functionality Verification routine requires one person to drive the vehicle and another person to monitor the progress of the routine. Failure to follow this instruction may result in personal injury.




The Transmission Control Module Functionality Verification routine is used to verify the function of the transmission during a road test.

The Transmission Control Module Functionality Verification routine should be performed after installing a new valve block.

After completing the road test, check the transmission control module for DTCs and perform the relevant corrective actions.

Pinpoint Tests

PINPOINT TEST A : PRELIMINARY TESTS	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: READ DTCS	
	1 Using the manufacturer approved diagnostic system, perform routine - Read DTCs.
	Are any DTCs set in the powertrain control module or the transmission control module? Yes Refer to the relevant DTC index and perform the relevant corrective actions. No GO to A2 .
A2: POWERTRAIN CONTROL MODULE AND TRANSMISSION CONTROL MODULE SOFTWARE CHECK	
NOTE: Before performing any routines, ensure that the manufacturer approved diagnostic system has been updated with the latest level software.	
	1 Using the manufacturer approved diagnostic system, check if the powertrain control module and transmission control module are configured with the latest level software.
	Are the powertrain control module and transmission control module configured with the latest level software? Yes GO to Pinpoint Test B . No Using the manufacturer approved diagnostic system, re-configure the powertrain control module and/or the transmission control module with the latest level software as necessary. GO to Pinpoint Test B .
PINPOINT TEST B : AUTOMATIC TRANSMISSION ADAPTION ASSESSMENT	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: AUTOMATIC TRANSMISSION TOTAL ADAPTION DISPLAY	
	1 Using the manufacturer approved diagnostic system, perform routine - Automatic Transmission Total Adaption Display.
	2 Check the values in the 'Filling Count Total Adaptions' column.
	Are any of the adaption values less than 3? Yes GO to Pinpoint Test C . No Contact dealer technical support.
PINPOINT TEST C : TRANSMISSION CONTROL MODULE ADAPTION ROUTINE	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: TRANSMISSION CONTROL MODULE ADAPTION ROUTINE	

	 WARNING: The Transmission Control Module Adaption routine requires one person to drive the vehicle and another person to monitor the progress of the routine. Failure to follow this instruction may result in personal injury.  NOTE: For further information, refer to the section above entitled 'Transmission Control Module Adaption'.  Using the manufacturer approved diagnostic system, perform routine - Transmission Control Module Adaption.
	Did the Transmission Control Module Adaption routine complete successfully (all adaption values equal to or greater than 3)? Yes Repair complete. No Repair complete. Customer explanation: Explain to the customer that the Transmission adaption process is an expected behaviour and will adapt during normal customer driving over a period of time. This is the same condition in which new vehicle are sold and handed over to customers. There is no specific time frame for the adaption process to be complete and may change due to the customer driving conditions and environment conditions.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Transmission Control Module \(TCM\)](#) (100-00 General Information, Description and Operation).

Published: 29-Sep-2016

General Information - Diagnostic Trouble Code (DTC) Index DTC: Transmission Control Module (TCM)

Description and Operation

Transmission Control Module (TCM)

CAUTIONS:



Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.



Extreme cleanliness must be exercised when carrying out repairs to the transmission or transmission components.

NOTES:



If a control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.



Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).



When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.



Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.



Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.















If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.




















Check DDW for open campaigns. Refer to the corresponding bulletins and SSMS which may be valid for the specific customer complaint and carry out the recommendations as required.










The table below lists all Diagnostic Trouble Codes (DTCs) that could be logged in the Transmission Control Module (TCM). For additional diagnosis and testing information, refer to the relevant Diagnosis and Testing section in the workshop manual. For additional information, refer to: [Diagnostics - Vehicles With: 9HP48 9-Speed Automatic Transmission - AWD](#) (307-01 Automatic Transmission/Transaxle, Diagnosis and Testing).










DTC	Description	Possible Causes	Action
P0219-64	Engine Overspeed Condition - Signal plausibility failure	<ul style="list-style-type: none"> Engine speed has exceeded the maximum plausible speed 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P0501-64	Vehicle Speed Sensor A Circuit Range/Performance - Signal plausibility failure	<ul style="list-style-type: none"> Missing/invalid data from the anti-lock brake system control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
P0501-86	Vehicle Speed Sensor A Circuit Range/Performance - Signal invalid	<ul style="list-style-type: none"> Missing/invalid data from the anti-lock brake system control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
P0561-62	System Voltage Unstable - Signal compare failure	 NOTE: Circuit reference - VBATT / GND - <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance Transmission control module internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0562-1C	System Voltage Low - Circuit voltage out of range	 NOTE: Circuit reference - VBATT / GND - <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance Battery/charging system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Refer to the relevant section of the workshop manual and check the battery and charging system
P0562-21	System Voltage Low - Signal amplitude < minimum	 NOTE: Circuit reference - VBATT / GND - <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance Battery/charging system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Refer to the relevant section of the workshop manual and check the battery and charging system
	System Voltage High - Signal		<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer









P0563-22	amplitude > maximum	<ul style="list-style-type: none"> Battery/charging system fault 	to the relevant section of the workshop manual and check the battery and charging system
P0600-04	Serial Communication Link - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0601-41	Internal Control Module Memory Checksum Error - General checksum failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P0605-41	Internal Control Module Read Only Memory (ROM) Error - General checksum failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0606-04	Control Module Processor - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0606-62	Control Module Processor - Signal compare failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0606-64	Control Module Processor - Signal plausibility failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P060A-04	Internal Control Module Monitoring Processor Performance - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0613-04	TCM Processor - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module






P0613-47	TCM Processor - Watchdog/safety microcontroller failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P062C-86	Internal Control Module Vehicle Speed Performance - Signal invalid	 NOTE: Circuit reference - N_T / N_OUT / SENSOR GND - <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P062F-04	Internal Control Module EEPROM Error - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0631-62	VIN Not Programmed or Incompatible - TCM - Signal compare failure	<ul style="list-style-type: none"> Transmission control module previously installed on another vehicle New transmission control module installed and VIN not yet programmed 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Install the original or a new transmission control module as necessary Using the manufacturer approved diagnostic system, configure the transmission control module as a new module
P0657-13	Actuator Supply Voltage A Circuit/Open - Circuit open	 NOTE: Circuit reference - UDRMV1 / UDRMV2 - <ul style="list-style-type: none"> Pressure control valves power circuit open circuit, high resistance Solenoid valves power circuit open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure control valves power circuit for open circuit, high resistance. Repair the wiring harness as necessary Refer to the electrical circuit diagrams and check the solenoid valves power circuit for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module











P06A6-01	Sensor Reference Voltage A Circuit Range/Performance - General electrical failure	 NOTE: Circuit reference - VS_9V / SENSOR GND - <ul style="list-style-type: none"> Automatic transmission sensor power or ground circuit open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the automatic transmission sensor power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P06A7-01	Sensor Reference Voltage B Circuit Range/Performance - General electrical failure	 NOTE: Circuit reference - VS_5V / SENSOR GND - <ul style="list-style-type: none"> Automatic transmission sensor power or ground circuit open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the automatic transmission sensor power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0700-02	Transmission Control System (MIL Request) - General signal failure	<ul style="list-style-type: none"> Transmission fault 	 NOTE: This DTC is for event information only and does not indicate a fault. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other transmission related DTCs and perform the relevant corrective actions
P0701-98	Transmission Control System Range/Performance - Component or system over temperature	<ul style="list-style-type: none"> Transmission cooling system fault 	<ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the transmission cooling system. Using the manufacturer approved diagnostic system, clear the DTCs and retest
P0702-04	Transmission Control System Electrical - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0702-06	Transmission Control System Electrical - Algorithm based failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P0710-27	Transmission Fluid Temperature Sensor A Circuit -	 NOTE: Circuit reference - T_OIL+ / T_OIL- - <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit short circuit to 	<p>NOTES:</p>  Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.
			 After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69).







	Signal rate of change above threshold	<p>ground, short circuit to power, open circuit, high resistance</p> <ul style="list-style-type: none"> Transmission control module internal failure 	<p>Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0710-64	Transmission Fluid Temperature Sensor A Circuit - Signal plausibility failure	<p> NOTE: Circuit reference - T_OIL+ / T_OIL- -</p> <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	<p>NOTES:</p> <p> Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.</p> <p> After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0712-11	Transmission Fluid Temperature Sensor A Circuit Low - Circuit short to ground	<p> NOTE: Circuit reference - T_OIL+ / T_OIL- -</p> <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit short circuit to ground Transmission control module internal failure 	<p>NOTES:</p> <p> Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.</p> <p> After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0713-13	Transmission Fluid Temperature Sensor A Circuit High - Circuit open	<p> NOTE: Circuit reference - T_OIL+ / T_OIL- -</p> <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit open circuit, high resistance Transmission control module internal failure 	<p>NOTES:</p> <p> Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.</p> <p> After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module






P0715-12	Input/Turbine Shaft Speed Sensor A Circuit - Circuit short to battery	 <p>NOTE: Circuit reference - N_T / SENSOR GND -</p> <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0716-64	Input/Turbine Shaft Speed Sensor A Circuit Range/Performance - Signal plausibility failure	 <p>NOTE: Circuit reference - N_T / SENSOR GND -</p> <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0717-14	Input/Turbine Shaft Speed Sensor A Circuit No Signal - Circuit short to ground or open	 <p>NOTE: Circuit reference - N_T / SENSOR GND -</p> <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P071A-07	Transmission Mode Switch A Circuit - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0720-12	Output Shaft Speed Sensor Circuit - Circuit short to battery	 <p>NOTE: Circuit reference - N_OUT / SENSOR GND -</p> <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to power Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to power. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module





P0721-02	Output Shaft Speed Sensor Circuit Range/Performance - General signal failure	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0721-64	Output Shaft Speed Sensor Circuit Range/Performance - Signal plausibility failure	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0722-14	Output Shaft Speed Sensor Circuit No Signal - Circuit short to ground or open	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0725-83	Engine Speed Input Circuit - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Engine system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P072A-63	Stuck in Neutral - Circuit/component protection time-out	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: This DTC is always accompanied by other DTCs which indicate which component is affected. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other transmission related DTCs and perform the relevant corrective actions
P072F-07	Stuck in Gear 4 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission






P0730-00	Incorrect Gear Ratio - No sub type information	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P073E-07	Unable to Engage Reverse - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0741-07	Torque Converter Clutch Circuit Performance/Stuck Off - Mechanical failures	<ul style="list-style-type: none"> Torque converter pressure control valve solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance Torque converter or automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition: <ul style="list-style-type: none"> Automatic transmission fluid normal: Install a new torque converter Automatic transmission fluid dirty or contaminated: Install a new automatic transmission
P074C-24	Unable to Engage Gear 4 - Signal stuck high	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new valve body and drain and refill the automatic transmission fluid. Clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P077B-92	Output Speed Sensor Circuit - Direction Error - Performance or incorrect operation	<ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary
	Transmission Fluid Temperature Measurement System - Multiple		 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.







P077E-64	Sensor Correlation - Signal plausibility failure	<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0780-62	Shift Error - Signal compare failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0780-93	Shift Error - No operation	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0780-94	Shift Error - Unexpected operation	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0795-04	Pressure Control Solenoid C - System internal failures	<ul style="list-style-type: none"> Engine system fault Transmission control module is not configured correctly 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P07B3-11	Transmission Park Position Sensor/Switch A Circuit Low - Circuit short to ground	 NOTE: Circuit reference - L3 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07B4-15	Transmission Park Position Sensor/Switch A Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - L3 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
	Transmission Park Position	 NOTE: Circuit reference - L4 -	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.











P07B9-11	Sensor/Switch B Circuit Low - Circuit short to ground	<ul style="list-style-type: none"> • Park position sensor circuit short circuit to ground • Transmission control module internal failure 	<ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground. Repair the wiring harness or install a new sensor unit as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07BA-15	Transmission Park Position Sensor/Switch B Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - L4 - <ul style="list-style-type: none"> • Park position sensor circuit short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07D4-07	Transmission Mode Switch F Circuit - Mechanical failures	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Check the automatic transmission serial number: <ul style="list-style-type: none"> - Serial number is less than 91782: Install a new automatic transmission - Serial number is greater than 91781: Refer to the relevant section of the workshop manual and check the automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P07D9-07	Gear 8 Incorrect Ratio - Mechanical failures	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DC-07	Incorrect Shift from Gear 1 - Mechanical failures	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DD-07	Incorrect Shift from Gear 2 - Mechanical failures	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and













			perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DE-07	Incorrect Shift from Gear 3 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DF-07	Incorrect Shift from Gear 4 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E0-07	Incorrect Shift from Gear 5 - Mechanical failures	<ul style="list-style-type: none"> Engine system fault Accessory drive belt components incorrectly installed Driveline imbalance Driveline components excessively worn Wheel/tire imbalance Engine mount damaged Transmission mount damaged Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Check the installation of the accessory drive belt components Check the driveline for debris around rotating components Check the driveline for excessive wear or backlash Check the wheels and tires for snow or mud packing and correct balance Check the engine mounts for damage Check the transmission mounts for damage Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E1-07	Incorrect Shift from Gear 6 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E2-07	Incorrect Shift from Gear 7 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the











			manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E3-07	Incorrect Shift from Gear 8 - Mechanical failures	<ul style="list-style-type: none"> Engine system fault Accessory drive belt components incorrectly installed Driveline imbalance Driveline components excessively worn Wheel/tire imbalance Engine mount damaged Transmission mount damaged Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Check the installation of the accessory drive belt components Check the driveline for debris around rotating components Check the driveline for excessive wear or backlash Check the wheels and tires for snow or mud packing and correct balance Check the engine mounts for damage Check the transmission mounts for damage Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E4-64	Unable to Engage Park - Signal plausibility failure	<ul style="list-style-type: none"> Park position sensor mountings loose Valve block internal failure 	 <p>NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (5.5Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P07E7-07	Stuck in Drive - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Check the automatic transmission serial number: <ul style="list-style-type: none"> Serial number is less than 81206: Install a new automatic transmission Serial number is greater than 81205: Refer to the relevant section of the workshop manual and check the automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P07F6-07	Gear 9 Incorrect Ratio - Mechanical		 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p>











	failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	<ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07FA-07	Incorrect Shift From Gear 9 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0801-94	Reverse Inhibit Control Circuit/Open - Unexpected operation	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P084F-29	Park/Neutral Switch Output Circuit - Signal invalid	 NOTE: Circuit reference - P-SIG - <ul style="list-style-type: none"> Park lock fault Park lock engaged signal circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other park lock related DTCs and perform the relevant corrective actions Refer to the electrical circuit diagrams and check the park lock engaged signal circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
			 NOTE: After installing a new valve block, perform routines - Transmission Valve Block , Transmission Control Module Adaption .









P0850-29	Park/Neutral Switch Input Circuit - Signal invalid	 NOTE: Circuit reference - L3 / L4 - <ul style="list-style-type: none"> • Service park release lever in release position • Park position sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance • Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance • Park position sensor mountings loose • Park lock mechanical failure 	<ul style="list-style-type: none"> • Check parklock mechanism by engaging and disengaging the parking lock several times. Check that the service park release lever is in the normal position • Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P0893-07	Multiple Gears Engaged - Mechanical failures	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0932-14	Hydraulic Pressure Sensor Circuit - Circuit short to ground or open	 NOTE: Circuit reference - VOUT_PR - <ul style="list-style-type: none"> • Pressure sensor signal circuit short circuit to ground, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new pressure sensor as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0933-62	Hydraulic Pressure Sensor Range/Performance - Signal compare failure	 NOTE: Circuit reference - VOUT_PR - <ul style="list-style-type: none"> • Pressure sensor signal circuit short circuit to ground, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new pressure sensor as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module






P0935-12	Hydraulic Pressure Sensor Circuit High - Circuit short to battery	 NOTE: Circuit reference - VOUT_PR - <ul style="list-style-type: none"> Pressure sensor signal circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to power. Repair the wiring harness or install a new pressure sensor as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0936-64	Hydraulic Pressure Sensor Circuit Intermittent - Signal plausibility failure	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0942-62	Hydraulic Pressure Unit - Signal compare failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0962-11	Pressure Control Solenoid A Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT5 - <ul style="list-style-type: none"> System pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the system pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0963-15	Pressure Control Solenoid A Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT5 - <ul style="list-style-type: none"> System pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the system pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0973-14	Shift Solenoid A Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT6 - <ul style="list-style-type: none"> Dog clutch 'A' solenoid circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'A' solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module





P0974-12	Shift Solenoid A Control Circuit High - Circuit short to battery	 NOTE: Circuit reference - OUT6 - <ul style="list-style-type: none"> • Dog clutch 'A' solenoid circuit short circuit to power • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the dog clutch 'A' solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0975-19	Shift Solenoid B Control Circuit Range/Performance - Circuit current above threshold	 NOTE: Circuit reference - OUT0 - <ul style="list-style-type: none"> • Multiplate clutch 'B' pressure control valve solenoid circuit short circuit to power • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0976-11	Shift Solenoid B Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT0 - <ul style="list-style-type: none"> • Multiplate clutch 'B' pressure control valve solenoid circuit short circuit to ground • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0977-15	Shift Solenoid B Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT0 - <ul style="list-style-type: none"> • Multiplate clutch 'B' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the Multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0978-19	Shift Solenoid C Control Circuit Range/Performance - Circuit current above threshold	 NOTE: Circuit reference - OUT1 - <ul style="list-style-type: none"> • Multiplate clutch 'C' pressure control valve solenoid circuit short circuit to power • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
	Shift Solenoid C	 NOTE: Circuit reference - OUT1 - <ul style="list-style-type: none"> • Multiplate clutch 'C' pressure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.







P0979-11	Control Circuit Low - Circuit short to ground	control valve solenoid circuit short circuit to ground <ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0980-15	Shift Solenoid C Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT1 - <ul style="list-style-type: none"> Multiplate clutch 'C' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0981-19	Shift Solenoid D Control Circuit Range/Performance - Circuit current above threshold	 NOTE: Circuit reference - OUT2 - <ul style="list-style-type: none"> Multiplate clutch 'D' pressure control valve solenoid circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0982-11	Shift Solenoid D Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT2 - <ul style="list-style-type: none"> Multiplate clutch 'D' pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0983-15	Shift Solenoid D Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT2 - <ul style="list-style-type: none"> Multiplate clutch 'D' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
	Shift Solenoid E Control Circuit	 NOTE: Circuit reference - OUT3 - <ul style="list-style-type: none"> Multiplate clutch 'E' pressure control valve 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.








P0984-19	Range/Performance - Circuit current above threshold	<p>solenoid circuit short circuit to power</p> <ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0985-11	Shift Solenoid E Control Circuit Low - Circuit short to ground	<p> NOTE: Circuit reference - OUT3 -</p> <ul style="list-style-type: none"> Multiplate clutch 'E' pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0986-15	Shift Solenoid E Control Circuit High - Circuit short to battery or open	<p> NOTE: Circuit reference - OUT3 -</p> <ul style="list-style-type: none"> Multiplate clutch 'E' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0998-14	Shift Solenoid F Control Circuit Low - Circuit short to ground or open	<p> NOTE: Circuit reference - OUT7 -</p> <ul style="list-style-type: none"> Dog clutch 'F' solenoid circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'F' solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0999-12	Shift Solenoid F Control Circuit High - Circuit short to battery	<p> NOTE: Circuit reference - OUT7 -</p> <ul style="list-style-type: none"> Dog clutch 'F' solenoid circuit short circuit to power Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'F' solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099B-14	Shift Solenoid G Control Circuit Low - Circuit short to ground or open	<p> NOTE: Circuit reference - OUT8 -</p> <ul style="list-style-type: none"> Park lock solenoid circuit short circuit to ground, open circuit, high resistance 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary





		<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099C-12	Shift Solenoid G Control Circuit High - Circuit short to battery	 <p>NOTE: Circuit reference - OUT8 -</p> <ul style="list-style-type: none"> Park lock solenoid circuit short circuit to power Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099E-14	Shift Solenoid H Control Circuit Low - Circuit short to ground or open	 <p>NOTE: Circuit reference - OUT9 -</p> <ul style="list-style-type: none"> Park lock control solenoid circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park lock control solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099F-12	Shift Solenoid H Control Circuit High - Circuit short to battery	 <p>NOTE: Circuit reference - OUT9 -</p> <ul style="list-style-type: none"> Park lock control solenoid circuit short circuit to power Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park lock control solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P164C-62	Internal Control Module Start-Stop Performance - Signal compare failure	<ul style="list-style-type: none"> Engine system fault <ul style="list-style-type: none"> Stop/start system 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P1706-94	High Vehicle Speed Observed in Park - Unexpected operation	 <p>NOTE: Circuit reference - L3 / L4 -</p> <ul style="list-style-type: none"> Park position sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw
			 <p>NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption.</p>







P1707-72	Transfer Case Neutral or Park/Neutral Indication Circuit - Actuator stuck open	 <p>NOTE: Circuit reference - OUT8 -</p> <ul style="list-style-type: none"> • Service park release lever in release position • Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance • Park position sensor mountings loose • Park lock mechanical failure 	<ul style="list-style-type: none"> • Check that the service park release lever is in the normal position • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). <p>The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P1707-74	Transfer Case Neutral or Park/Neutral Indication Circuit - Actuator slipping	 <p>NOTE: Circuit reference - OUT8 -</p> <ul style="list-style-type: none"> • Service park release lever in release position • Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance • Park position sensor mountings loose • Park lock mechanical failure 	 <p>NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> • Check that the service park release lever is in the normal position • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). <p>The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P1707-77	Transfer Case Neutral or Park/Neutral Indication Circuit - Commanded position not reachable	 <p>NOTE: Circuit reference - OUT8 -</p> <ul style="list-style-type: none"> • Service park release lever in release position • Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance 	 <p>NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> • Check that the service park release lever is in the normal position • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For

		<ul style="list-style-type: none"> • Park position sensor mountings loose • Park lock mechanical failure 	<p>additional information, refer to: (307-01 Automatic Transmission/Transaxle)</p> <p>Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation),</p> <p>Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation).</p> <p>The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P1710-86	Transmission Control Module Solenoid/Internal Ground Circuit - Signal invalid	<ul style="list-style-type: none"> • One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance • Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P174E-62	Output Shaft Speed / ABS Wheel Speed Correlation - Signal compare failure	<ul style="list-style-type: none"> • Missing/invalid data from the anti-lock brake system control module • Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance • Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index • Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1758-19	Pressure Solenoid Control System Incorrect Current - Circuit current above threshold	<ul style="list-style-type: none"> • One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance • Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1758-62	Pressure Solenoid Control System Incorrect Current - Signal compare failure	<ul style="list-style-type: none"> • One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary





		<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1770-04	Clutch Solenoid Circuit - System internal failures	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P177F-07	Transmission Friction Element B or D - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P178A-07	Transmission Friction Element B or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P178C-07	Transmission Friction Element C or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P178D-07	Transmission Friction Element D or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
	Clutch Control System	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and





P181F-18	Performance - Circuit current below threshold	circuit to power, open circuit, high resistance • Transmission control module internal failure	check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2544-86	Torque Management Request Input Signal A - Signal invalid	• Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2545-86	Torque Management Request Input Signal A Range/Performance - Signal invalid	• Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2546-86	Torque Management Request Input Signal A Low - Signal invalid	• Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2547-86	Torque Management Request Input Signal A High - Signal invalid	• Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2638-86	Torque Management Feedback Signal A Range/Performance - Signal invalid	• Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2701-07	Transmission Friction Element B Apply Time Range/Performance - Mechanical failures	• Automatic transmission internal failure	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
	Transmission Friction Element C Apply Time		 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.

P2702-07	Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	<ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P2703-07	Transmission Friction Element D Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P2704-07	Transmission Friction Element E Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Check the automatic transmission serial number: <ul style="list-style-type: none"> Serial number is less than 63584: Install a new automatic transmission Serial number is greater than 63583: Refer to the relevant section of the workshop manual and check the automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P2711-94	Unexpected Mechanical Gear Disengagement - Unexpected operation	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
		 <p>NOTE: Circuit reference - OUT4 -</p>	

P2763-15	Torque Converter Clutch Pressure Control Solenoid Control Circuit High - Circuit short to battery or open	<ul style="list-style-type: none"> • Torque converter pressure control valve solenoid circuit short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2764-11	Torque Converter Clutch Pressure Control Solenoid Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT4 - <ul style="list-style-type: none"> • Torque converter pressure control valve solenoid circuit short circuit to ground • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2787-4B	Clutch Temperature Too High - Over temperature	<ul style="list-style-type: none"> • Paddle switch fault • Automatic transmission fluid level low • Transmission cooling system fault 	NOTES:  This DTC may be induced by the driver using the paddle switches excessively.  This DTC may be induced by a paddle switch fault that causes excessive gear shifts. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check for paddle switch related DTCs and perform the relevant corrective actions • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary • Refer to the relevant section of the workshop manual and check the transmission cooling system. Using the manufacturer approved diagnostic system, clear the DTCs and retest
P2793-94	Gear Shift Direction Circuit - Unexpected operation	<ul style="list-style-type: none"> • One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
U0001-81	High Speed CAN Communication Bus - Invalid serial data received	<ul style="list-style-type: none"> • Invalid data received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-82	High Speed CAN Communication Bus -	<ul style="list-style-type: none"> • Invalid data received from another control module via the 	

	Alive/sequence counter incorrect / not updated	high speed CAN bus (powertrain)	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-83	High Speed CAN Communication Bus - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Invalid data received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-86	High Speed CAN Communication Bus - Signal invalid	<ul style="list-style-type: none"> Invalid signal received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid signal source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-87	High Speed CAN Communication Bus - Missing message	<ul style="list-style-type: none"> Missing message from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the missing message source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0073-00	Control Module Communication Bus A Off - No sub type information	<ul style="list-style-type: none"> Engine control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Engine system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the engine control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0100-87	Lost Communication With ECM/PCM A - Missing message	<ul style="list-style-type: none"> Engine control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Engine system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the engine control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0121-87	Lost Communication With Anti-Lock Brake System (ABS) Control Module - Missing message	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary

		circuit to power, open circuit, high resistance • Anti-lock brake system fault	• Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0300-00	Internal Control Module Software Incompatibility - No sub type information	• Car configuration file mismatch with vehicle specification • Transmission control module is not configured correctly	 NOTE: After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs. • Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest • Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software
U0302-57	Software Incompatibility with Transmission Control Module - Invalid/incomplete software component	• Car configuration file mismatch with vehicle specification • Transmission control module is not configured correctly • Incorrect transmission control module installed	NOTES:  After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs.  After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest • Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software • Install a new transmission control module as necessary
U0401-02	Invalid Data Received From ECM/PCM A - General signal failure	• Missing/invalid data from the engine control module	• Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-64	Invalid Data Received From ECM/PCM A - Signal plausibility failure	• Missing/invalid data from the engine control module	• Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-67	Invalid Data Received From ECM/PCM A - Signal incorrect after event	• Missing/invalid data from the engine control module	• Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-82	Invalid Data Received From ECM/PCM A - Alive/sequence counter incorrect / not updated	• Missing/invalid data from the engine control module	• Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-83	Invalid Data Received From ECM/PCM A - Value of signal protection calculation incorrect	• Missing/invalid data from the engine control module	• Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0415-27	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Signal rate of change above threshold	• Missing/invalid data from the anti-lock brake system control module	 NOTE: This DTC is set when the automatic transmission output shaft speed rate of change is implausible. This can occur if the brakes lock during braking because of an anti-lock brake system fault. • Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index

U0415-82	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Alive/sequence counter incorrect / not updated	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Anti-lock brake system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0415-83	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Anti-lock brake system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0422-86	Invalid Data Received From Body Control Module - Signal invalid	 NOTE: Circuit reference - IGN - <ul style="list-style-type: none"> Missing/invalid data from the central junction box Ignition signal circuit short circuit to ground, short circuit to power, open circuit, high resistance 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the central junction box for related DTCs and refer to the relevant DTC index Refer to the electrical circuit diagrams and check the ignition signal circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary
U2101-56	Control Module Configuration Incompatible - Invalid/incomplete configuration	<ul style="list-style-type: none"> Transmission control module is not configured correctly Car configuration file mismatch with vehicle specification Incorrect transmission control module installed 	<p>NOTES:</p>  After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs.  After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest Install a new transmission control module as necessary
U3000-56	Control Module - Invalid/incomplete	<ul style="list-style-type: none"> Mis-match between transmission control module 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.

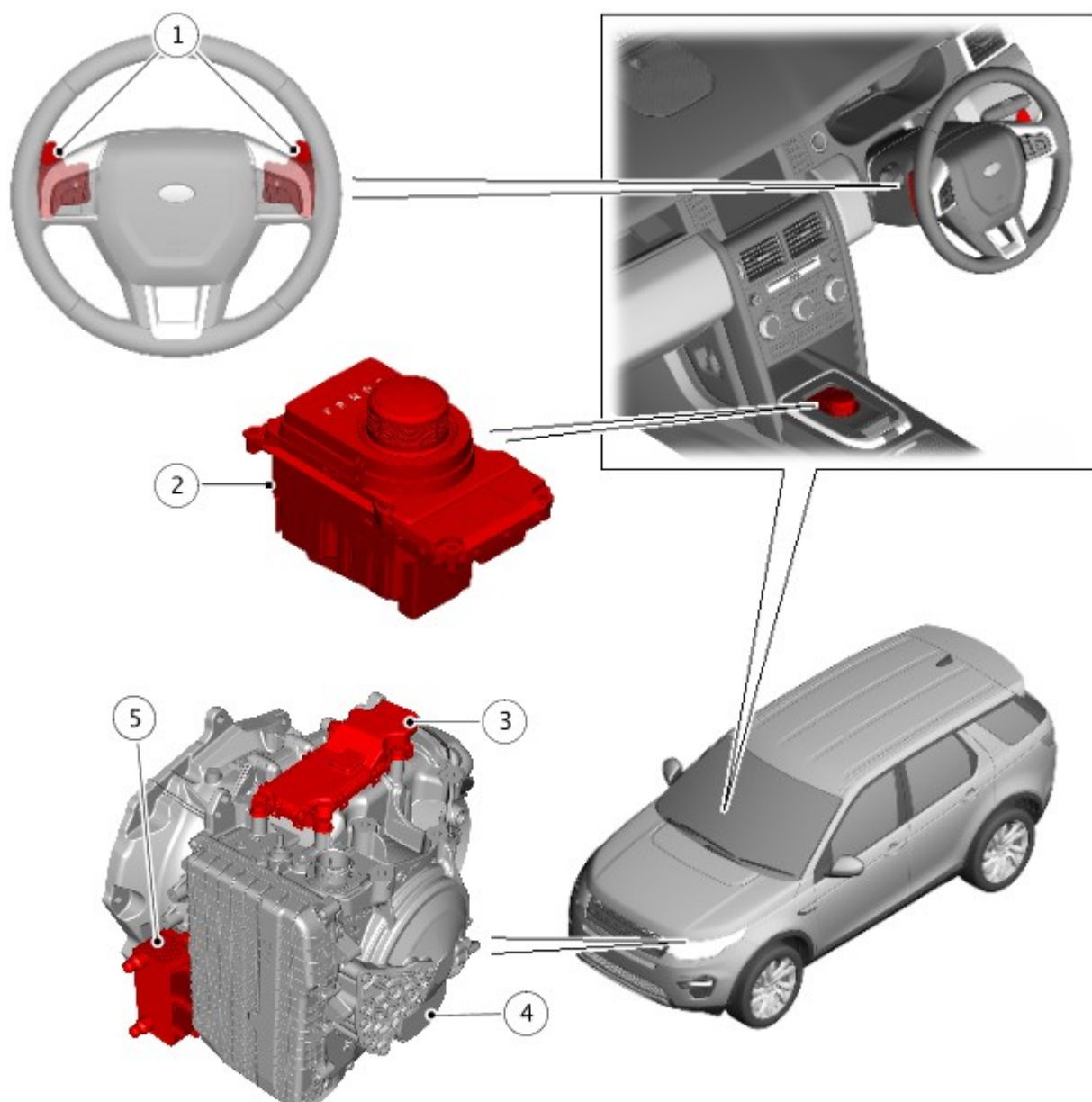
	configuration	configuration and valve block specification	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, configure the transmission control module as a new module. Perform routine - Transmission Valve Block. Clear the DTCs and retest. If the fault persists, install a new transmission control module
U3000-9A	Control Module - Component or system operating conditions	<ul style="list-style-type: none"> Engine system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index

Published: 09-Jul-2015

Automatic Transmission/Transaxle - Transmission Description

Description and Operation

COMPONENT LOCATION



E181074

Item	Description
1	Paddle switches - upshift / downshift
2	Transmission Control Switch (TCS)
3	Transmission Control Module (TCM)
4	ZF 9HP48 Automatic transmission

OVERVIEW

The ZF 9HP48 automatic transmission is a 9 speed, electronically controlled unit manufactured by ZF. The transmission represents the latest in automatic transmission technology for a transverse, [AWD \(all-wheel drive\)](#) unit. The transmission features lock-up slip control, 'CommandShift™' functions and automatic and driver selectable modes to give the optimum on and off road performance.

The automatic transmission is controlled by a [TCM \(transmission control module\)](#) which contains software to provide operation as a semi-automatic 'CommandShift™' transmission. Driver selections for P, R, N, D and S on the rotary [TCS \(transmission control switch\)](#) are received by the [TCM](#). The [TCM](#) operates solenoid valves and clutches to control transmission gear shifts, allowing the system to operate as a 'shift by wire' system, with no mechanical link to the transmission for drive selections.

The [TCM](#) allows the transmission to be operated as a conventional automatic unit by selecting P, R, N, D, S on the [TCS](#). Rotation of the [TCS](#) to the 'S' position puts the transmission into electronic 'Sport' mode. Operation of the steering wheel mounted + or – paddle switches puts the transmission into electronic manual 'CommandShift™' mode. For additional information, refer to: External Controls (307-05 Automatic Transmission/Transaxle External Controls, Description and Operation).

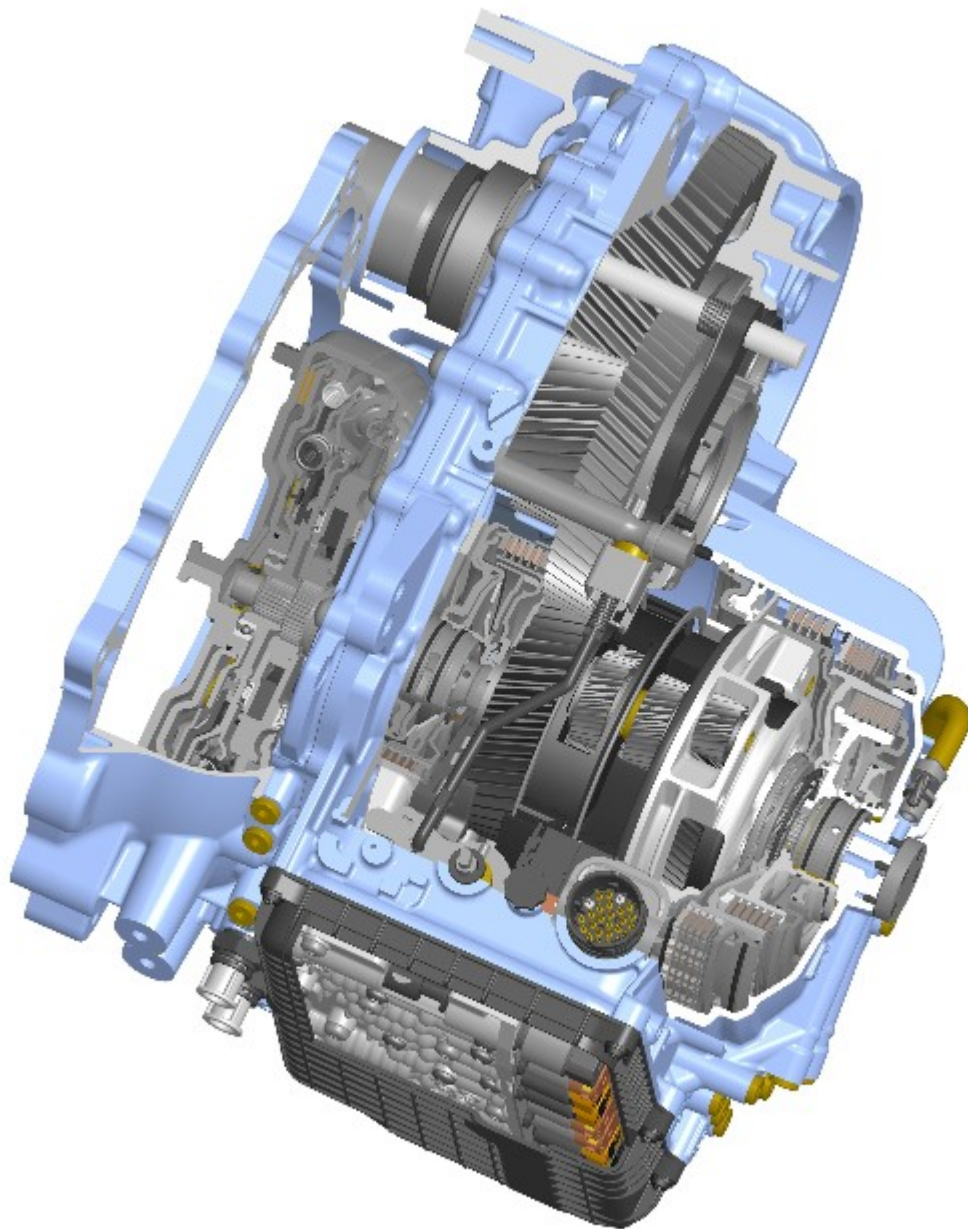
The ZF 9HP48 transmission has the following features:

- Designed to be maintenance free
- Transmission fluid is fill for life
- The torque converter features a controlled slip feature with electronically regulated lock-up control on gears 1 to 9
- Planetary gearset with 9 speeds, 4 planetary geartrains, and 6 shift elements
- Wide transmission ratio spread with small ratio steps
- The first-ever use of interlocking dog clutches in a passenger car automatic transmission
- Shift programs controlled by the [TCM](#)
- [TCM](#) has an adaptive capability to ensure efficient gear shift quality throughout the service life of the transmission
- Diagnostics available from the [TCM](#) via the high speed [CAN \(controller area network\)](#) Powertrain systems bus.

COMPONENT DESCRIPTION

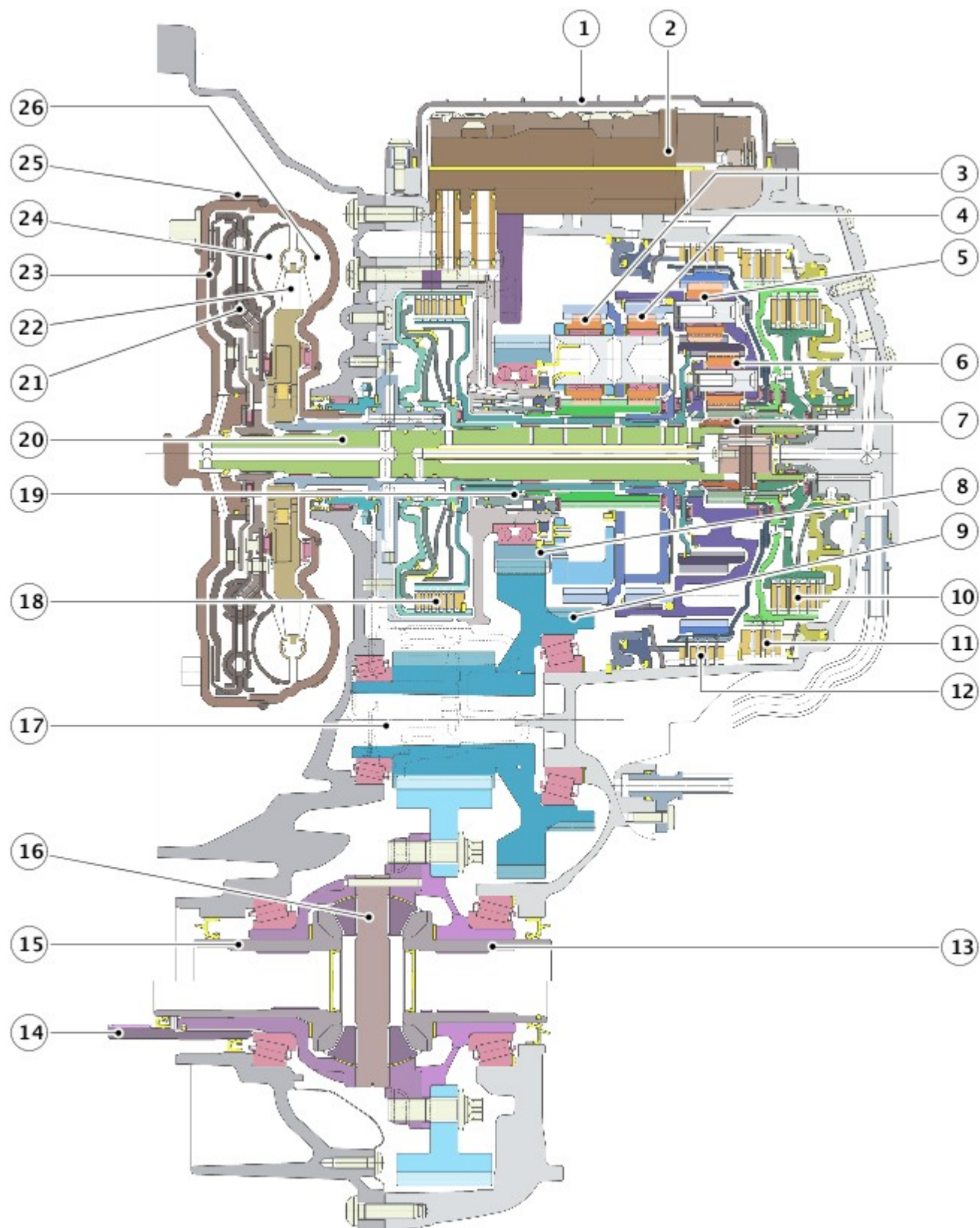
The transmission comprises the main casing which houses all of the transmission components. The torque converter is located in a separate converter housing, bolted to the main casing.

ZF 9HP48 Cut-Away View



E160559

ZF 9HP48 Sectional View



E160560

Item	Description
1	Fluid pan
2	Valve block
3	Planetary gear set 4
4	Planetary gear set 3
5	Planetary gear set 2
6	Planetary gear set 1
7	Dog clutch A

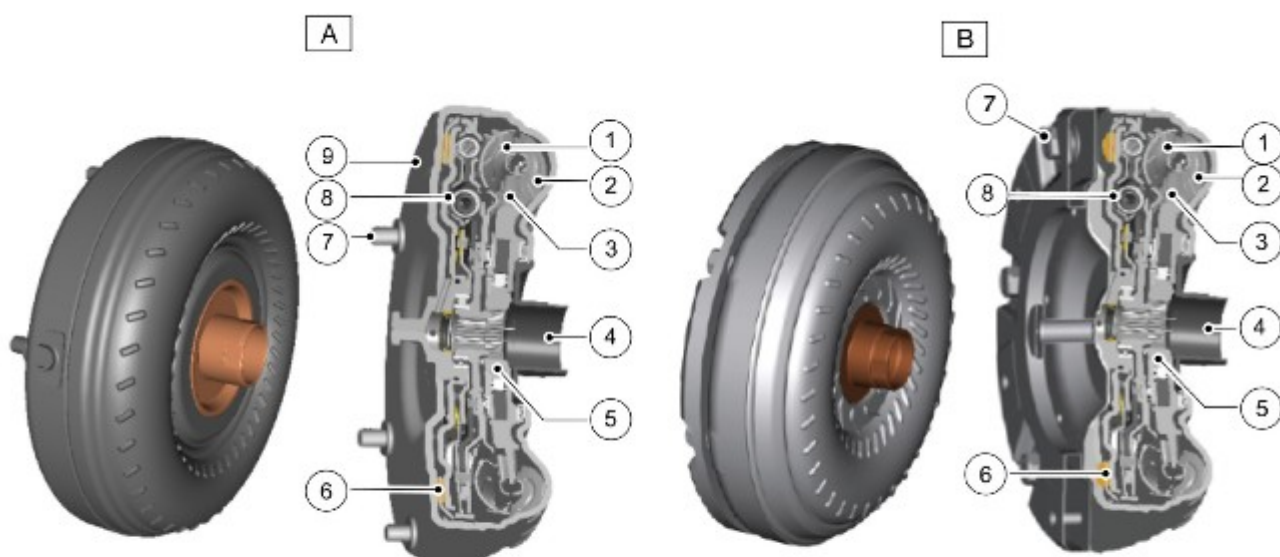
8	Spur pinion
9	Park interlock gear
10	Multiplate clutch 'B'
11	Multiplate brake 'C'
12	Multiplate brake 'D'
13	Left splined output shaft (connection to halfshaft)
14	Right splined output shaft (connection to Power Transfer Unit (PTU))
15	Right splined output shaft (connection to halfshaft)
16	Differential
17	Automatic Transmission Fluid (ATF) pump
18	Multiplate clutch 'E'
19	Dog clutch 'F'
20	Input shaft
21	Torsional damper
22	Torque converter stator
23	Torque converter lock-up clutch
24	Torque converter turbine
25	Torque converter assembly
26	Torque converter impeller

The main casing retains the **ATF (automatic transmission fluid)** at the bottom. A drain plug is located in the main casing. The oil level is checked by removal of a level plug, with the engine running and the transmission fluid at a temperature of between 37 to 45°C (99 to 113°F). The level is correct when the oil flow becomes a drip from the level plug hole.

The transmission has a fluid cooler which is located at the front of the transmission, adjacent to the fluid pan. The cooler is connected to the transmission casing by two sealed connections. The fluid cooler is connected into the engine cooling system and cools the transmission fluid by heat transfer through the cooler to the engine coolant.

For additional information, refer to: Transmission Cooling (307-02 Transmission/Transaxle Cooling, Description and Operation).

TORQUE CONVERTER



E181182

Item	Description

A	Torque Converter fitted to GTDi 2.0L and TD4 2.2L Engines
1	Turbine
2	Impeller
3	Stator
4	Transmission connection
5	One-way clutch
6	Lock-up clutch
7	Engine drive plate attachment studs
8	Torsional damper
9	Torque converter housing
B	Torque Converter fitted to Ingenium I4 2.0L Diesel Engine
1	Turbine
2	Impeller
3	Stator
4	Transmission connection
5	One-way clutch
6	Lock-up clutch
7	Engine drive plate attachment bolts
8	Torsional damper - including pendulum masses

The torque converter is the coupling element between the engine and the transmission and is located in the torque converter housing, on the engine side of the transmission. The driven power from the engine crankshaft is transmitted hydraulically and mechanically through the torque converter to the transmission. The torque converter is connected to the engine by a drive plate.

The torque converter comprises an impeller, a stator and a turbine. The torque converter is a sealed unit with all components located between the converter housing cover and the impeller. The two components are welded together to form a sealed, fluid filled housing. With the impeller welded to the converter housing cover, the impeller is therefore driven at engine crankshaft speed.

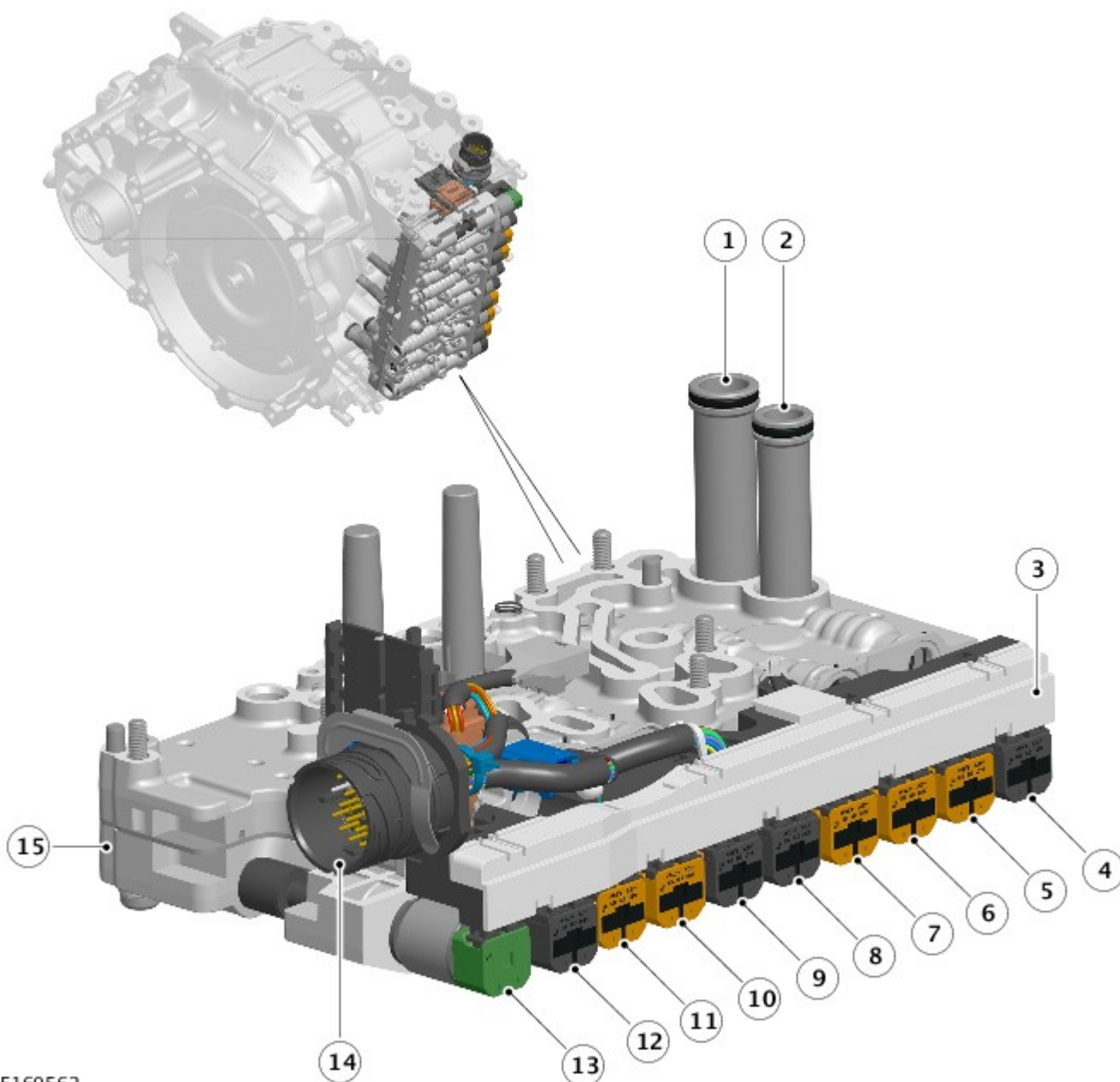
The torque converter contains a hydraulically operated lock-up clutch which is controlled by the [TCM](#) via a solenoid in the valve block. The solenoid actuates spool valves to control the hydraulic pressure applied to the clutch. This allows the [TCM](#) to provide 3 modes of converter operation; unlocked, partially locked and fully locked.

VALVE BLOCK

The valve block is located in a vertical position at the front of the transmission main casing, behind a sealed cover. The valve block contains a number of solenoids and spool valves to control the transmission operation. The solenoids are controlled by the [TCM](#) to provide gear changes and smooth transition between ratio changes.

If the [TCM](#) or the valve block is replaced, a diagnostic routine using an approved Land Rover diagnostic system will be required to calibrate the [TCM](#) .

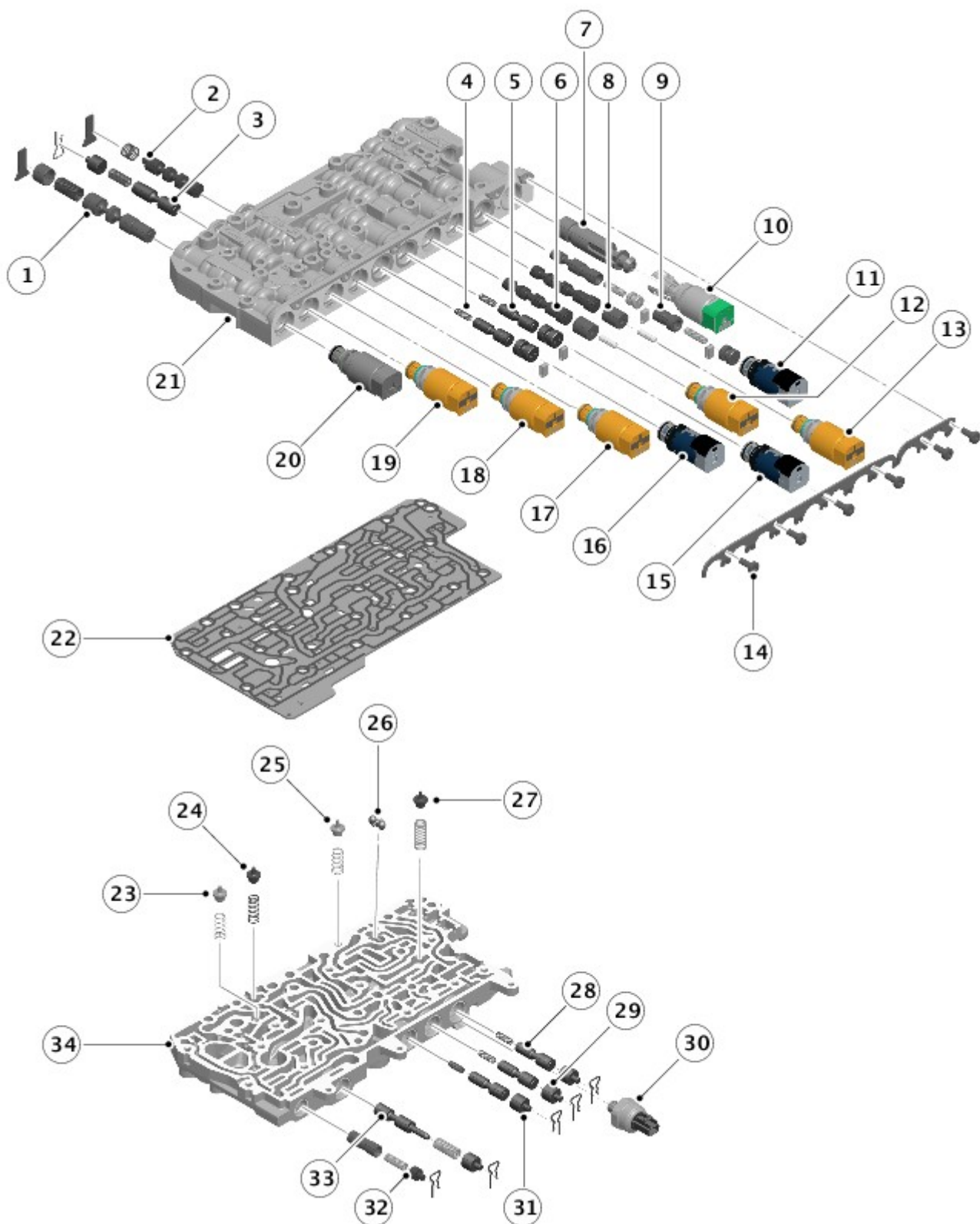
Valve Block Assembly



E160562

Item	Description
1	Automatic Transmission Fluid (ATF) pump intake
2	ATF pump pressure outlet
3	Sensor unit
4	System Pressure Control Valve (PCV)
5	Torque converter lock-up clutch PCV
6	Multiplate clutch 'B' PCV
7	Multiplate clutch 'E' PCV
8	Dog clutch A solenoid valve
9	Dog clutch F solenoid valve
10	Multiplate clutch 'D' PCV
11	Multiplate clutch 'C' PCV
12	Park lock solenoid valve
13	Magnetic valve control solenoid - park lock actuator
14	Electrical connector
15	Valve block

Valve Block Components

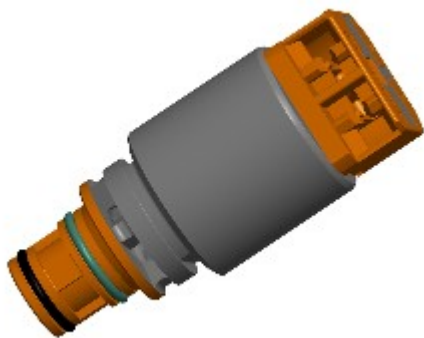


E160563

Item	Description
1	System pressure spool valve
2	Torque converter pressure spool valve
3	Lubrication spool valve
4	Dog clutch 'A' spool valve
5	Dog clutch 'F' spool valve
6	Multiplate clutch 'D' spool valve

7	Magnetic holding valve piston
8	Multiplate clutch 'C' spool valve
9	Park lock spool valve
10	Magnetic valve control solenoid - park lock actuator
11	Park lock solenoid valve
12	Multiplate clutch 'D' Pressure Control Valve (PCV)
13	Multiplate clutch 'C' PCV
14	Retainer
15	Dog clutch 'F' solenoid valve
16	Dog clutch 'A' solenoid valve
17	Multiplate clutch 'E' PCV
18	Multiplate clutch 'B' PCV
19	Torque converter lock-up clutch PCV
20	System PCV
21	Valve housing
22	Intermediate plate
23	Valve and spring
24	Valve and spring
25	Valve and spring
26	Ball rocker
27	Valve and spring
28	Multiplate clutch 'C' spool valve
29	Multiplate clutch 'D' spool valve
30	Pressure sensor
31	Torque converter lock-up clutch spool valve
32	Shift system pressure spool valve
33	Pressure reduction spool valve
34	Valve plate

Pressure Control valves



E160565

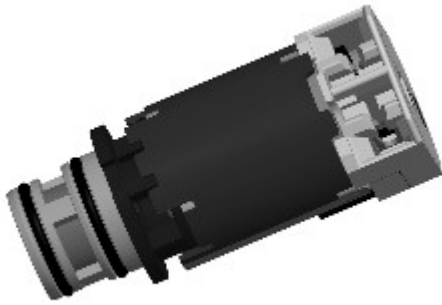
Six PCV's are located in the valve block. The solenoid operated PCV's are controlled by **PWM (pulse width modulation)** signals from the **TCM**. The solenoids convert the electrical signals into hydraulic control pressure proportional to the signal to actuate the spool valves and clutches for precise transmission operation.

Five PCV solenoids for the multiplate clutch and the torque converter lock-up clutch supply a higher control pressure as the signal current increases and can be identified by an orange connector cap. The **TCM** operates the solenoids using **PWM** signals. The **TCM** monitors engine load and clutch slip and varies the solenoid duty cycle accordingly. The solenoids have a 12 V operating voltage and a pressure range of 0 - 4.7 bar (0 - 68 lbf.in²).

One PCV solenoid for the system pressure control supplies a lower control pressure as the signal amperage increases and can be identified by a gray connector cap. The **TCM** monitors engine load and clutch slip and varies the solenoid duty cycle accordingly. The solenoids have a 12 V operating voltage and a pressure range of 4.7 - 0 bar (68 - 0 lbf.in²).

The resistance of the solenoid coil winding for all PCV solenoids is 5.05 Ohms at 20 °C (68 °F).

Solenoid Valves



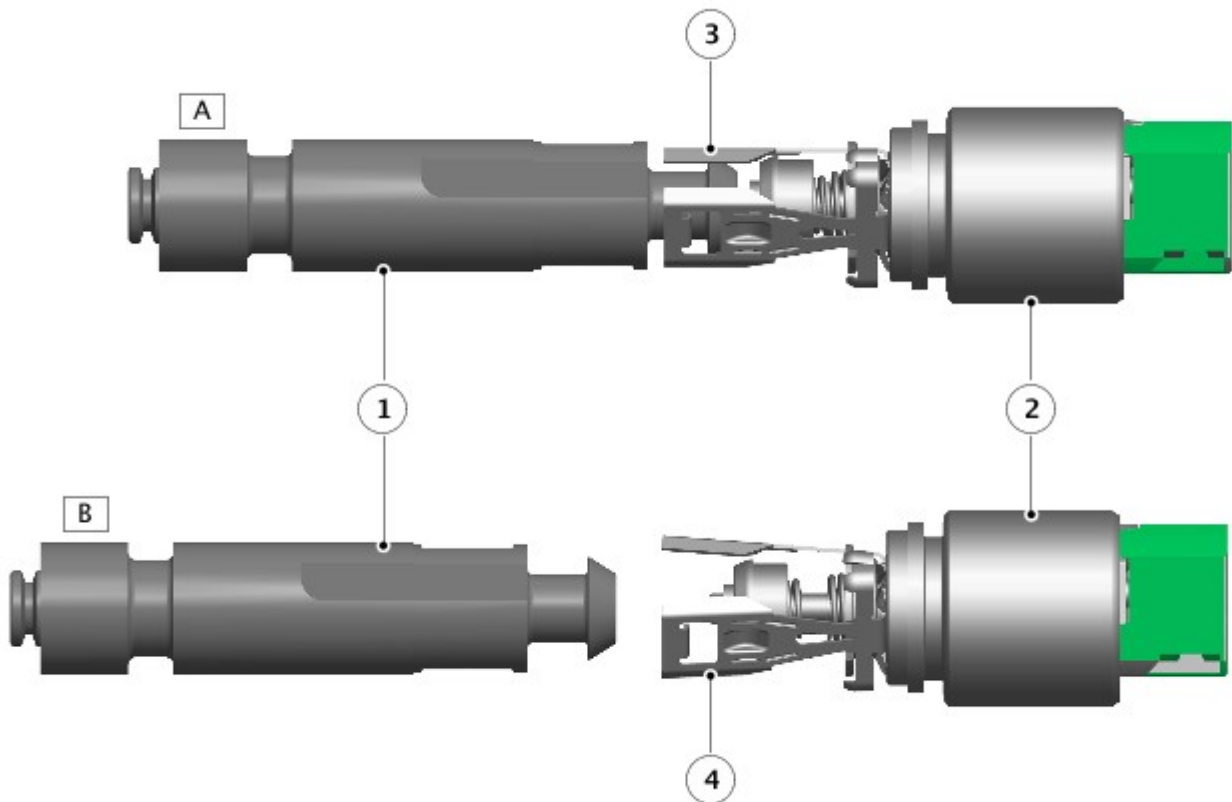
E160564

Three solenoid valves are located in the valve block. The solenoid valves are controlled by the **TCM** and converts electrical signals into hydraulic control signals to control dog clutch application.

The solenoid valve is an open/closed, on/off solenoid which is controlled by the **TCM** switching the solenoid to earth. The **TCM** also supplies power to the solenoid. The **TCM** energises the solenoid in a programmed sequence for clutch application for gear ratio changes and shift control.

The resistance of the solenoid coil winding for solenoid is between 10 to 11 Ohms at 20 °C (68 °F).

Park Lock Actuator - Magnetic Valve Control Solenoid



E160566

Item	Description
A	Solenoid in locked (energized) condition - park lock released
B	Solenoid in unlocked (de-energized) condition - park lock engaged
1	Park lock spool valve
2	Control solenoid
3	Claw locked
4	Claw unlocked

A control solenoid is located in the valve block. The solenoid is controlled by the **TCM** and converts electrical signals into hydraulic control signals to control the electronic park lock function.

The control solenoid is an on/off solenoid which is controlled by the **TCM** by switching the solenoid to earth.

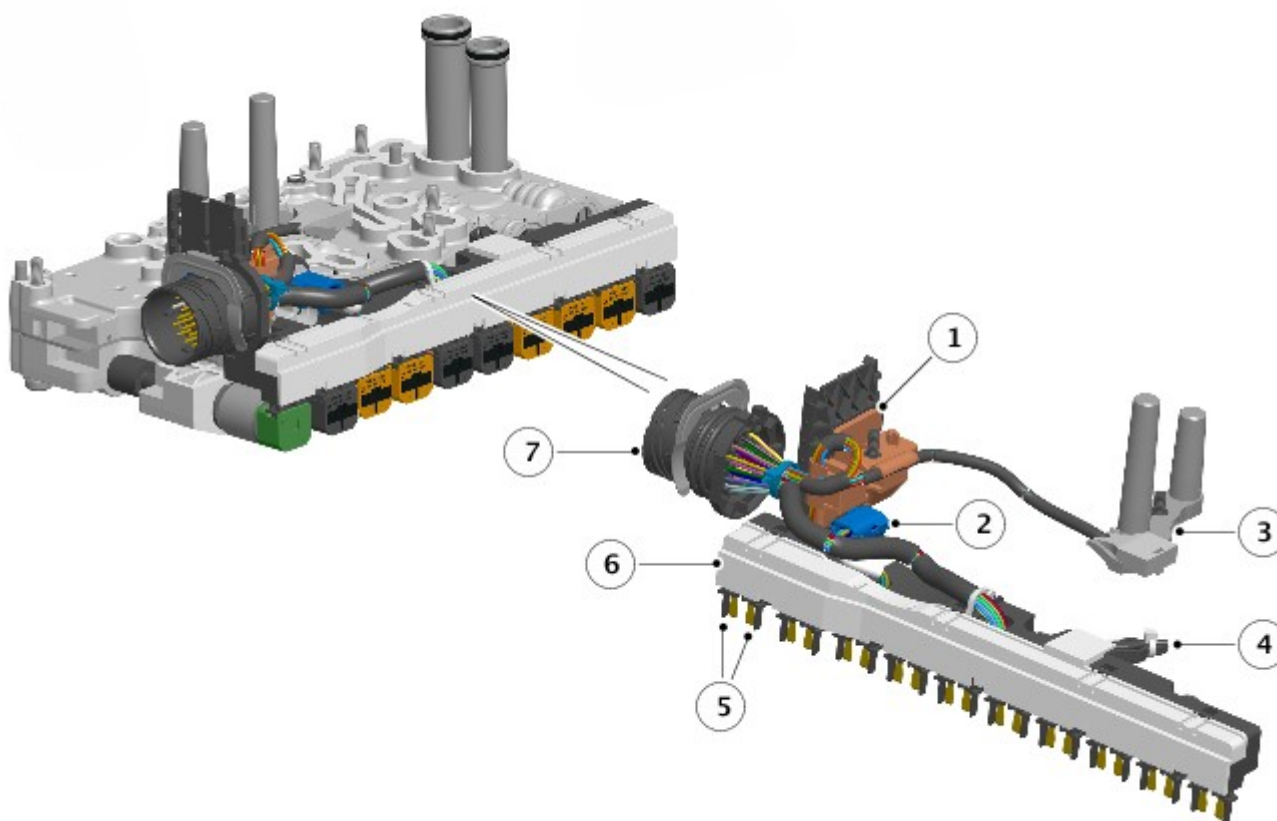
When the Park lock is to be released, the park lock solenoid valve sends **ATF** pressure to the spool valve and moves it into contact with the claws of the solenoid. Movement of the spool valve moves the park rod and releases the park pawl from the park interlock gear. The control solenoid is energised by the **TCM** and the claws close to retain the spool valve in the unlocked position. A shuttle valve retains **ATF** pressure on the spool to prevent inadvertent park lock operation in the event of an electrical failure until the engine is stopped.

When the Park lock is to be engaged, **ATF** pressure is released from the spool valve and the **TCM** de-energises the control solenoid. The claws are released, the spool valve returns under spring pressure to the park lock position and the park lock is engaged. A Service Park Release (SPR) procedure must be performed to release the parking lock manually if an electrical failure occurs or the engine is not running.

To allow the vehicle to roll through a car wash, the control solenoid remains energised if the engine is stopped with the **TCS** in neutral. This holds the transmission out of park without hydraulic pressure for 10 minutes. After this time the control solenoid is de-energised, releasing the claws and allowing the spool valve to return to the park position.

The resistance of the solenoid coil winding is 25 Ohms at 20 °C (68 °F).

Sensor Unit



E160567

Item	Description
1	'PARK' (P) sensor
2	Pressure sensor connector
3	Speed sensor (torque converter turbine and output shaft)
4	Automatic Transmission Fluid (ATF) temperature sensor
5	Connector pins for pressure control valves, solenoid valves and park lock control solenoid
6	Connector board
7	Transmission electrical connector

The sensor unit is mounted on the valve block and secured with three screws. The sensor unit comprises a 26 pin electrical connector, a 'PARK' sensor, a pressure sensor connector, two speed sensors, ten solenoid connectors and an **ATF** temperature sensor.

The electrical connector is fitted with seals through a hole in the transmission main casing and secured with a spring clip.

The 'PARK' (P) sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw. The 'PARK' sensor comprises a sliding switch which is operated by the selector shaft when it is moved by the park lock actuator.

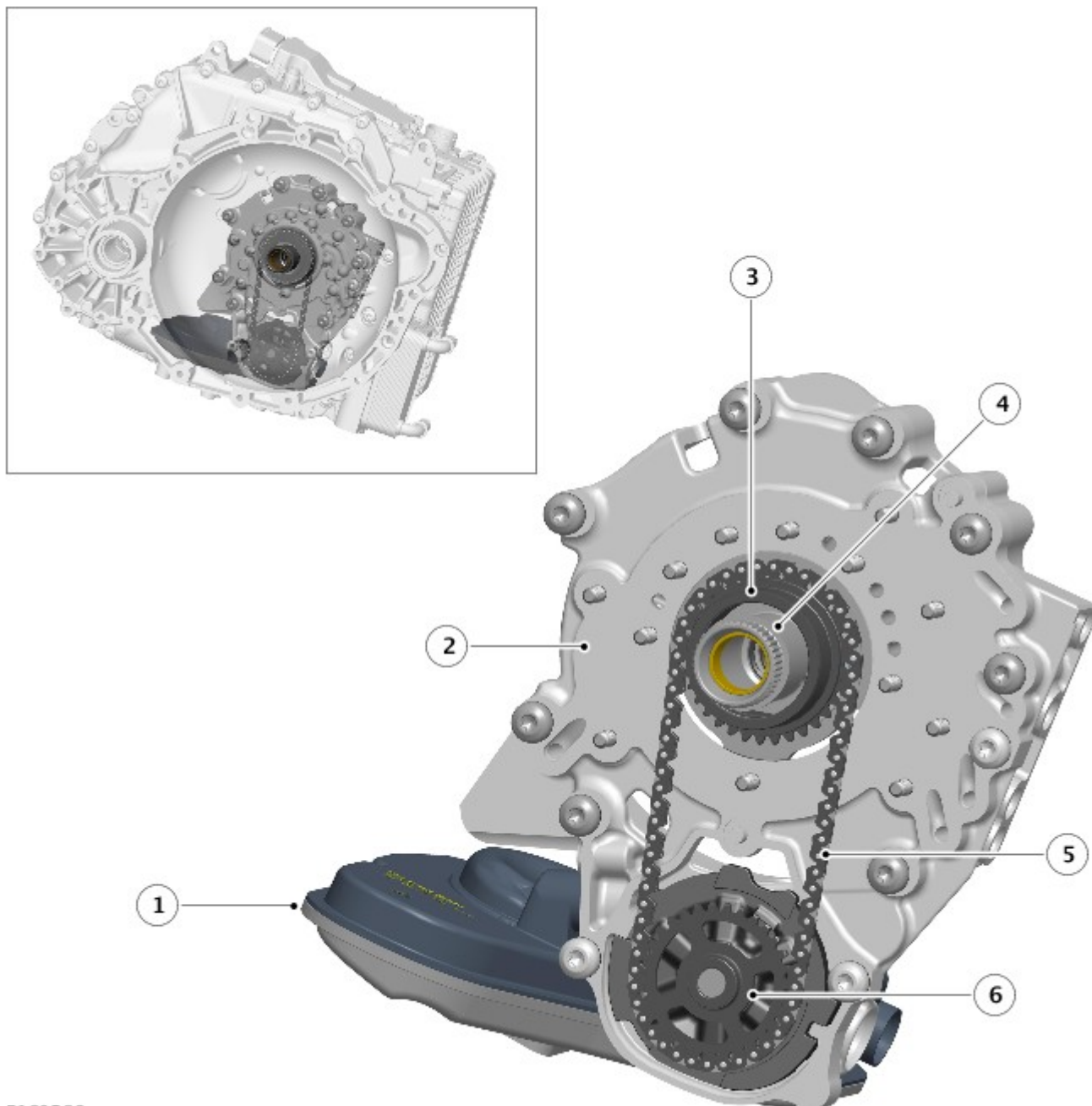
Two speed sensors are used in the transmission and are located within the transmission housing and are connected to the sensor unit. The sensors take their speed reading from the slots in the clutch basket of the multiplate clutch E and the gear

teeth of the spur pinion. The sensors provide input and output speed signals to the **TCM** . Both speed signals are received by the **TCM** which uses the signals to calculate engine torque output, shift timing and torque converter lock-up.

The fluid temperature sensor is integrated into the internal wiring harness within the transmission sensor unit. It detects the **ATF** temperature in the transmission and transmits a signal corresponding to the temperature to the **TCM** . The **TCM** monitors the temperature and adjusts clutch and brake application to provide smooth gear shifts across a wide range of temperatures and **ATF** viscosities.

Each solenoid is connected by two pins integral with the connector board. Each solenoid pins is connected via a harness to the electrical connector.

AUTOMATIC TRANSMISSION FLUID (ATF) PUMP



E160568

Item	Description
1	ATF filter
2	Intermediate plate
3	Drive pinion
4	Stator shaft
5	Drive chain
6	ATF pump

The ATF pump is located in an intermediate plate within the transmission main casing. The intermediate plate is attached to the inside of the transmission main casing with studs and nuts, behind the torque converter. The intermediate plate contains

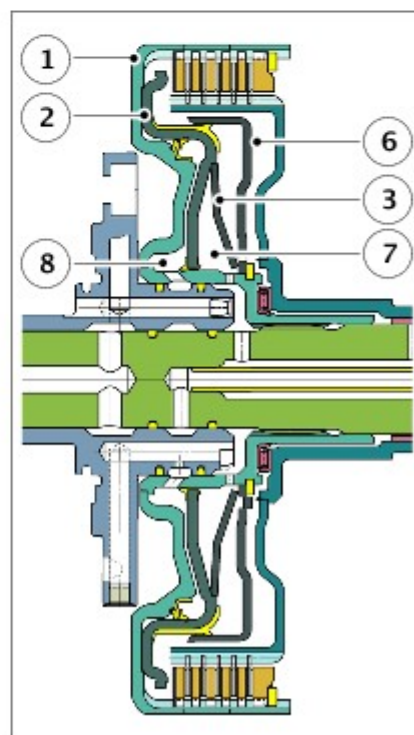
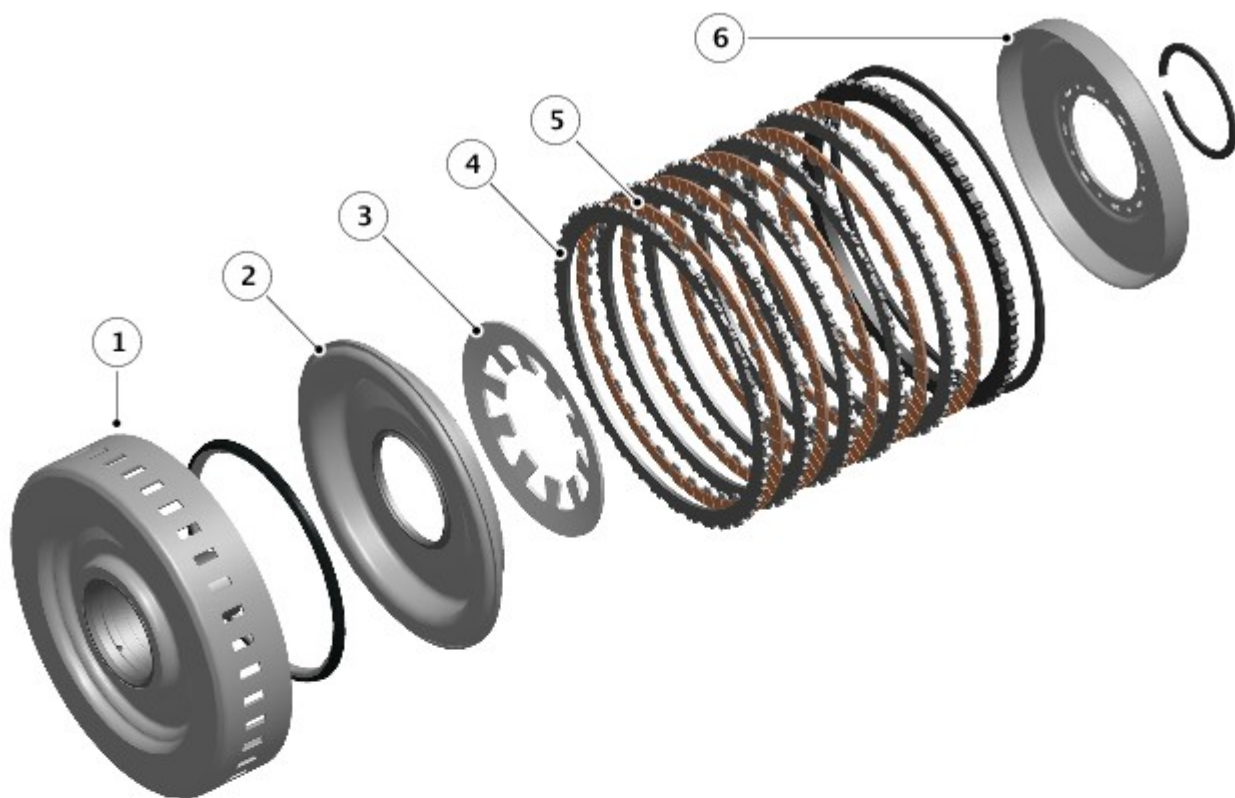
the splined stator shaft, to which the torque converter stator is connected. The torque converter shell extends into and drives a drive pinion with an integral sprocket, which operates a roller drive chain to drive the ATF pump. The drive pinion is therefore rotated at engine speed.

The pump is located at the bottom of the transmission main casing and is attached to the housing with screws. An ATF filter ensures that any particulate matter is collected by the filter before the ATF enters the ATF pump.

The ATF pump is a vane cell pump which can produce a pressure of between 3.5 and 44.0 bar (50 and 638 lbf/in²) and a flow of 14.7 cm³ (0.9 in³). The pump can operate at speeds from 700 to 7800 Revolutions Per Minute (RPM) with a maximum speed of 8600 RPM.

DRIVE CLUTCHES

Multiplate Drive or Brake Clutch – Typical



E160569

Item	Description
1	Cylinder
2	Piston
3	Disk spring
4	Metal plates
5	Friction plates
6	Baffle plate
7	Pressure equalization chamber

There are two multiplate drive clutches and two multiplate brakes used in the ZF 9HP48 automatic transmission. Each clutch or brake comprises a number of friction plates dependent on the output controlled. A typical clutch or brake consists of a number of steel outer plates and inner plates with friction material bonded to each face.

The drive clutches have both the friction plate and the metal plates rotating when the clutch is open. Multiplate brakes have either the friction plate or the metal plate rotating, with one fixed stationary.

Clutch / Brake	Operation
Multiplate clutch 'B'	Connects the input shaft to sun gear 'S1'
Multiplate clutch 'E'	Connects the input shaft to planet carrier 3 and ring gear 4
Multiplate brake 'C'	Locks sun gear 'S1'
Multiplate brake 'D'	Locks ring gear 2

The multiplate clutch and brake plates are held apart mechanically by a disk spring and hydraulically by ATF pressure. The ATF pressure is derived from a lubrication channel which supplies ATF to the transmission components. The ATF is passed via drillings in the input shaft into the chamber between the baffle plate and the piston. To prevent inadvertent clutch application due to pressure build up produced by centrifugal force, the fluid in the pressure equalization chamber overcomes any pressure in the piston chamber and holds the piston off the clutch plate assembly. The multiplate brakes do not require a baffle plate and pressure equalization chamber to compensate for centrifugal pressure which occurs in a rotating piston.

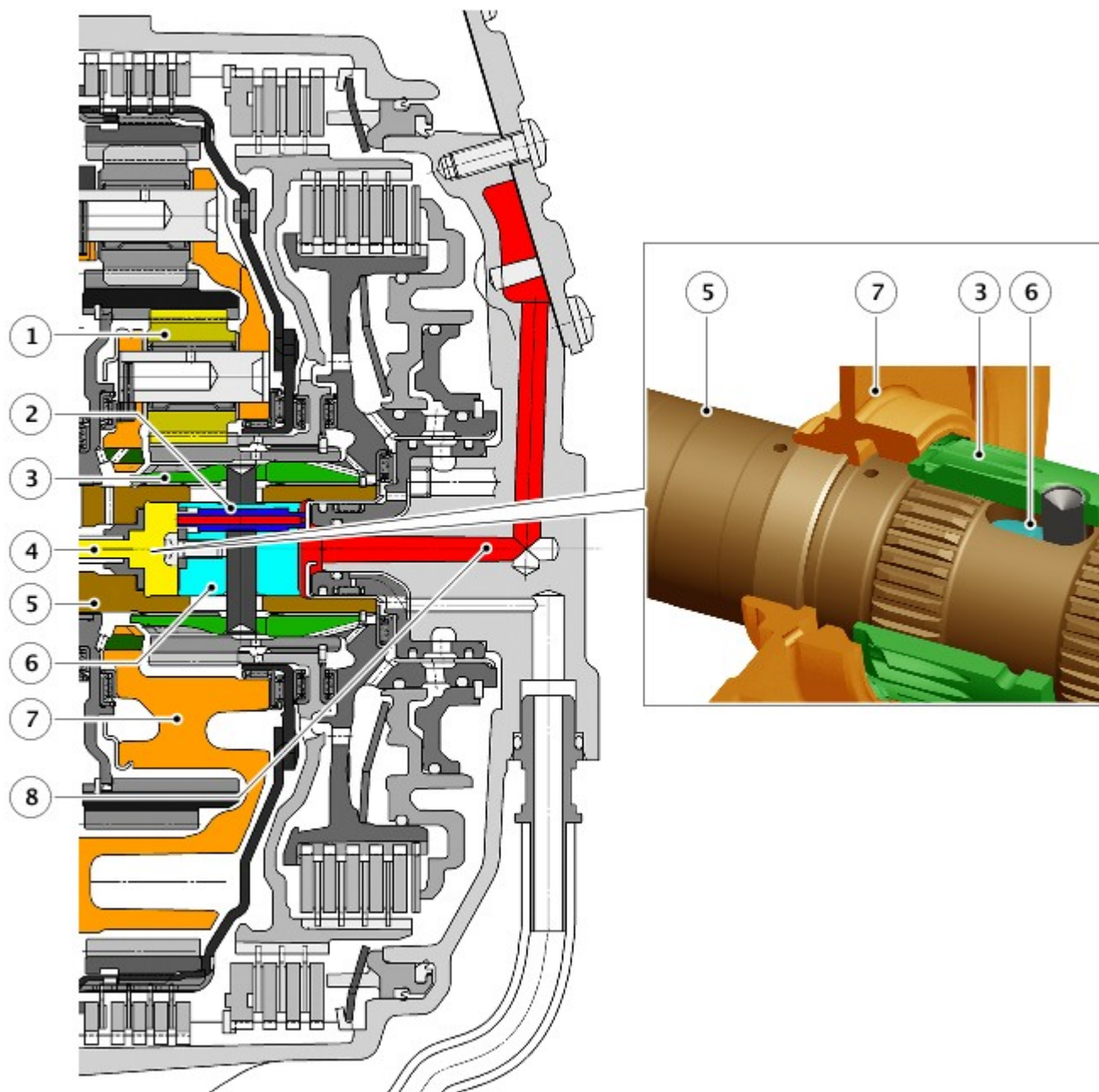
When clutch application is required, pressure from the ATF pump is applied to the piston chamber from the supply port. This pressure overcomes the low pressure fluid present in the pressure equalization chamber. The piston moves, against the pressure applied by the disk spring, and compresses the clutch plate assembly. When the pressure falls, the disk spring pushes the piston away from the clutch plate assembly, disengaging the clutch.

DOG CLUTCHES

Two dog clutches are used on the transmission; dog clutch 'A' connects the input shaft to sun gear S2 and ring gear R1, and dog clutch 'F' connects sun gears S3 and S4 to the centering plate mounted in the transmission casing.

Both dog clutches are similar in their operation. Each clutch is operated by ATF pressure acting on a double acting piston to move the dog clutch into and out of engagement.

Dog Clutch 'A'



E160570

Item	Description
1	Planetary gear set 1
2	Sensing piston
3	Dog 'A'
4	ATF pressure supply for dog clutch 'A' release
5	Input shaft
6	Piston
7	Planet carrier
8	ATF pressure supply for dog clutch 'A' engagement

Dog clutch 'A' is located at the end of the input shaft and is controlled by a double acting piston located within the input shaft.

A double acting piston is located internally in the input shaft and can move within the shaft when ATF pressure is applied to either side of the piston. The piston is connected to the dog 'A' by a pin which moves in a slot in the input shaft.

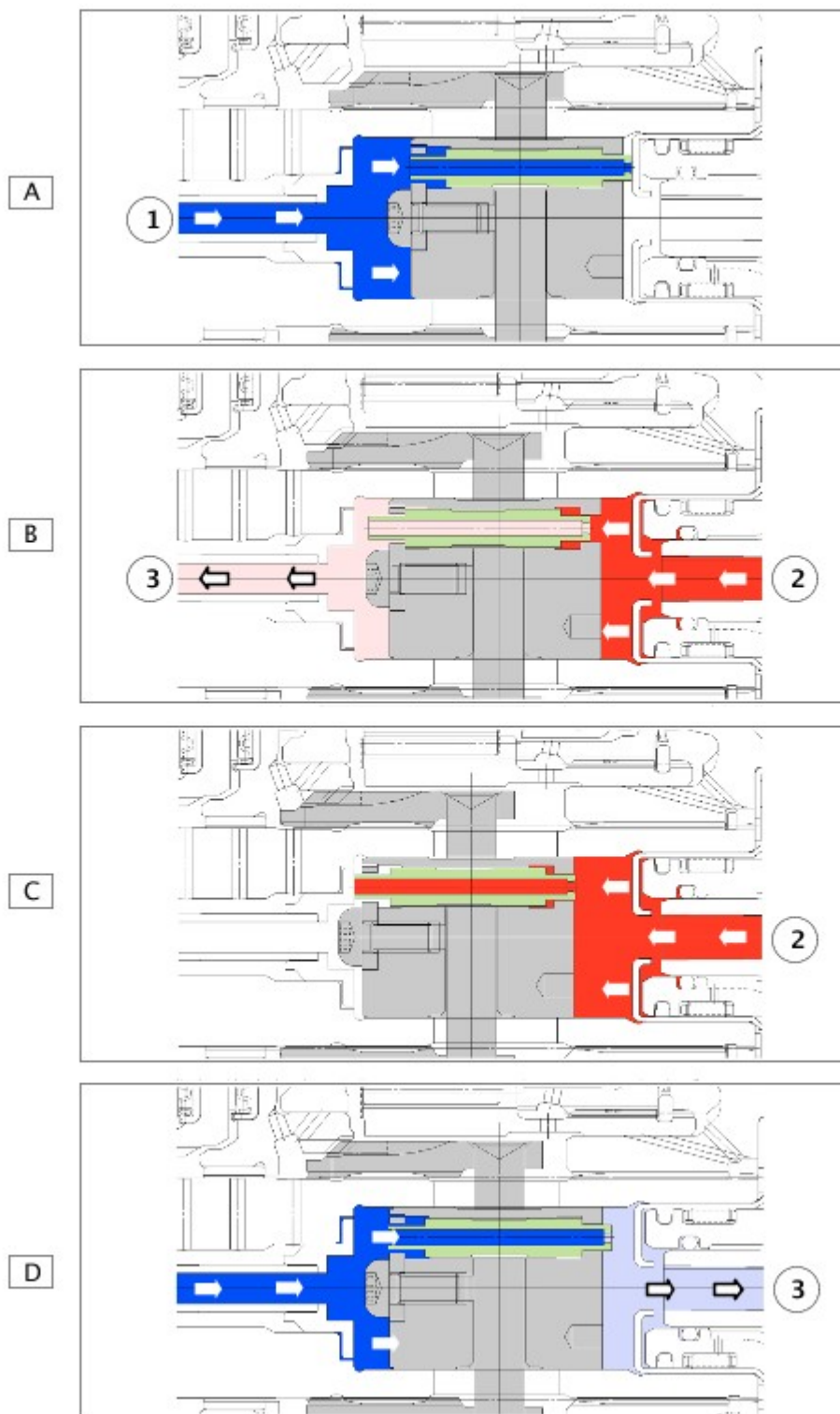
Dog 'A' is a sleeve with internal and external splines. Dog 'A' is permanently engaged with the input shaft via the internal splines. When the piston moves dog 'A' along the input shaft to the 'closed' position, dog 'A' engages with splines on the gearset 1 and 2 planet carrier, transferring drive from the input shaft to the gear set 2. When the dog 'A' is to be disengaged to the 'open' position, ATF pressure is applied to the opposite side of the piston and dog 'A' is moved along the input shaft and is disengaged from the planet carrier. Dog 'A' is in the 'closed' position in gears 1 through 7.

The dog 'A' has two states; open and closed. The piston cannot determine if the dog 'A' has travelled its full distance into or out of engagement with the ring gear carrier or has remained in an intermediate position. The piston is fitted with a sensing piston and the ATF pressure leakage through the sensing piston can be measured by the pressure sensor in the sensor unit.

The sensing piston is hollow and moves axially within the piston. Referring to the below illustration, if ATF pressure is applied to the right side of the piston, the piston and the sensing piston are pushed to the left. During the movement of the piston, a small amount of ATF pressure is passed through the sensing piston. This leakage pressure is measured at the left side of the piston by the pressure sensor. When the piston has moved fully to the left and reached its end position, the leakage through the sensing piston is blocked. The pressure drop on the left side of the piston is sensed and the TCM can determine the dog clutch 'A' is fully disengaged with the ring gear carrier.

If the pressure on the left side of the piston does not drop within a specified shift time, the TCM can determine that the dog 'A' has stopped in an intermediate position.

The dog clutch 'A' has four possible states of operation as follows:

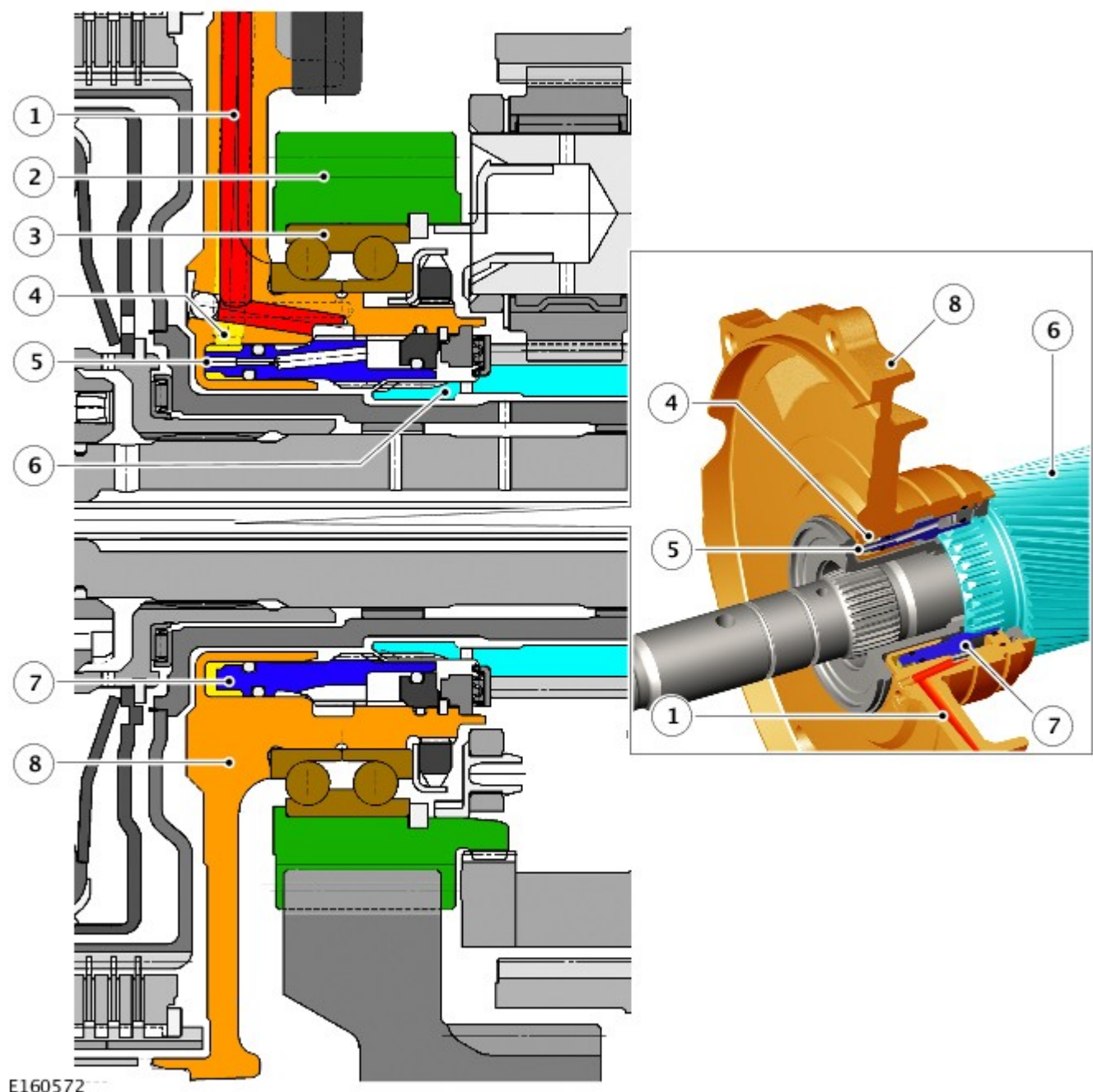


E160571

Item	Description
A	Dog 'A' open - piston at end position
B	Dog 'A' closing - piston at intermediate position
C	Dog 'A' closed - piston at end position
D	Dog 'A' opening - piston at intermediate position
1	ATF Pressure applied - dog 'A' open
2	ATF pressure applied - dog 'A' closed
3	Leakage through sensing piston for pressure sensing.

- A. Dog 'A' Open** - ATF pressure is applied to the piston from the left side chamber and the dog clutch 'A' is open. The ATF pressure in the right chamber is almost zero because the sensing piston is pushed to its limit of movement and leakage through the sensing piston is prevented.
- B. Dog 'A' Closing** - ATF pressure is applied from the right side chamber which starts the piston moving to the left into engagement with the ring gear carrier. The piston is now in the intermediate position and leakage pressure is passed through the sensing piston into the left side chamber. Pressure in the left side chamber can be measured and will be approximately 2 bar (29 lbf in³).
- C. Dog 'A' Closed** - ATF pressure is applied to the piston from the right side chamber, the dog 'A' is closed and fully engaged with the ring gear carrier. The ATF pressure in the left chamber is almost zero because the sensing piston is pushed to its limit of movement and leakage through the sensing piston is prevented.
- D. Dog 'A' Opening** - ATF pressure is applied to the piston from the left side chamber which starts the piston moving to the right and disengaging from the ring gear carrier. The piston is now in the intermediate position and leakage pressure is passed through the sensing piston into the right side chamber. Pressure in the right side chamber can be measured and will be approximately 2 bar (29 lbf in³).

Dog Clutch 'F'



E160572

Item	Description
1	ATF pressure supply - open
2	Spur pinion
3	Angular contact ball bearing race

4	ATF pressure supply - close
5	Pressure sensing leakage hole
6	Sun gear 3 and 4
7	Dog 'F'
8	Bearing support housing

Dog clutch 'F' is located between the multiplate clutch 'E' and planetary gear set 4. The dog clutch is controlled by a double acting piston located within the bearing support housing.

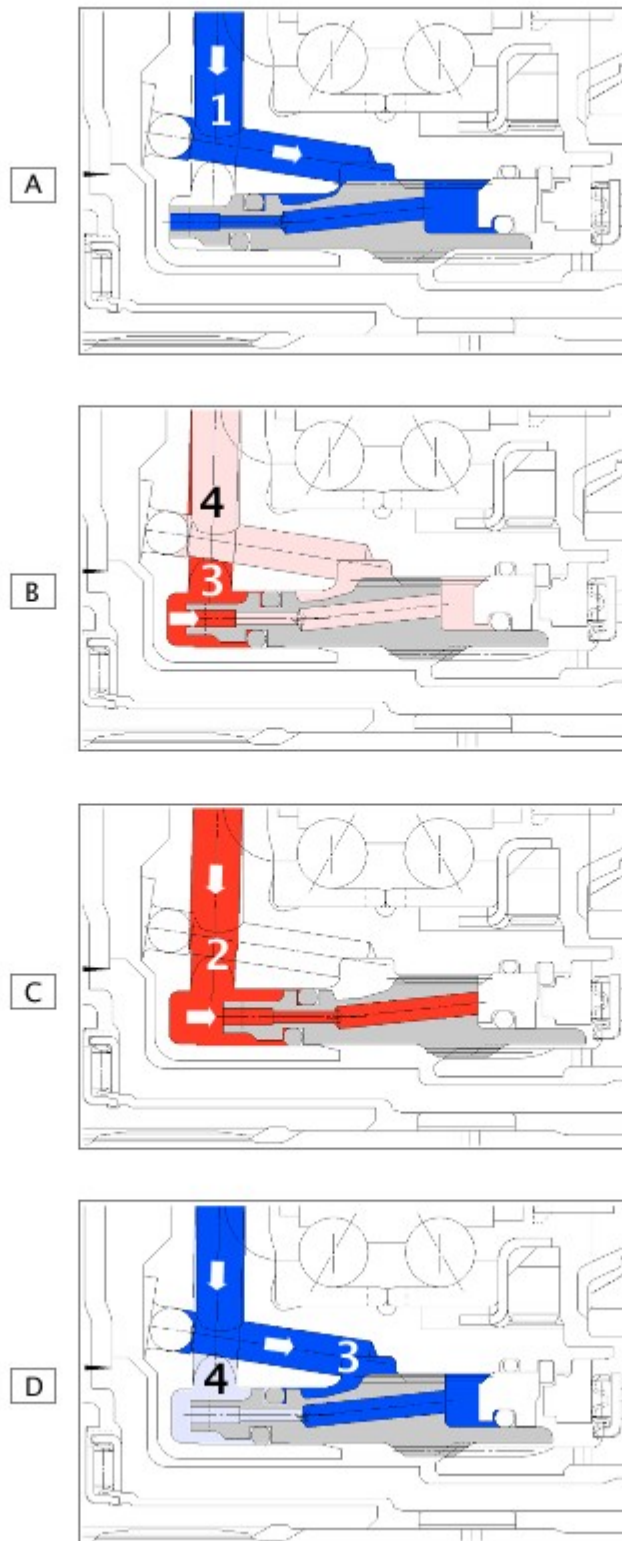
Dog 'F' is a sleeve with internal and external splines. Dog 'F' is permanently engaged on the splines with the bearing support housing, which in turn is fixed and static within the transmission casing. When dog 'F' is moved to the closed position, it acts as a brake for sun gears 3 and 4 in planetary gear set 4.

The dog 'F' has two states; open and closed. Dog 'F' employs a more simple sensing system than dog 'A'. Dog 'F' is also the piston itself and does not use a sensing piston. The piston of dog 'F' has a leakage sensing hole which is used to detect its current position via pressure sensing.

Referring to the below illustration, if **ATF** pressure is applied to the right side of the piston, the piston is pushed to the left. During the movement of the piston, a small amount of **ATF** pressure is passed through the leakage sensing hole. This leakage pressure is measured at the left side of the piston by the pressure sensor in the sensor unit. When the piston has moved fully to the left and reached its end position, the leakage through the leakage sensing hole is blocked. The pressure drop on the left side of the piston is sensed and the **TCM** can determine that dog clutch 'F' is fully engaged with sun gears 3 and 4.

If the pressure on the left side of the piston does not drop within a specified shift time, the **TCM** can determine that the dog 'F' has stopped in an intermediate position.

The dog clutch 'F' has four possible states of operation as follows:



E160573

Item	Description
A	Dog 'F' open - piston at end position
B	Dog 'F' closing - piston at intermediate position
C	Dog 'F' closed - piston at end position
D	Dog 'F' opening - piston at intermediate position
1	ATF Pressure applied - dog 'F' open
2	ATF pressure applied - dog 'F' closed
3	ATF pressure applied - dog 'F' in intermediate position

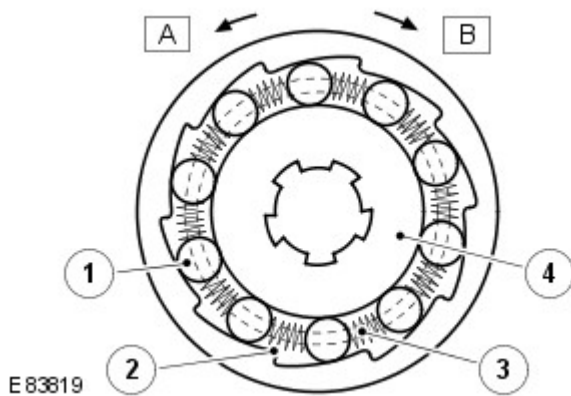
A. Dog 'F' Open - ATF pressure is applied to the piston from the right side chamber and the dog clutch 'F' is open. The ATF pressure in the left chamber is almost zero because the piston is pushed to its limit of movement and leakage through the leakage sensing hole is prevented.

B. Dog 'F' Closing - ATF pressure is applied from the left side chamber which starts the piston moving to the right into engagement with the sun gears 3 and 4. The piston is now in the intermediate position and leakage pressure is passed through the leakage sensing hole into the right side chamber. Pressure in the right side chamber can be measured and will be approximately 2 bar (29 lbf in³).

C. Dog 'F' Closed - ATF pressure is applied to the piston from the left side chamber, the dog 'F' is closed and fully engaged with the sun gears 3 and 4. The ATF pressure in the right chamber is almost zero because the piston is pushed to its limit of movement and leakage through the leakage sensing hole is prevented.

D. Dog 'F' Opening - ATF pressure is applied to the piston from the right side chamber which starts the piston moving to the left and disengaging from the sun gears 3 and 4. The piston is now in the intermediate position and leakage pressure is passed through the leakage sensing hole into the left side chamber. Pressure in the left side chamber can be measured and will be approximately 2 bar (29 lbf in³).

One-Way Clutch - Torque Converter

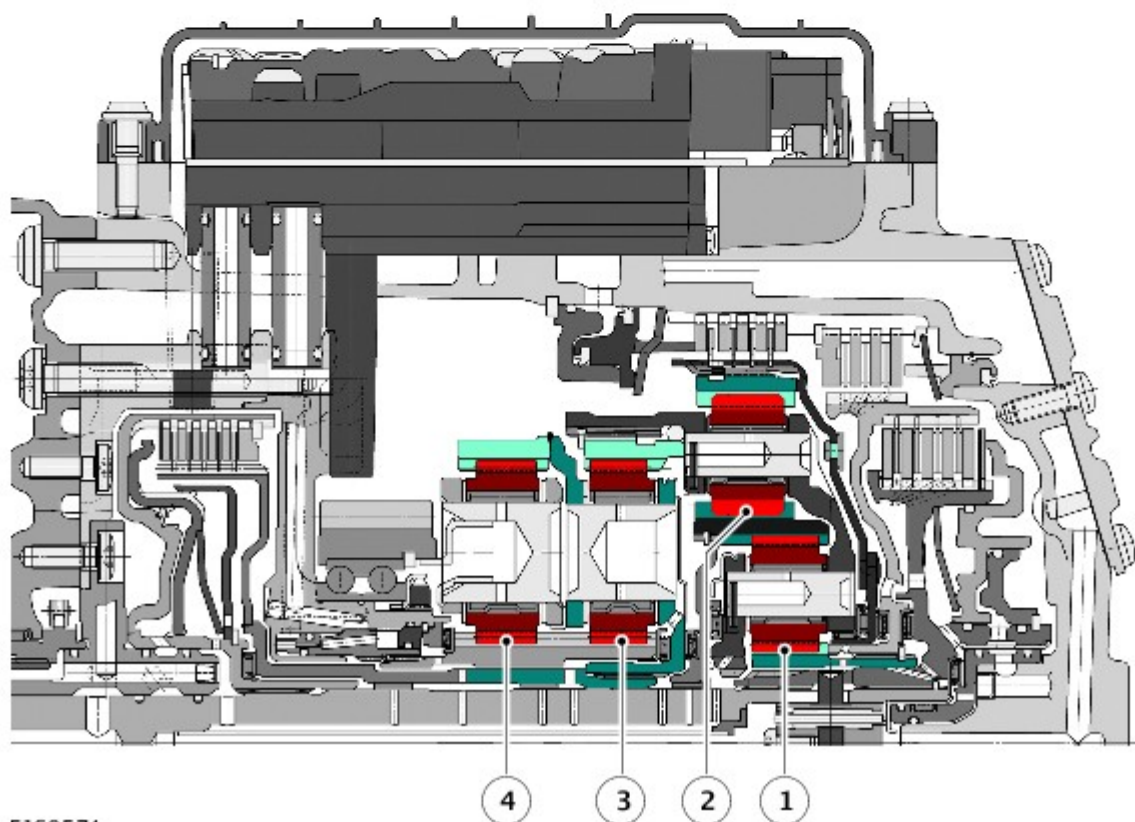
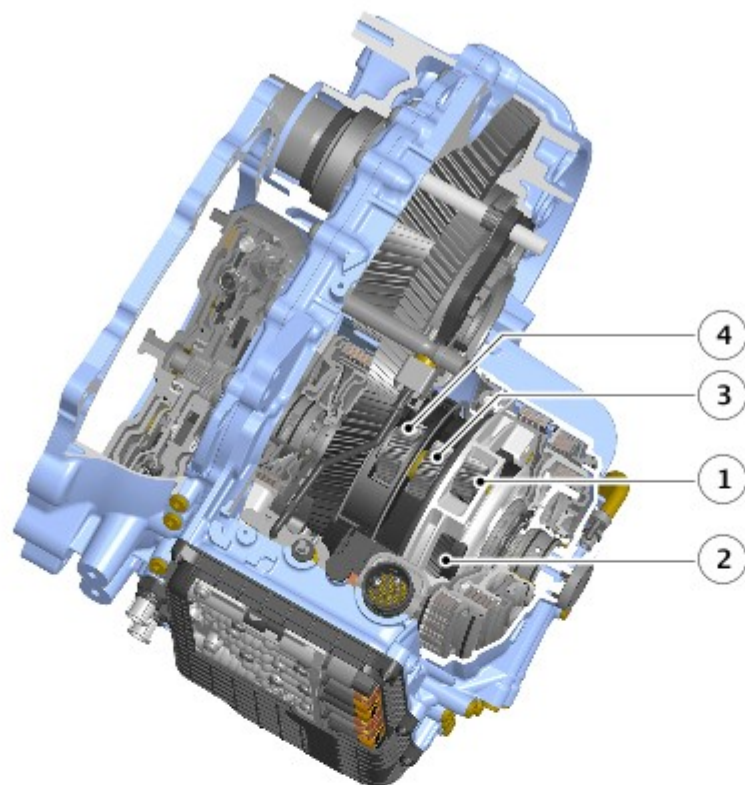


Item	Description
A	Unlocked condition
B	Locked condition
1	Roller
2	Cage
3	Spring
4	Inner race

The roller clutch uses parallel rollers, located between the smooth, cylindrical inner race and the inclined cam faces of the clutch body. Springs are used to hold the rollers in position between the two contact faces.

When the clutch is rotated in a clockwise direction, the rollers become trapped between the inner race and the inclined cam faces of the clutch body, providing positive (locked) rotation of the inner race, locking the clockwise rotation of the stator. When the clutch is rotated in a counter-clockwise direction, the rollers are moved away from the inclined cam faces and can rotate freely (unlocked) with the clutch body, this allows the torque converter stator to rotate freely when the vehicle is decelerating.

PLANETARY GEAR TRAINS



E160574

Item	Description
1	Gear set 1
2	Gearset 2
3	Gear set 3
4	Gear set 4

The planetary gear trains used on the 9HP48 transmission comprise four planetary gear sets; GS1, GS2, GS3 and GS4.

Engine torque is transferred, via operation of single or combinations of multiplate clutches, multiplate brakes and two dog clutches, to the four planetary gear trains. The gear trains are controlled by reactionary inputs from the multiplate clutches to produce the nine forward gears and one reverse gear. The gear ratios are as follows:

Gear	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	Reverse
Ratio	4.713	2.842	1.909	1.382	1.00	0.808	0.699	0.580	0.480	3.830

Sun gear S2 of gear set GS2 has additional internal gearing and also operates as the ring gear R1 of gear set GS1.

Ring gear R3 is connected to planet carrier PC1 and PC2 and therefore rotates in the same direction and speed as the planet carrier.

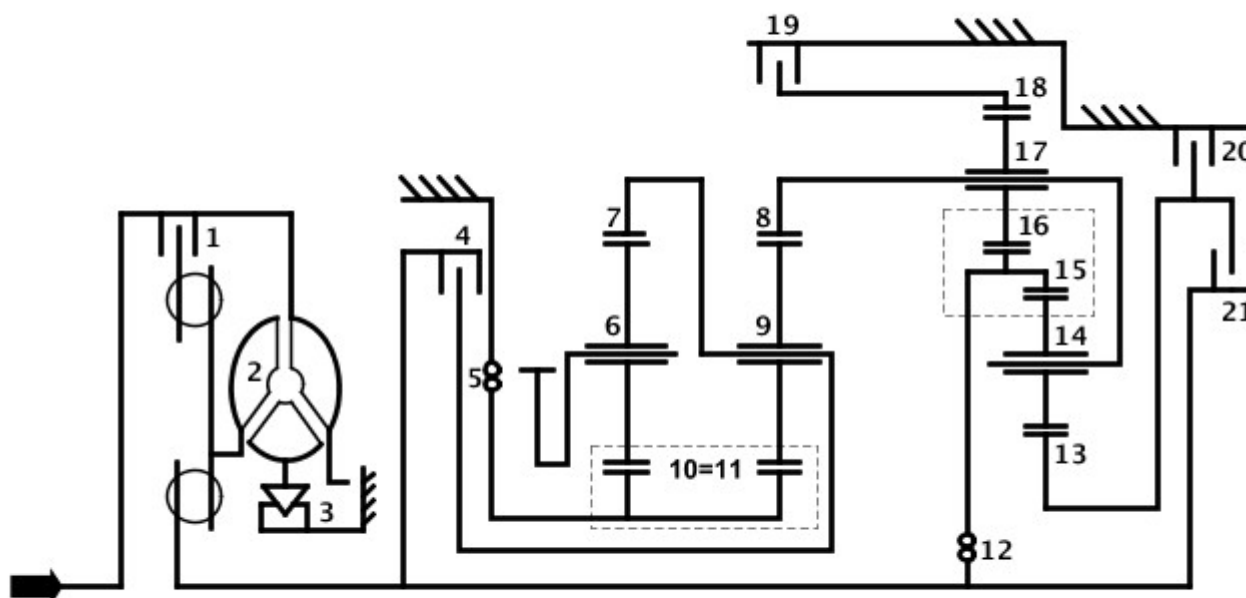
Gear sets GS3 and GS4 are connected via a joint sun gear S3/S4 as a Simpson planetary gear set.

Ring gear R4 is connected to planet carrier PC3 and therefore rotates in the same direction and speed as the planet carrier.

Final output from the transmission occurs via gear set GS4 via a spur gear to the differential.

POWER FLOW

Operation of the transmission is controlled by the **TCM** which electrically activates various solenoids to control clutches to achieve the required transmission gear selection. The sequence of solenoid activation is based on programmed information in the **TCM** memory and physical transmission operating conditions such as vehicle speed, throttle position, engine load and the **TCS** position.



E160575

Item	Description
1	Torque converter lock-up clutch
2	Torque converter
3	Torque converter one-way clutch
4	Multiplate clutch 'E'
5	Dog clutch 'F'
6	Planetary gears P4
7	Ring gear R4
8	Ring gear R3
9	Planetary gear P3
10	Sun gear S4
11	Sun gear S3

12	Dog clutch 'A'
13	Sun gear S1
14	Planetary gear P1
15	Ring gear R1
16	Sun gear S2
17	Planetary gear P2
18	Ring gear R2
19	Multiplate brake 'D'
20	Multiplate brake 'C'
21	Multiplate clutch 'B'

Solenoid Operation

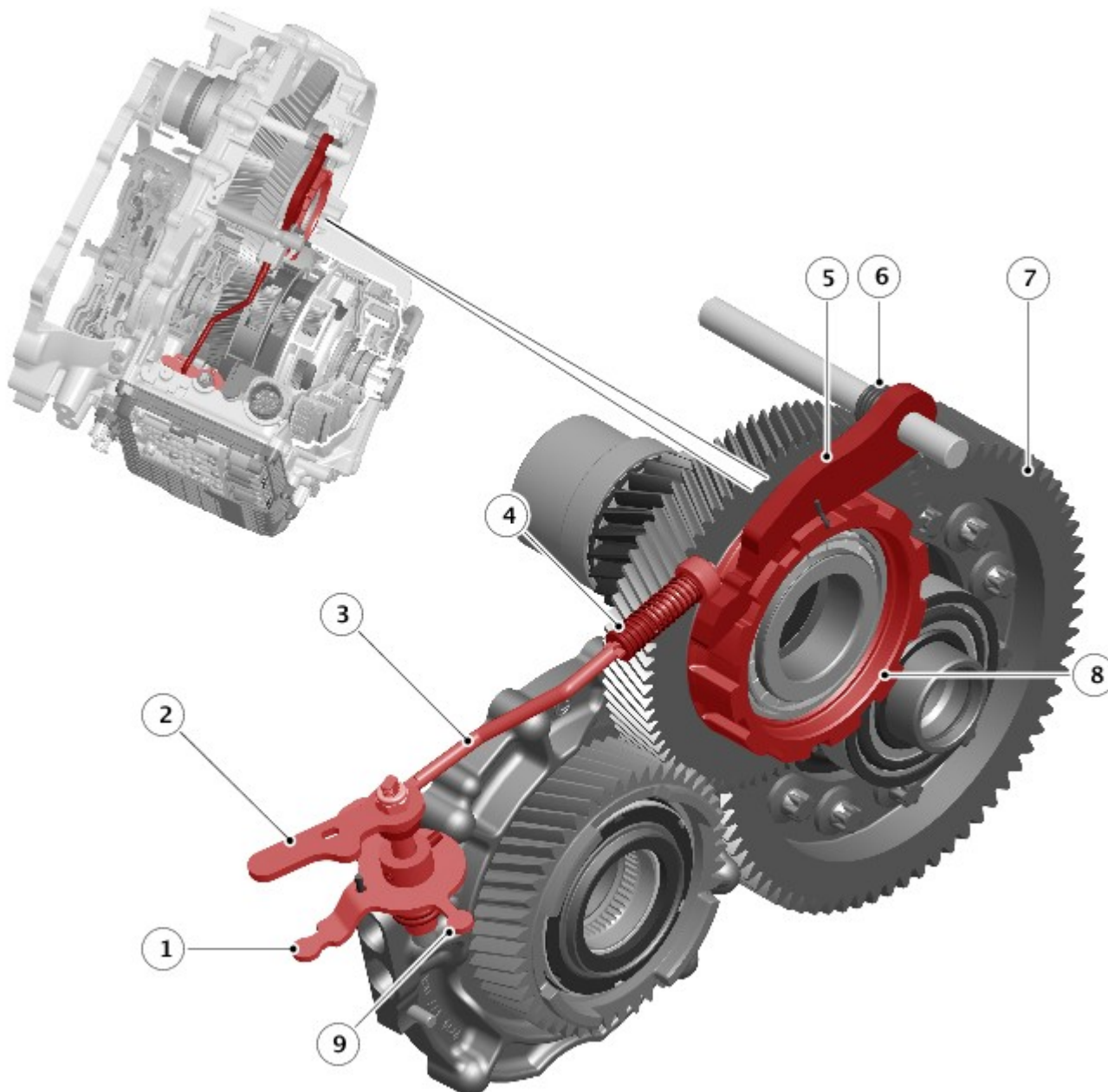
The following table shows the clutches that are closed to achieve the required gear ratios.

Gear	Multiplate Clutch 'C' (Brake)	Multiplate Clutch 'D' (Brake)	Multiplate Clutch 'B'	Multiplate Clutch 'E'	Dog Clutch 'F'	Dog Clutch 'A'
1		X			X	X
2	X				X	X
3			X		X	X
4				X	X	X
5			X	X		X
6	X			X		X
7		X		X		X
8	X	X		X		
9		X	X	X		
R		X	X		X	

X = Clutch closed

In neutral, all of the solenoids are de-energized and the clutches and brakes are all disengaged, with the exception of dog clutch 'F' which is engaged when the transmission is in neutral. This allows rotation from the input shaft to rotate the planetary gear sets without transferring any drive to the differential.

PARK LOCK



E160576

Item	Description
1	Park lock lever - Connection with park lock actuator spool valve
2	Selector shaft Service Park Release (SPR) lever
3	Park rod
4	Spring
5	Park lock pawl
6	Spring
7	Differential spur gear
8	Park lock gear
9	Park lock lever - Connection with PARK (P) sensor

The park lock comprises a selector shaft, a park lock lever, a shift rod, a park lock pawl and a park lock gear.

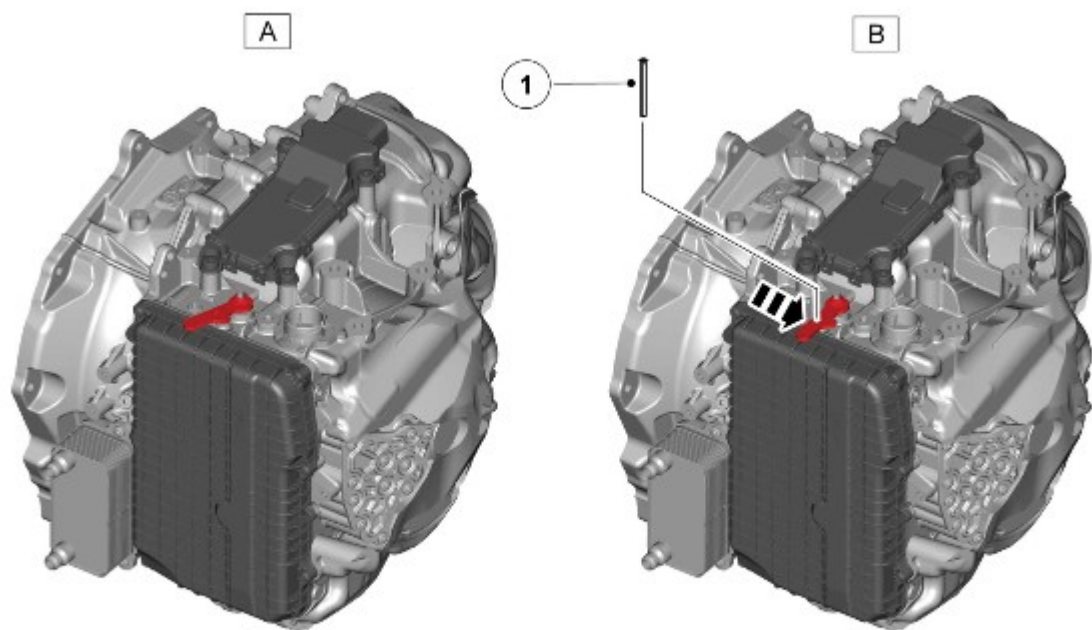
The park lock is electronically and hydraulically actuated via a control solenoid and a spool valve, which are located in the valve block. A slot in the spool valve engages with a connection with a lever on the selector shaft. A second connection on the lever engages with the PARK (P) sensor which is part of the sensor unit. Refer to the 'Valve Block' and 'Sensor Unit' sections in this section for details of the individual components.

When the control solenoid is actuated, the park lock spool moves, rotating the park lock lever. The rotary motion of the lever is converted to linear movement of the shift rod which moves in the required direction to apply or release the park lock pawl from the park lock gear.

Service Park Release (SPR)

The SPR is a mechanical procedure which requires removal of the air filter housing for access. The procedure is required when there has been a loss of vehicle electrical power or a failure to the automatic transmission preventing release of the park lock.

The following procedure must be used to release the park lock before moving the vehicle. The vehicle must be held by either the electric park brake or wheel chocks to prevent it unintentionally moving when the park lock is released.



E181004

Item	Description
A	SPR engaged
B	SPR released
1	5mm locking pin

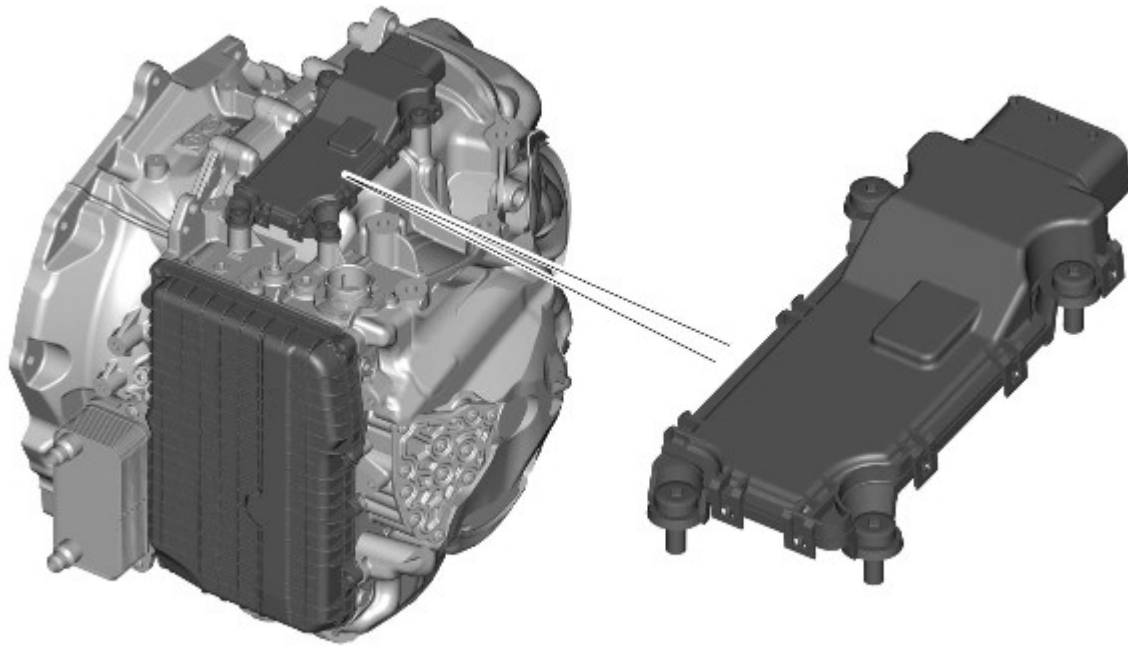
Apply SPR

- Make sure that the ignition is off (power mode 4)
- Remove the air filter assembly to get access to the SPR lever on the automatic transmission
- Rotate the SPR lever in a counter clockwise direction until the slot in the SPR lever aligns with a corresponding hole in the automatic transmission casing
- Hold the SPR lever in this position and insert a suitable 5mm diameter locking pin (Allen key for example) through the slot in the SPR lever and into the hole in the automatic transmission casing
- The vehicle can now be moved.

Release SPR

- Remove the 5mm diameter locking pin from the SPR lever
- Make sure the SPR lever has moved fully clockwise and the park lock is engaged
- Replace the air filter assembly.

TRANSMISSION CONTROL MODULE (TCM)



E181024

The **TCM** is located on the top of the automatic transmission casing and is connected on the high speed **CAN** powertrain systems bus to send and receive information to and from other system modules.

The **TCM** outputs signals to operate the transmission solenoid valves to control the hydraulic operation of the transmission.

The **ECM (engine control module)** supplies the engine management data on the high speed **CAN** powertrain systems bus. The **TCM** requires engine data to efficiently control the automatic transmission operation, using for example; crankshaft torque, engine speed, accelerator pedal angle, engine temperature etc.

The **TCM** processes signals from the transmission speed and temperature sensors, **ECM** and other vehicle systems. From the received signal inputs and pre-programmed data, the **TCM** calculates the correct gear, torque converter clutch setting and optimum settings for gear shift and lock-up clutch control.

The steering angle sensor and the **ABS (anti-lock brake system)** module also supply data to the **TCM** on the high speed **CAN** powertrain systems bus. The **TCM** uses data from these systems to suspend gear changes when the vehicle is cornering and/or the **ABS** module is controlling braking or traction control.

The transmission is controlled by a 'shift by wire' system. The **TCS** is connected to the **TCM** on the high speed **CAN** powertrain systems bus. Driver selections made on the **TCS** are passed via **CAN** messages to the **TCM**.

If the **TCM**, the transmission or the valve block is replaced, a diagnostic routine using an approved Land Rover diagnostic system will be required to calibrate the **TCM** to learn the Touchpoint Adaptions. Refer to 'Touchpoint Adaptions' and 'Clutch Adaptions' later in this section.

INSTRUMENT CLUSTER



NOTE: The following illustration shows the display when the transmission is in CommandShift™ mode. PRNDS is displayed during normal transmission operation.



E160578

Item	Description
1	Malfunction Indicator Lamp (MIL)
2	Gear indicator (Dynamic mode)
3	Transmission indicator

The instrument cluster is connected to the **TCM** via the high speed **CAN** powertrain systems bus. Transmission status is transmitted by the **TCM** and displayed to the driver in the instrument cluster.
For additional information, refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation).

Malfunction Indicator Lamp (MIL)

The **MIL (malfunction indicator lamp)** is located in the upper right side of the instrument cluster, within the tachometer. Transmission related faults which may affect the vehicle emissions output will illuminate the **MIL**.

The **MIL** is illuminated by the **ECM** on receipt of a relevant fault message from the **TCM** on the high speed **CAN** powertrain systems bus. The nature of the fault can be diagnosed using a Land Rover approved diagnostic system which reads fault codes stored in the memory.

Transmission Status Display

The transmission status display is located in the central Thin Film Transistor (TFT) message display in the instrument cluster. The display shows the selected P R N D S position and the current selected gear in normal transmission modes. In Drive 'D' the current gear is not displayed unless the paddle switches are operated.

In Dynamic (Sport) mode, the selected transmission gear is displayed in a central position in the TFT display.

DRIVING MODES

A number of different driving modes are available. Some can be selected by the driver and some are automatically initiated by the **TCM** to adapt to different driving conditions.

- Normal
- Sports
- Manual 'CommandShift™'
- Cooling
- Hill Descent Control (HDC)
- Cruise
- Limp home
- Coast
- Fast off recognition
- Uphill and Trailer
- Downhill

- Wide Throttle
- Terrain Response
- Reverse lock-out
- Kick-Down
- Shift Adapt Under Braking
- Corner Recognition
- Road Gradient Recognition
- Driver Type Recognition

Normal

Normal mode is automatically selected by the **TCM** when the ignition is switched on (ignition mode 6). In this mode all automatic and adaptive modes are active. Normal mode uses gear shift and lock-up maps which provide the optimum of fuel consumption, emissions and driveability, depending on the driving style.

If the transmission is operated in sport mode or 'CommandShift™' mode and the **TCS** is moved back to the drive 'D' position, then normal mode operation is resumed.

Sports

Sports mode provides enhanced acceleration and responsiveness by the use of sports shift maps. This mode allows the transmission to down shift more readily and hold gears for longer at higher engine speeds.

Manual 'CommandShift™'

Manual 'CommandShift' mode allows the transmission to operate as a semi-automatic transmission. The driver can change up and down the nine forward gears with the freedom of a manual transmission provided the requested gear is within the allowed engine and vehicle speed range.

Shift maps are provided to protect the engine at high speeds. The **TCM** will automatically change up to a higher gear ratio to prevent engine overspeed and change down to a lower gear ratio to avoid engine laboring and stalling.

When kick-down is requested the **TCM** shifts down to the lowest available gear. When the vehicle is stationary, the driver can select 1st or 2nd to start off.

Upshifts (+) are optimized for performance via the short shift function, resulting in firmer feeling shifts than in automatic mode. Downshift requests (-) utilize a throttle 'blip' during the shift, resulting in an improved shift feel.

Temporary Manual Gear Selection

With the **TCS** in the 'D' position, manual mode can be directly accessed by the single action of operating one of the steering wheel paddle switches. This allows immediate, but temporary use of the shift paddles when the **TCS** is in 'D'. If continued use of manual mode is required, the **TCS** must be moved to the Sport 'S' position to enter permanent manual mode in the currently selected gear.

If the **TCS** remains in the 'D' position, temporary manual mode will be held while the driver is accelerating, decelerating, cornering or continuing to request shifts using the paddle switches. The transmission will revert back to automatic operation after a short period of driving at a steady speed. Alternatively, the upshift (+) paddle can be held for approximately 2 seconds to return to automatic mode in **TCS** position 'D'.

Permanent Manual Gear Selection

Select the 'S' position on the **TCS**, permanent manual mode is then accessed by the operation of the steering paddle switches. The instrument cluster message center will show the currently selected gear. To exit from manual mode, pull and hold the upshift (+) paddle switch for approximately 2 seconds to return to automatic operation in Sport (S) mode. Alternatively, rotate the **TCS** to the 'D' position; the transmission will revert to 'D' automatic mode.

Manual Operation

Upshifts are performed using a brief operation of the upshift (+) paddle switch. Downshifts are performed using the downshift (-) paddle switch. The message center will display the selected gear.

The transmission will inhibit upshifts and downshifts if the requested shift would result in an engine speed outside the engine's operating range.

Commandshift™ - Additional Features

Kick-Down: - Operation of kick-down mode will override the currently selected gear. The lowest available gear will be selected for maximum acceleration and will be highlighted in the message center. Subsequent manual shifts may then be selected as usual.

Positive Torque: - Provides throttle 'blips' on downshifts, improving transmission shift quality and response.

Shift Assist: - The transmission will automatically upshift at the engine speed redline in CommandShift mode, as if operated manually. The transmission will automatically downshift, when the engine speed falls below the range for the currently selected gear. When the vehicle approaches, or comes to rest, second gear is automatically selected. Subsequent starts from standstill will occur in second gear, unless accelerator pedal demand is high or a downshift is manually selected, in which case first gear will be selected. In all cases the message center will show the currently selected gear.

During sustained braking, if a downshift is selected at a speed which would result in an engine speed outside the engine's operating range, the downshift will be delayed until the vehicle speed has reduced sufficiently for the gear selection to be made, without causing the engine speed to exceed its normal operating range.

Cooling

Cooling mode is activated when the **TCM** detects excessively high **ATF** or engine coolant temperatures. When this mode is active, torque converter lock-up is activated earlier to minimize a further rise in **ATF** and/or engine coolant temperature and assist **ATF** cooling.

Hill Descent Control (HDC)

The HDC mode assists the **ABS** control module in controlling the downhill speed of the vehicle. When HDC is active, the **TCM** selects the most appropriate gear for the descent to maximize engine braking.

Maximum engine braking is applied using a shift map which initiates later upshifts and early downshifts.

Cruise

When speed control is activated, the **TCM** receives a speed control active message on the high speed **CAN** powertrain systems bus. The **TCM** activates a speed control map which minimizes up and down shifts.

Cruise mode is active when speed control is selected to 'on' and the transmission is in drive 'D', Sport 'S', HDC or a Terrain Response Grass/gravel/snow program. Unique cruise maps override the current mode to provide a smooth driving feel and mode reselection.

Limp Home

If a transmission fault is detected by the **TCM**, the **TCM** adopts a limp home strategy and a message 'TRANSMISSION FAULT LIMITED GEARS AVAILABLE' is displayed in the message center. If the fault has an effect on engine emissions, the **MIL** in the instrument cluster will also be illuminated.

In limp home mode, P, R and N functions operate normally (if the fault allows these selections) and the **TCM** locks the transmission in an available gear to allow the driver to take the vehicle to a Land Rover dealer or approved repairer. Torque converter lock-up is disabled and reverse-lock-out will not function.

If the vehicle is stopped and subsequently restarted in the limp home mode condition, the **TCM** operates normally until the fault which caused the condition is detected again.

Coast

Coast mode provides earlier downshifts during coasting dependant on output shaft deceleration rate to improve driveability and refinement by avoiding negative to positive driveline torque reversal transmissions during the downshifts.

Fast Off Recognition

Fast off recognition is activated when the **TCM** detects that the driver has released the accelerator pedal quickly. This is detected by the **TCM** monitoring for a high level of negative pedal angle from **ECM** signals on the high speed **CAN** Powertrain systems bus. If this condition is detected, the **TCM** holds the current gear ratio to allow the driver to complete the manoeuvre without the need for a downshift. The mode can remain active for a predetermined length of time or if the driving style remains passive.

Fast off recognition mode assists vehicle stability and is used in conjunction with a lateral acceleration input during cornering to maintain the current gear until the corner is negotiated.

Uphill and Trailer

Uphill and trailer mode can be active when the transmission is operating in normal, sport or Terrain Response modes. When the vehicle is pulling a trailer or driving up an incline, the **TCM** detects the increased resistance by monitoring engine torque and speed signals received from the **ECM** on the high speed **CAN** powertrain systems bus and also transmission output shaft speed sensor signals. Uphill and trailer mode will provide downshifts to prevent a drop in transmission torque output and maintain driving force.

Downhill

Downhill mode can be active when the transmission is operating in normal, sport or Terrain Response modes. When the vehicle is descending an incline, the **TCM** detects a reduction in resistance by monitoring engine torque and speed signals received from the **ECM** on the high speed **CAN** powertrain systems bus and also transmission output shaft speed sensor signals. Downhill mode assists engine braking by selecting an appropriate gear reducing the load required on the brakes.

Wide Throttle

Wide open throttle mode operates for part throttle upshifts and kick-down upshifts. It provides consistent wide open throttle upshift performance under all driving conditions. The full engine speed range is used in all driving modes; normal, sport, hill modes and CommandShift™. Compensation is used for delays (hydraulic and electronic) in gear change request to gear change start to provide smooth changes and correct shift point correction.

Terrain Response

The Terrain Response system has a unique set of shift maps for each of the Terrain Response programs. These programs override existing modes; for example when HDC is active and the 'Sand', 'Mud and Ruts' or 'Grass/Gravel/Snow' programs are selected, a specific Terrain Response map is used, not the HDC mode shift map detailed previously.

Reverse Lock-Out

If the **TCS** is moved from N to R and the vehicle is travelling forwards, reverse selection is prevented if the vehicle speed is 5 km/h (3 mph) or more.

The same strategy is applied if the vehicle is moving backwards and D or S are selected on the **TCS**, the selection will be prevented if the vehicle speed is 5 km/h (3 mph) or more.

Kick-Down

When D is selected and the accelerator pedal is fully depressed, the transmission will down-shift to the lowest appropriate gear. Once the accelerator pedal is returned to a normal driving position, the transmission will upshift to the highest appropriate gear. Kick-down will vary according to road speed, current gear selection and accelerator pedal movement.

Shift Adapt Under Braking

Under braking, the transmission will vary the downshift point in proportion to braking effort and road gradient. This feature works in conjunction with the positive torque function, resulting in a smoother down-shift. If Sport mode S is selected, driver type recognition will vary the activation of this feature according to driving style.

Corner Recognition

Corner recognition inhibits up-shifts during cornering to provide improved vehicle balance. If Sport mode S is selected, driver type recognition will vary the activation of this feature according to driving style.

Road Gradient recognition

When the vehicle is driven on an uphill gradient, the transmission adapts the shift pattern to make better use of the engine power.

When the vehicle is driven on a long downhill gradient, the transmission may automatically select a lower gear to increase engine braking. Selecting Sport mode S will increase the tendency of the transmission to select a lower gear in these conditions, further increasing engine braking.

It is also possible to select a lower gear to increase engine braking using the gear shift - paddle switch.

Driver Type Recognition

In Sport mode S, the transmission monitors driving style and in combination with other vehicle systems, varies the shift schedule, fast off, corner recognition and shift adapt under braking functions according to the driving style.

TRANSMISSION FAULT STATUS

If the **TCM** detects a fault with the transmission system, it will enter a default (limp home) mode to prevent further damage to the transmission and allow the vehicle to be driven. If possible reverse gear will be available and also 3rd gear only.

When a fault is detected, a high speed **CAN** powertrain systems bus message is sent from the **TCM** and is received by the instrument cluster. The instrument cluster illuminates the **MIL** (if required) and displays an applicable message in the message center.

For additional information, refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation).

Some transmission faults may not illuminate the **MIL** or display a fault message, but the driver may notice a reduction in shift quality.

TOUCHPOINT ADAPTIONS

The transmission is supplied by ZF with Touchpoint Adaptions set in the Transmission Control Module (TCM) at the factory which match the transmission to which the TCM is attached.



CAUTION: TOUCHPOINT ADAPTIONS MUST ONLY BE PERFORMED WHEN A NEW TCM OR A TCM FROM ANOTHER VEHICLE HAS BEEN FITTED. UNDER NO OTHER CIRCUMSTANCES MUST TOUCHPOINT ADAPTIONS BE PERFORMED. Resetting Touchpoint Adaptions for any reason other than replacing the TCM could result in poor shift performance if the procedure is carried out unnecessarily.

Before performing a diagnostic Touchpoint Adaption reset procedure using an approved Land Rover diagnostic system, ensure the following conditions are applied:

- the Automatic Transmission Fluid (ATF) is at a temperature greater than 30 degrees C (86 degrees F)
- the Transmission Control switch (TCS) is in the 'Park' position
- the vehicle is stationary
- the engine is running at idle speed
- Brake pressure applied using the foot brake
- the Electric Parking Brake (EPB) is applied and held on manually to ensure it does not release when 'Drive' is selected
- no faults or Diagnostic Trouble Codes (DTCs) are present in the TCM.



NOTE: If the EPB is allowed to release, the Touchpoint Adaption reset procedure will be terminated.

When the transmission is built, it is tested at the ZF factory to determine how much electrical current is required by each Pressure Control Valve (PCV) to attain a datum engagement point. The engagement (Touchpoint) is determined by a predefined level of friction in the clutch plates.

This data is stored with the serial number of the transmission and the same data is written to the TCM fitted to that transmission. This ensures that each transmission has a uniform performance.

If the Touchpoint Adaption data is not available because the TCM or the transmission has been replaced, the Touchpoint Adaptions contained in the TCM will be incorrect for the transmission. This will result in harsh clutch engagements and could cause damage to the transmission.

Using the Touchpoint Adaptions learning routine in the approved Land Rover diagnostic system, enables the TCM to establish the Touchpoint for all the clutches. Once the Touchpoint Adaptions have been learnt, the Clutch Adaptions routine must be performed to further refine the transmission operation.

CLUTCH ADAPTIONS

When the vehicle is driven, the TCM monitors and refines the clutch pressures and engagement points to maintain smooth transition between gear changes.

After certain service operations, the Clutch Adaptions may need to be reset to restore optimum performance of the transmission.

When the vehicle is driven, the TCM monitors the gear changes. When the TCM determines that smooth and reliable changes are occurring, it initiates a Clutch Adaptions learning cycle. The learning cycle determines if higher or lower PCV pressures are required or if PCV timing can be improved to apply smoother gear change transitions. The dynamic behaviour of each clutch is monitored and can be compensated for. The TCM will also monitor static engagement when the vehicle is stationary.

The Clutch Adaptions are initially started after a reset with drive cycles including the ability to cruise at various speeds. The fully Clutch Adaptions are achieved gradually over many drive cycles.

The Clutch Adaptions ensure that the transmission provides smooth gear changes without slip for the life of the transmission. The Clutch Adaptions compensate for wear providing that the Touch Adaptions were correct for the static calibration of the transmission.

The Clutch Adaption process compensates for assembly build tolerances in the hydraulic system, mechanical tolerances of the transmission components to include friction and electrical tolerances for example resistance and inductance. All of these can affect the dynamic behaviour of the transmission.

The Clutch Adaptions ensure that the TCM is operating at its optimum operating parameters adjusted to suit the individual characteristics of the transmission. The TCM to a lesser extent, also adjusts to the characteristics of the driver and vehicle.



NOTE: Some drivers and their driving style may inhibit the Clutch Adaption process, which can lead to transmission driveability issues over a period of time.

ENGINE SPEED AND TORQUE MONITORING

The ECM constantly supplies the TCM with information on engine speed and torque through messages on the CAN powertrain systems bus. The TCM uses this information to calculate the correct and appropriate timing of shift changes.

If the messages are not received from the ECM, the TCM will implement a back-up strategy to protect the transmission from damage and allow the vehicle to be driven.

In the event of an engine speed or torque signal failure, the transmission will adopt the electrical limp home mode with the transmission operating in a fixed gear.

TOWING FOR RECOVERY



WARNING: Ensure that the remote handset remains in the vehicle whilst the vehicle is being recovered. Removing the remote handset will engage the steering lock, which will prevent the vehicle from steering correctly.

If the engine cannot be run whilst the vehicle is being recovered, there will be no power assistance for the steering or brakes. This will result in greater effort being required to steer or slow the vehicle.



CAUTION: The vehicle should not be towed more than required to load to a trailer or recovery vehicle.

NOTES:



The recommended recovery method is by trailer or recovery vehicle.



Where recovery to a vehicle or trailer is not possible (for example vehicle is off-road), the vehicle can be towed with all 4 wheels on the ground for a distance of up to 10 km (6.2 miles) at a speed no greater than 25 Km/h (15 mph). The Service Park Release (SPR) procedure must be used to disengage the park lock.

Secure the towing attachment from the recovery vehicle to the front towing eye.

Ensure the remote handset is in the vehicle and switch on the ignition (power mode 6) by pressing the start/stop button once.



NOTE: Leaving the ignition switched on for extended periods will cause the battery to drain.

The Service Park Release (SPR) procedure must be used to disengage the park lock.

Release the electric park brake.

Tow the vehicle onto the trailer or recovery vehicle.

Apply the electric park brake and manually disengage the SPR, remove the pin and ensure the park lock lever is in the correct position to engage the park lock.

Switch off the ignition (power mode 4) and remove the remote handset from the vehicle.



CAUTION: The vehicle cannot be towed in a reverse direction.

SYSTEM OPERATION

Operation of the transmission is controlled by the **TCM**, which electrically activates various solenoids to control the transmission gear selection. The sequence of solenoid activation is based on programmed information in the **TCM** memory and physical transmission operating conditions such as vehicle speed, throttle position, engine load and rotary **TCS** position.

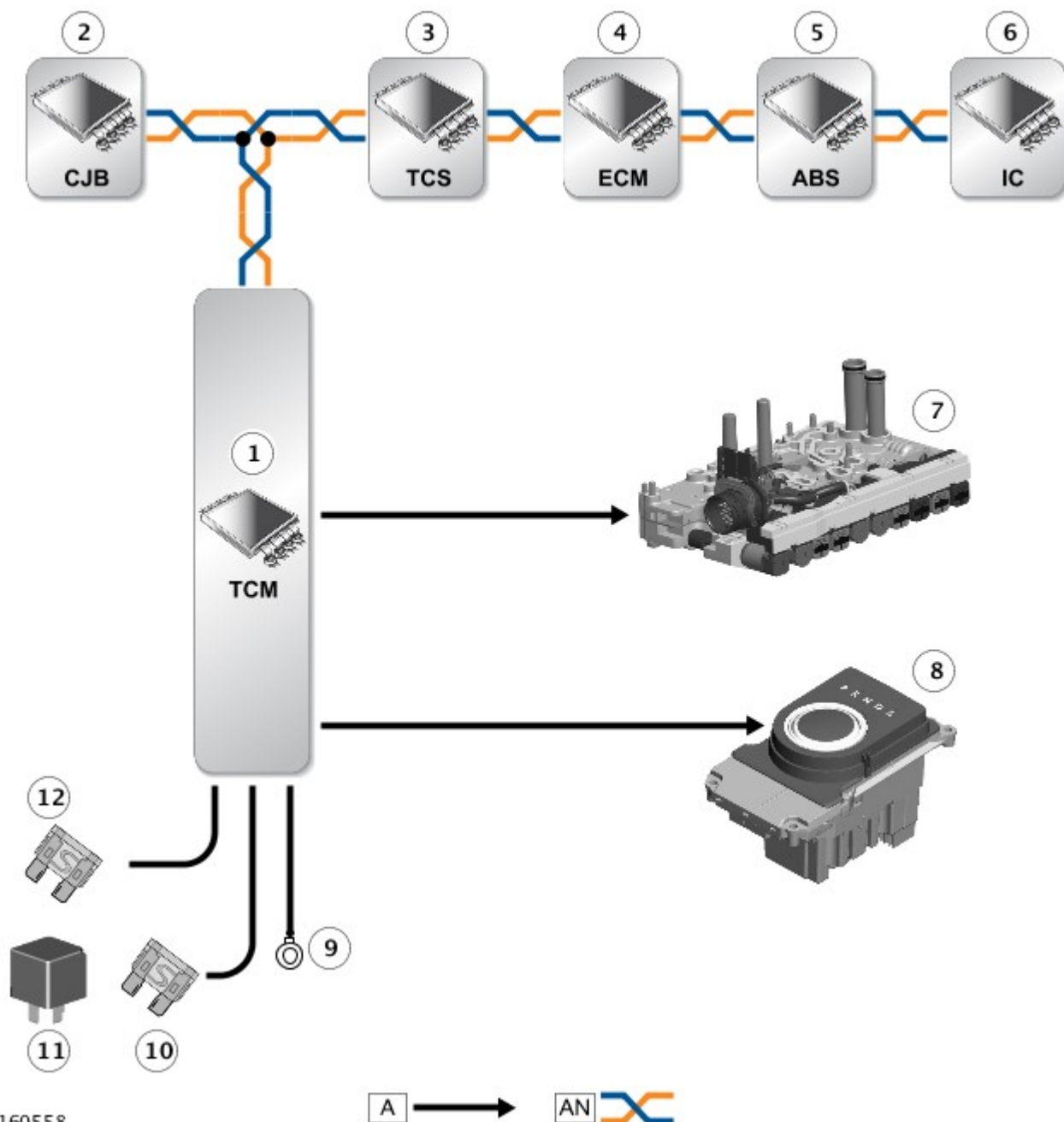
Engine torque is transferred, via operation of combinations of clutches to the planetary gear trains. The gear trains are controlled by reactionary inputs from brakes and clutches to produce the 9 forward gears and 1 reverse gear.

The shift elements (clutches and brakes) are actuated hydraulically. Fluid pressure is applied to the required clutch and/or brake, pressing the plates together and allowing drive to be transmitted through the plates. The purpose of the shift elements is to perform power-on shifts with no interruption to traction and smooth transition between gear ratios.

CONTROL DIAGRAM



NOTE: **A** = Hardwired; **AN** = High speed CAN Powertrain systems



Item	Description
1	Transmission Control Module (TCM)
2	Central Junction Box (CJB)
3	Transmission Control Switch (TCS)
4	Engine Control module (ECM)
5	Anti-lock Brake System (ABS) control module
6	Instrument cluster
7	Valve block
8	Transmission Control Switch (TCS)
9	Ground
10	Fuse - ignition supply from ignition relay
11	Ignition relay (CJB)
12	Fuse - Permanent battery supply

Published: 01-Oct-2013

Automatic Transmission/Transaxle - Transmission Fluid Level Check

General Procedures

Check

WARNINGS:



Be prepared to collect escaping fluids.



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



CAUTION: Vehicle must be horizontal during this operation.




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

1. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

2. Connect the Land Rover equipment.

3. Start and run the engine.


4. Select terrain response mode. Grass/Gravel/Snow.

5.  WARNING: Make sure that all four wheels are off the ground for this step.




NOTE: Move the transmission control switch (TCS) from D to S then using the steering paddles pause in each gear for a minimum 10 seconds until you reach 4th gear. (max 2000rpm)

Using the diagnostic equipment monitor the transmission fluid temperature until 35 degrees celsius is reached.

6.  CAUTION: Decelerate the wheels until they stop, then turn the (TCS) back into the P position.

Make sure that torque converter is full of oil by raising the engine speed to 2000rpm for 10 seconds, return to idle speed.

7.  CAUTION: Engine must be running to carry out the fluid level check.

8. CAUTIONS:



Transmission fluid temperature must not exceed 45 degrees celsius.



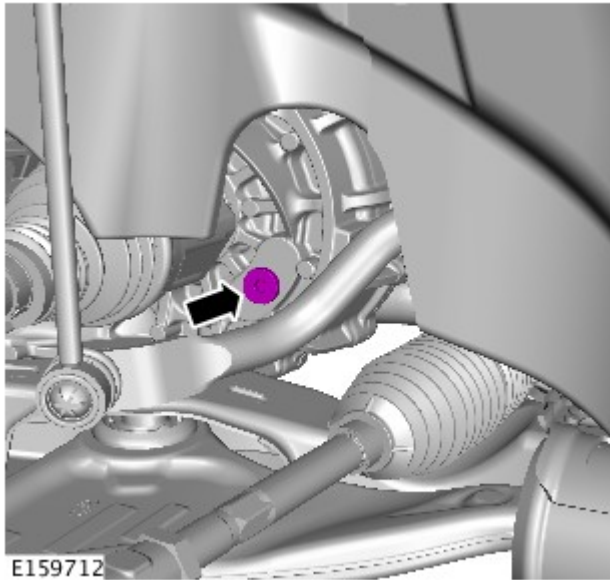
Discard the sealing plug.



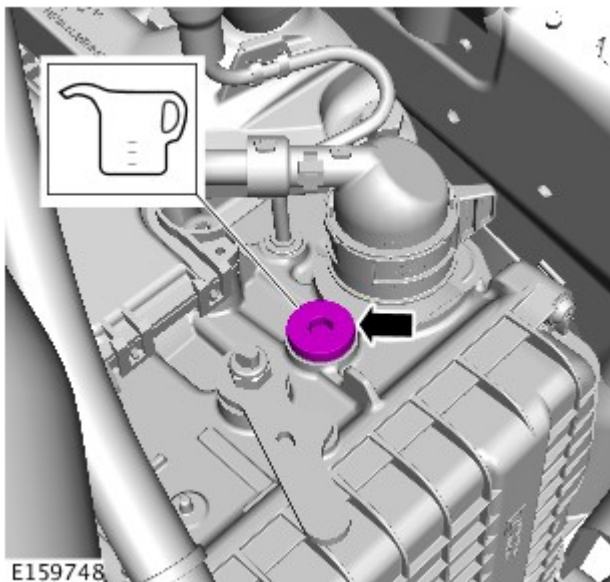
Drain the fluid into a suitable container.



NOTE: With the engine running a small amount of automatic transmission fluid should drip out of the level plug.



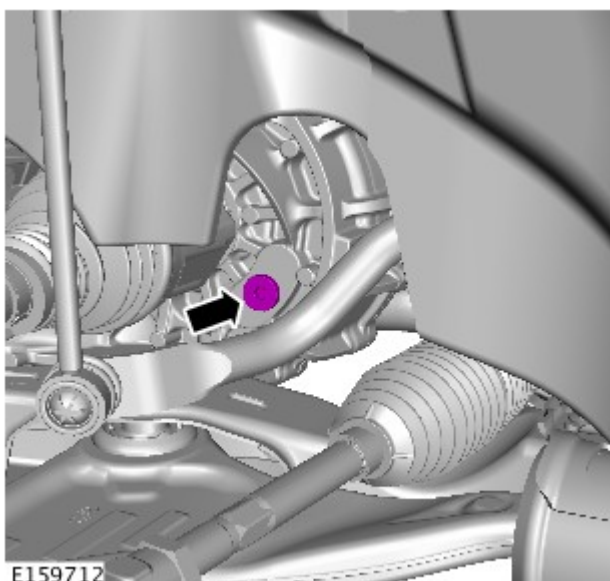
When transmission fluid temperature reaches 37 degrees celsius, remove the level plug and wait until oil stops dripping out.



9.  **CAUTION:** Install a new sealing plug.

If the transmission fluid does not come out of the transmission fluid level plug hole the transmission fluid level is insufficient. If this is the case add the transmission fluid in 0.5 litre units into the transmission fluid fill plug hole until fluid comes out.

Torque: 35 Nm



10.  **CAUTION:** Install a new sealing plug.

 **NOTE:** If the temperature has exceeded 45 degrees celsius before the plug is re-fitted, you must start the procedure again.

Torque: 35 Nm

11. Switch off the engine.

12. Remove the container.

13. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).



14. Lower the vehicle.

15. Disconnect the diagnostic tool.

Automatic Transmission/Transaxle - Transmission INGENIUM I4 2.0L Diesel

Installation

Special Tool(s)

 303-021	303-021 Engine support bracket
 E136268	JLR-303-1591 Lifting Bracket, Engine - Rear

NOTES:



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

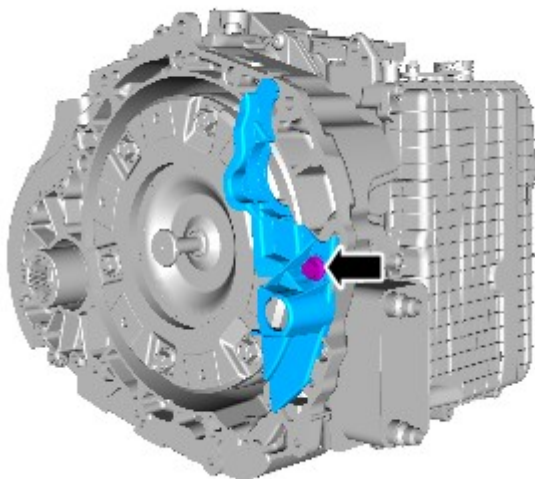


Some illustrations may show the transmission removed for clarity.

1.



NOTE: Remove the torque converter retainer.

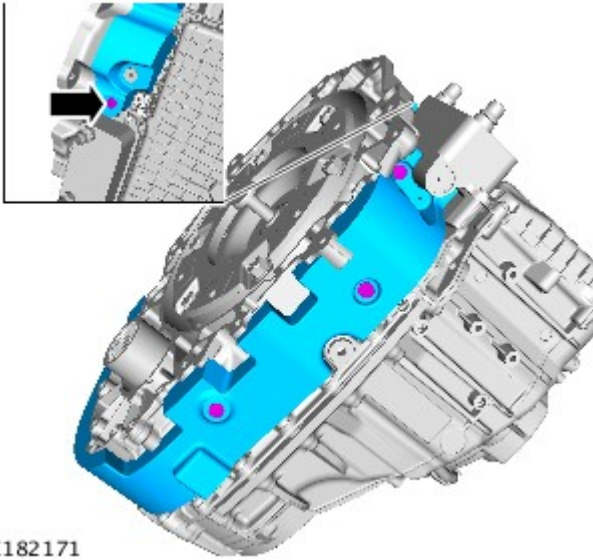


E182253

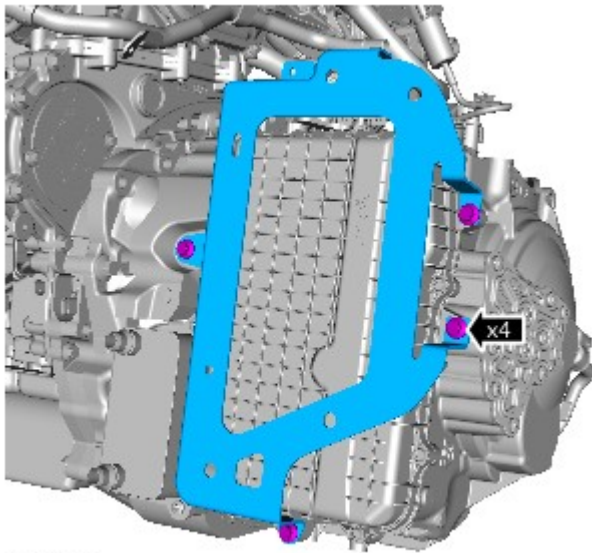
2.



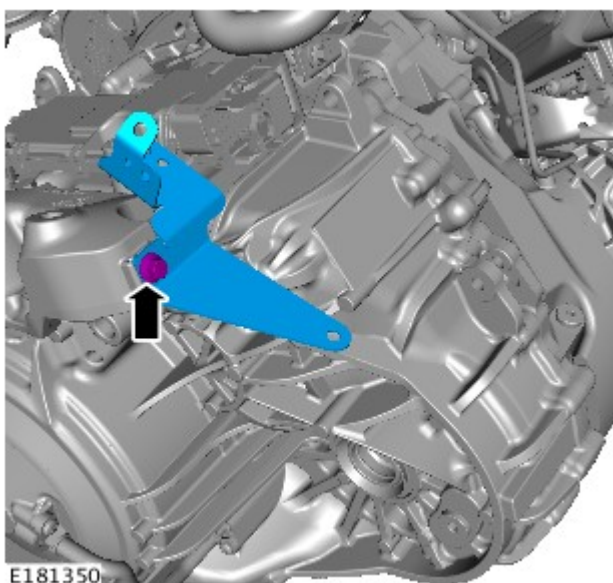
NOTE: This step is only required if a new component is installed.



E182171



E181661



E181350

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

Torque: 10 Nm

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

Torque: 10 Nm

5. NOTES:



This step only applies to vehicles from the following markets; China all MY, Taiwan all MY and Gulf 18MY onwards.

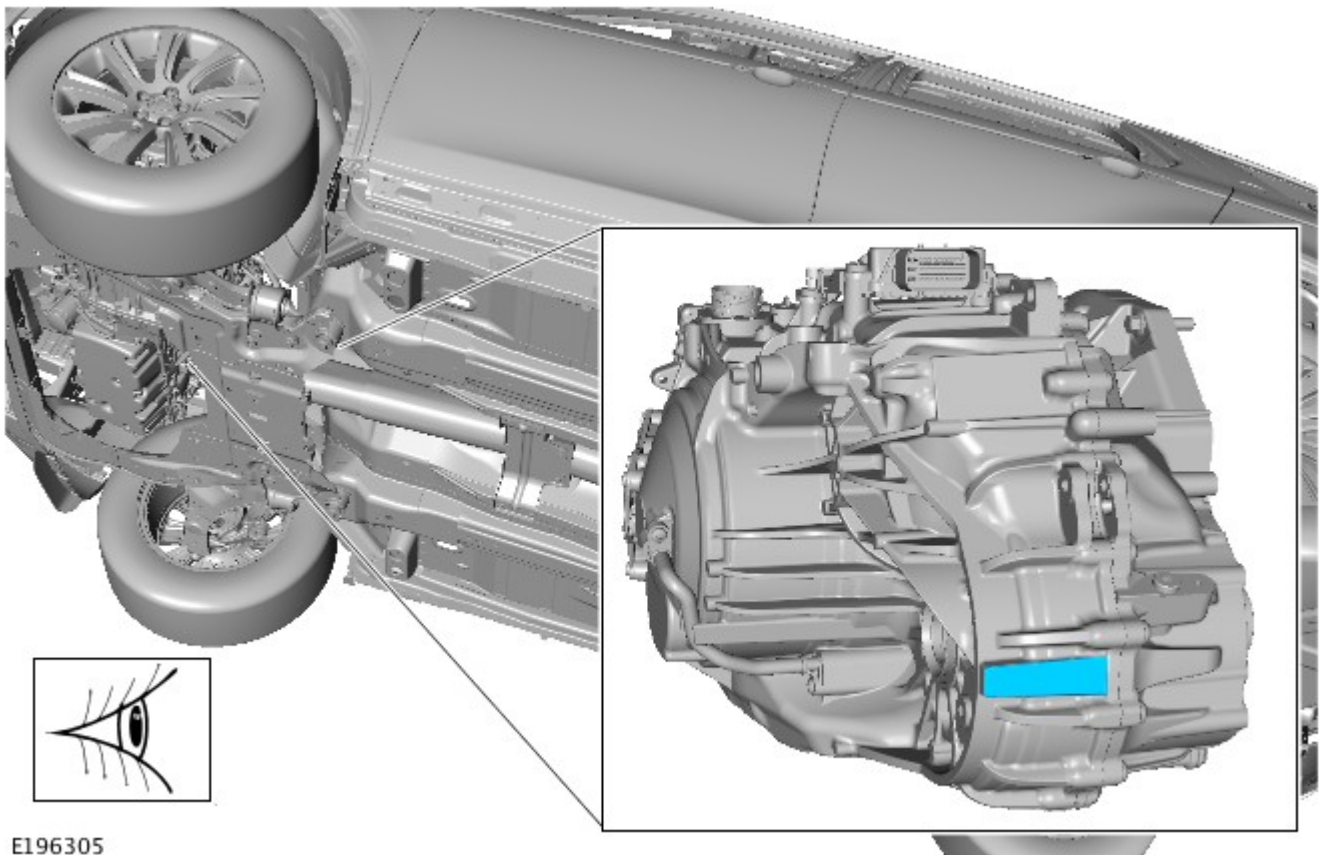


Make sure that the transmission anti-theft label is fitted evenly and has no bubbles or folds. It must not be fitted over the curvature of the transmission casing.

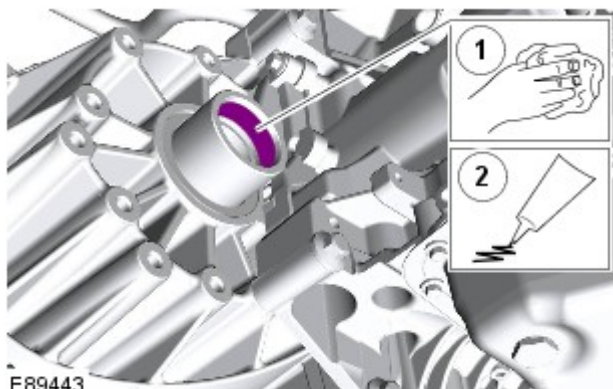


Before installing the transmission inspect the highlighted area, If no transmission anti-theft label is fitted, proceed with the following steps;

1. Make sure the VIN number on the label matches the VIN number of the vehicle.
2. Using a suitable cleaning fluid thoroughly clean the highlighted area of the transmission.
3. Install the transmission anti-theft label to the highlighted area.



E196305



E89443

6. CAUTIONS:



Make sure that the component is clean, free of foreign material and lubricant.



Apply the correct specification and quantity of grease.

Refer to: [Specifications](#) (307-01 Automatic Transmission/Transaxle, Specifications).

7. WARNINGS:



This step requires the aid of another technician.



Make sure that the transmission is secured with suitable retaining straps.



Make sure the torque converter remains with the transmission.

CAUTIONS:



Make sure the torque converter is fully located into the oil pump drive.



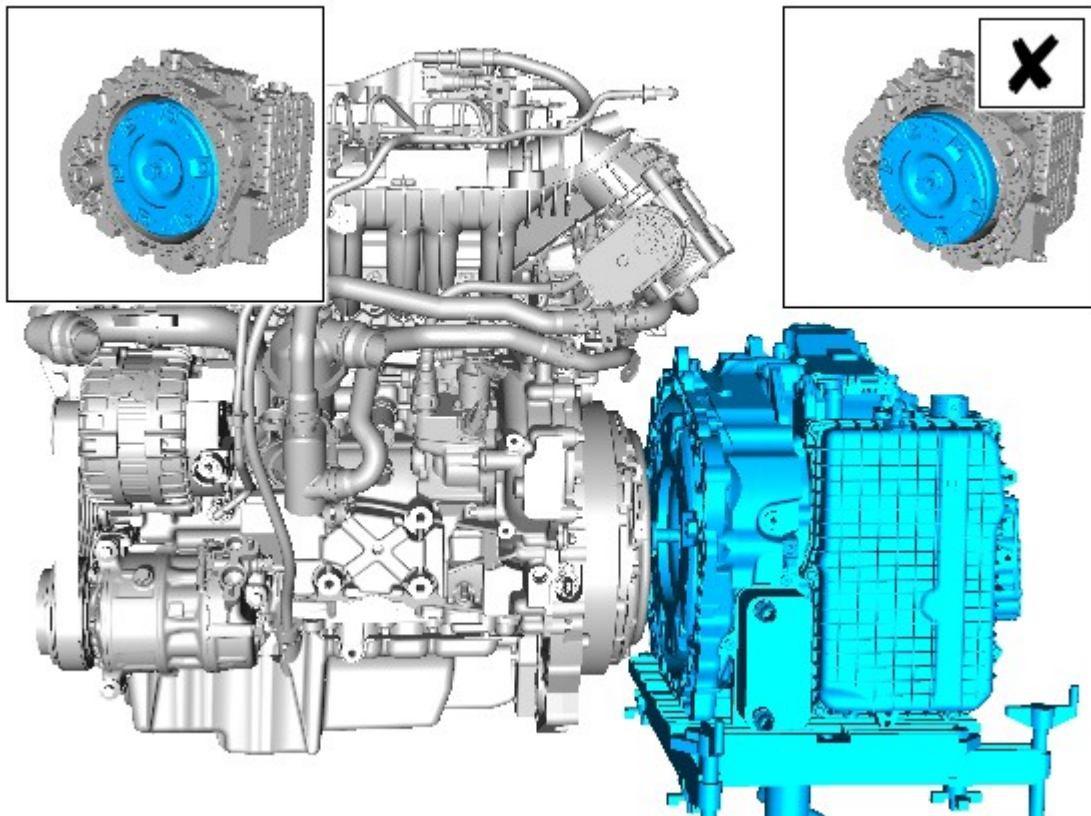
Apply grease of the correct specification to the torque converter spigot.



Make sure that the component is correctly located on the locating dowels.

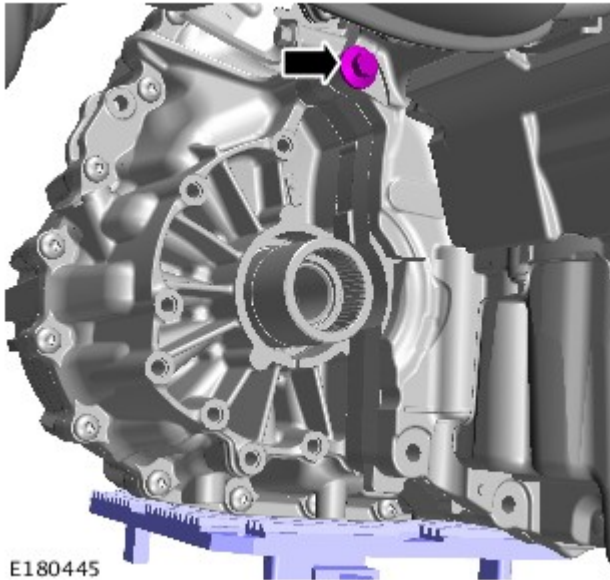


Make sure that the mating faces are clean and free of foreign material.

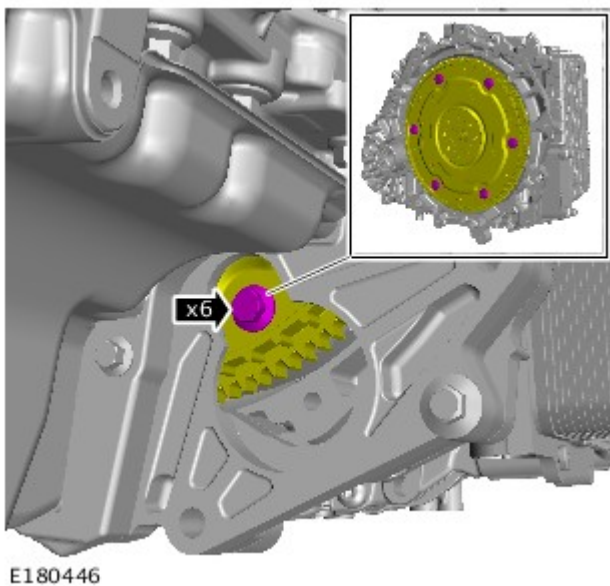
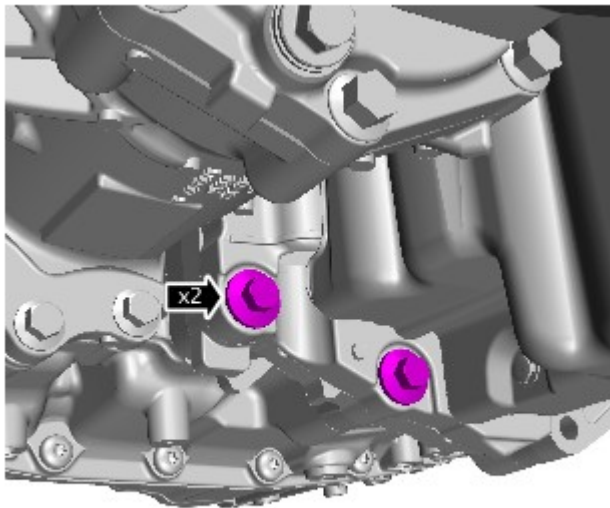


E182187

8. Torque: 65 Nm



9. Torque: 65 Nm



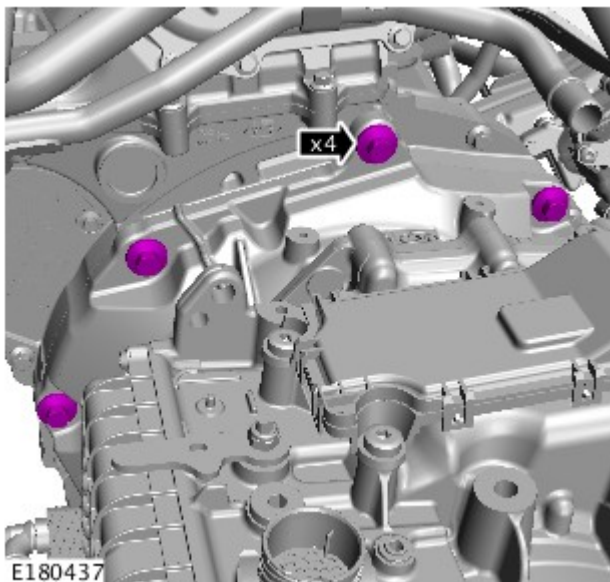
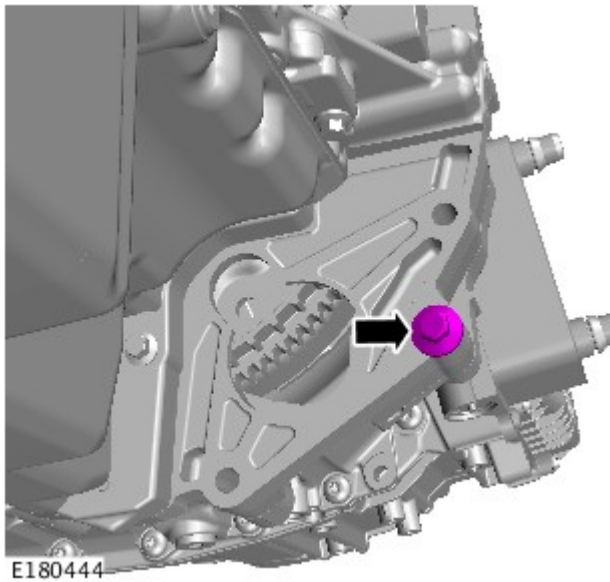
10. CAUTIONS:

⚠ Make sure that new bolts are installed.

⚠ Only rotate the crankshaft clockwise.

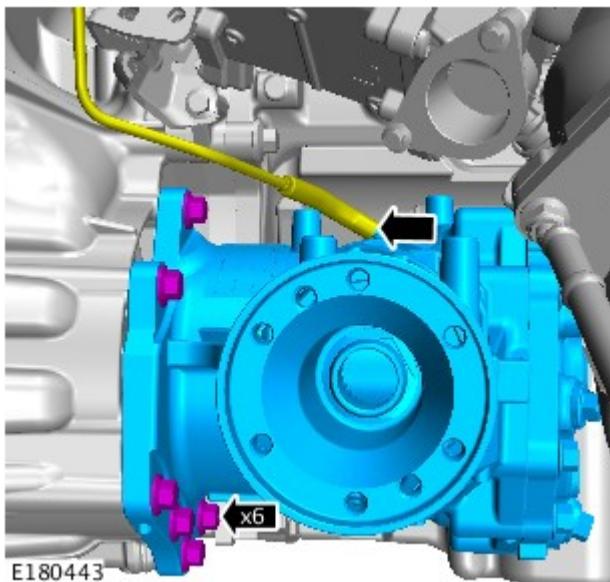
Torque: 62 Nm


11. Torque: 65 Nm



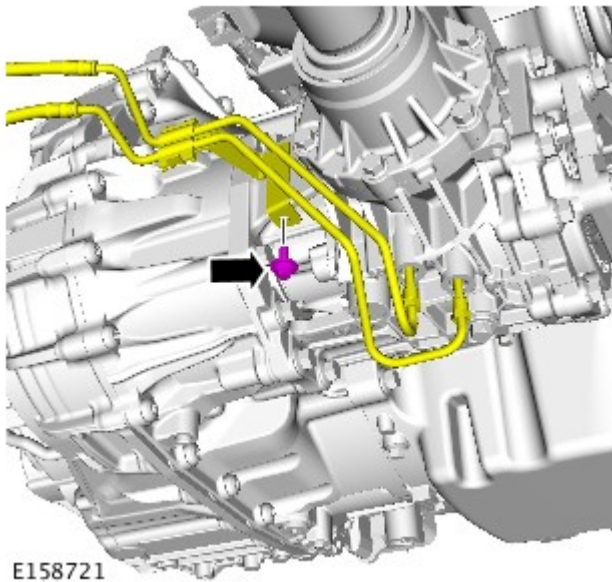
12. Torque: 65 Nm


13. Remove the transmission jack.



14.  CAUTION: Be prepared to collect escaping fluids.

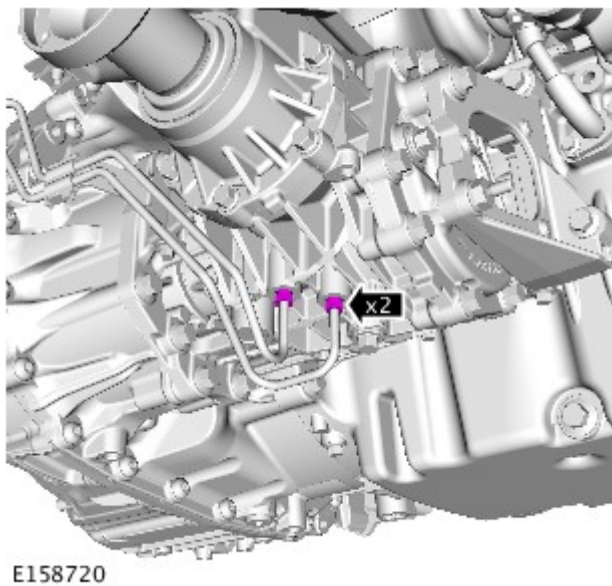
Torque: 60 Nm



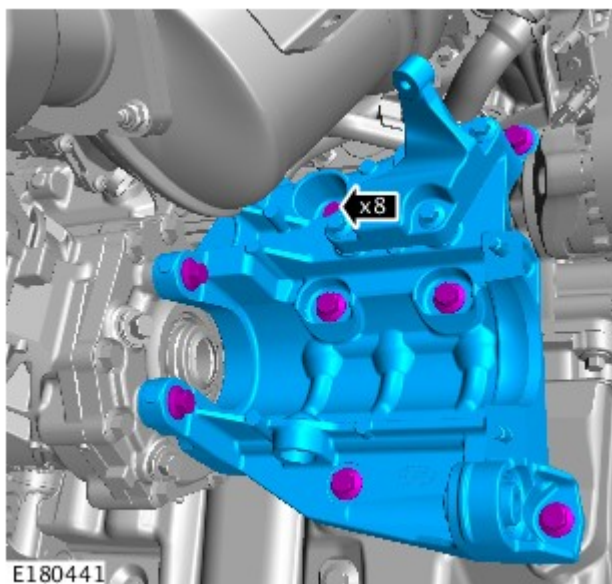
15.  **CAUTION:** Be prepared to collect escaping fluids.

 **NOTE:** :Remove and discard the blanking caps.

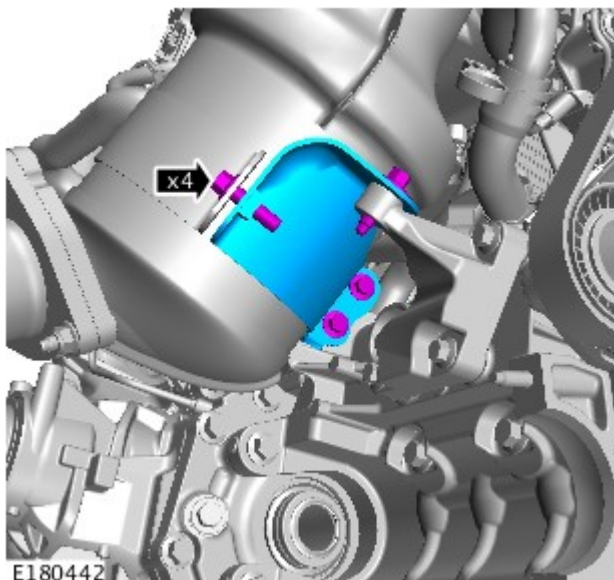
Torque: 12 Nm



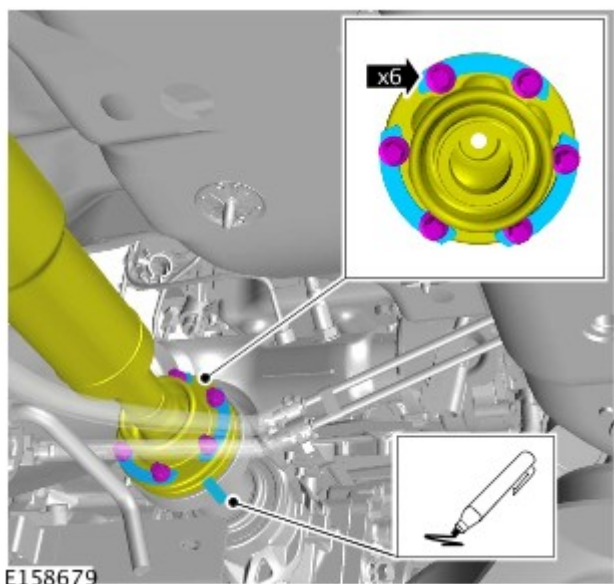
16. Torque: 4 Nm



17. Torque: 60 Nm



18. Torque: 24 Nm



19. CAUTIONS:



Make sure that new bolts are installed.



Make sure that the installation marks are aligned.



NOTE: Tighten the retaining bolts working diagonally.

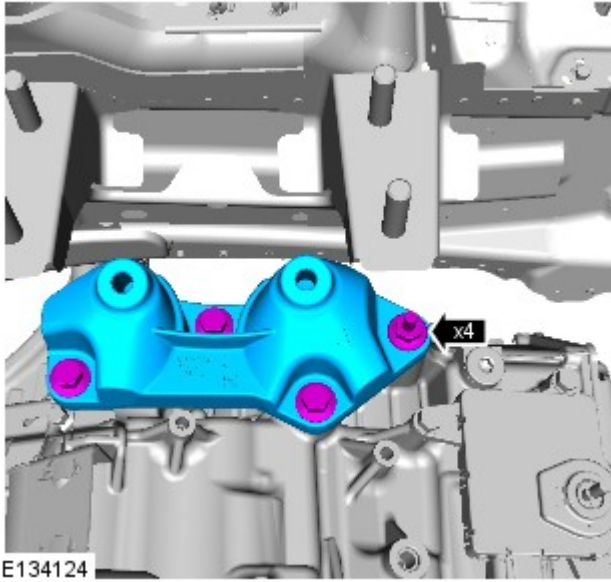
Torque: 40 Nm

20. Refer to: [Front Halfshaft RH - RHD AWD/LHD AWD](#) (205-04 Front Drive Halfshafts, Removal and Installation).

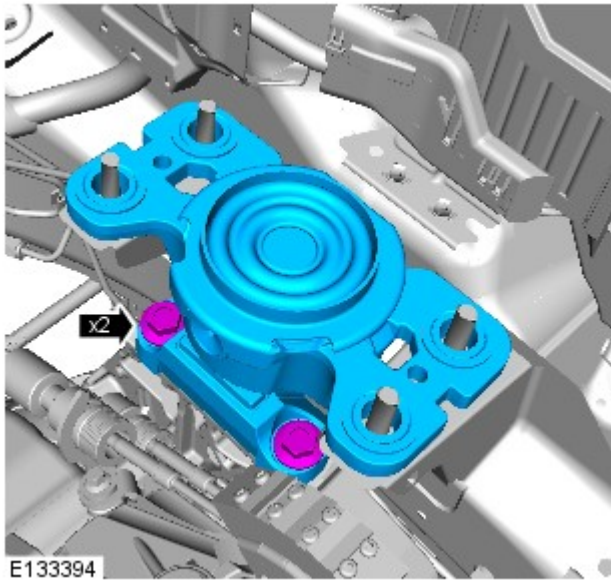
21. Refer to: [Front Halfshaft LH](#) (205-04 Front Drive Halfshafts, Removal and Installation).

22. Lower the vehicle.

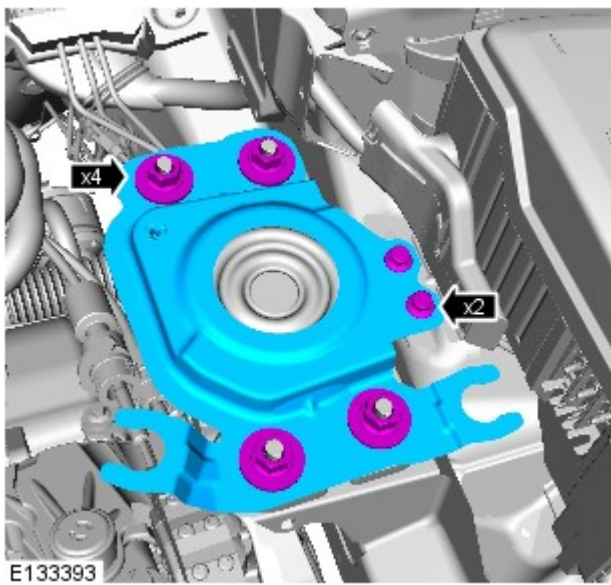
23. Torque: 80 Nm



24. Torque: 175 Nm

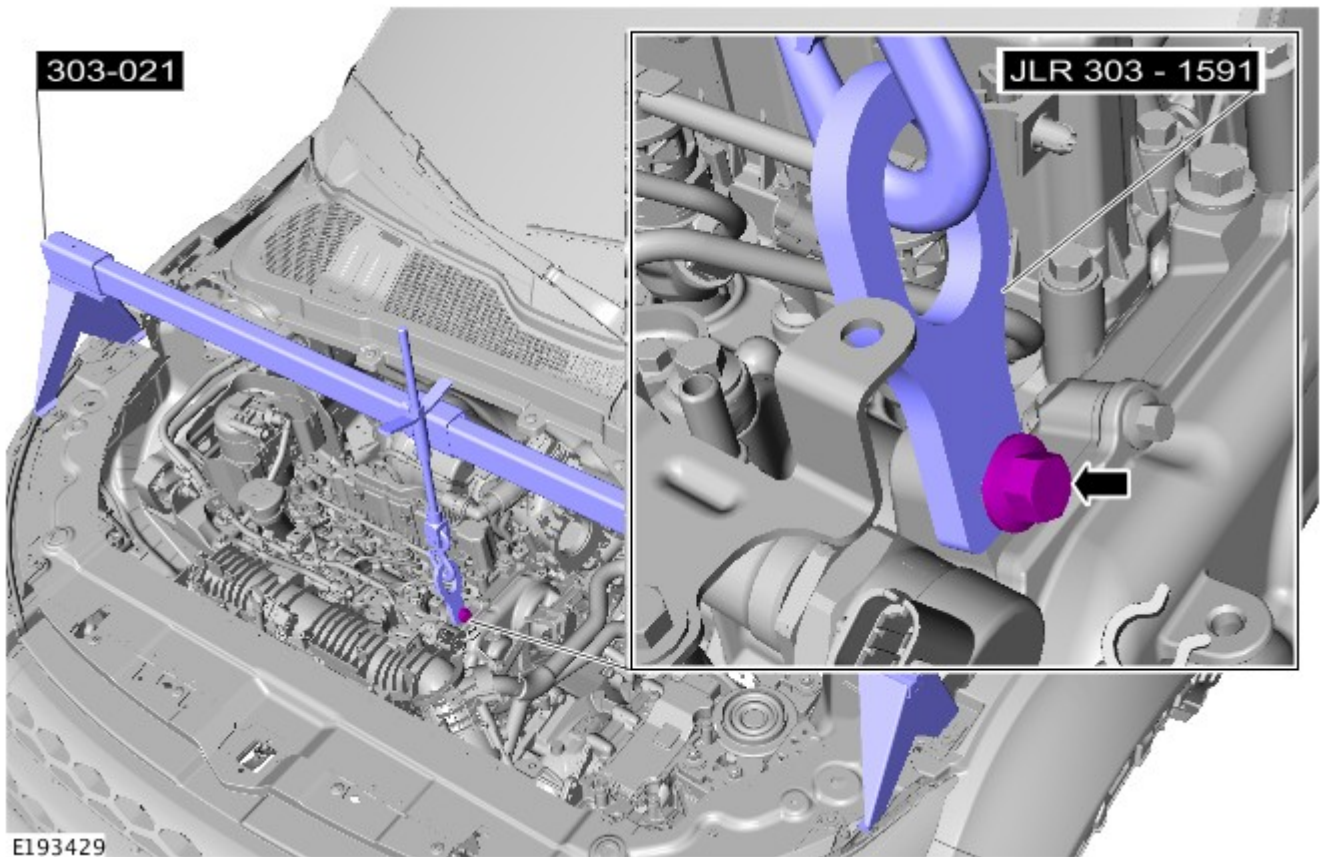


25. Torque:
M8 24 Nm
M12 80 Nm

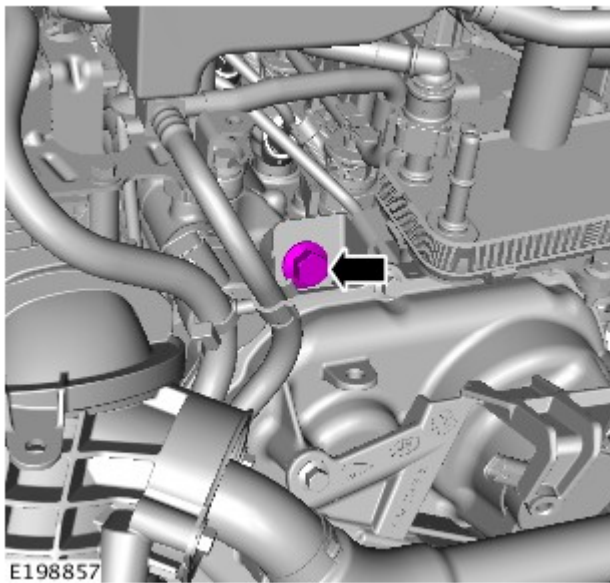


26. Support the engine.

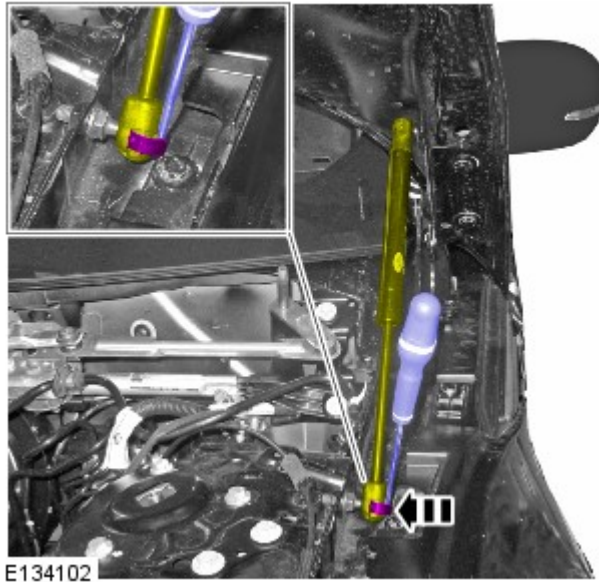
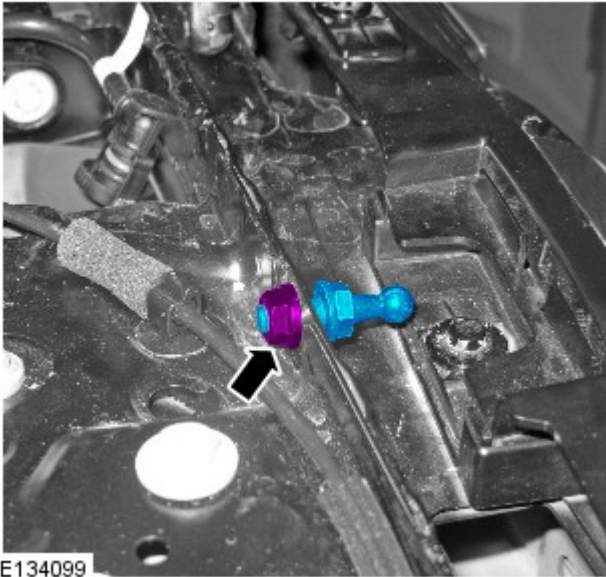
Remove the Special Tool(s): [303-021](#) , [JLR-303-1591](#)



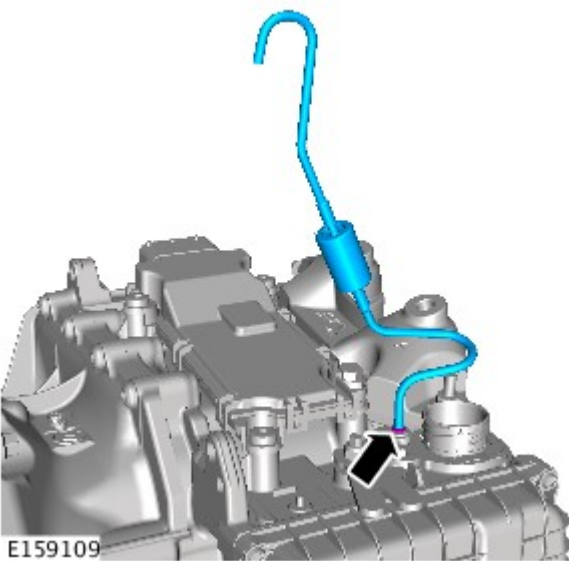
27. Torque: 50 Nm




28. Repeat the above step for the other side.

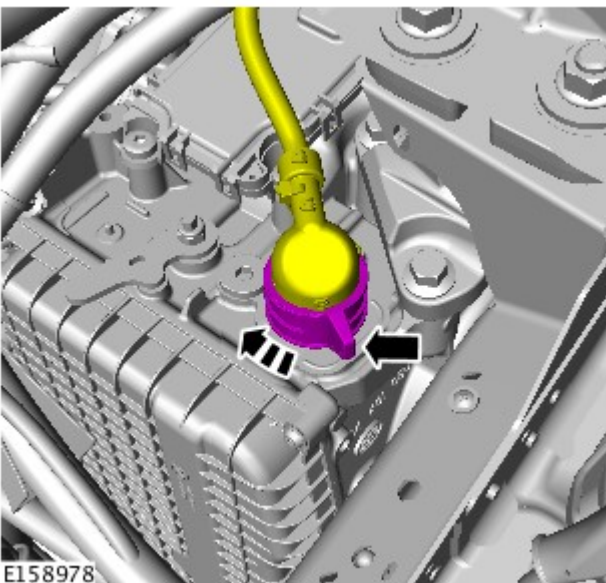
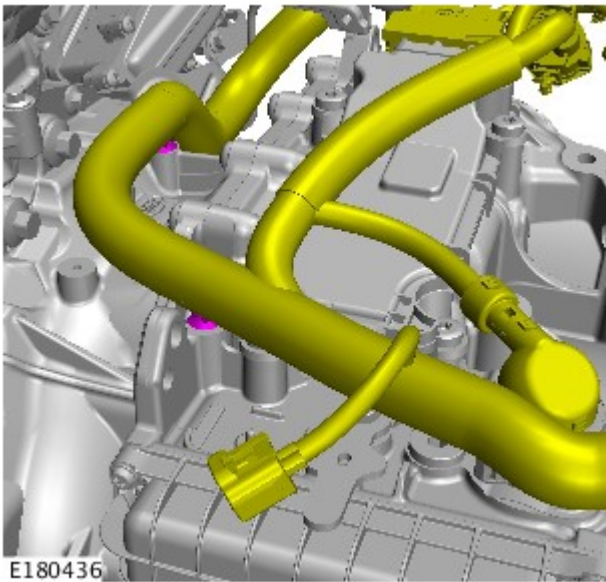
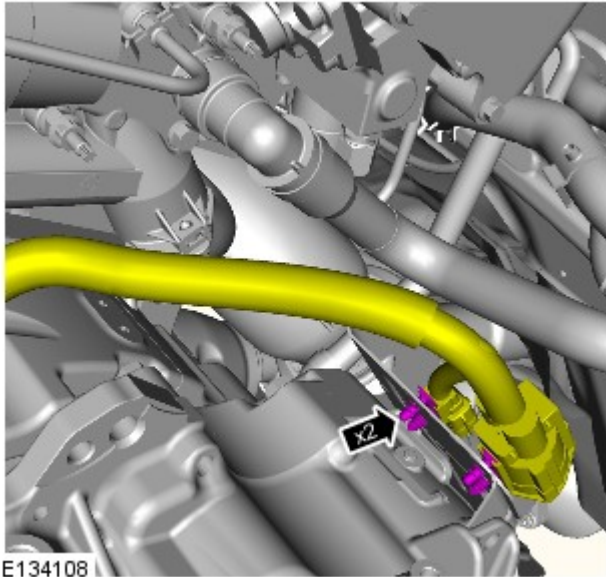


- 29.
- Repeat the above step for the other side.




30.  **CAUTION:** To prevent water ingress and subsequent transmission damage, make sure that the breather is fully pushed home into the transmission casing. The white line around the circumference of the pipe should not be visible when correctly installed.

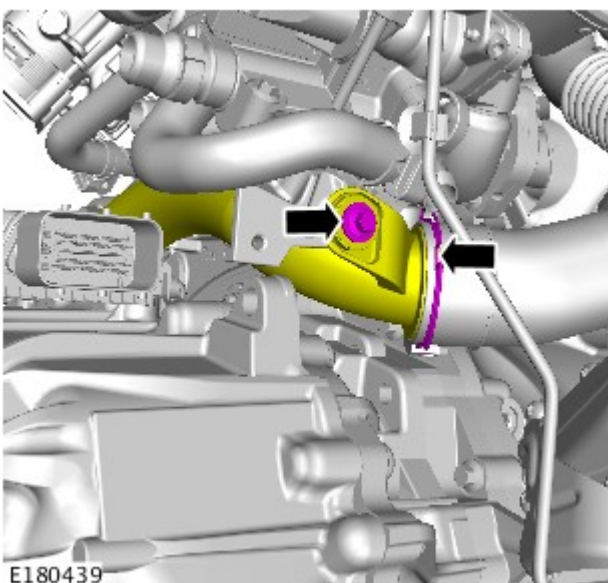
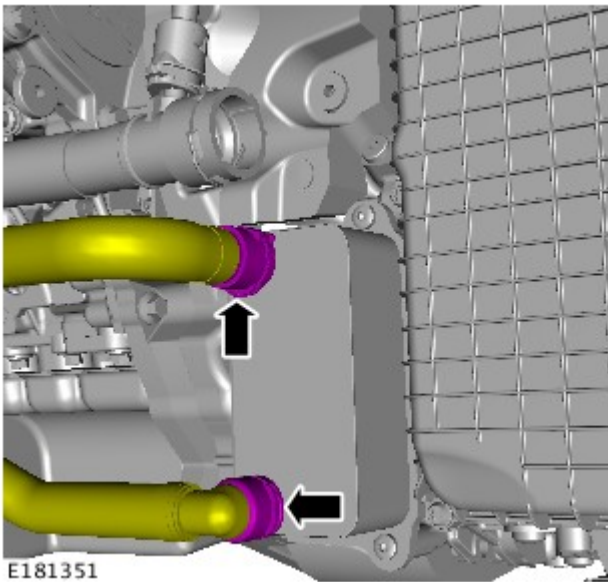
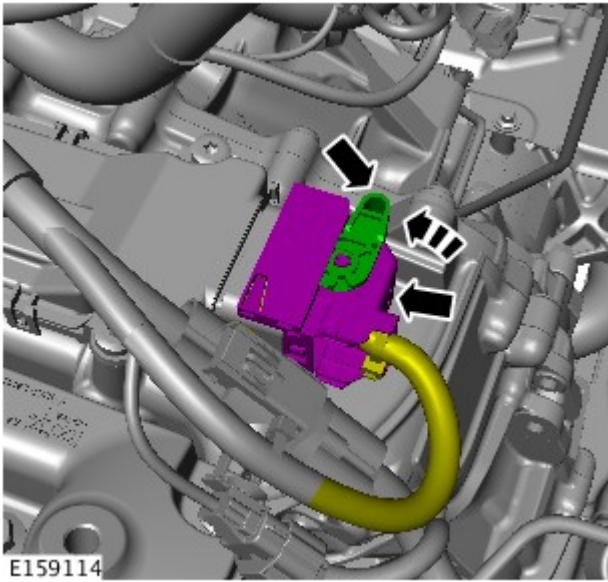
- 31.




32.

33.  NOTE: Make sure the electrical connector is correctly secured.

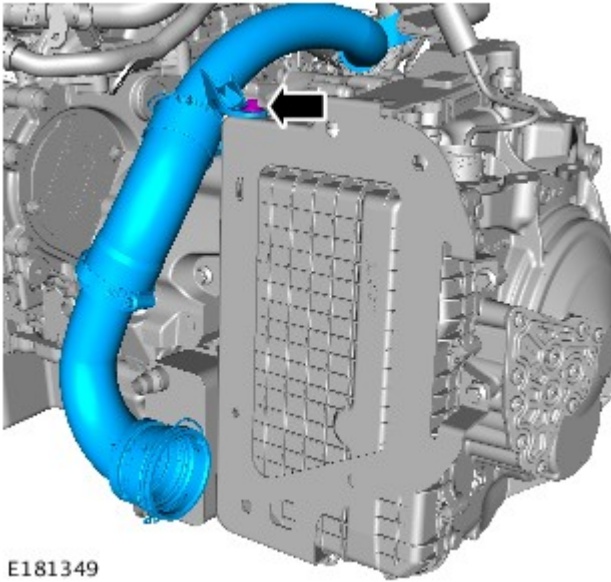
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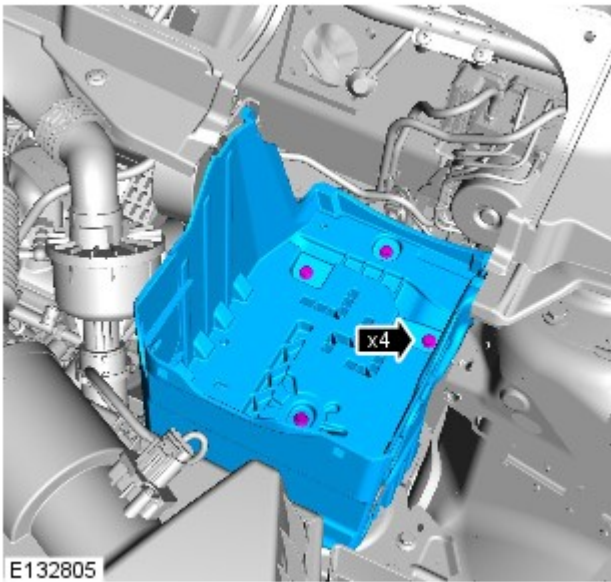
35.  CAUTION: Be prepared to collect escaping coolant.

36. Torque: 8 Nm

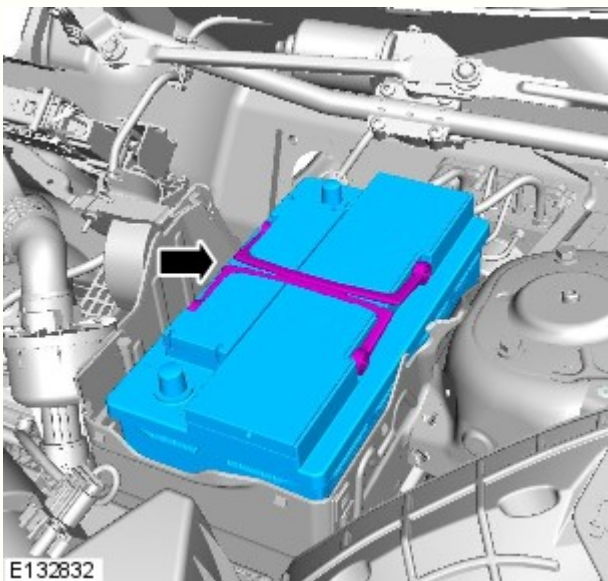
- 37.



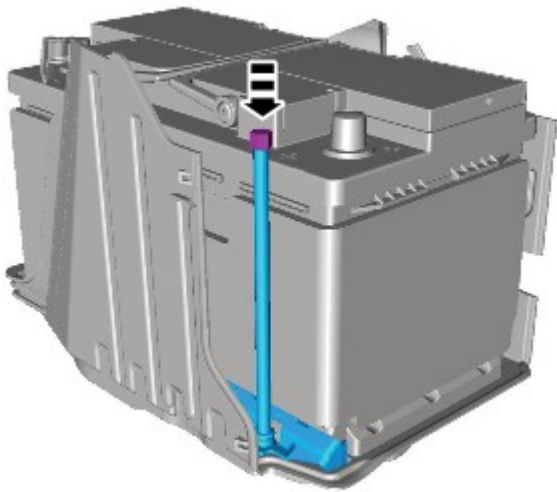
38. Torque: 10 Nm



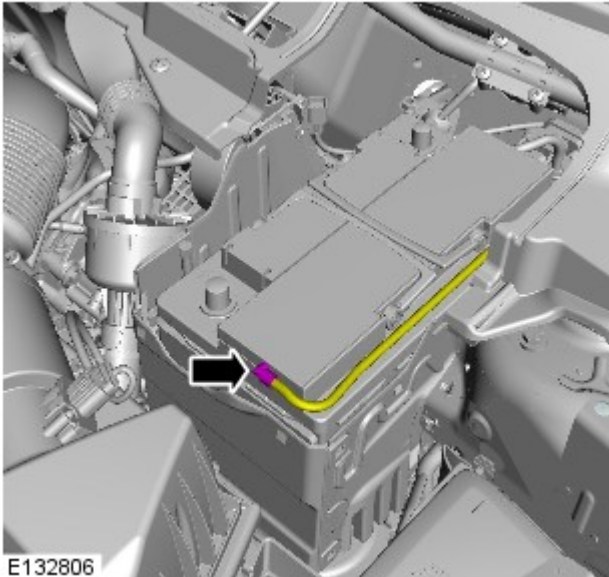
39.



40. Torque: 12 Nm

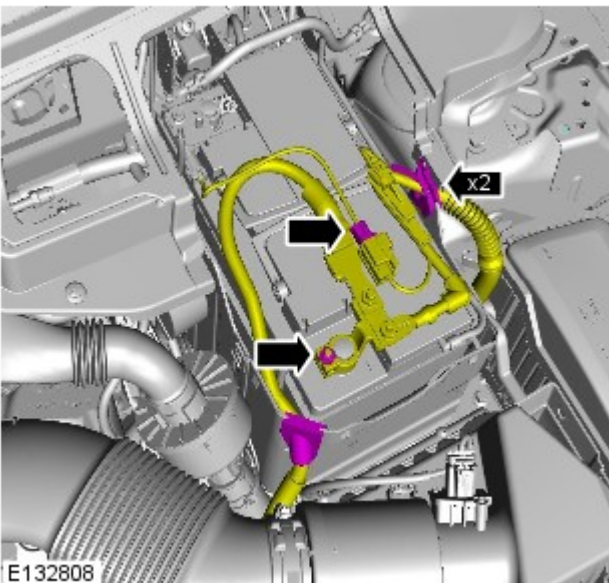


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E132806

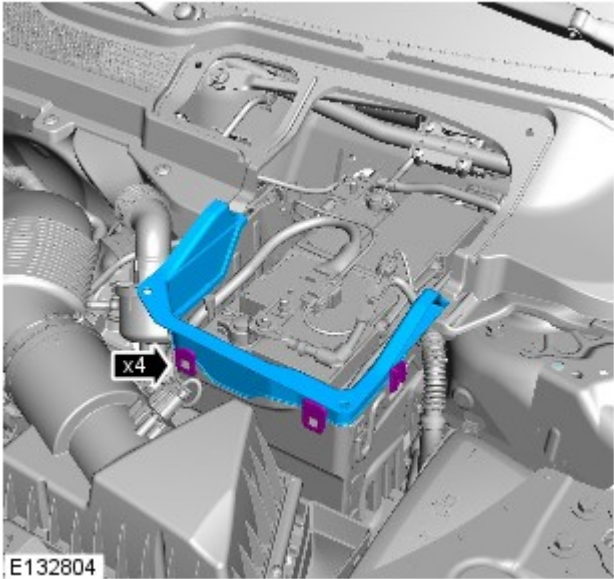
41.



E132808

42.

43.



44. Refer to: [Starter Motor](#) (303-06A Starting System - INGENIUM I4 2.0L Diesel, Removal and Installation).

45. Refer to: [Plenum Chamber](#) (412-01 Climate Control, Removal and Installation).

46. Refer to: [Charge Air Cooler](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

47. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

48. Refer to: [Engine Cover - INGENIUM I4 2.0L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

49. Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

50. Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

51. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

52. If a new component has been installed, configure using Land Rover approved diagnostic equipment.

Published: 02-Oct-2015

Automatic Transmission/Transaxle -

Maintenance

 **CAUTION:** Use only shell L12108 (ZF Lifeguard 8) Automatic transmission fluid. Use of any other fluids may result in a transmission malfunction or failure.

Description	Intervals
-------------	-----------

Normal maintenance	Filled for life.
Severe duty maintenance	Change the fluid at 48,000 km (30,000 miles) intervals.

Capacities

	Litres
Transmission Fluid	6.5

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
9HP48 Transmission fluid	Shell L12108 (ZF Lifeguard 8)
Metal surface cleaner	WSW-M5B392-A
High temperature grease	Molecote FB180
Connection sleeve grease	IYX500050

Torque Specifications

Description	Nm	lb-ft	lb-in
Main control valve body retaining bolts	8	-	71
Transmission control module	24	18	-
Torque converter retaining nuts	60	44	-
Transmission fluid cooler retaining bolts	10	-	88
Transmission fluid level plug	35	26	-
Transmission fluid drain plug	35	26	-
Transmission fluid fill plug	35	26	-
Transmission fluid pan retaining bolts	9	-	79
External oil feed pipe retaining bolts	10	-	88
Transmission end cover retaining bolts	10	-	88

Torque Specifications


Transmission Bolts	Nm	lb-ft	lb-in
Diesel transmission retaining bolts	60	44	-
Petrol transmission retaining bolts	48	35	-

Published: 12-Aug-2016

Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel - Charge Air Cooler

Removal and Installation

Removal

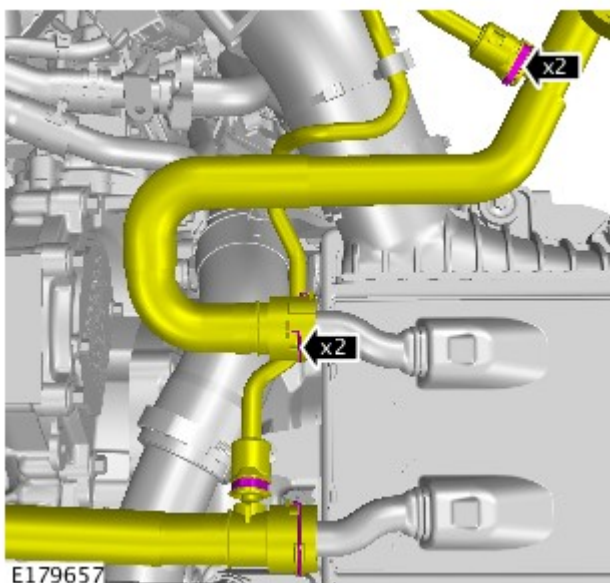
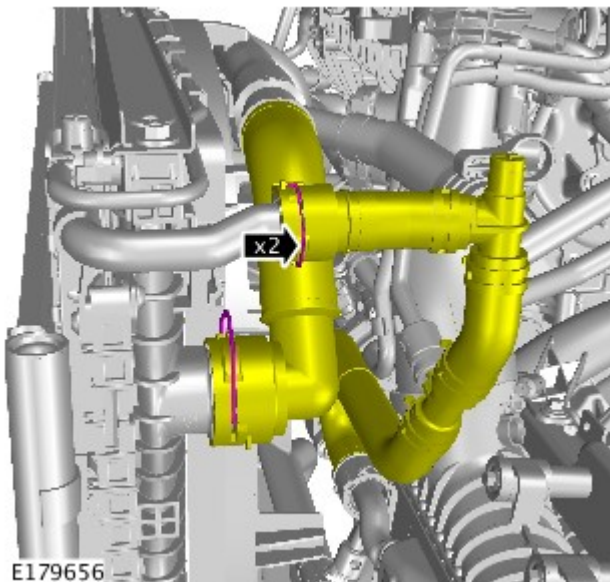
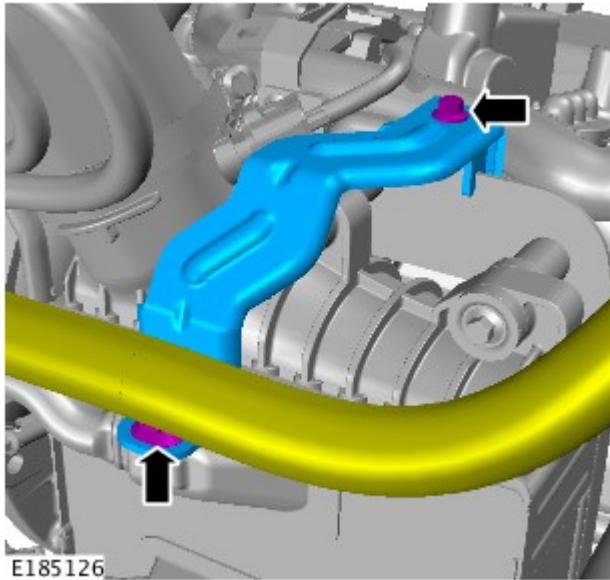
1.  **WARNING:** Make sure to support the vehicle with axle stands.


Raise and support the vehicle.


2. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV, General Procedures).

3. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

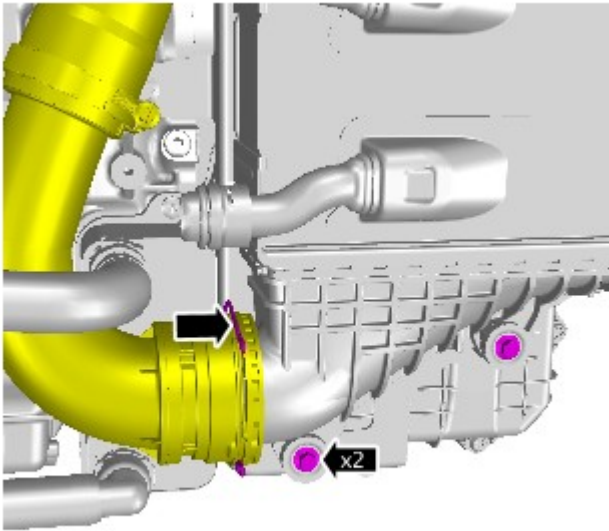
4.



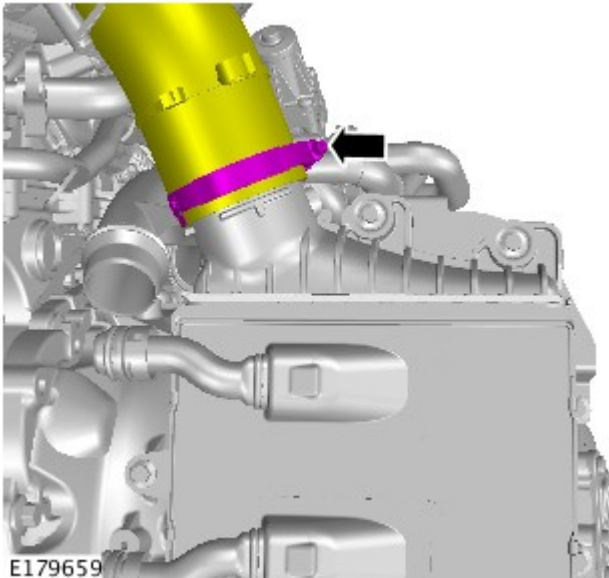
5.  CAUTION: Be prepared to collect escaping coolant.

6.  CAUTION: Be prepared to collect escaping coolant.

7. Torque: 7 Nm

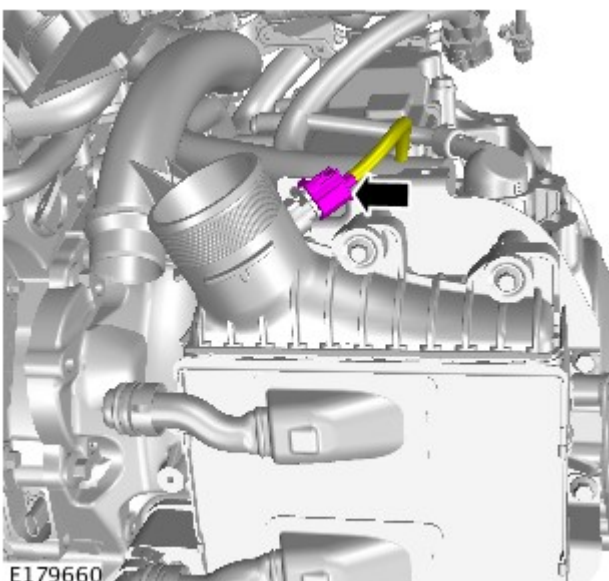


E179658



E179659

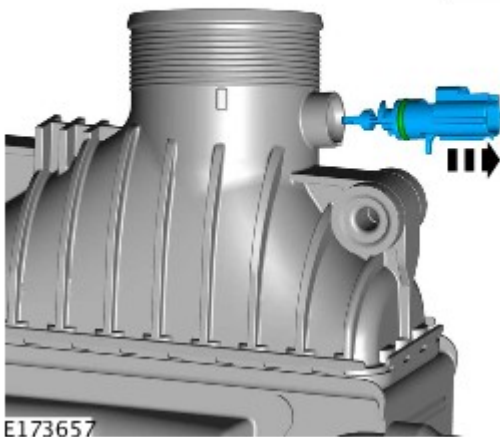
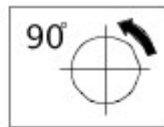
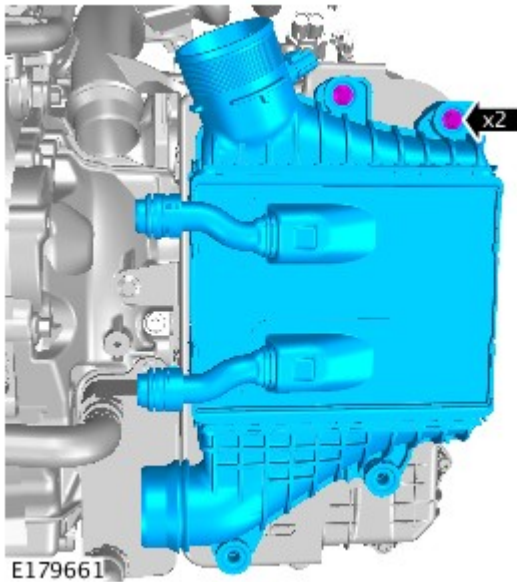
8.




E179660

9.

10. Torque: 7 Nm



11.  **CAUTION:** Remove and discard the O-ring seals.

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

Installation

1.  **CAUTION:** Install a new O-ring seals.

To install reverse the removal procedure.

Published: 30-Sep-2014

Battery, Mounting and Cables -

General Specification - Stop-start and timed climate models:

Item	Specification
Battery:	
Type	H7 AGM (VRLA)
Capacity	80Ah/800CCA

General Specification - All except stop-start and timed climate models

Item	Specification
Battery:	
Type	H7 Flooded
Capacity	80Ah/700CCA

Battery Disconnect/Connect



CAUTION: The vehicle status must be established before attempting battery disconnect/connect. Reference must be then made to the following table to establish the relevant procedure to be followed.



NOTE: Make a note of the customers radio preset stations.

Vehicle status	Procedure
Vehicle without Telematics	1
Vehicle with Telematics	2

Procedure 1

Disconnect battery	Connect battery
1. Chock the wheels	1. Make sure that all electrical loads are switched OFF
2. Open the hood	2. Connect battery ground cable to the battery - 6Nm
3. Remove the battery cover	3. Connect the BMS electrical connector
4. Disconnect the engine wiring harness ground connector/terminal	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the battery ground to starter motor connector/terminal (if equipped)	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery monitoring system (BMS) module electrical connector	6. Install the battery cover
7. Disconnect the battery ground cable from the battery	7. Close the hood
	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work

Procedure 2

Disconnect battery	Connect battery
1. Make sure the customer has placed stolen vehicle tracking into Service Mode (if equipped)	1. Make sure that all electrical loads are switched OFF
2. Chock the wheels	2. Connect battery ground cable to the battery - 6Nm
3. Open the hood	3. Connect the BMS electrical connector
4. Remove the battery cover	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the engine wiring harness ground connector/terminal	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery ground to starter motor connector/terminal (if equipped)	6. Install the battery cover
7. Disconnect the battery monitoring system (BMS) module electrical connector	7. Close the hood
8. Disconnect the battery ground cable from the battery	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work
	12. Request stolen vehicle tracking removed from Service Mode (if equipped)

Torque Specifications

Item	Nm	lb-ft	lb-in
Vehicle body brace retaining bolts	25	18	-
Battery terminal nuts	6	-	53
Battery ground terminal nut - battery to starter motor retaining stud (if equipped)	10	7	-
Battery tray retaining bolts	10	7	-

Published: 14-Jun-2016

Automatic Transmission/Transaxle - Transmission Fluid Drain and Refill

General Procedures

Draining

WARNINGS:

 Be prepared to collect escaping fluids.

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

CAUTIONS:

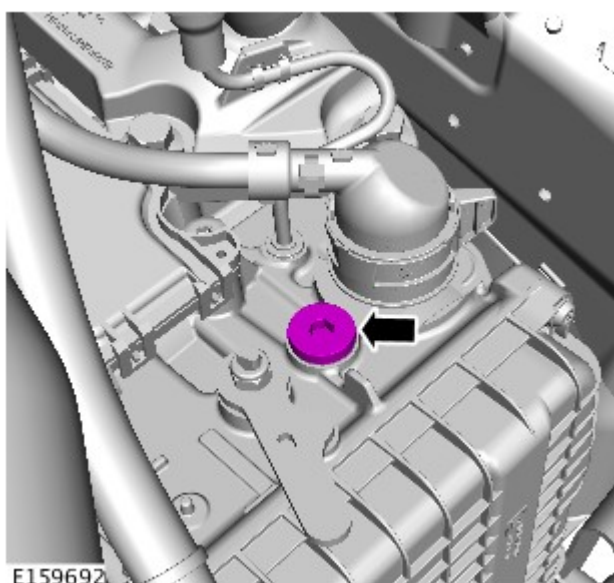
 Make sure that the area around the component is clean and free of foreign material.

 Vehicle must be horizontal during this operation.


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

1. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

2.  NOTE: Discard the sealing plug.



3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

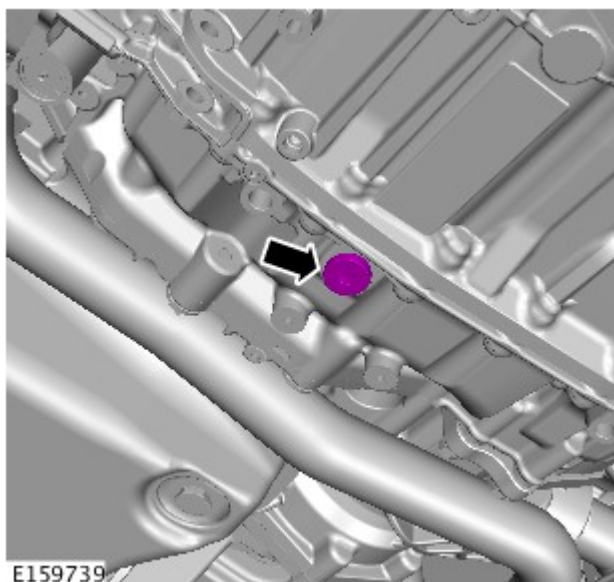
4.  CAUTION: The ambient temperature should not be below 20 degrees celsius.

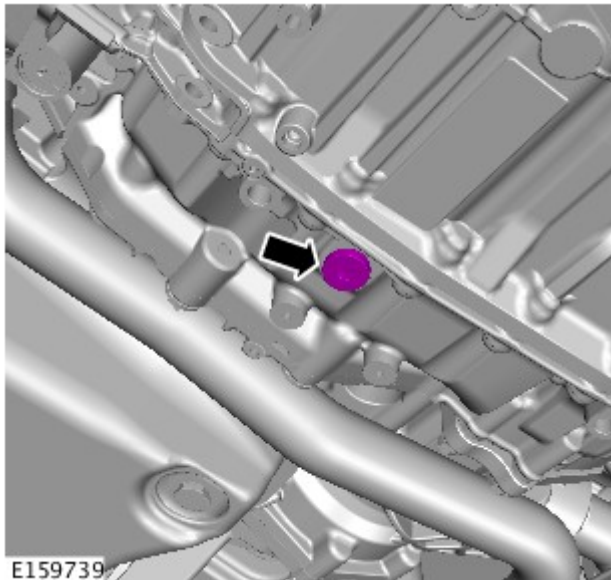
NOTES:

 Drain the fluid into a suitable container.

 Discard the sealing plug.

Allow the fluid to drain until the flow stops.

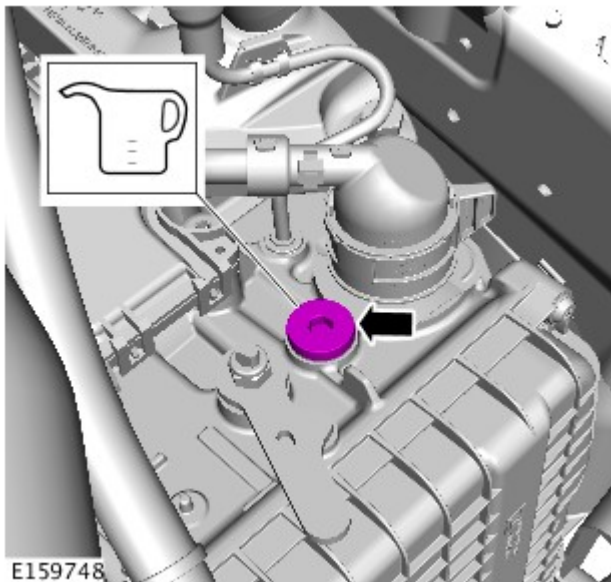




5.  **CAUTION:** Install a new sealing plug.

Torque: 35 Nm

6. Lower the Vehicle.



7. **CAUTIONS:**

 Install a new sealing plug.

 Use transmission fluid meeting Landrover specification.

Fill the transmission with 3.5 litres of oil.

Refer to: [Specifications](#) (307-01 Automatic Transmission/Transaxle, Specifications).

Torque: 35 Nm

8. Carry out transmission fluid level check.

Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

Published: 30-Jun-2015

Interior Trim and Ornamentation - Engine Cover INGENIUM I4 2.0L Diesel

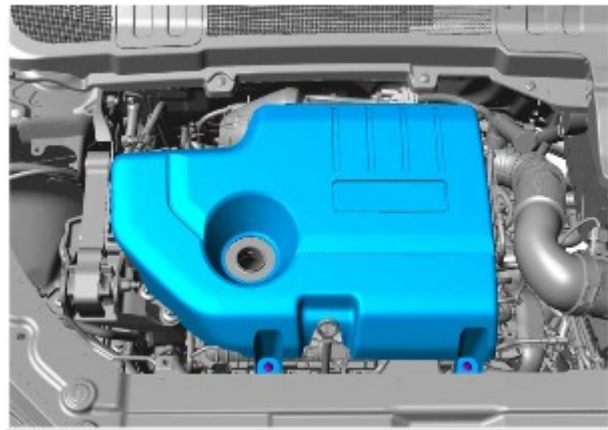
Removal and Installation

Removal

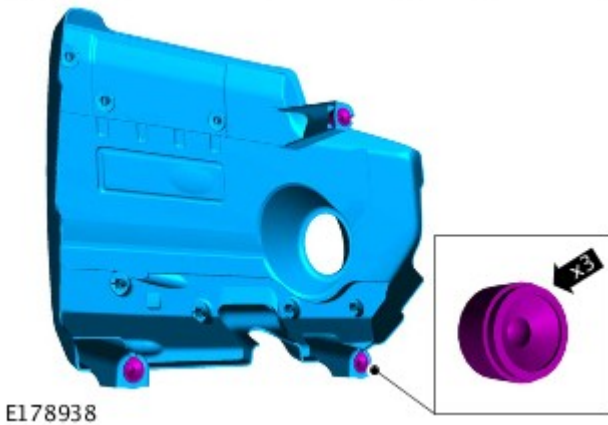


NOTE: Removal steps in this procedure may contain installation details.

- 1.



2.



Installation

1. To install, reverse the removal procedure

Published: 18-Oct-2016

Front Drive Halfshafts - Front Halfshaft LH

Removal and Installation

Special Tool(s)

	205-857 Remover, Halfshaft
--	-------------------------------

 <p>E79462</p>	
 <p>E52536</p>	<p>307-520 Installer, Output Shaft Seal</p>
 <p>E159484</p>	<p>JLR-307-686 Installer, Oil Seal</p>

Removal

CAUTIONS:



Nuts and bolts must be tightened with the weight of the vehicle on the suspension.



Do not allow halfshafts to hang unsupported at one end or joint damage will occur.



Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

1.



WARNING: Make sure to support the vehicle with axle stands.

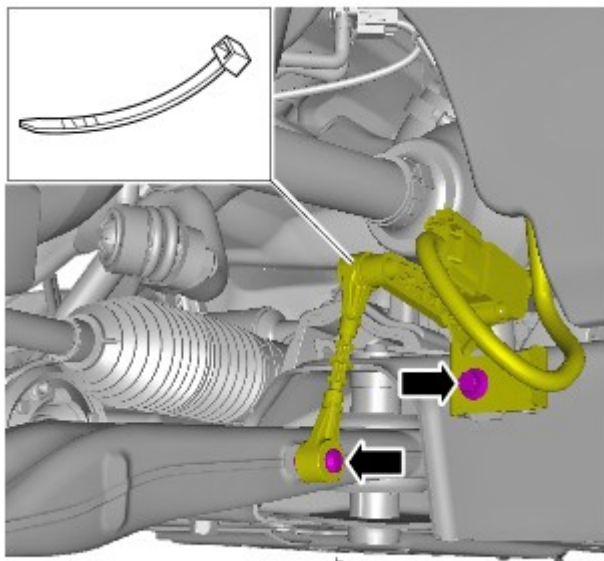
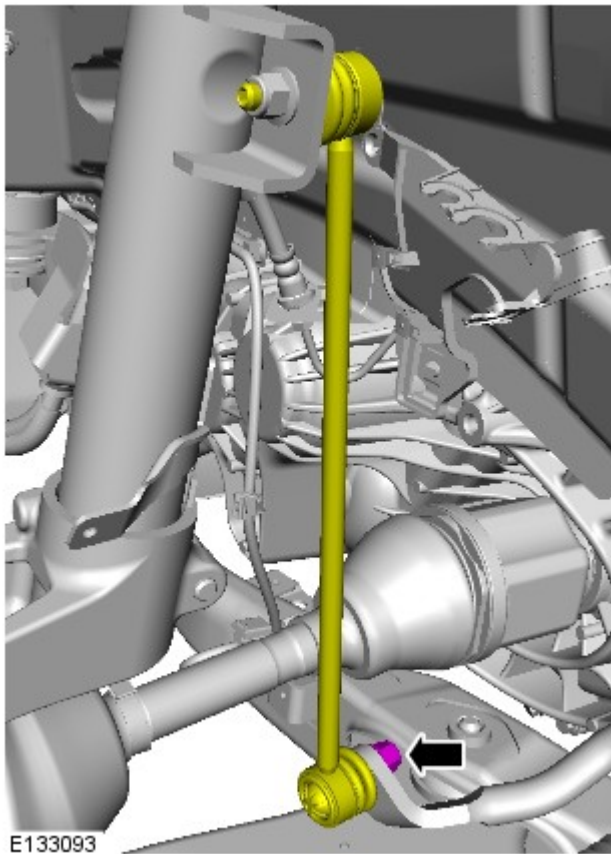
Raise and support the vehicle.

2. Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).

3.



CAUTION: Discard the nut.



4.

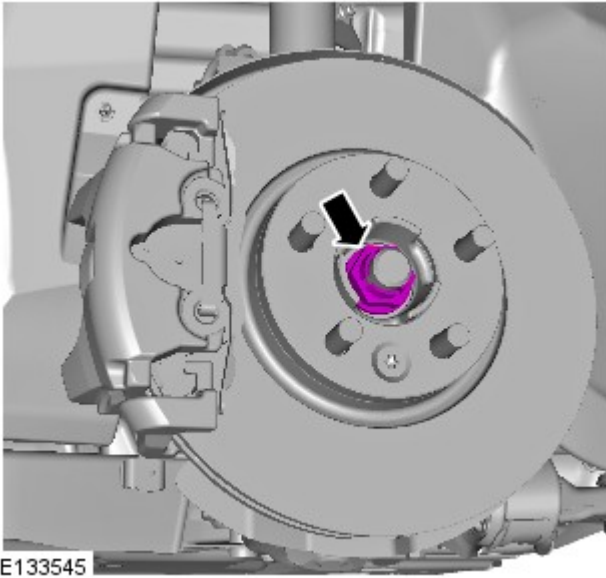
5. CAUTIONS:



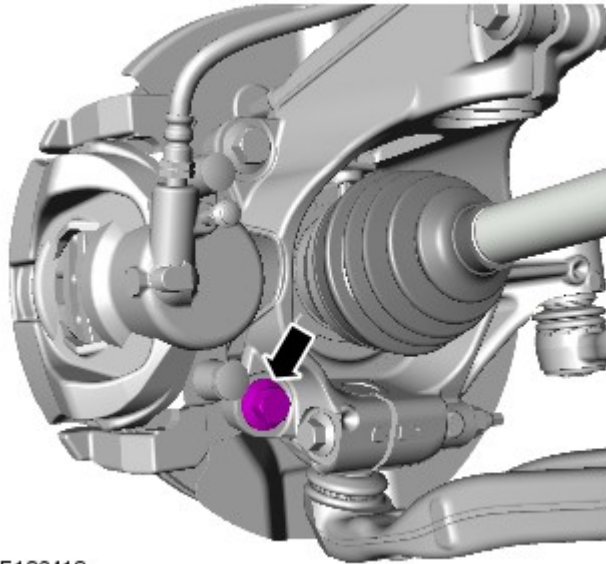
Do not use air tools to remove the nut.



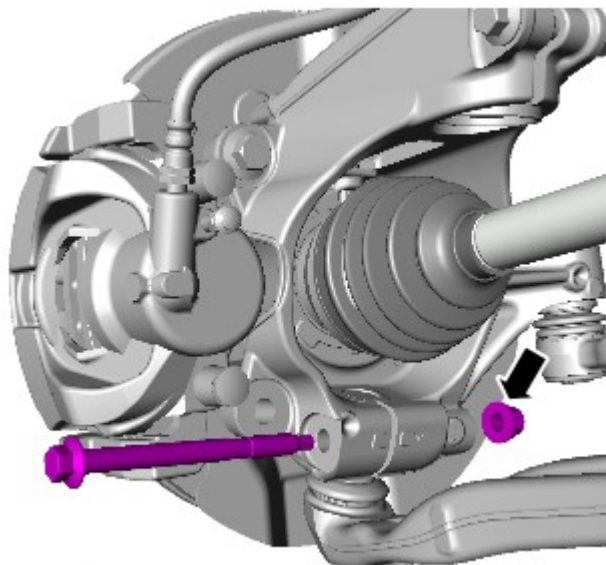
Discard the nut.



E133545



E136418

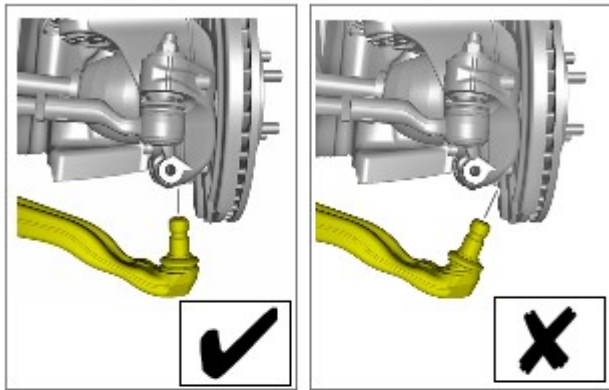


E136419

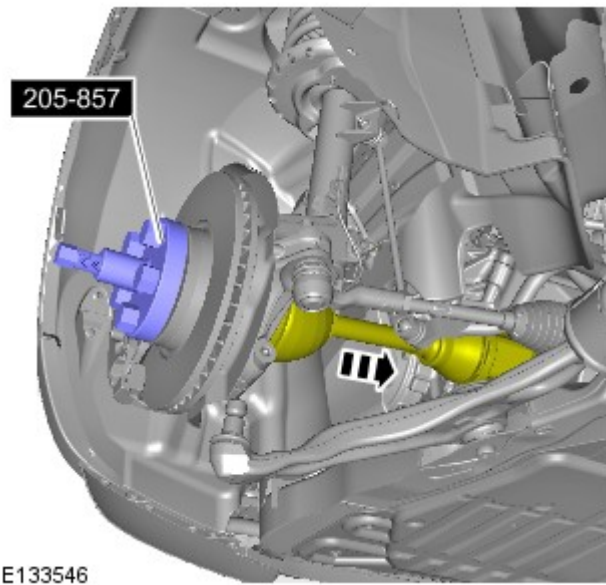
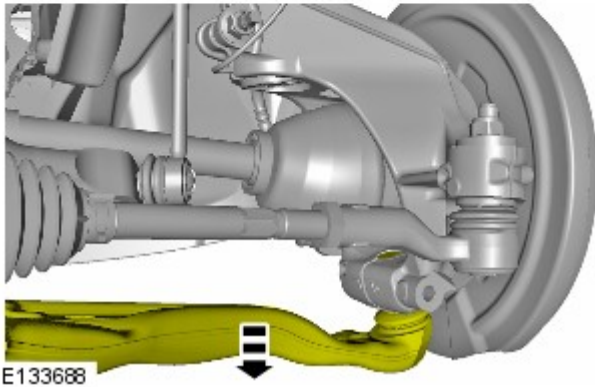
6.  **CAUTION:** Discard the bolt.

 **NOTE:** Right hand illustration shown, left hand is similar.


7.  **NOTE:** Right hand illustration shown, left hand is similar.




8.  NOTE: Right hand illustration shown, left hand is similar.





9. CAUTIONS:

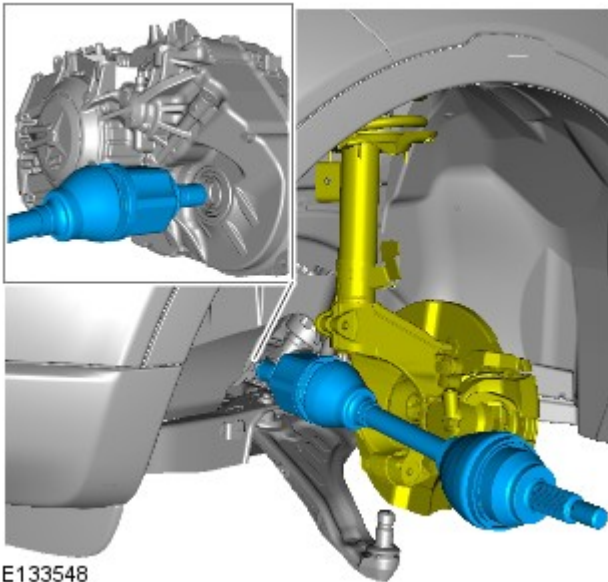
 Make sure that the driveshaft is supported with suitable retaining straps.

 Do not use a hammer to detach the halfshaft from the hub assembly, failure to follow this instruction may result in damage to the halfshaft.

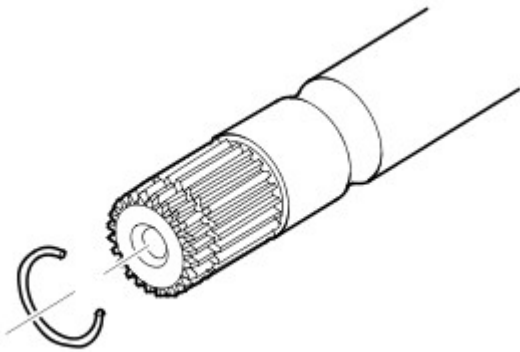
Special Tool(s): [205-857](#)

10.  WARNING: Be prepared to collect escaping fluids.

 CAUTION: Keep the halfshaft horizontal to avoid damaging the oil seal.

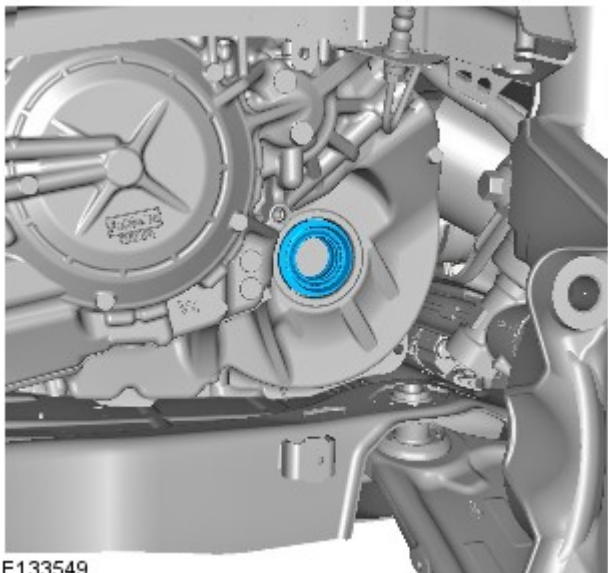


E133548





E45752

11.  CAUTION: Discard the snap ring.




E133549

12.  CAUTION: Inspect the seal, replace if damaged

 NOTE: Automatic transmission shown, manual transmission is similar.

Installation

1. CAUTIONS:

 Make sure that the mating faces are clean and free of corrosion and foreign material.



E159531



Make sure the seal is installed correctly.



NOTE: This step is only required if previously removed.

Special Tool(s): [307-520](#) , [JLR-307-686](#)



2. NOTES:

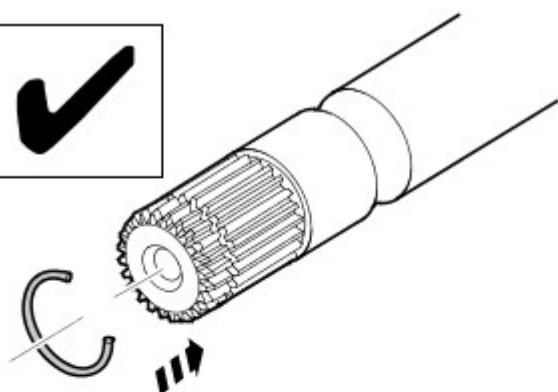


Do not fully engage the halfshaft until the oil seal protector has been removed.



Manual transmission shown, automatic transmission is similar.

To prevent oil seal damage use the protector when installing the shaft into the transmission. It is not a special tool but is available from the Parts Catalogue.



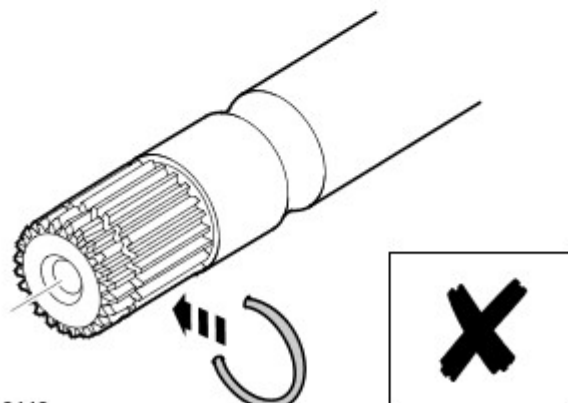
3. CAUTIONS:



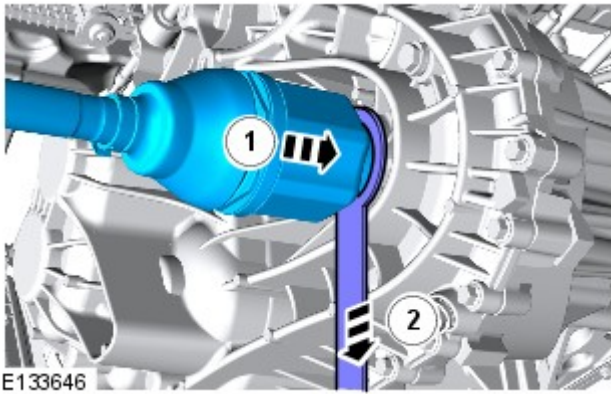
Make sure that the snap ring is installed from the end of the halfshaft. Failure to follow this instruction may result in damage to the vehicle.




Install a new snap ring.



E116449




4. CAUTIONS:

 Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the transmission.

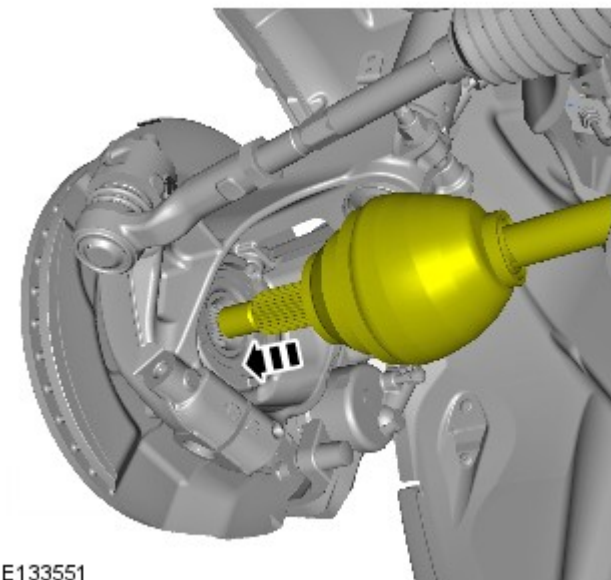
 Keep the halfshaft horizontal to avoid damaging the oil seal.

NOTES:

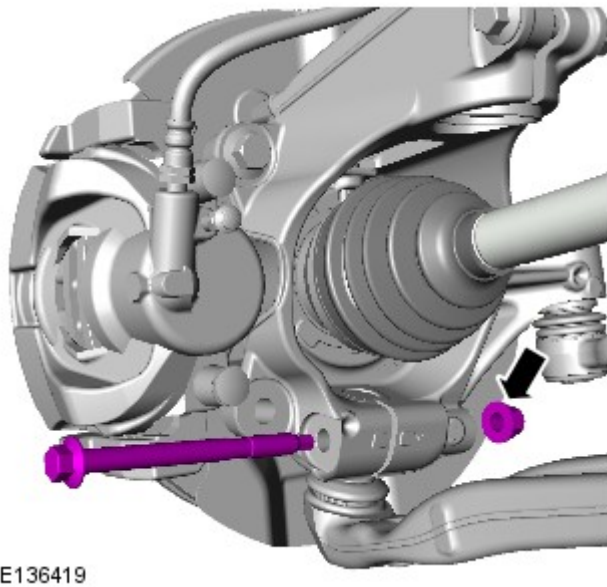
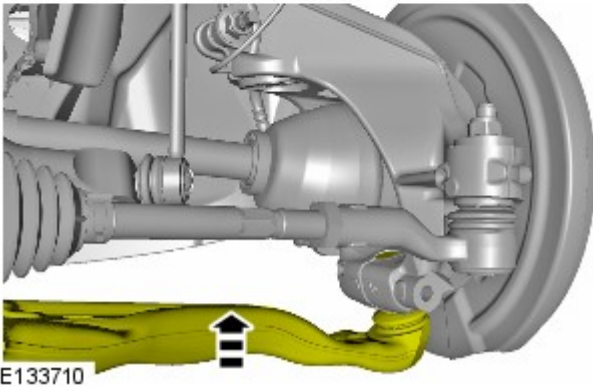
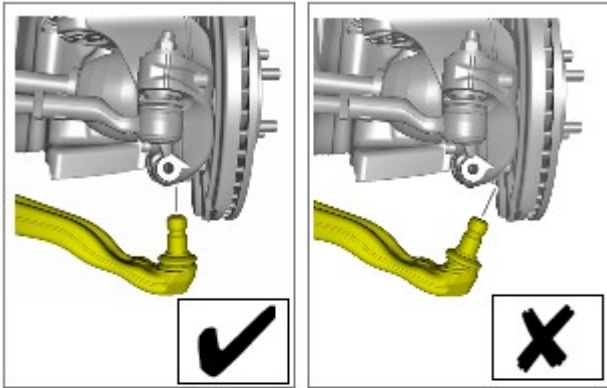
 Do not fully engage the halfshaft until the oil seal protector has been removed.

 Manual transmission shown, automatic transmission is similar.

5.



6.  NOTE: Right hand illustration shown, left hand is similar.



7.  **CAUTION:** Make sure that a new bolt is installed.

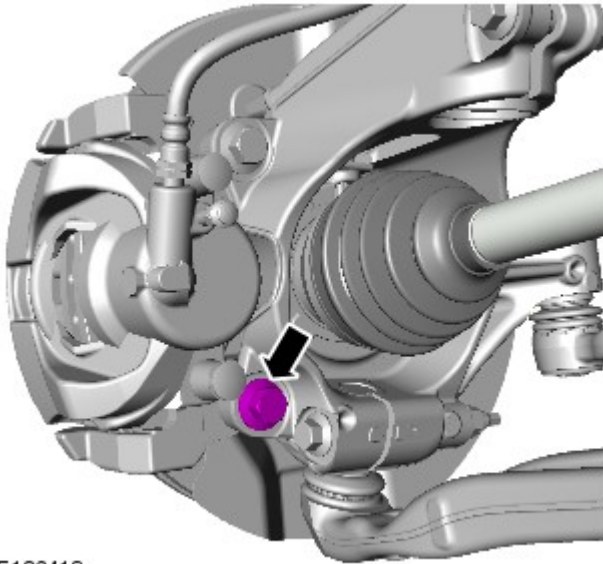
 **NOTE:** Right hand illustration shown, left hand is similar.

Torque:
 Stage 1: 80 Nm
 Stage 2: 180°

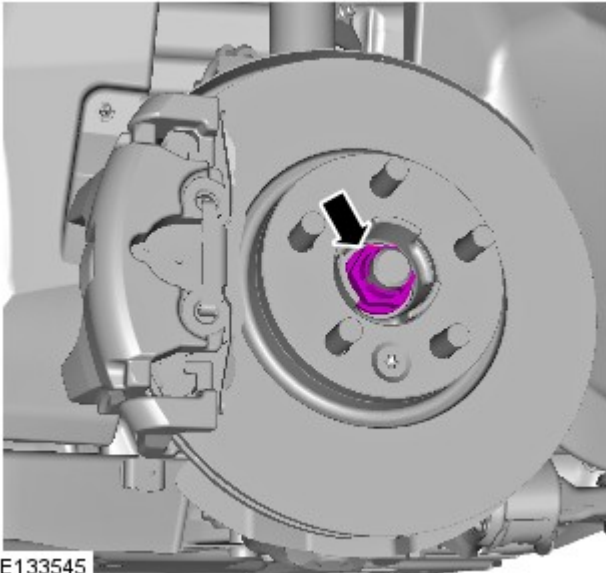
8.  **CAUTION:** Make sure that a new bolt is installed.

 **NOTE:** Right hand illustration shown, left hand is similar.

Torque:
 Stage 1: 90 Nm
 Stage 2: 120°




E136418




E133545

9.  **WARNING:** Make sure that a new nut is installed.

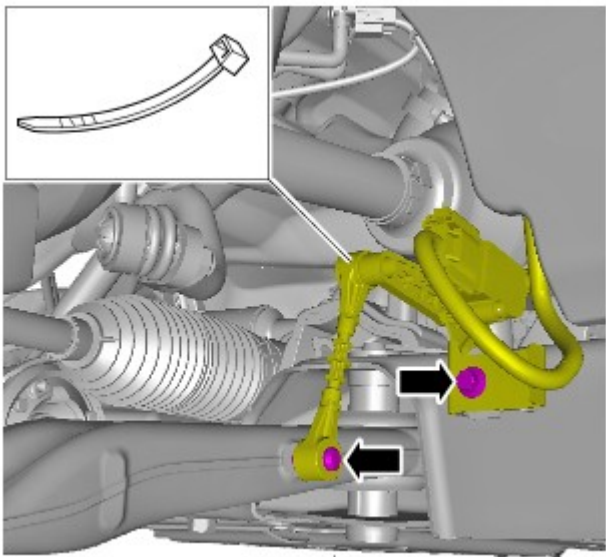
CAUTIONS:

-  Do not use air tools to install the nut. Failure to follow this instruction may result in damage to the component.

-  Install the halfshaft nut finger tight.

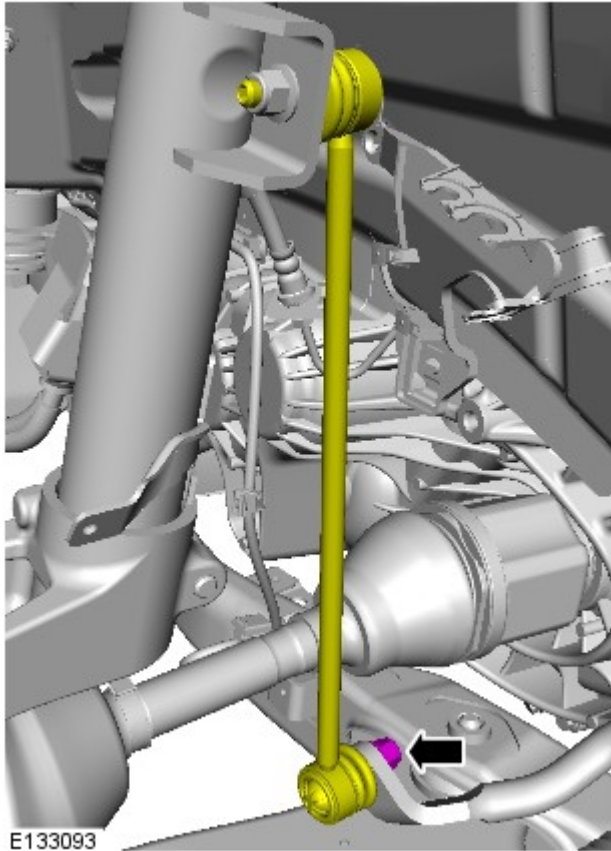
-  Tighten the nut without the weight of the vehicle on the suspension.


Torque:
 Stage 1: 100 Nm
 Stage 2: 90°



E133691

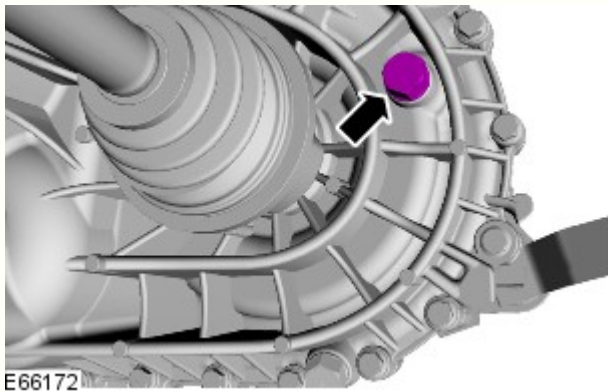
10. *Torque:* 10 Nm



11.  **WARNING:** Make sure that a new nut is installed.

Torque: 65 Nm

12. Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).



13. Manual transmission vehicles only: Check and top-up the transmission fluid level.

14. Using only four wheel alignment equipment approved by Land Rover, check and adjust the wheel alignment.

Refer to: [Four-Wheel Alignment](#) (204-00 Suspension System - General Information, General Procedures).

Published: 01-Oct-2013

Automatic Transmission/Transaxle - Transmission Fluid Level Check

General Procedures

Check

WARNINGS:



Be prepared to collect escaping fluids.



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



CAUTION: Vehicle must be horizontal during this operation.




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

1. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

2. Connect the Land Rover equipment.

3. Start and run the engine.


4. Select terrain response mode. Grass/Gravel/Snow.

5.  WARNING: Make sure that all four wheels are off the ground for this step.




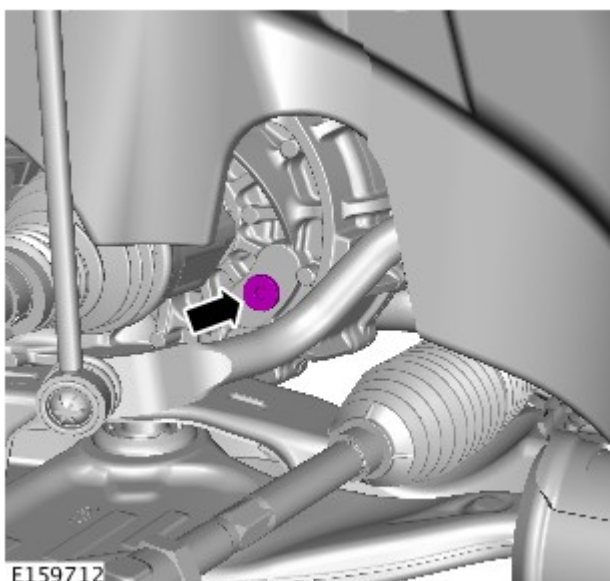
NOTE: Move the transmission control switch (TCS) from D to S then using the steering paddles pause in each gear for a minimum 10 seconds until you reach 4th gear. (max 2000rpm)

Using the diagnostic equipment monitor the transmission fluid temperature until 35 degrees celsius is reached.

6.  CAUTION: Decelerate the wheels until they stop, then turn the (TCS) back into the P position.

Make sure that torque converter is full of oil by raising the engine speed to 2000rpm for 10 seconds, return to idle speed.

7.  CAUTION: Engine must be running to carry out the fluid level check.



8. CAUTIONS:



Transmission fluid temperature must not exceed 45 degrees celsius.



Discard the sealing plug.

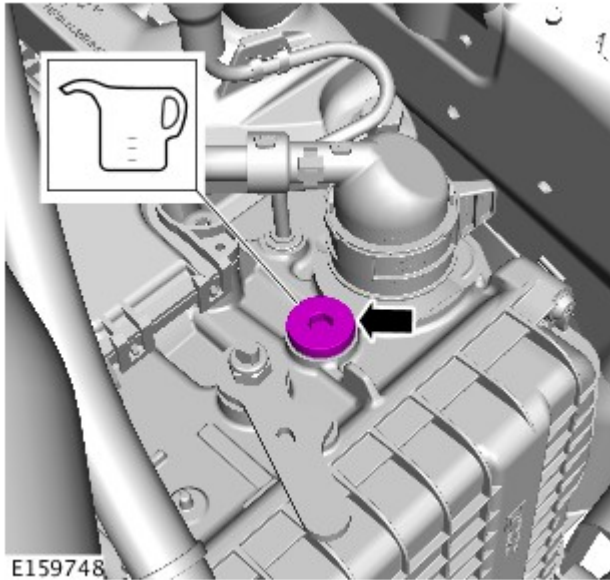


Drain the fluid into a suitable container.



NOTE: With the engine running a small amount of automatic transmission fluid should drip out of the level plug.

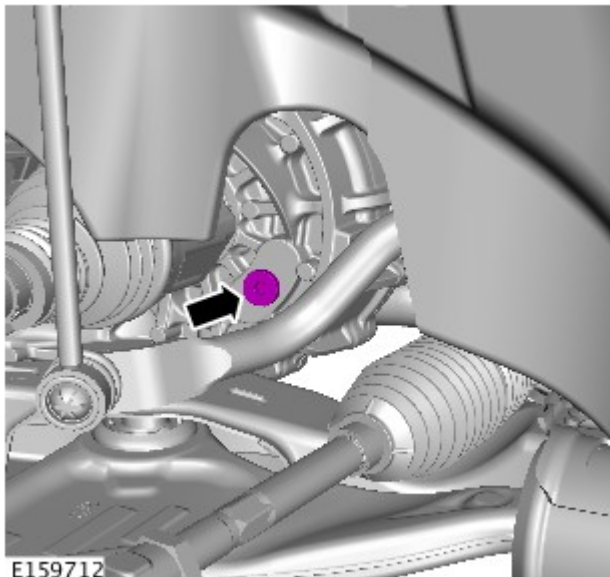
When transmission fluid temperature reaches 37 degrees celsius, remove the level plug and wait until oil stops dripping out.



9.  **CAUTION:** Install a new sealing plug.

If the transmission fluid does not come out of the transmission fluid level plug hole the transmission fluid level is insufficient. If this is the case add the transmission fluid in 0.5 litre units into the transmission fluid fill plug hole until fluid comes out.

Torque: 35 Nm



10.  **CAUTION:** Install a new sealing plug.

 **NOTE:** If the temperature has exceeded 45 degrees celsius before the plug is re-fitted, you must start the procedure again.

Torque: 35 Nm

11. Switch off the engine.
12. Remove the container.
13. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).
14. Lower the vehicle.
15. Disconnect the diagnostic tool.

Published: 15-Oct-2014

Climate Control - Plenum Chamber

Removal and Installation

Removal

NOTES:

 Removal steps in this procedure may contain installation details.

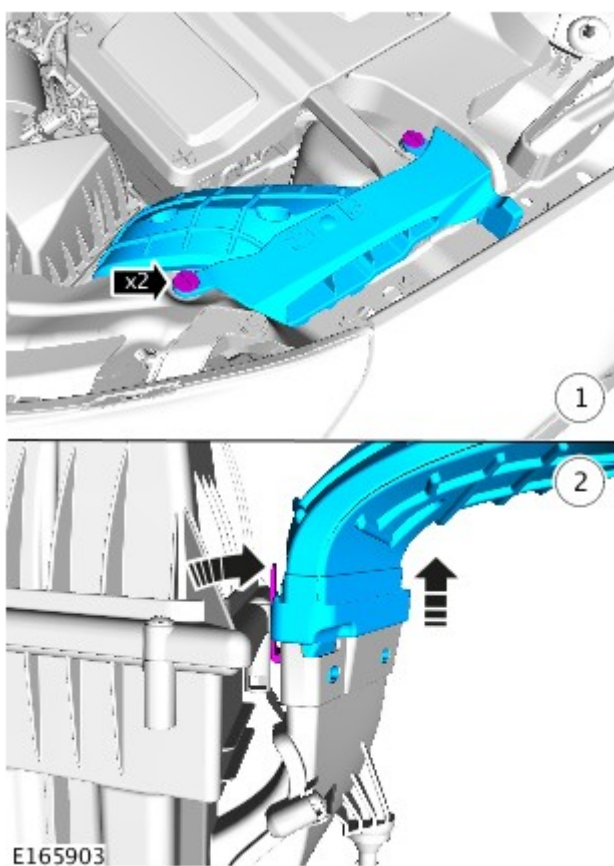
 LHD illustration shown, RHD is similar.

All vehicles

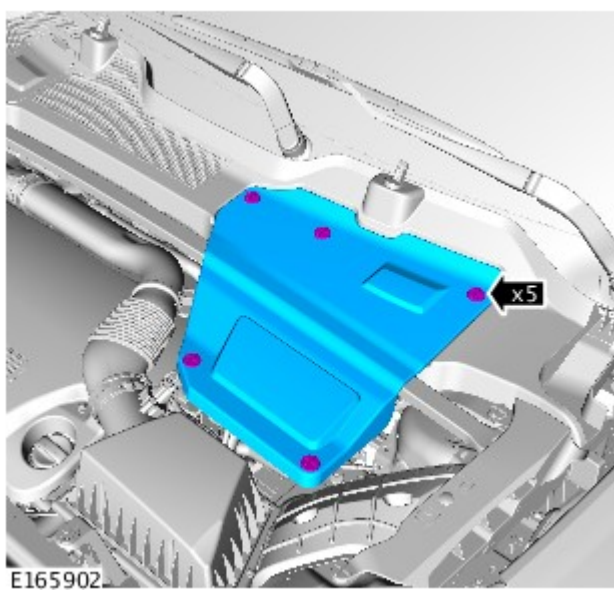
1. Refer to: Wiper Pivot Arm (501-16, Removal and Installation).

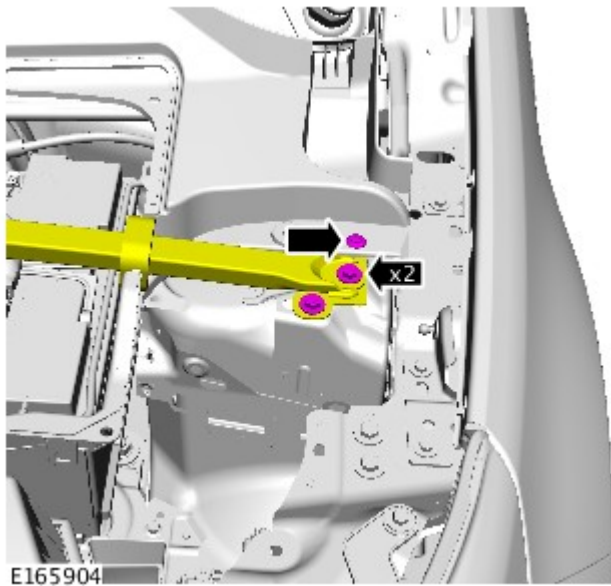
2. Repeat the above procedure for the other wiper arm.

3.

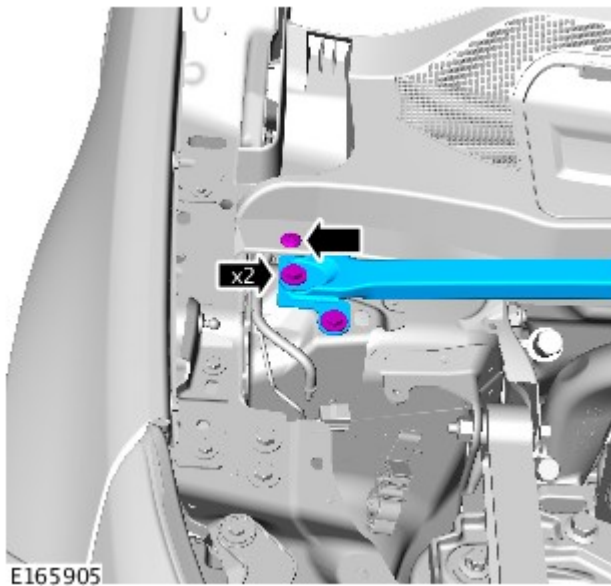


4.

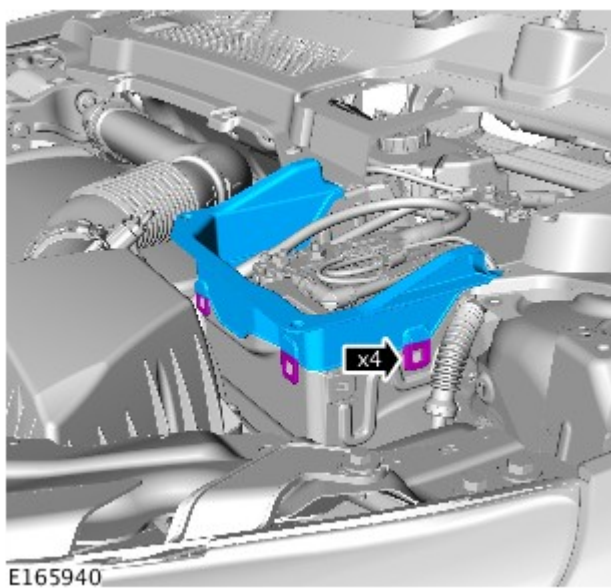




5. Torque: 25 Nm

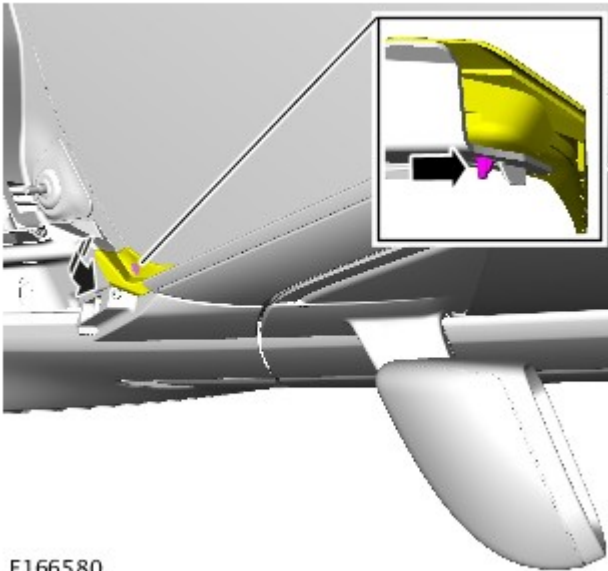


6. Torque: 25 Nm



7.

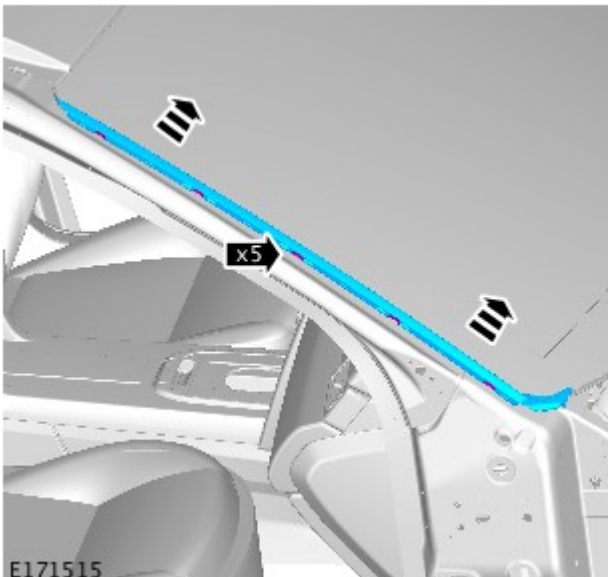
8.



E166580



NOTE: Repeat the step for the other side.

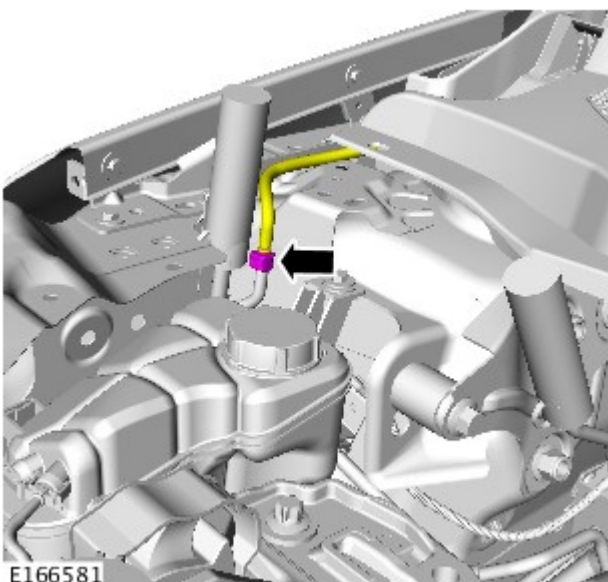


E171515

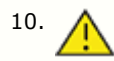


NOTE: Repeat the step for the other side.

Vehicles without heated washers

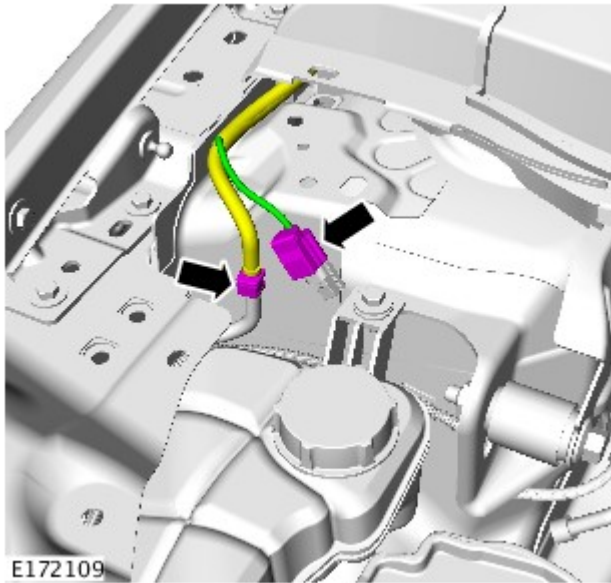



E166581



CAUTION: Be prepared to collect escaping fluids.

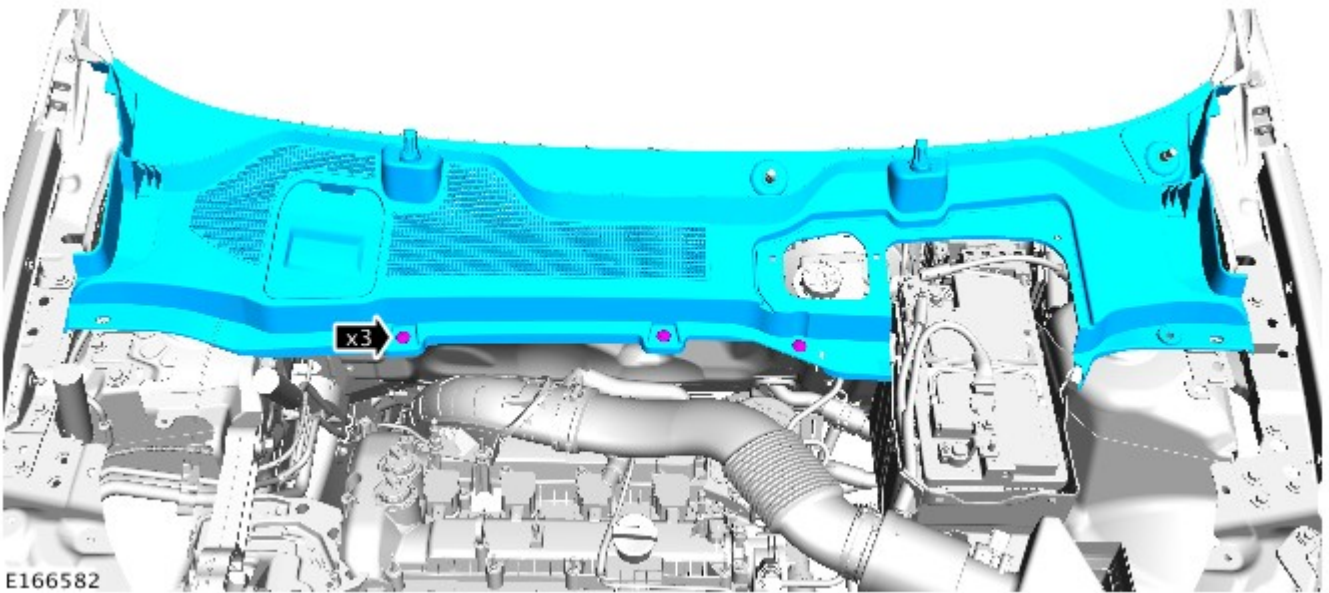
Vehicles with heated washers



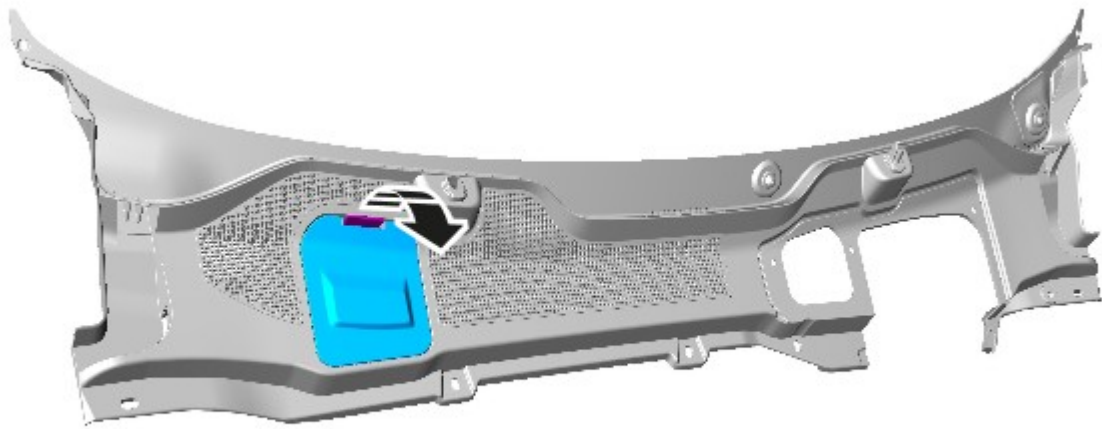
11.  CAUTION: Be prepared to collect escaping fluids.

All vehicles

12.



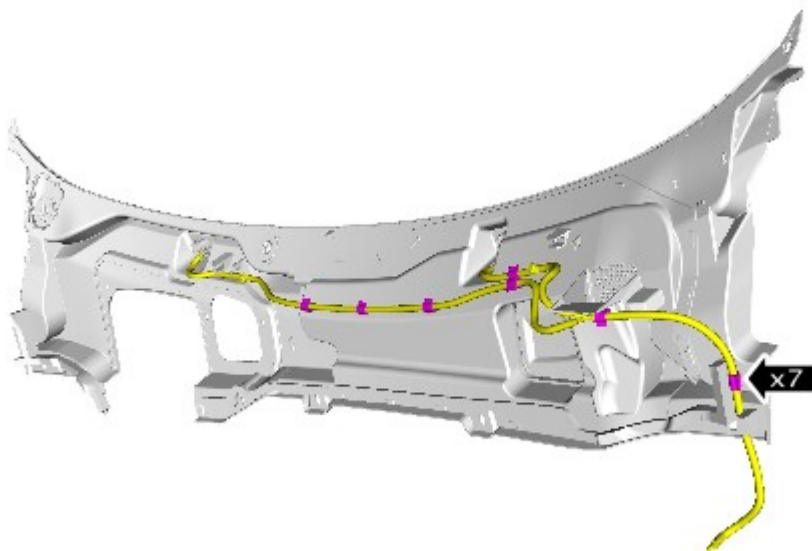
13.  NOTE: Do not disassemble further if the component is removed for access only.



E166583

Vehicles without heated washers

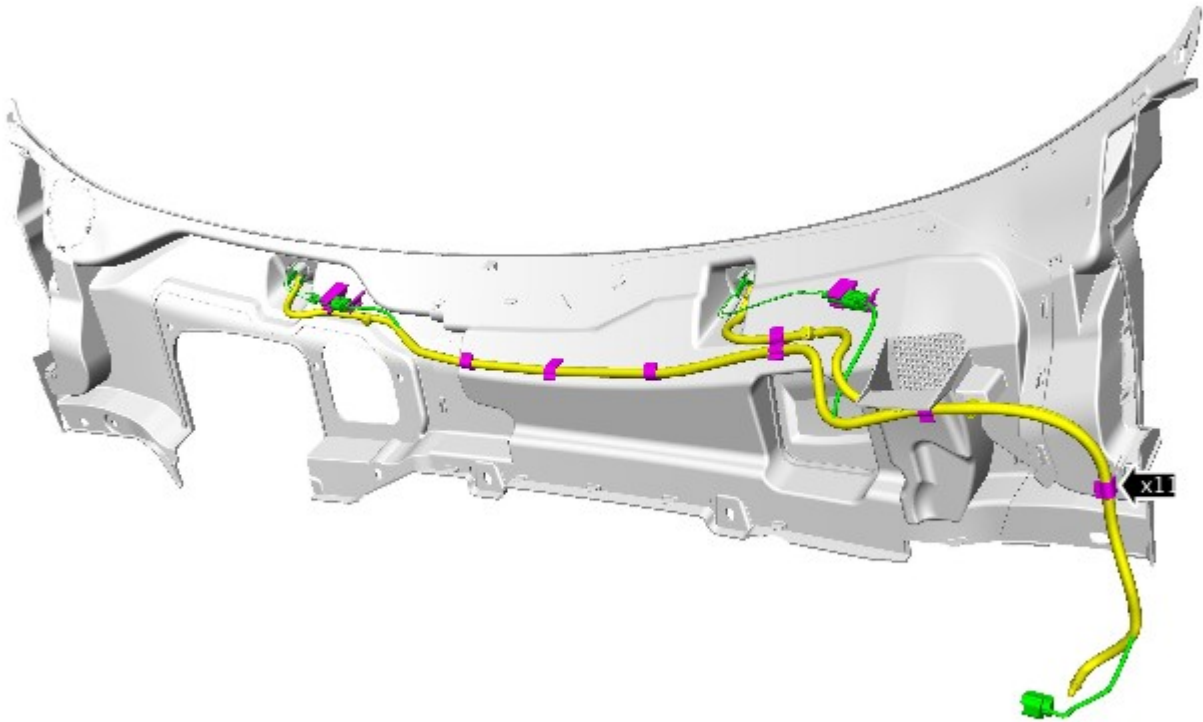
14.



E166584


Vehicles with heated washers

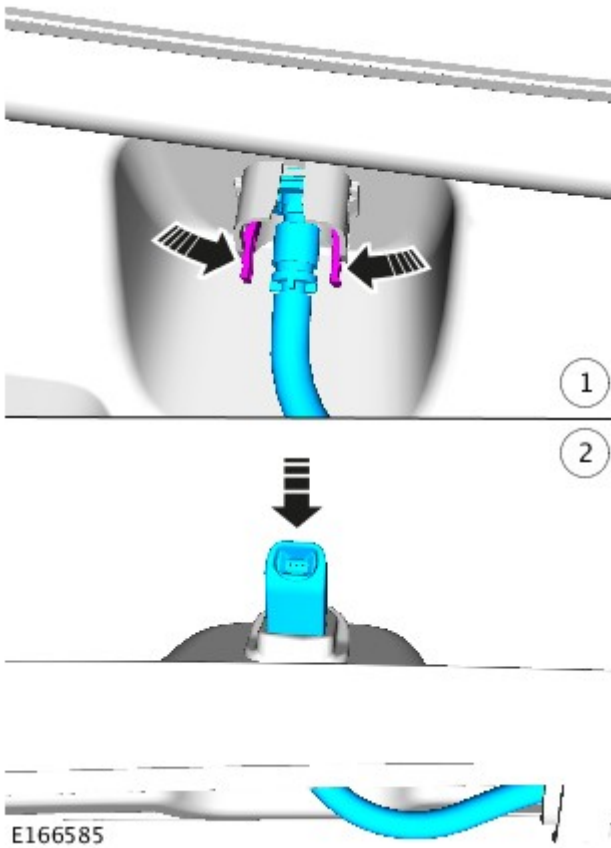
15.



E172110

All vehicles

16.  NOTE: Repeat the step for the other side.



E166585

Installation

1. To install, reverse the removal procedure.

Published: 01-Oct-2013

Front End Body Panels - Engine Undershield

Removal and Installation

Removal

NOTES:



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



Removal steps in this procedure may contain installation details.

1.



WARNING: Make sure to support the vehicle with axle stands.

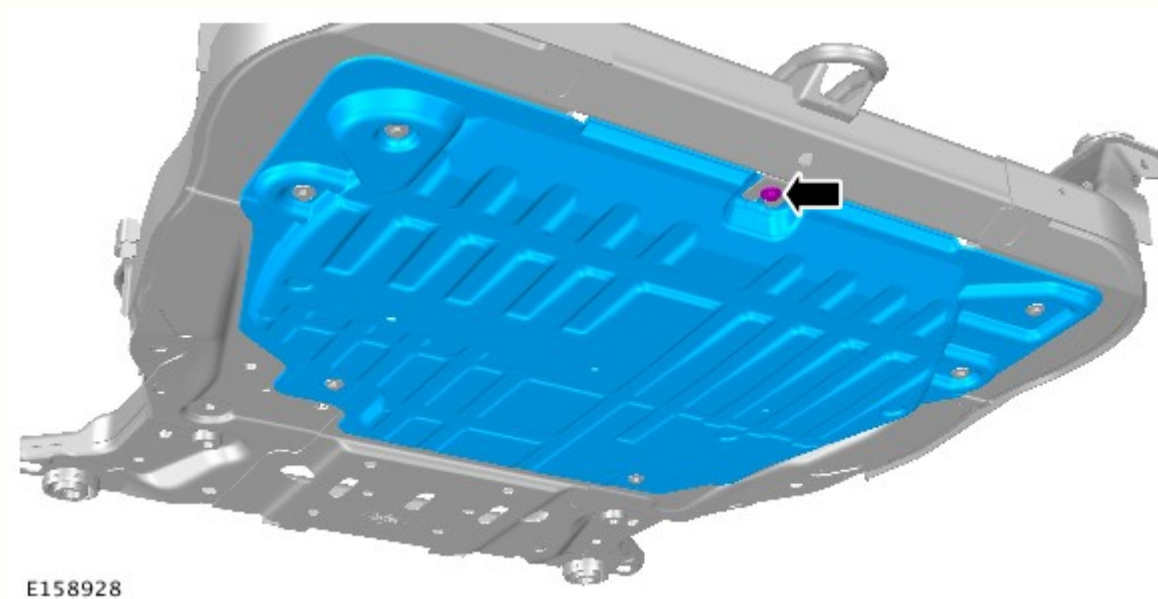
Raise and support the vehicle.

2.

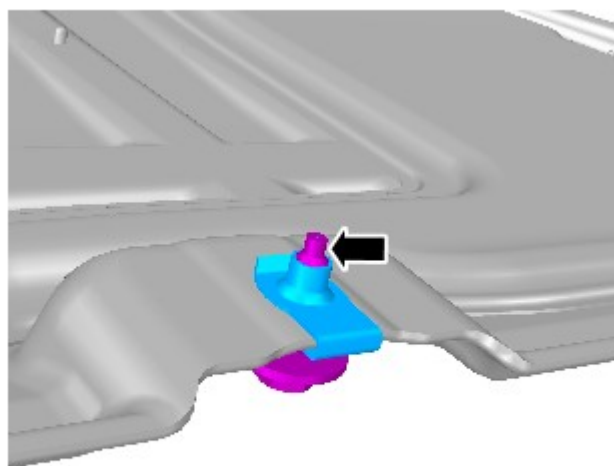
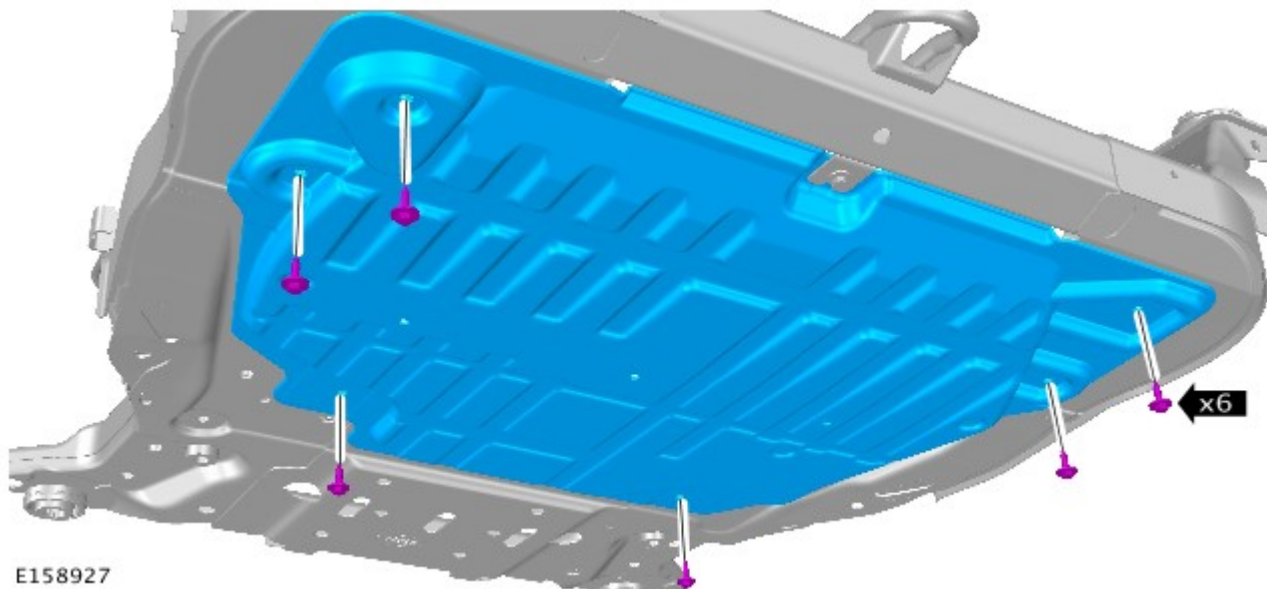



NOTE: Loosen the bolt, but do not fully remove.

Torque: 10 Nm



3. *Torque:* 10 Nm



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

Installation

1. To install, reverse the removal procedure.

Published: 30-Jun-2015

Starting System - INGENIUM I4 2.0L Diesel - Starter Motor

Removal and Installation

Removal

NOTES:



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



Removal steps in this procedure may contain installation details.

All vehicles

- 1.



WARNING: Make sure to support the vehicle with axle stands.

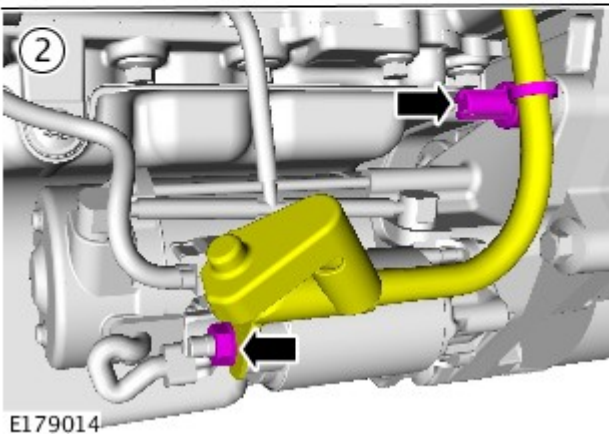
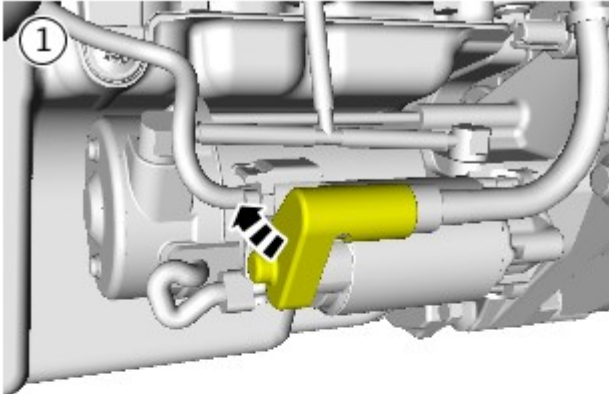
Raise and support the vehicle.

2. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

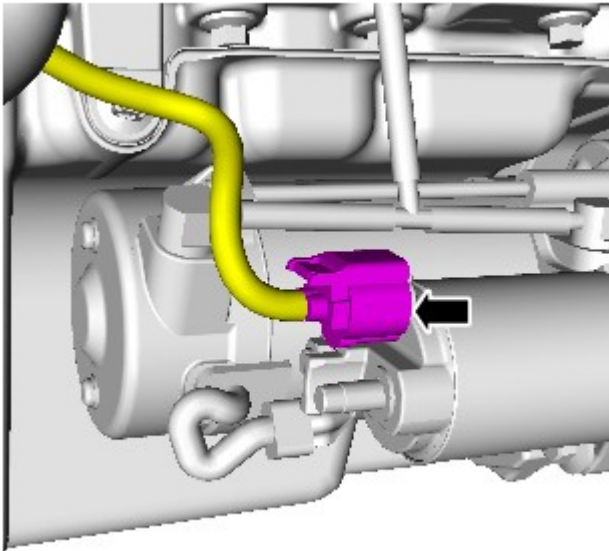
3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

4. Torque: 10 Nm



Vehicles with automatic transmission

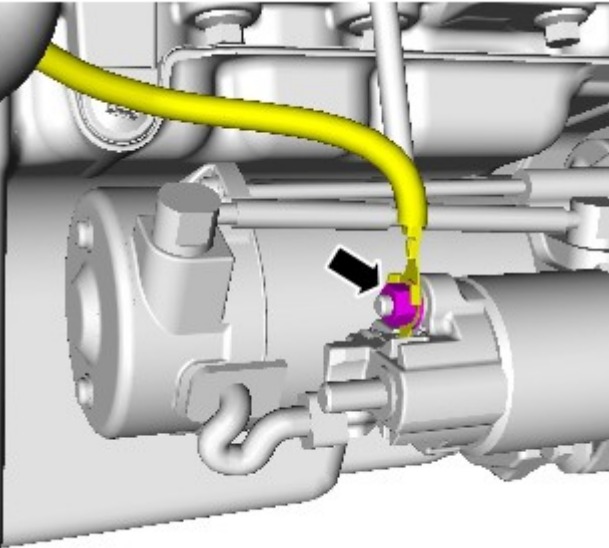
5.



E179015

Vehicles with manual transmission

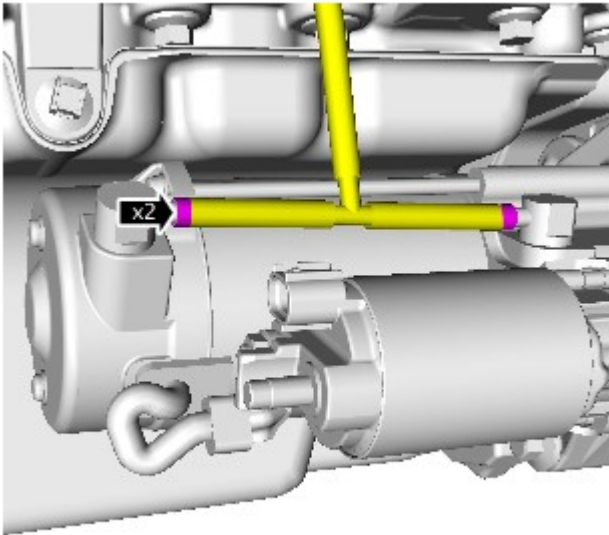
6. Torque: 7 Nm



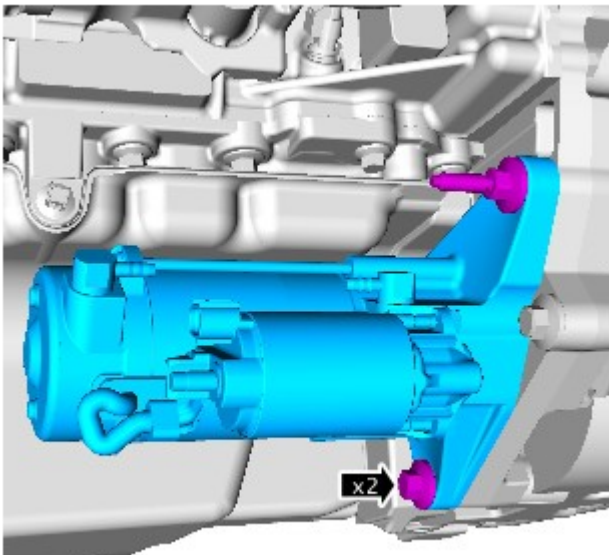
E179016

All vehicles

7.



E179017



E179018

8. Torque: 48 Nm

Installation

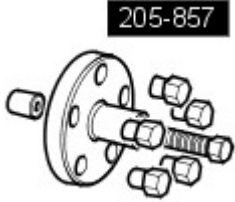
1. To install, reverse the removal procedure.

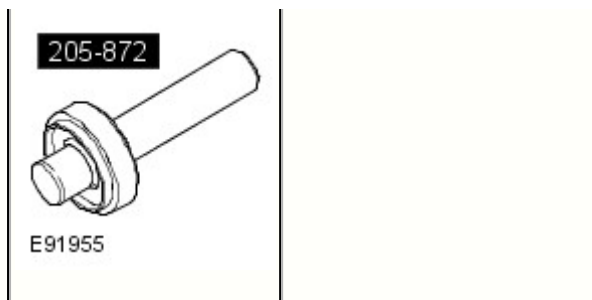
Published: 18-Oct-2016

Front Drive Halfshafts - Front Halfshaft RH RHD AWD/LHD AWD

Removal and Installation

Special Tool(s)

 <p>205-857 Remover, Halfshaft</p> <p>E79462</p>	
	<p>205-872 Installer, Transfer Case Seal</p>



Removal

CAUTIONS:



Nuts and bolts must be tightened with the weight of the vehicle on the suspension.



Do not allow halfshafts to hang unsupported at one end or joint damage will occur.



Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

1.



WARNING: Make sure to support the vehicle with axle stands.

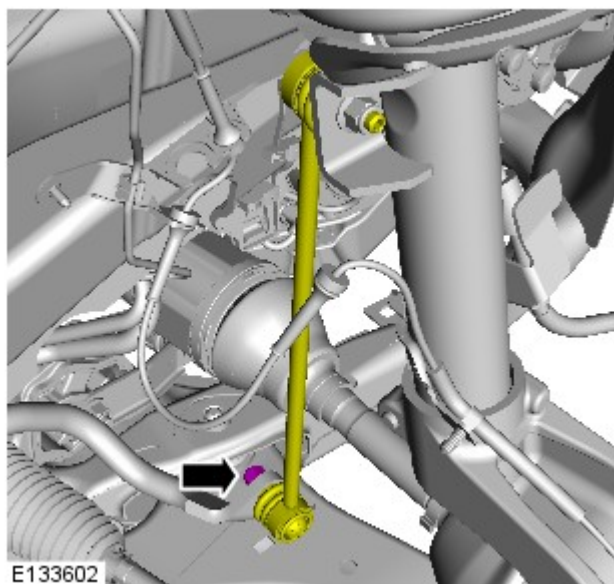
Raise and support the vehicle.

2. Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).

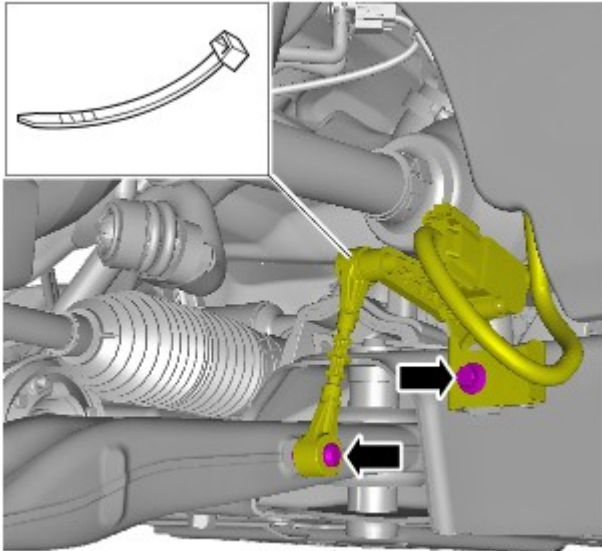
3.



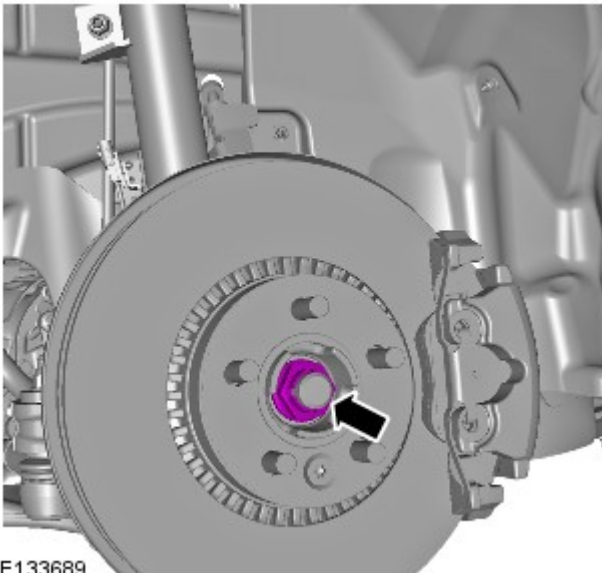
CAUTION: Discard the nut.



4.



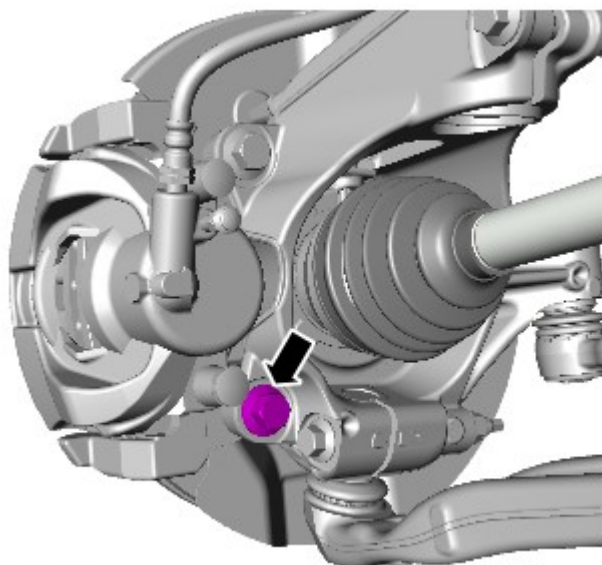
E133691



E133689

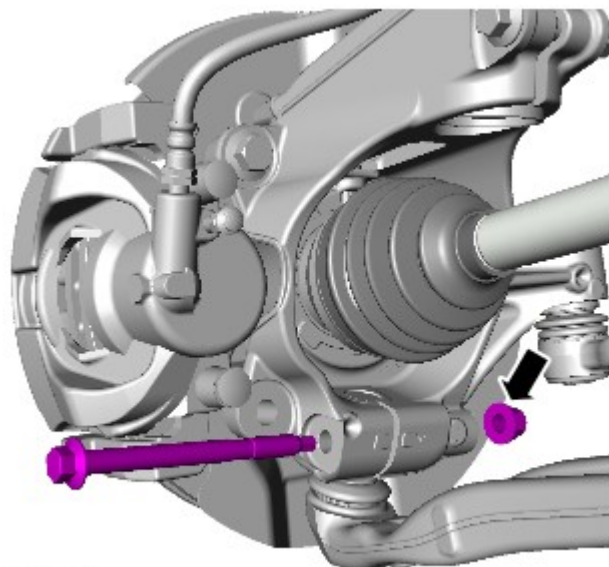
5.  **WARNING:** Make sure that a new nut is installed.

 **CAUTION:** Discard the nut.



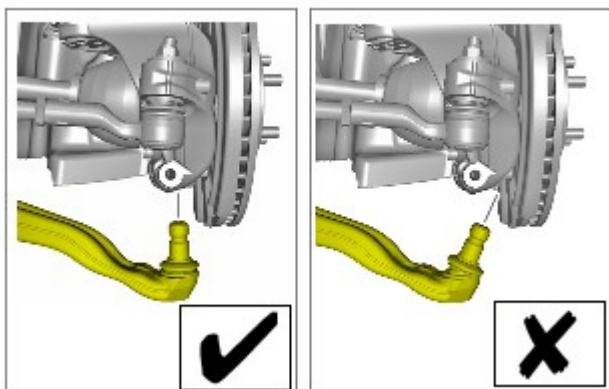
E136418

6.  **CAUTION:** Discard the bolt.

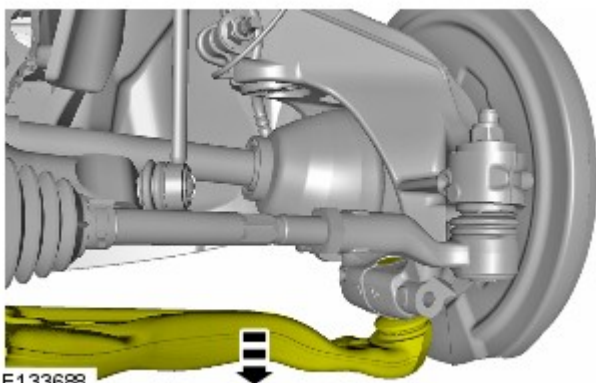


E136419

7.



8.



E133688

9. CAUTIONS:

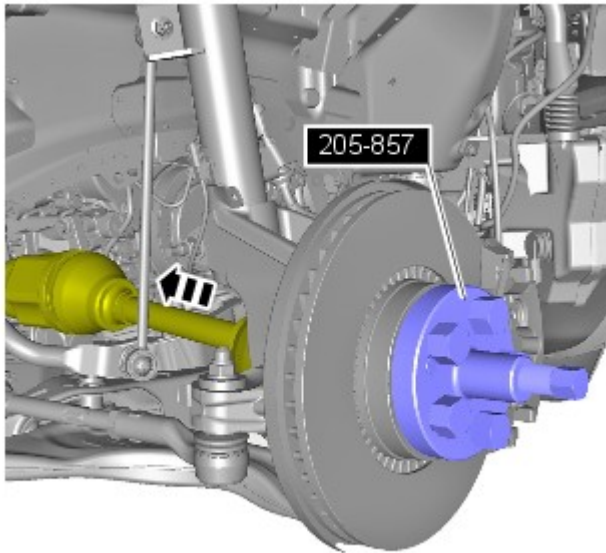


Make sure that the driveshaft is supported with suitable retaining straps.

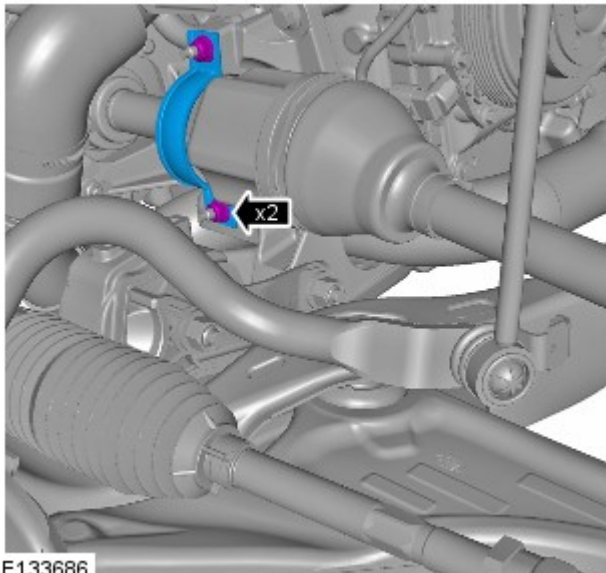


Do not use a hammer to detach the halfshaft from the hub assembly, failure to follow this instruction may result in damage to the halfshaft.

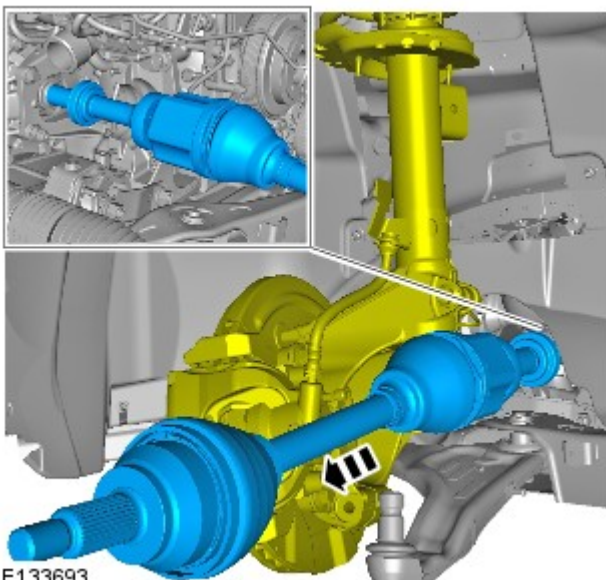
Special Tool(s): [205-857](#)



E133690





E133686

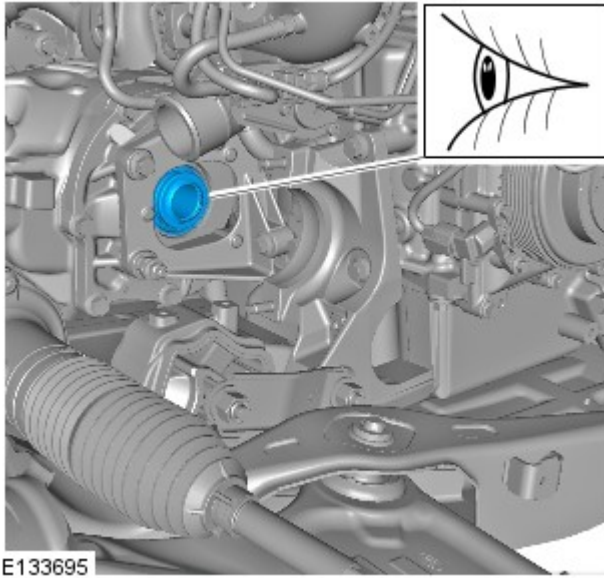


E133693



10.

11.  **WARNING:** Be prepared to collect escaping fluids.

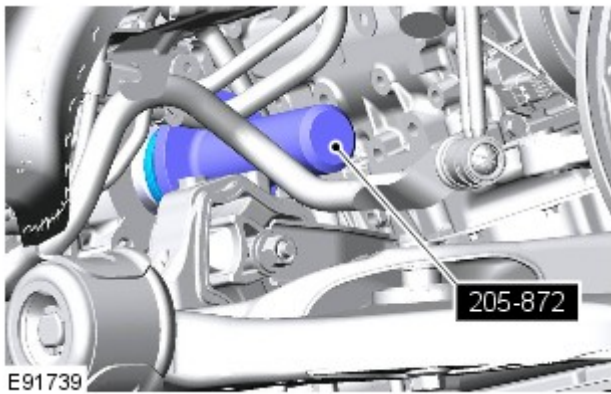
 **CAUTION:** Keep the halfshaft horizontal to avoid damaging the oil seal.






12. CAUTIONS:

-  Inspect the seal, replace if damaged
-  Take extra care not to damage the mating faces.

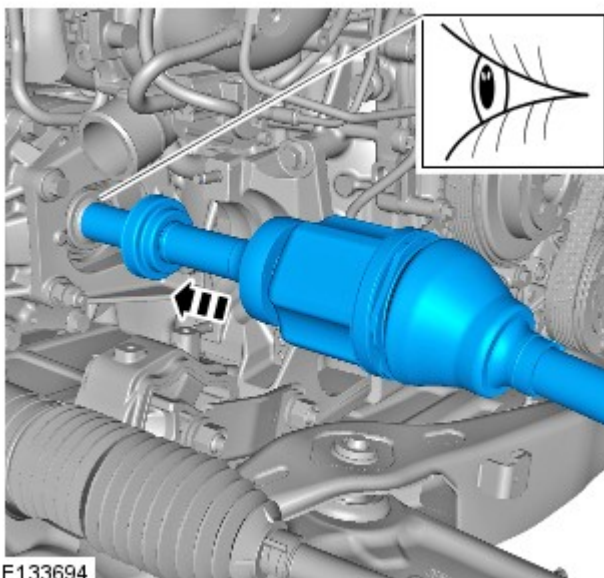
Installation




1. CAUTIONS:

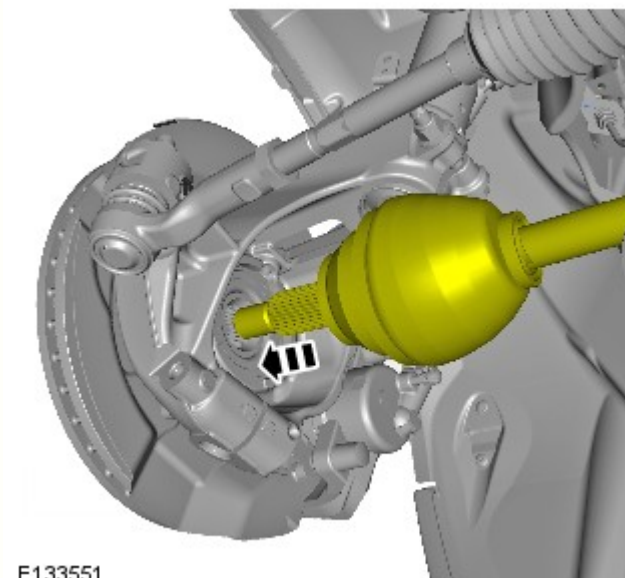
-  Make sure that the mating faces are clean and free of corrosion and foreign material.
-  Make sure the seal is installed correctly.
-  NOTE: This step is only required if previously removed.

Special Tool(s): [205-872](#)



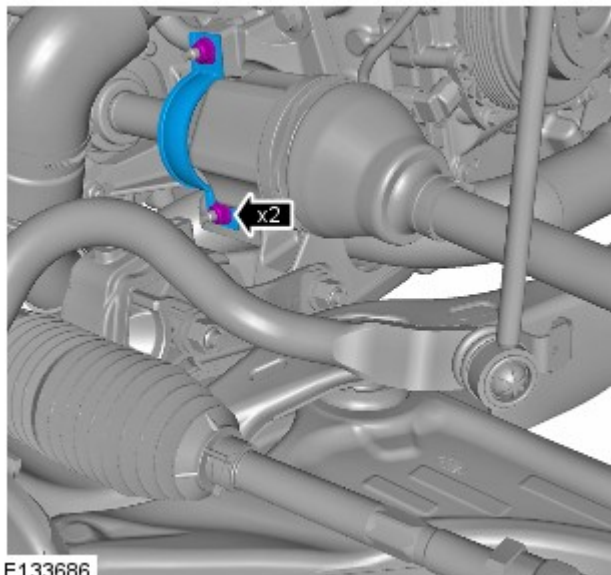
2.  CAUTION: Keep the halfshaft horizontal to avoid damaging the oil seal.

3.  CAUTION: LH illustration shown, RH is similar.



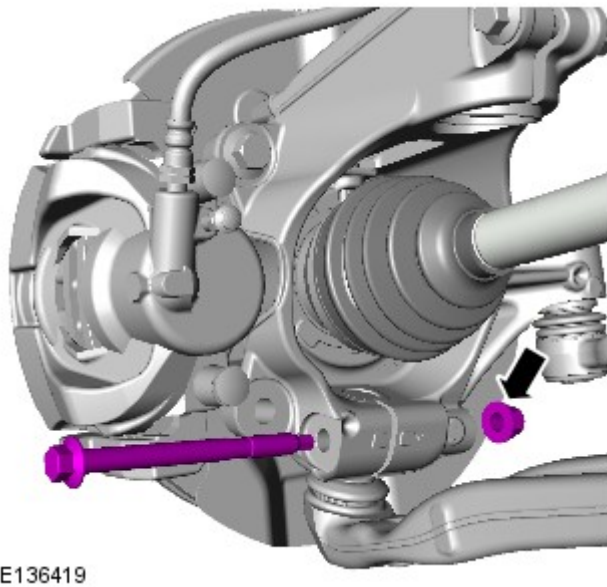
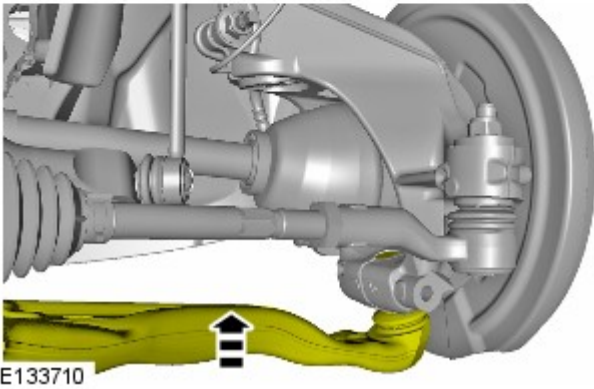
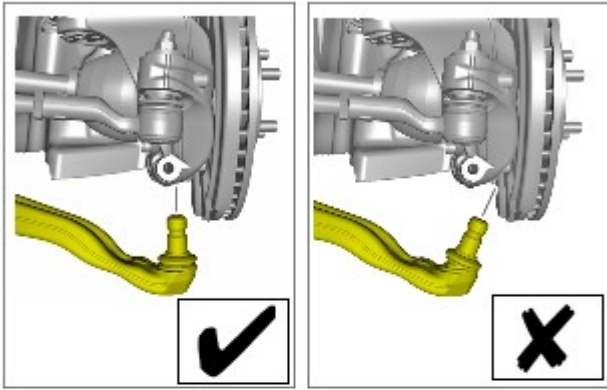
E133551

4. Torque: 25 Nm



E133686

5.

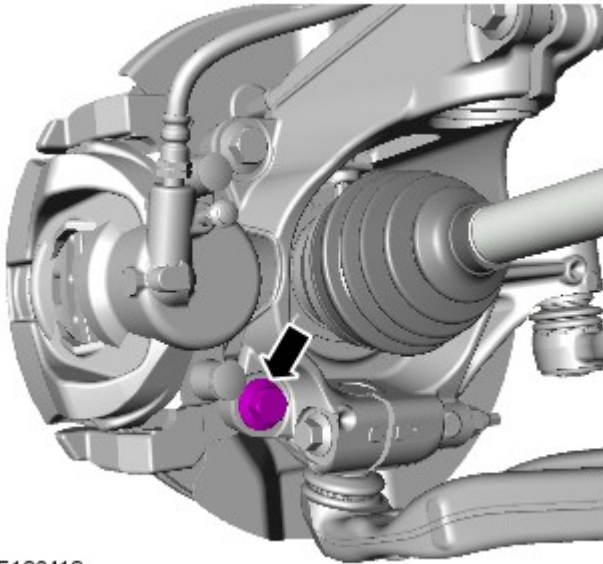


6.  CAUTION: Make sure that a new bolt is installed.

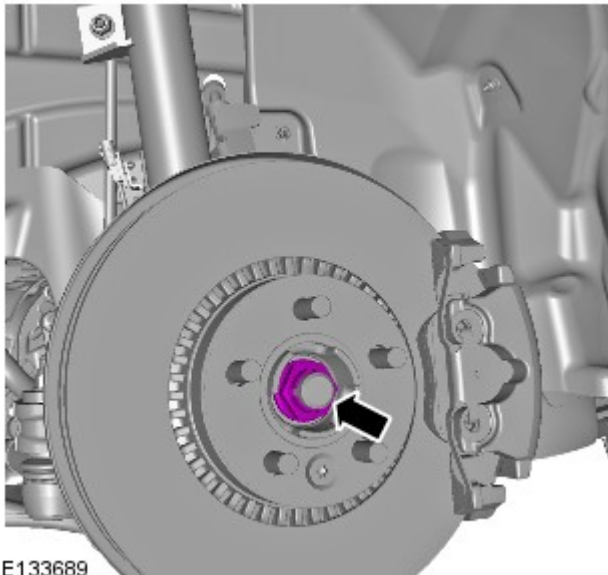
Torque:
 Stage 1: 80 Nm
 Stage 2: 180°

7.  CAUTION: Make sure that a new bolt is installed.

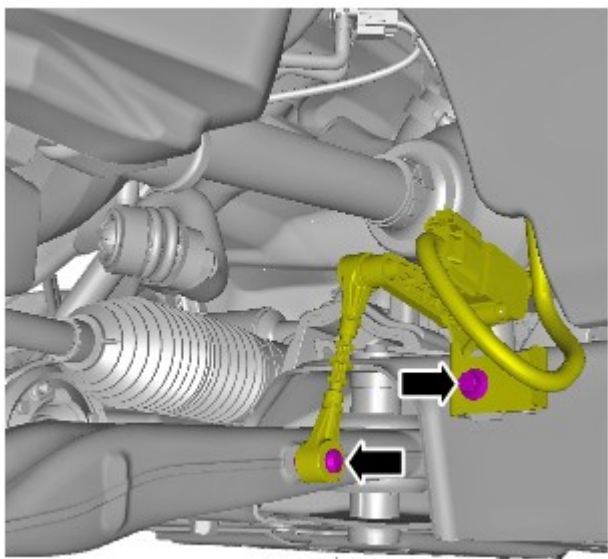
Torque:
 Stage 1: 90 Nm
 Stage 2: 120°




E136418




E133689



E133692

8.  **WARNING:** Make sure that a new nut is installed.

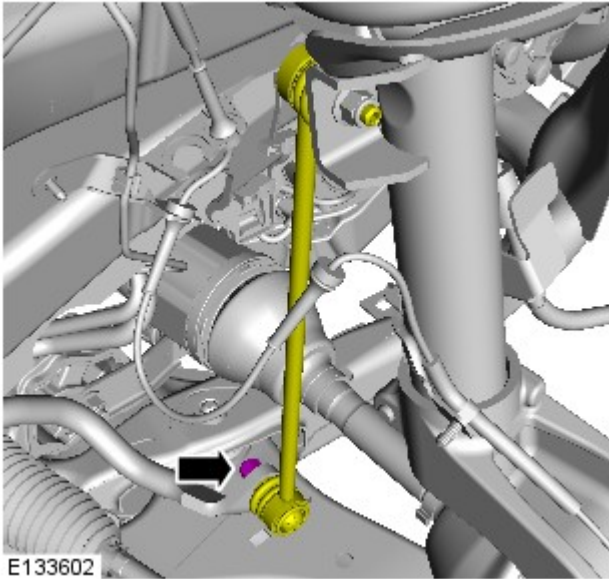
CAUTIONS:

-  Do not use air tools to install the nut. Failure to follow this instruction may result in damage to the component.

-  Install the halfshaft nut finger tight.

Torque:
 Stage 1: 100 Nm
 Stage 2: 90°

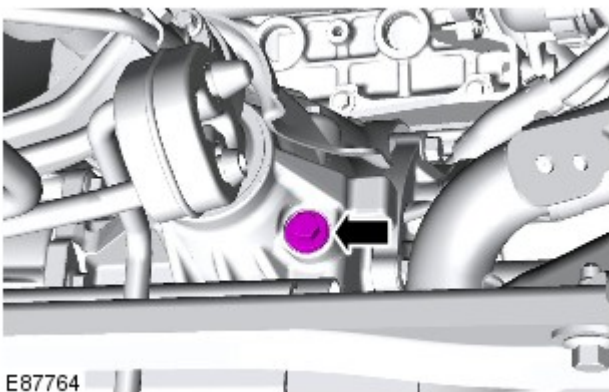
9. **Torque:** 10 Nm




10.  **WARNING:** Make sure that a new nut is installed.

Torque: 65 Nm

11. Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).



12.  **CAUTION:** The fluid filler plug is not a fluid level plug.

Check and top-up the transfer case fluid level.

13. Using only four wheel alignment equipment approved by Land Rover, check and adjust the wheel alignment.

Refer to: [Four-Wheel Alignment](#) (204-00 Suspension System - General Information, General Procedures).

Automatic Transmission/Transaxle - Main Control Valve Body Solenoids

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.

CAUTIONS:



Make sure that the mating faces are clean and free of foreign material.



Extreme cleanliness must be exercised when handling these components.

NOTES:



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



Removal steps in this procedure may contain installation details.

1.



WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

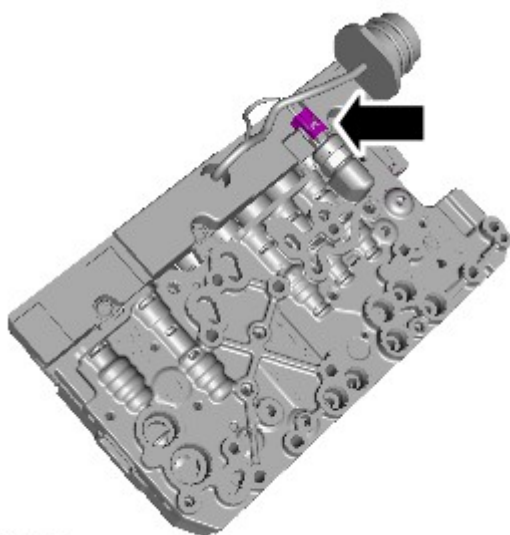
3. Remove the main control valve body.

Refer to: [Main Control Valve Body - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

Refer to: [Main Control Valve Body - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

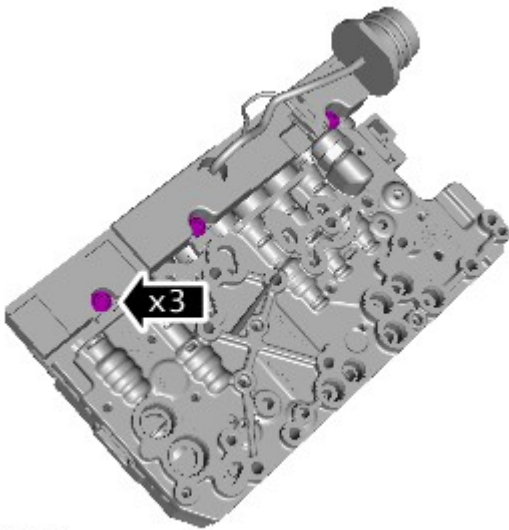
Refer to: [Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

4.



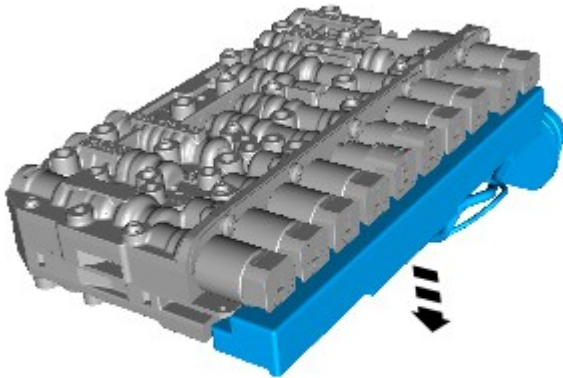
E187957

5. Torque: 6 Nm



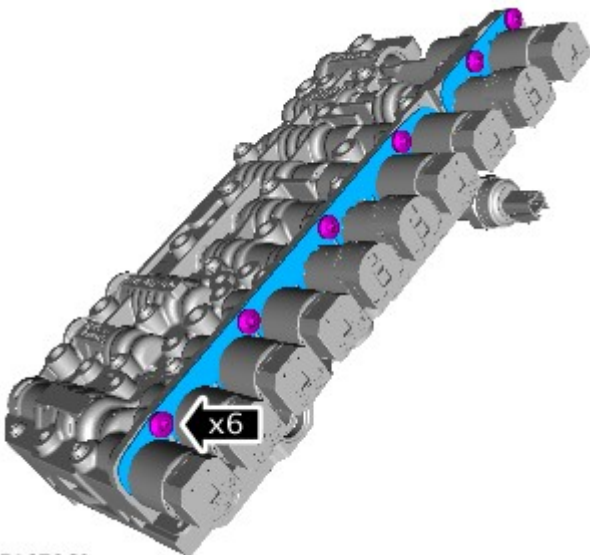
E187958

6.

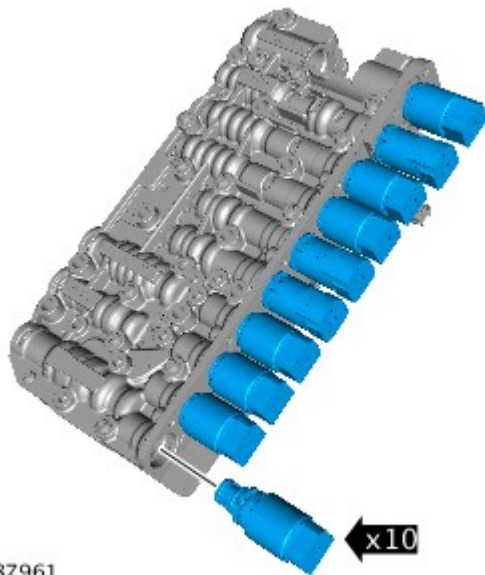


E187959

7. Torque: 6 Nm



E187960



E187961

8.



NOTE: Note the position of the components prior to removal.

Installation

1. To install reverse the removal procedure.

2. Using the approved Land Rover diagnostic equipment, run the Automatic transmission valve block application.

Published: 30-Sep-2014

Battery, Mounting and Cables -

General Specification - Stop-start and timed climate models:

Item	Specification
Battery:	
Type	H7 AGM (VRLA)
Capacity	80Ah/800CCA

General Specification - All except stop-start and timed climate models

Item	Specification
Battery:	
Type	H7 Flooded
Capacity	80Ah/700CCA

Battery Disconnect/Connect



CAUTION: The vehicle status must be established before attempting battery disconnect/connect. Reference must be then made to the following table to establish the relevant procedure to be followed.



NOTE: Make a note of the customers radio preset stations.

Vehicle status	Procedure
Vehicle without Telematics	1
Vehicle with Telematics	2

Procedure 1

Disconnect battery	Connect battery
1. Chock the wheels	1. Make sure that all electrical loads are switched OFF
2. Open the hood	2. Connect battery ground cable to the battery - 6Nm
3. Remove the battery cover	3. Connect the BMS electrical connector
4. Disconnect the engine wiring harness ground connector/terminal	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the battery ground to starter motor connector/terminal (if equipped)	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery monitoring	

system (BMS) module electrical connector	6. Install the battery cover
7. Disconnect the battery ground cable from the battery	7. Close the hood
	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work

Procedure 2

Disconnect battery	Connect battery
1. Make sure the customer has placed stolen vehicle tracking into Service Mode (if equipped)	1. Make sure that all electrical loads are switched OFF
2. Chock the wheels	2. Connect battery ground cable to the battery - 6Nm
3. Open the hood	3. Connect the BMS electrical connector
4. Remove the battery cover	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the engine wiring harness ground connector/terminal	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery ground to starter motor connector/terminal (if equipped)	6. Install the battery cover
7. Disconnect the battery monitoring system (BMS) module electrical connector	7. Close the hood
8. Disconnect the battery ground cable from the battery	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work
	12. Request stolen vehicle tracking removed from Service Mode (if equipped)

Torque Specifications

Item	Nm	lb-ft	lb-in
Vehicle body brace retaining bolts	25	18	-
Battery terminal nuts	6	-	53
Battery ground terminal nut - battery to starter motor retaining stud (if equipped)	10	7	-
Battery tray retaining bolts	10	7	-

Published: 31-May-2016

Automatic Transmission/Transaxle - Main Control Valve Body GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.



CAUTION: Extreme cleanliness must be exercised when handling this component.



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

1.



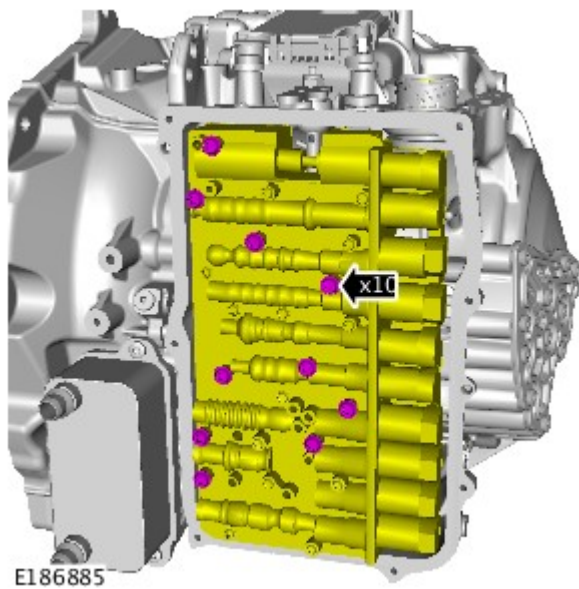
WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Disconnect the battery ground cable.

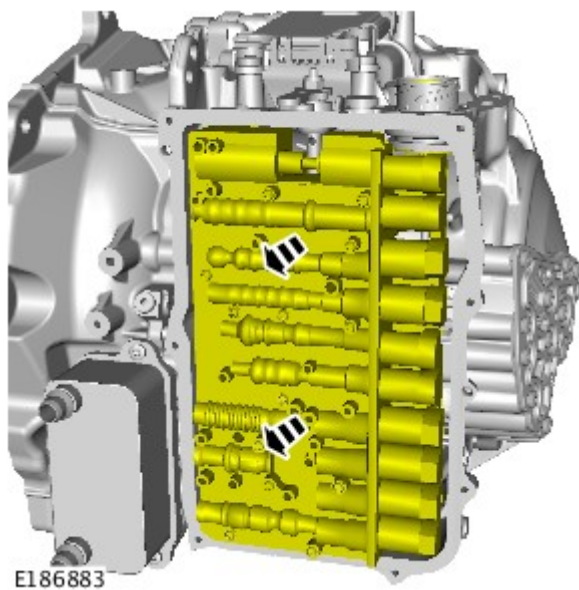
Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

3. Refer to: [Transmission Fluid Pan - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).




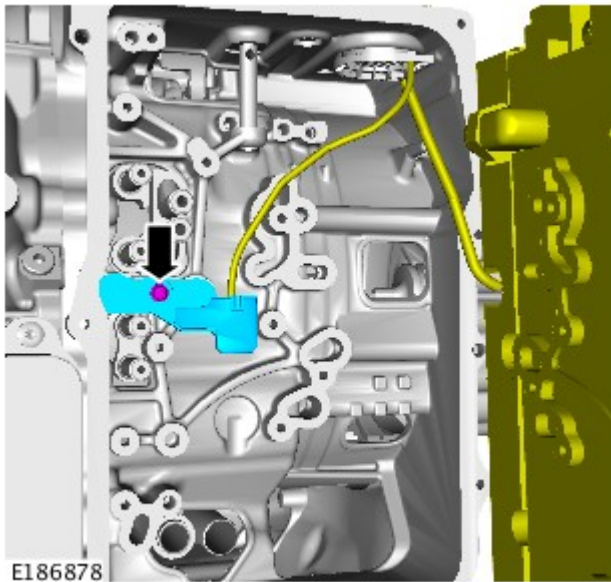
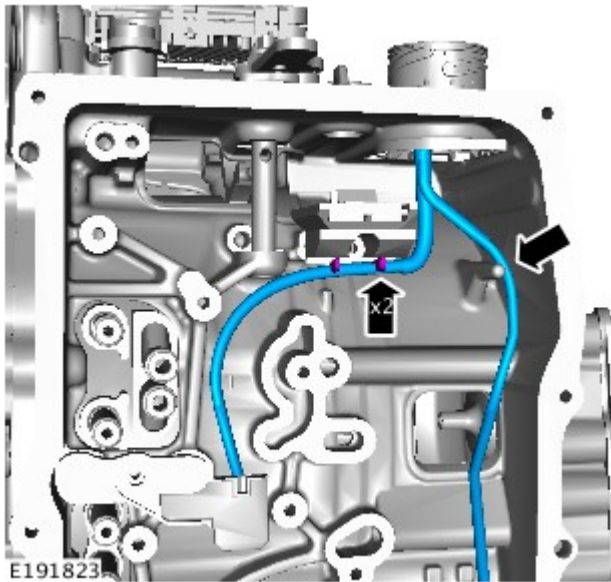
4.  NOTE: Note the orientation of the component.


Remove and discard the bolts.

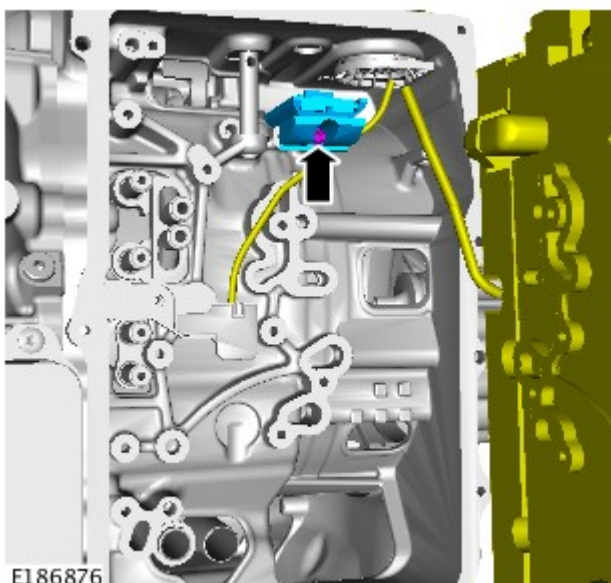



5.  CAUTION: Take extra care not to damage the wiring harnesses.

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

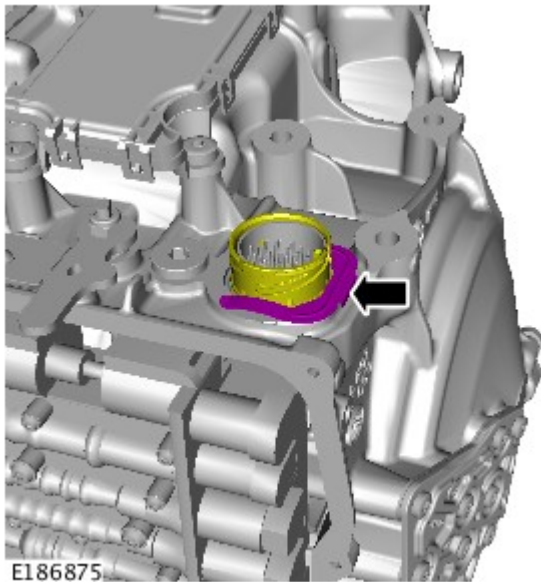


7.  NOTE: Note the orientation of the component prior to removal.

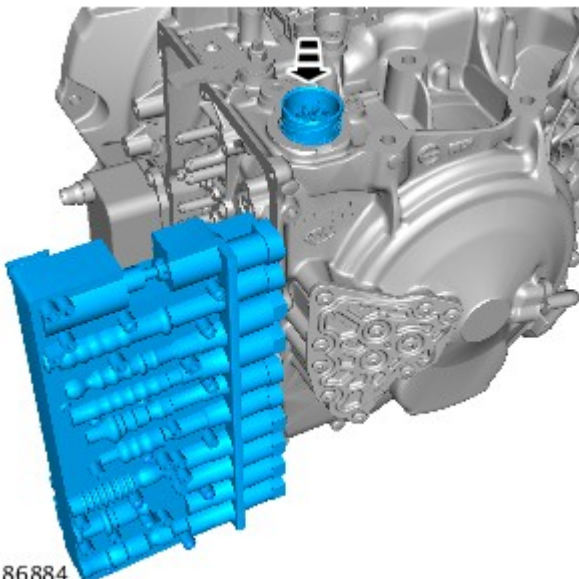


8.  NOTE: Note the orientation of the component prior to removal.

- 9.



E186875



E186884

10. CAUTIONS:



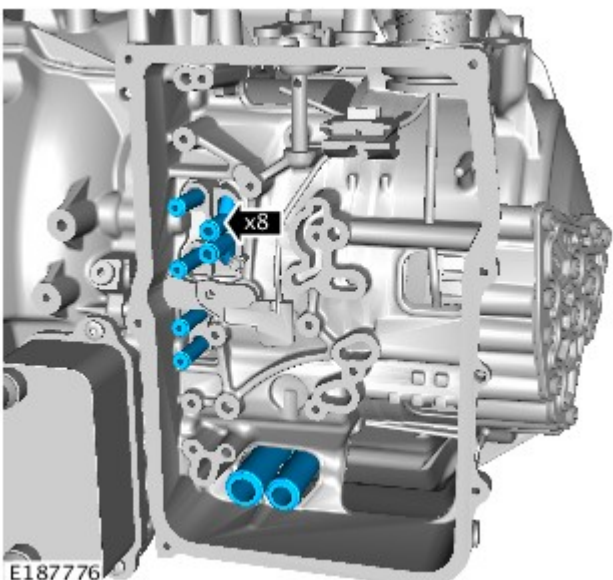
Take extra care not to damage the wiring harnesses.



Care must be taken to avoid damage to the mating surfaces.



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



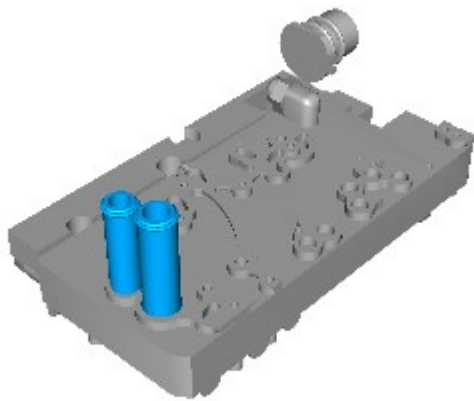
E187776

11.




NOTE: Discard the components.

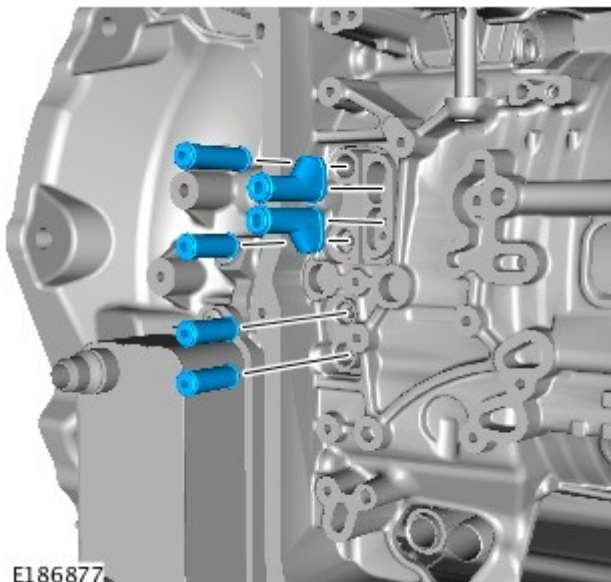
Installation



E186881

1.  **CAUTION:** Make sure that the oil tubes are correctly installed.

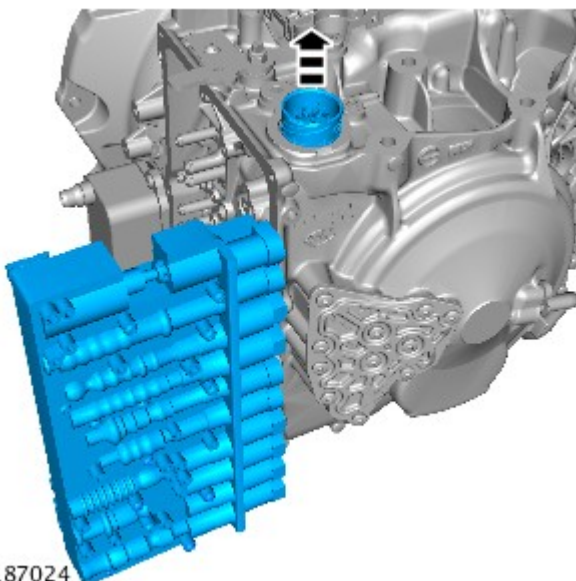
Install the new oil tubes to the valve body as illustrated.



E186877


2.  **CAUTION:** Make sure that the oil tubes are correctly installed.


Install the new oil tubes to the transmission as illustrated.

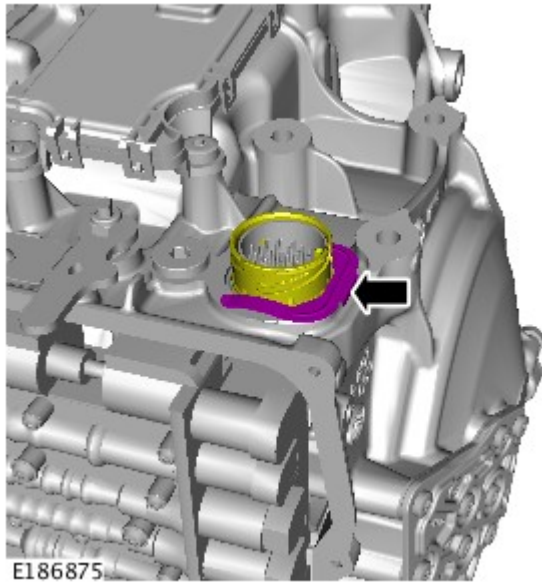


E187024

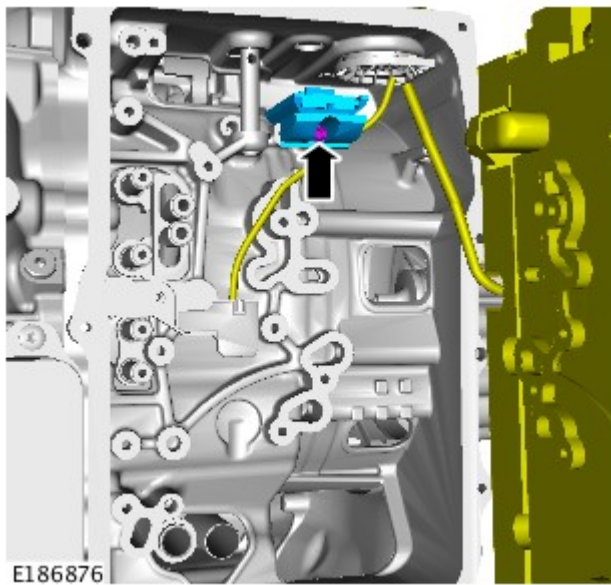
3. **CAUTIONS:**

 Make sure that the electrical connector is installed in the correct orientation as noted in the removal step.

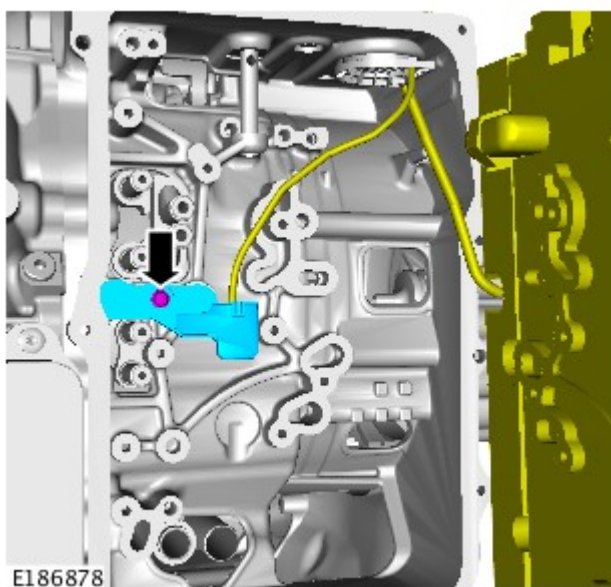
 Care must be taken not to damage the component.




4.



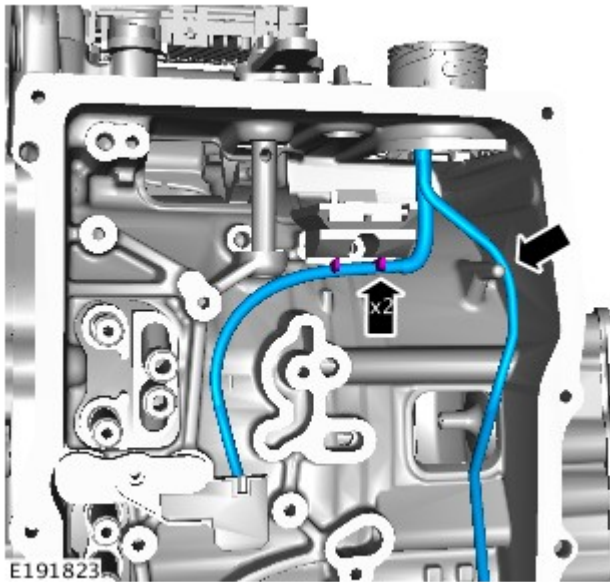
5. Torque: 6 Nm



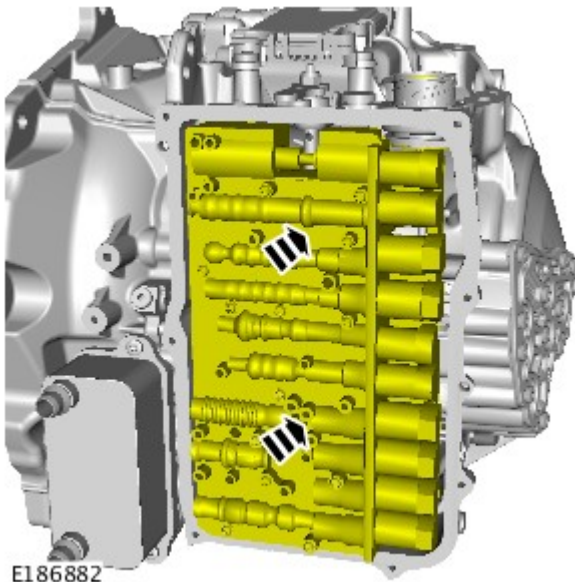
6.  NOTE: Make sure that the component is installed to the noted removal position.

Torque: 6 Nm

7.



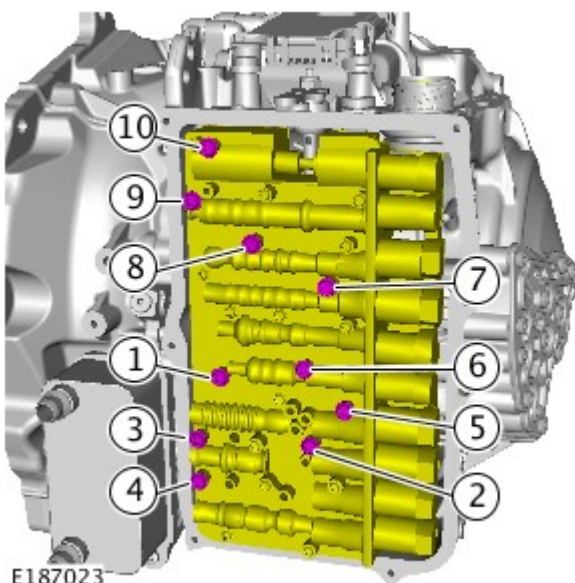
NOTE: Make sure that the wiring harness is installed as illustrated, failure to follow this instruction may cause damage to the wiring harness



8.



CAUTION: Take extra care not to damage the wiring harnesses.



9.



CAUTION: Make sure that new bolts are installed.



NOTE: Tighten the retaining bolts in the sequence illustrated.

Torque: 8 Nm

Refer to: [Transmission Fluid Pan - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

11. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

12. Using the approved Land Rover diagnostic equipment, run the Automatic transmission valve block application.

Published: 31-May-2016

Automatic Transmission/Transaxle - Main Control Valve Body INGENIUM I4 2.0L Diesel

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.



CAUTION: Extreme cleanliness must be exercised when handling this component.



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

1.



WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

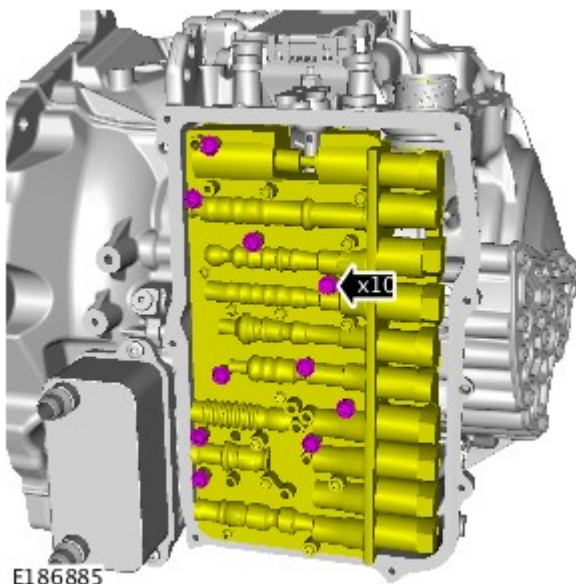
3. Refer to: [Transmission Fluid Pan - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

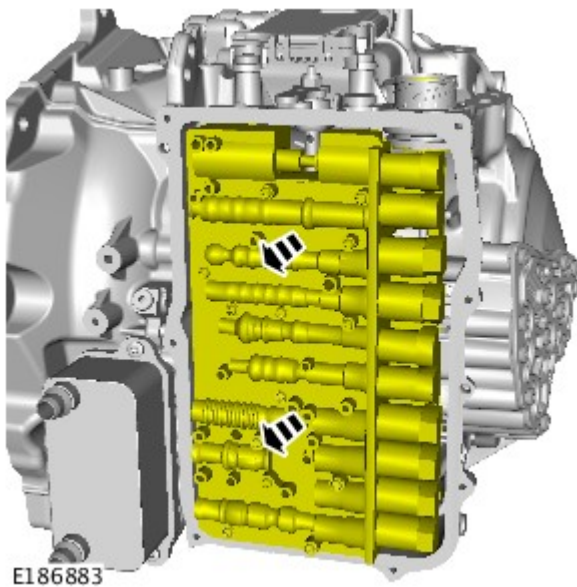
4.



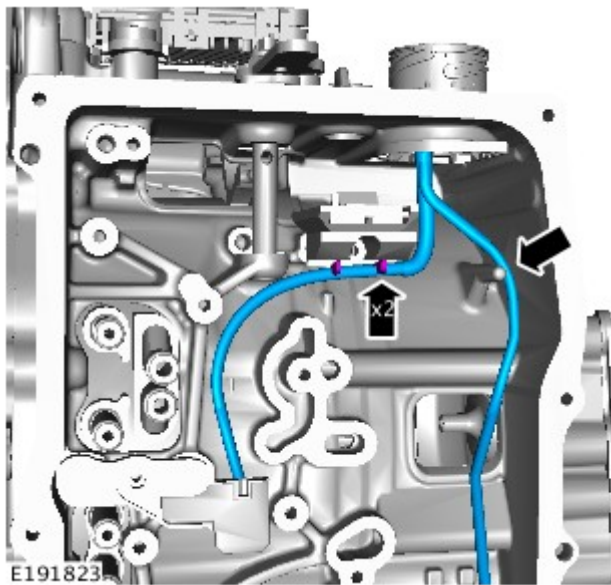
NOTE: Note the orientation of the component.


Remove and discard the bolts.

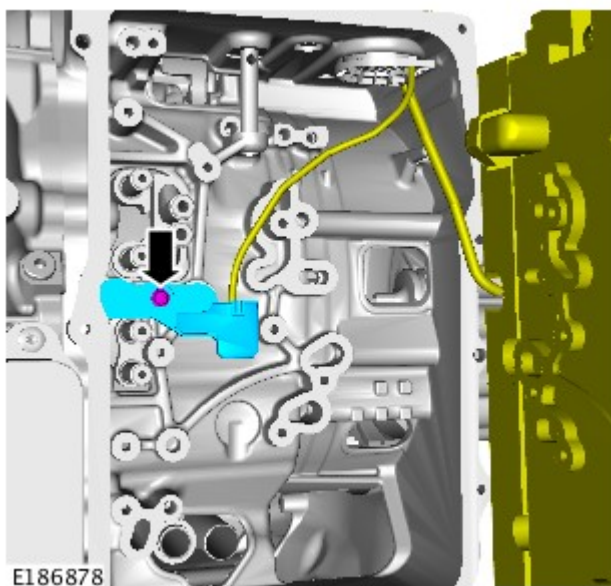





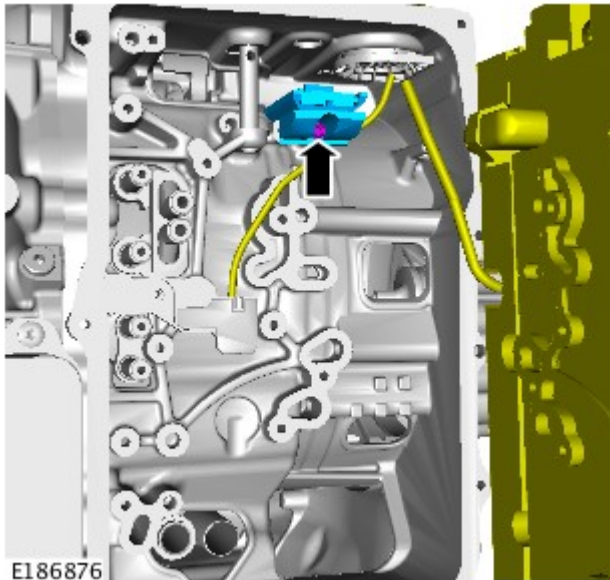
5.  CAUTION: Take extra care not to damage the wiring harnesses.




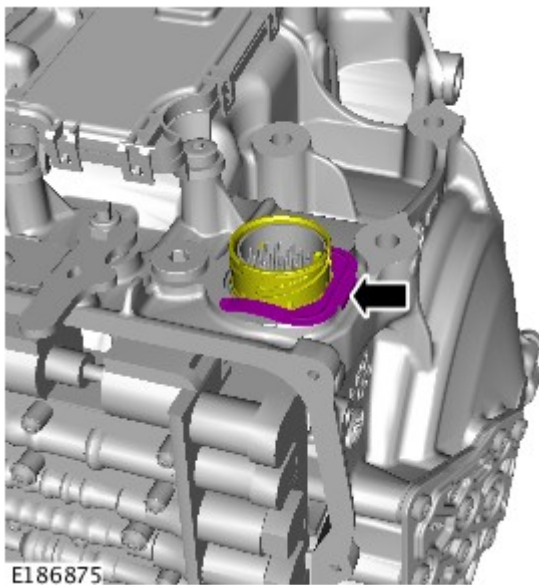
6.  NOTE: Note the orientation of the component prior to removal.



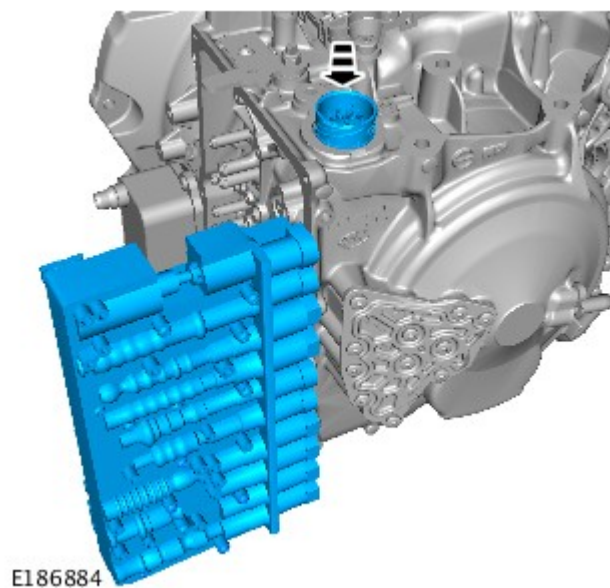
7.  NOTE: Note the orientation of the component prior to removal.




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





9.

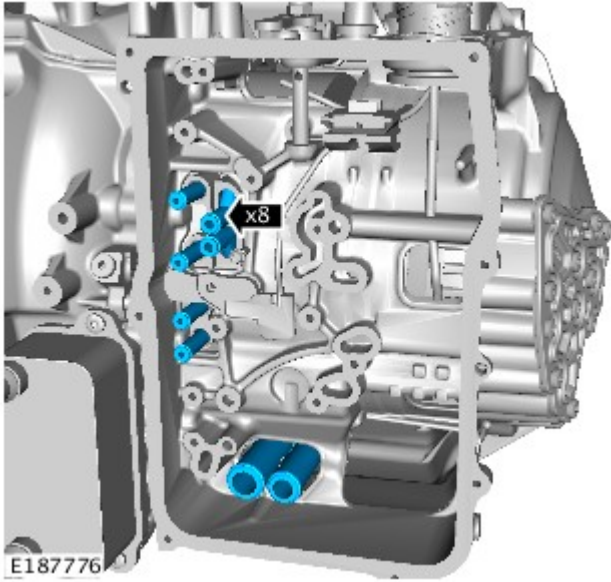


10. CAUTIONS:

 Take extra care not to damage the wiring harnesses.

 Care must be taken to avoid damage to the mating surfaces.

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

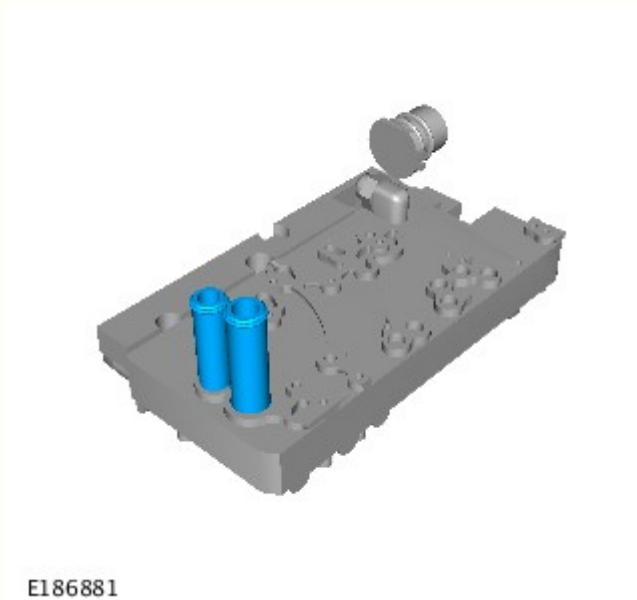


11.



NOTE: Discard the components.

Installation

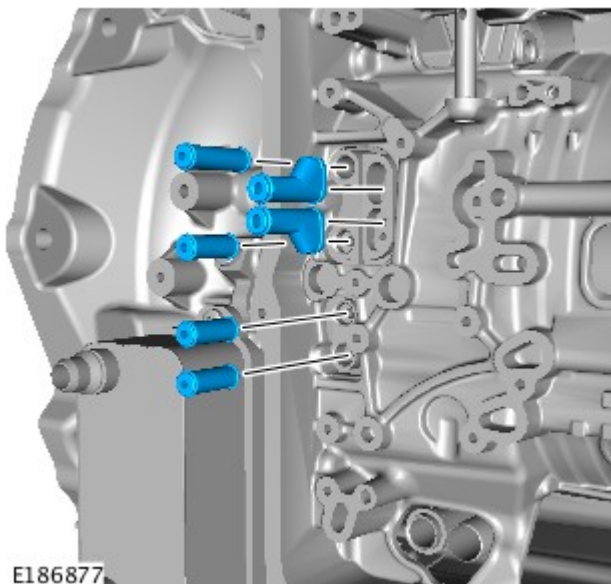


1.



CAUTION: Make sure that the oil tubes are correctly installed.

Install the new oil tubes to the valve body as illustrated.

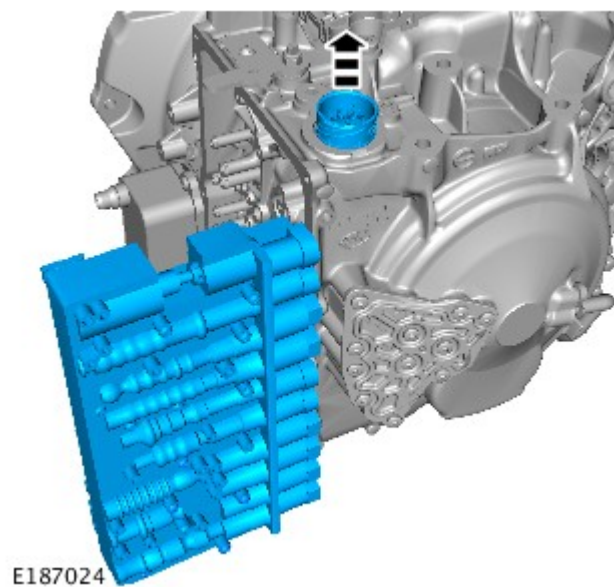


2.



CAUTION: Make sure that the oil tubes are correctly installed.

Install the new oil tubes to the transmission as illustrated.



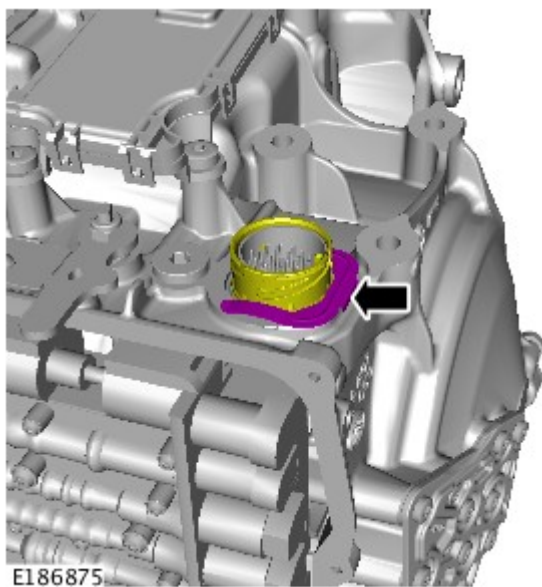
3. CAUTIONS:



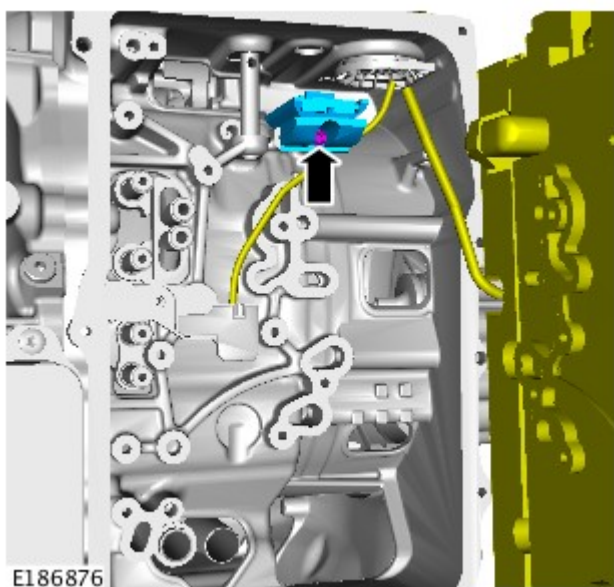
Make sure that the electrical connector is installed in the correct orientation as noted in the removal step.



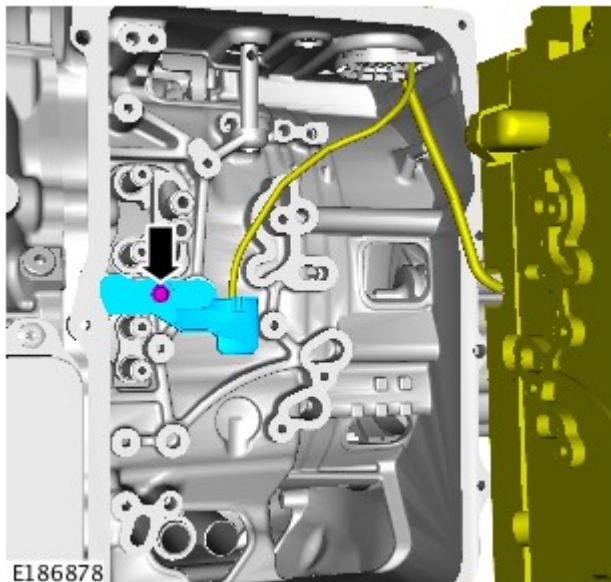
Care must be taken not to damage the component.



4.

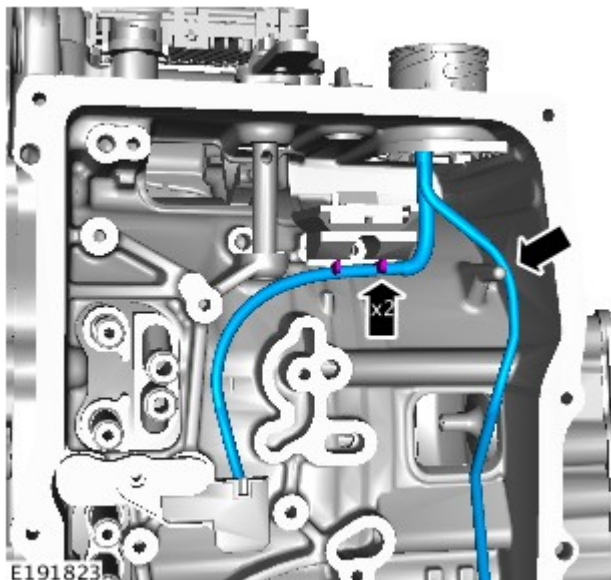



5. Torque: 6 Nm

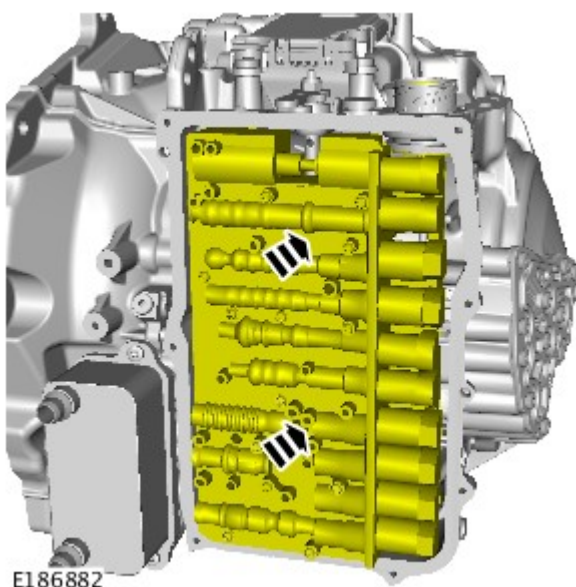


6.  NOTE: Make sure that the component is installed to the noted removal position.

Torque: 6 Nm

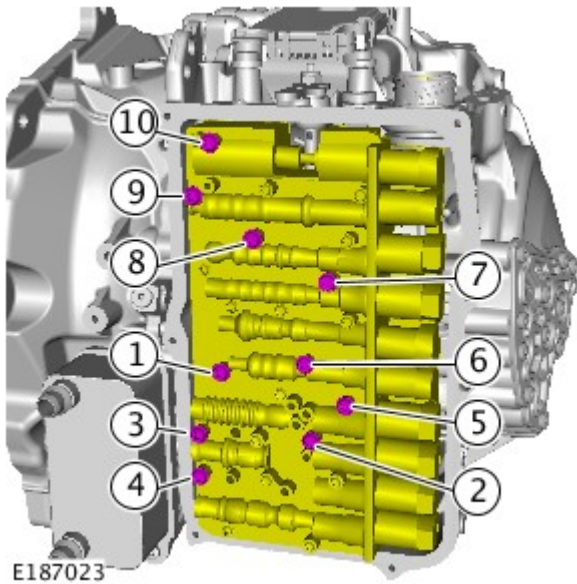


7.  NOTE: Make sure that the wiring harness is installed as illustrated, failure to follow this instruction may cause damage to the wiring harness



8.  CAUTION: Take extra care not to damage the wiring harnesses.

- 9.



CAUTION: Make sure that new bolts are installed.



NOTE: Tighten the retaining bolts in the sequence illustrated.

Torque: 8 Nm

10. Refer to: [Transmission Fluid Pan - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

11. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

12. Using the approved Land Rover diagnostic equipment, run the Automatic transmission valve block application.

Automatic Transmission/Transaxle - Main Control Valve Body INGENIUM I4 2.0L Diesel

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.



CAUTION: Extreme cleanliness must be exercised when handling this component.



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

1.



WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

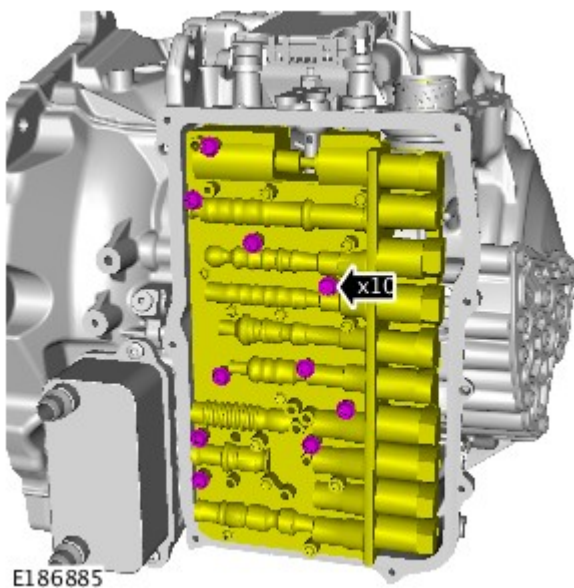
3. Refer to: [Transmission Fluid Pan - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

4.



NOTE: Note the orientation of the component.

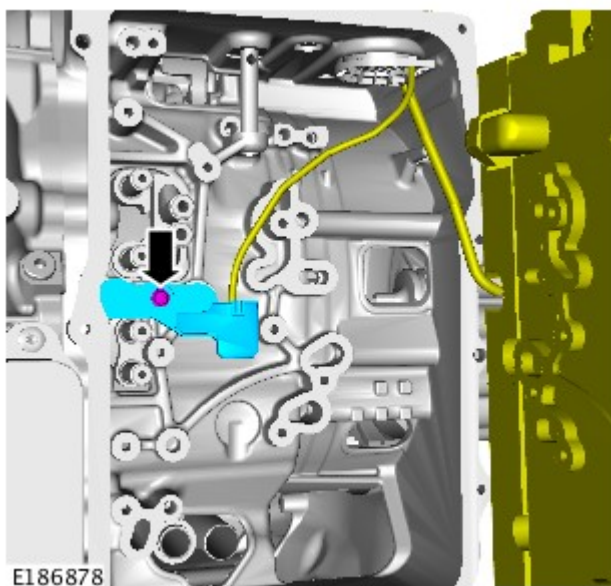
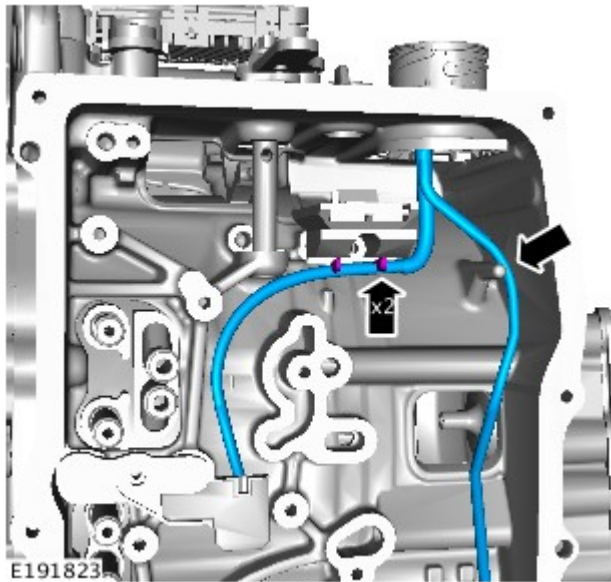
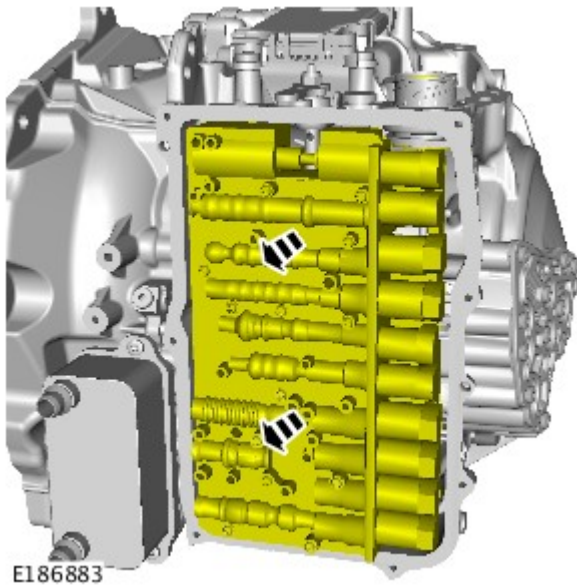
Remove and discard the bolts.





5.



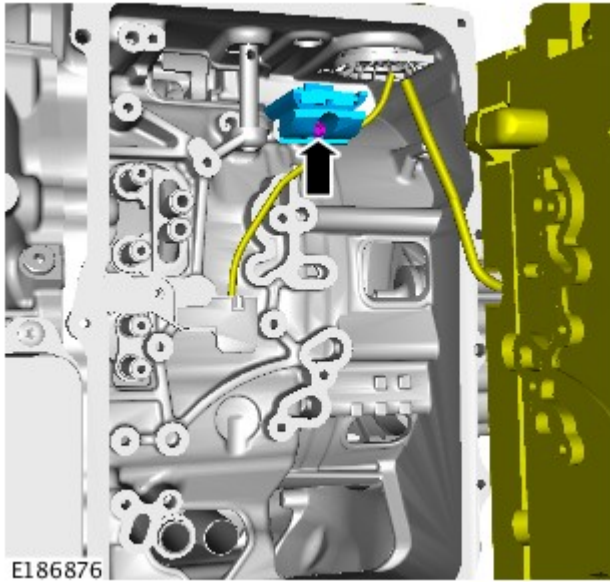
CAUTION: Take extra care not to damage the wiring harnesses.



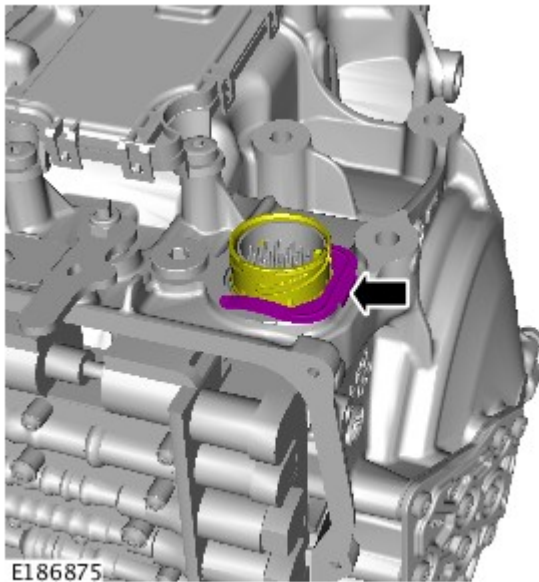
6.  NOTE: Note the orientation of the component prior to removal.

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

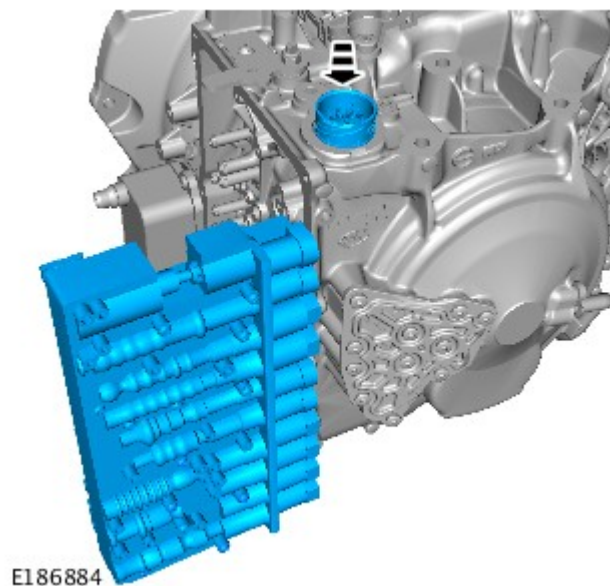
- 8.



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



9.



10. CAUTIONS:



Take extra care not to damage the wiring harnesses.

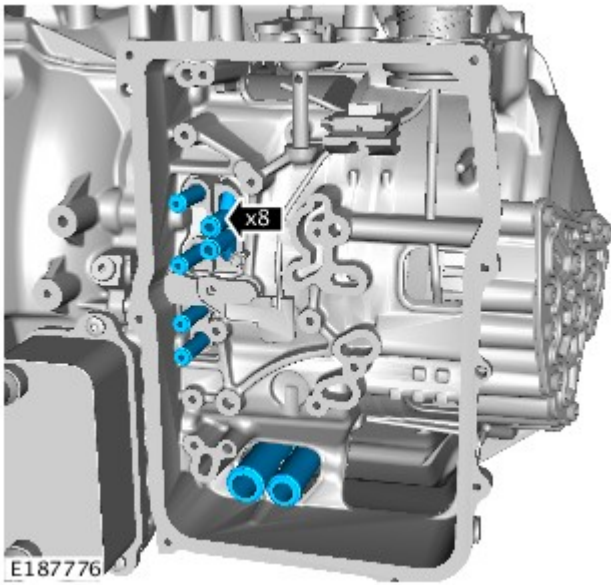


Care must be taken to avoid damage to the mating surfaces.



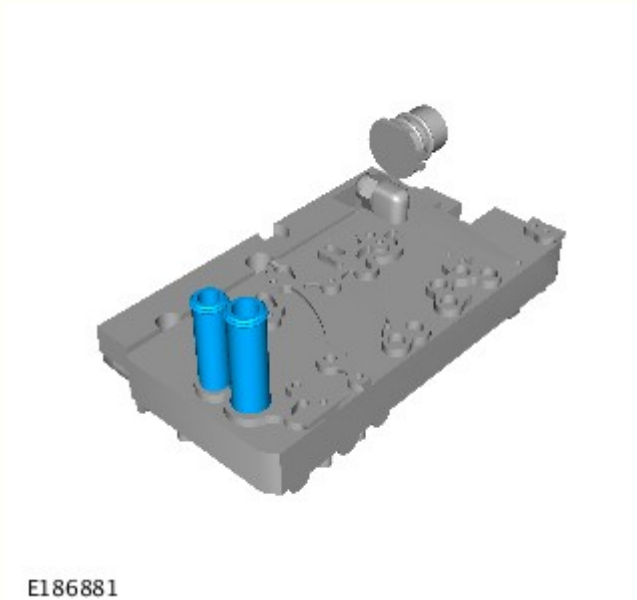
NOTE: Note the orientation of the component prior to removal.

11.



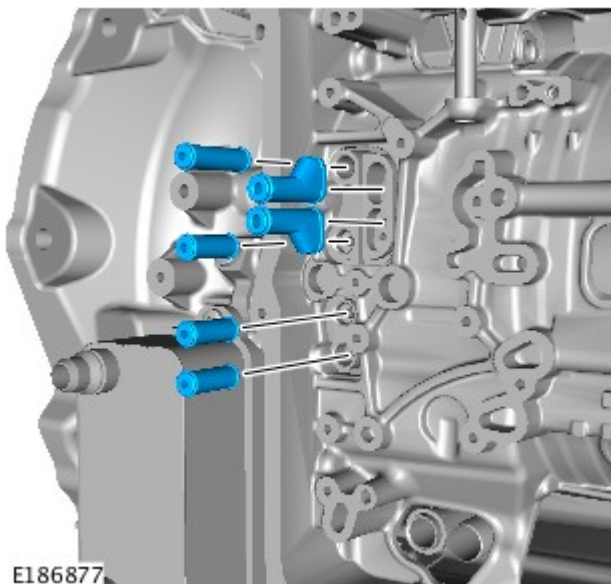
NOTE: Discard the components.


Installation



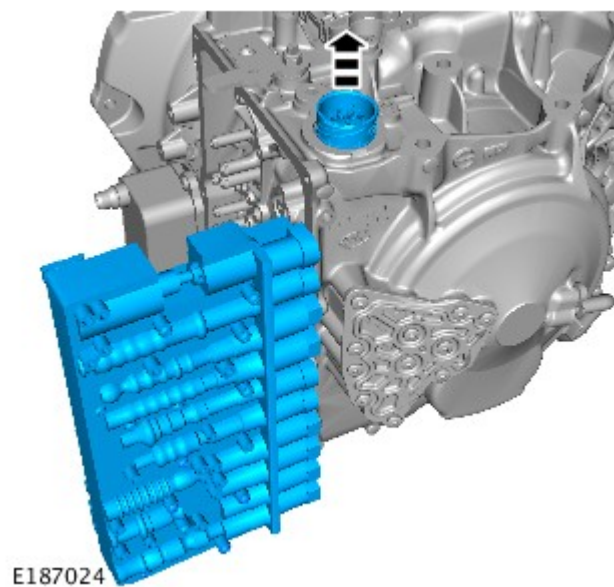
1.  CAUTION: Make sure that the oil tubes are correctly installed.

Install the new oil tubes to the valve body as illustrated.



2.  CAUTION: Make sure that the oil tubes are correctly installed.

Install the new oil tubes to the transmission as illustrated.



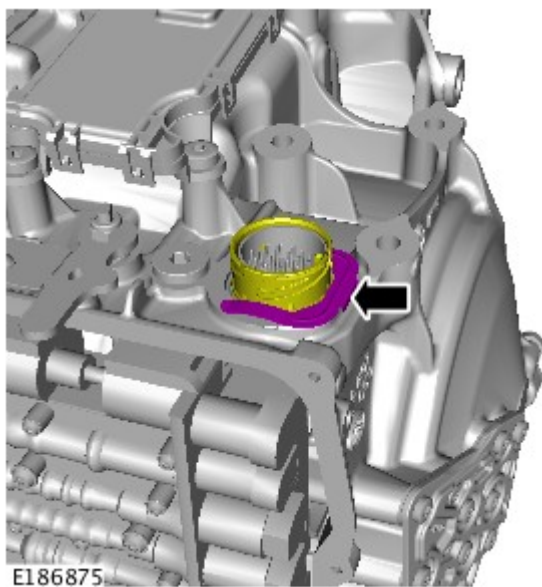
3. CAUTIONS:



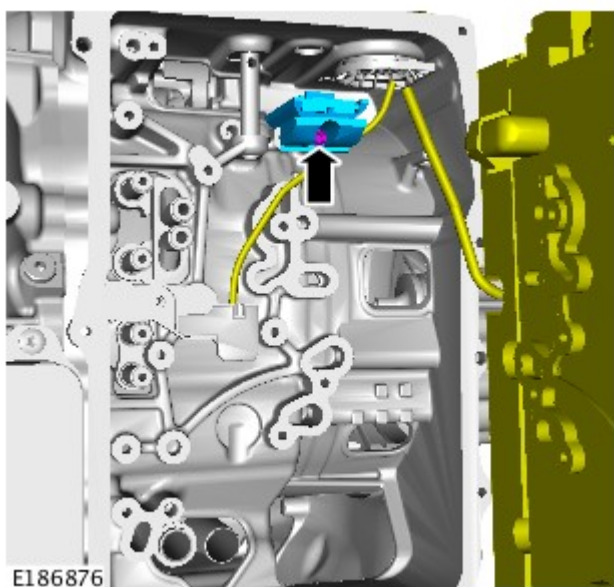
Make sure that the electrical connector is installed in the correct orientation as noted in the removal step.



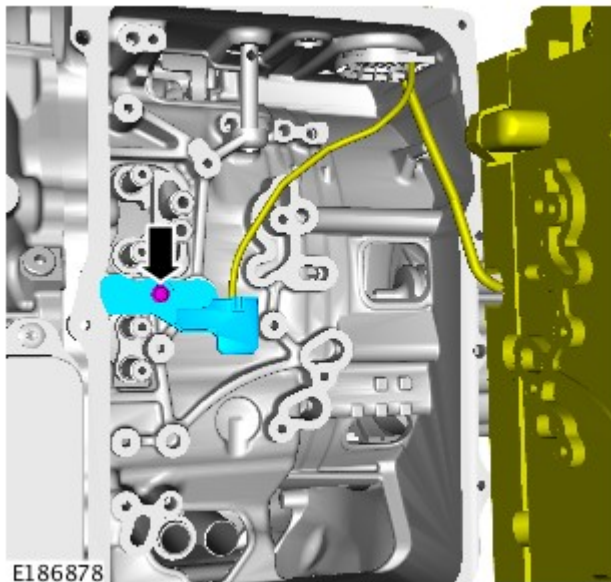
Care must be taken not to damage the component.




4.



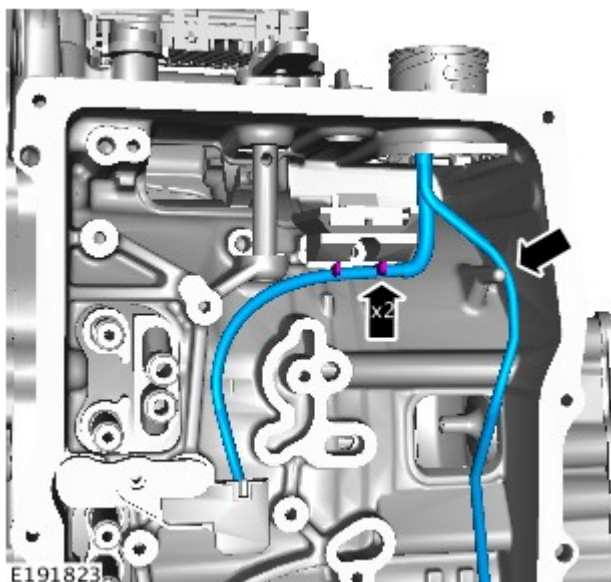
5. Torque: 6 Nm




E186878

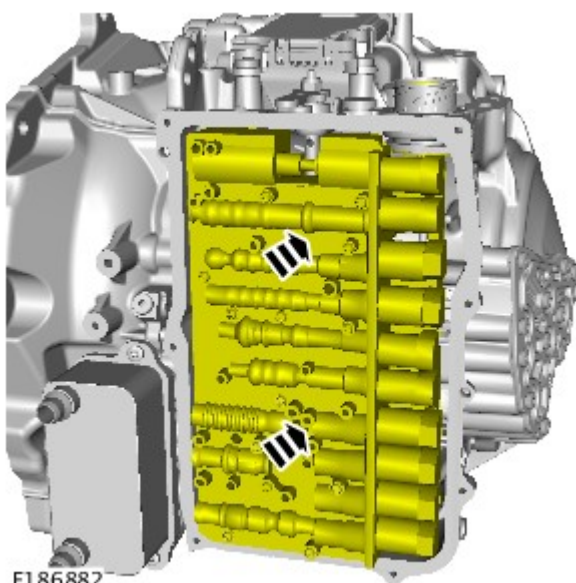
6.  NOTE: Make sure that the component is installed to the noted removal position.

Torque: 6 Nm



E191823

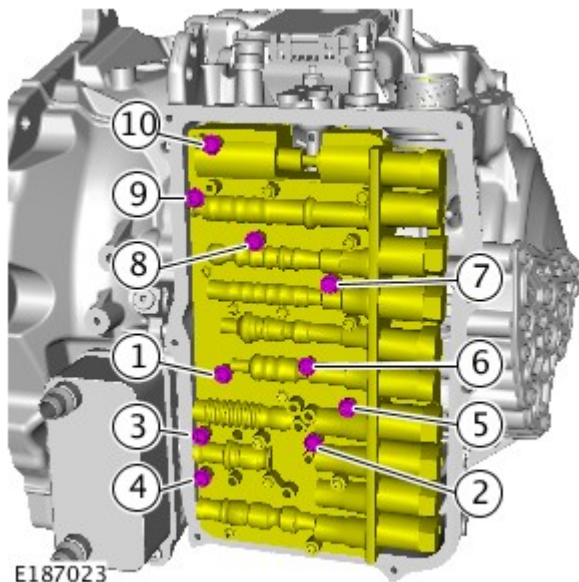
7.  NOTE: Make sure that the wiring harness is installed as illustrated, failure to follow this instruction may cause damage to the wiring harness



E186882

8.  CAUTION: Take extra care not to damage the wiring harnesses.

- 9.



CAUTION: Make sure that new bolts are installed.



NOTE: Tighten the retaining bolts in the sequence illustrated.

Torque: 8 Nm

10. Refer to: [Transmission Fluid Pan - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

11. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

12. Using the approved Land Rover diagnostic equipment, run the Automatic transmission valve block application.

Published: 30-Sep-2014

Battery, Mounting and Cables -

General Specification - Stop-start and timed climate models:

Item	Specification
Battery:	
Type	H7 AGM (VRLA)
Capacity	80Ah/800CCA

General Specification - All except stop-start and timed climate models

Item	Specification
Battery:	
Type	H7 Flooded
Capacity	80Ah/700CCA

Battery Disconnect/Connect



CAUTION: The vehicle status must be established before attempting battery disconnect/connect. Reference must be then made to the following table to establish the relevant procedure to be followed.



NOTE: Make a note of the customers radio preset stations.

Vehicle status	Procedure
Vehicle without Telematics	1
Vehicle with Telematics	2

Procedure 1

Disconnect battery	Connect battery
1. Chock the wheels	1. Make sure that all electrical loads are switched OFF
2. Open the hood	2. Connect battery ground cable to the battery - 6Nm
3. Remove the battery cover	3. Connect the BMS electrical connector
4. Disconnect the engine wiring harness ground connector/terminal	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm

5. Disconnect the battery ground to starter motor connector/terminal (if equipped)	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery monitoring system (BMS) module electrical connector	6. Install the battery cover
7. Disconnect the battery ground cable from the battery	7. Close the hood
	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work

Procedure 2

Disconnect battery	Connect battery
1. Make sure the customer has placed stolen vehicle tracking into Service Mode (if equipped)	1. Make sure that all electrical loads are switched OFF
2. Chock the wheels	2. Connect battery ground cable to the battery - 6Nm
3. Open the hood	3. Connect the BMS electrical connector
4. Remove the battery cover	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the engine wiring harness ground connector/terminal	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery ground to starter motor connector/terminal (if equipped)	6. Install the battery cover
7. Disconnect the battery monitoring system (BMS) module electrical connector	7. Close the hood
8. Disconnect the battery ground cable from the battery	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work
	12. Request stolen vehicle tracking removed from Service Mode (if equipped)

Torque Specifications

Item	Nm	lb-ft	lb-in
Vehicle body brace retaining bolts	25	18	-
Battery terminal nuts	6	-	53
Battery ground terminal nut - battery to starter motor retaining stud (if equipped)	10	7	-
Battery tray retaining bolts	10	7	-

Published: 25-Jan-2016

Automatic Transmission/Transaxle - Transmission Fluid Pan INGENIUM I4 2.0L Diesel

Removal and Installation

Removal



WARNING: Be prepared to catch escaping fluid.



CAUTION: Extreme cleanliness must be exercised when handling this component.

NOTES:



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



Some illustrations may show the transmission removed for clarity.

1.



WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Disconnect the battery ground cable.

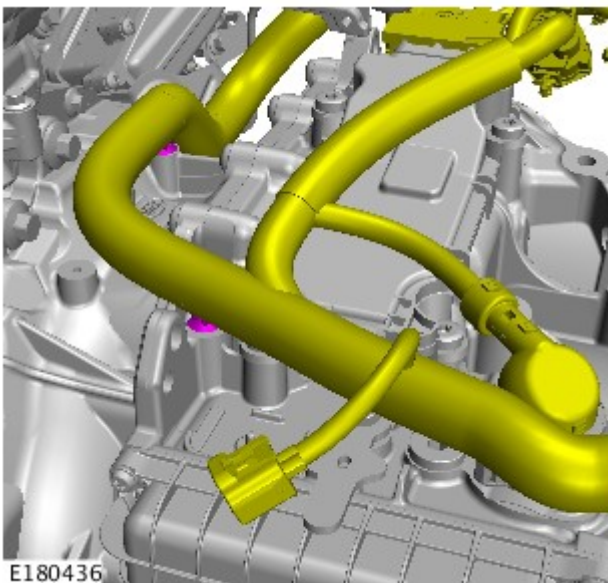
Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

3. Refer to: [Charge Air Cooler](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

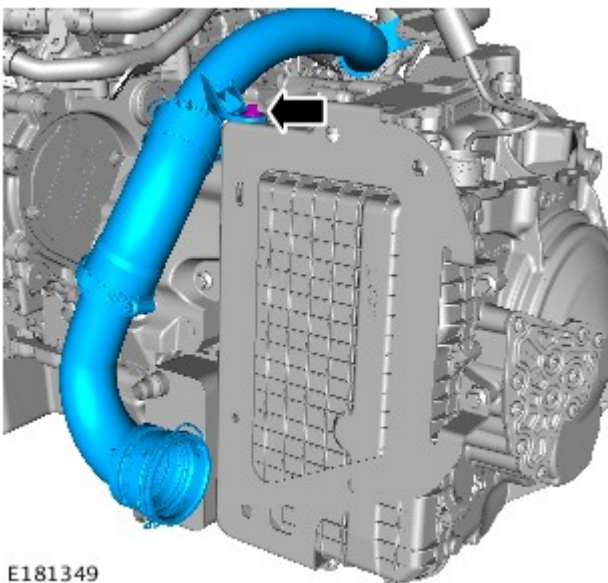
4. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03A Engine Cooling - INGENIUM I4 2.0L Diesel, General Procedures).

5. Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

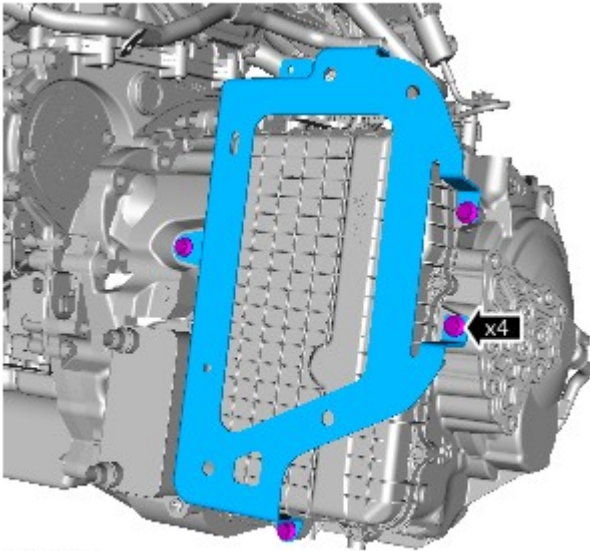
6.



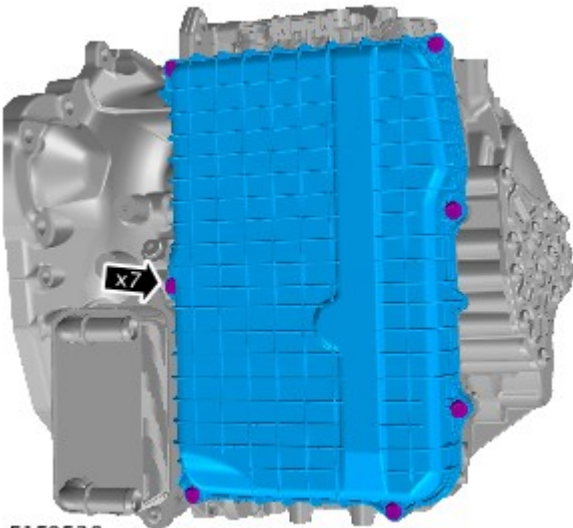
7.




8.



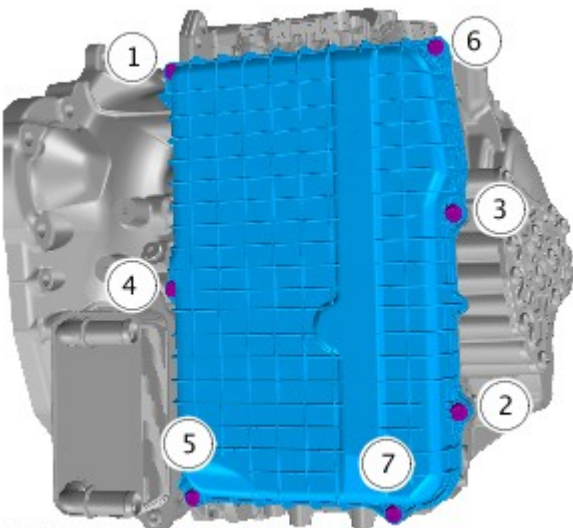
E181661




E159538

9.  **CAUTION:** Care must be taken when handling the component. Do not place on a surface with the seal faced down. Failure to follow this instruction may damage the component.

Installation

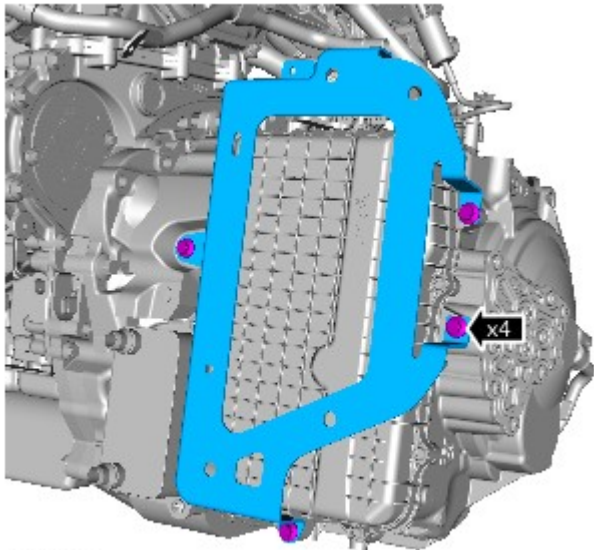


E159556

1.  **CAUTION:** Make sure that the mating faces are clean and free of foreign material.

Tighten the bolts in the sequence illustrated.

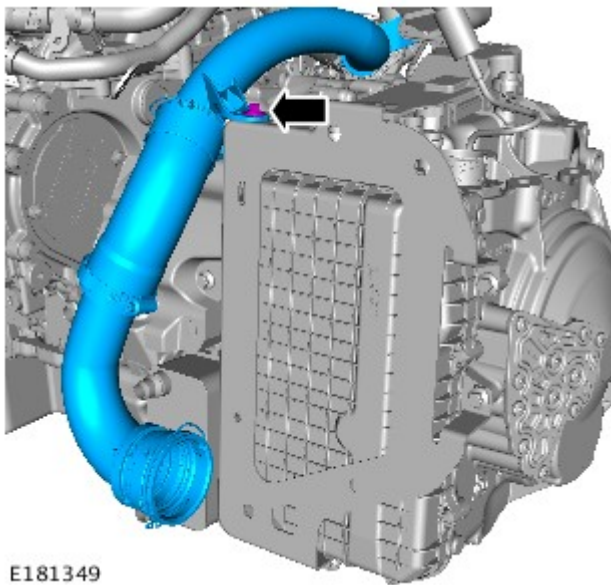
Torque: 9 Nm



E181661

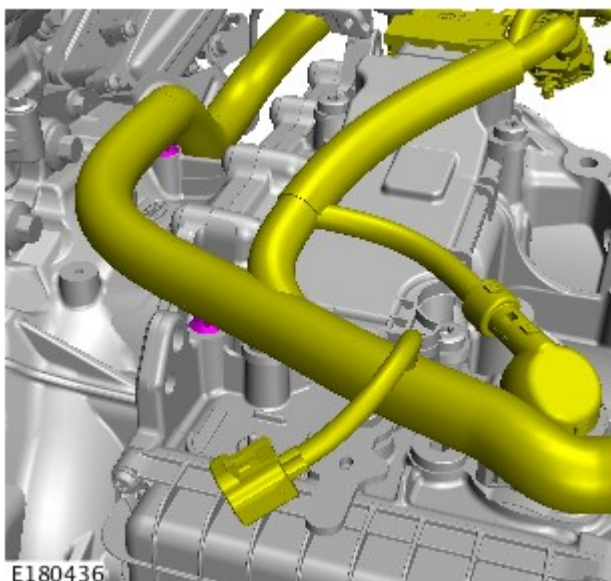
2.  NOTE: This step is only required if previously removed.

Torque: 10 Nm



E181349

3. Torque: 8 Nm



E180436

- 4.

5. Refer to: [Charge Air Cooler](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

6. Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

7. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03A Engine Cooling - INGENIUM I4 2.0L Diesel, General Procedures).


8. Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

Published: 25-Jan-2016

Automatic Transmission/Transaxle - Selector Shaft Seal INGENIUM I4 2.0L Diesel

Removal and Installation

Special Tool(s)

 E159488	JLR-307-684 Installer, Oil Seal
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Removal

NOTES:



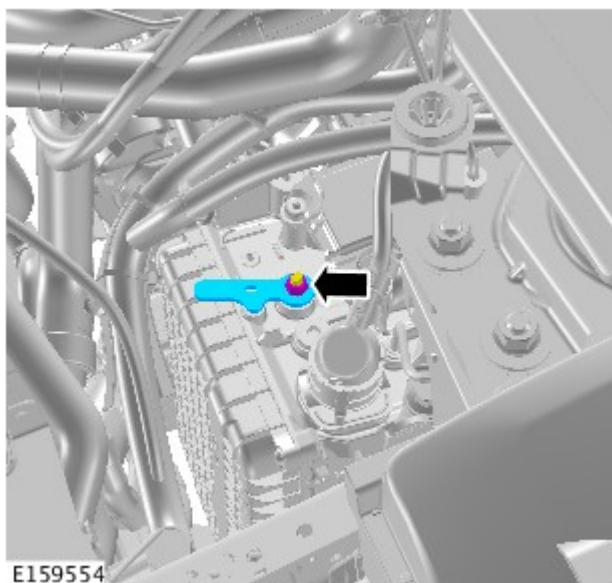
Some illustrations may show the transmission removed for clarity.



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

1. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

2.

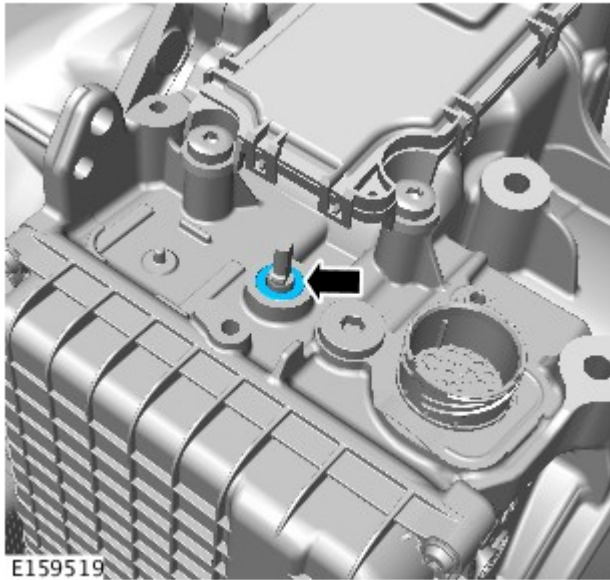


3.

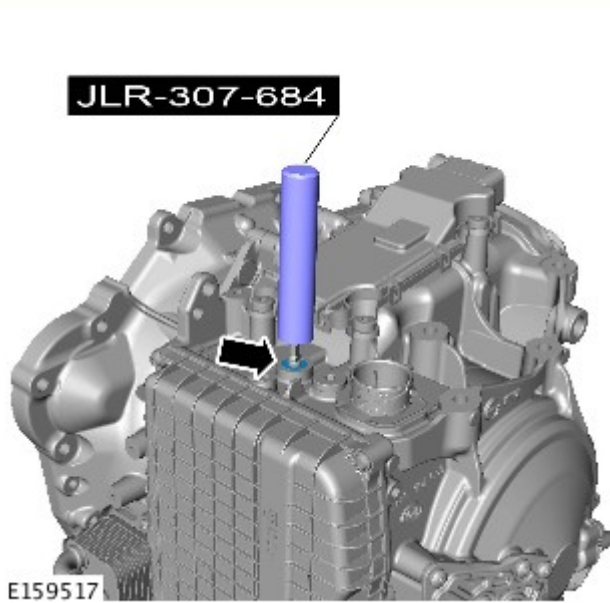


CAUTION: Care must be taken when removing the seal to prevent damage to the components.

Using a suitable tool, remove and discard the oil seal.




Installation



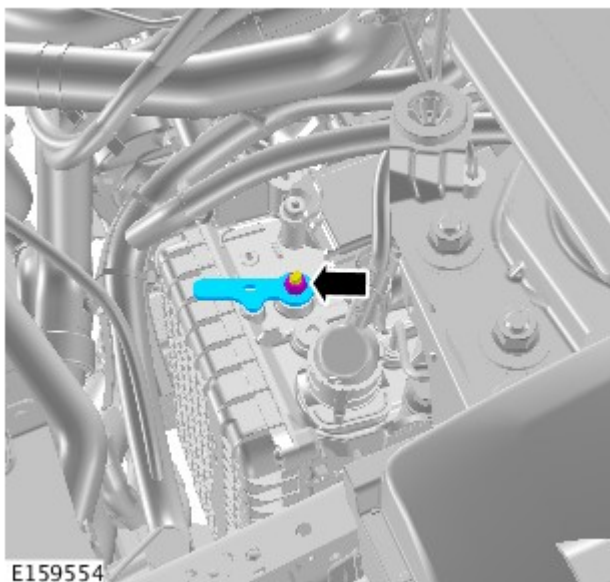
1. CAUTIONS:

 Make sure that the mating faces are clean and free of foreign material.

 Make sure that the seal is correctly located.

 Make sure a new oil seal is installed.

Special Tool(s): [JLR-307-684](#)



2. Torque: 10 Nm

3. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

Published: 17-Nov-2015

Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel - Air Cleaner

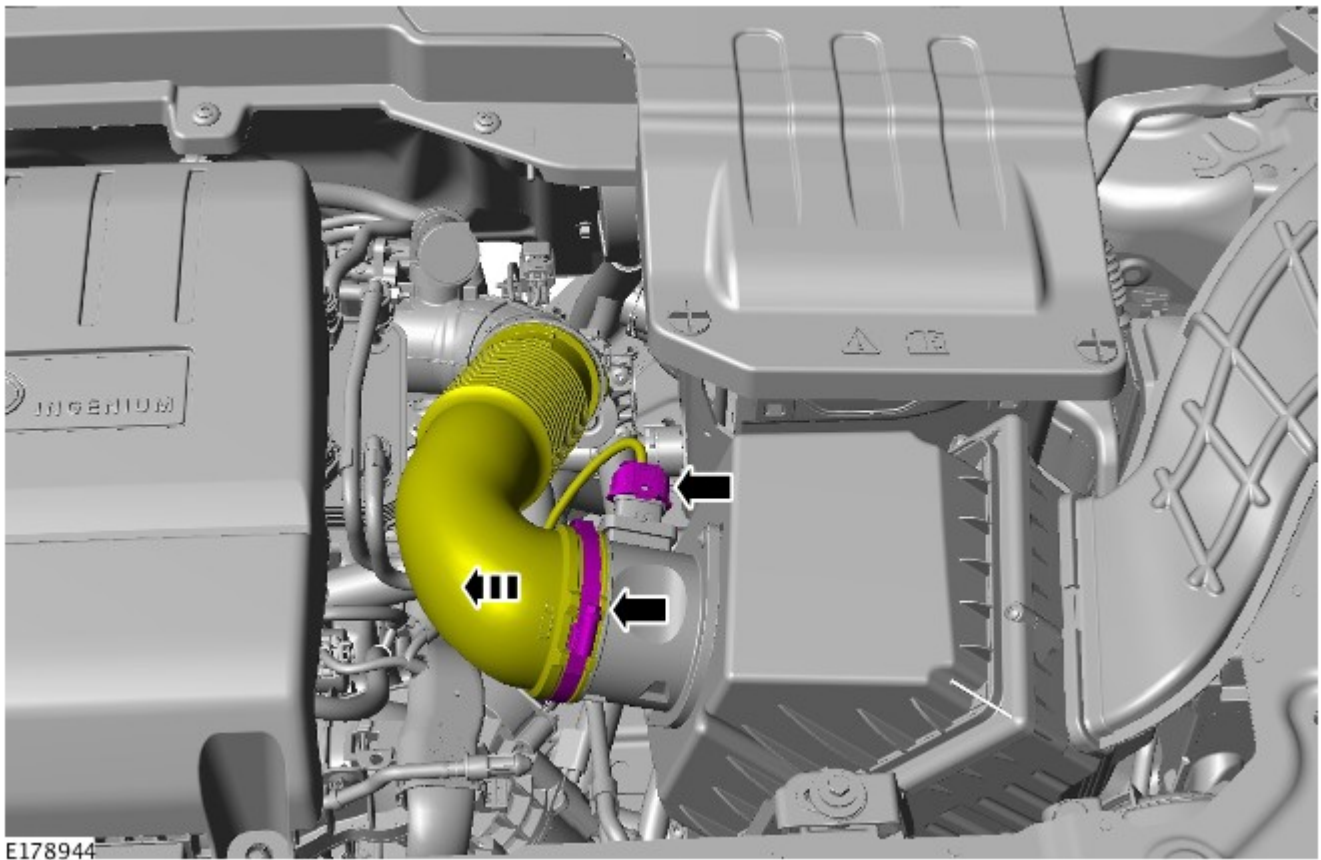
Removal and Installation

Removal

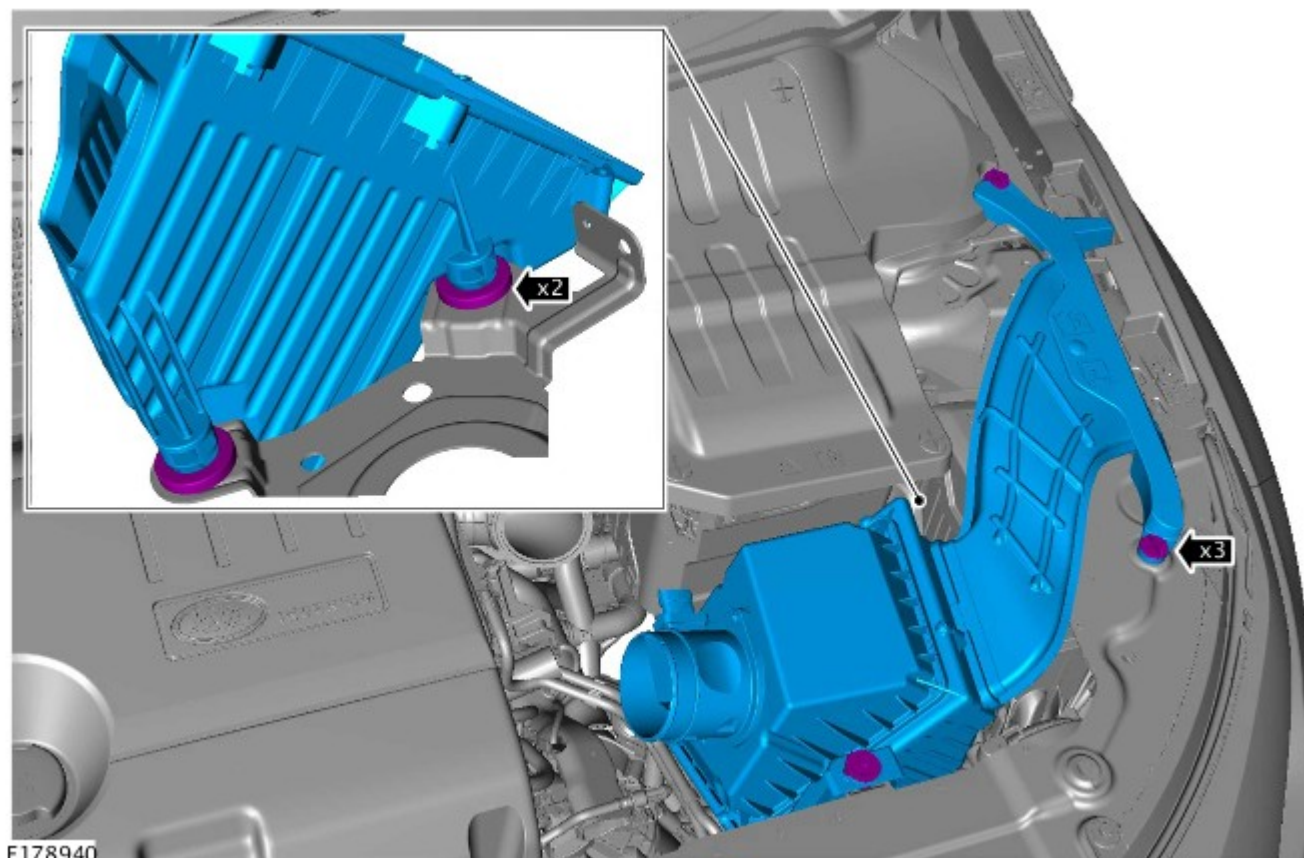


NOTE: Removal steps in this procedure may contain installation details.

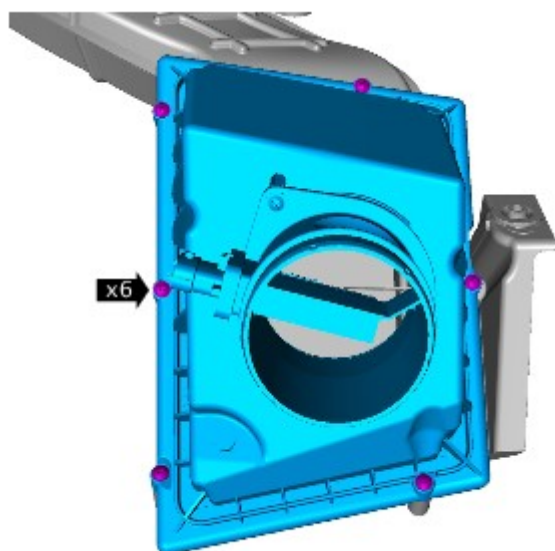
1. Torque: 3.5 Nm



2. Torque: 8 Nm



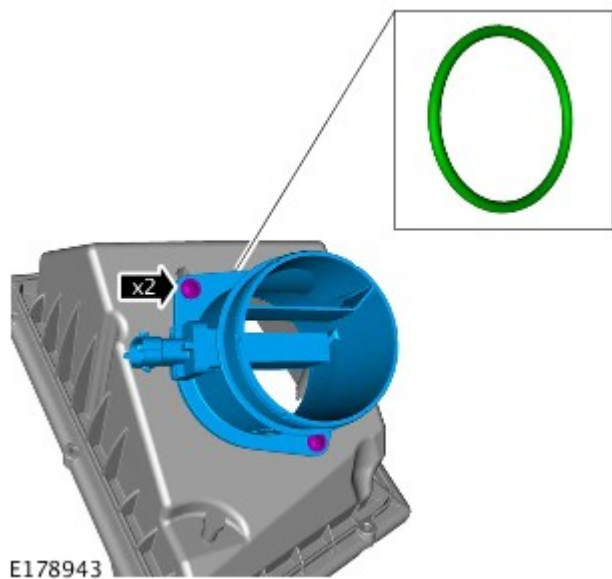
3. Torque: 2 Nm



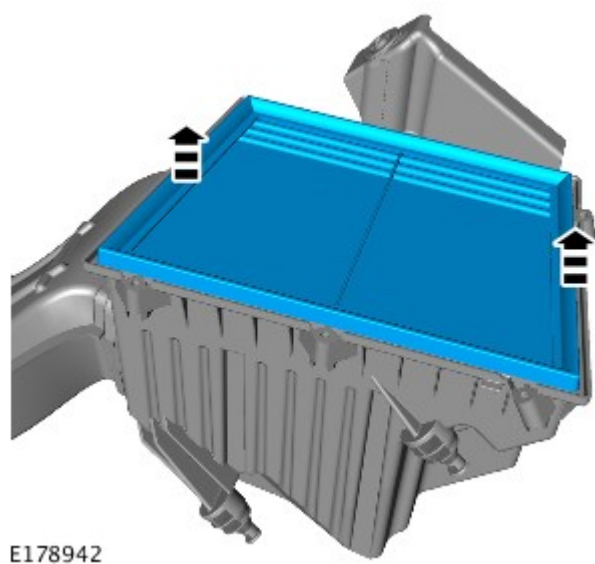
4. Do not disassemble further if the component is removed for access only.

5.  **CAUTION:** Inspect the O-ring seal, install a new component if damaged.

Torque: 1.9 Nm



6.

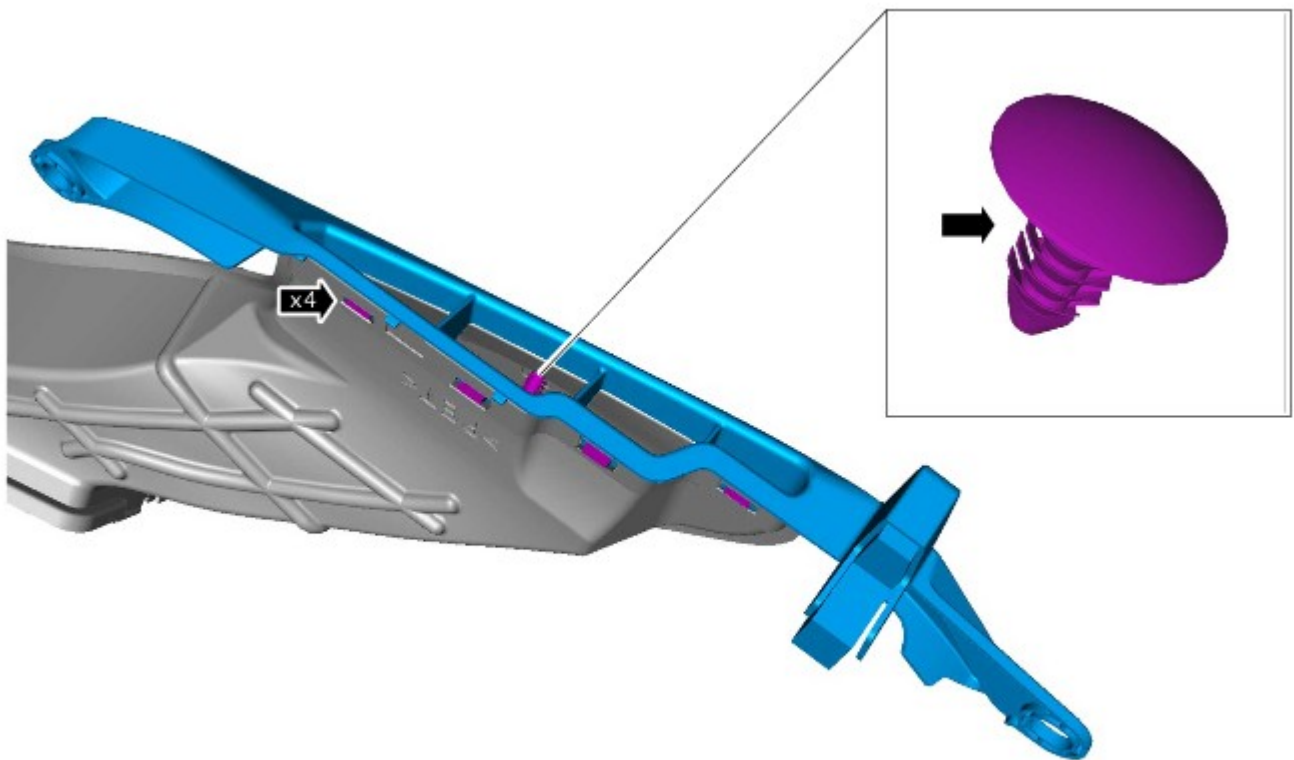


7.



E178941

8.



E178945

Installation

1. To install, reverse the removal procedure.

Published: 25-Jan-2016

Automatic Transmission/Transaxle - Torque Converter Seal INGENIUM I4 2.0L Diesel

Removal and Installation


Special Tool(s)

 E54135	100-012 Slide Hammer
 100-012-01	100-012-01 Slide Hammer Adapter
 E52536	307-520 Installer, Output Shaft Seal
 308-375	308-375 Remover, Input and Output Seal
 E159483	JLR-307-683 Installer, Oil Seal

Removal



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

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Refer to: [Torque Converter - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

3. CAUTIONS:



Care must be taken when removing the seal. Failure to follow this instruction may cause damage to the components.

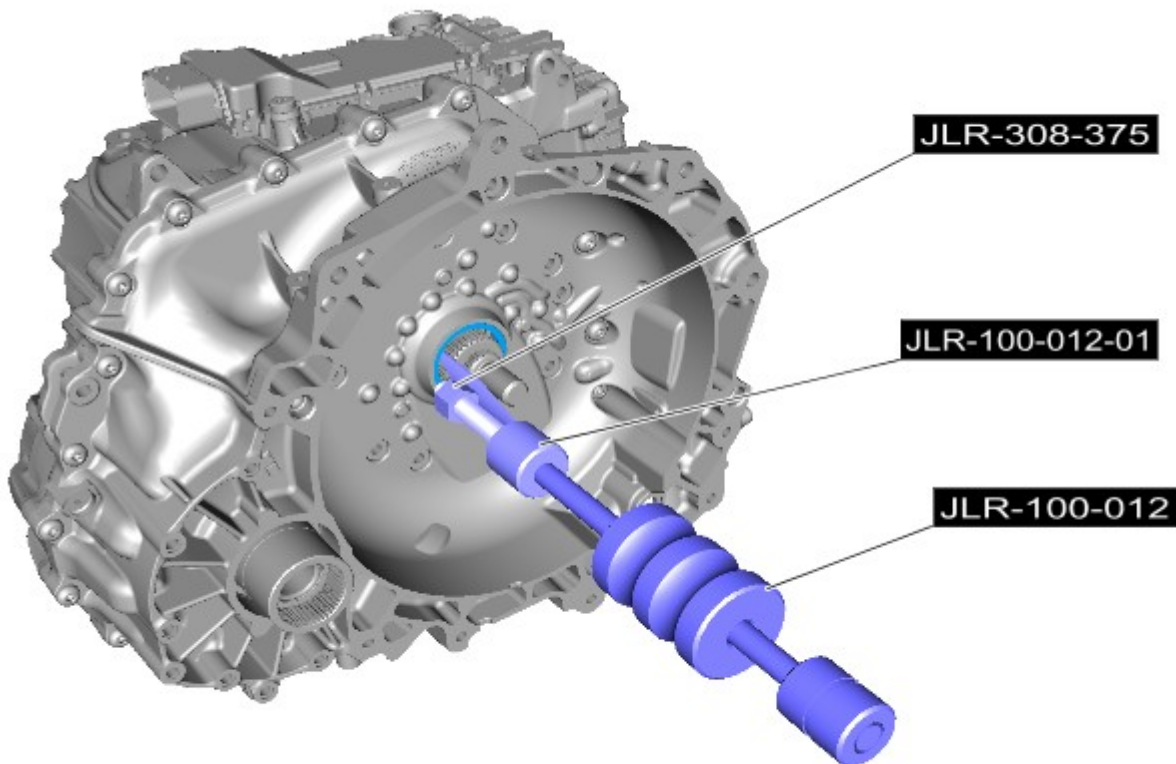


Make sure that extreme cleanliness is observed with the following steps.



Make sure that the tools and equipment are clean, free of foreign material and lubricant.

Special Tool(s): [100-012](#) , [100-012-01](#) , [308-375](#)



E187178

Installation

1. CAUTIONS:



Make sure a new oil seal is installed.

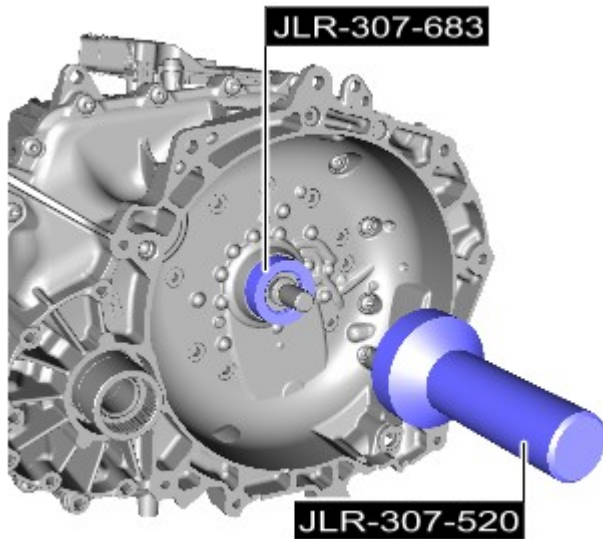


Make sure that the tools and equipment are clean, free of foreign material and lubricant.



Make sure that all the component mating faces are clean.

- *Special Tool(s):* [307-520](#) , [JLR-307-683](#)



E186879

2. Refer to: [Torque Converter - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).


3. Carry out a transmission fluid level check.

Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

Published: 25-Jan-2016

Automatic Transmission/Transaxle - Torque Converter INGENIUM I4 2.0L Diesel Removal and Installation

Special Tool(s)

 <p>E159489</p>	<p>JLR-307-688 Remover, Torque Converter</p>
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Removal



WARNING: Be prepared to collect escaping fluid.



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



1. **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Refer to: [Transmission - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal).

3. *Special Tool(s):* [JLR-307-688](#)




E159518

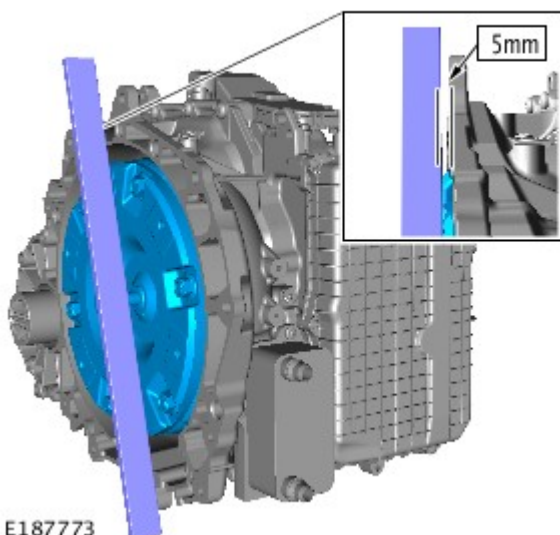
Installation




E159518

1.  CAUTION: Make sure that all the component mating faces are clean.

Special Tool(s): [JLR-307-688](#)



E187773

2.  CAUTION: Make sure the torque converter is fully located into the oil pump drive.

3. Refer to: [Transmission - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Installation).

4. Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

Published: 01-Oct-2013

Automatic Transmission/Transaxle - Transmission Fluid Level Check

General Procedures

Check

WARNINGS:



Be prepared to collect escaping fluids.



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



CAUTION: Vehicle must be horizontal during this operation.




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

1. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

2. Connect the Land Rover equipment.

3. Start and run the engine.


4. Select terrain response mode. Grass/Gravel/Snow.

5.  WARNING: Make sure that all four wheels are off the ground for this step.




NOTE: Move the transmission control switch (TCS) from D to S then using the steering paddles pause in each gear for a minimum 10 seconds until you reach 4th gear. (max 2000rpm)

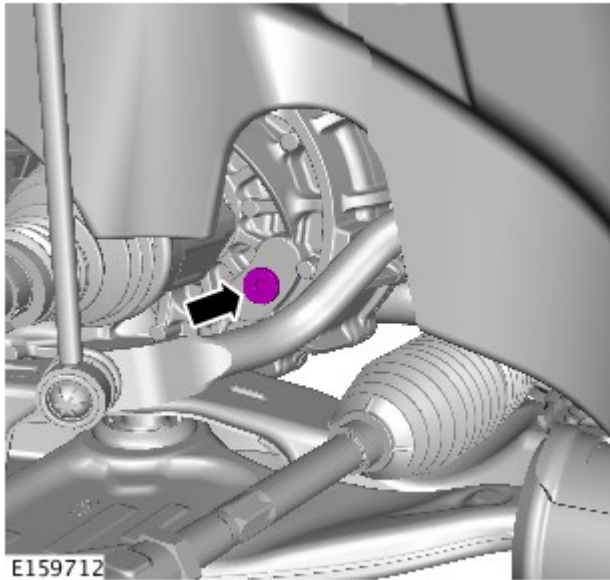
Using the diagnostic equipment monitor the transmission fluid temperature until 35 degrees celsius is reached.

6.  CAUTION: Decelerate the wheels until they stop, then turn the (TCS) back into the P position.

Make sure that torque converter is full of oil by raising the engine speed to 2000rpm for 10 seconds, return to idle speed.

7.  CAUTION: Engine must be running to carry out the fluid level check.

8. CAUTIONS:



Transmission fluid temperature must not exceed 45 degrees celsius.



Discard the sealing plug.

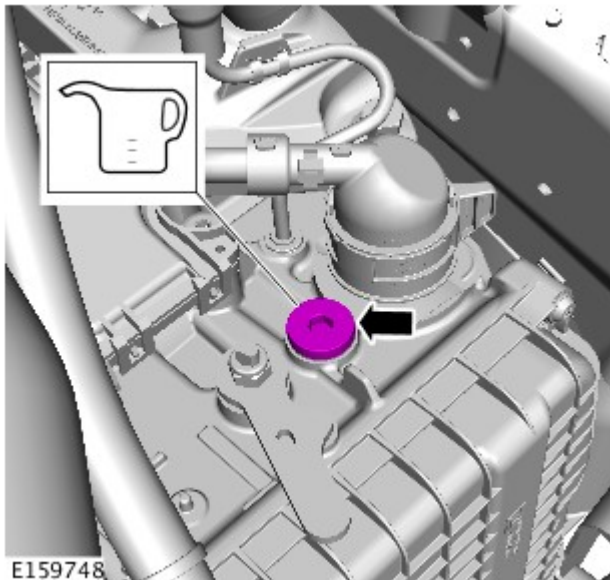


Drain the fluid into a suitable container.



NOTE: With the engine running a small amount of automatic transmission fluid should drip out of the level plug.

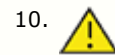
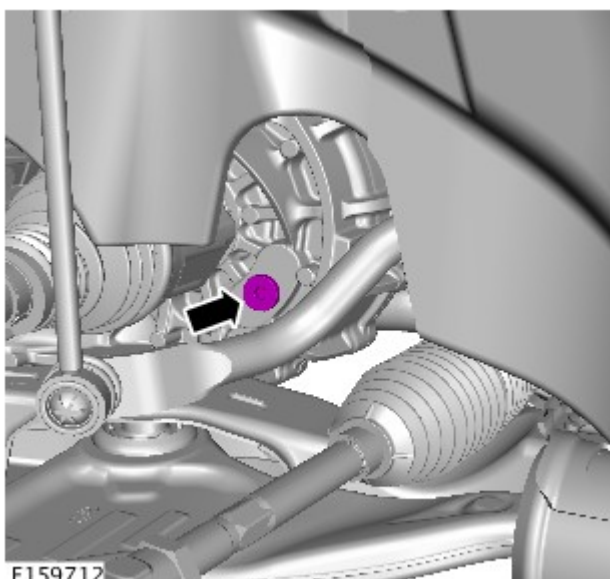
When transmission fluid temperature reaches 37 degrees celsius, remove the level plug and wait until oil stops dripping out.



CAUTION: Install a new sealing plug.

If the transmission fluid does not come out of the transmission fluid level plug hole the transmission fluid level is insufficient. If this is the case add the transmission fluid in 0.5 litre units into the transmission fluid fill plug hole until fluid comes out.

Torque: 35 Nm



CAUTION: Install a new sealing plug.



NOTE: If the temperature has exceeded 45 degrees celsius before the plug is re-fitted, you must start the procedure again.

Torque: 35 Nm

11. Switch off the engine.

12. Remove the container.

13. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

14. Lower the vehicle.

15. Disconnect the diagnostic tool.

Automatic Transmission/Transaxle - Torque Converter INGENIUM I4 2.0L Diesel

Removal and Installation

Special Tool(s)

 E159489	JLR-307-688 Remover, Torque Converter
--	--

Removal



WARNING: Be prepared to collect escaping fluid.



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

1.



WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Refer to: [Transmission - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal).

3. *Special Tool(s):* [JLR-307-688](#)



E159518

Installation

1.

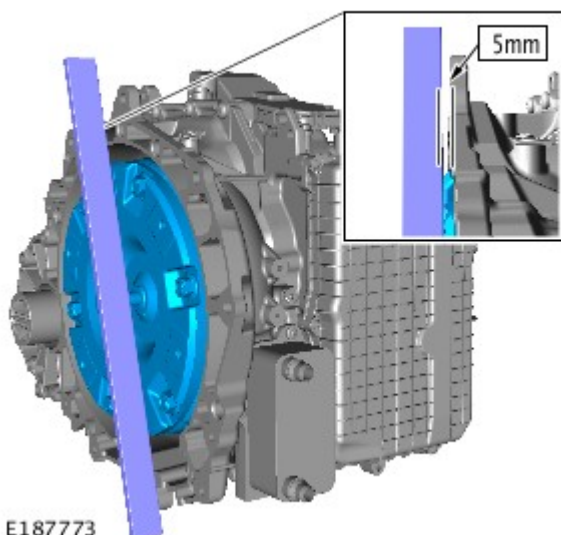


CAUTION: Make sure that all the component mating faces are clean.


Special Tool(s): [JLR-307-688](#)



E159518



E187773

2.  **CAUTION:** Make sure the torque converter is fully located into the oil pump drive.

3. Refer to: [Transmission - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Installation).


4. Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

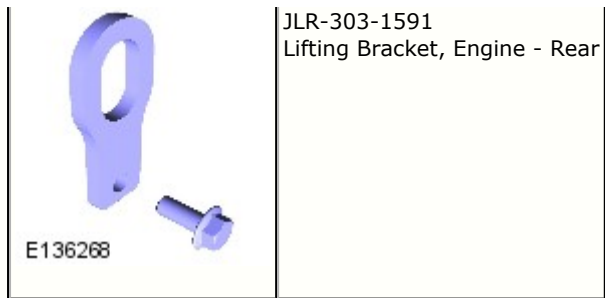
Published: 05-Oct-2016

Automatic Transmission/Transaxle - Transmission INGENIUM I4 2.0L Diesel

Removal

Special Tool(s)

 <p>303-021</p>	<p>303-021 Engine support bracket</p>
--	---



General Equipment

Transmission jack

NOTES:



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



Some illustrations may show the transmission removed for clarity.

1. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

2. Refer to: [Engine Cover - INGENIUM I4 2.0L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

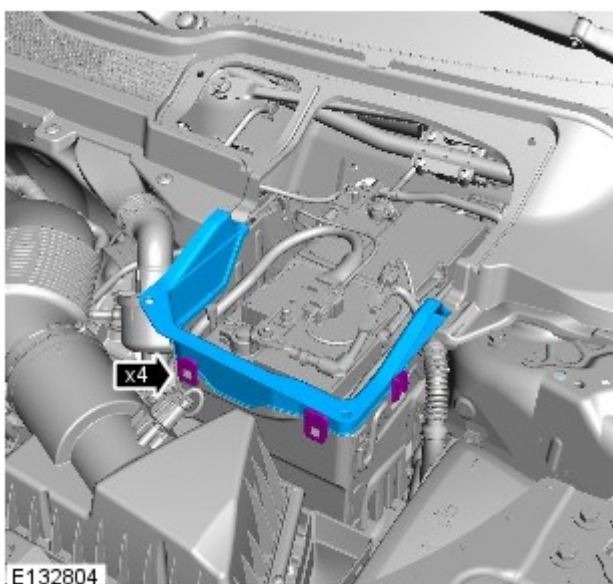
3. Refer to: [Plenum Chamber](#) (412-01 Climate Control, Removal and Installation).

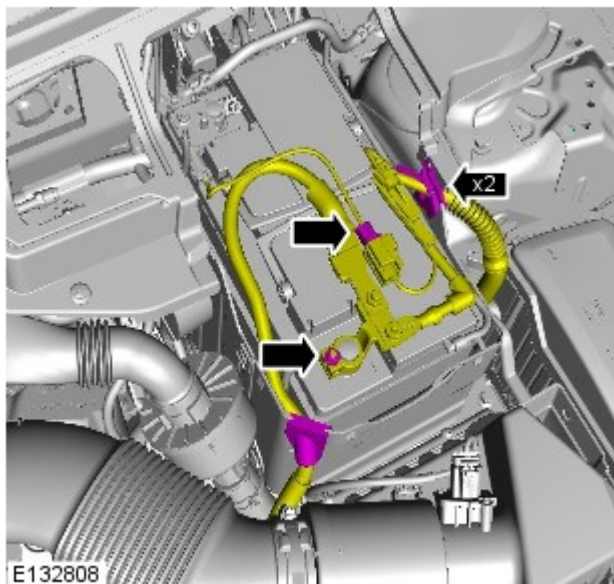
4. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

5. Refer to: [Starter Motor](#) (303-06A Starting System - INGENIUM I4 2.0L Diesel, Removal and Installation).

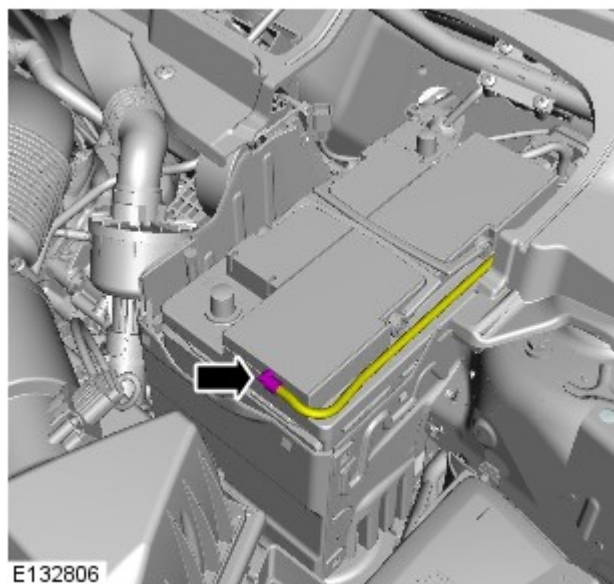
6. Refer to: [Charge Air Cooler](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

- 7.

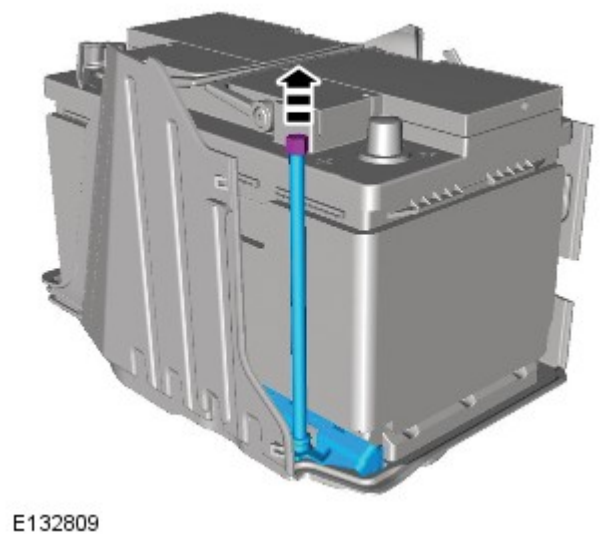




8.

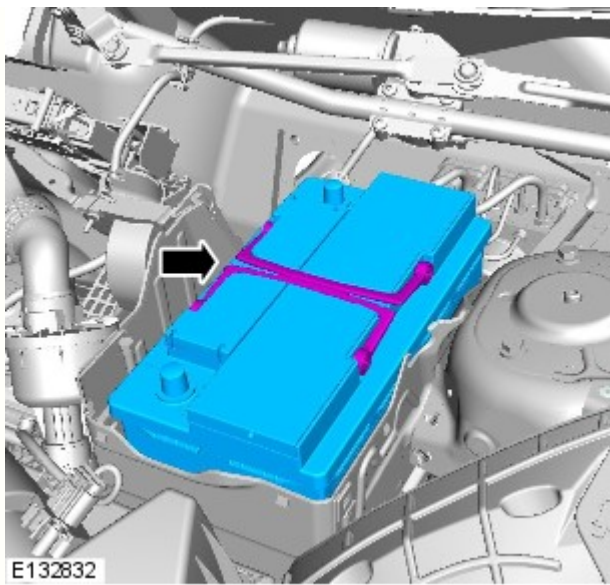


9.

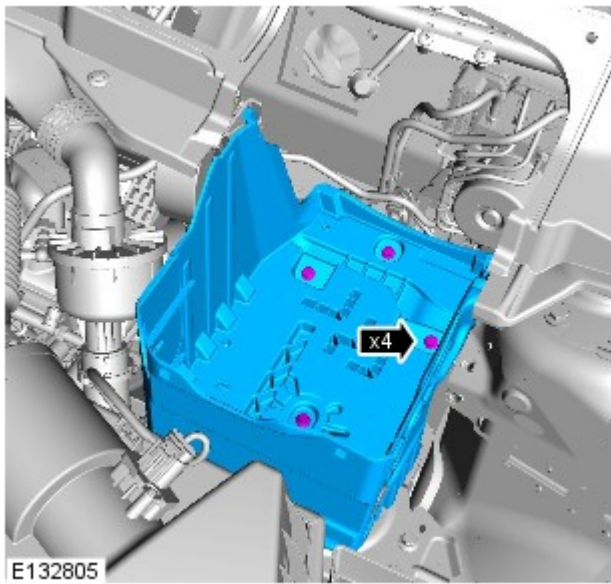


10.

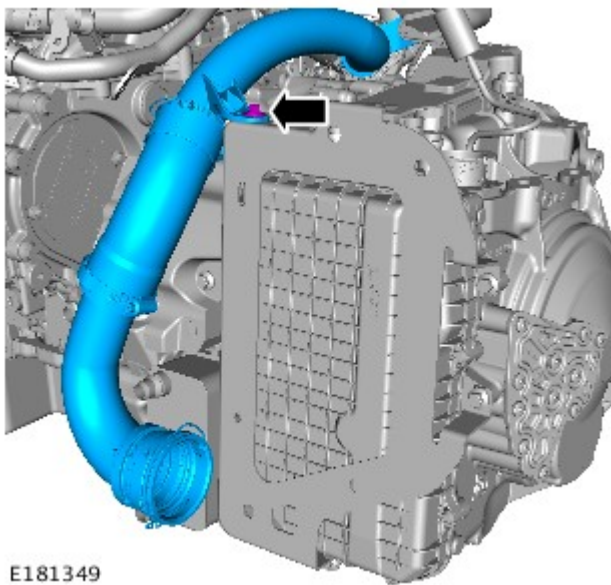
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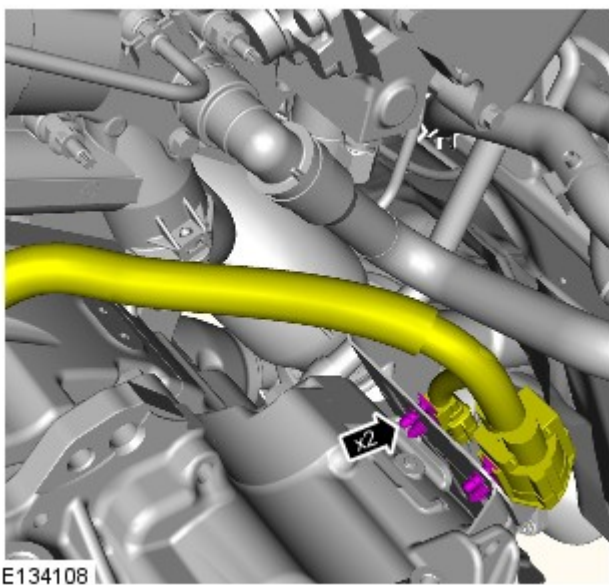
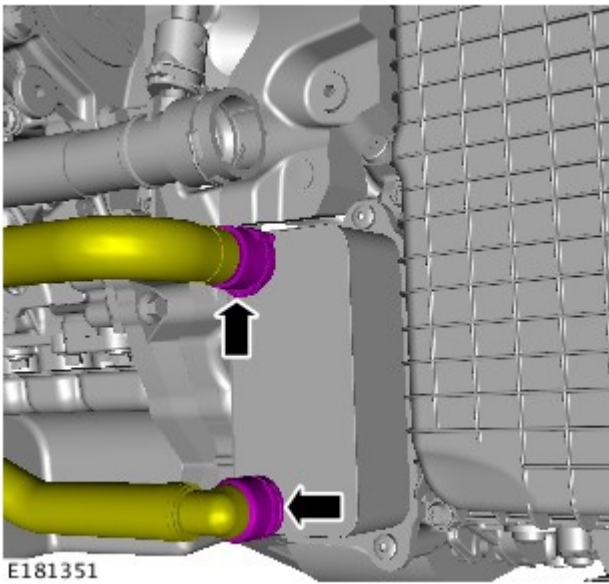
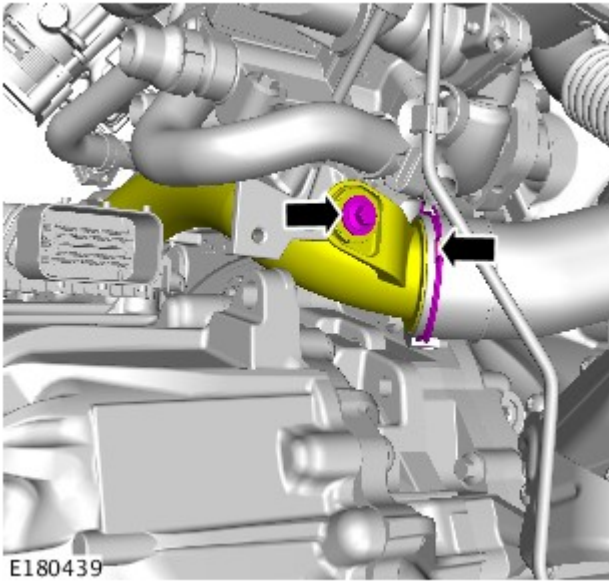
12.




13.



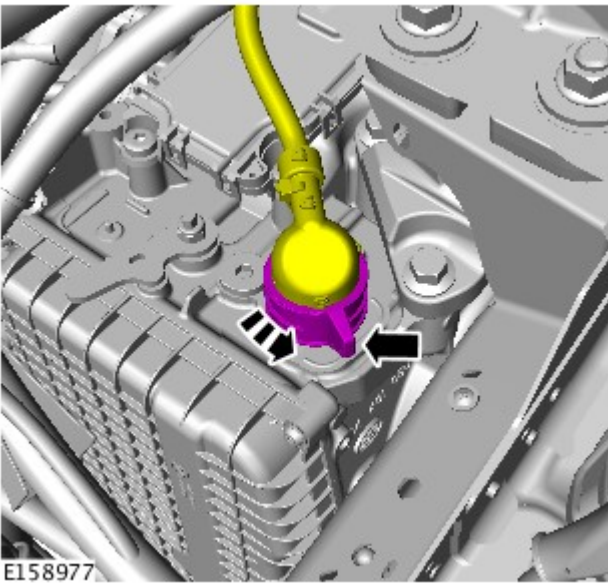
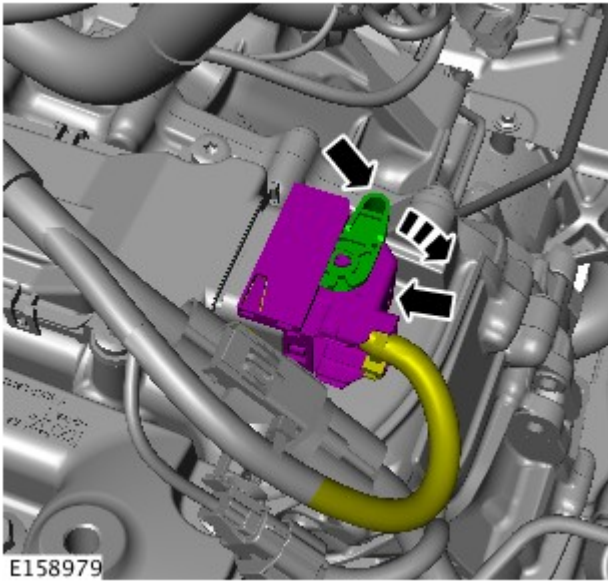
14.



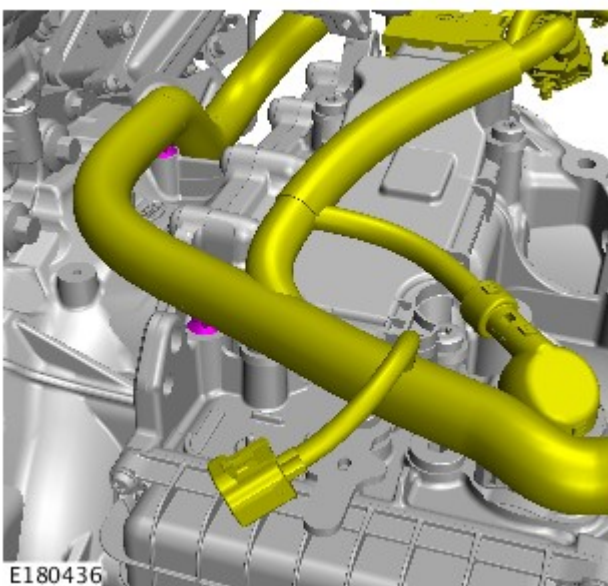
15.  CAUTION: Be prepared to collect escaping coolant.

16.

17.

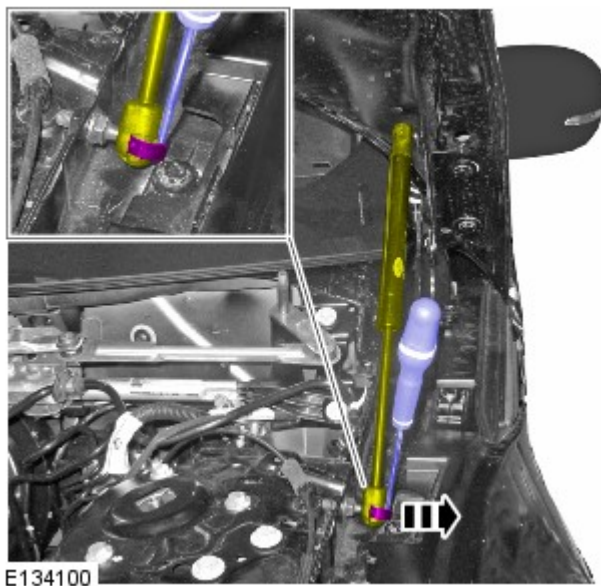
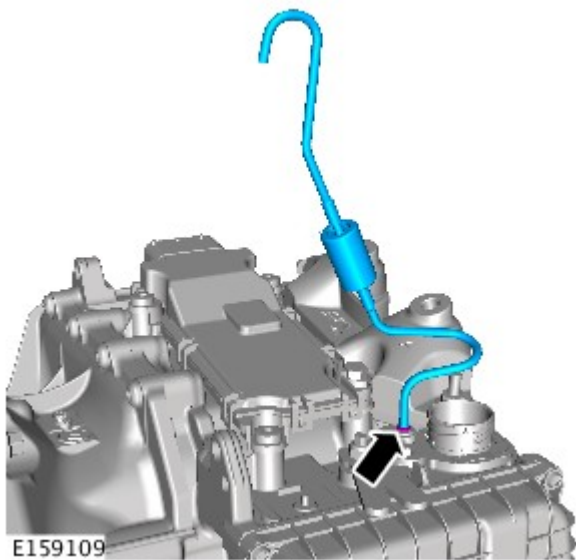


18.

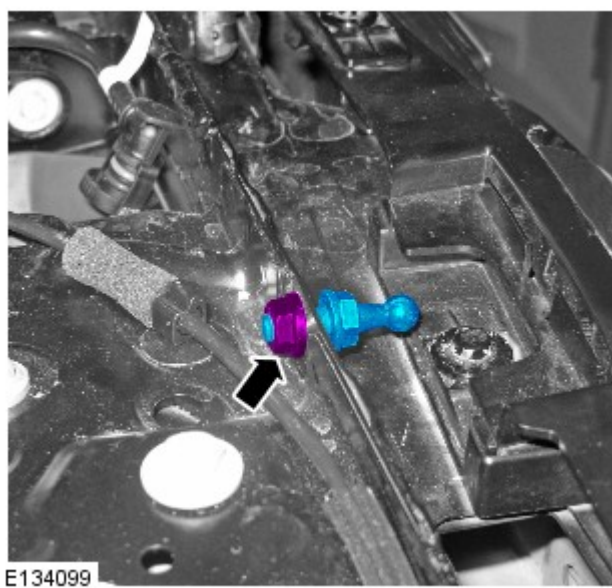


19.

20.

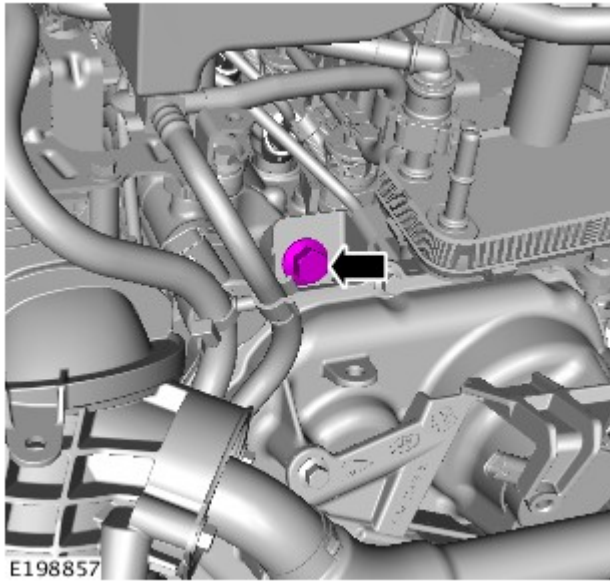


21.
 - Repeat the above step for the other side.
 - Secure the hood at the highest position.



22. Repeat the above step for the other side.

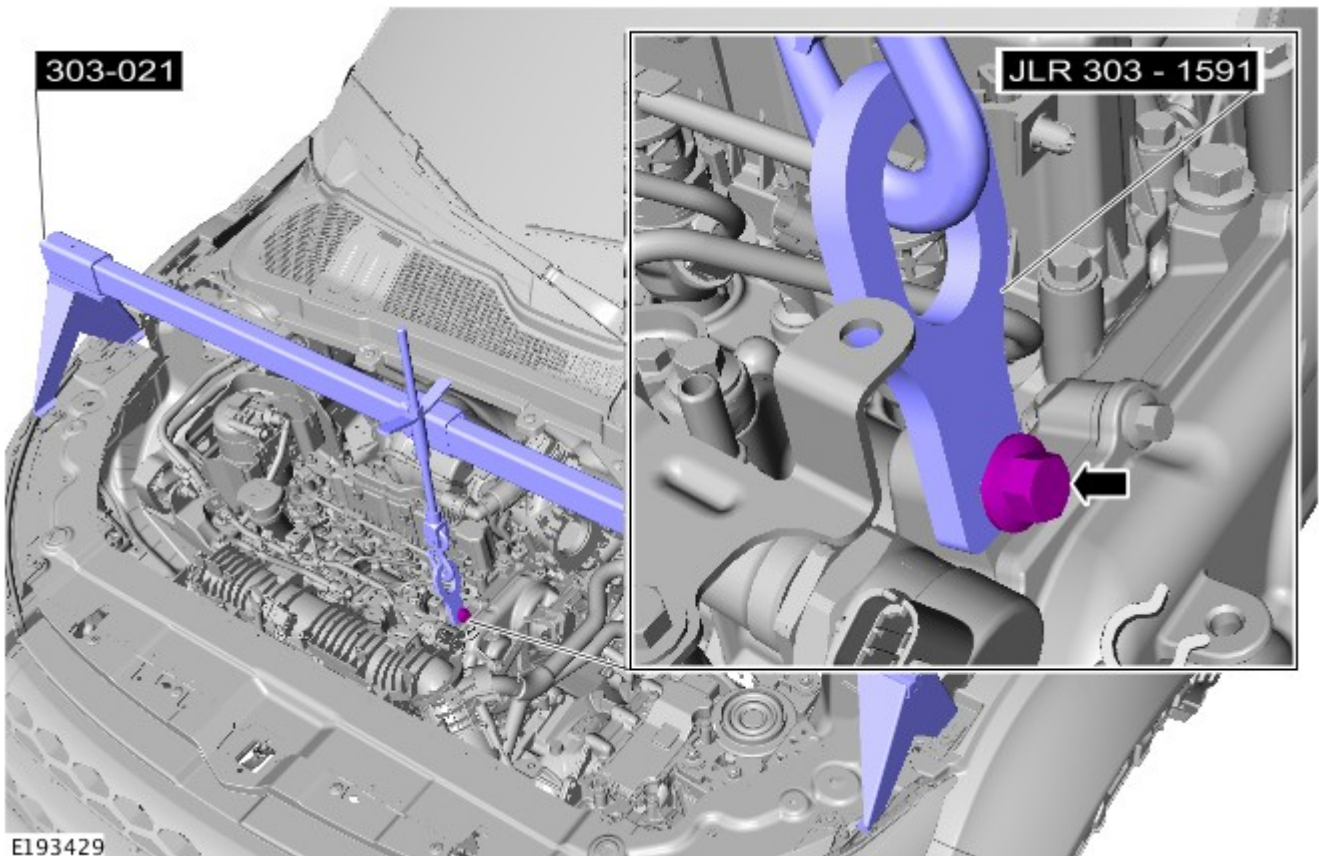
- 23.



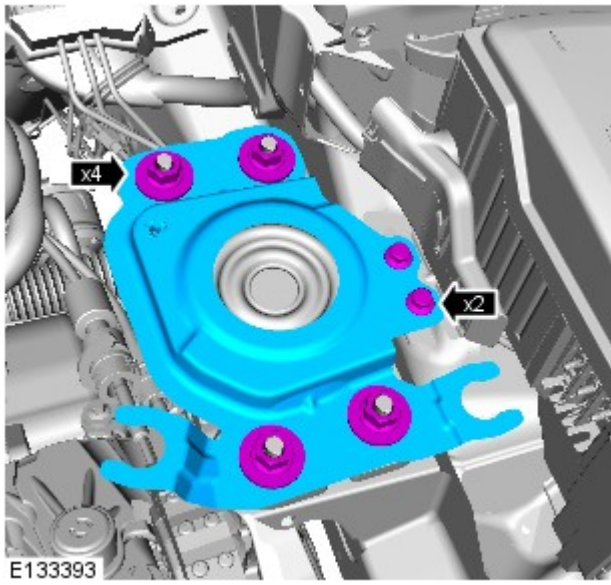
24. Support the engine.

Install the Special Tool(s): [303-021](#) , [JLR-303-1591](#)

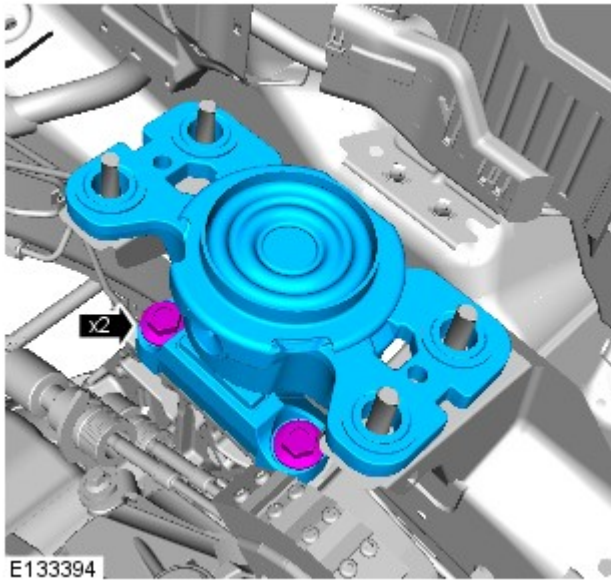
Torque: 50 Nm



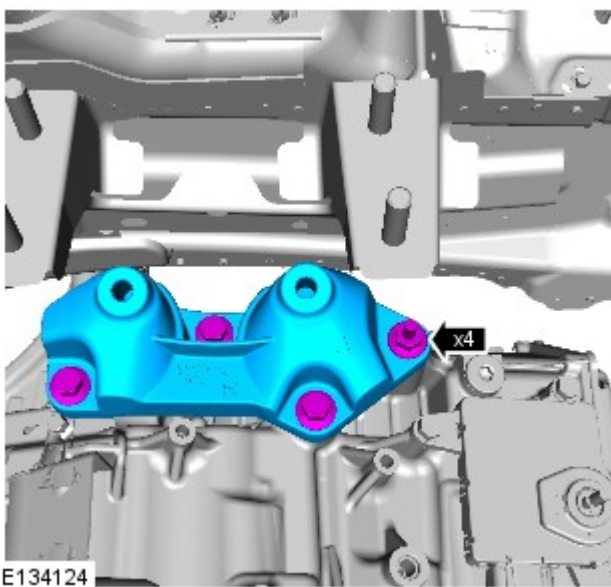
25.



26.



27.



28.  **NOTE:** This step is only necessary when installing a new component.

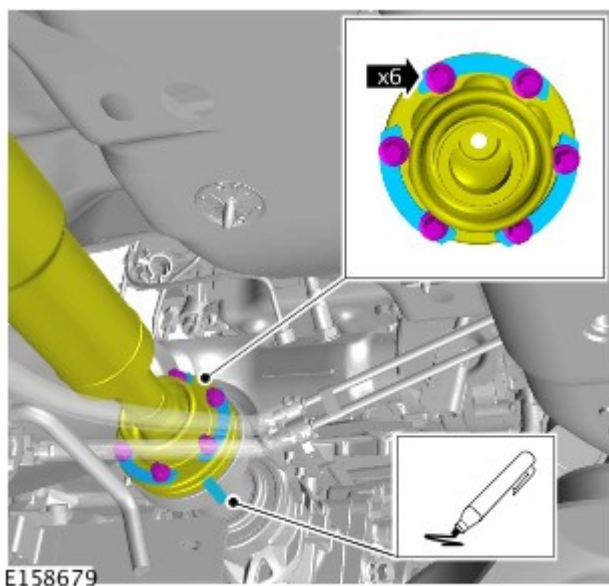
Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

29. Refer to: Front Subframe (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).





30.  **CAUTION:** Discard the nut.

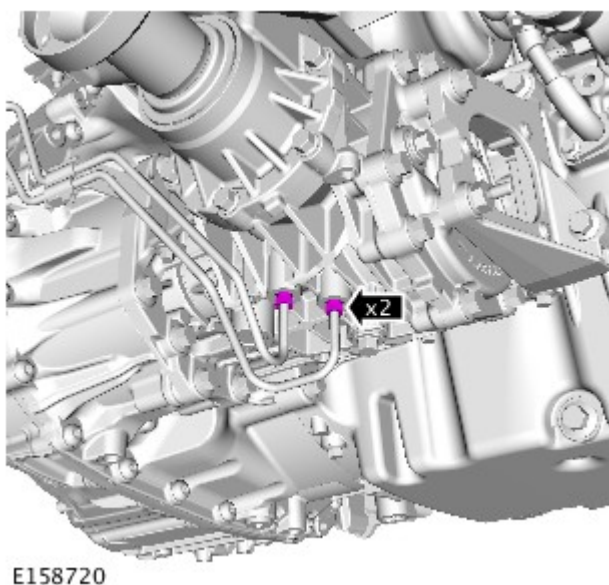
Refer to: [Front Halfshaft LH](#) (205-04 Front Drive Halfshafts, Removal and Installation).

31. Refer to: [Front Halfshaft RH - RHD AWD/LHD AWD](#) (205-04 Front Drive Halfshafts, Removal and Installation).





32. **CAUTIONS:**

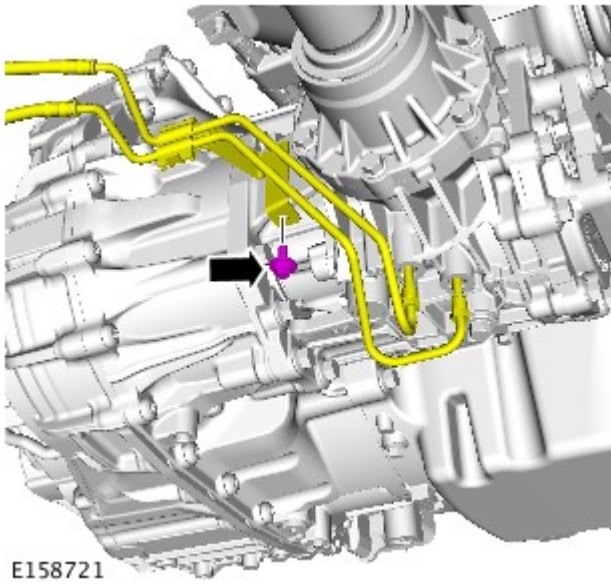
-  To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.
-  Make sure that the driveshaft is supported with suitable retaining straps.
-  Discard the bolts.
-  Mark the components to aid installation.



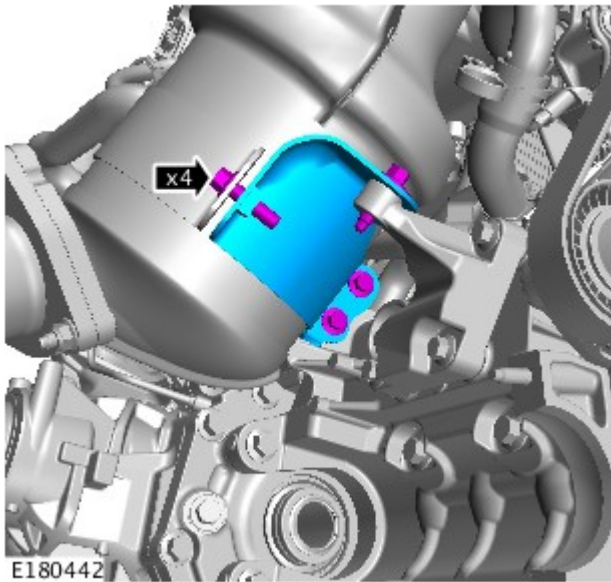
33. **CAUTIONS:**

-  Be prepared to collect escaping fluids.
-  Make sure that all openings are sealed. Use new blanking caps.

- 34.

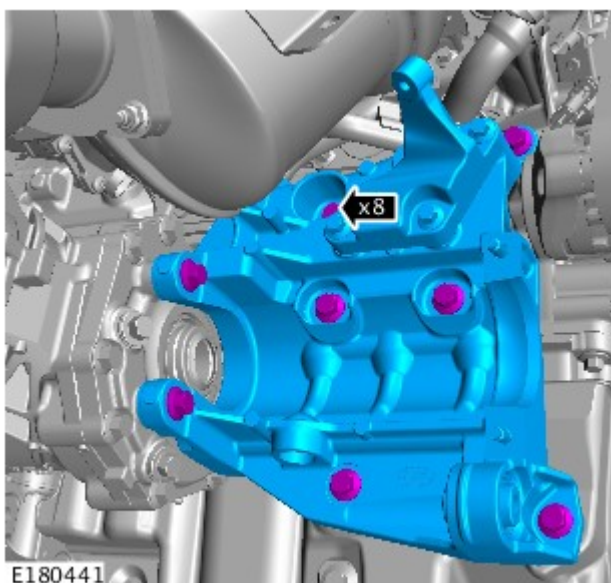


E158721



E180442

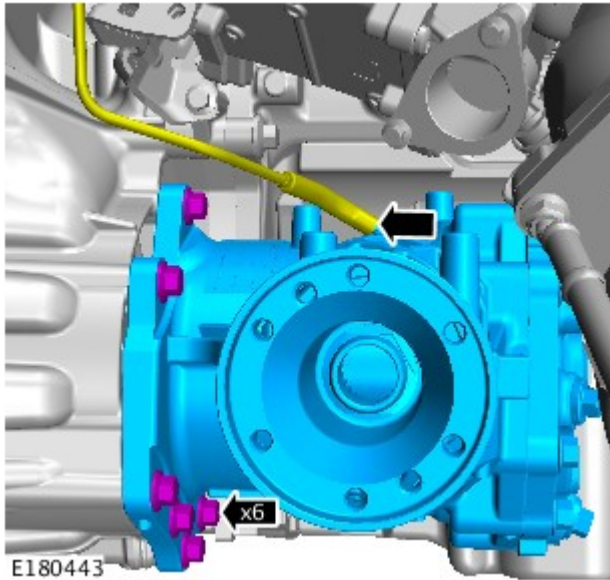
35.



E180441

36.

37.



WARNING: This step requires the aid of another technician.



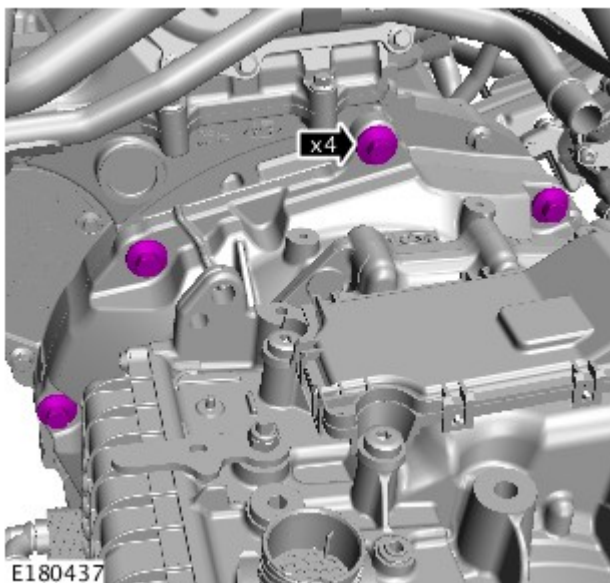
CAUTION: Be prepared to collect escaping fluids.

38.



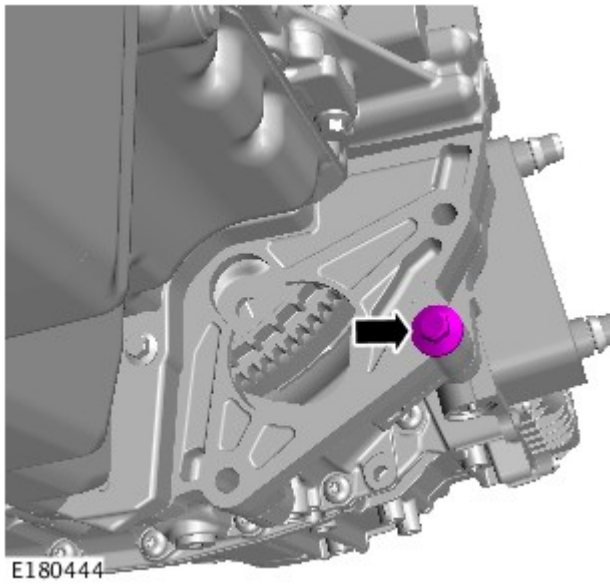
WARNING: Make sure that the transmission is secured with suitable retaining straps.

- Using a suitable hydraulic jack, support the transmission.
- *General Equipment:* [Transmission jack](#)

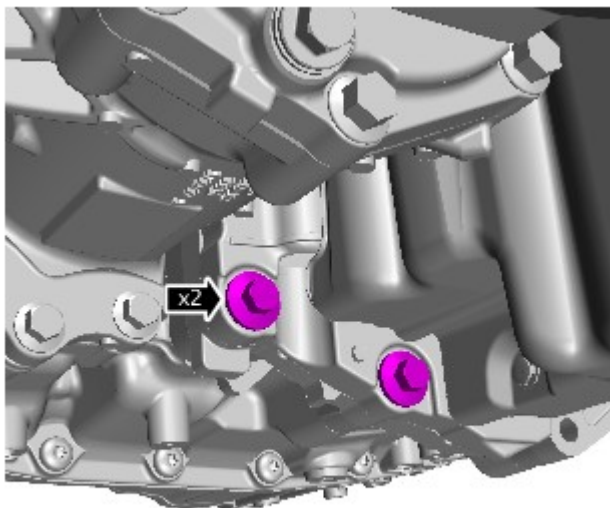


39.

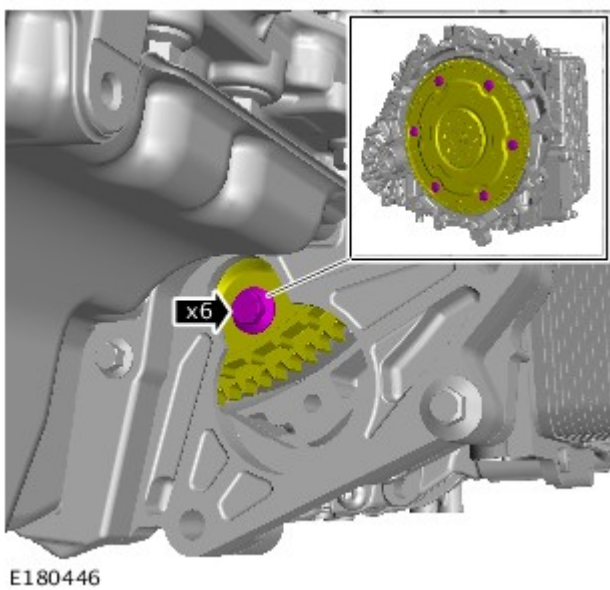
40.



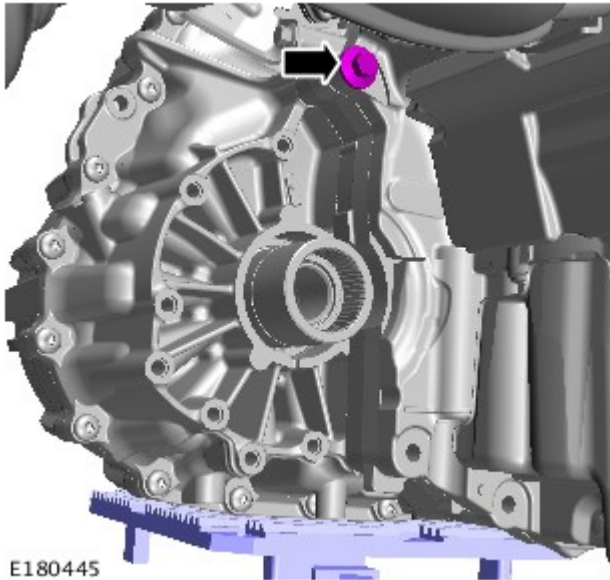
41.



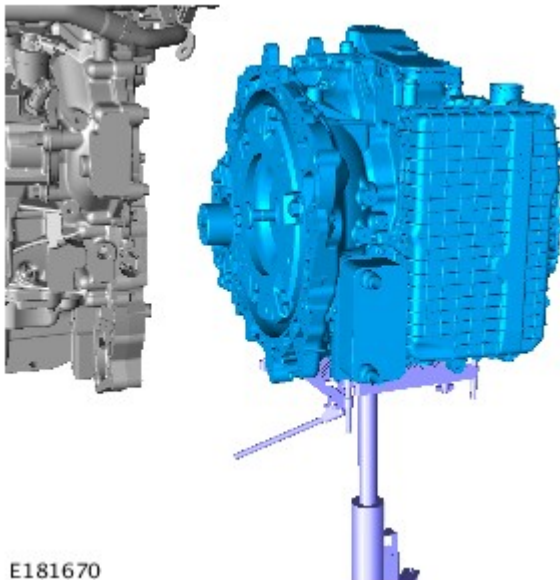
42.  CAUTION: Discard the bolts



43.



NOTE: Using a suitable transmission jack support the differential case.



44.  **WARNING:** This step requires the aid of another technician.

CAUTIONS:



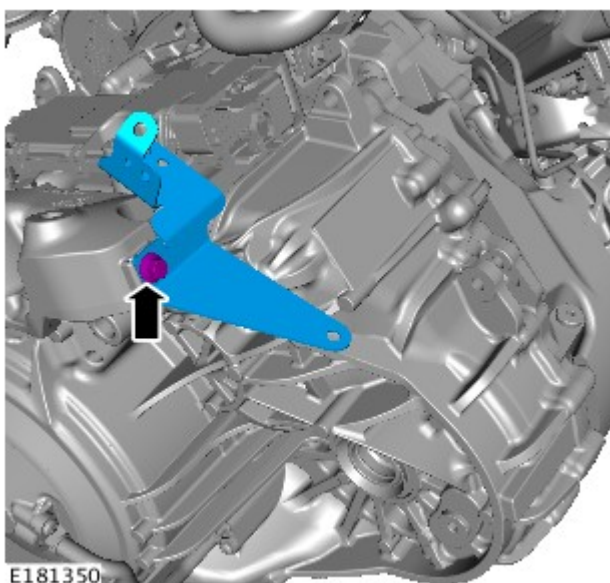
Make sure that the dowels are still located on the engine and not the transmission.




On removal and installation of the transmission, make sure that the transmission does not damage the brake pipe.

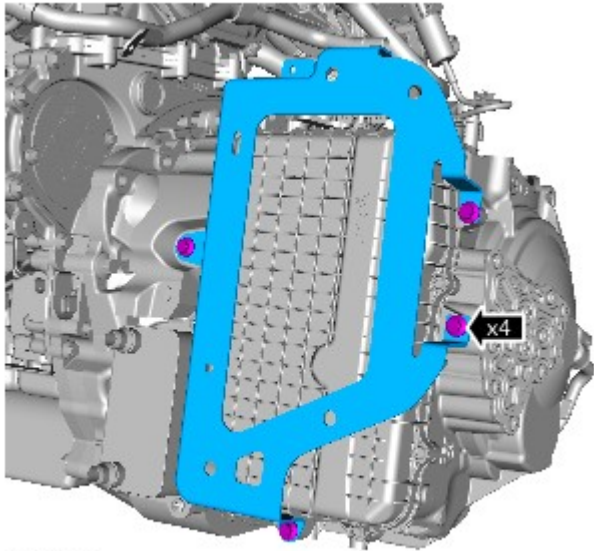


Make sure that the torque converter remains in the transmission.



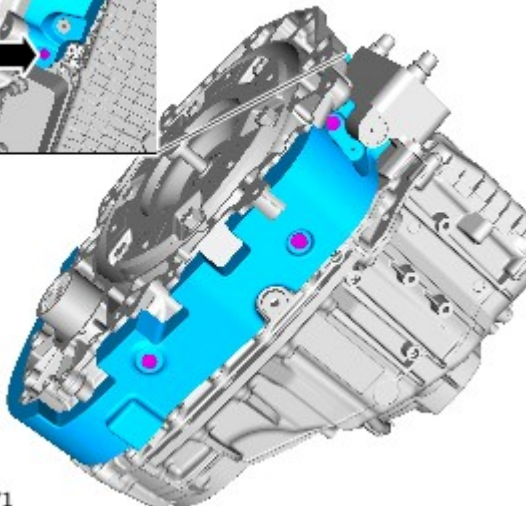
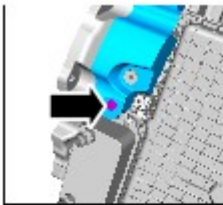
45.  NOTE: Do not disassemble further if the component is removed for access only.

46.



E181661

47.



E182171

Published: 01-Oct-2013

Automatic Transmission/Transaxle - Transmission Fluid Level Check

General Procedures

Check

WARNINGS:



Be prepared to collect escaping fluids.



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



CAUTION: Vehicle must be horizontal during this operation.




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


1. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

2. Connect the Land Rover equipment.


3. Start and run the engine.

4. Select terrain response mode. Grass/Gravel/Snow.


5.  **WARNING:** Make sure that all four wheels are off the ground for this step.

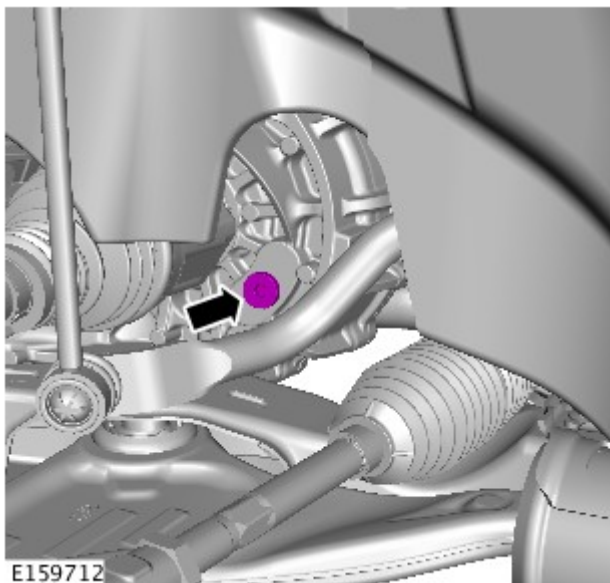
 **NOTE:** Move the transmission control switch (TCS) from D to S then using the steering paddles pause in each gear for a minimum 10 seconds until you reach 4th gear. (max 2000rpm)

Using the diagnostic equipment monitor the transmission fluid temperature until 35 degrees celsius is reached.

6.  **CAUTION:** Decelerate the wheels until they stop, then turn the (TCS) back into the P position.

Make sure that torque converter is full of oil by raising the engine speed to 2000rpm for 10 seconds, return to idle speed.

7.  **CAUTION:** Engine must be running to carry out the fluid level check.




8. **CAUTIONS:**

 Transmission fluid temperature must not exceed 45 degrees celsius.

 Discard the sealing plug.

 Drain the fluid into a suitable container.

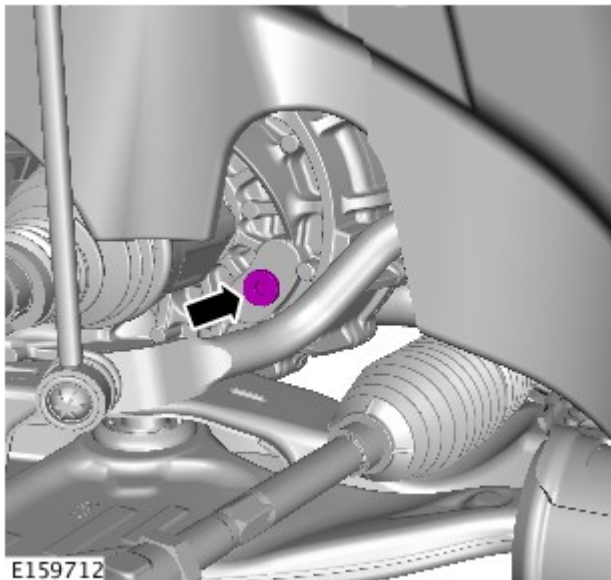
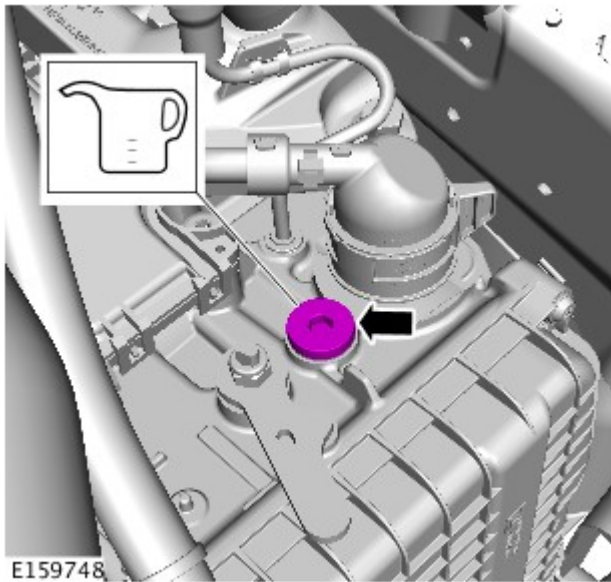
 **NOTE:** With the engine running a small amount of automatic transmission fluid should drip out of the level plug.

When transmission fluid temperature reaches 37 degrees celsius, remove the level plug and wait until oil stops dripping out.

9.  **CAUTION:** Install a new sealing plug.

If the transmission fluid does not come out of the transmission fluid level plug hole the transmission fluid level is insufficient. If this is the case add the transmission fluid in 0.5 litre units into the transmission fluid fill plug hole until fluid comes out.

Torque: 35 Nm



10.  **CAUTION:** Install a new sealing plug.

 **NOTE:** If the temperature has exceeded 45 degrees celsius before the plug is re-fitted, you must start the procedure again.

Torque: 35 Nm

11. Switch off the engine.
12. Remove the container.
13. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).
14. Lower the vehicle.
15. Disconnect the diagnostic tool.



Published: 05-Oct-2016

Automatic Transmission/Transaxle - Transmission INGENIUM I4 2.0L Diesel

Installation

Special Tool(s)

	303-021
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 <p>303-021</p>	<p>Engine support bracket</p>
 <p>E136268</p>	<p>JLR-303-1591 Lifting Bracket, Engine - Rear</p>

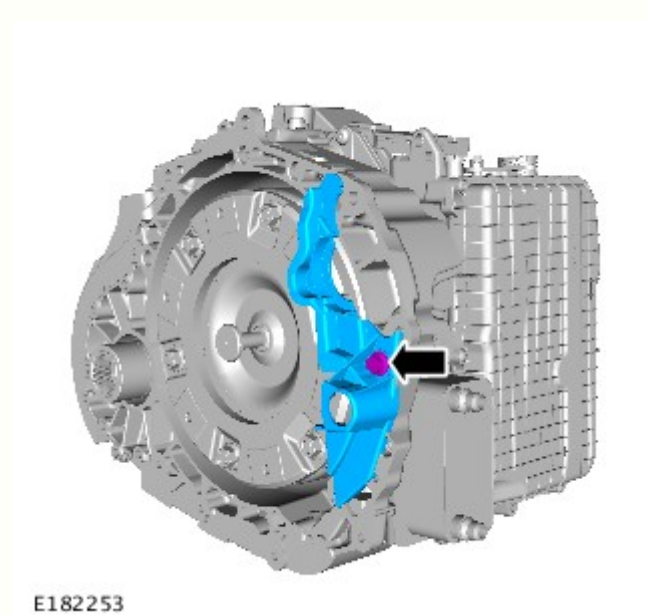
NOTES:



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



Some illustrations may show the transmission removed for clarity.



1.

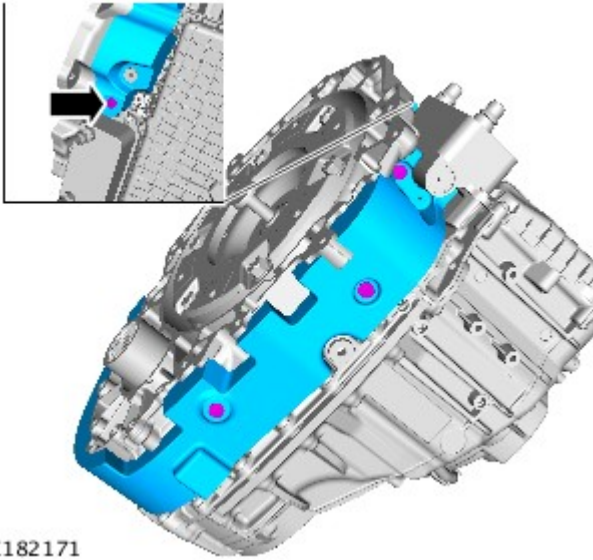


NOTE: Remove the torque converter retainer.

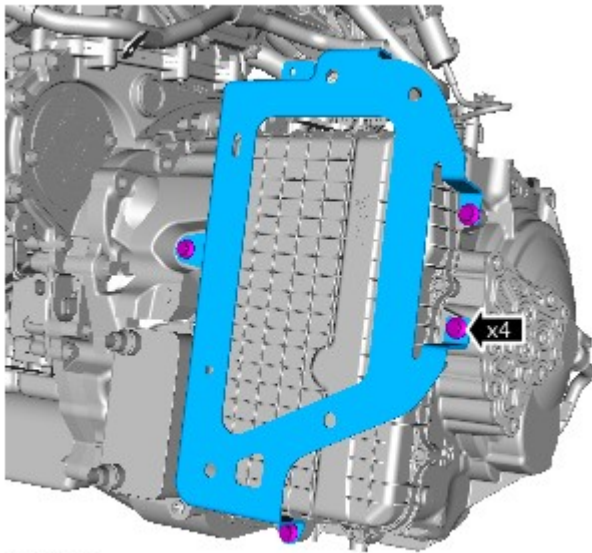
2.



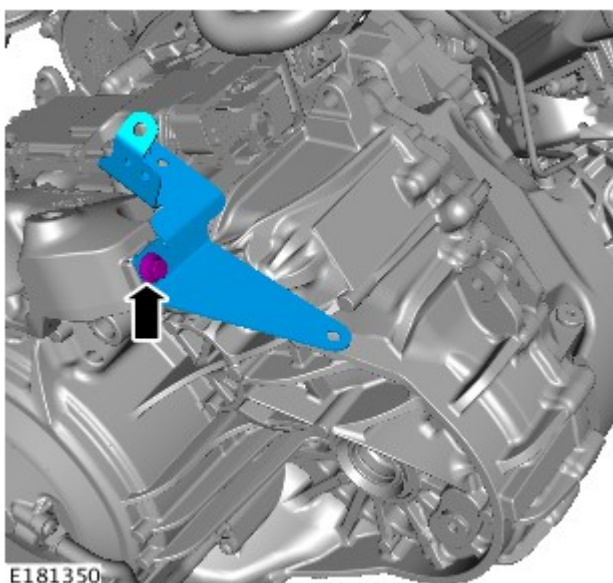
NOTE: This step is only required if a new component is installed.



E182171



E181661



E181350

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

Torque: 10 Nm

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

Torque: 10 Nm

5. NOTES:



This step only applies to vehicles from the following markets; China all MY, Taiwan all MY and Gulf 18MY onwards.

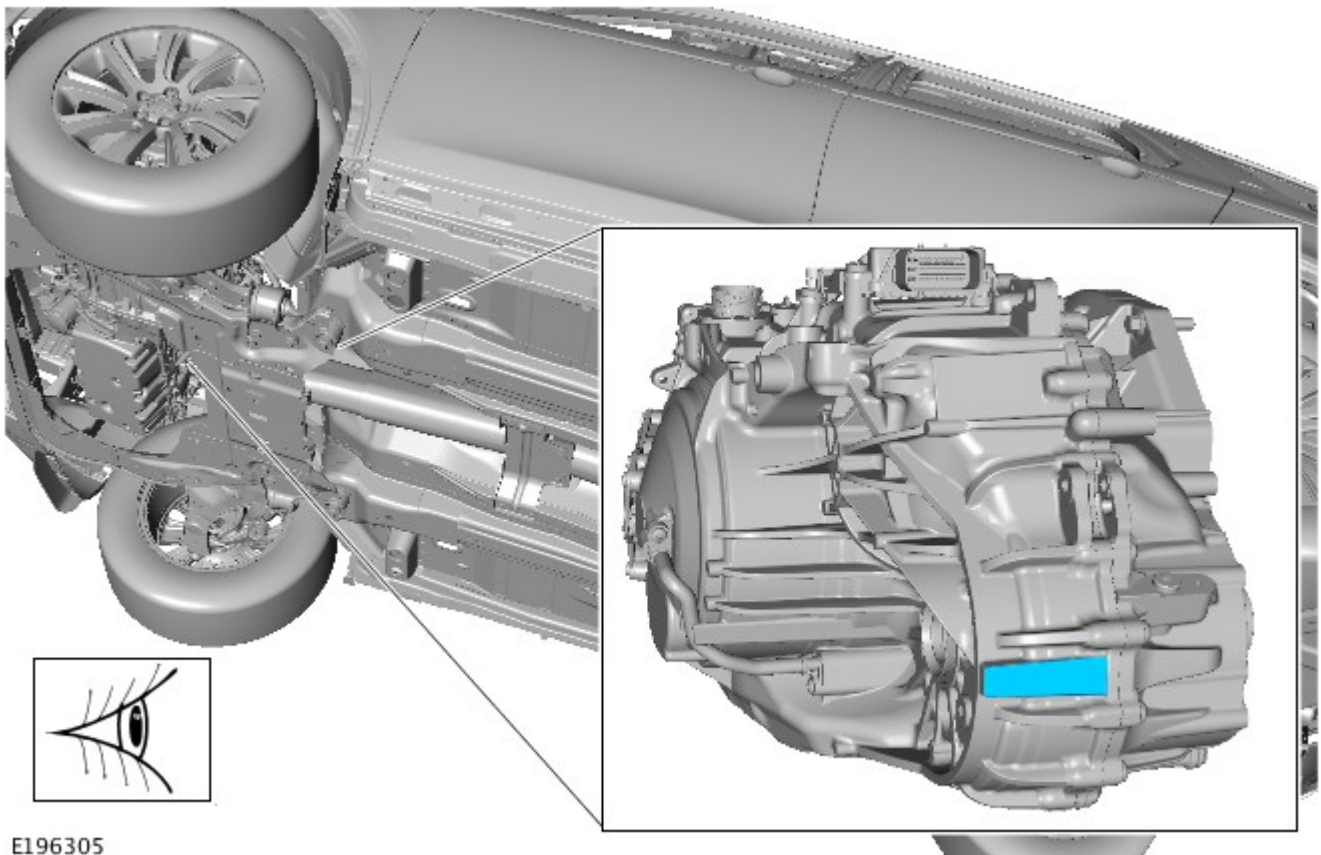


Make sure that the transmission anti-theft label is fitted evenly and has no bubbles or folds. It must not be fitted over the curvature of the transmission casing.

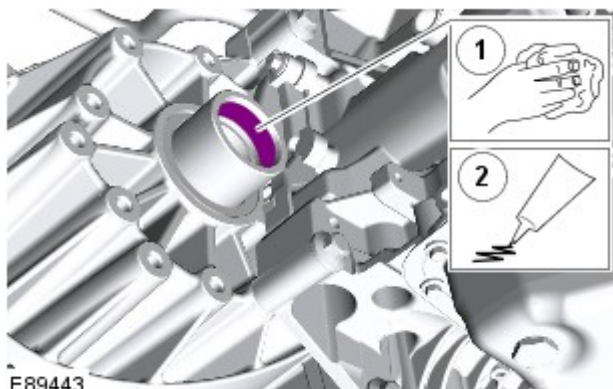


Before installing the transmission inspect the highlighted area, If no transmission anti-theft label is fitted, proceed with the following steps;

1. Make sure the VIN number on the label matches the VIN number of the vehicle.
2. Using a suitable cleaning fluid thoroughly clean the highlighted area of the transmission.
3. Install the transmission anti-theft label to the highlighted area.



E196305



E89443

6. CAUTIONS:



Make sure that the component is clean, free of foreign material and lubricant.



Apply the correct specification and quantity of grease.

Refer to: [Specifications](#) (307-01 Automatic Transmission/Transaxle, Specifications).

7. WARNINGS:



This step requires the aid of another technician.



Make sure that the transmission is secured with suitable retaining straps.



Make sure the torque converter remains with the transmission.

CAUTIONS:



Make sure the torque converter is fully located into the oil pump drive.



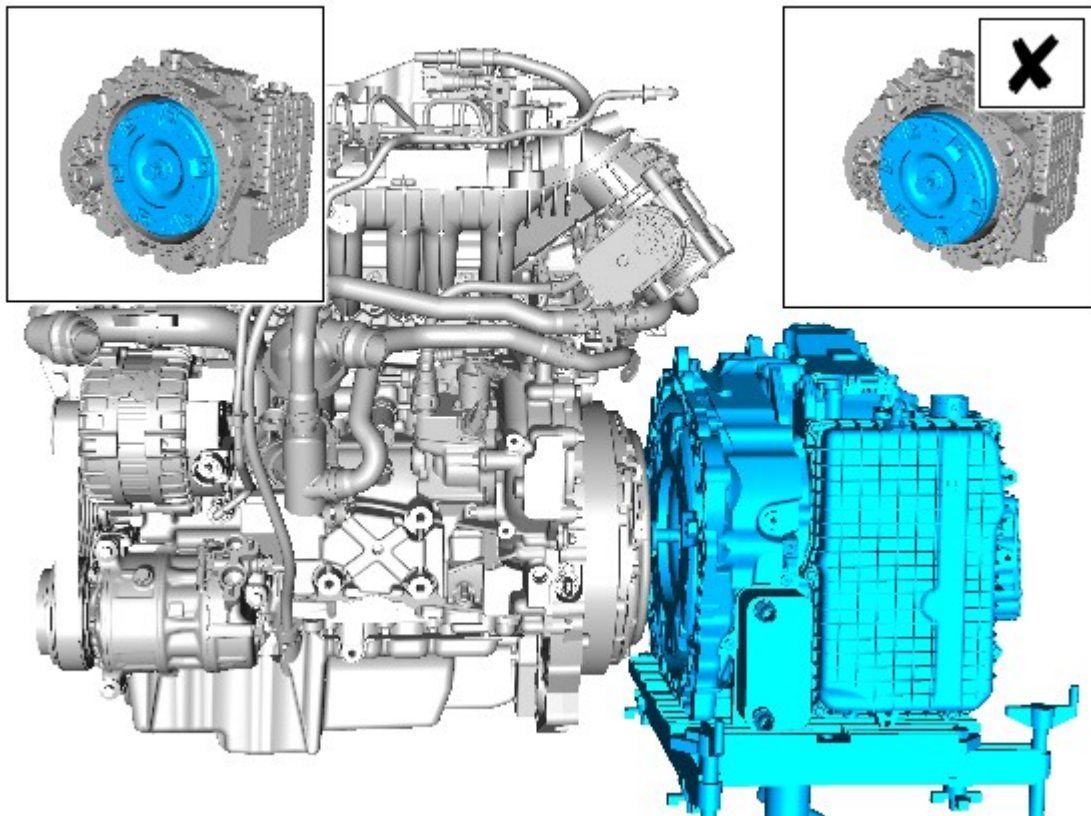
Apply grease of the correct specification to the torque converter spigot.



Make sure that the component is correctly located on the locating dowels.

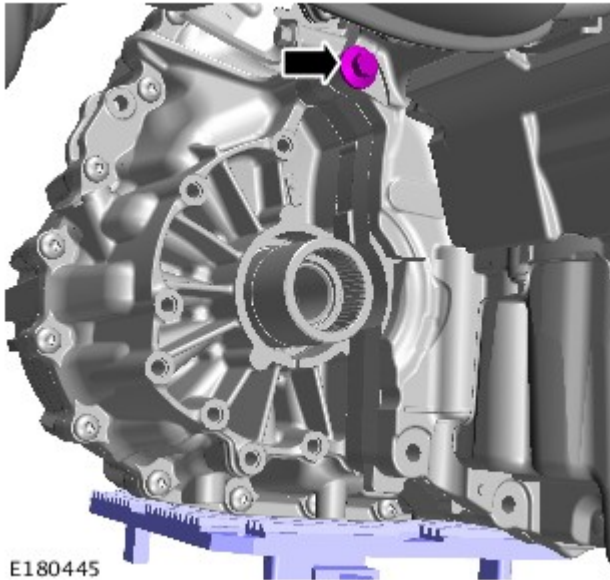


Make sure that the mating faces are clean and free of foreign material.

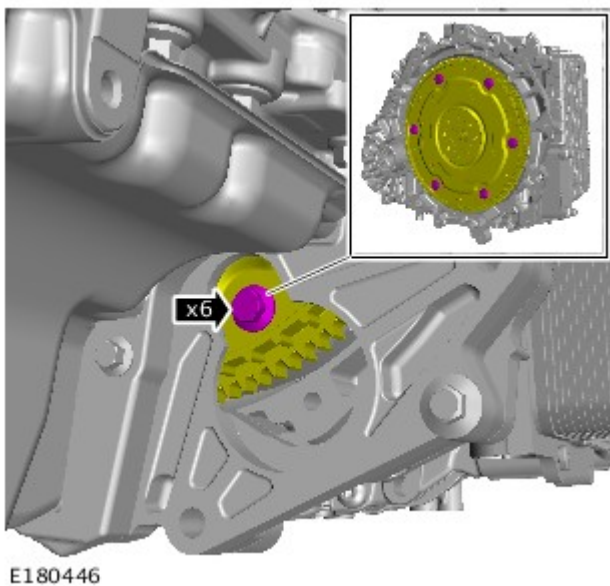
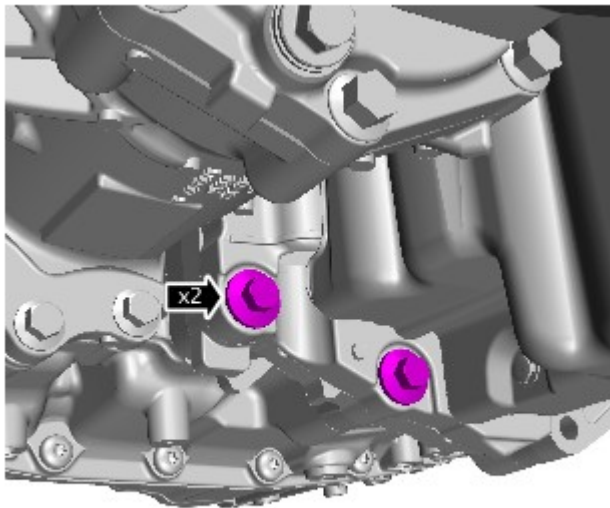


E182187

8. Torque: 65 Nm



9. Torque: 65 Nm



10. CAUTIONS:



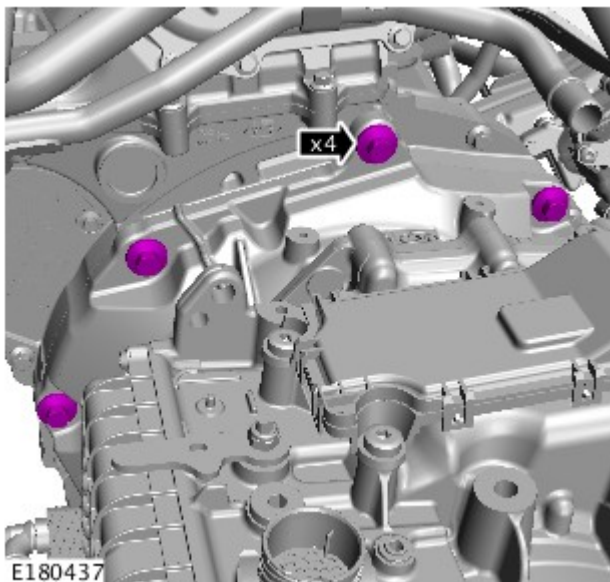
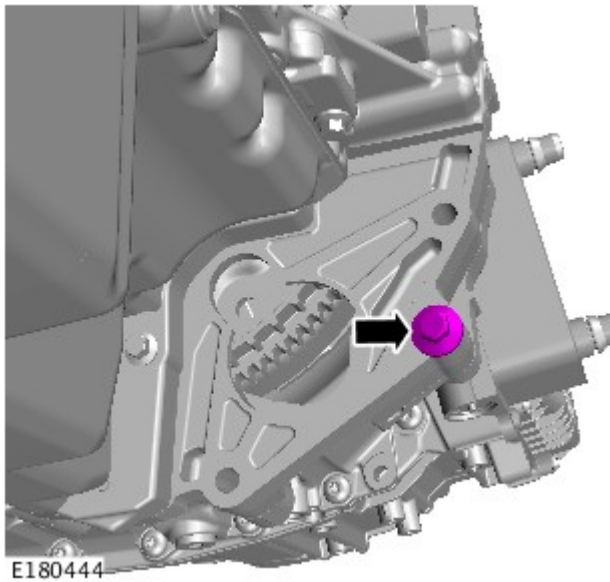
Make sure that new bolts are installed.



Only rotate the crankshaft clockwise.

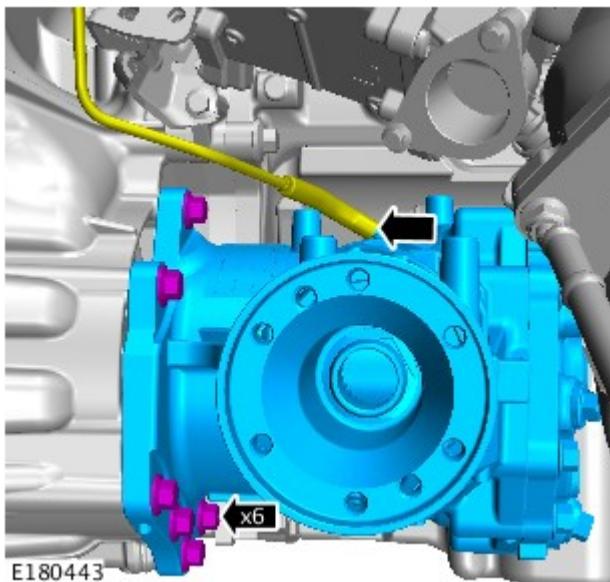
Torque: 62 Nm


11. Torque: 65 Nm



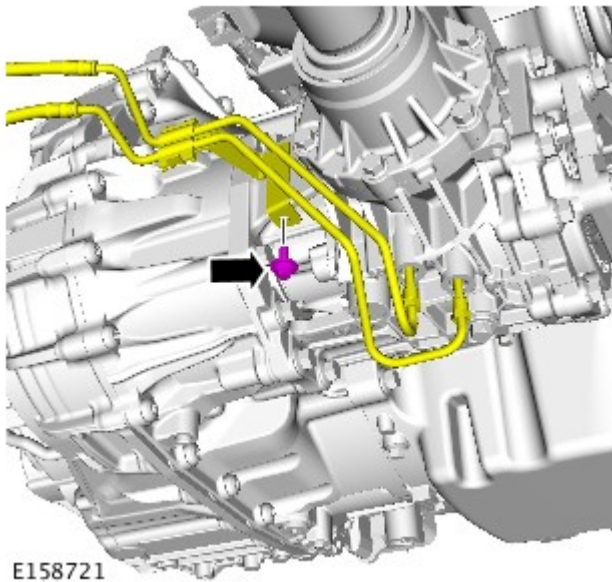
12. Torque: 65 Nm


13. Remove the transmission jack.



14.  CAUTION: Be prepared to collect escaping fluids.

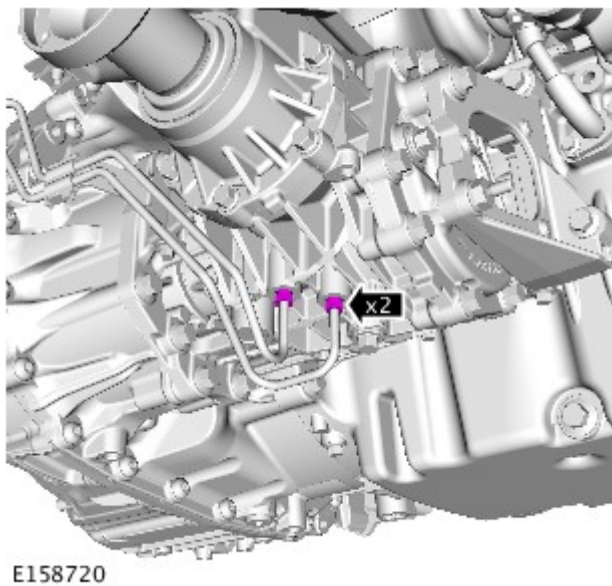
Torque: 60 Nm



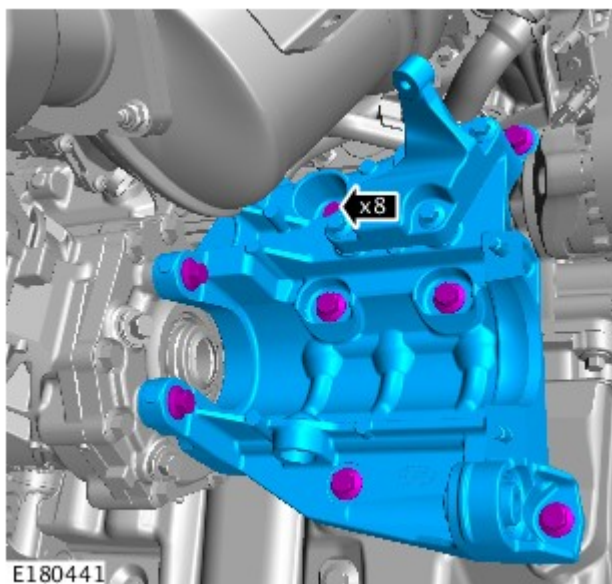
15.  **CAUTION:** Be prepared to collect escaping fluids.

 **NOTE:** :Remove and discard the blanking caps.

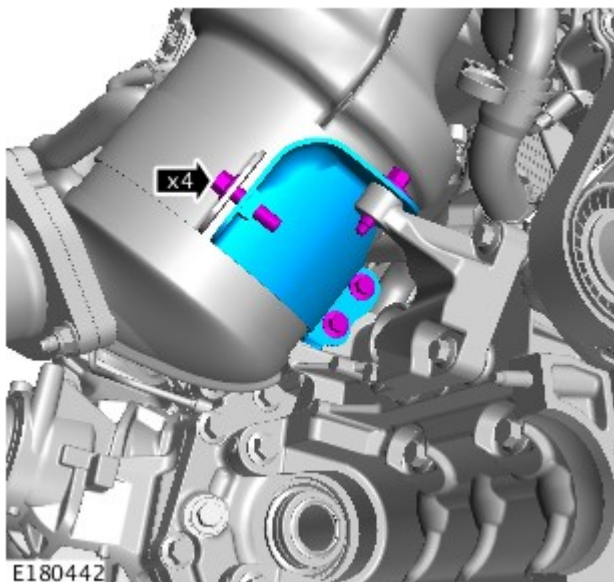
Torque: 12 Nm



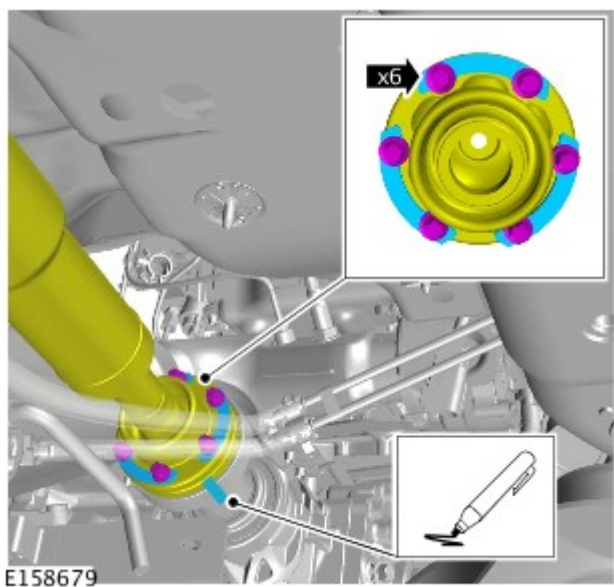
16. Torque: 4 Nm



17. Torque: 60 Nm



18. Torque: 24 Nm



19. CAUTIONS:



Make sure that new bolts are installed.



Make sure that the installation marks are aligned.



NOTE: Tighten the retaining bolts working diagonally.

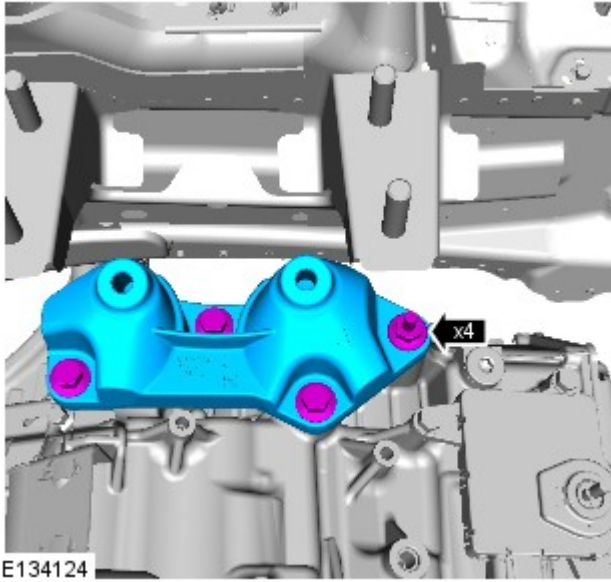
Torque: 40 Nm

20. Refer to: [Front Halfshaft RH - RHD AWD/LHD AWD](#) (205-04 Front Drive Halfshafts, Removal and Installation).

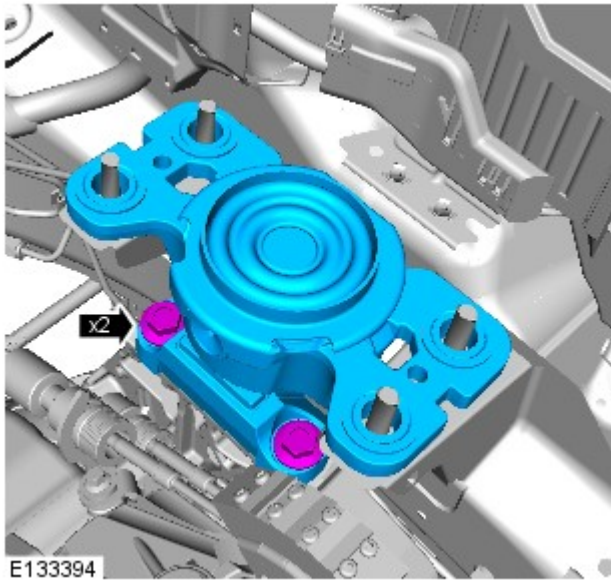
21. Refer to: [Front Halfshaft LH](#) (205-04 Front Drive Halfshafts, Removal and Installation).

22. Lower the vehicle.

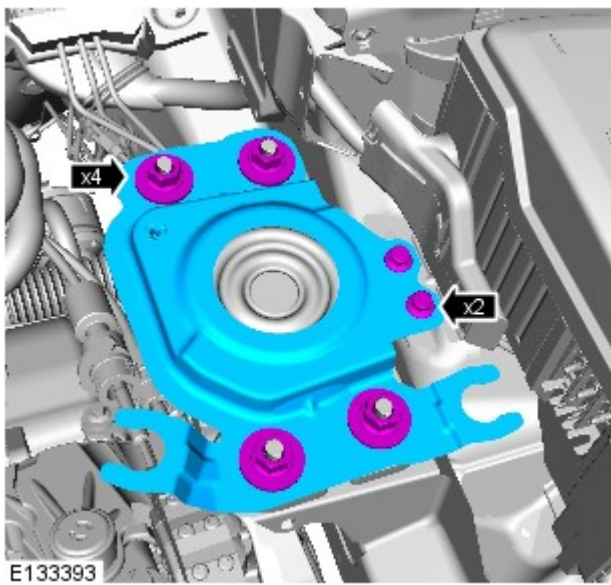
23. Torque: 80 Nm



24. Torque: 175 Nm

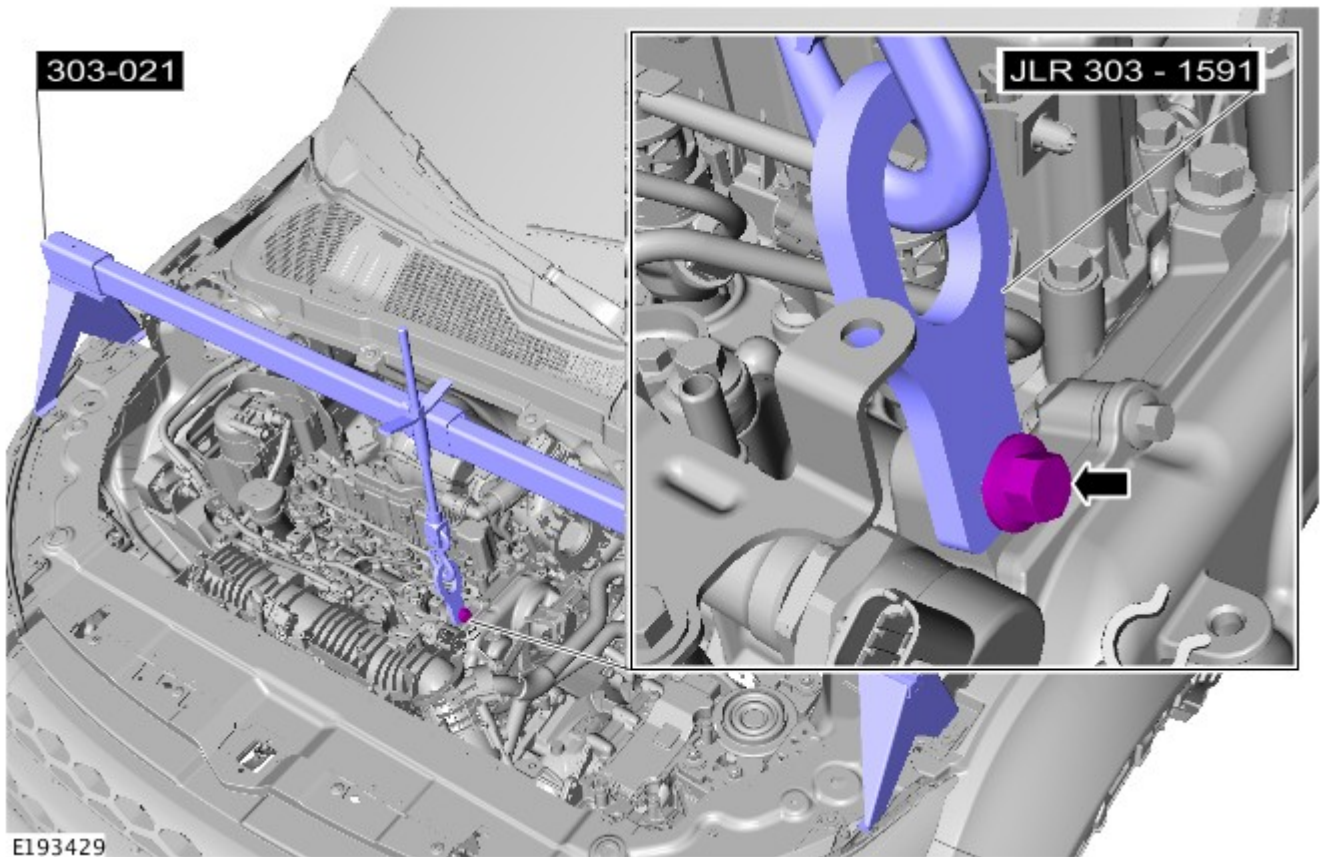


25. Torque:
M8 24 Nm
M12 80 Nm

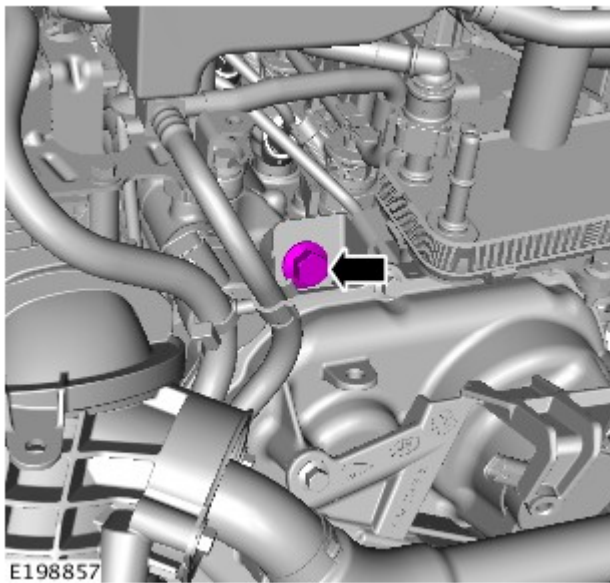


26. Support the engine.

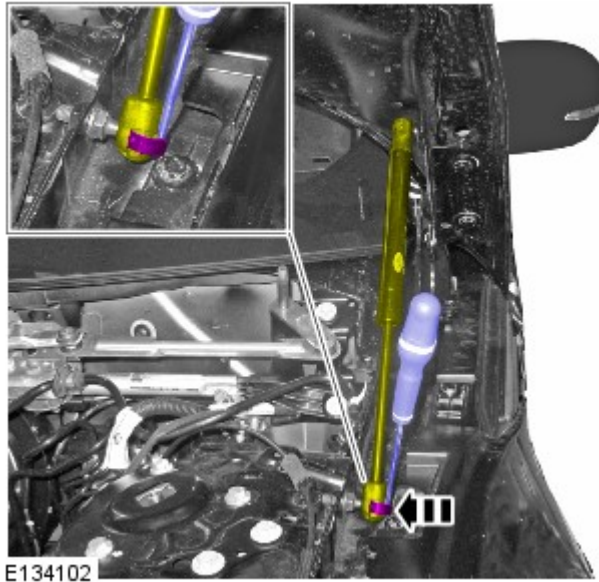
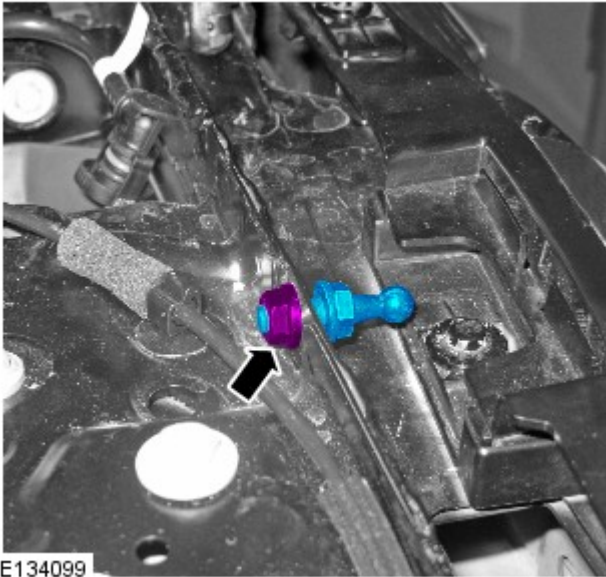
Remove the Special Tool(s): [303-021](#) , [JLR-303-1591](#)



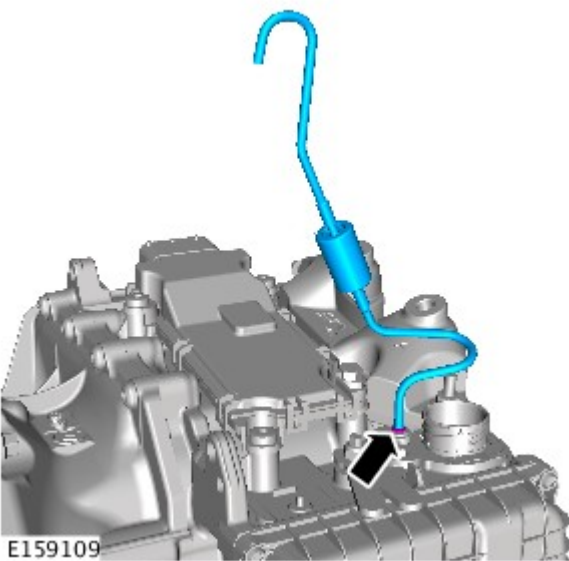
27. Torque: 50 Nm




28. Repeat the above step for the other side.

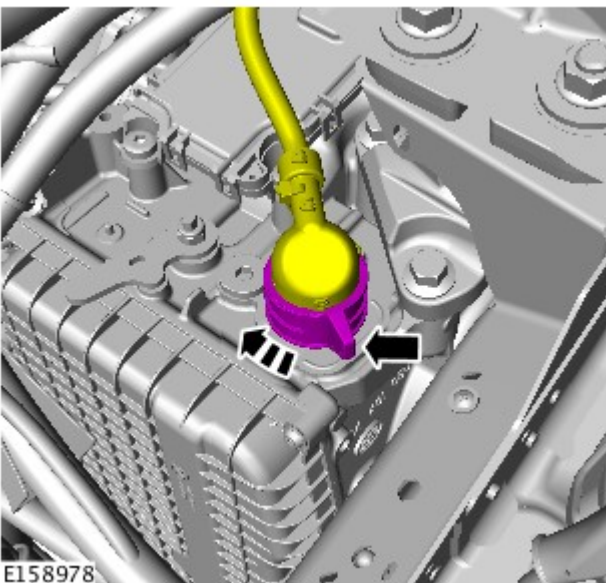
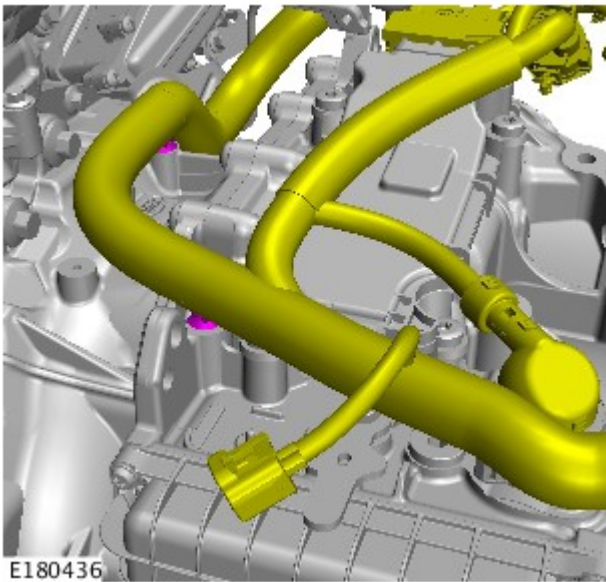
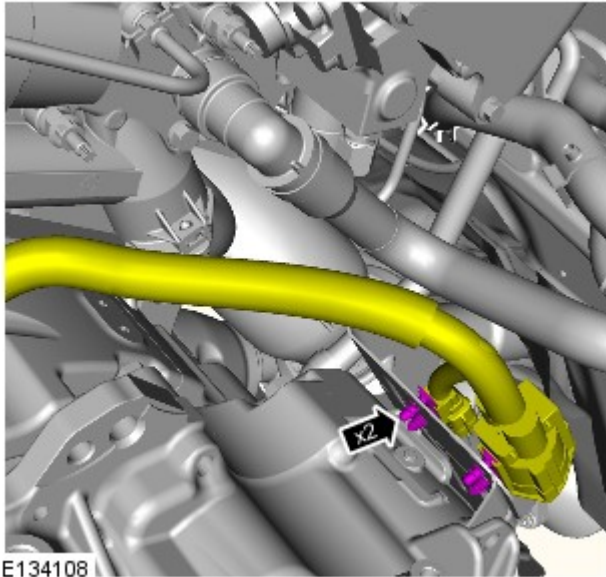


- 29.
- Repeat the above step for the other side.




30.  **CAUTION:** To prevent water ingress and subsequent transmission damage, make sure that the breather is fully pushed home into the transmission casing. The white line around the circumference of the pipe should not be visible when correctly installed.

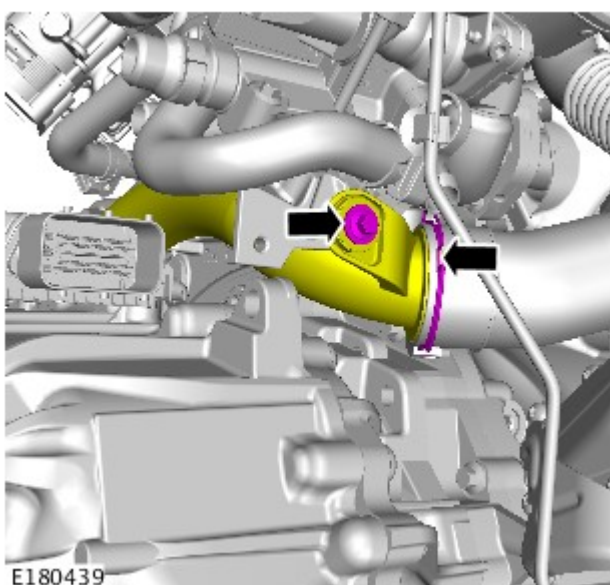
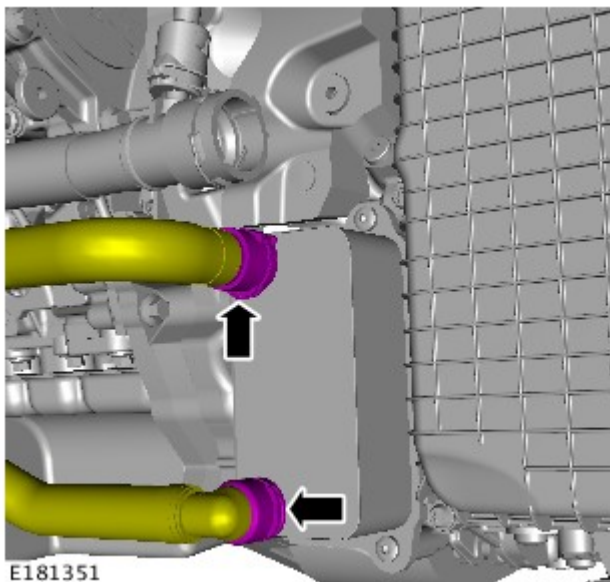
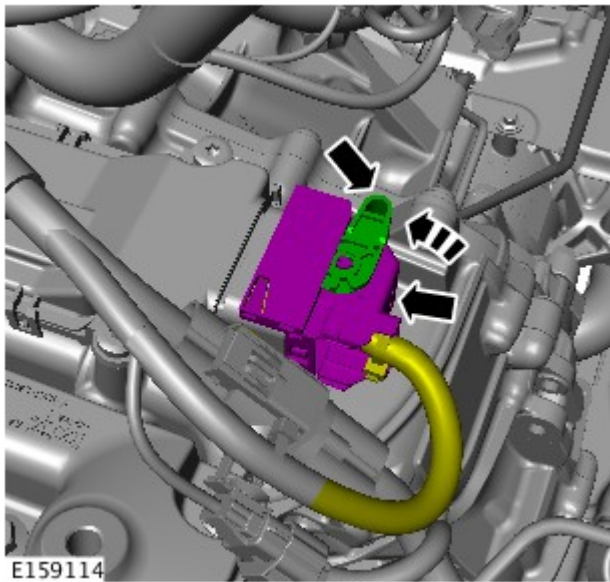
- 31.




32.

33.  NOTE: Make sure the electrical connector is correctly secured.

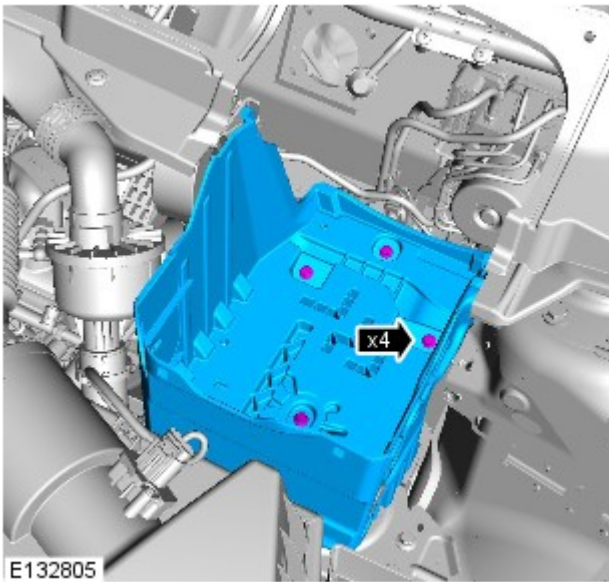
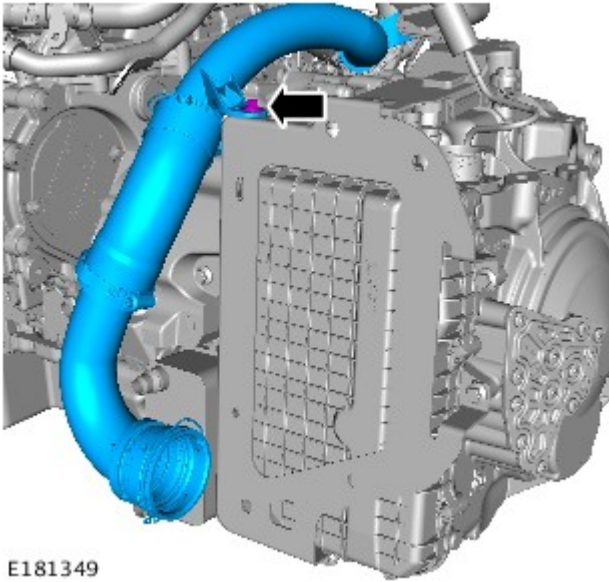
34.



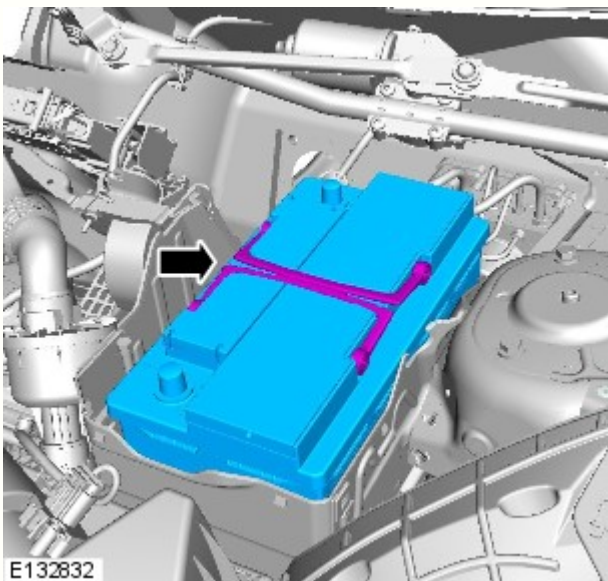
35.  CAUTION: Be prepared to collect escaping coolant.

36. Torque: 8 Nm

- 37.

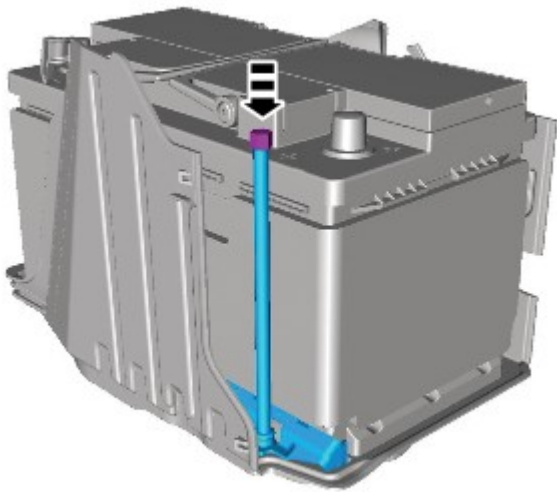


38. Torque: 10 Nm

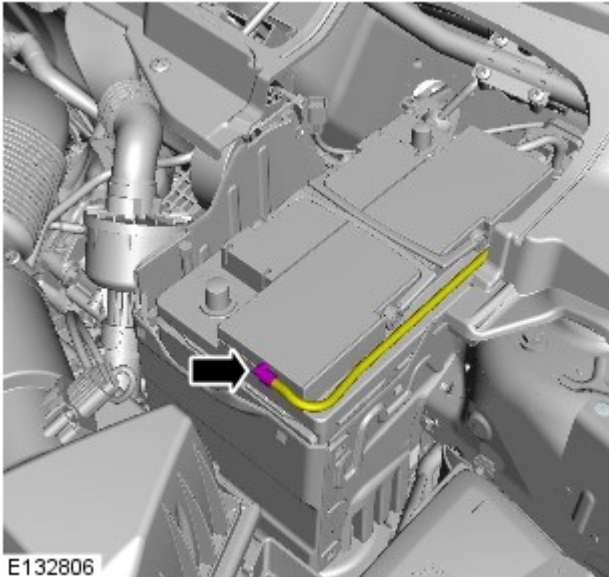


39.

40. Torque: 12 Nm

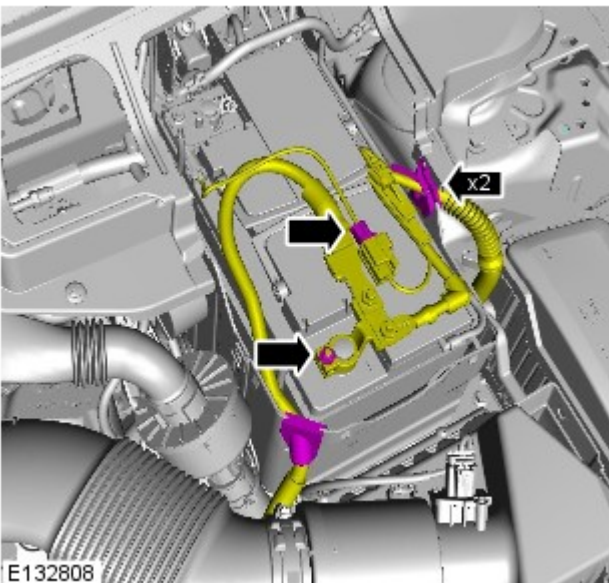


E134165



E132806

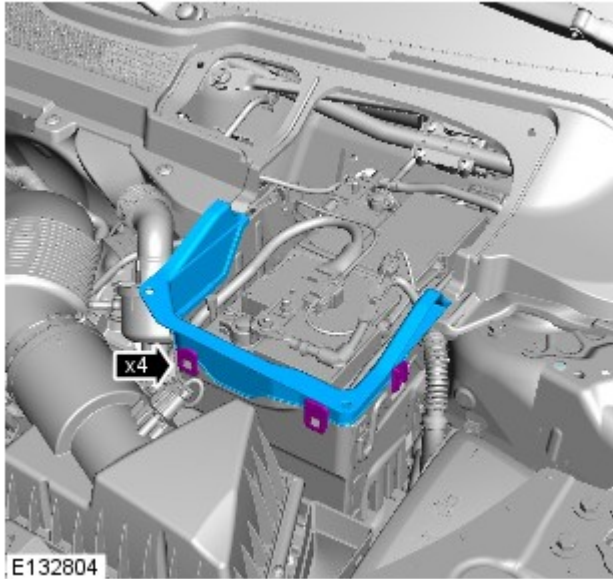
41.



E132808

42.

43.



44. Refer to: [Starter Motor](#) (303-06A Starting System - INGENIUM I4 2.0L Diesel, Removal and Installation).

45. Refer to: [Plenum Chamber](#) (412-01 Climate Control, Removal and Installation).

46. Refer to: [Charge Air Cooler](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

47. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

48. Refer to: [Engine Cover - INGENIUM I4 2.0L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

49. Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

50. Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

51. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

52. If a new component has been installed, configure using Land Rover approved diagnostic equipment.

Automatic Transmission/Transaxle - Transmission Control Module (TCM) INGENIUM I4 2.0L Diesel

Removal and Installation

Removal

NOTES:



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

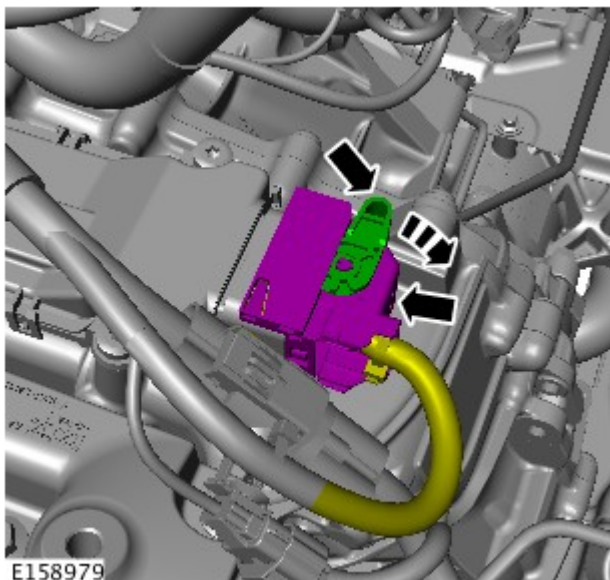


Removal steps in this procedure may contain installation details.

1. Refer to: [Battery Tray](#) (414-01 Battery, Mounting and Cables, Removal and Installation).

2. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

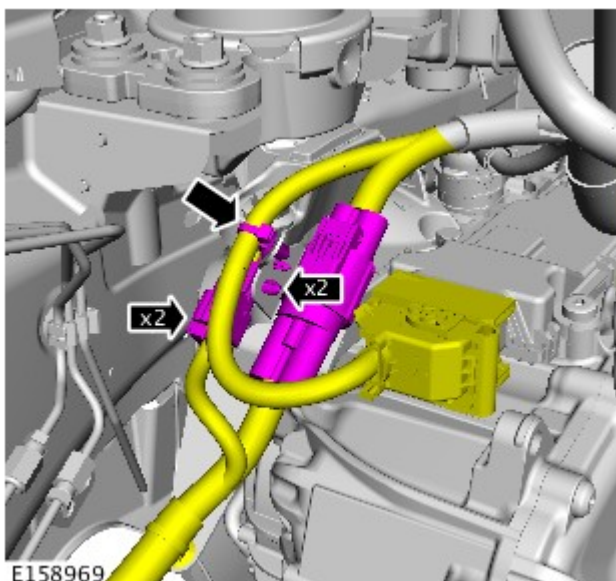
3.

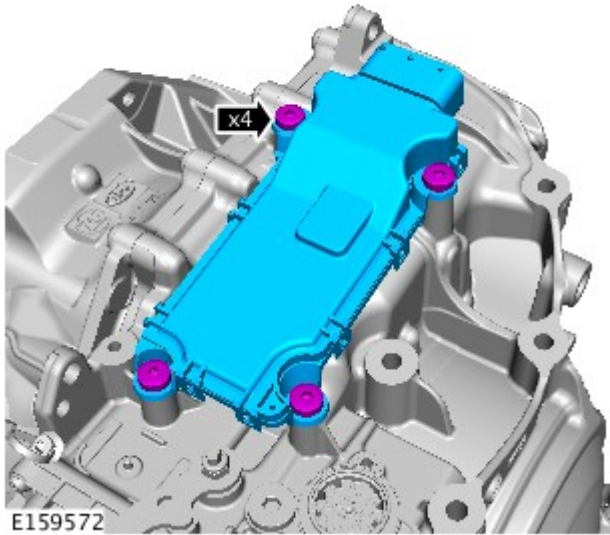


4.



CAUTION: Take extra care not to damage the wiring harness clips.





5.  **CAUTION:** Make sure that new bolts are installed.

Torque: 24 Nm

Installation

1. To install, reverse the removal procedure.

2.  **NOTE:** This step is only required if a new component is installed.

Using the approved Land Rover diagnostic equipment, configure new transmission control module (TCM) without transmission replacement.

Published: 17-Nov-2015

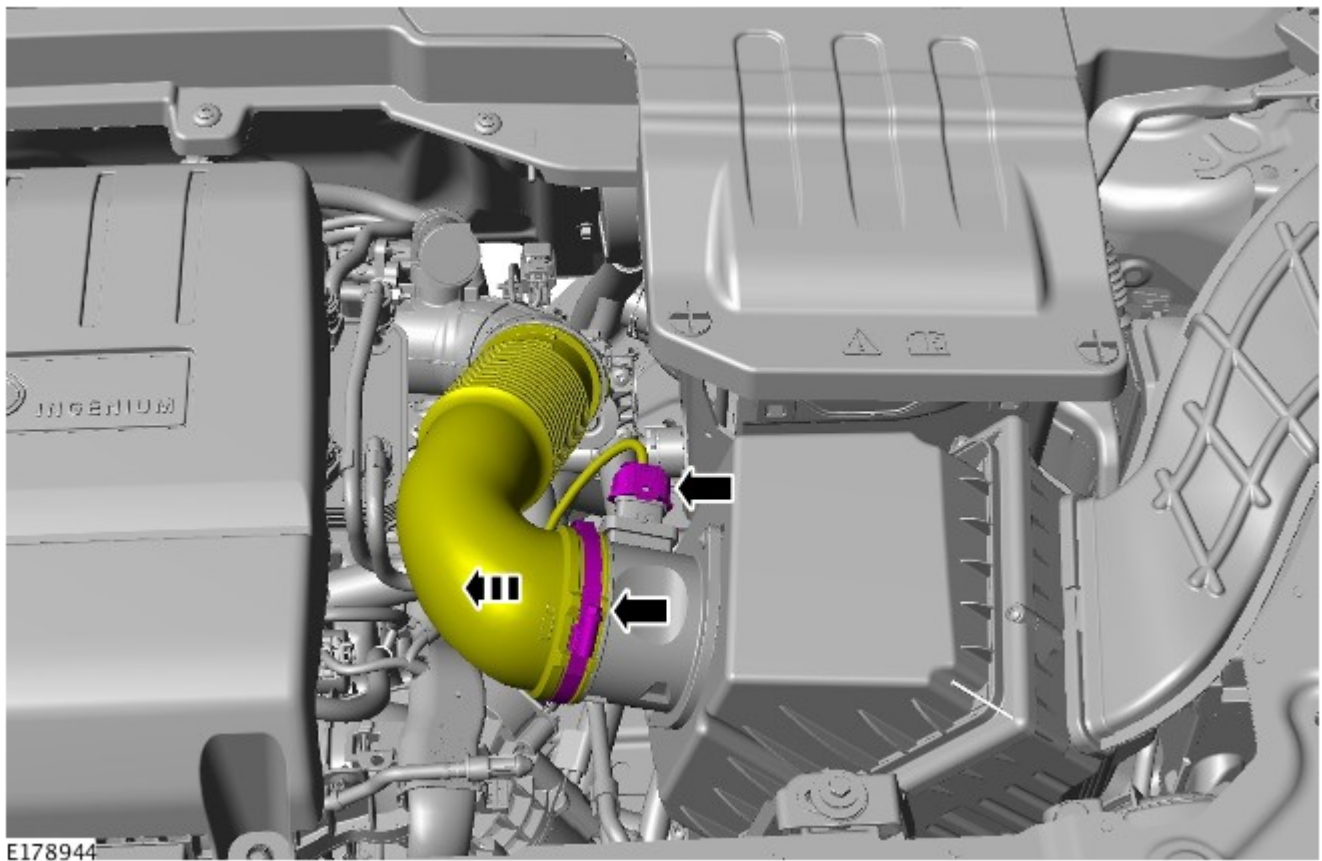
Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel - Air Cleaner Removal and Installation

Removal

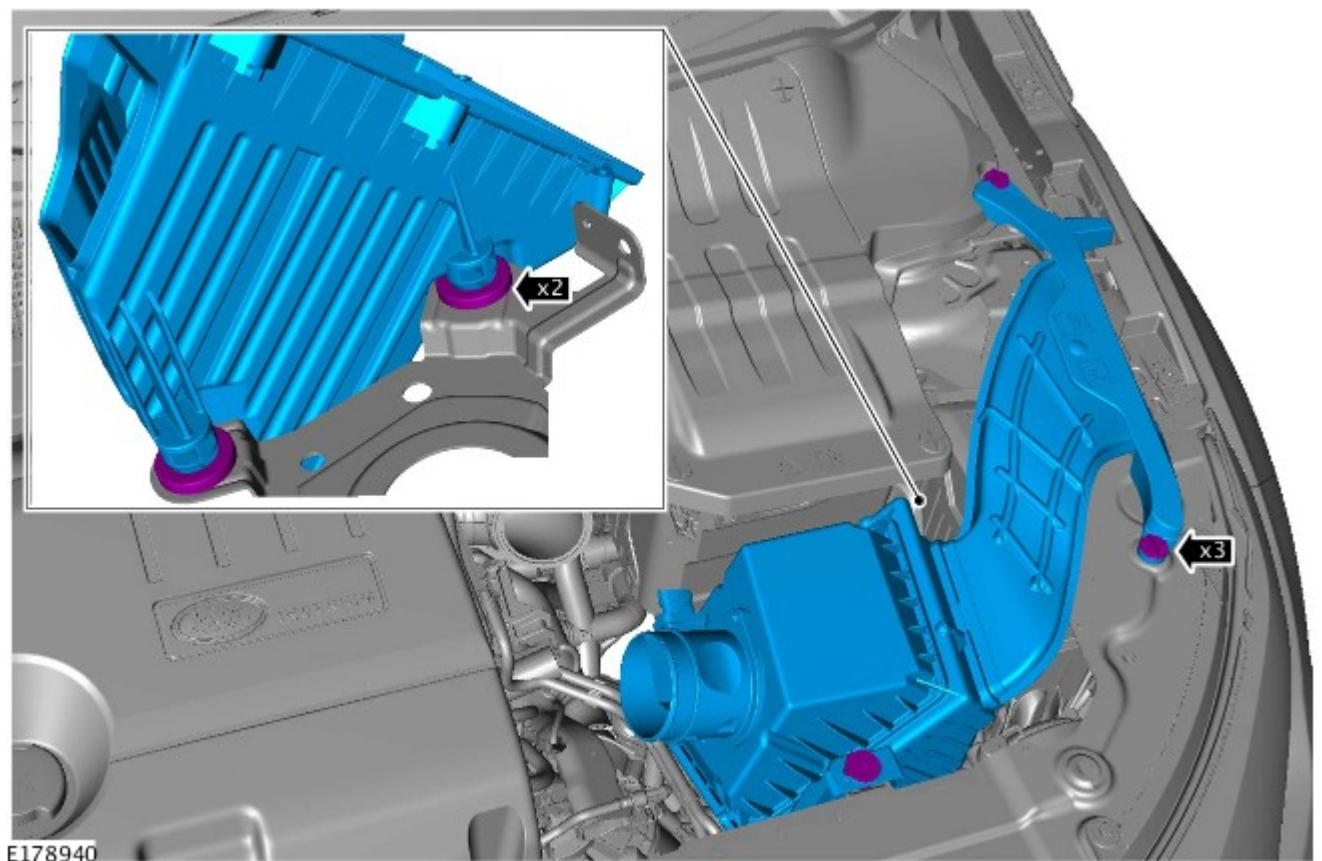


NOTE: Removal steps in this procedure may contain installation details.

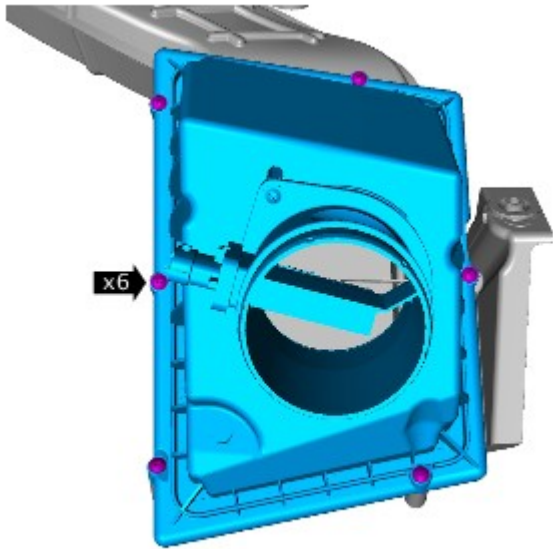
1. *Torque:* 3.5 Nm



2. Torque: 8 Nm

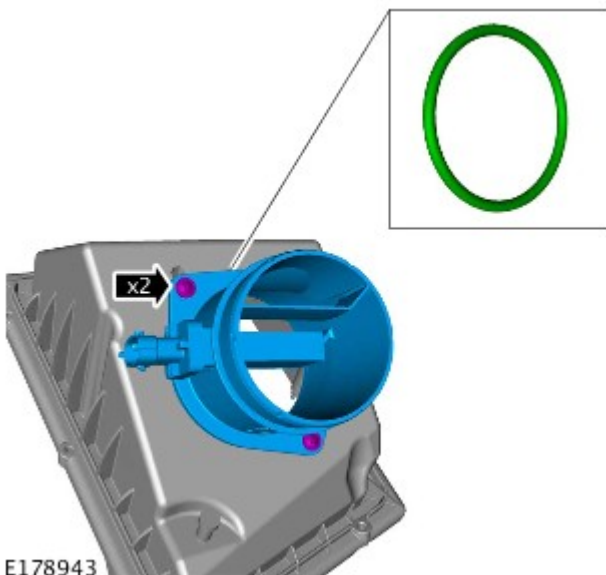


3. Torque: 2 Nm



E178946

4. Do not disassemble further if the component is removed for access only.

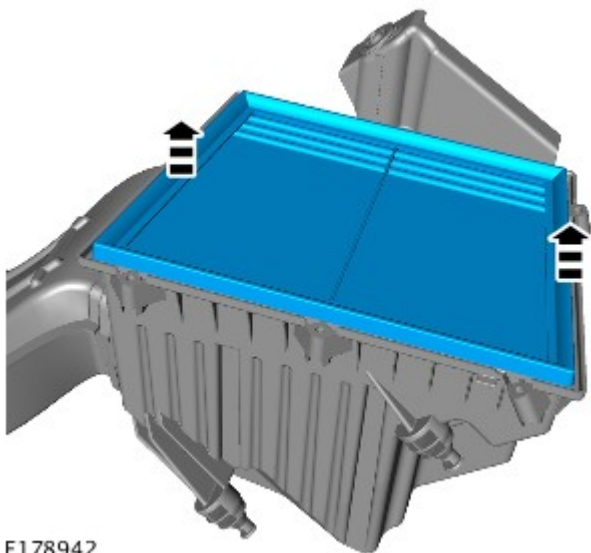


E178943

5.  **CAUTION:** Inspect the O-ring seal, install a new component if damaged.

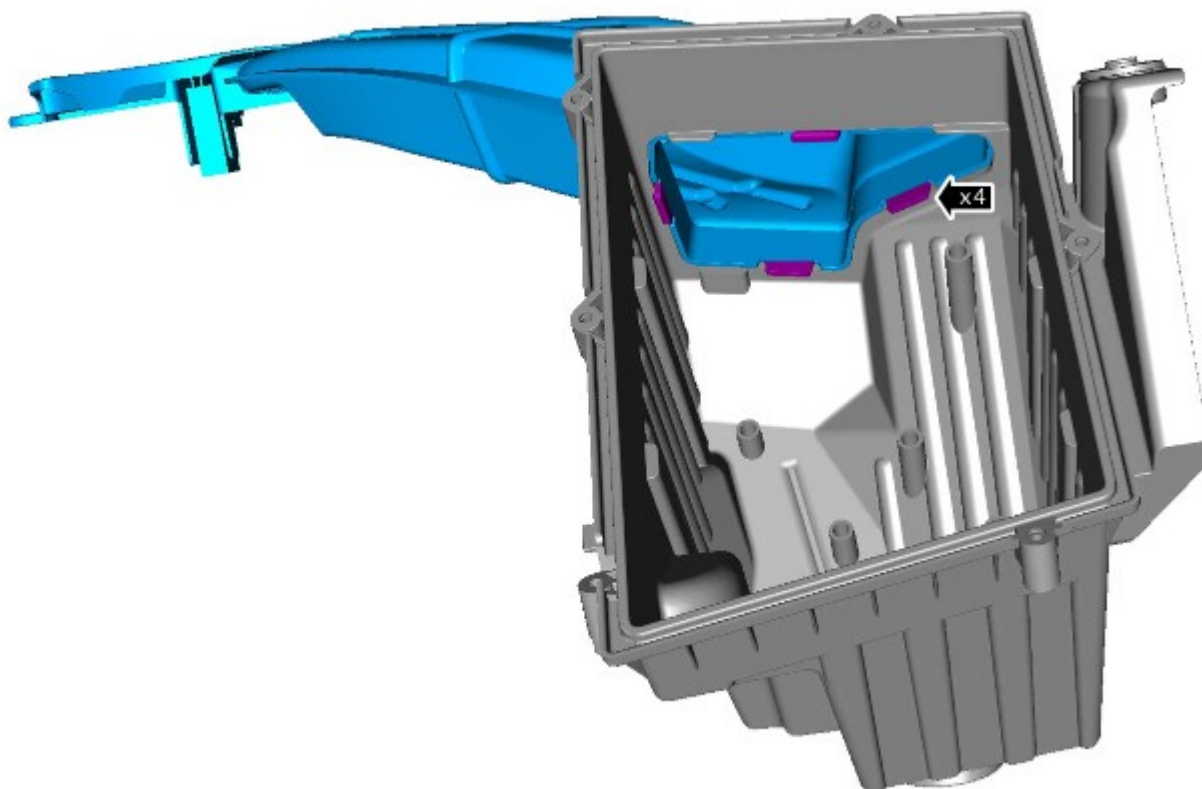
Torque: 1.9 Nm

6.



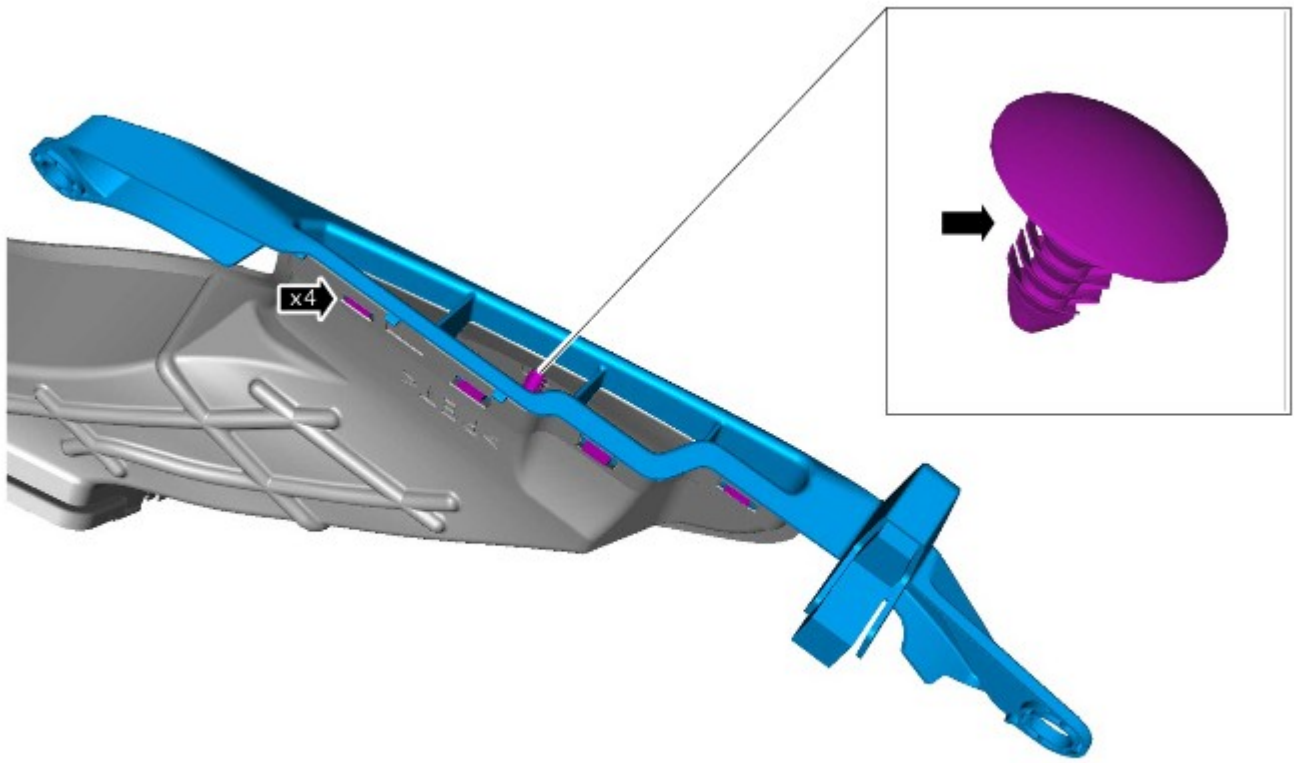
E178942

7.



E178941

8.



E178945

Installation

1. To install, reverse the removal procedure.

Published: 30-Sep-2014

Battery, Mounting and Cables - Battery Tray

Removal and Installation

Removal

NOTES:



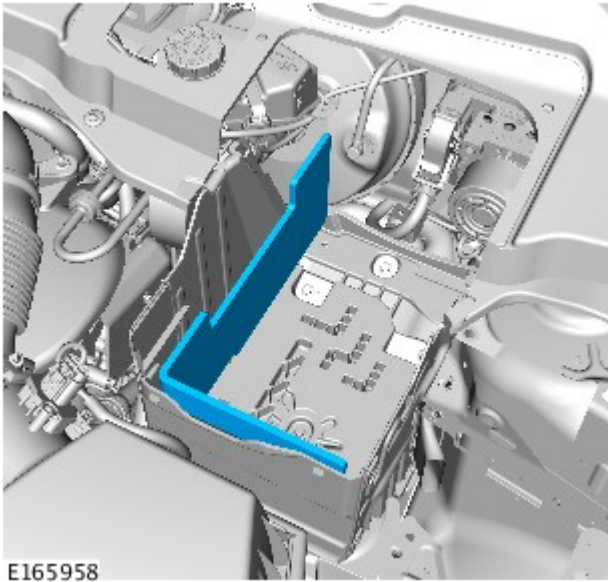
Removal steps in this procedure may contain installation details.



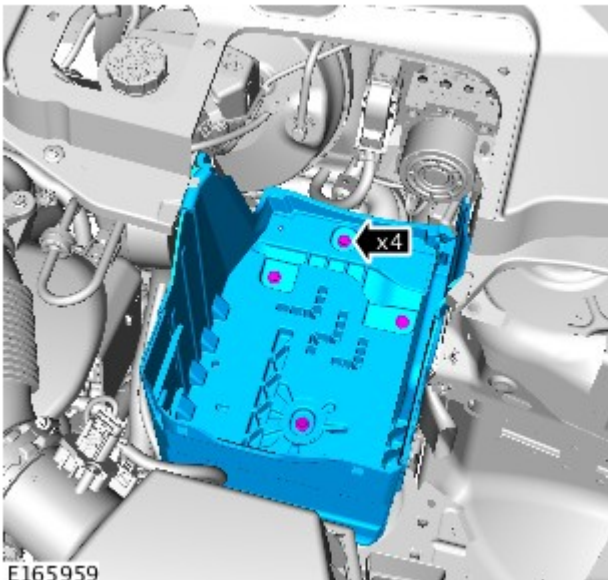
Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: Battery (414-01, Removal and Installation).

- 2.

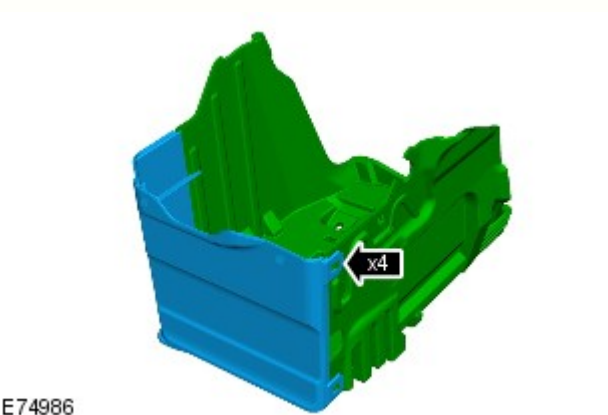


E165958




E165959

3. Torque: 10 Nm



E74986

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

Installation

1. To install, reverse the removal procedure.

Automatic Transmission/Transaxle - Transmission Cover

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluid.



CAUTION: Extreme cleanliness must be exercised when handling this component.

NOTES:



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



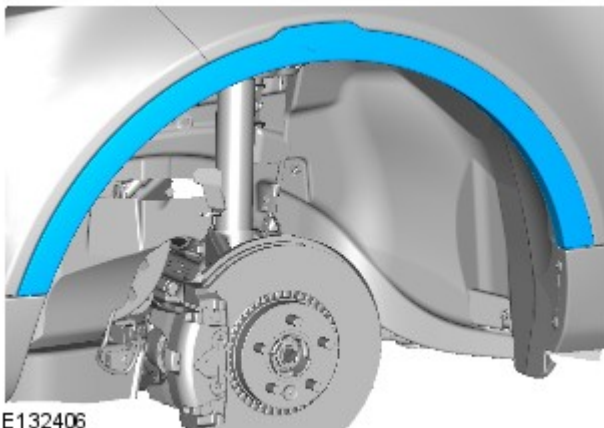
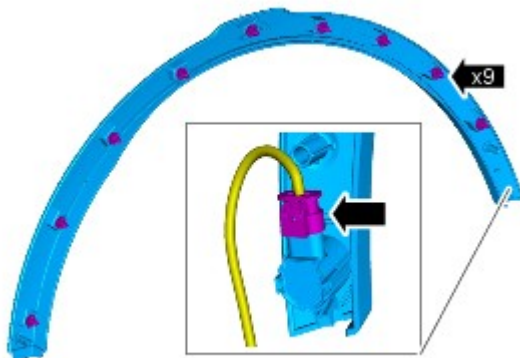
Removal steps in this procedure may contain installation details.



Transmission shown removed for clarity.

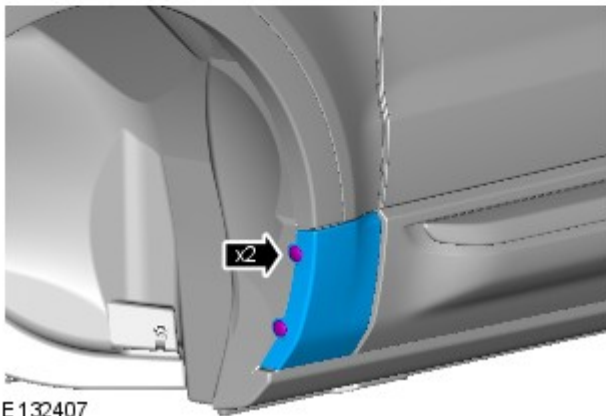
1. Refer to: Wheel and Tire (204-04, Removal and Installation).

2.

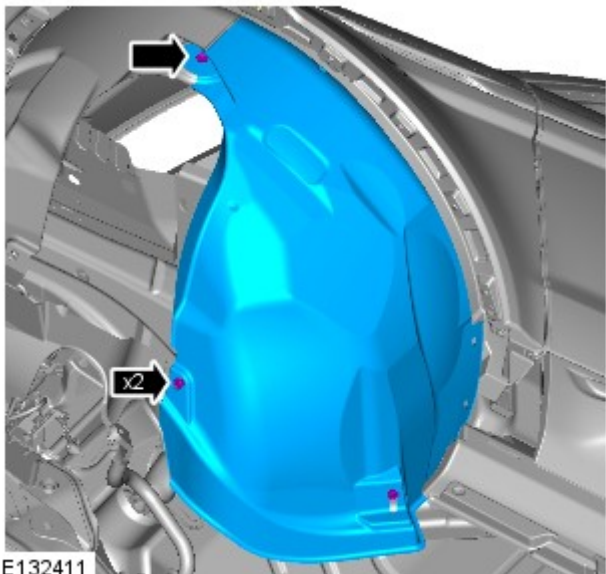


E132406

3.



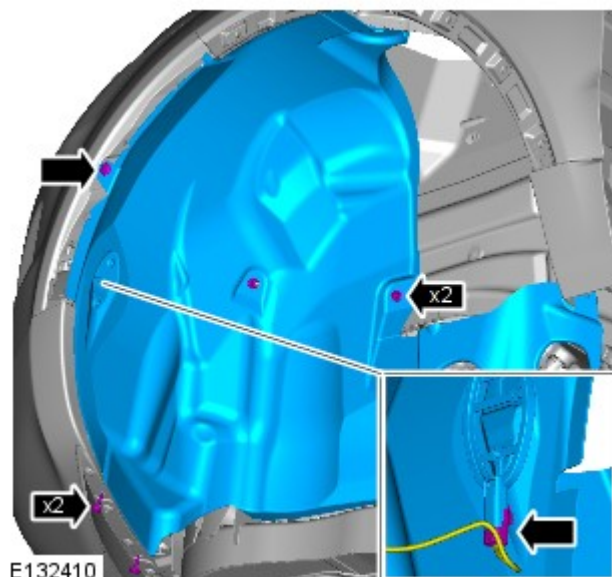
E132407



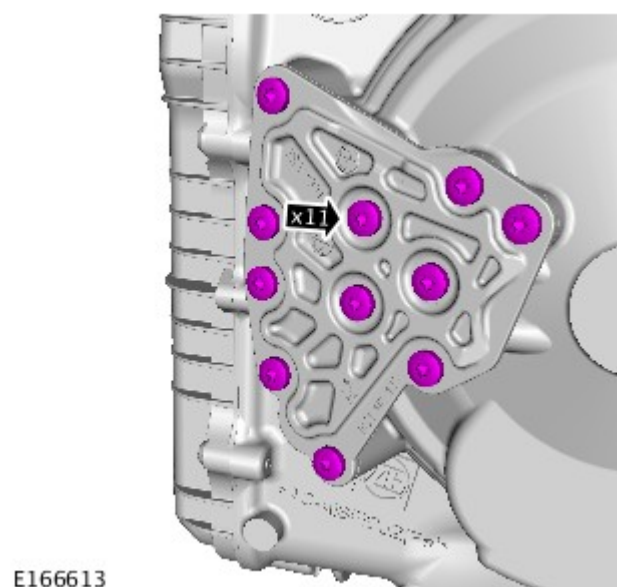
E132411


4.

5.

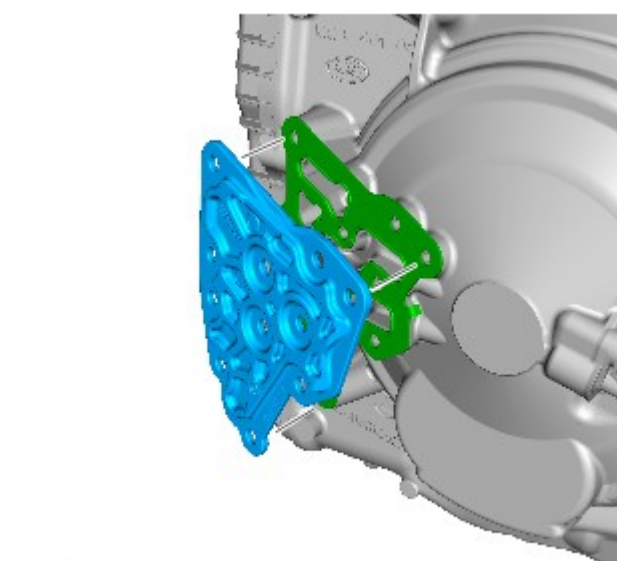


6.  **CAUTION:** Discard the bolts.





7.  **CAUTION:** Make sure that the mating faces are clean and free of corrosion and foreign material.

 **NOTE:** Discard the gasket.

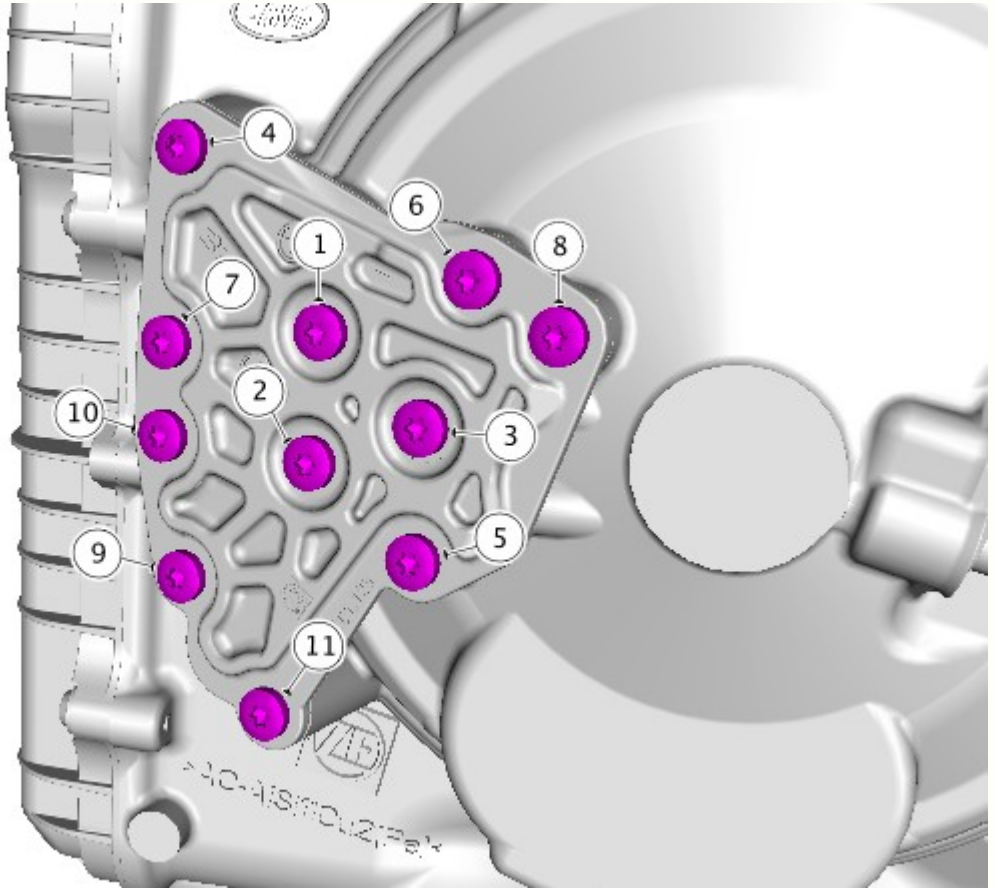


Installation

1.  CAUTION: Tighten the bolts in the sequence shown.

 NOTE: Make sure that new bolts are installed.

Torque: 10 Nm



E166615

2. To install, reverse the removal procedure.

Automatic Transmission/Transaxle - Transmission Fluid Pan INGENIUM I4 2.0L Diesel

Removal and Installation

Removal



WARNING: Be prepared to catch escaping fluid.



CAUTION: Extreme cleanliness must be exercised when handling this component.

NOTES:



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



Some illustrations may show the transmission removed for clarity.

1.



WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Disconnect the battery ground cable.

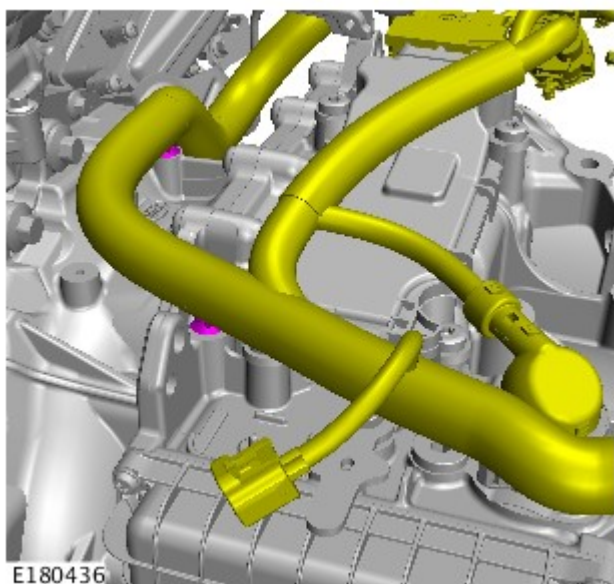
Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

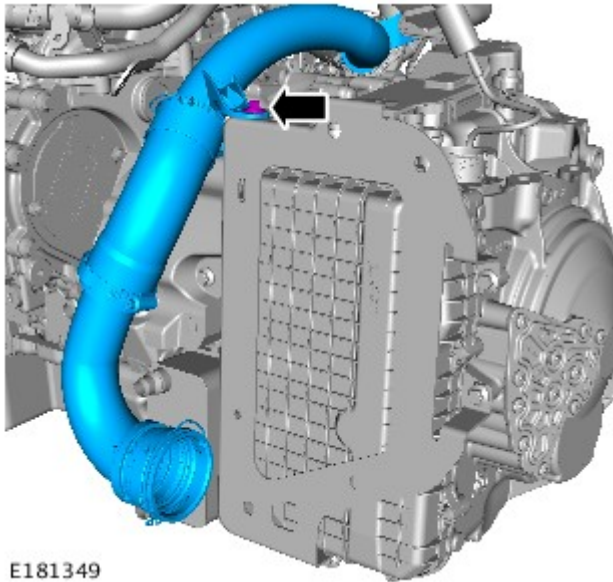
3. Refer to: [Charge Air Cooler](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

4. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03A Engine Cooling - INGENIUM I4 2.0L Diesel, General Procedures).

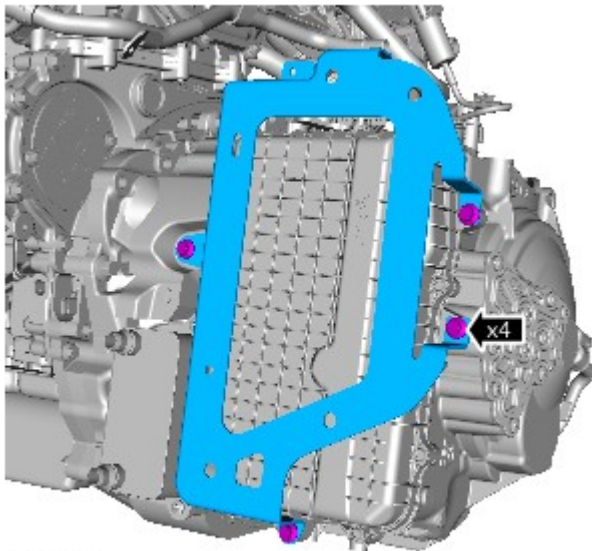
5. Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

6.

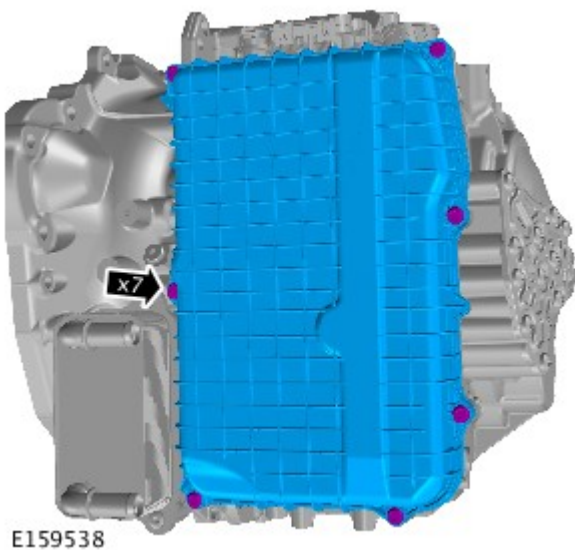





7.

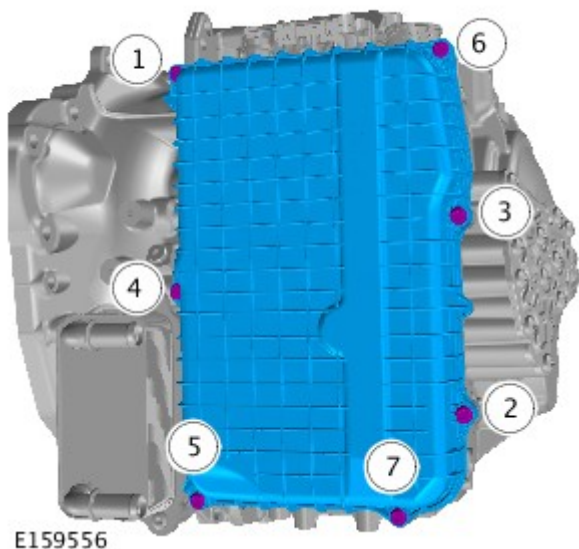



8.



9.  **CAUTION:** Care must be taken when handling the component. Do not place on a surface with the seal faced down. Failure to follow this instruction may damage the component.

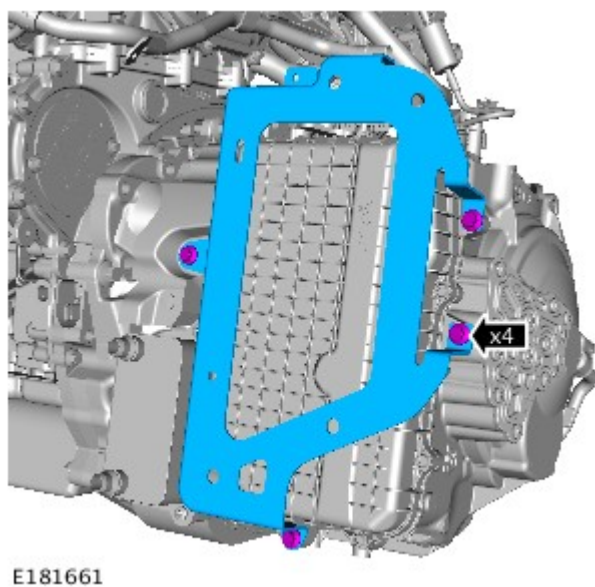
Installation



1.  **CAUTION:** Make sure that the mating faces are clean and free of foreign material.

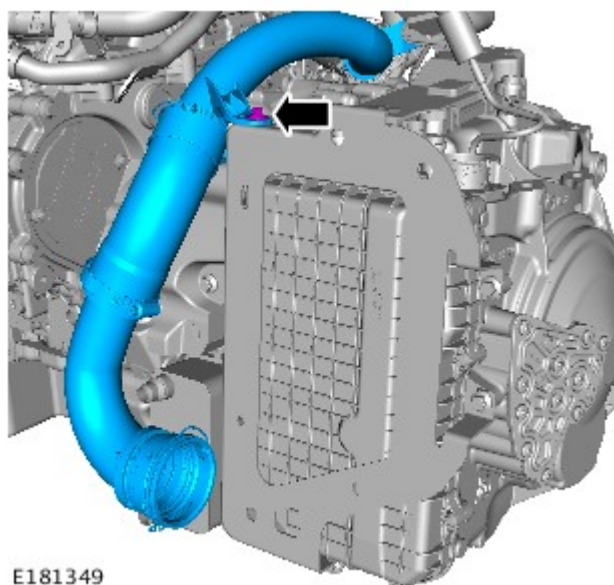
Tighten the bolts in the sequence illustrated.

Torque: 9 Nm

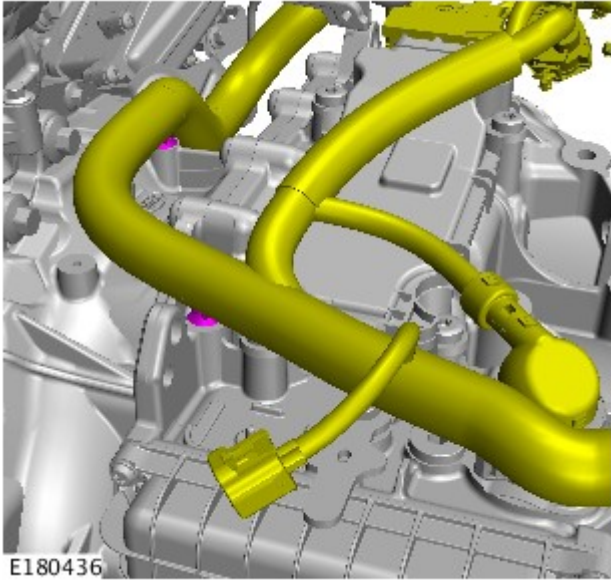


2.  **NOTE:** This step is only required if previously removed.

Torque: 10 Nm



3. Torque: 8 Nm



4.


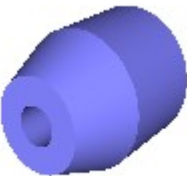
- 5. Refer to: [Charge Air Cooler](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).
- 6. Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission/Transaxle, General Procedures).
- 7. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03A Engine Cooling - INGENIUM I4 2.0L Diesel, General Procedures).
- 8. Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

Published: 29-Jul-2015

Engine Cooling - INGENIUM I4 2.0L Diesel - Cooling System Partial Draining and Vacuum Filling

General Procedures

Special Tool(s)

	HU-919 Coolant System Vacuum Refill Kit
	JLR-303-1634 Adaptor, Cooling System Vacuum Refill Kit

Draining



WARNING: Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.

CAUTIONS:



The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.



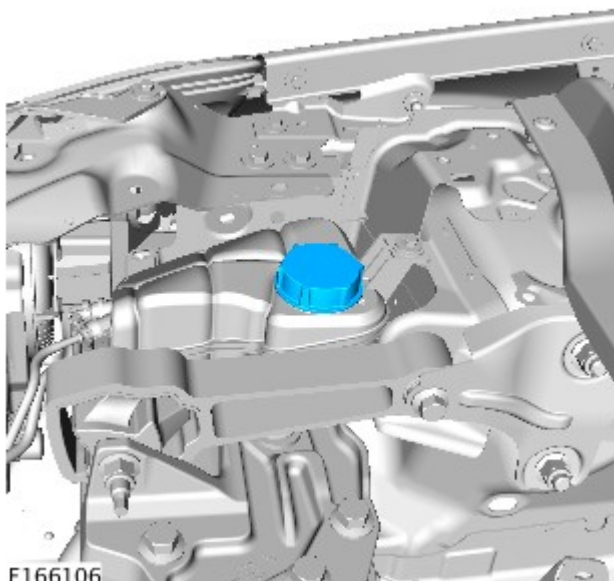
Engine coolant will damage the paint finished surfaces. If spilt, immediately remove the coolant and clean the area with water.

1.



WARNING: 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.



WARNING: Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.

3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

4. Position a container to collect the fluid.

5. **NOTES:**

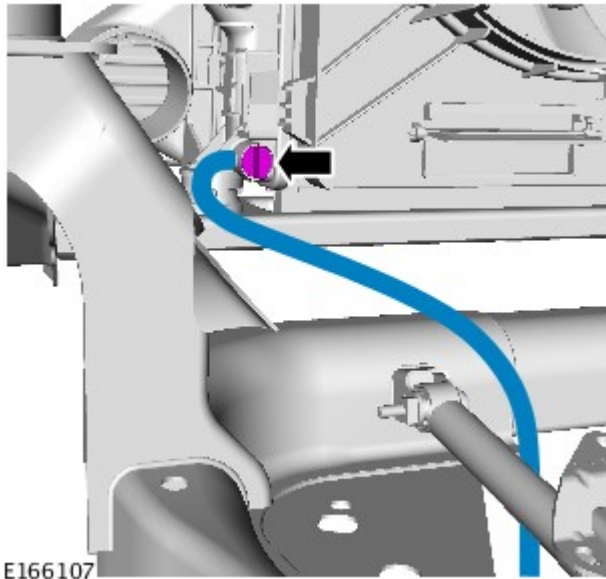


Some components shown removed for clarity.



Collect the coolant in a clean container and reuse.

- Attach a hose to the radiator drain tap.
- Open the radiator drain tap.
- Drain the coolant from the radiator.



6. Close the radiator drain tap and remove the hose.

Filling



WARNING: Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.

CAUTIONS:



The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.



Engine coolant will damage the paint finished surfaces. If spilt, immediately remove the coolant and clean the area with water.

1. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).
2. Prepare a sufficient amount of coolant to the specified concentration.
- 3.

- **NOTES:**



Make sure the coolant supply valve is in the closed position on the special tool.



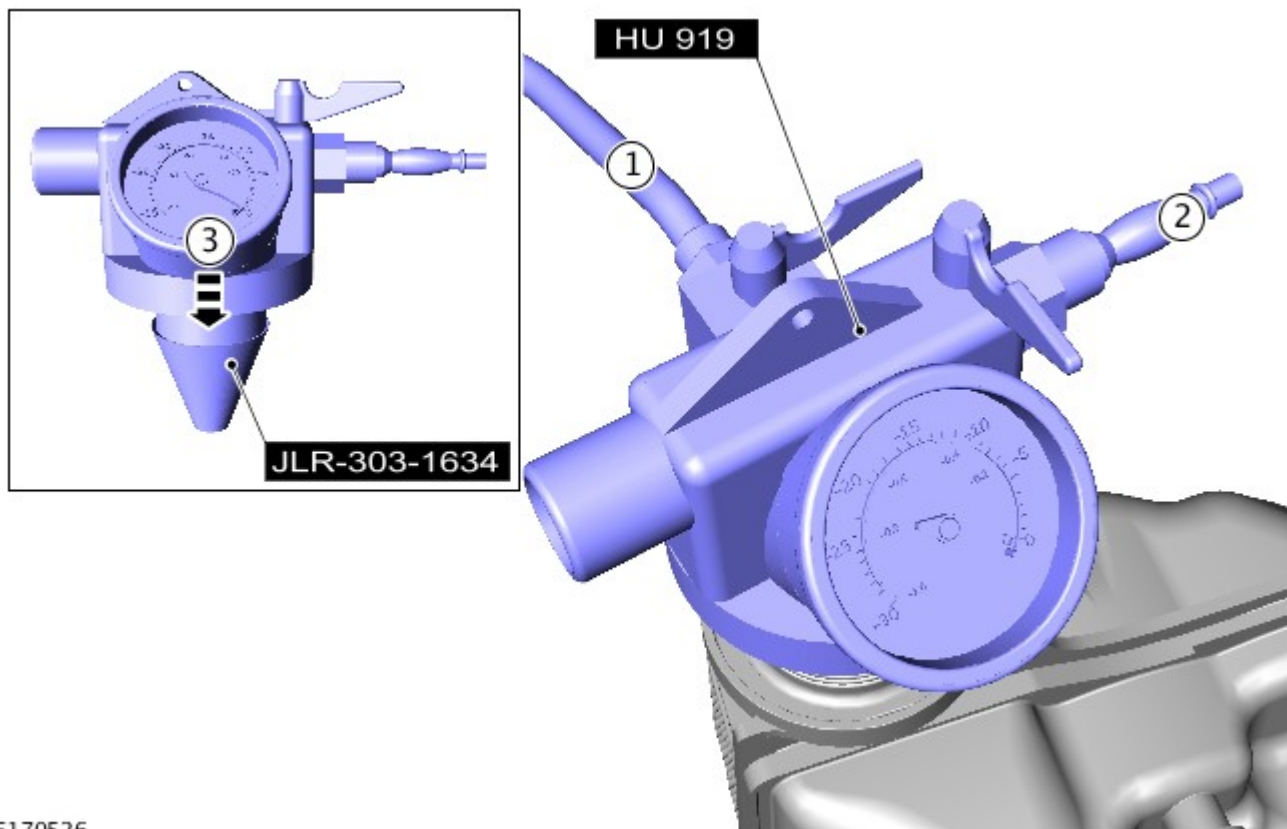
The special tool needs an air pressure of 6 to 8 bar (87 to 116 psi) to operate correctly.



Small diameter or long airlines may restrict airflow to the coolant vacuum fill tool.

Special Tool(s): [HU-919](#) , [JLR-303-1634](#)

1. Position the hose from the special tool into a container of clean coolant.
2. Connect a regulated compressed air supply to the special tool.
3. Move the special tool to the expansion tank.



E170526

4. NOTES:



Make sure the coolant supply valve is in the closed position on the special tool.



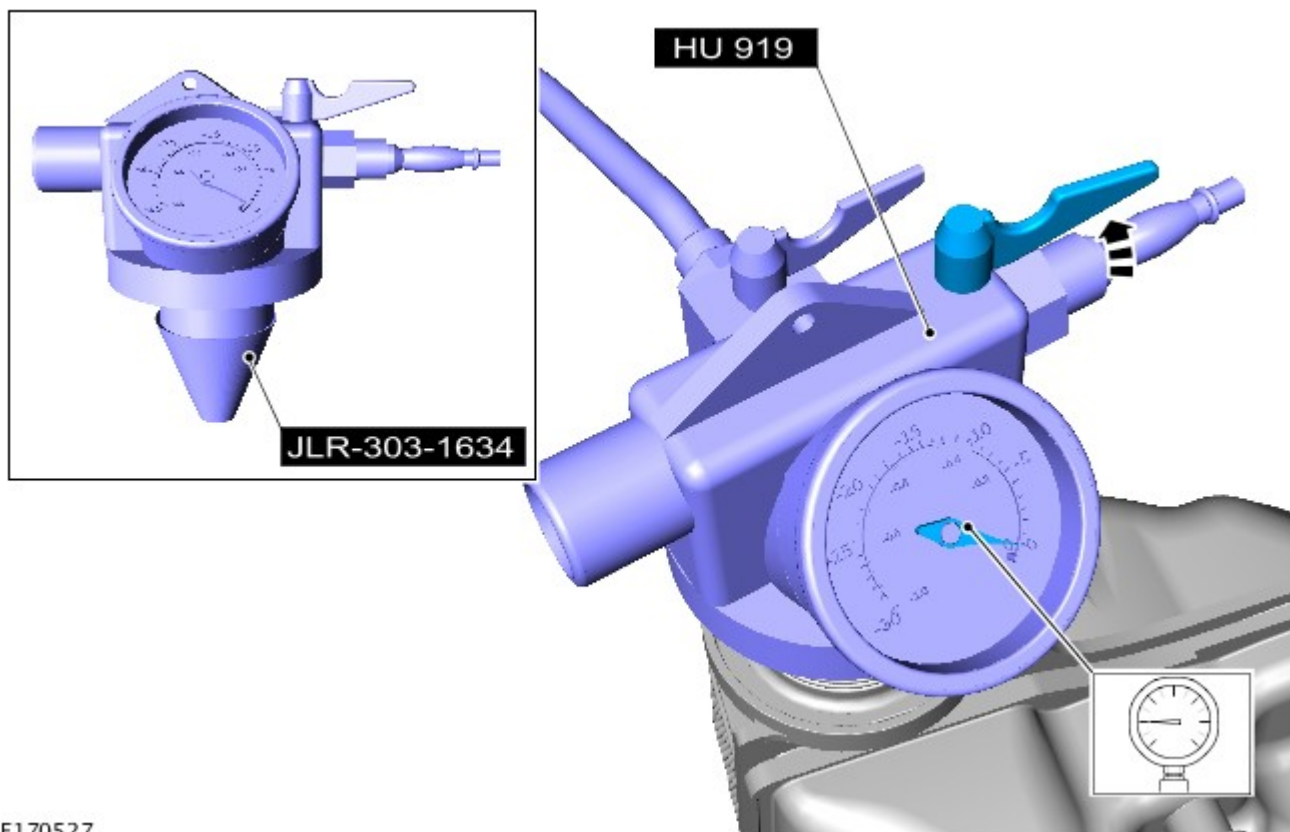
The coolant vacuum fill tool needs an air pressure of 6 to 8 bar (87 to 116 psi) to operate correctly.



Small diameter or long airlines may restrict airflow to the coolant vacuum fill tool.

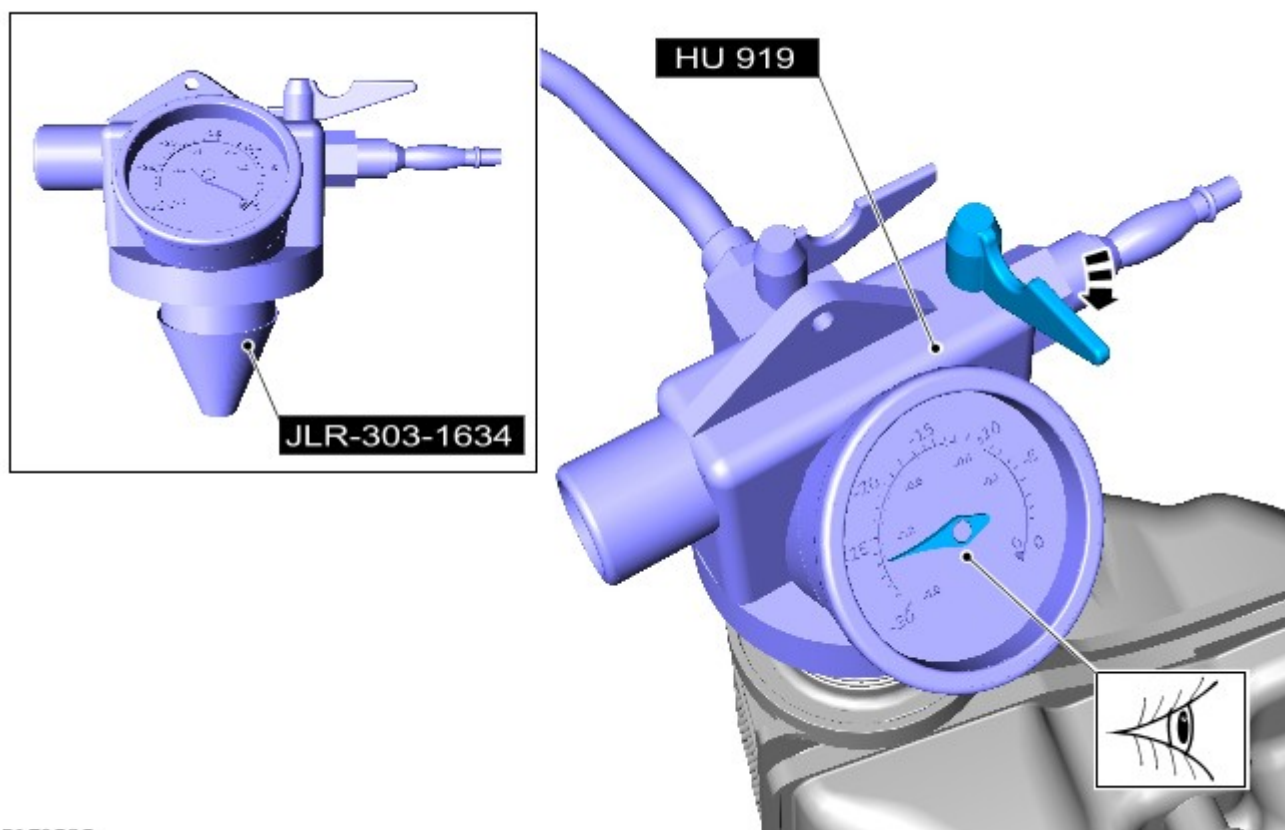
Open the air supply valve until -0.8 (-12 psi) Bar is shown on the gauge.

Special Tool(s): [HU-919](#) , [JLR-303-1634](#)



E170527

5.
 - *Special Tool(s):* [HU-919](#) , [JLR-303-1634](#)
 - Close the air supply valve.
 - Allow 1 minute to check the vacuum is held.



E170525

6. NOTES:



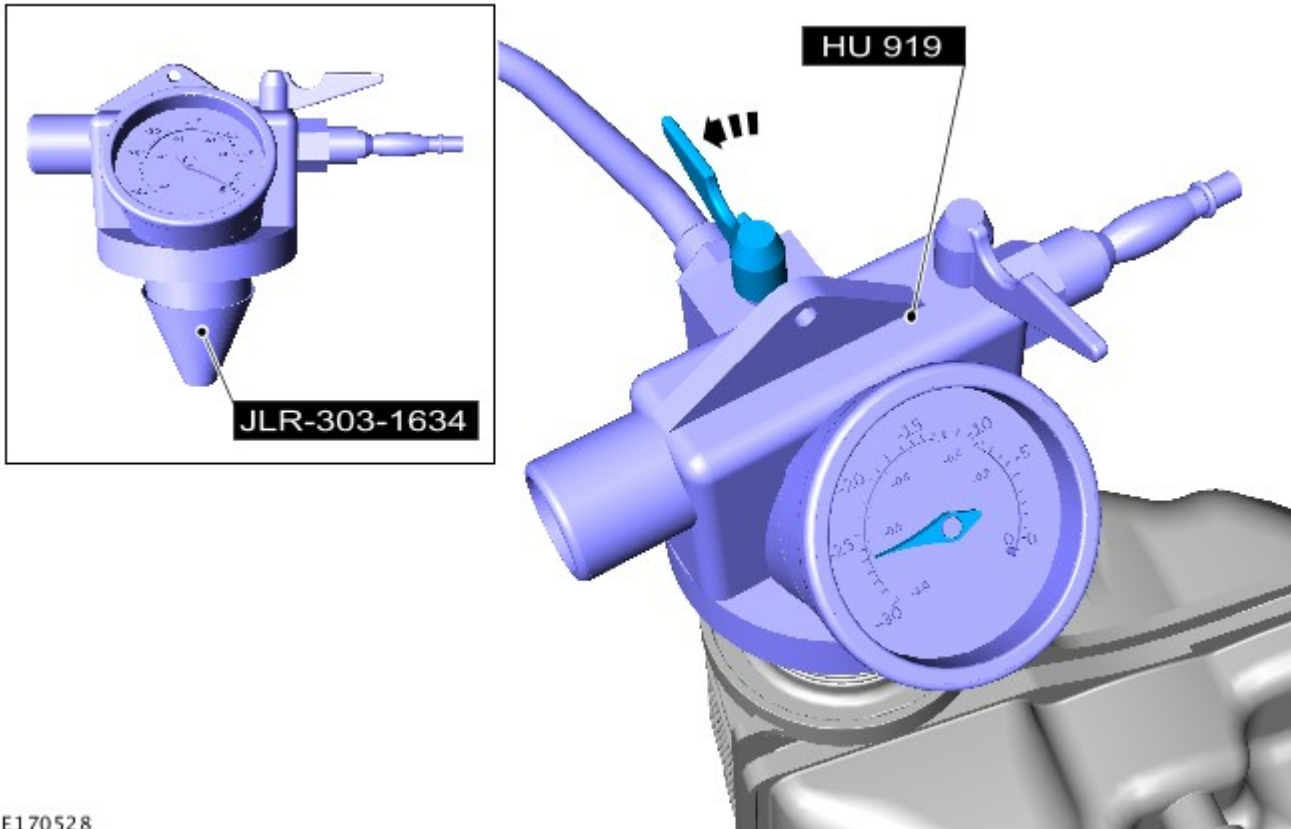
The coolant is to be reused.



Close the coolant supply valve when the coolant expansion tank MAX mark is reached or coolant movement has stopped.

Open the coolant supply valve and allow the coolant to be drawn into the system.

Special Tool(s): [HU-919](#) , [JLR-303-1634](#)



E170528

7. Remove the special tool.

8. Connect exhaust extraction hoses to the tail pipes.

9. Start and run the engine.

10. Install the coolant expansion tank cap.

11. Hold the engine speed at 2000 revolutions per minute (RPM) until warm air is expelled from the heater.

12. Switch the engine off and allow to cool.

13. Clean any spilt or excess coolant from the vehicle.

14.



WARNING: Since injury such as scalding could be caused by escaping steam or coolant, allow the vehicle cooling system to cool prior to carrying out this procedure.

Check and top-up the coolant if required.

Published: 12-Aug-2016

Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel - Charge Air Cooler Removal and Installation

Removal

1.



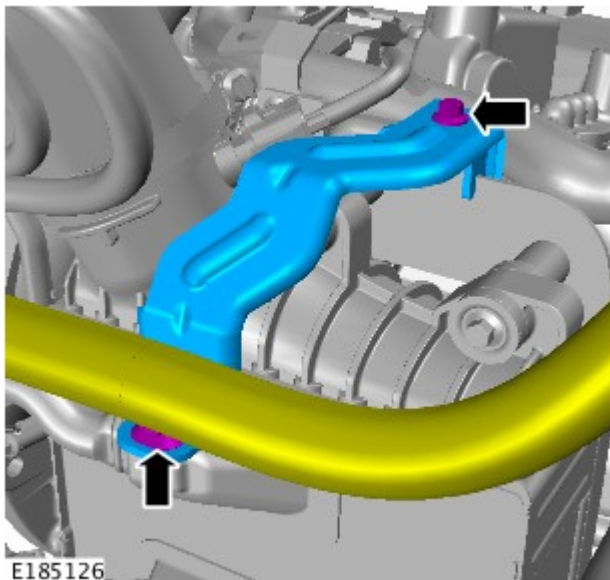
WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV, General Procedures).

3. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

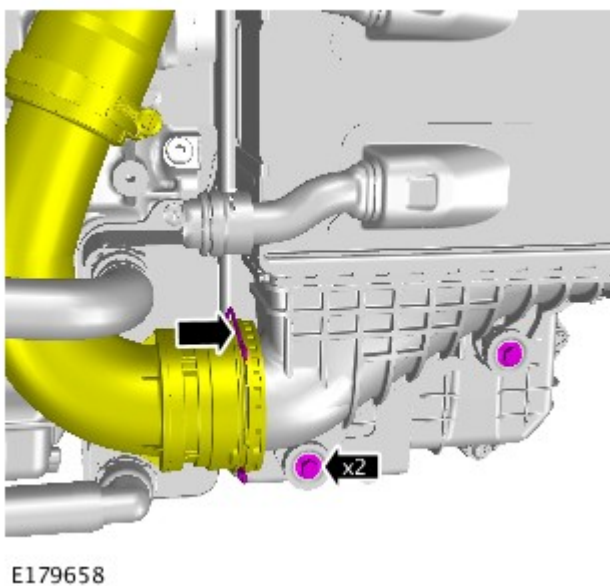
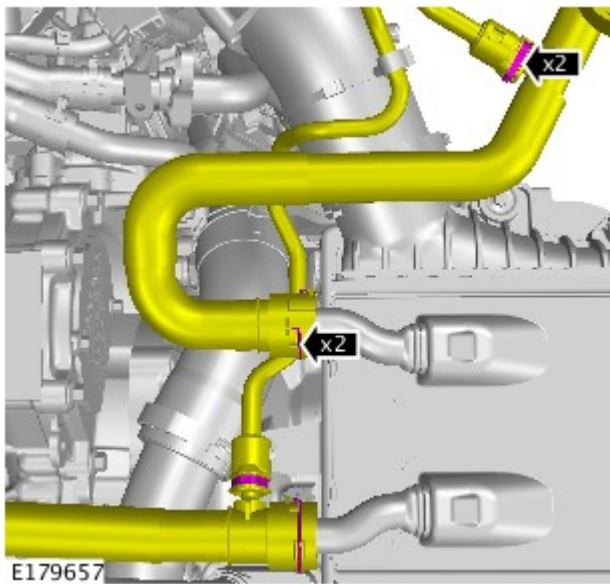
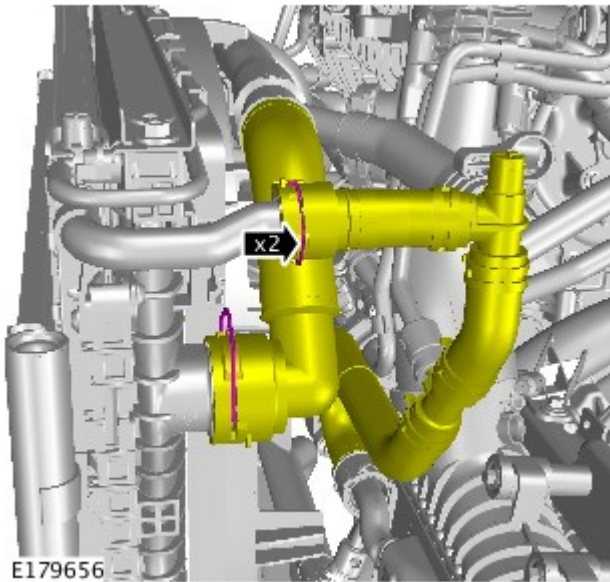
4.




5.



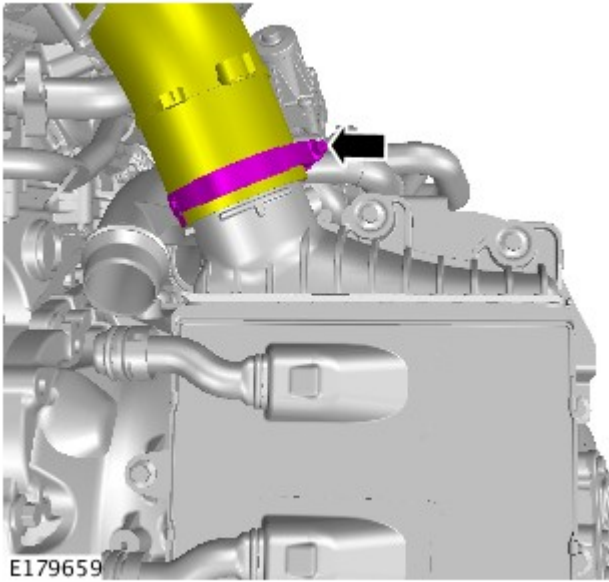
CAUTION: Be prepared to collect escaping coolant.



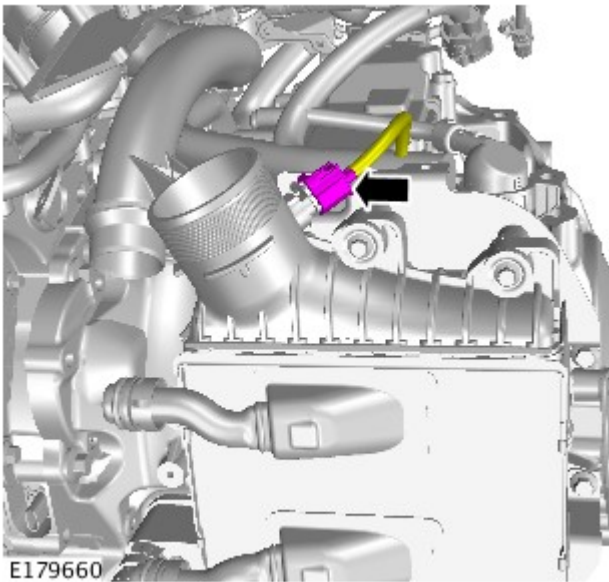
6.  CAUTION: Be prepared to collect escaping coolant.

7. Torque: 7 Nm

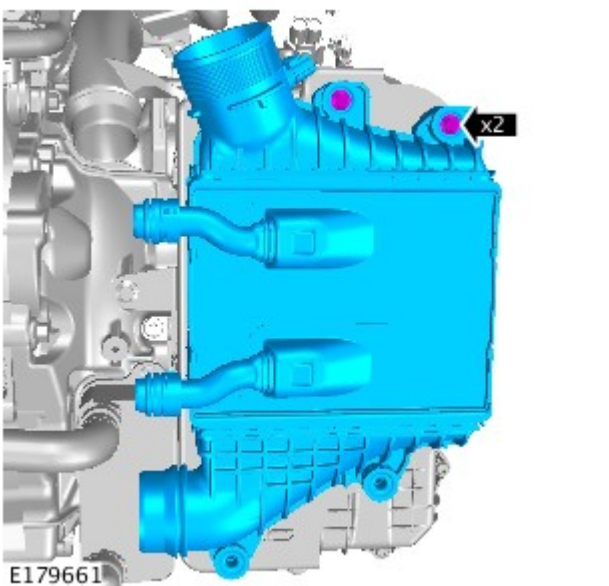
- 8.



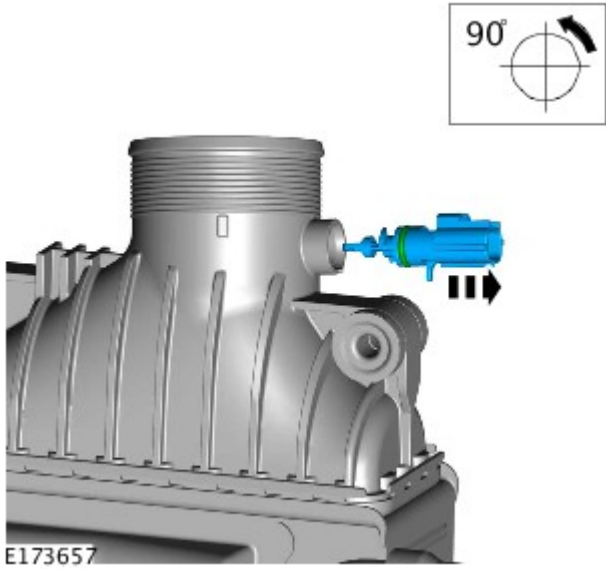
9.



10. Torque: 7 Nm



11.



CAUTION: Remove and discard the O-ring seals.



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

Installation

1.



CAUTION: Install a new O-ring seals.

To install reverse the removal procedure.

Published: 14-Jun-2016

Automatic Transmission/Transaxle - Transmission Fluid Drain and Refill

General Procedures

Draining

WARNINGS:



Be prepared to collect escaping fluids.



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

CAUTIONS:



Make sure that the area around the component is clean and free of foreign material.



Vehicle must be horizontal during this operation.



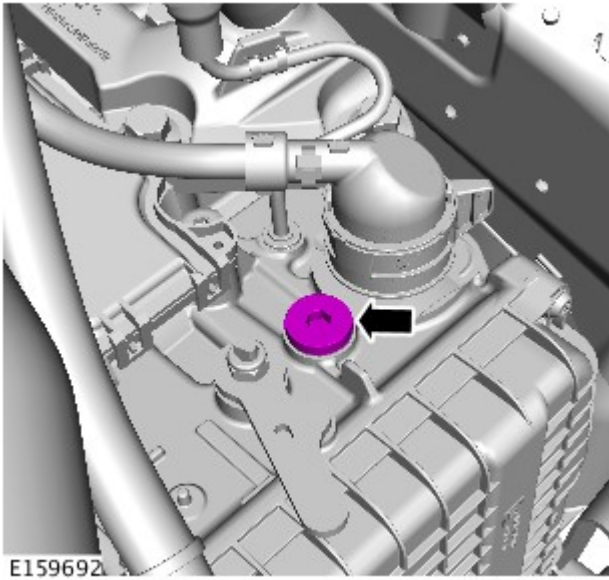
NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

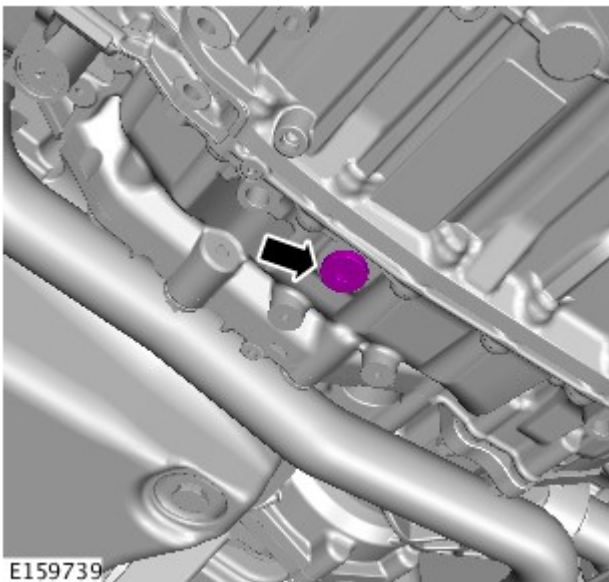
2.




NOTE: Discard the sealing plug.




3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).



4.  **CAUTION:** The ambient temperature should not be below 20 degrees celsius.

NOTES:

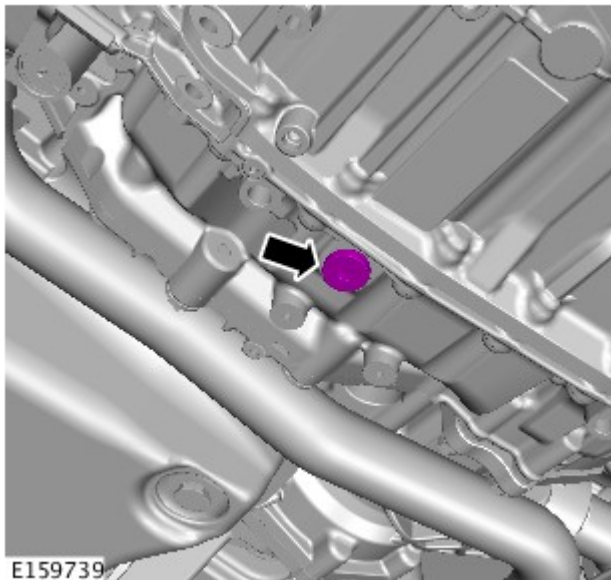
 Drain the fluid into a suitable container.

 Discard the sealing plug.

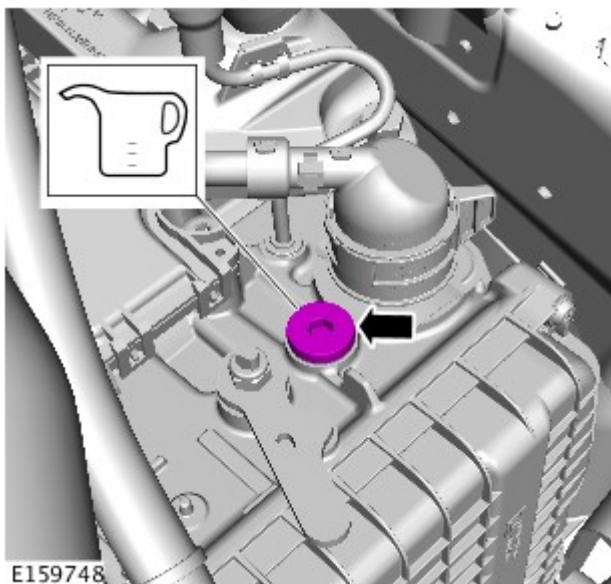
Allow the fluid to drain until the flow stops.

5.  **CAUTION:** Install a new sealing plug.

Torque: 35 Nm



6. Lower the Vehicle.



7. CAUTIONS:



Install a new sealing plug.



Use transmission fluid meeting Landrover specification.

Fill the transmission with 3.5 litres of oil.

Refer to: [Specifications](#) (307-01 Automatic Transmission/Transaxle, Specifications).

Torque: 35 Nm

8. Carry out transmission fluid level check.

Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

Published: 30-Sep-2014

Battery, Mounting and Cables -

General Specification - Stop-start and timed climate models:

Item	Specification
Battery:	
Type	H7 AGM (VRLA)
Capacity	80Ah/800CCA

General Specification - All except stop-start and timed climate models

Item	Specification
Battery:	
Type	H7 Flooded
Capacity	80Ah/700CCA

Battery Disconnect/Connect

CAUTION: The vehicle status must be established before attempting battery disconnect/connect. Reference must be then made to the following table to establish the relevant procedure to be followed.



NOTE: Make a note of the customers radio preset stations.

Vehicle status	Procedure
Vehicle without Telematics	1
Vehicle with Telematics	2

Procedure 1

Disconnect battery	Connect battery
1. Chock the wheels	1. Make sure that all electrical loads are switched OFF
2. Open the hood	2. Connect battery ground cable to the battery - 6Nm
3. Remove the battery cover	3. Connect the BMS electrical connector
4. Disconnect the engine wiring harness ground connector/terminal	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the battery ground to starter motor connector/terminal (if equipped)	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery monitoring system (BMS) module electrical connector	6. Install the battery cover
7. Disconnect the battery ground cable from the battery	7. Close the hood
	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work

Procedure 2

Disconnect battery	Connect battery
1. Make sure the customer has placed stolen vehicle tracking into Service Mode (if equipped)	1. Make sure that all electrical loads are switched OFF
2. Chock the wheels	2. Connect battery ground cable to the battery - 6Nm
3. Open the hood	3. Connect the BMS electrical connector
4. Remove the battery cover	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the engine wiring harness ground connector/terminal	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery ground to starter motor connector/terminal (if equipped)	6. Install the battery cover
7. Disconnect the battery monitoring system (BMS) module electrical connector	7. Close the hood
8. Disconnect the battery ground cable from the battery	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work
	12. Request stolen vehicle tracking removed from Service Mode (if equipped)

Torque Specifications

Item	Nm	lb-ft	lb-in
Vehicle body brace retaining bolts	25	18	-
Battery terminal nuts	6	-	53
Battery ground terminal nut - battery to starter motor retaining stud (if equipped)	10	7	-
Battery tray retaining bolts	10	7	-

Automatic Transmission/Transaxle - Transmission Oil Supply Pipe

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.

NOTES:



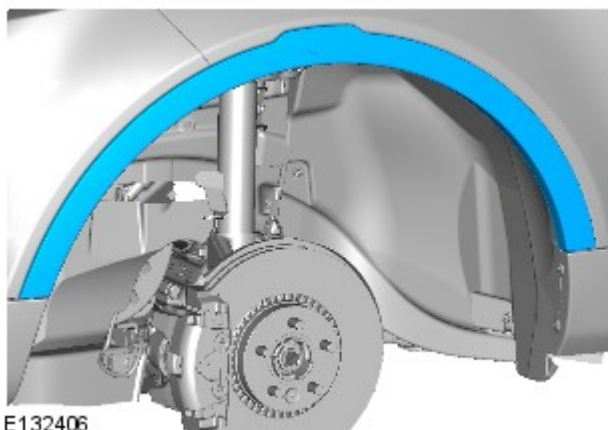
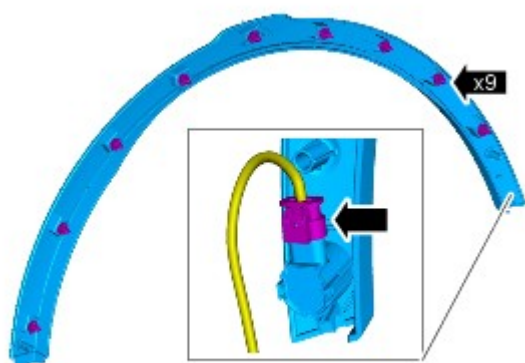
Some variation in the illustrations may occur, but the essential information is always correct.



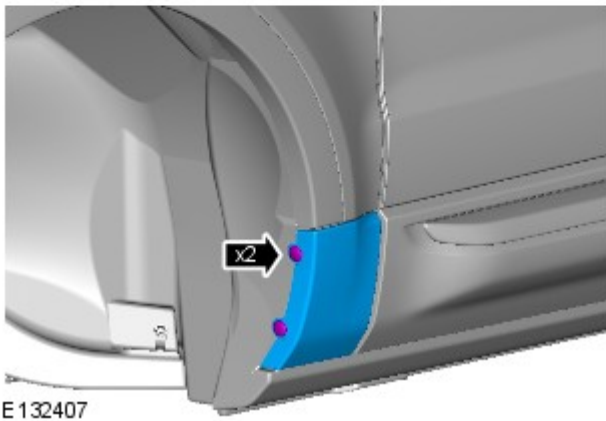
Removal steps in this procedure may contain installation details.

1. Refer to: Wheel and Tire (204-04, Removal and Installation).

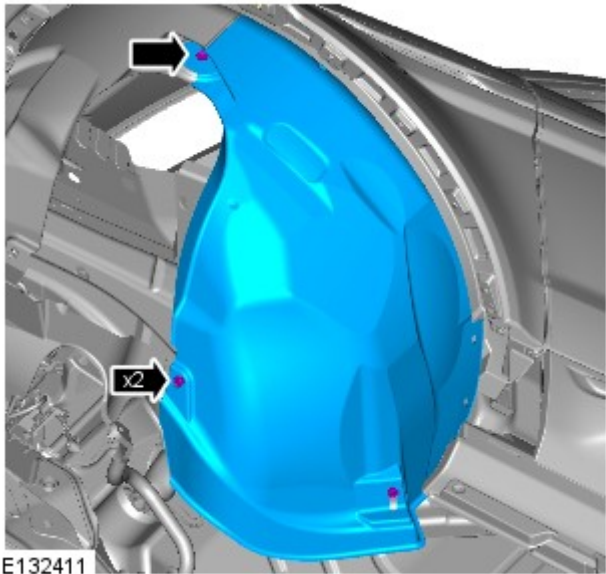
2.



3.



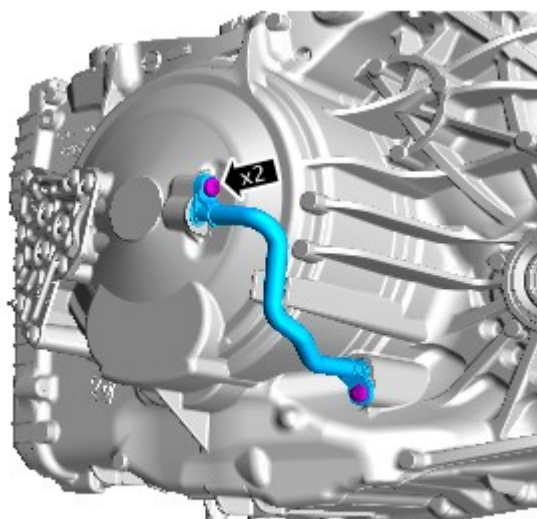
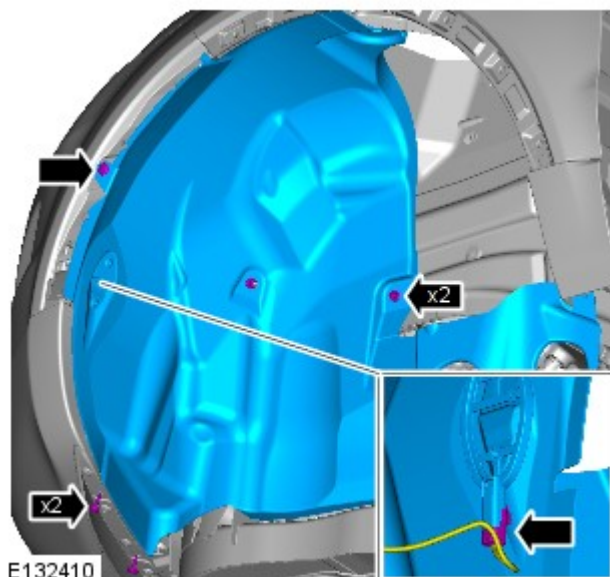
E132407




E132411

4.

5.



6.  **CAUTION:** Make sure that the mating faces are clean and free of foreign material.

Torque: 10 Nm

Installation

1. To install, reverse the removal procedure.
2. Carry out a transmission fluid level check.

Refer to: Transmission Fluid Level Check (307-01, General Procedures).

Automatic Transmission/Transaxle - Transmission Pressure Sensor

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.

CAUTIONS:



Extreme cleanliness must be exercised when handling this component.



Make sure that the area around the component is clean and free of foreign material.

NOTES:



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



Removal steps in this procedure may contain installation details.

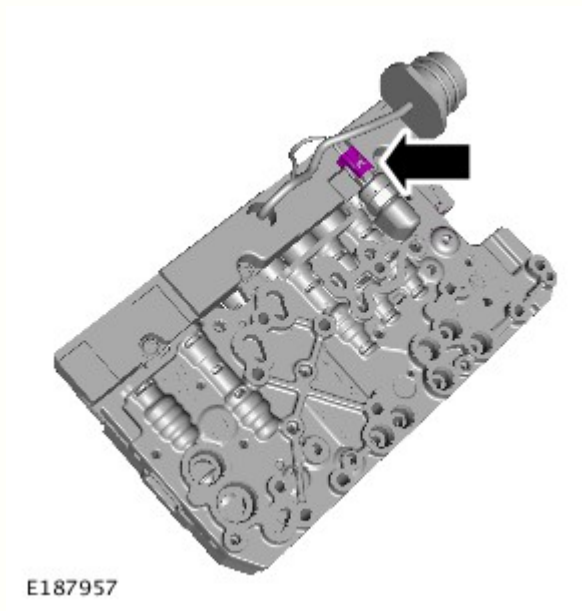
1. Remove the main control valve body.

Refer to: [Main Control Valve Body - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

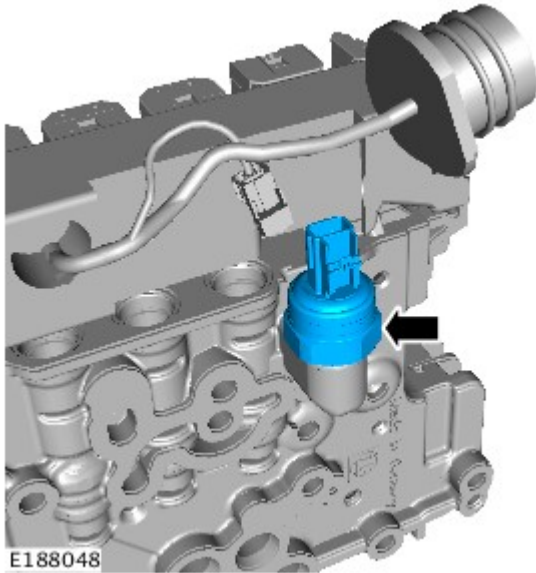
Refer to: [Main Control Valve Body - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

Refer to: [Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

- 2.



3. Torque: 12 Nm



Installation

1. To install, reverse the removal procedure.

Published: 31-May-2016

Automatic Transmission/Transaxle - Main Control Valve Body GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.



CAUTION: Extreme cleanliness must be exercised when handling this component.



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

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

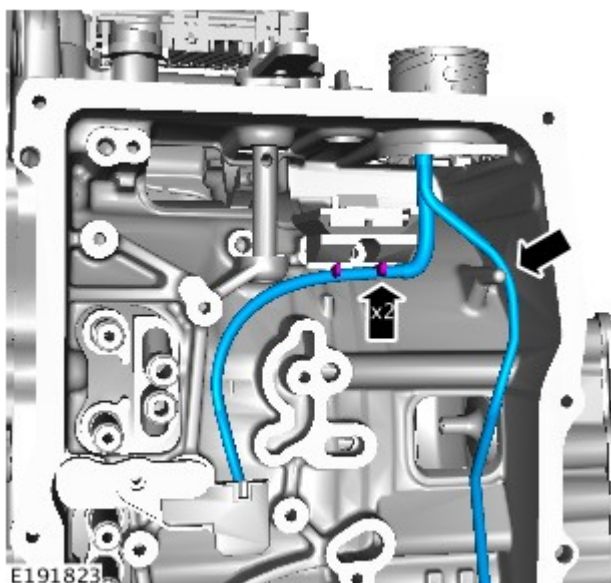
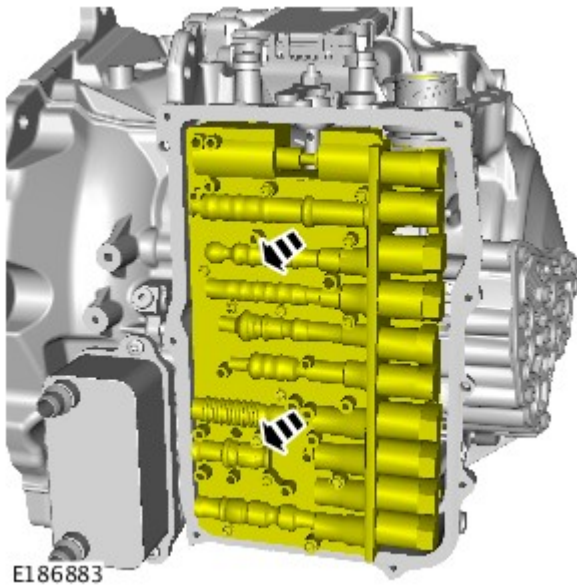
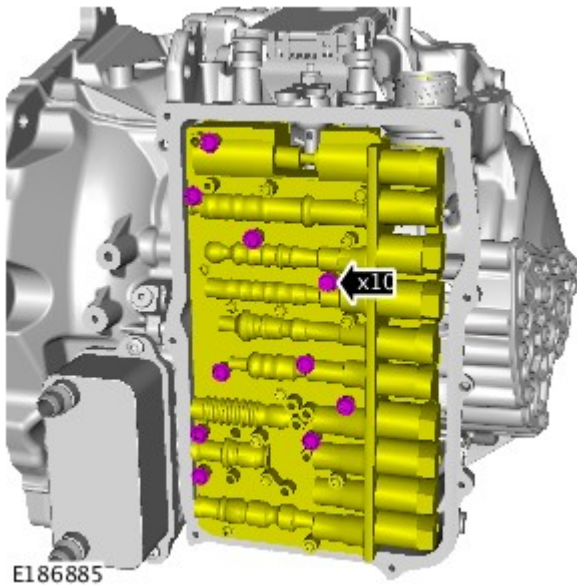
3. Refer to: [Transmission Fluid Pan - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

- 4.




NOTE: Note the orientation of the component.

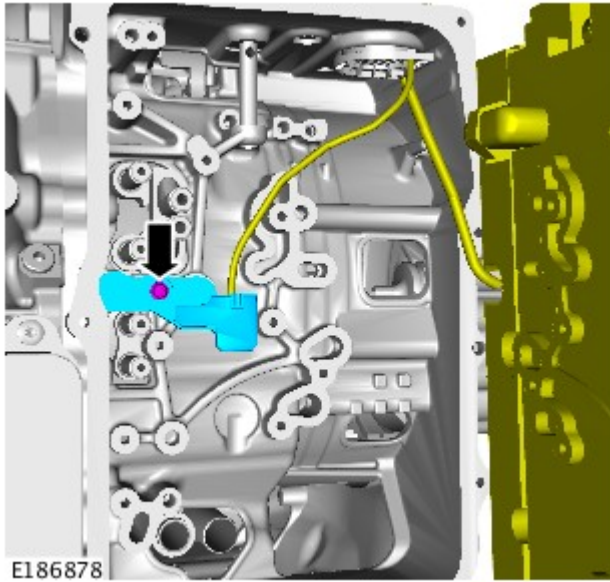
Remove and discard the bolts.



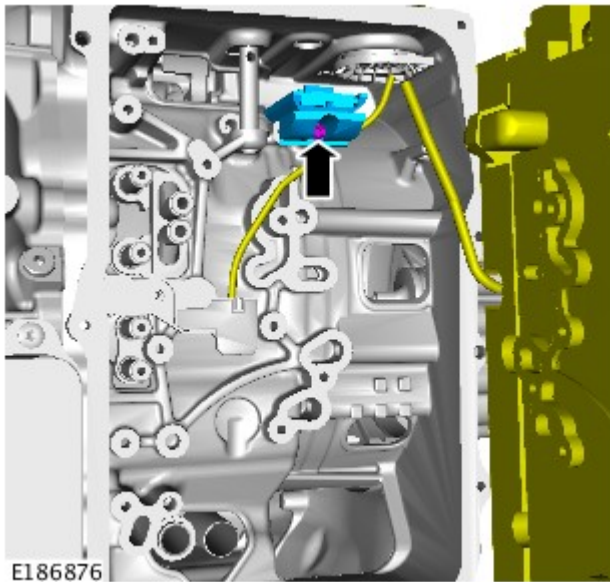
5.  CAUTION: Take extra care not to damage the wiring harnesses.

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

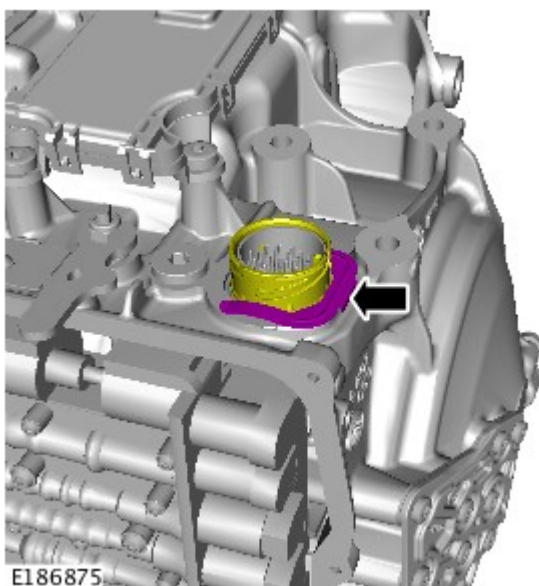
- 7.



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

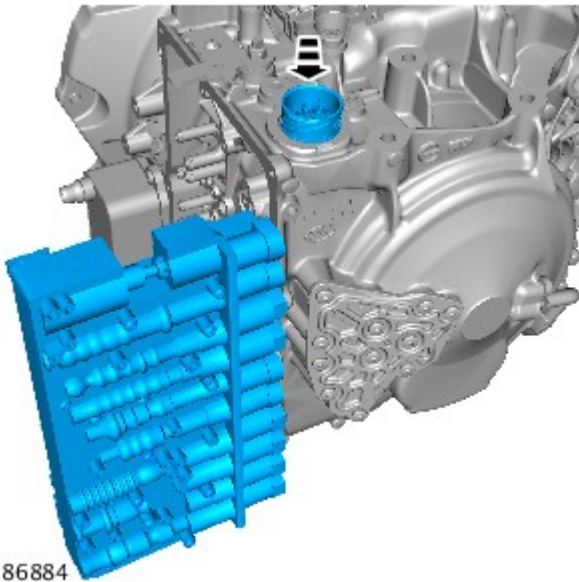


8. ⚠ NOTE: Note the orientation of the component prior to removal.



9.

10. CAUTIONS:



E186884



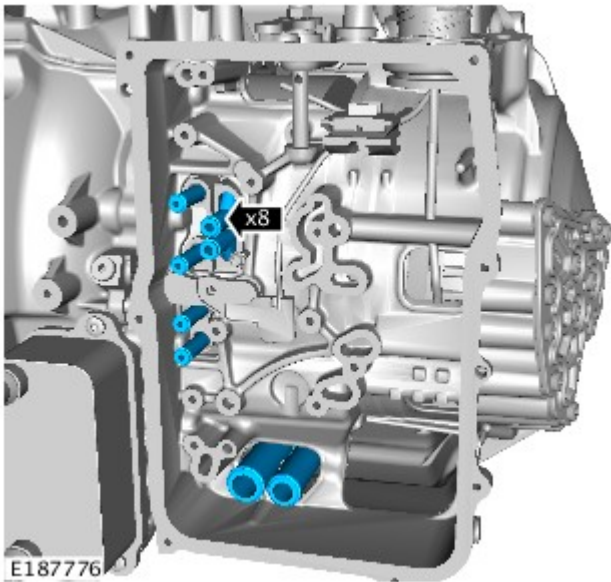
Take extra care not to damage the wiring harnesses.



Care must be taken to avoid damage to the mating surfaces.



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



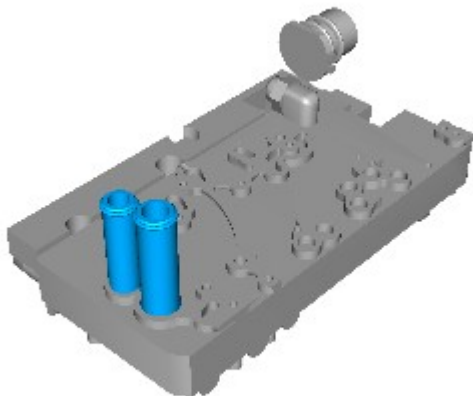
E187776

11.



NOTE: Discard the components.

Installation

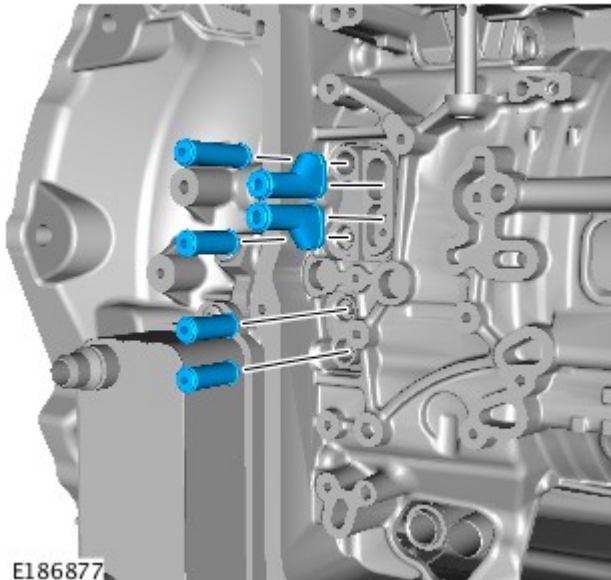


E186881



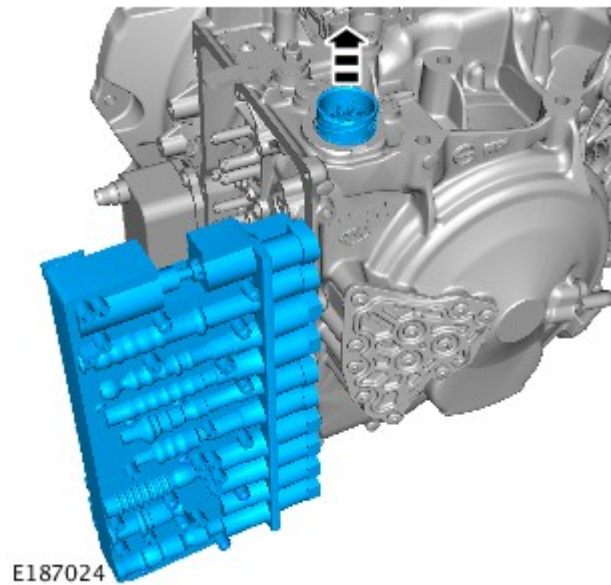
1. CAUTION: Make sure that the oil tubes are correctly installed.

Install the new oil tubes to the valve body as illustrated.





2.  **CAUTION:** Make sure that the oil tubes are correctly installed.

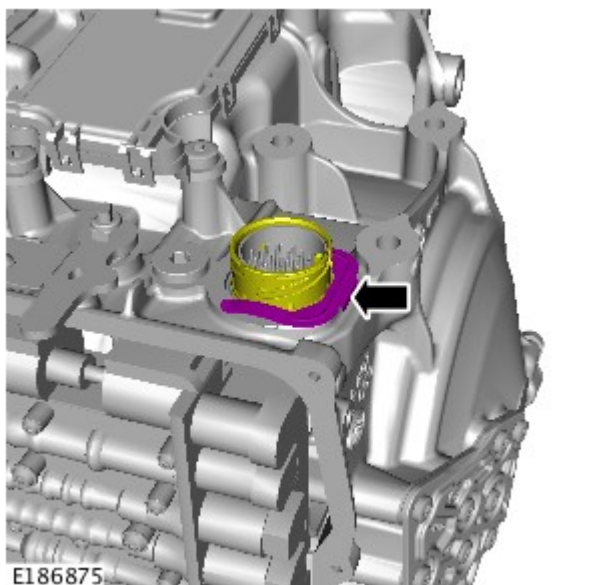
Install the new oil tubes to the transmission as illustrated.



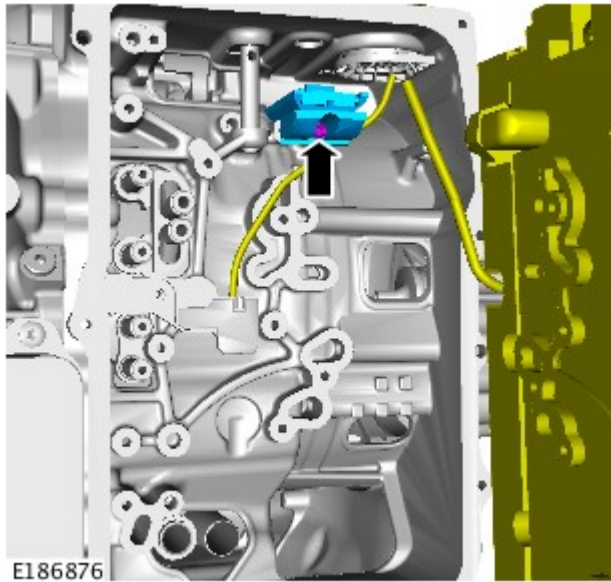
3. **CAUTIONS:**

 Make sure that the electrical connector is installed in the correct orientation as noted in the removal step.

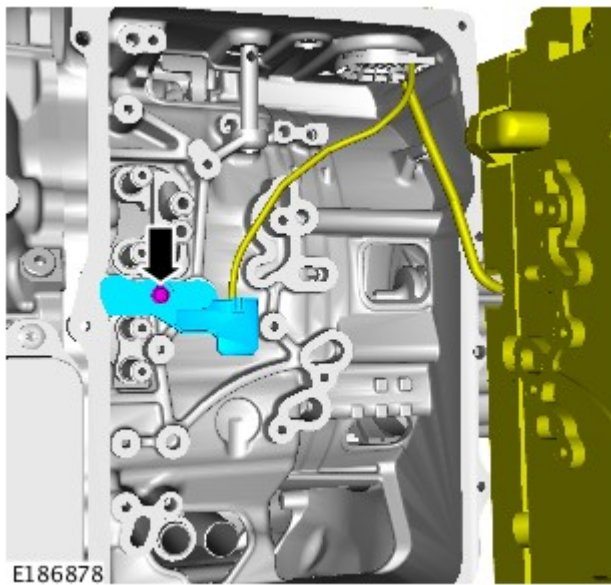
 Care must be taken not to damage the component.



- 4.

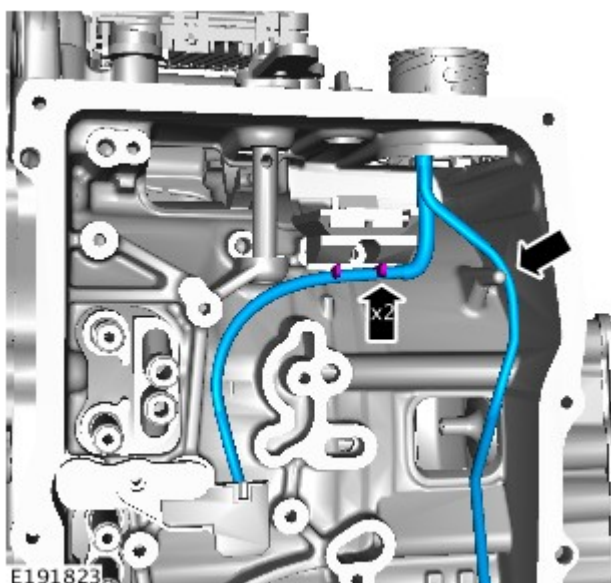



5. Torque: 6 Nm



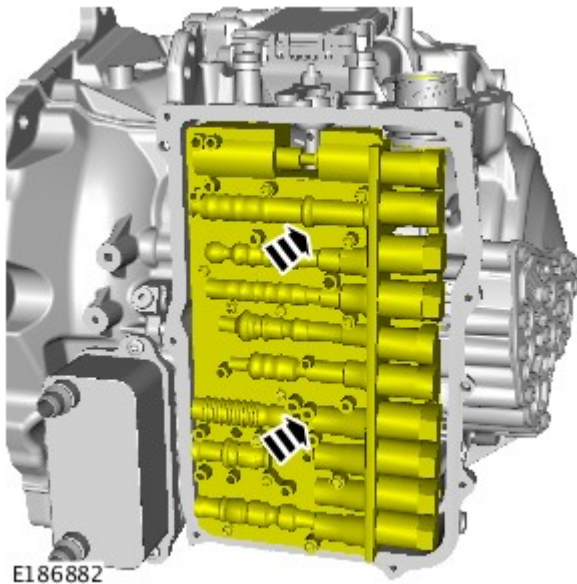
6.  NOTE: Make sure that the component is installed to the noted removal position.

Torque: 6 Nm

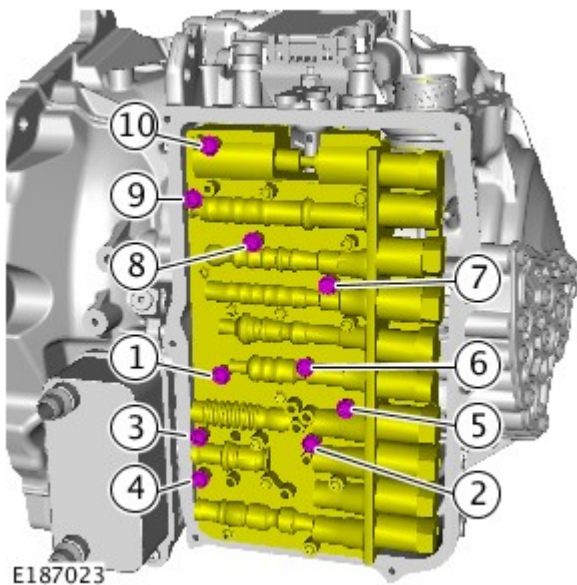


7.  NOTE: Make sure that the wiring harness is installed as illustrated, failure to follow this instruction may cause damage to the wiring harness

8.



CAUTION: Take extra care not to damage the wiring harnesses.



9.



CAUTION: Make sure that new bolts are installed.



NOTE: Tighten the retaining bolts in the sequence illustrated.

Torque: 8 Nm

10. Refer to: [Transmission Fluid Pan - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

11. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

12. Using the approved Land Rover diagnostic equipment, run the Automatic transmission valve block application.


Published: 31-May-2016

Automatic Transmission/Transaxle - Main Control Valve Body INGENIUM I4 2.0L Diesel


Removal and Installation

Removal

 **WARNING:** Be prepared to collect escaping fluids.

 **CAUTION:** Extreme cleanliness must be exercised when handling this component.

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

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

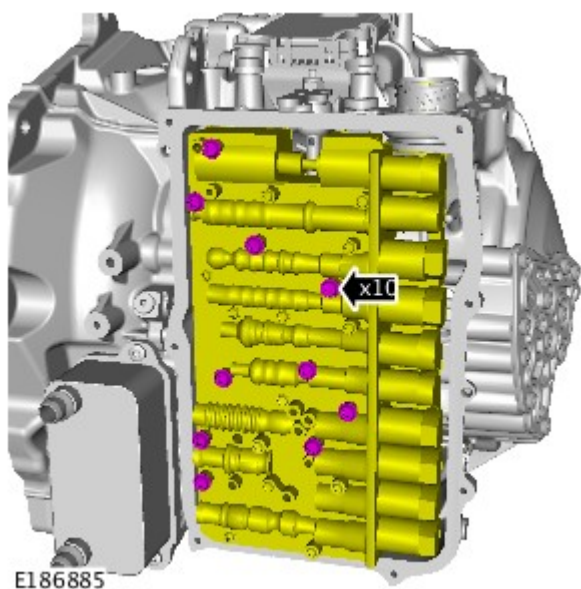
2. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

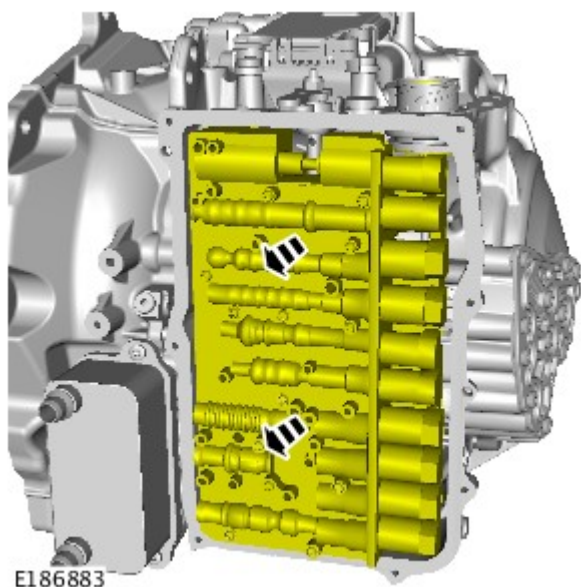
3. Refer to: [Transmission Fluid Pan - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

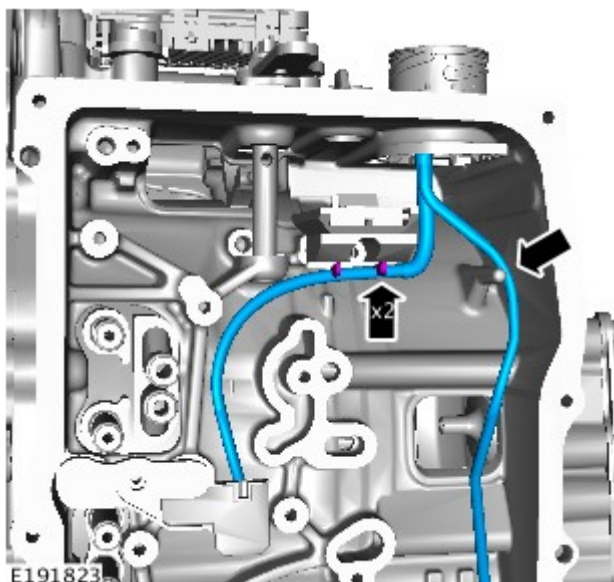
4.  **NOTE:** Note the orientation of the component.


Remove and discard the bolts.

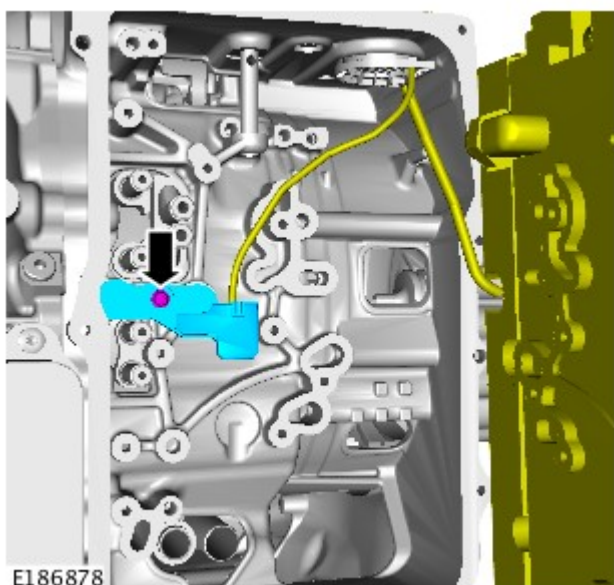



5.  **CAUTION:** Take extra care not to damage the wiring harnesses.

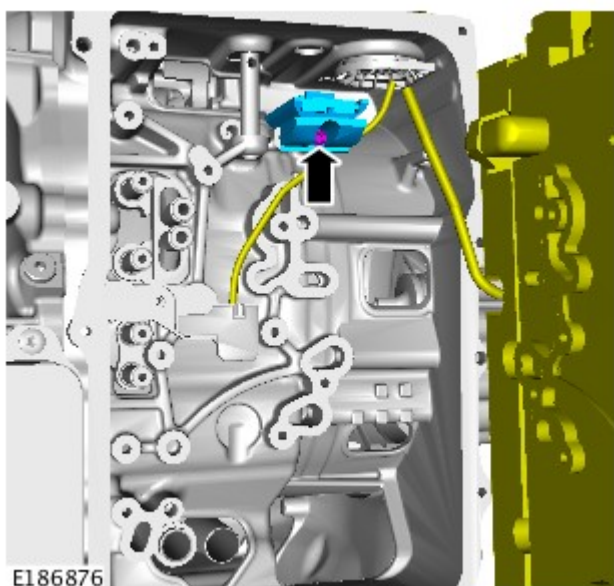





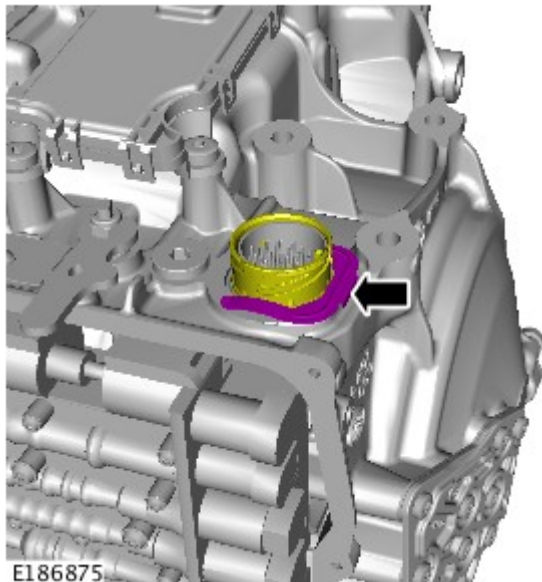
6.  NOTE: Note the orientation of the component prior to removal.



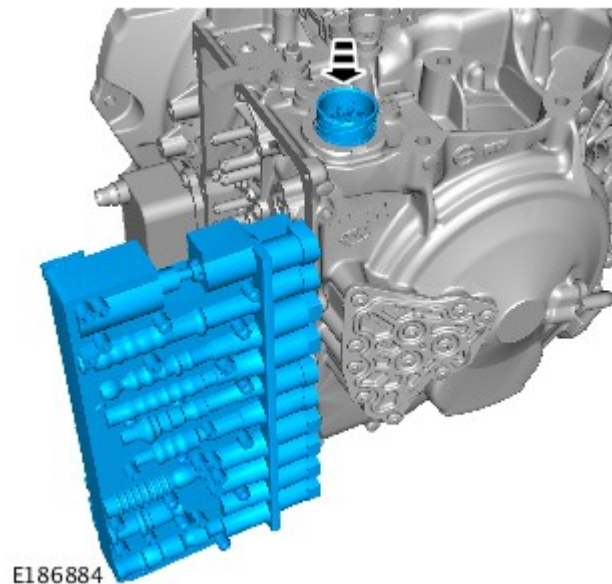
7.  NOTE: Note the orientation of the component prior to removal.



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



9.



10. CAUTIONS:



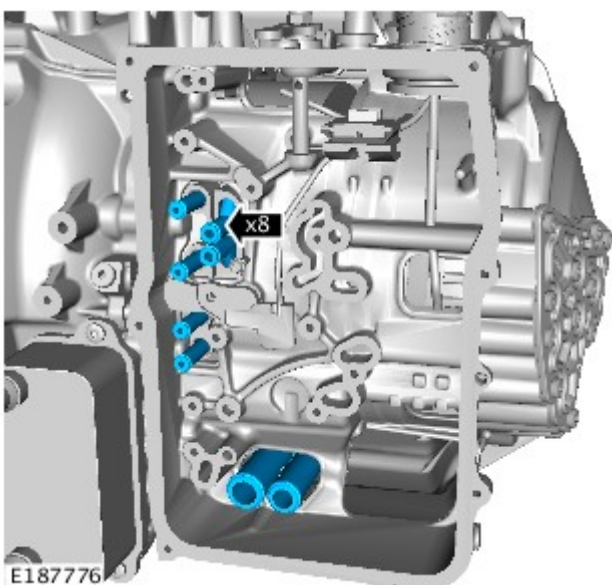
Take extra care not to damage the wiring harnesses.



Care must be taken to avoid damage to the mating surfaces.



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

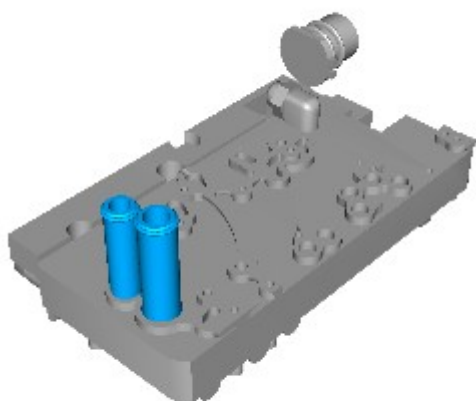


11.




NOTE: Discard the components.

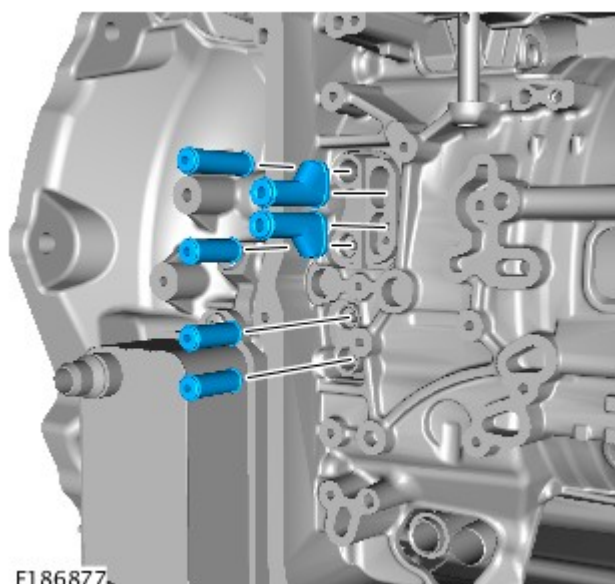
Installation




E186881

1.  **CAUTION:** Make sure that the oil tubes are correctly installed.

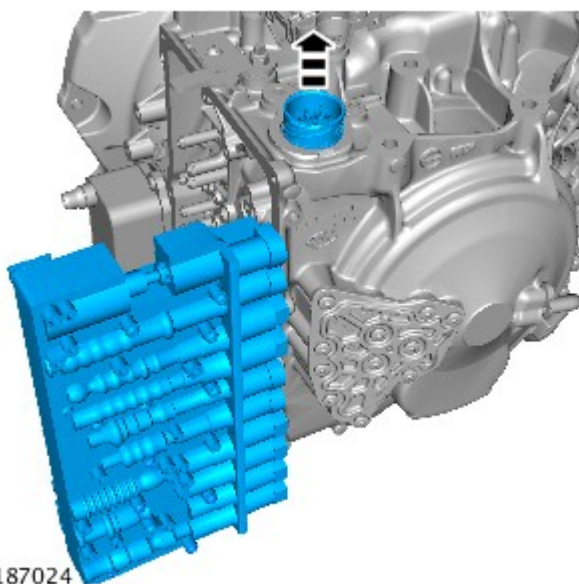
Install the new oil tubes to the valve body as illustrated.



E186877


2.  **CAUTION:** Make sure that the oil tubes are correctly installed.


Install the new oil tubes to the transmission as illustrated.

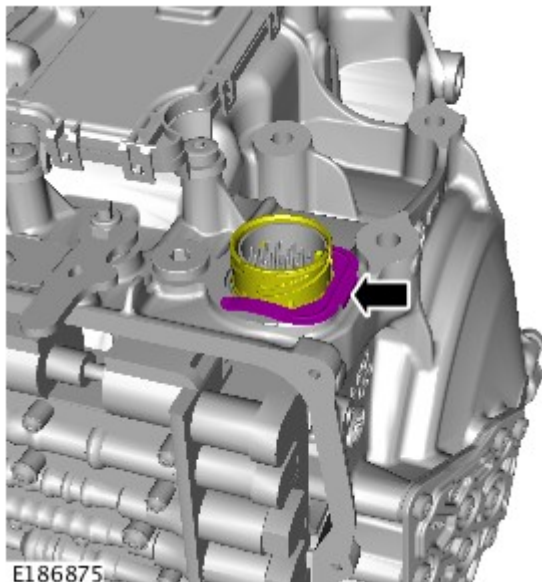


E187024

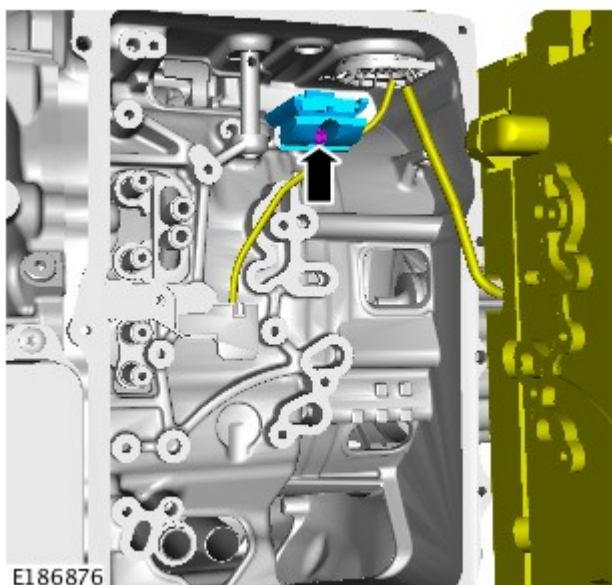
3. **CAUTIONS:**

 Make sure that the electrical connector is installed in the correct orientation as noted in the removal step.

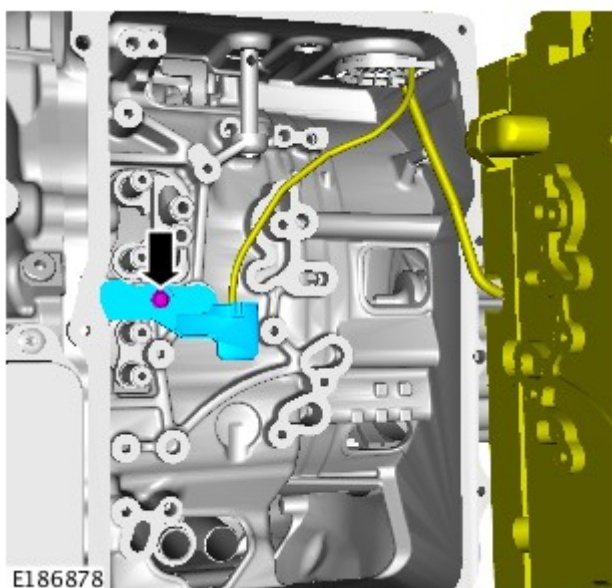
 Care must be taken not to damage the component.




4.

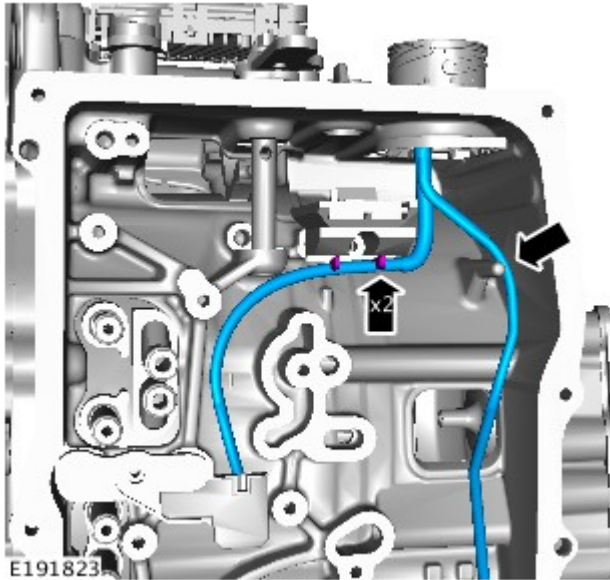



5. Torque: 6 Nm

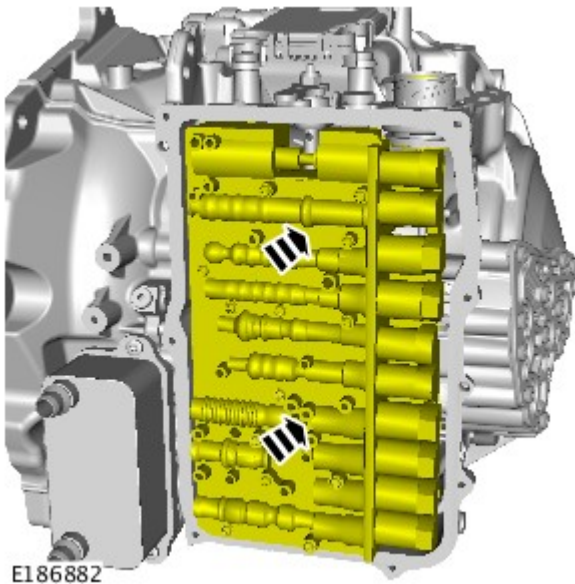


6.  NOTE: Make sure that the component is installed to the noted removal position.

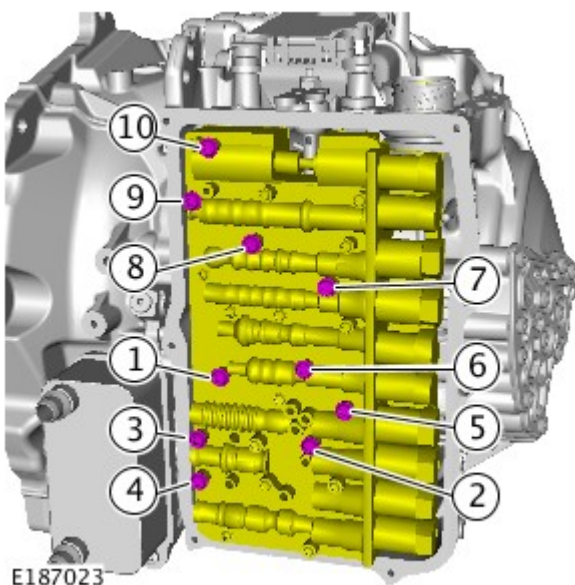
Torque: 6 Nm




7.  NOTE: Make sure that the wiring harness is installed as illustrated, failure to follow this instruction may cause damage to the wiring harness



8.  CAUTION: Take extra care not to damage the wiring harnesses.



9.  CAUTION: Make sure that new bolts are installed.

 NOTE: Tighten the retaining bolts in the sequence illustrated.

Torque: 8 Nm

Refer to: [Transmission Fluid Pan - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

11. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

12. Using the approved Land Rover diagnostic equipment, run the Automatic transmission valve block application.

Automatic Transmission/Transaxle - Sensor Unit

Removal and Installation

Removal

CAUTIONS:



Extreme cleanliness must be exercised when handling this component.



Make sure that the area around the component is clean and free of foreign material.

NOTES:



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



Removal steps in this procedure may contain installation details.

1. Remove the main control valve body.

Refer to: [Main Control Valve Body - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

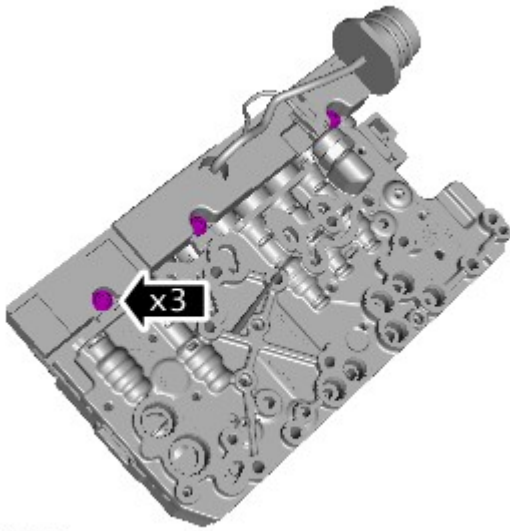
Refer to: [Main Control Valve Body - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

Refer to: [Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

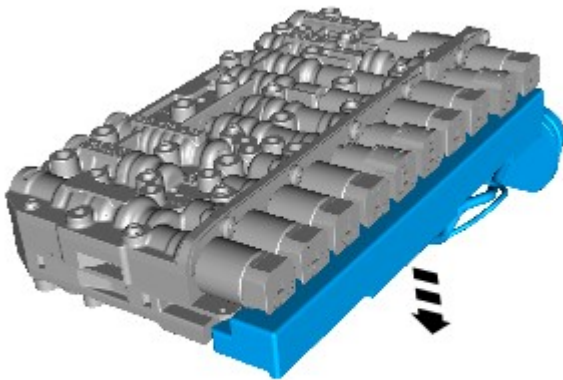
- 2.



3. Torque: 6 Nm




E187958



E187959

4.  NOTE: Note the fitted position of the sensor unit connectors, prior to removal.

Installation

1.  CAUTION: Make sure that the wiring harness is correctly routed.

To install, reverse the removal procedure.

Published: 31-May-2016

Automatic Transmission/Transaxle - Main Control Valve Body GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.



CAUTION: Extreme cleanliness must be exercised when handling this component.



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

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

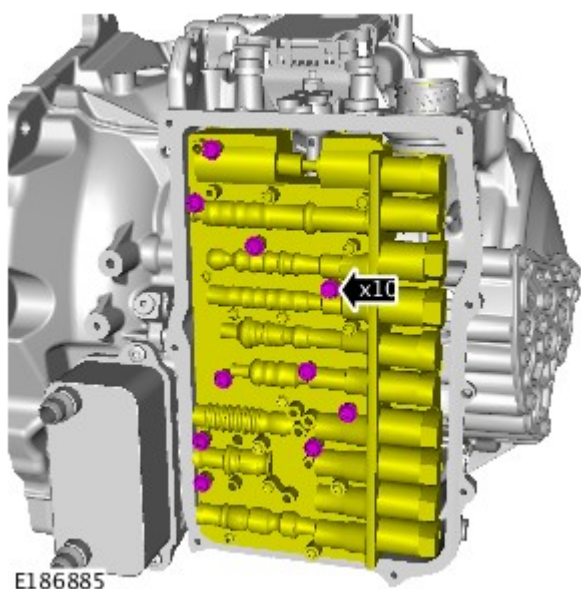
2. Disconnect the battery ground cable.


Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

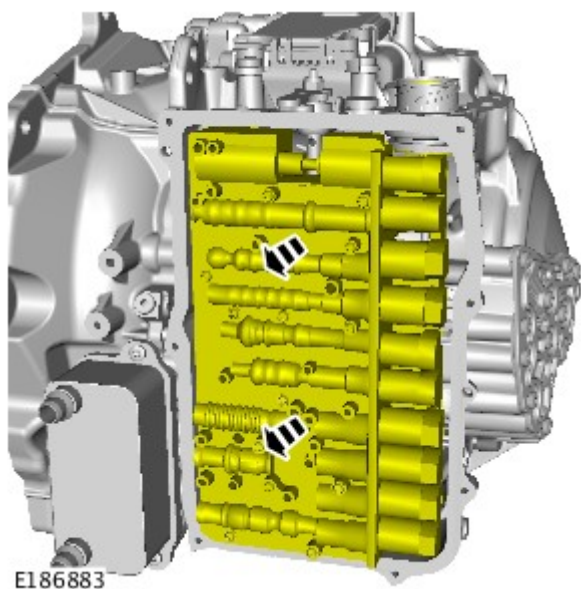
3. Refer to: [Transmission Fluid Pan - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).


4.  **NOTE:** Note the orientation of the component.

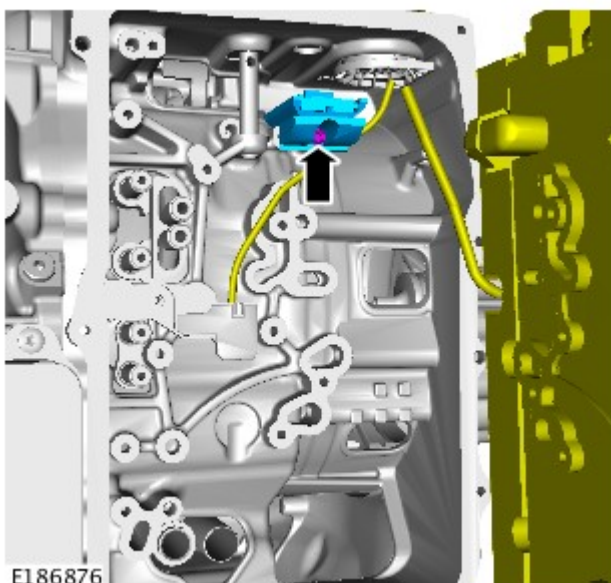
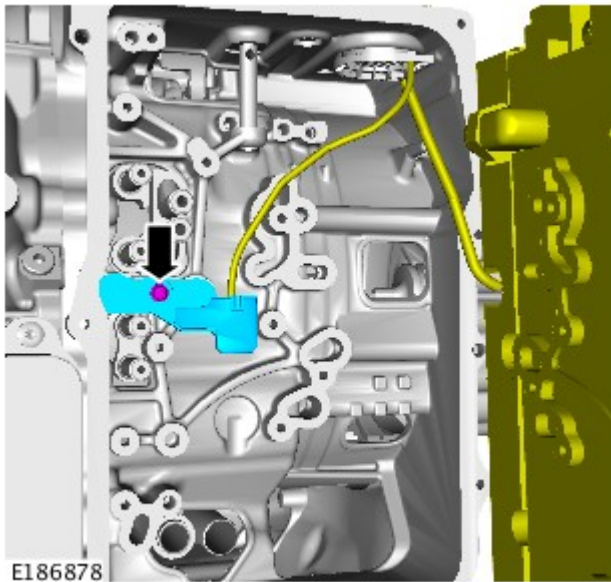
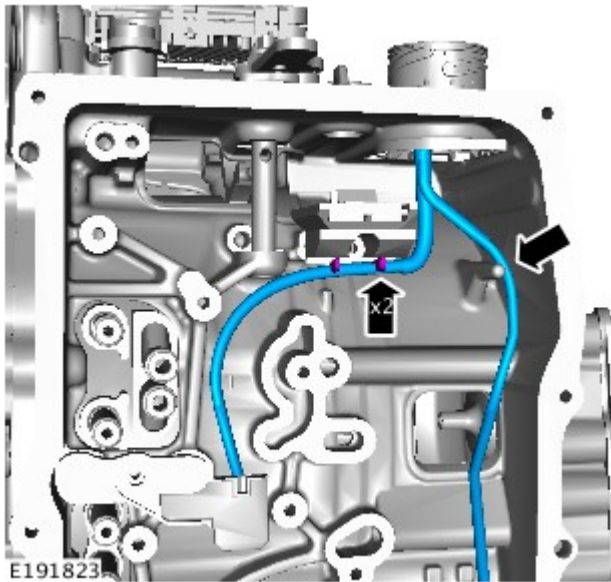
Remove and discard the bolts.





5.  **CAUTION:** Take extra care not to damage the wiring harnesses.



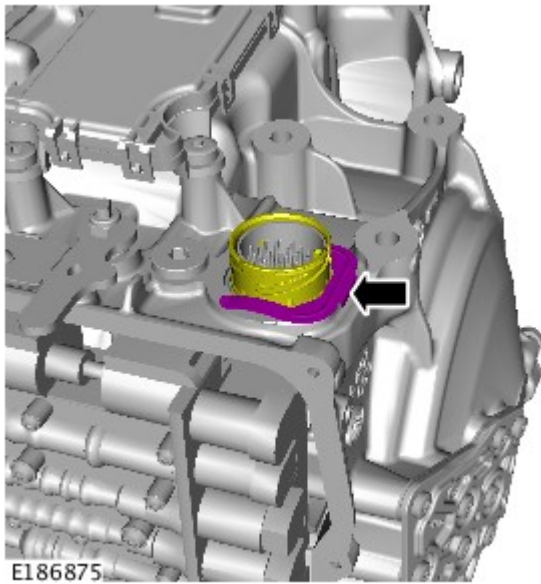
6.  **NOTE:** Note the orientation of the component prior to removal.



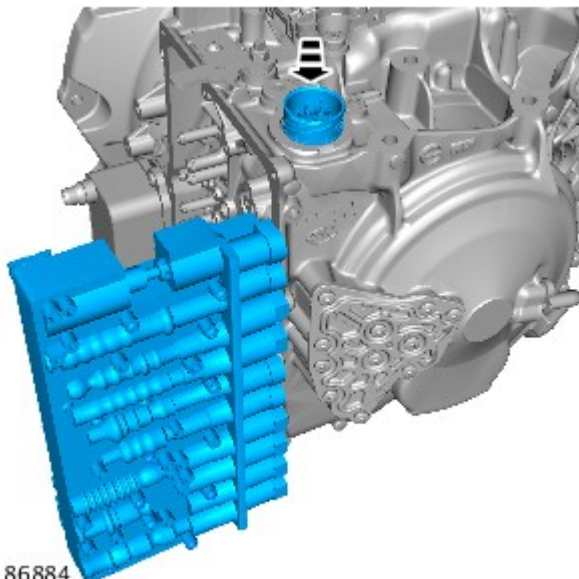
7.  NOTE: Note the orientation of the component prior to removal.

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

- 9.



E186875



E186884

10. CAUTIONS:



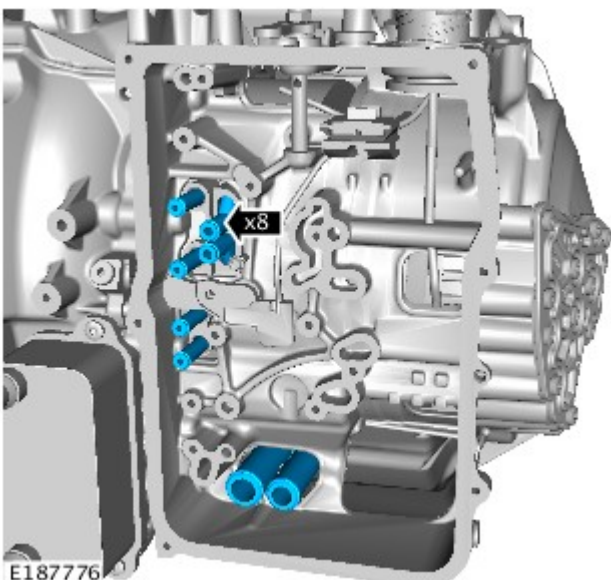
Take extra care not to damage the wiring harnesses.



Care must be taken to avoid damage to the mating surfaces.



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



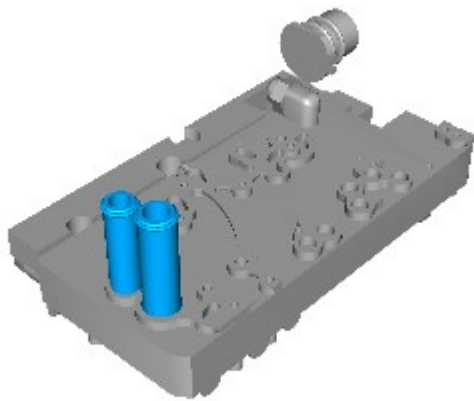
E187776

11.




NOTE: Discard the components.

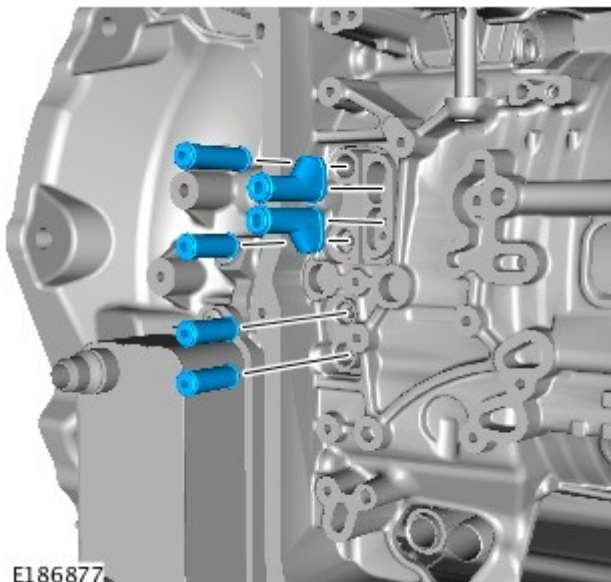
Installation



E186881

1.  **CAUTION:** Make sure that the oil tubes are correctly installed.

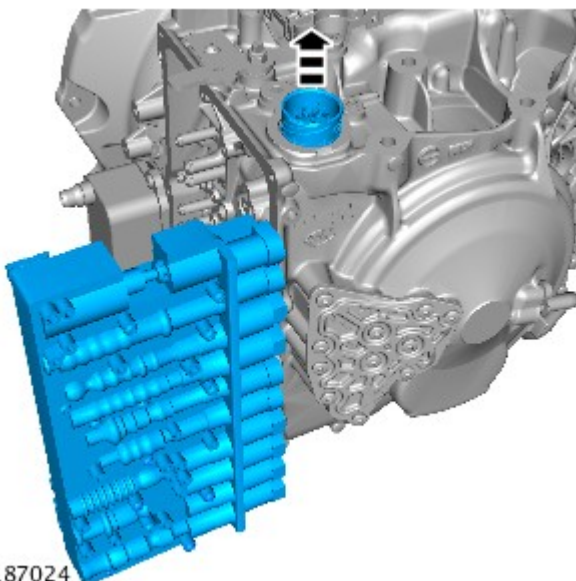
Install the new oil tubes to the valve body as illustrated.



E186877


2.  **CAUTION:** Make sure that the oil tubes are correctly installed.


Install the new oil tubes to the transmission as illustrated.

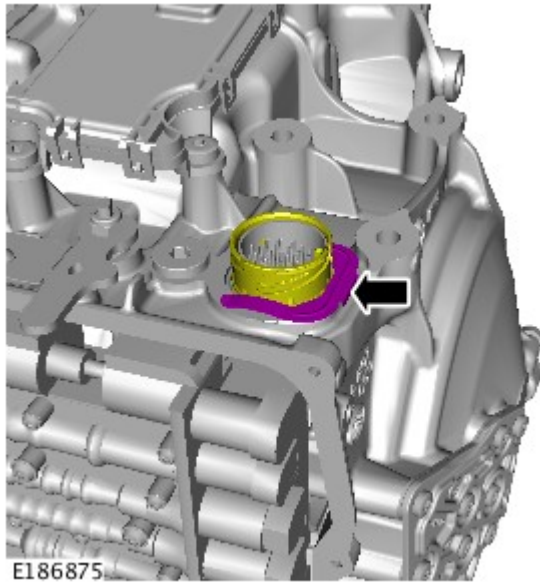


E187024

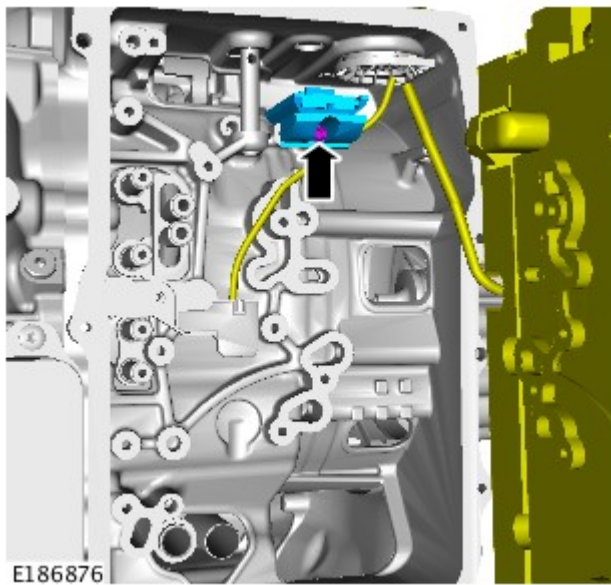
3. **CAUTIONS:**

 Make sure that the electrical connector is installed in the correct orientation as noted in the removal step.

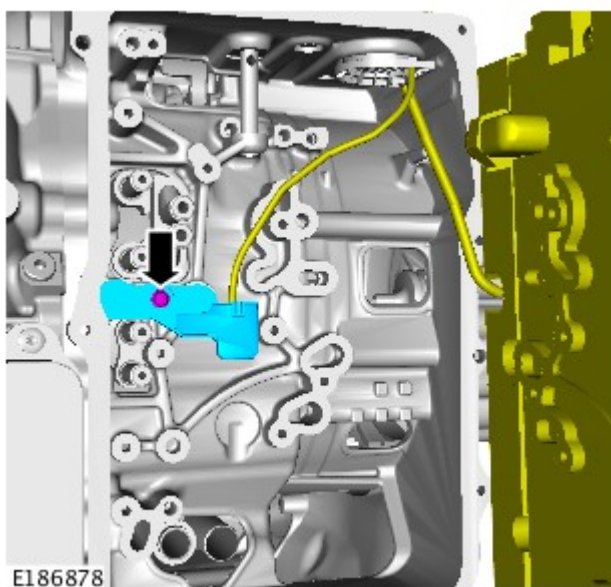
 Care must be taken not to damage the component.




4.



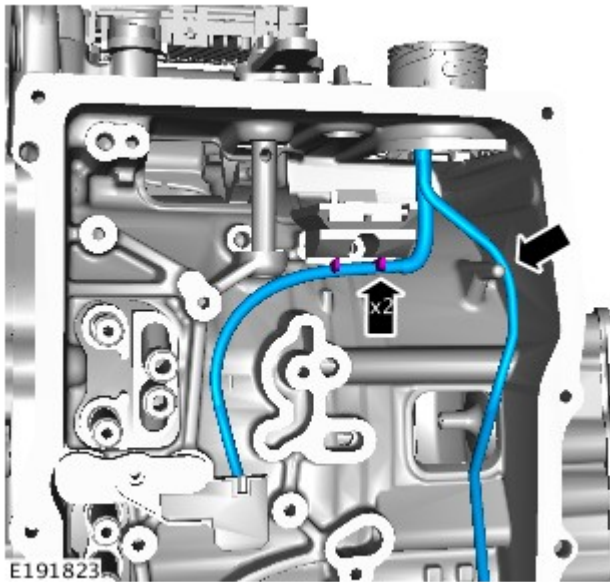
5. Torque: 6 Nm



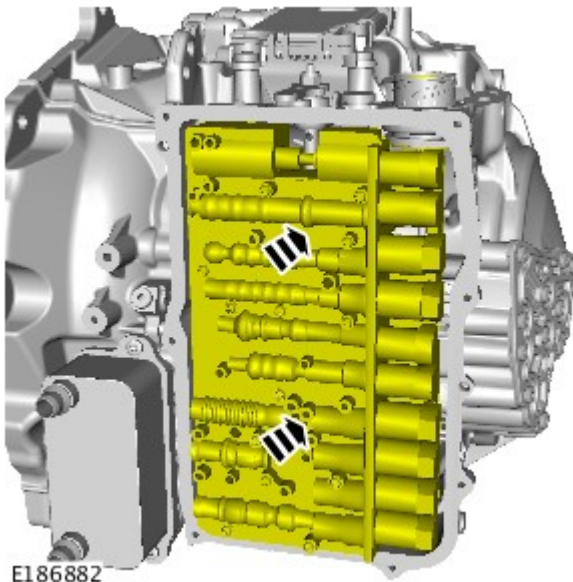
6.  NOTE: Make sure that the component is installed to the noted removal position.

Torque: 6 Nm

7.



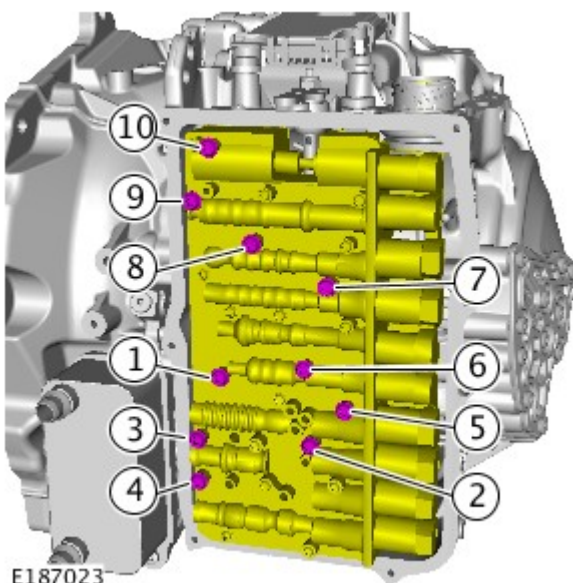
NOTE: Make sure that the wiring harness is installed as illustrated, failure to follow this instruction may cause damage to the wiring harness



8.



CAUTION: Take extra care not to damage the wiring harnesses.



9.



CAUTION: Make sure that new bolts are installed.



NOTE: Tighten the retaining bolts in the sequence illustrated.

Torque: 8 Nm

Refer to: [Transmission Fluid Pan - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

11. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

12. Using the approved Land Rover diagnostic equipment, run the Automatic transmission valve block application.

Published: 31-May-2016

Automatic Transmission/Transaxle - Main Control Valve Body INGENIUM I4 2.0L Diesel

Removal and Installation

Removal



WARNING: Be prepared to collect escaping fluids.



CAUTION: Extreme cleanliness must be exercised when handling this component.



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

1.



WARNING: Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

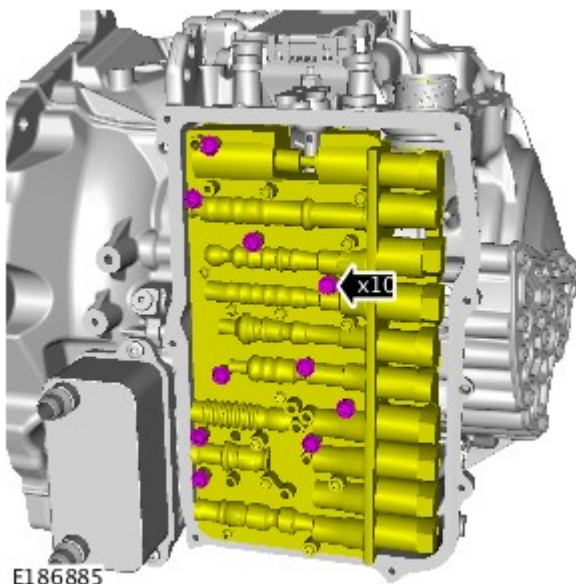
3. Refer to: [Transmission Fluid Pan - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

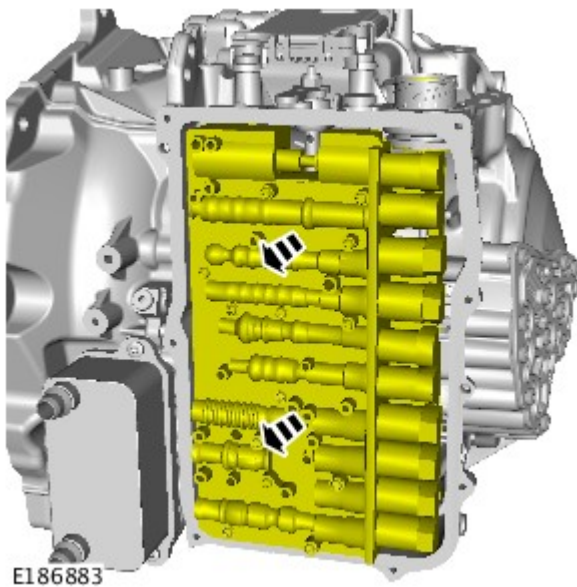
4.



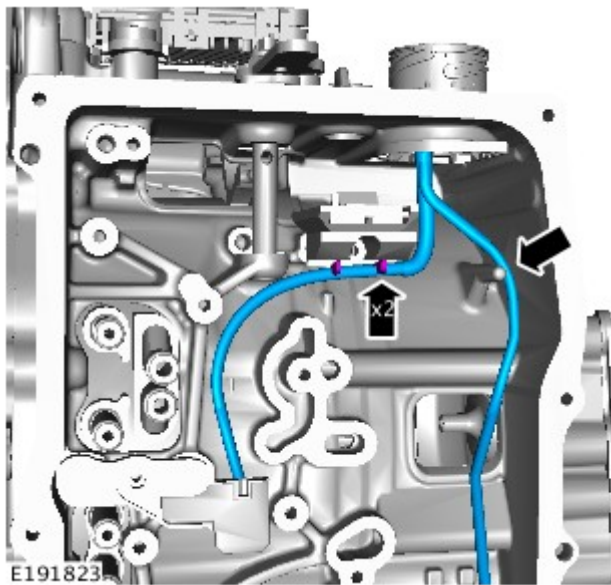
NOTE: Note the orientation of the component.


Remove and discard the bolts.

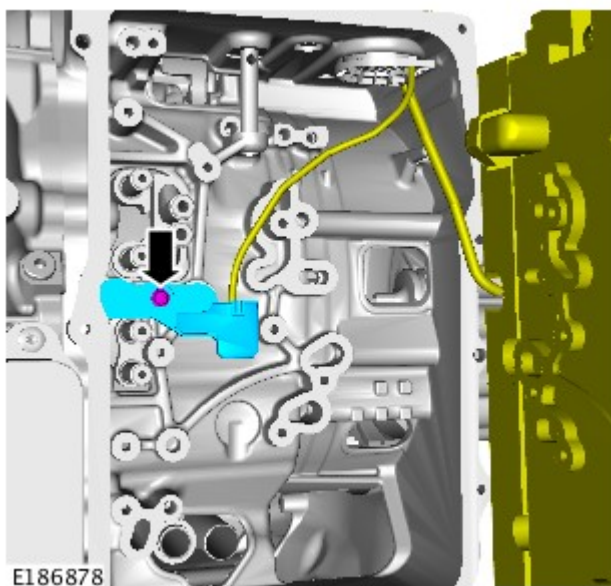





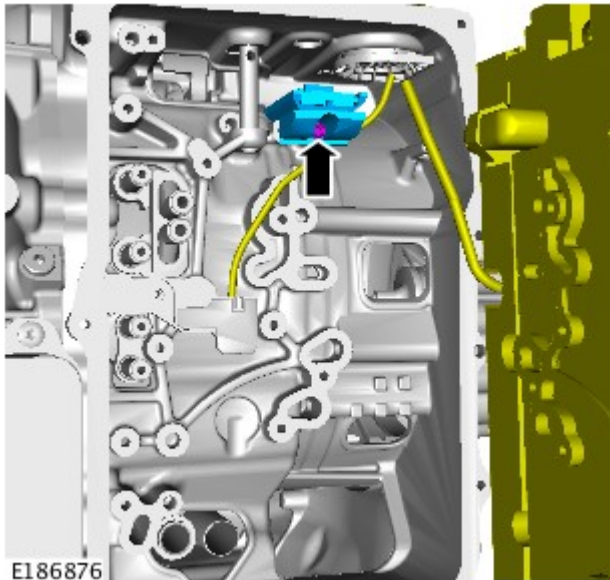
5.  CAUTION: Take extra care not to damage the wiring harnesses.



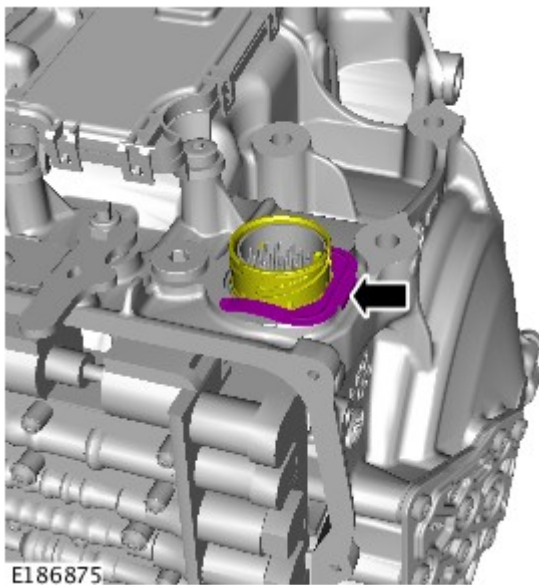
6.  NOTE: Note the orientation of the component prior to removal.



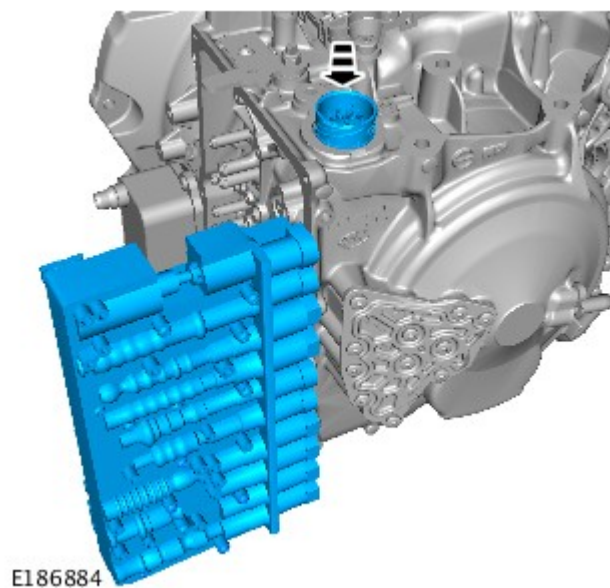
7.  NOTE: Note the orientation of the component prior to removal.




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





9.

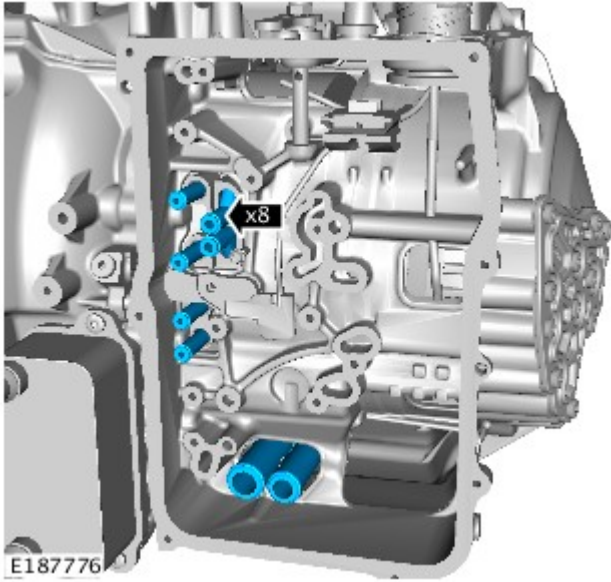


10. CAUTIONS:

 Take extra care not to damage the wiring harnesses.

 Care must be taken to avoid damage to the mating surfaces.

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

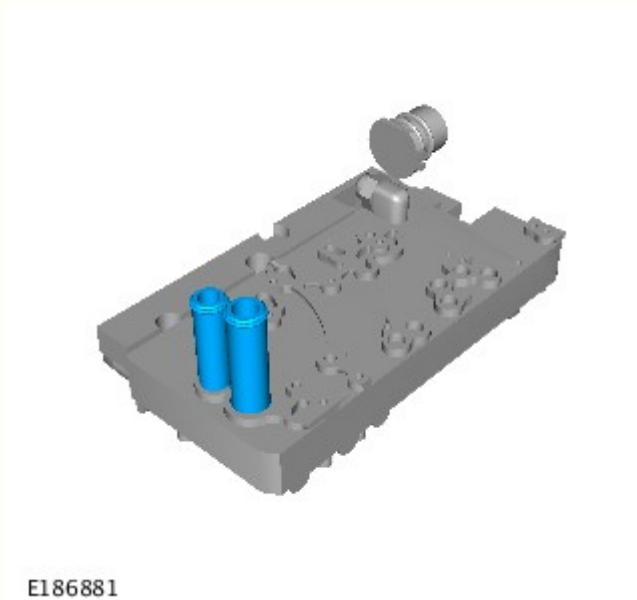


11.



NOTE: Discard the components.

Installation

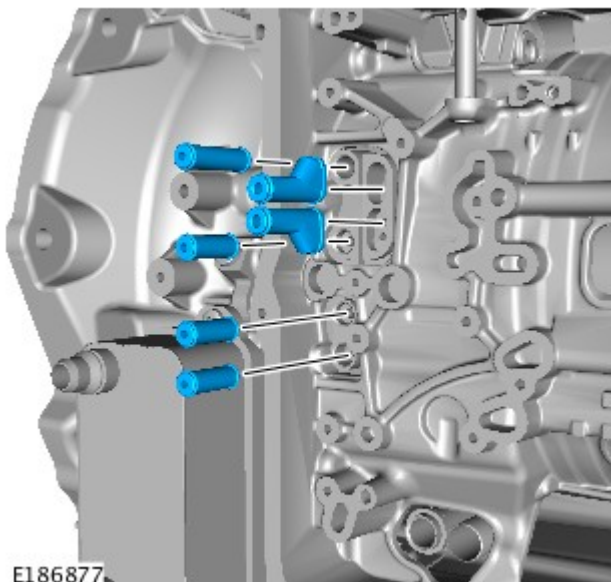


1.



CAUTION: Make sure that the oil tubes are correctly installed.

Install the new oil tubes to the valve body as illustrated.

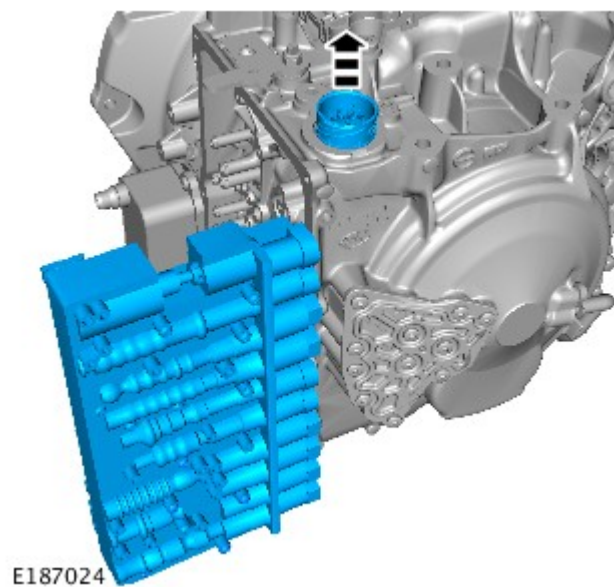


2.



CAUTION: Make sure that the oil tubes are correctly installed.

Install the new oil tubes to the transmission as illustrated.



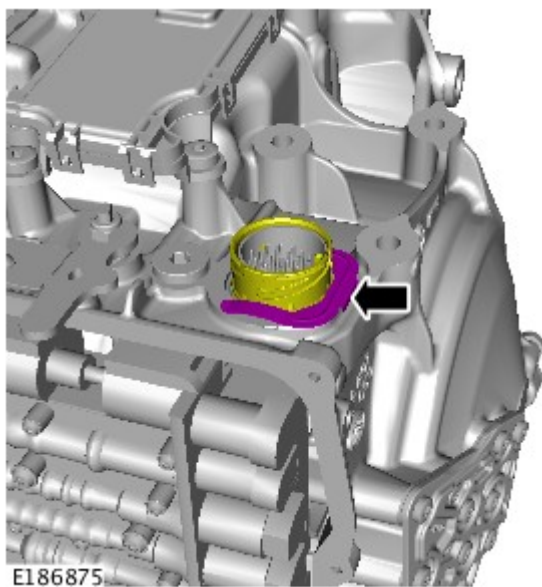
3. CAUTIONS:



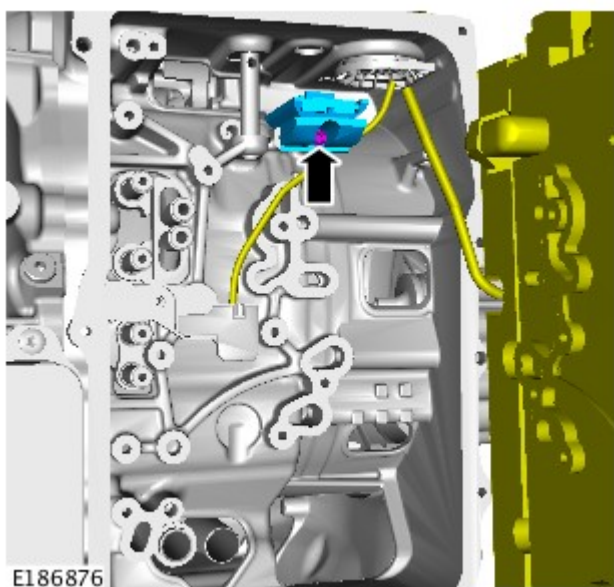
Make sure that the electrical connector is installed in the correct orientation as noted in the removal step.



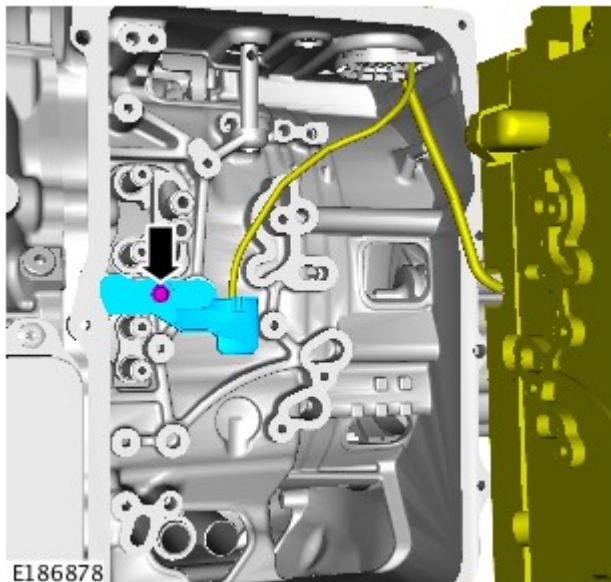
Care must be taken not to damage the component.



4.

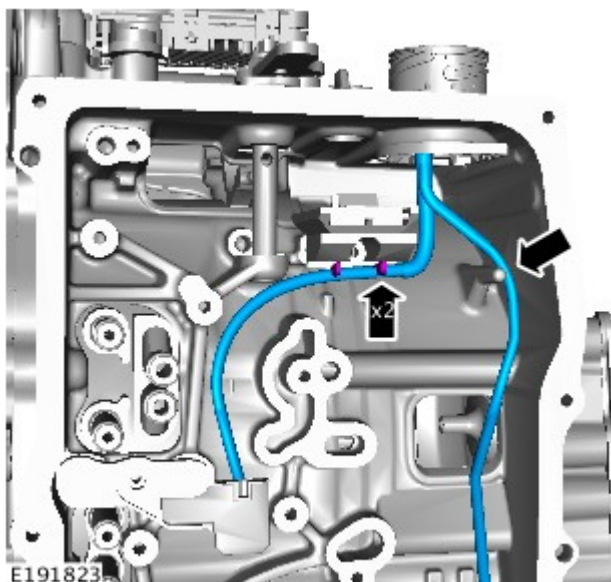



5. Torque: 6 Nm

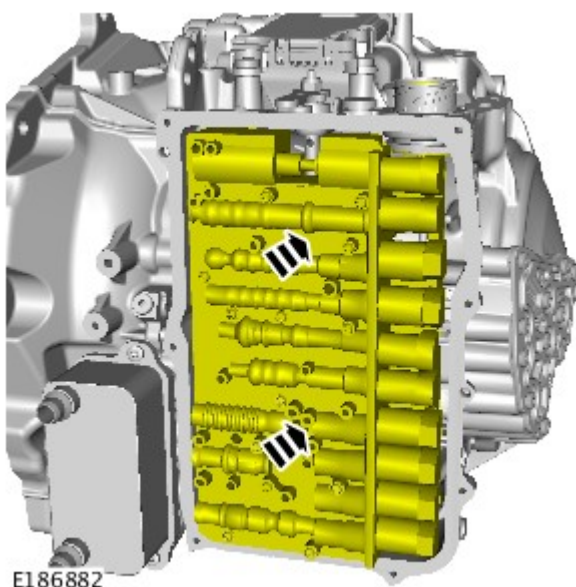


6.  NOTE: Make sure that the component is installed to the noted removal position.

Torque: 6 Nm

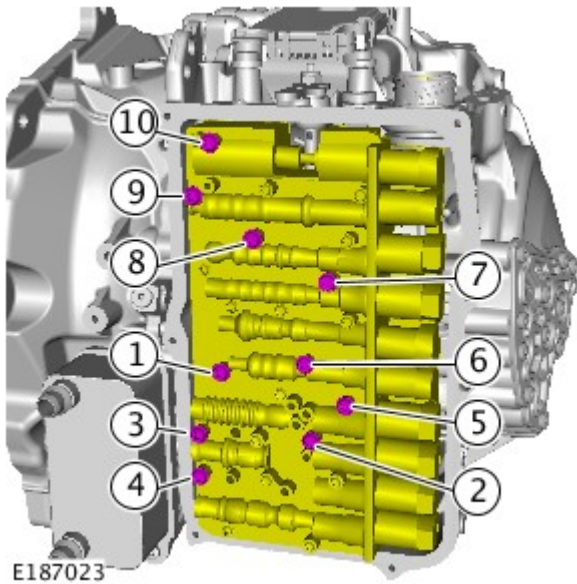


7.  NOTE: Make sure that the wiring harness is installed as illustrated, failure to follow this instruction may cause damage to the wiring harness



8.  CAUTION: Take extra care not to damage the wiring harnesses.

- 9.



CAUTION: Make sure that new bolts are installed.



NOTE: Tighten the retaining bolts in the sequence illustrated.

Torque: 8 Nm

10. Refer to: [Transmission Fluid Pan - INGENIUM I4 2.0L Diesel](#) (307-01 Automatic Transmission/Transaxle, Removal and Installation).

11. Connect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

12. Using the approved Land Rover diagnostic equipment, run the Automatic transmission valve block application.

Automatic Transmission/Transaxle - Transmission INGENIUM I4 2.0L Diesel

Removal

Special Tool(s)

 303-021	303-021 Engine support bracket
 E136268	JLR-303-1591 Lifting Bracket, Engine - Rear

General Equipment

Transmission jack

NOTES:



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



Some illustrations may show the transmission removed for clarity.

1. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

2. Refer to: [Engine Cover - INGENIUM I4 2.0L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

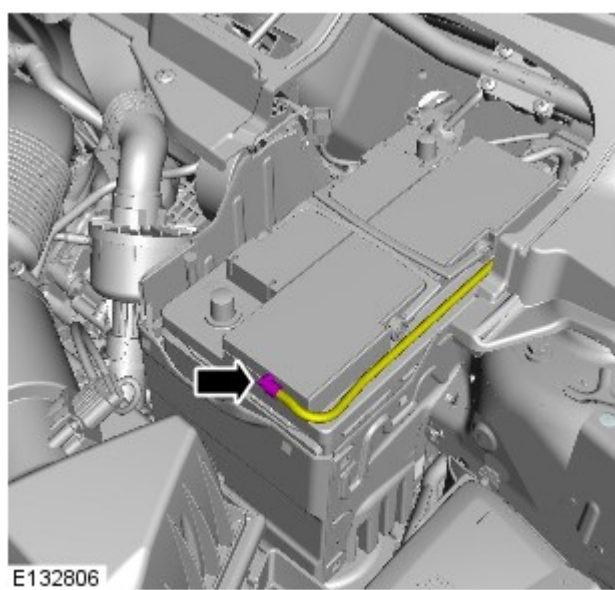
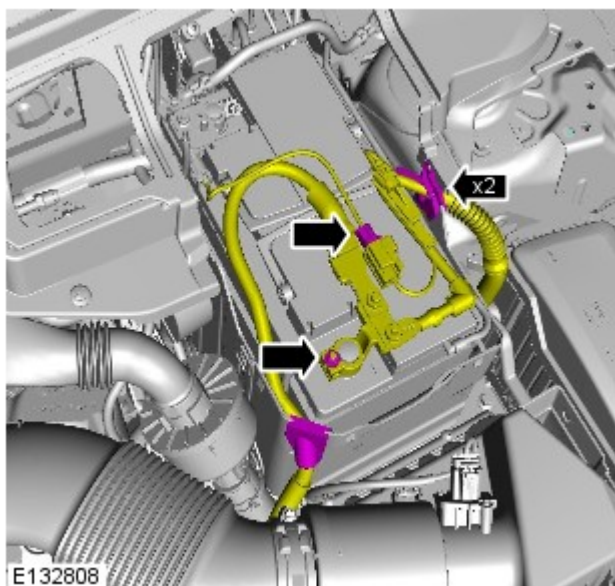
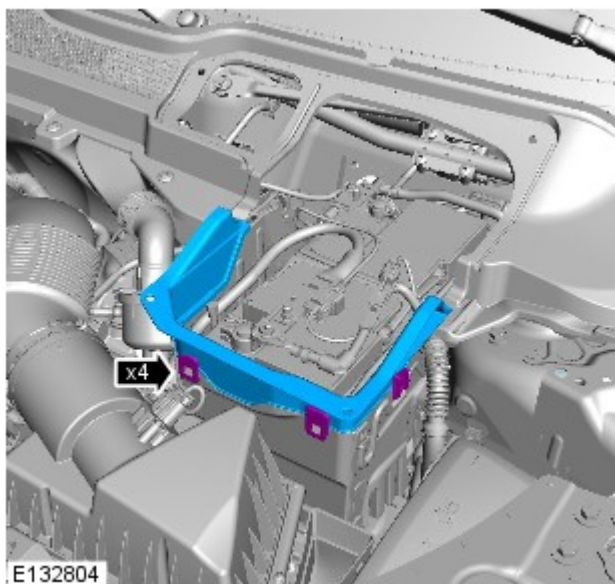
3. Refer to: [Plenum Chamber](#) (412-01 Climate Control, Removal and Installation).

4. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

5. Refer to: [Starter Motor](#) (303-06A Starting System - INGENIUM I4 2.0L Diesel, Removal and Installation).

6. Refer to: [Charge Air Cooler](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

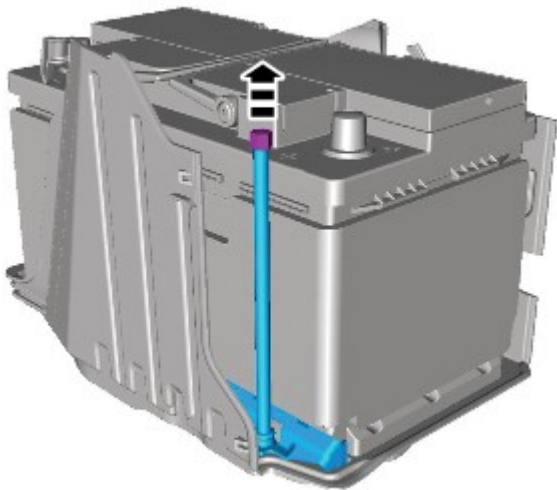
- 7.



8.

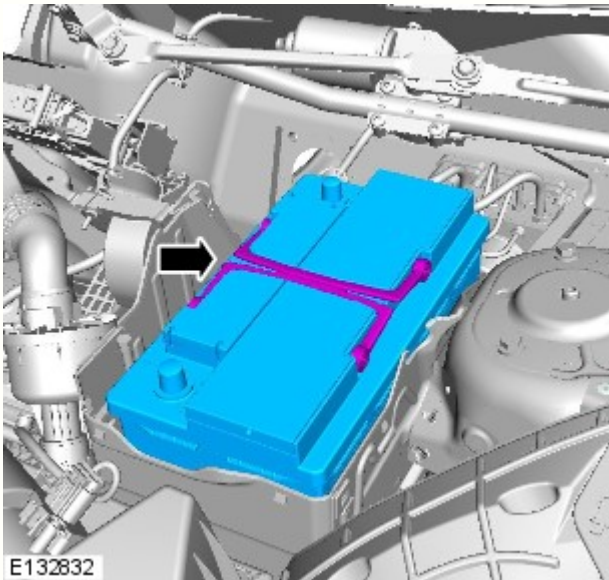
9.

10.



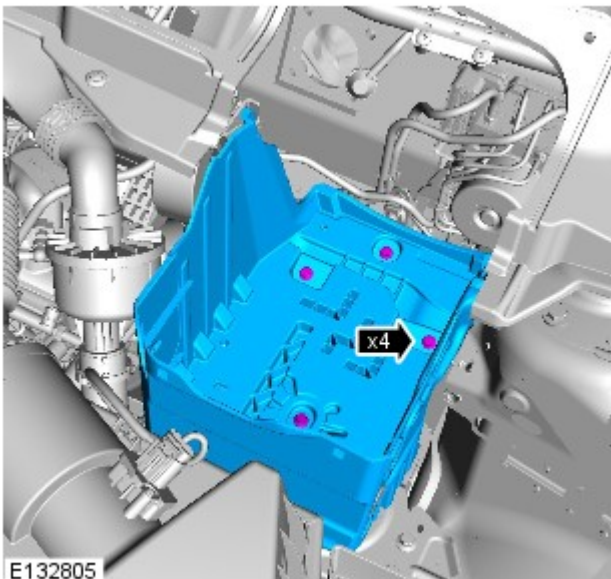
E132809

11.



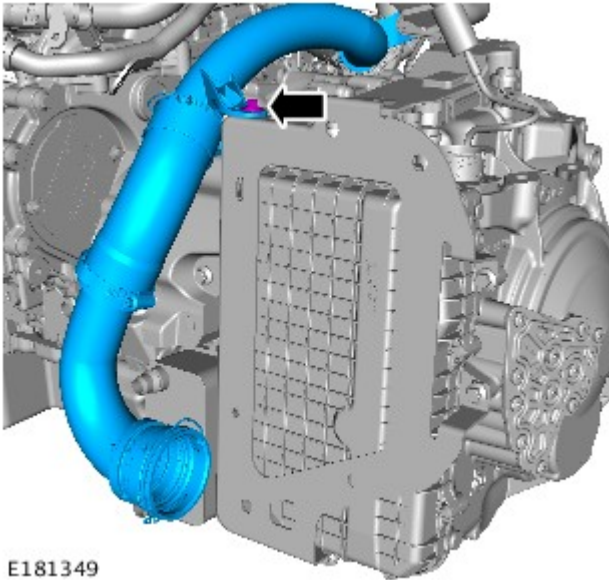
E132832

12.

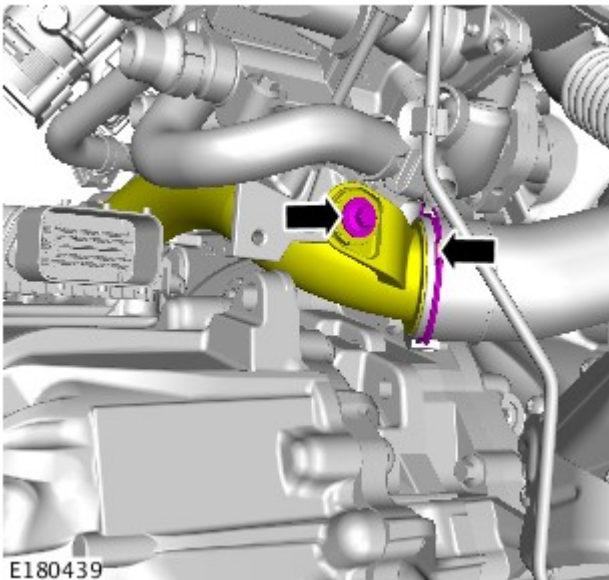


E132805

13.

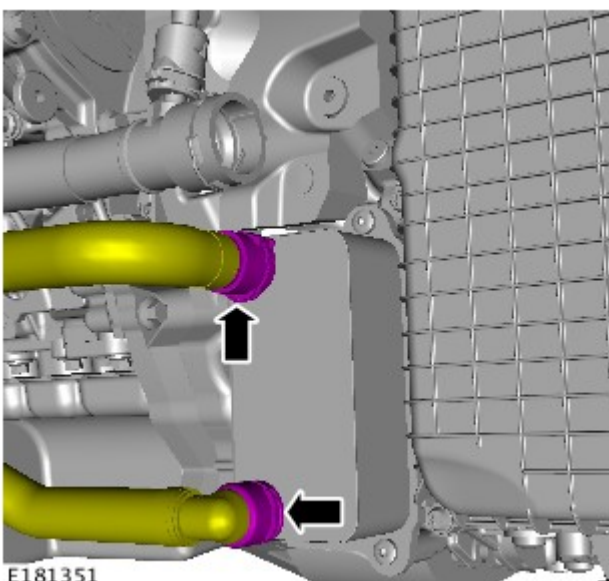


E181349




E180439

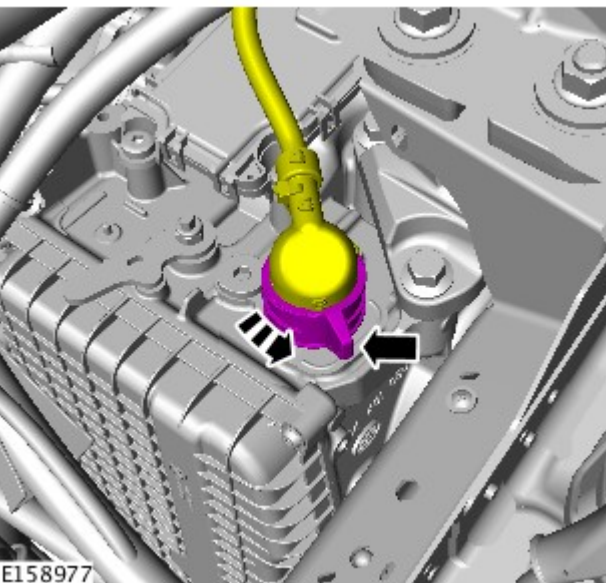
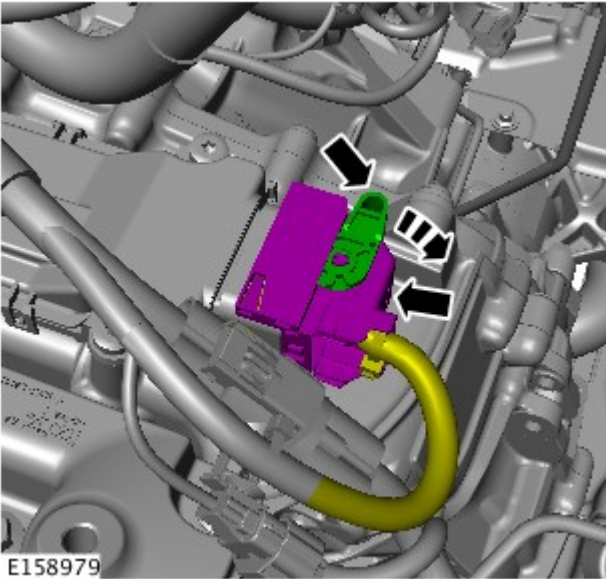
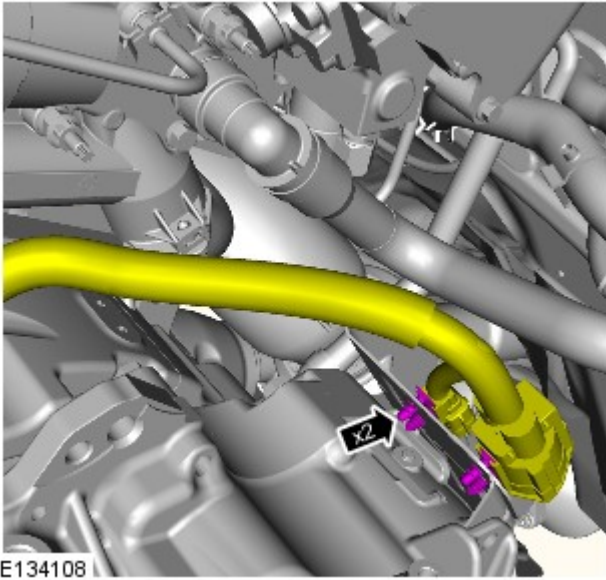
14.



E181351

15.  CAUTION: Be prepared to collect escaping coolant.

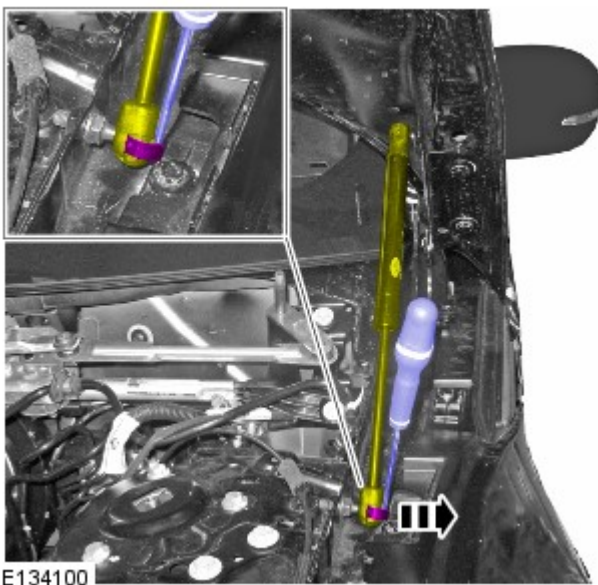
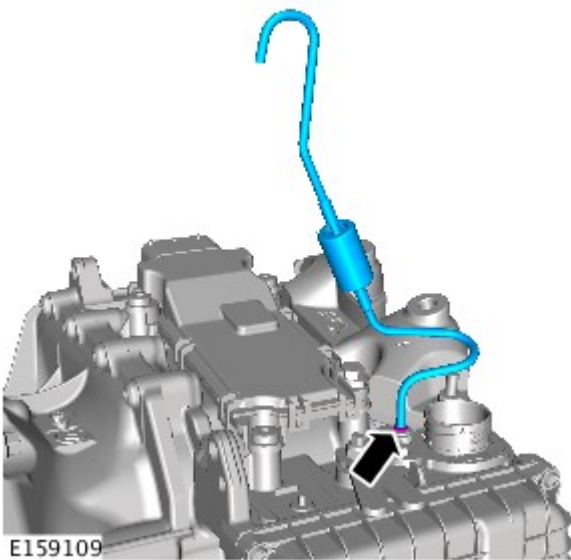
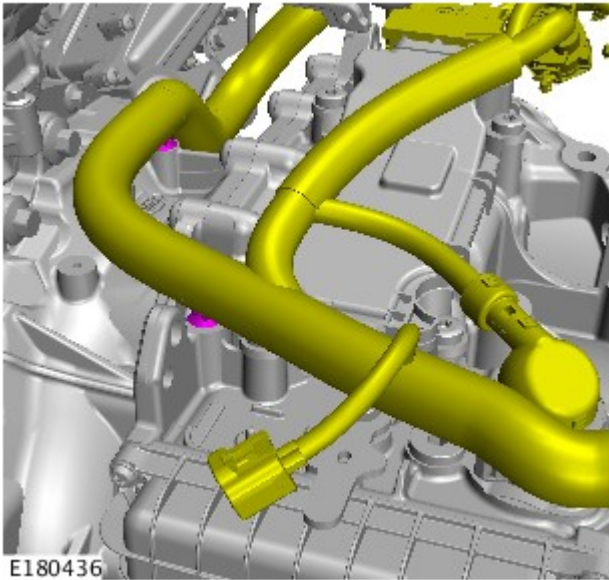
16.



17.

18.

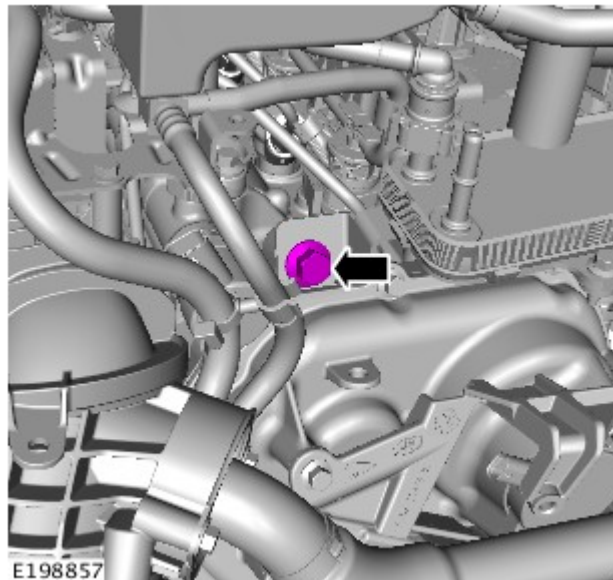
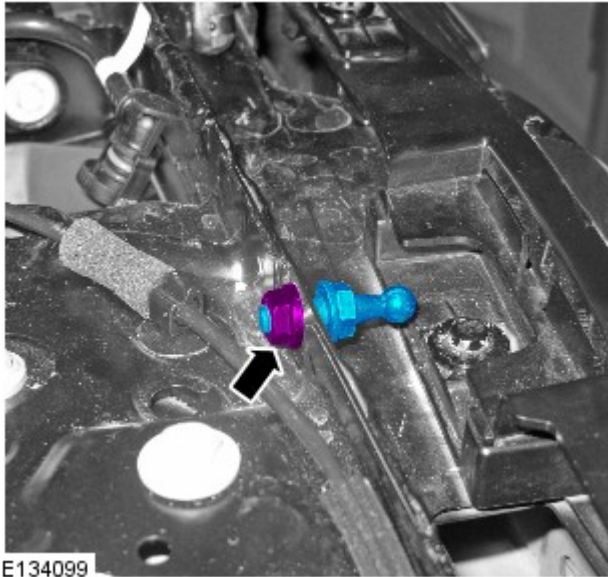
19.



20.

- 21.
- Repeat the above step for the other side.
 - Secure the hood at the highest position.

22. Repeat the above step for the other side.

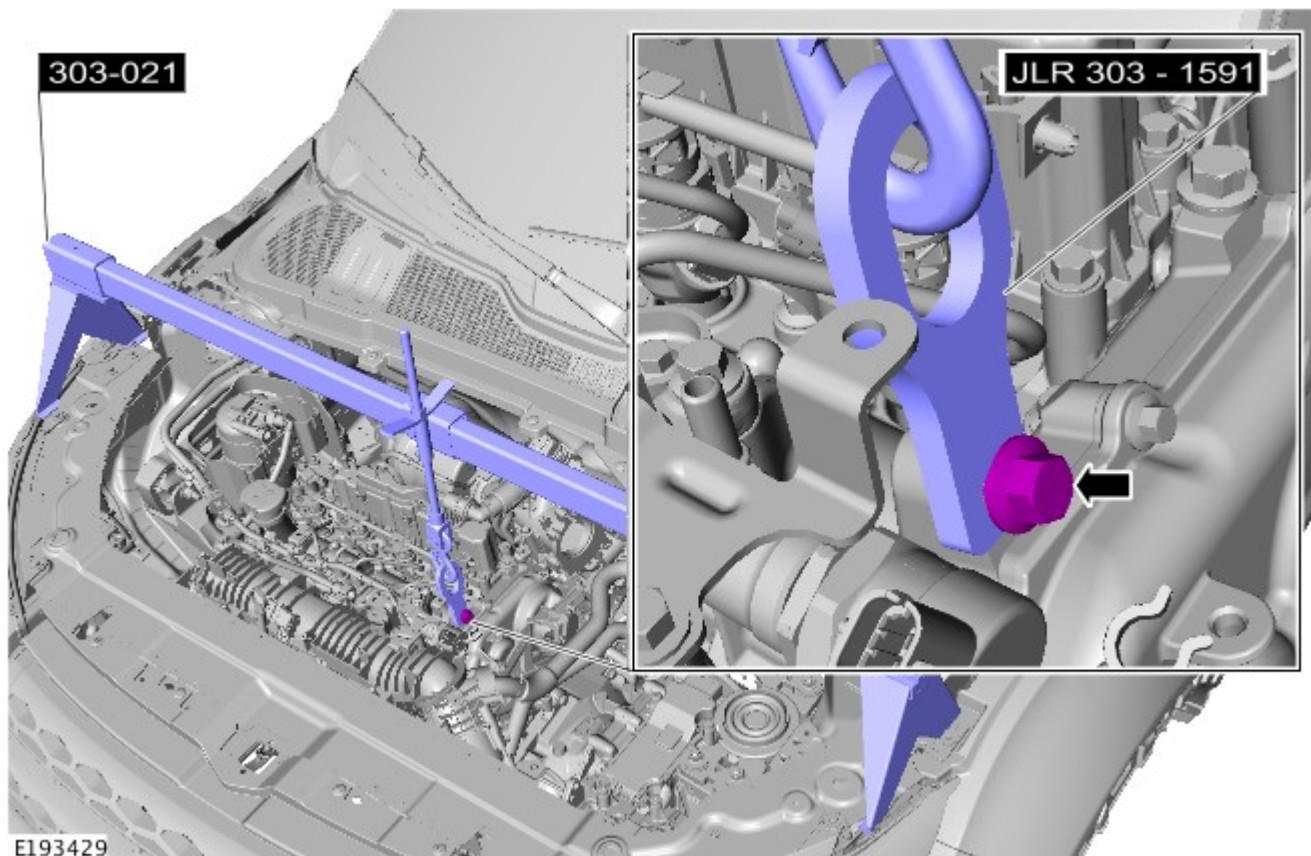


23.

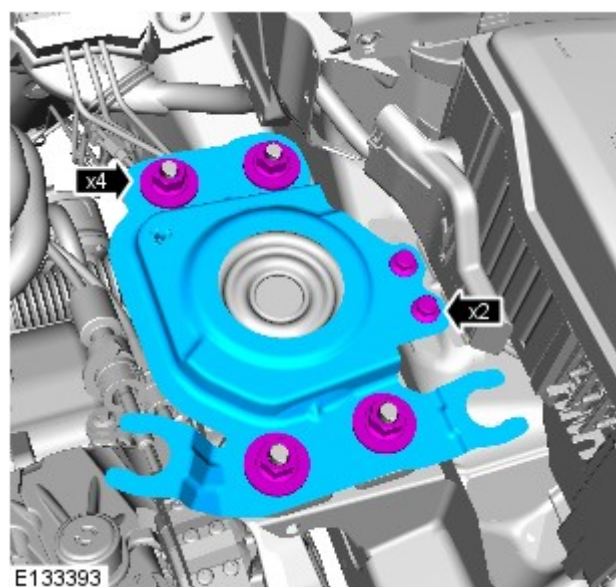
24. Support the engine.

Install the Special Tool(s): [303-021](#) , [JLR-303-1591](#)

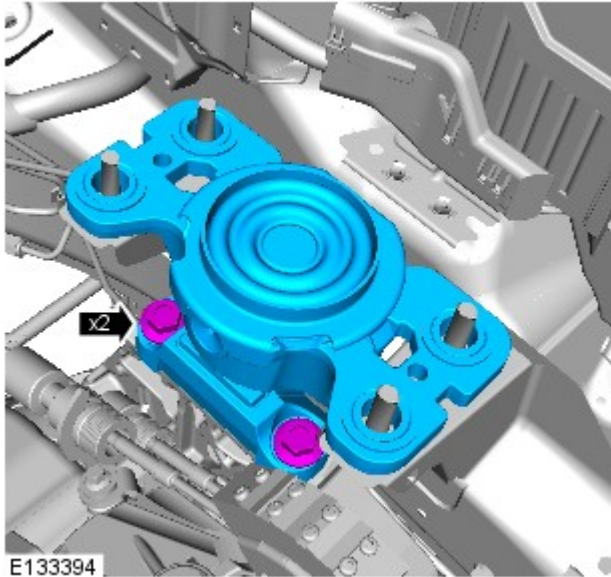
Torque: 50 Nm



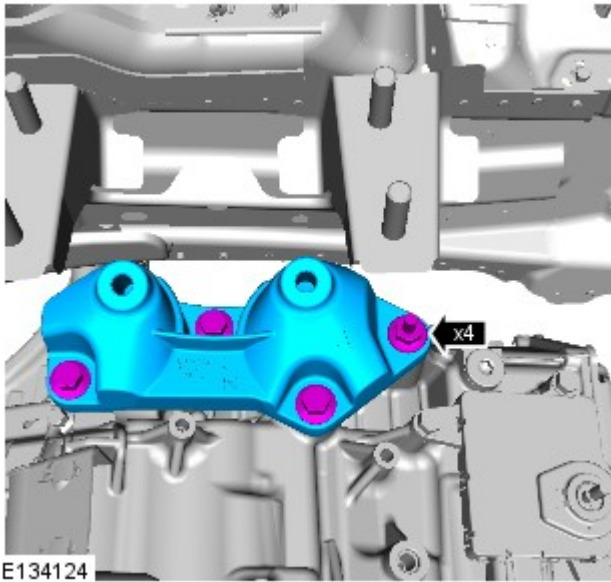
25.



26.



27.



28.  NOTE: This step is only necessary when installing a new component.

Refer to: [Transmission Fluid Drain and Refill](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

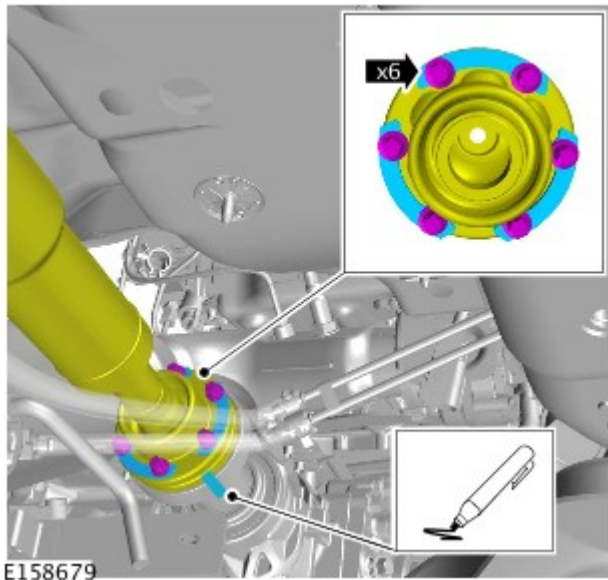
29. Refer to: Front Subframe (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

30.  CAUTION: Discard the nut.

Refer to: [Front Halfshaft LH](#) (205-04 Front Drive Halfshafts, Removal and Installation).

31. Refer to: [Front Halfshaft RH - RHD AWD/LHD AWD](#) (205-04 Front Drive Halfshafts, Removal and Installation).

32. CAUTIONS:

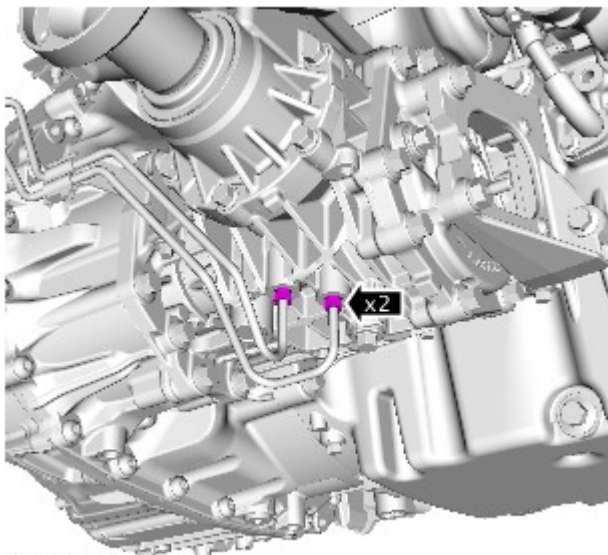


⚠ To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.

⚠ Make sure that the driveshaft is supported with suitable retaining straps.

⚠ Discard the bolts.

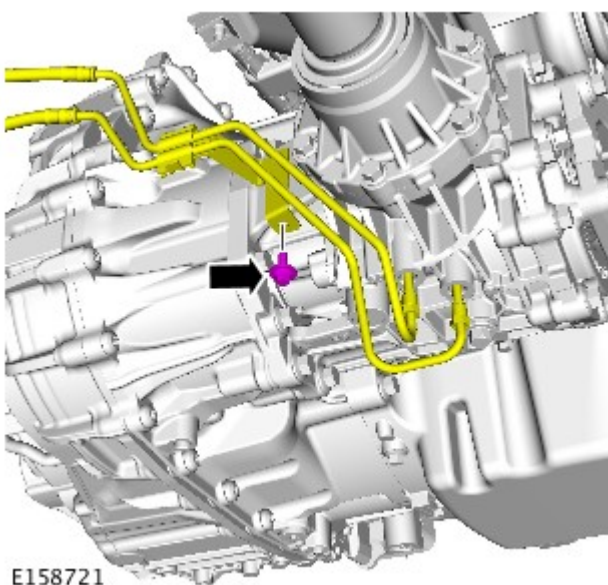
⚠ Mark the components to aid installation.



33. CAUTIONS:

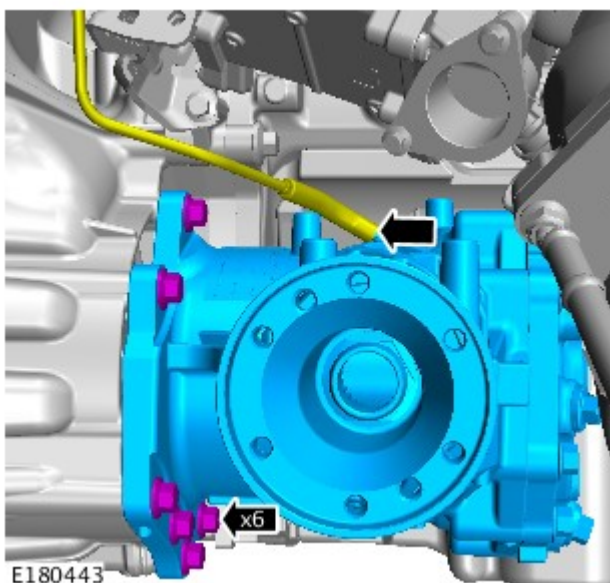
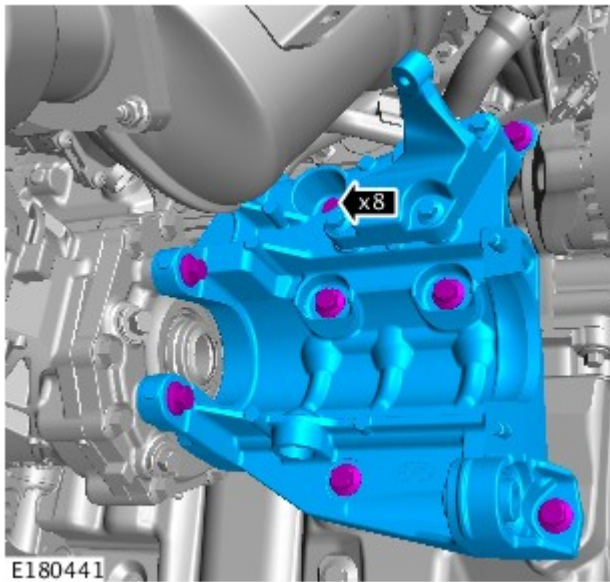
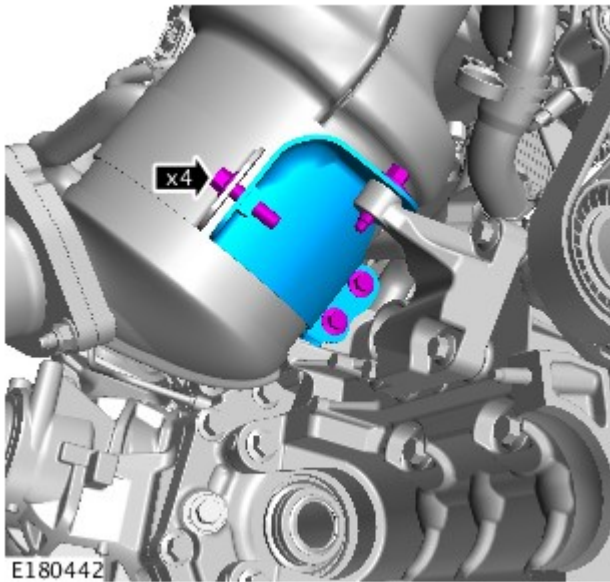
⚠ Be prepared to collect escaping fluids.

⚠ Make sure that all openings are sealed. Use new blanking caps.



34.

35.



36.

37.  **WARNING:** This step requires the aid of another technician.

 **CAUTION:** Be prepared to collect escaping fluids.

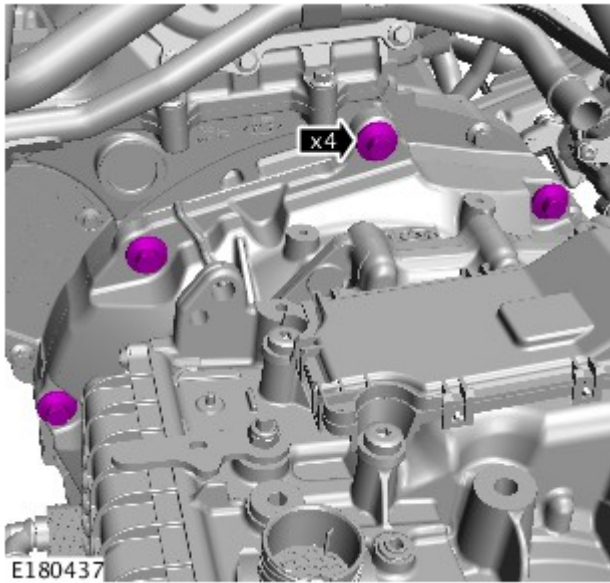
38.



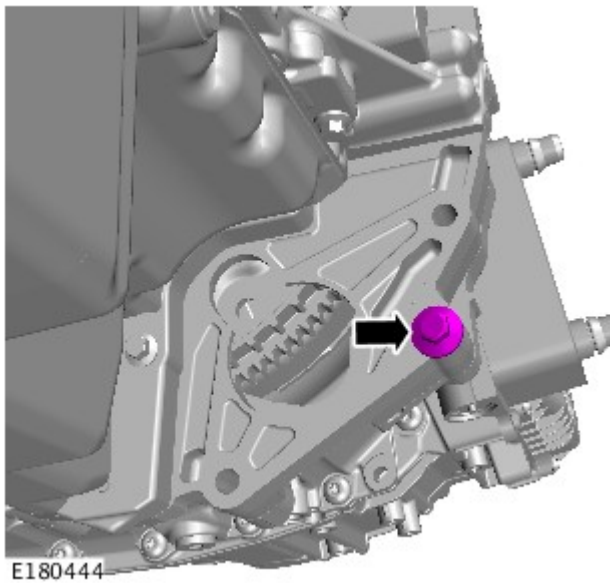
WARNING: Make sure that the transmission is secured with suitable retaining straps.

- Using a suitable hydraulic jack, support the transmission.
- *General Equipment:* [Transmission jack](#)

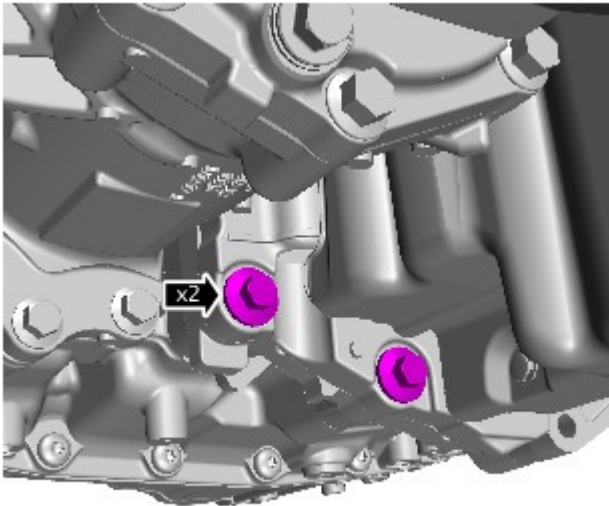
39.



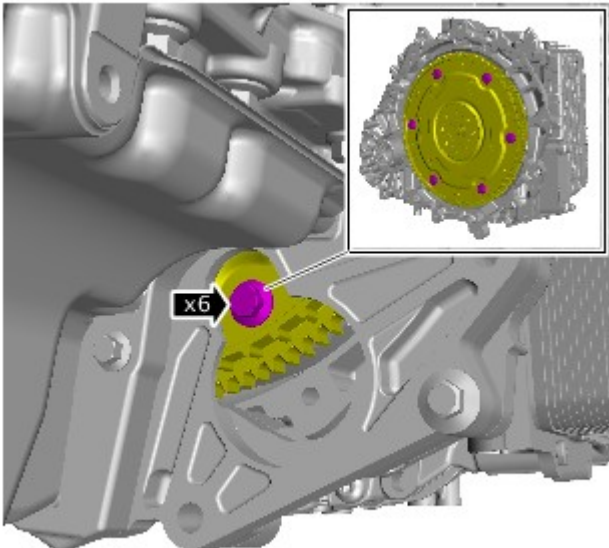
40.



41.

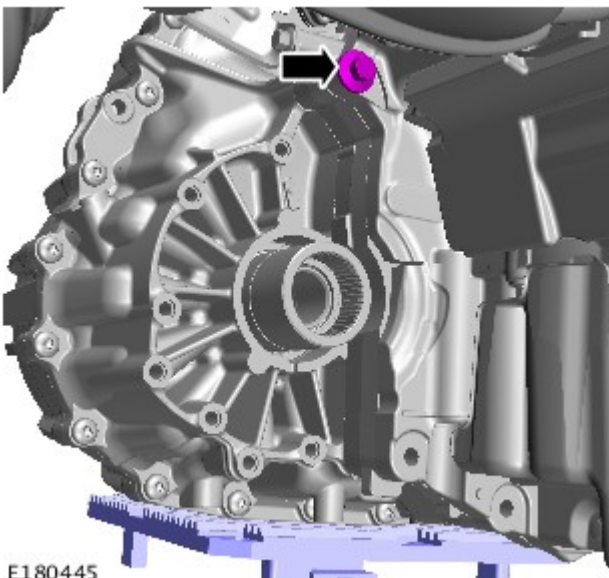


E181658




E180446

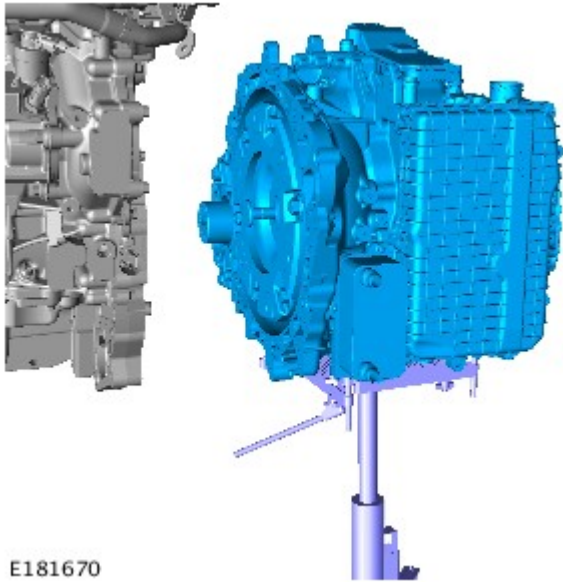
42.  CAUTION: Discard the bolts



E180445

43.  NOTE: Using a suitable transmission jack support the differential case.

- 44.




E181670

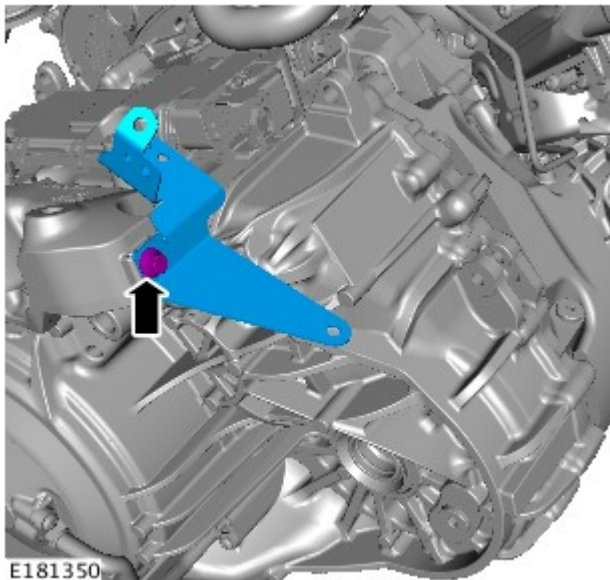
 **WARNING:** This step requires the aid of another technician.

CAUTIONS:


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

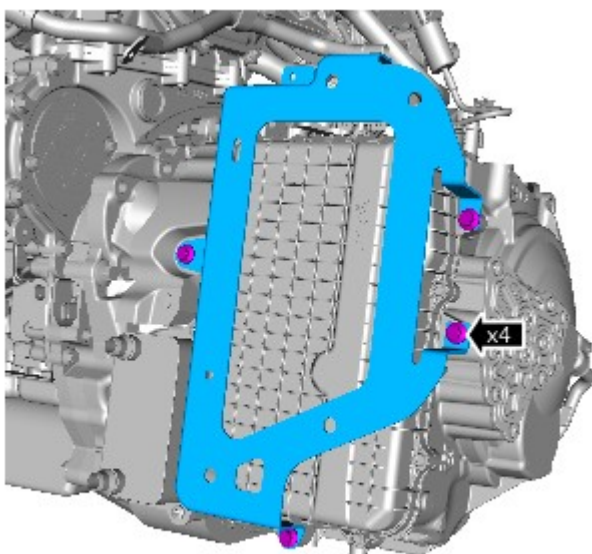
 On removal and installation of the transmission, make sure that the transmission does not damage the brake pipe.

 Make sure that the torque converter remains in the transmission.



E181350

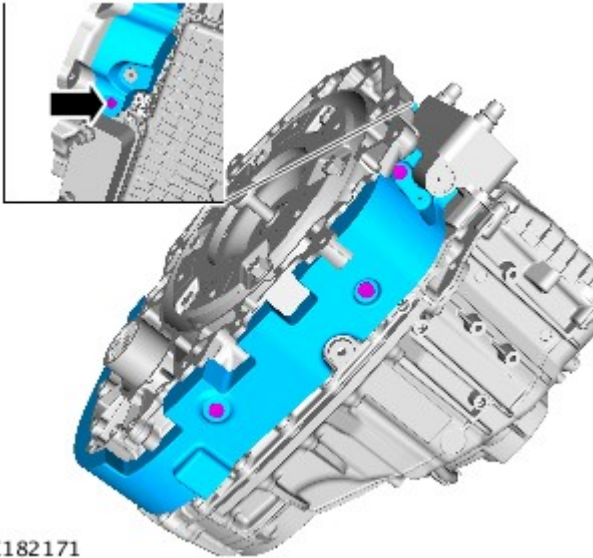
45.  **NOTE:** Do not disassemble further if the component is removed for access only.



E181661

46.

47.



E182171

Published: 12-Aug-2016

Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel - Charge Air Cooler Removal and Installation

Removal

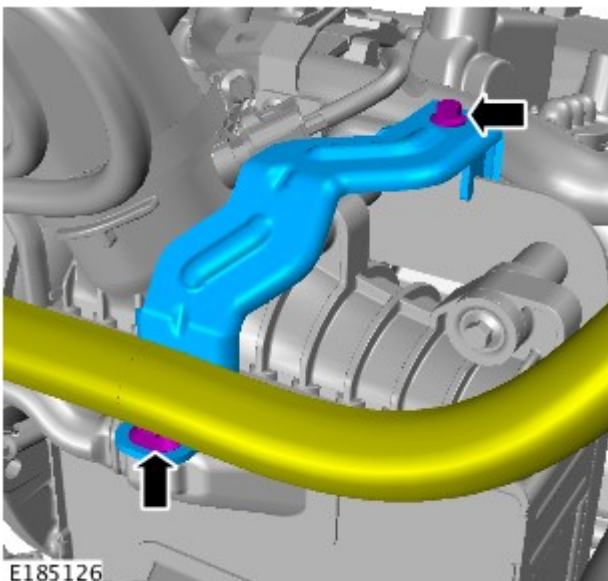
1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

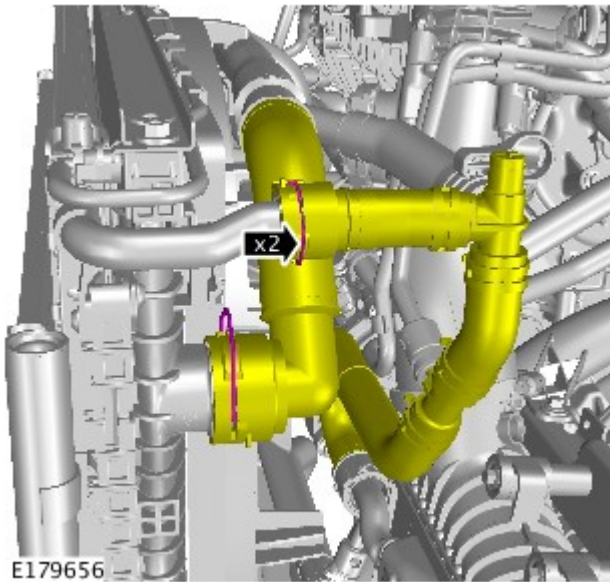
2. Refer to: [Cooling System Partial Draining and Vacuum Filling](#) (303-03B Engine Cooling - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV, General Procedures).


3. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

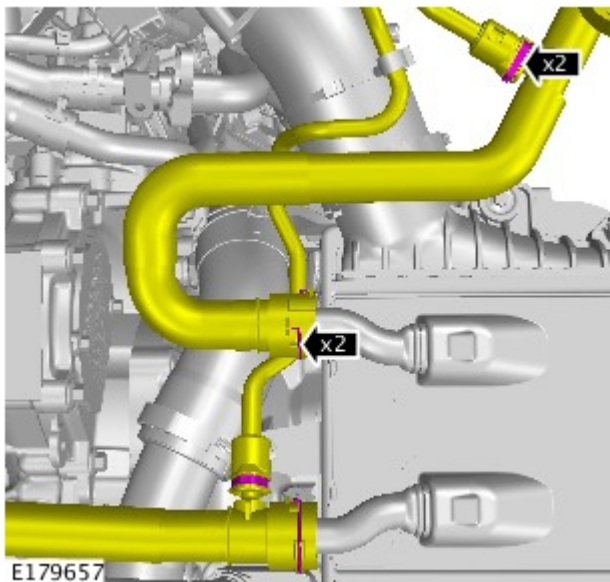
4.




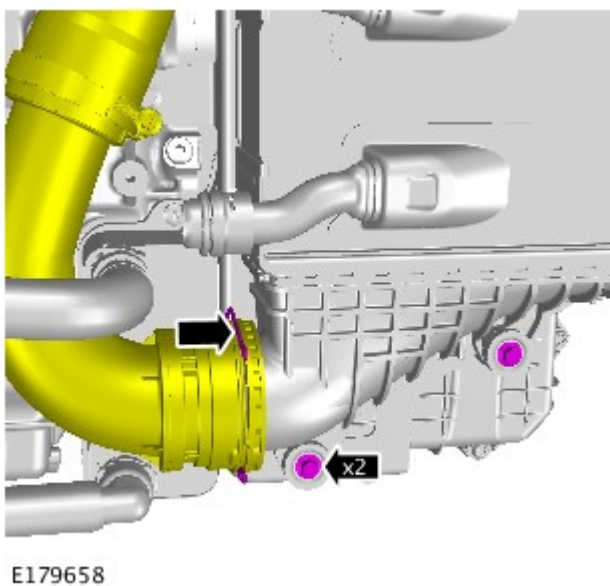
E185126



5.  CAUTION: Be prepared to collect escaping coolant.

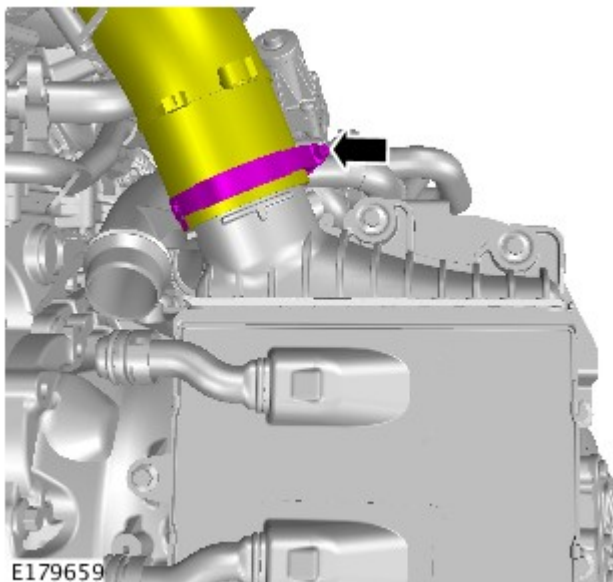


6.  CAUTION: Be prepared to collect escaping coolant.

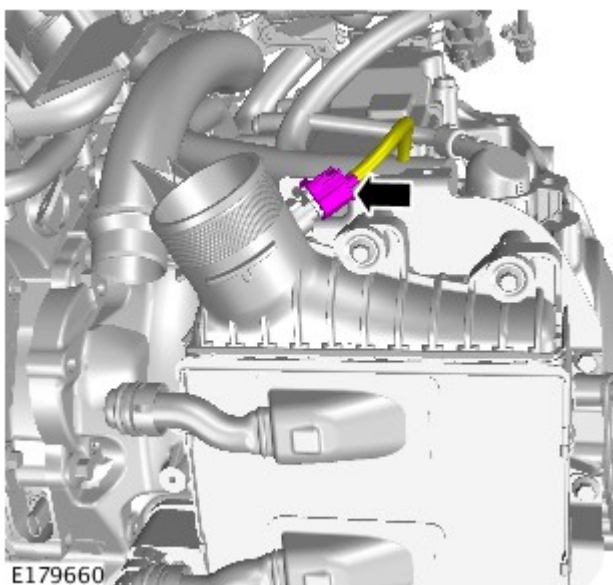


7. Torque: 7 Nm

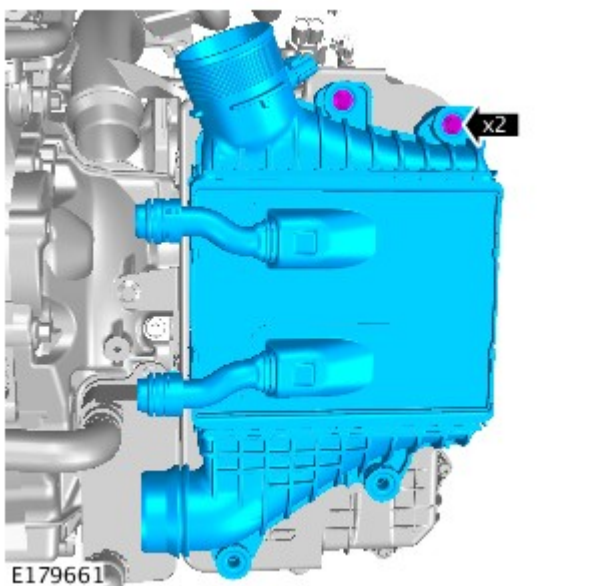
- 8.



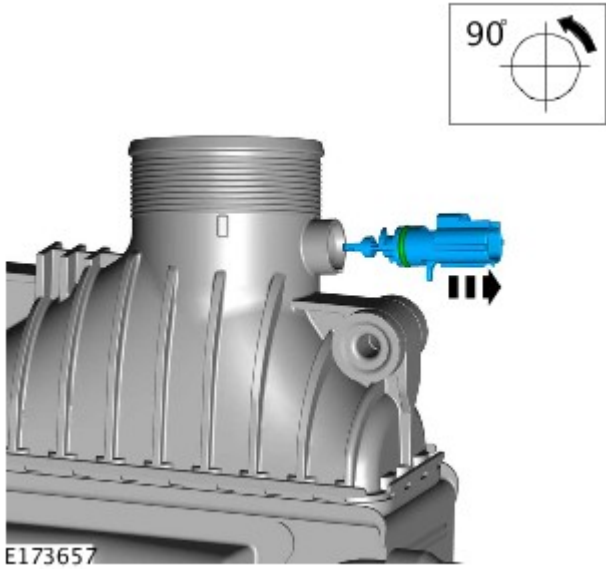
9.



10. Torque: 7 Nm



11.



CAUTION: Remove and discard the O-ring seals.



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

Installation

1.



CAUTION: Install a new O-ring seals.

To install reverse the removal procedure.

Published: 14-Jun-2016

Automatic Transmission/Transaxle - Transmission Fluid Drain and Refill

General Procedures

Draining

WARNINGS:



Be prepared to collect escaping fluids.



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

CAUTIONS:



Make sure that the area around the component is clean and free of foreign material.



Vehicle must be horizontal during this operation.



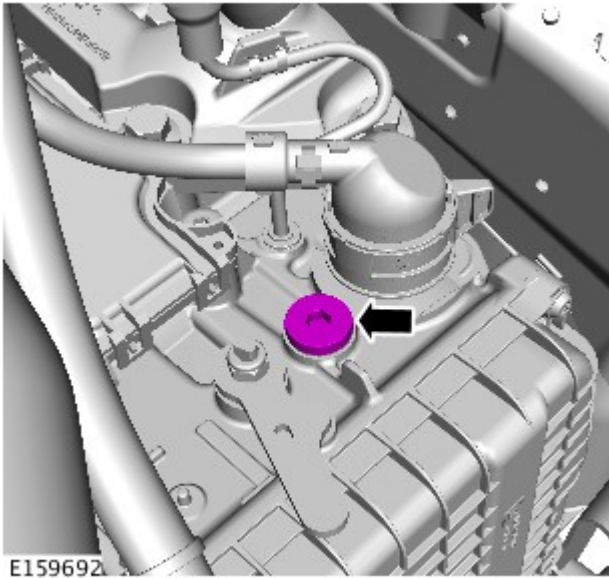
NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).

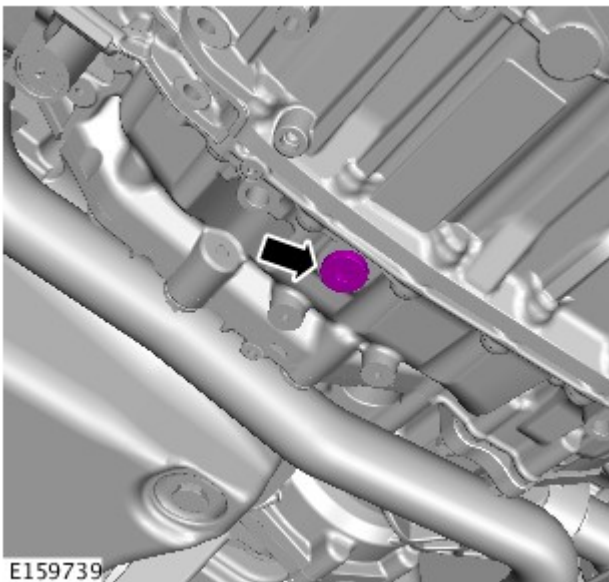
2.




NOTE: Discard the sealing plug.



3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).



4.  **CAUTION:** The ambient temperature should not be below 20 degrees celsius.

NOTES:

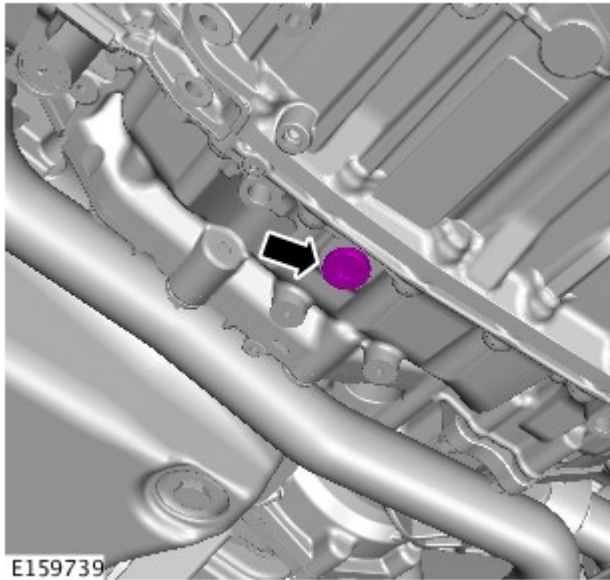
 Drain the fluid into a suitable container.

 Discard the sealing plug.

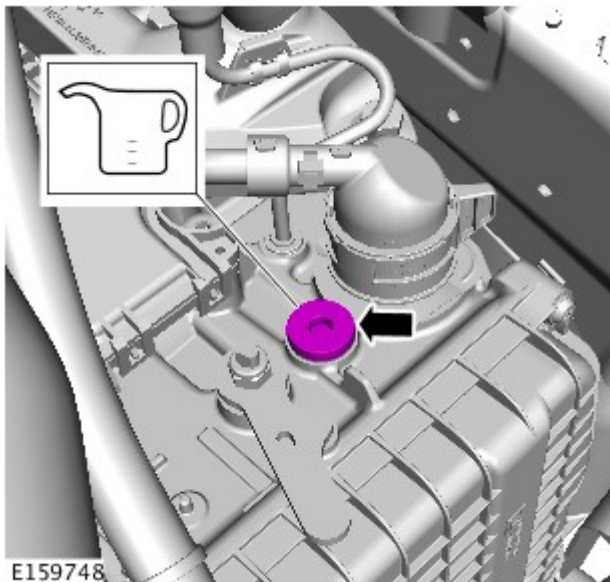
Allow the fluid to drain until the flow stops.

5.  **CAUTION:** Install a new sealing plug.

Torque: 35 Nm



6. Lower the Vehicle.



7. CAUTIONS:



Install a new sealing plug.



Use transmission fluid meeting Landrover specification.

Fill the transmission with 3.5 litres of oil.

Refer to: [Specifications](#) (307-01 Automatic Transmission/Transaxle, Specifications).

Torque: 35 Nm

8. Carry out transmission fluid level check.

Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

Published: 30-Jun-2015

Interior Trim and Ornamentation - Engine Cover INGENIUM I4 2.0L Diesel

Removal and Installation

Removal



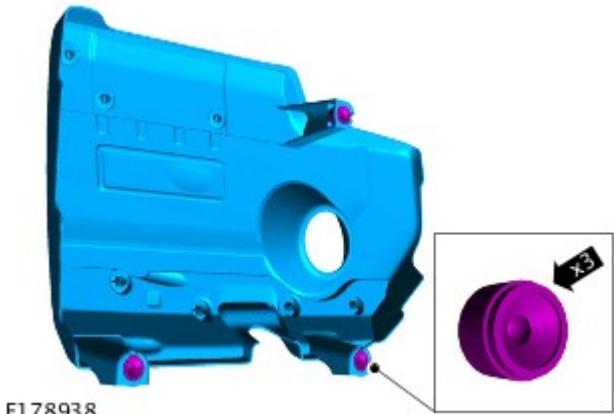
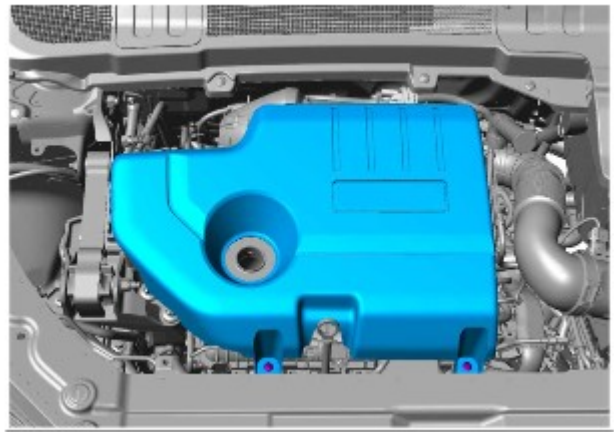
NOTE: Removal steps in this procedure may contain installation details.

1.



E178939

2.



E178938

Installation

- 1. To install, reverse the removal procedure

Published: 30-Sep-2014

Battery, Mounting and Cables -

General Specification - Stop-start and timed climate models:

Item	Specification
Battery:	
Type	H7 AGM (VRLA)
Capacity	80Ah/800CCA

General Specification - All except stop-start and timed climate models

Item	Specification
Battery:	
Type	H7 Flooded
Capacity	80Ah/700CCA

Battery Disconnect/Connect



CAUTION: The vehicle status must be established before attempting battery disconnect/connect. Reference must be then made to the following table to establish the relevant procedure to be followed.



NOTE: Make a note of the customers radio preset stations.

Vehicle status	Procedure
Vehicle without Telematics	1
Vehicle with Telematics	2

Procedure 1

Disconnect battery	Connect battery
1. Chock the wheels	1. Make sure that all electrical loads are switched OFF
2. Open the hood	2. Connect battery ground cable to the battery - 6Nm
3. Remove the battery cover	3. Connect the BMS electrical connector
4. Disconnect the engine wiring harness ground connector/terminal	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the battery ground to starter motor connector/terminal (if equipped)	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery monitoring system (BMS) module electrical connector	6. Install the battery cover
7. Disconnect the battery ground cable from the battery	7. Close the hood
	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work

Procedure 2

Disconnect battery	Connect battery
1. Make sure the customer has placed stolen vehicle tracking into Service Mode (if equipped)	1. Make sure that all electrical loads are switched OFF
2. Chock the wheels	2. Connect battery ground cable to the battery - 6Nm
3. Open the hood	3. Connect the BMS electrical connector
4. Remove the battery cover	4. Connect the battery ground to starter motor connector/terminal (if equipped) - 10Nm
5. Disconnect the engine wiring harness ground connector/terminal	5. Connect the engine wiring harness ground connector/terminal - 6Nm
6. Disconnect the battery ground to starter motor connector/terminal (if equipped)	6. Install the battery cover
7. Disconnect the battery monitoring system (BMS) module electrical connector	7. Close the hood
8. Disconnect the battery ground cable from the battery	8. Switch the ignition on
	9. Reset radio station preset stations
	10. Reset the clock
	11. Reset electric window one-touch facility. Power window up to hard stop, release switch, reapply and hold for 1 second (relay in door will click). One touch should now work
	12. Request stolen vehicle tracking removed from Service Mode (if equipped)

Torque Specifications

Item	Nm	lb-ft	lb-in
Vehicle body brace retaining bolts	25	18	-
Battery terminal nuts	6	-	53
Battery ground terminal nut - battery to starter motor retaining stud (if equipped)	10	7	-
Battery tray retaining bolts	10	7	-

Front Drive Halfshafts - Front Halfshaft LH

Removal and Installation

Special Tool(s)

 E79462	205-857 Remover, Halfshaft
 E52536	307-520 Installer, Output Shaft Seal
 E159484	JLR-307-686 Installer, Oil Seal

Removal

CAUTIONS:



Nuts and bolts must be tightened with the weight of the vehicle on the suspension.



Do not allow halfshafts to hang unsupported at one end or joint damage will occur.



Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

1.



WARNING: Make sure to support the vehicle with axle stands.

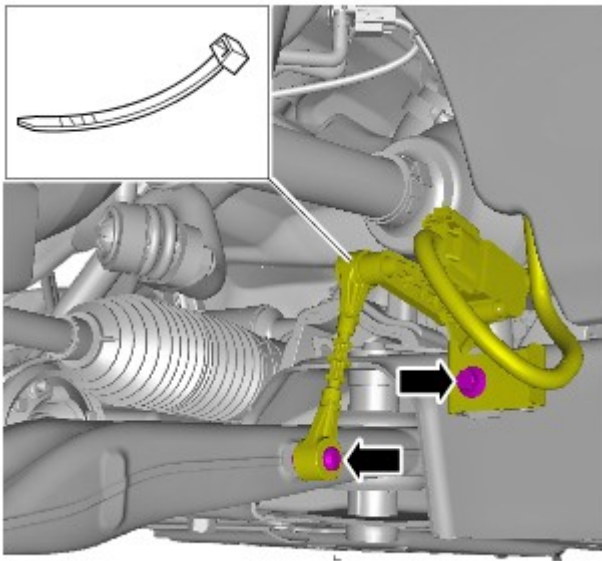
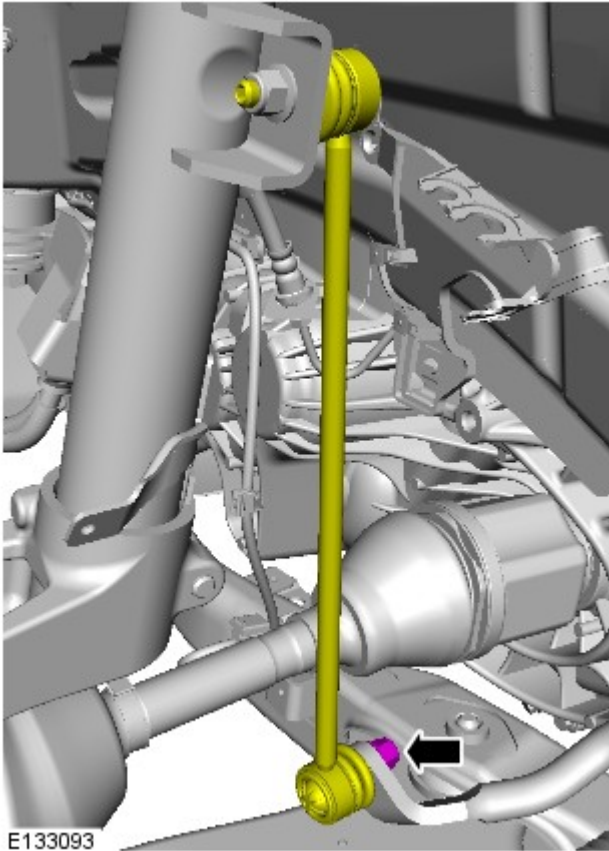
Raise and support the vehicle.

2. Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).

3.



CAUTION: Discard the nut.



4.

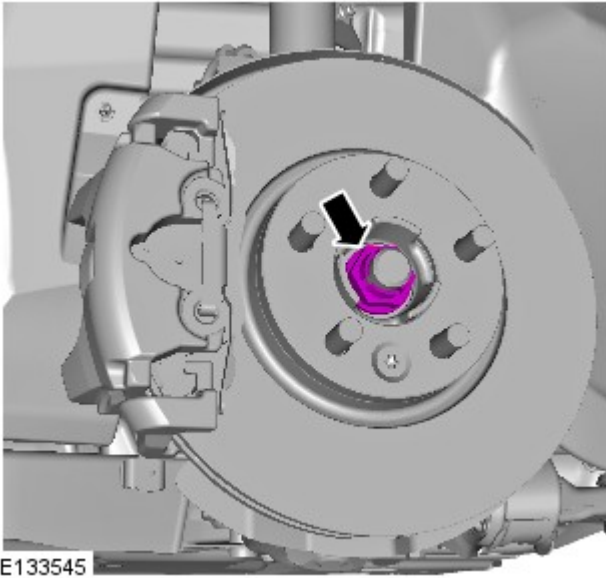
5. CAUTIONS:



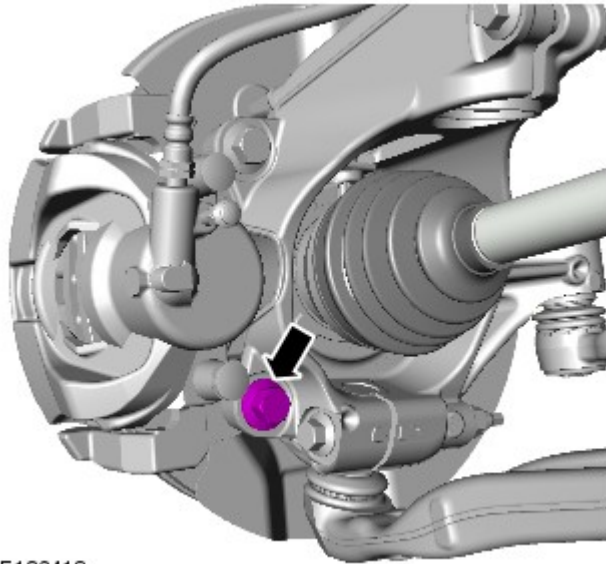
Do not use air tools to remove the nut.



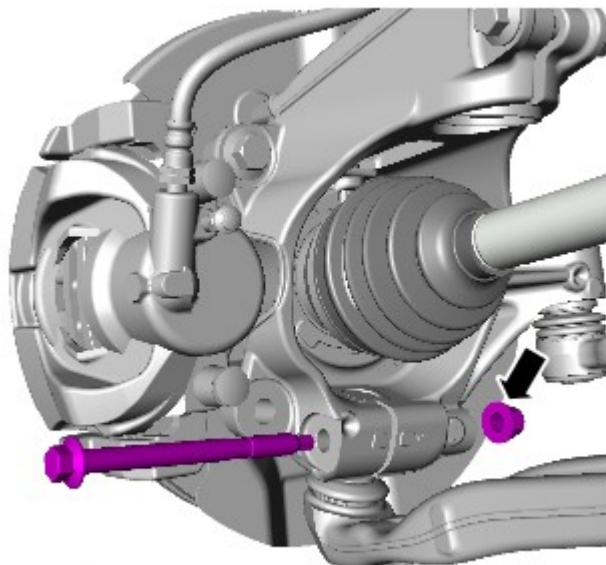
Discard the nut.



E133545



E136418

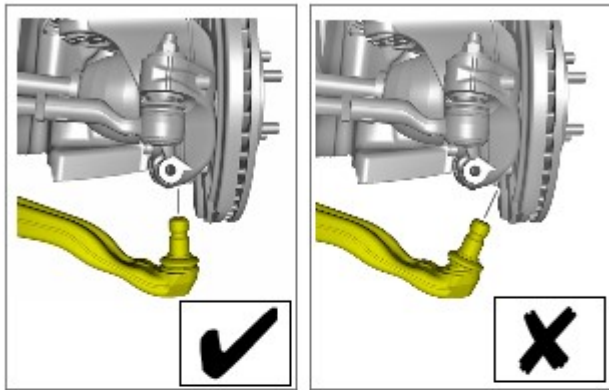


E136419

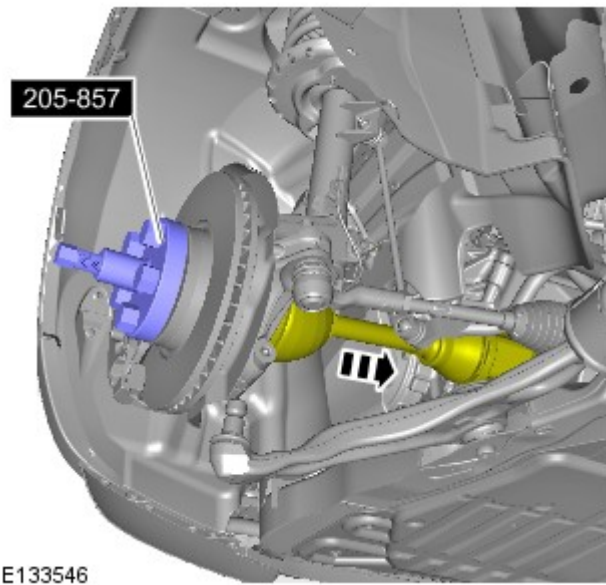
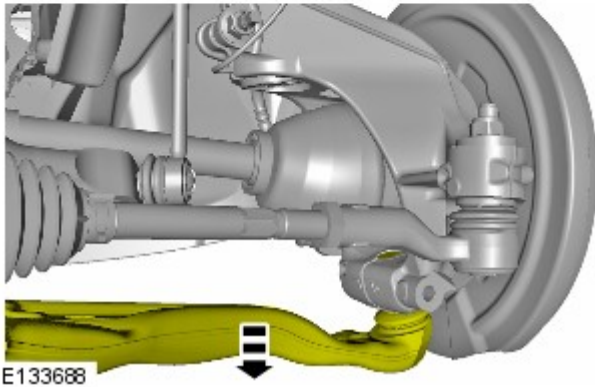
6.  CAUTION: Discard the bolt.

 NOTE: Right hand illustration shown, left hand is similar.


7.  NOTE: Right hand illustration shown, left hand is similar.




8.  NOTE: Right hand illustration shown, left hand is similar.





9. CAUTIONS:

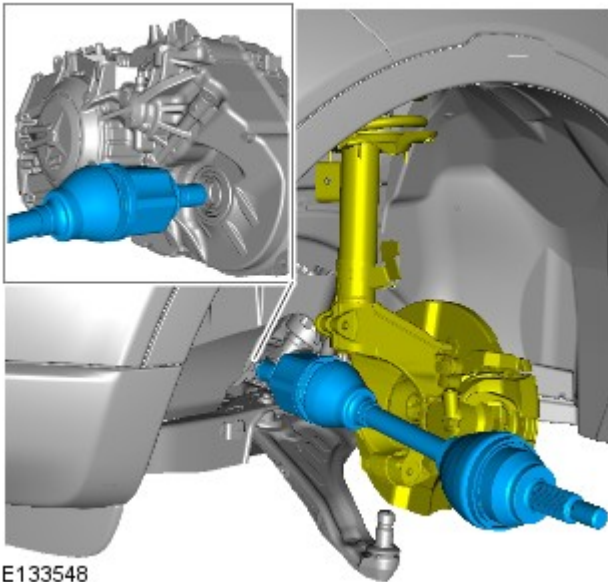
 Make sure that the driveshaft is supported with suitable retaining straps.

 Do not use a hammer to detach the halfshaft from the hub assembly, failure to follow this instruction may result in damage to the halfshaft.

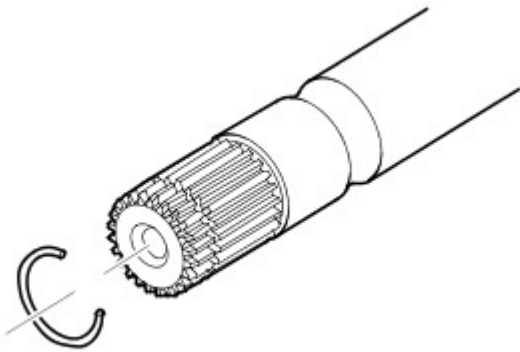
Special Tool(s): [205-857](#)

10.  WARNING: Be prepared to collect escaping fluids.

 CAUTION: Keep the halfshaft horizontal to avoid damaging the oil seal.

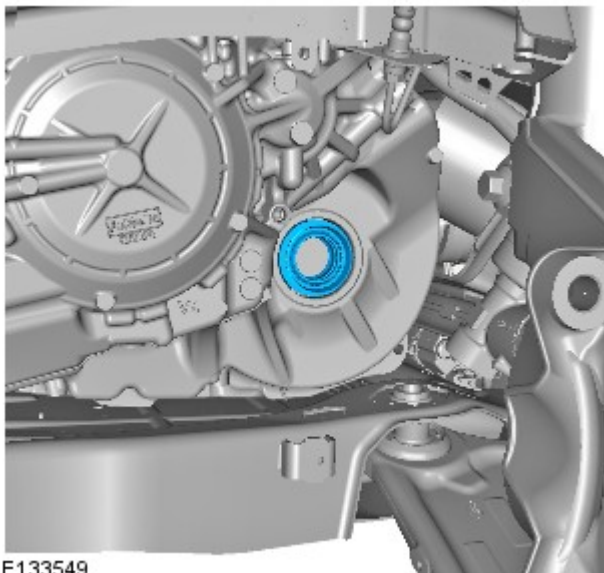


E133548





E45752

11.  CAUTION: Discard the snap ring.




E133549

12.  CAUTION: Inspect the seal, replace if damaged

 NOTE: Automatic transmission shown, manual transmission is similar.

Installation

1. CAUTIONS:

 Make sure that the mating faces are clean and free of corrosion and foreign material.



E159531



Make sure the seal is installed correctly.



NOTE: This step is only required if previously removed.

Special Tool(s): [307-520](#) , [JLR-307-686](#)



E133647

2. NOTES:

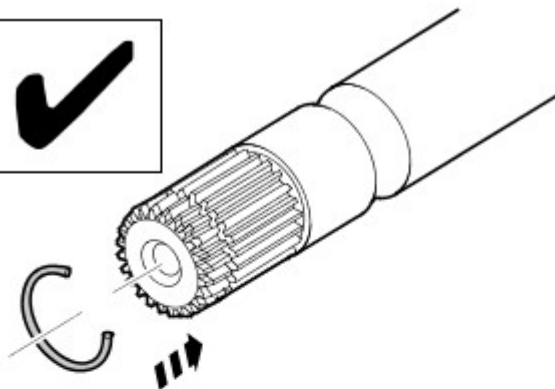


Do not fully engage the halfshaft until the oil seal protector has been removed.



Manual transmission shown, automatic transmission is similar.

To prevent oil seal damage use the protector when installing the shaft into the transmission. It is not a special tool but is available from the Parts Catalogue.



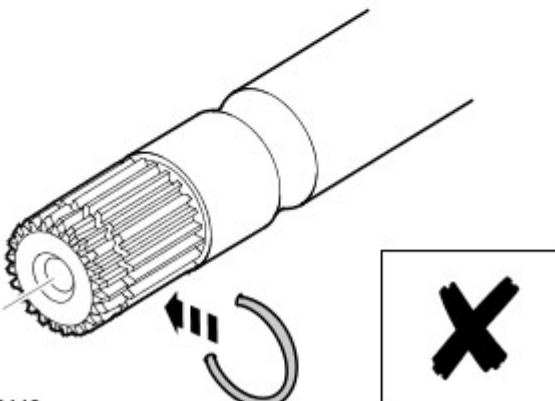
3. CAUTIONS:



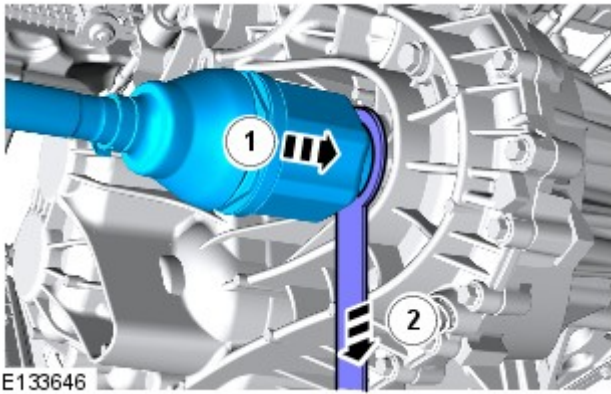
Make sure that the snap ring is installed from the end of the halfshaft. Failure to follow this instruction may result in damage to the vehicle.



Install a new snap ring.



E116449



4. CAUTIONS:



Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the transmission.



Keep the halfshaft horizontal to avoid damaging the oil seal.

NOTES:

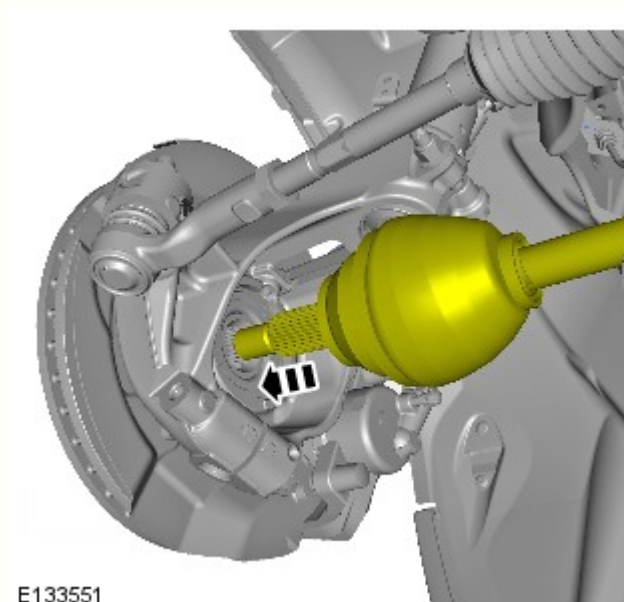


Do not fully engage the halfshaft until the oil seal protector has been removed.



Manual transmission shown, automatic transmission is similar.

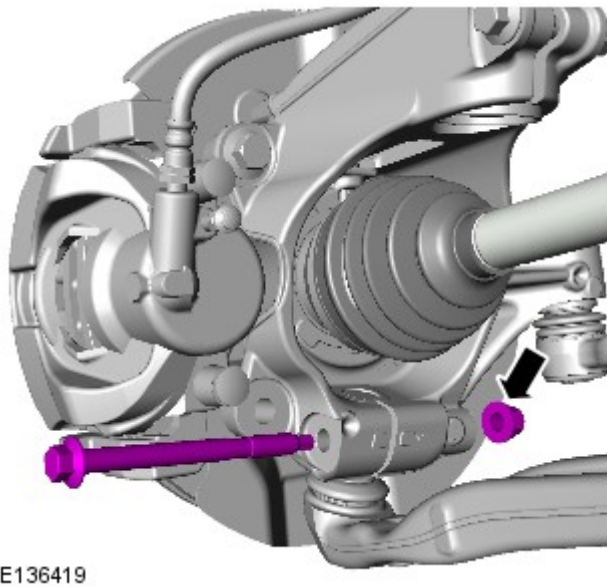
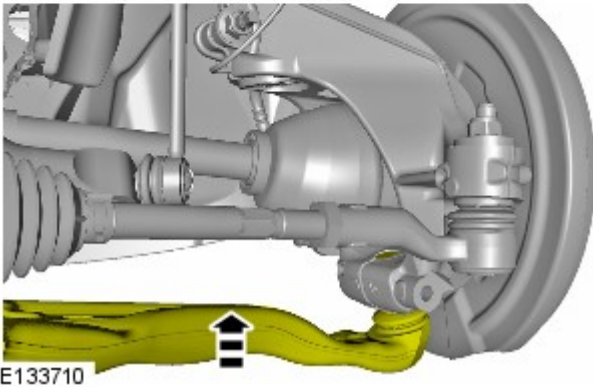
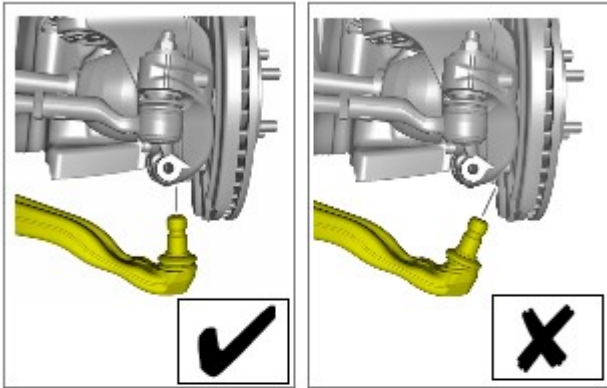
5.



6.



NOTE: Right hand illustration shown, left hand is similar.



7.  **CAUTION:** Make sure that a new bolt is installed.

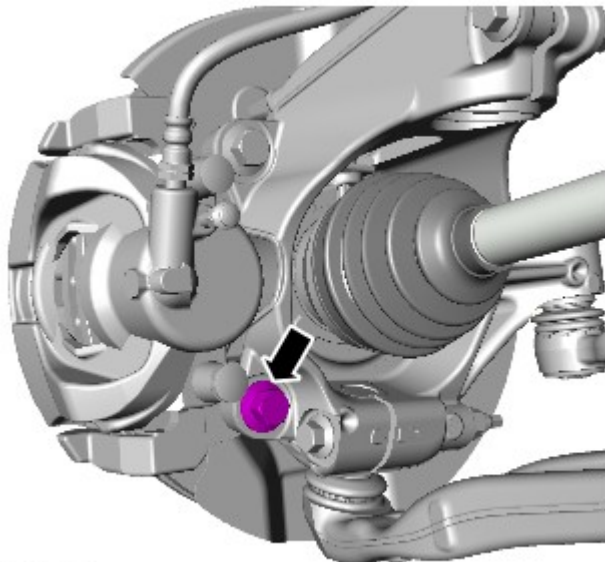
 **NOTE:** Right hand illustration shown, left hand is similar.

Torque:
 Stage 1: 80 Nm
 Stage 2: 180°

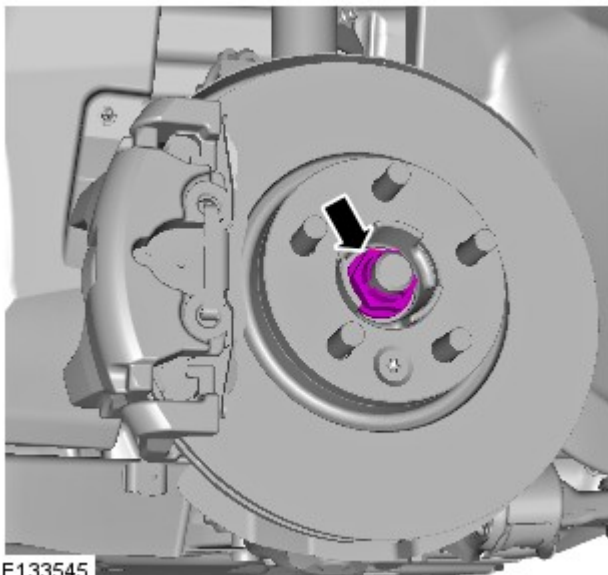
8.  **CAUTION:** Make sure that a new bolt is installed.

 **NOTE:** Right hand illustration shown, left hand is similar.


Torque:
 Stage 1: 90 Nm
 Stage 2: 120°




E136418




E133545

9.  **WARNING:** Make sure that a new nut is installed.

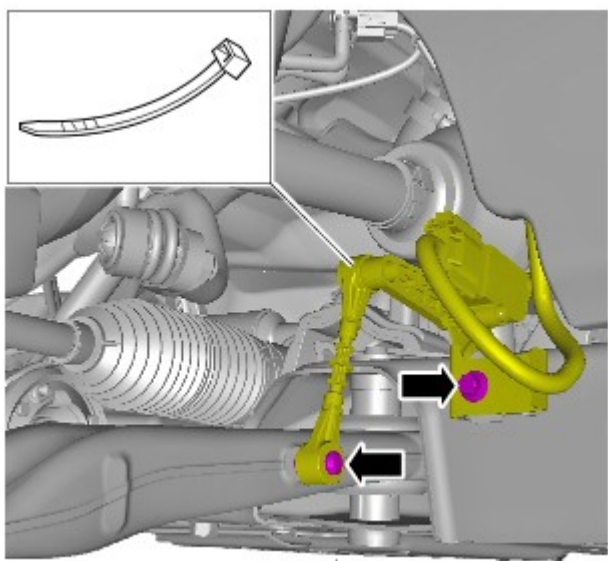
CAUTIONS:

-  Do not use air tools to install the nut. Failure to follow this instruction may result in damage to the component.

-  Install the halfshaft nut finger tight.

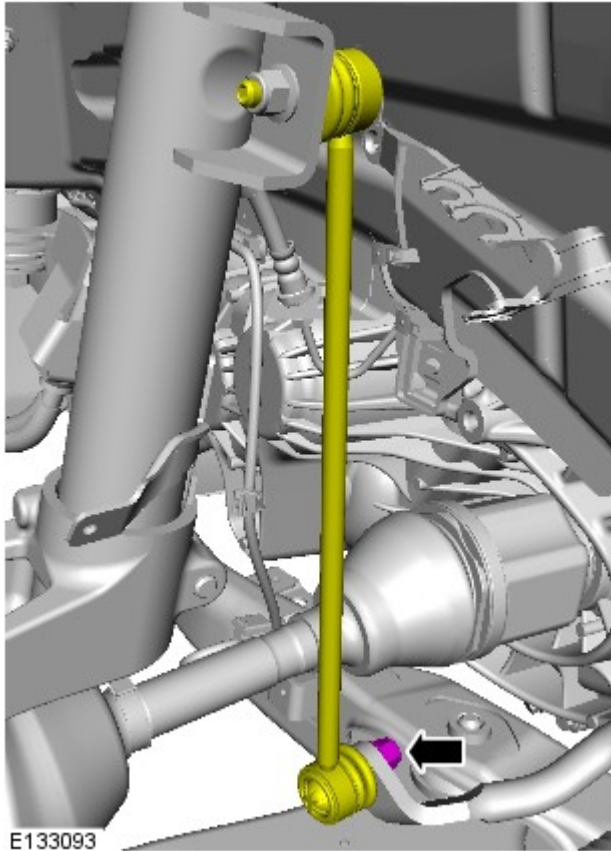
-  Tighten the nut without the weight of the vehicle on the suspension.


Torque:
 Stage 1: 100 Nm
 Stage 2: 90°



E133691

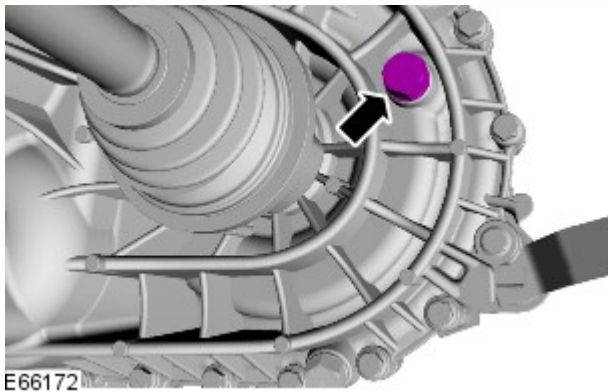
10. *Torque:* 10 Nm



11.  **WARNING:** Make sure that a new nut is installed.

Torque: 65 Nm

12. Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).



13. Manual transmission vehicles only: Check and top-up the transmission fluid level.

14. Using only four wheel alignment equipment approved by Land Rover, check and adjust the wheel alignment.

Refer to: [Four-Wheel Alignment](#) (204-00 Suspension System - General Information, General Procedures).

Published: 15-Oct-2014

Climate Control - Plenum Chamber Removal and Installation

Removal

NOTES:



Removal steps in this procedure may contain installation details.

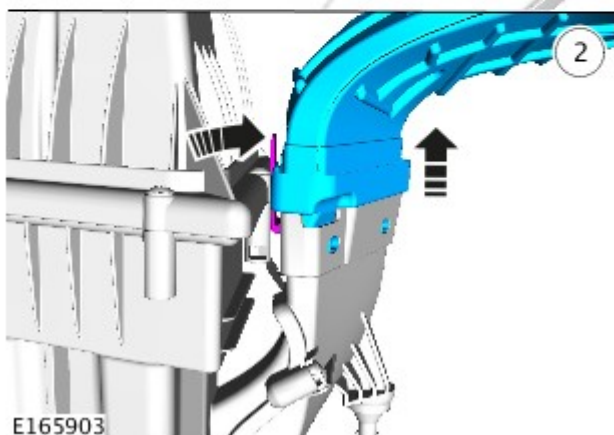
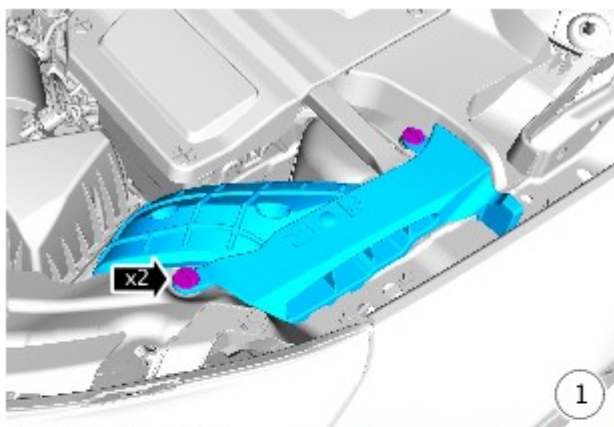
 LHD illustration shown, RHD is similar.

All vehicles

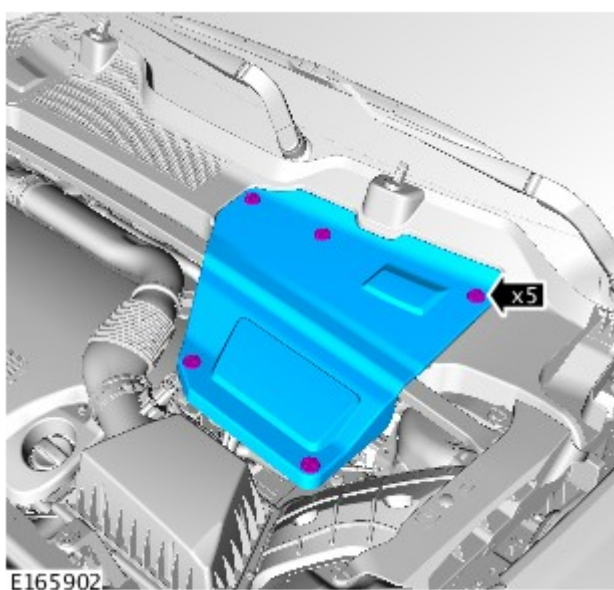
1. Refer to: Wiper Pivot Arm (501-16, Removal and Installation).

2. Repeat the above procedure for the other wiper arm.

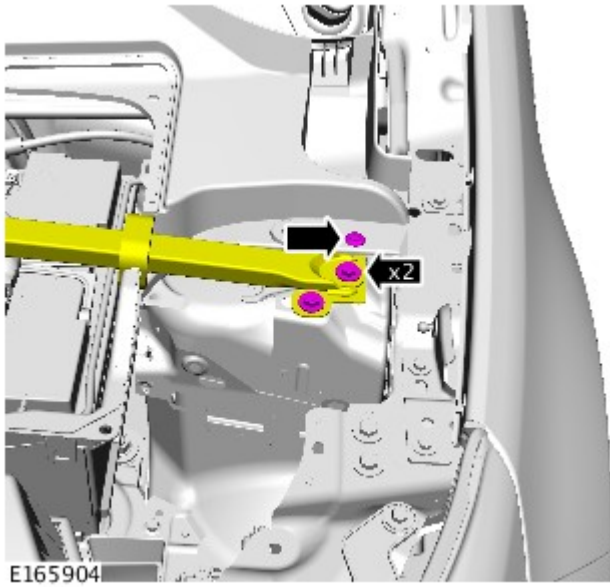
3.



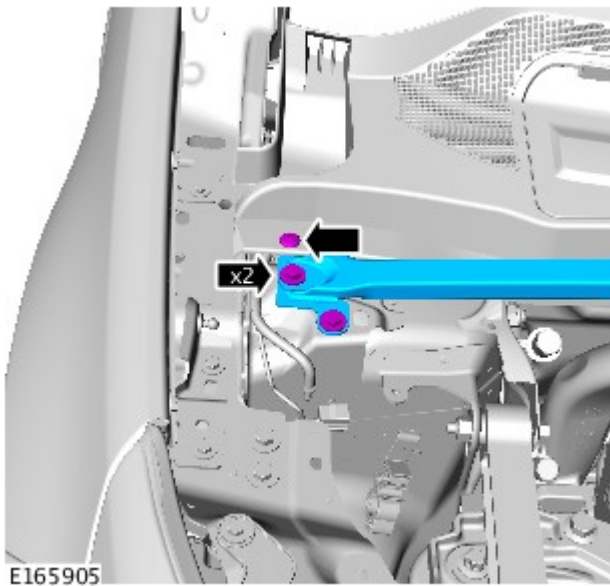
4.



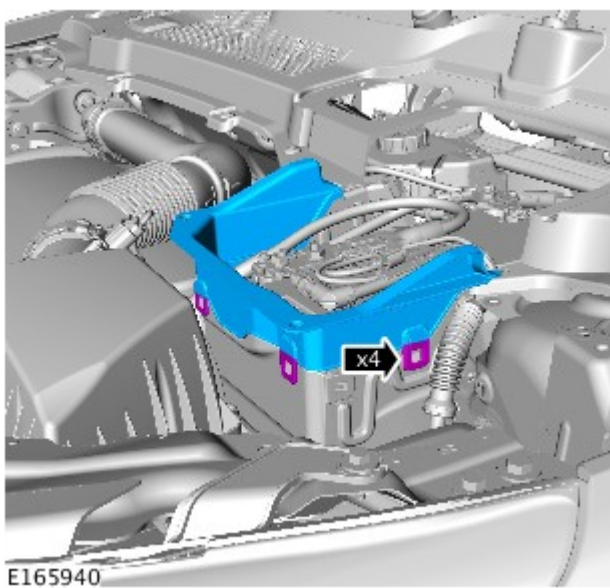
5. Torque: 25 Nm



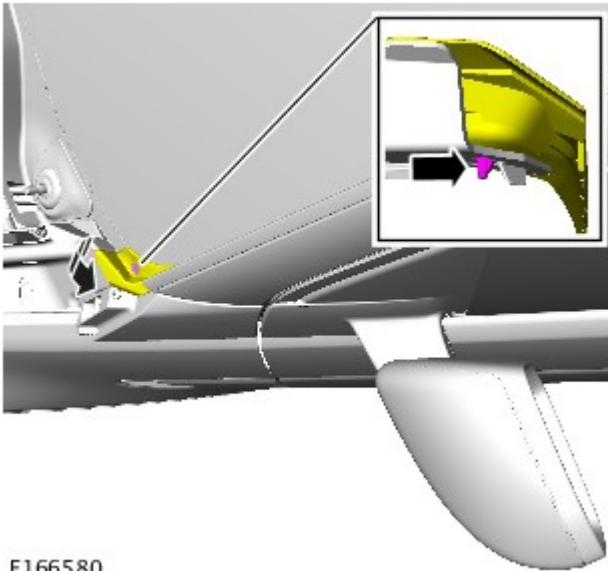
6. Torque: 25 Nm



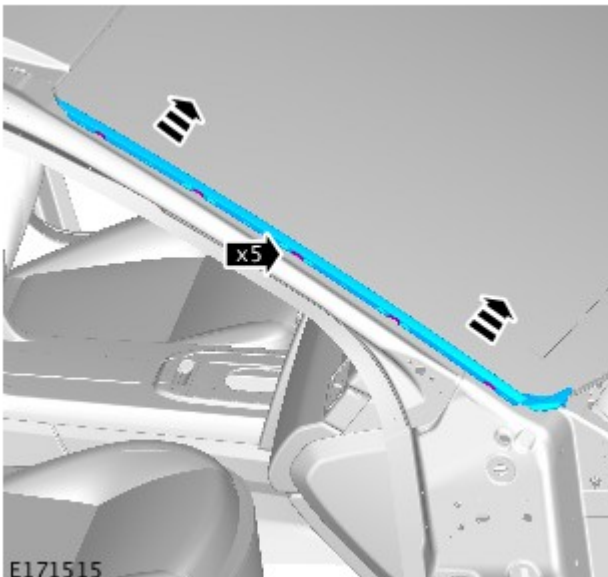
7.



8.

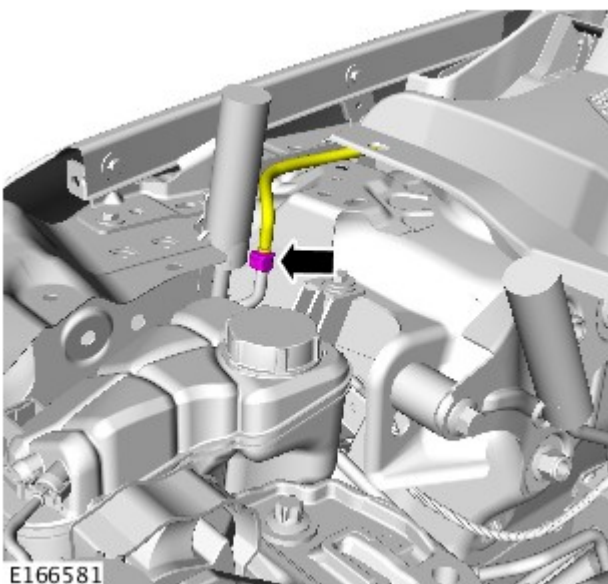


△ NOTE: Repeat the step for the other side.



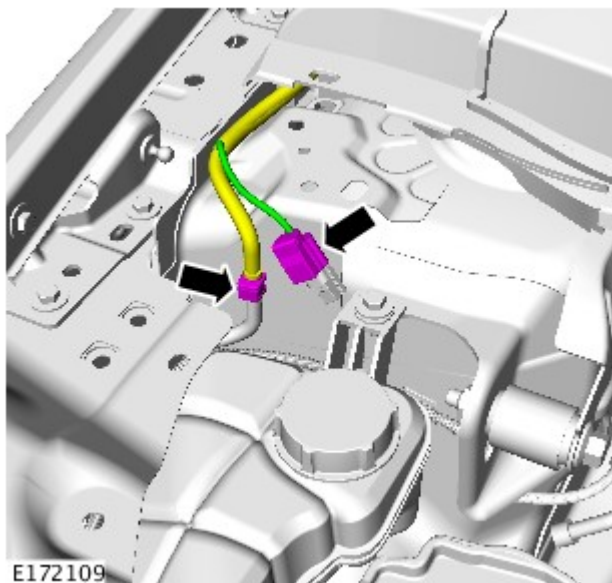
9. △ NOTE: Repeat the step for the other side.


Vehicles without heated washers



10. ⚠ CAUTION: Be prepared to collect escaping fluids.

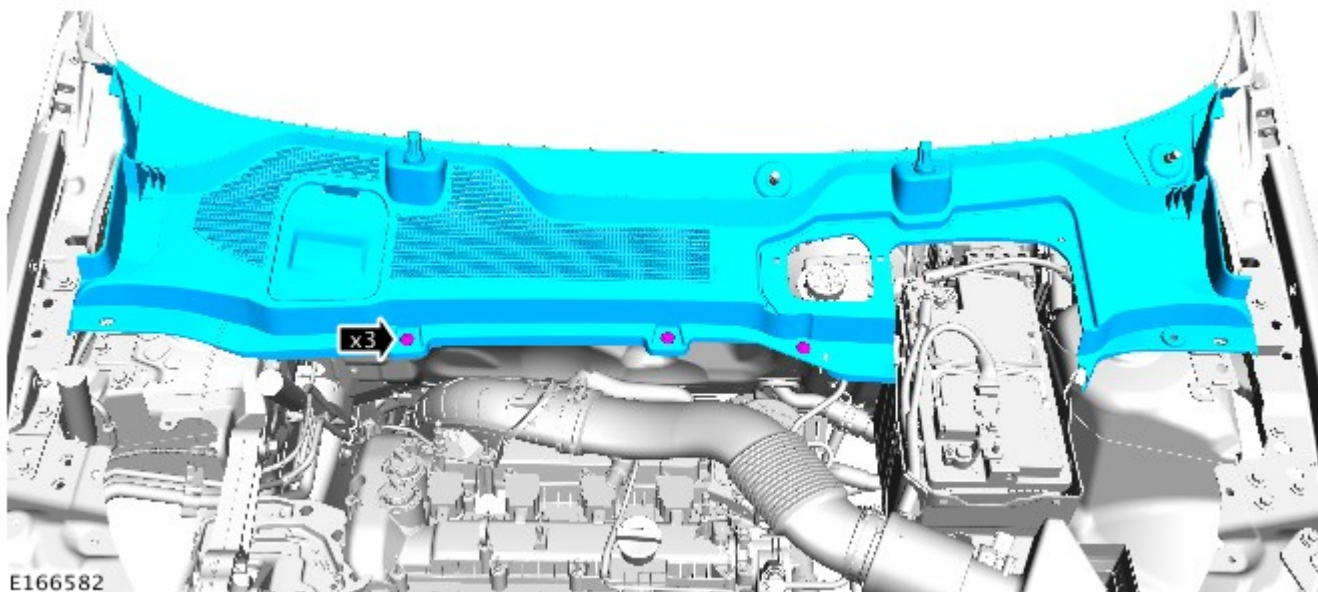
Vehicles with heated washers




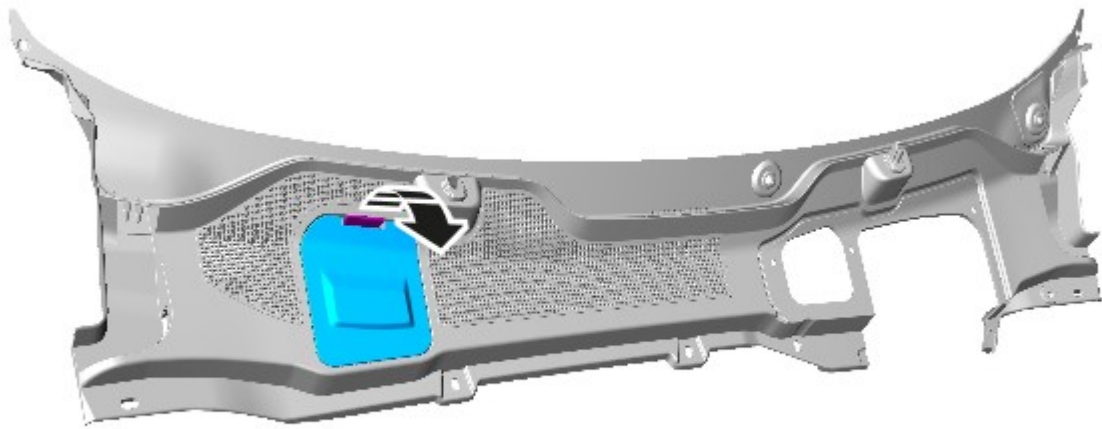
11.  CAUTION: Be prepared to collect escaping fluids.

All vehicles

12.



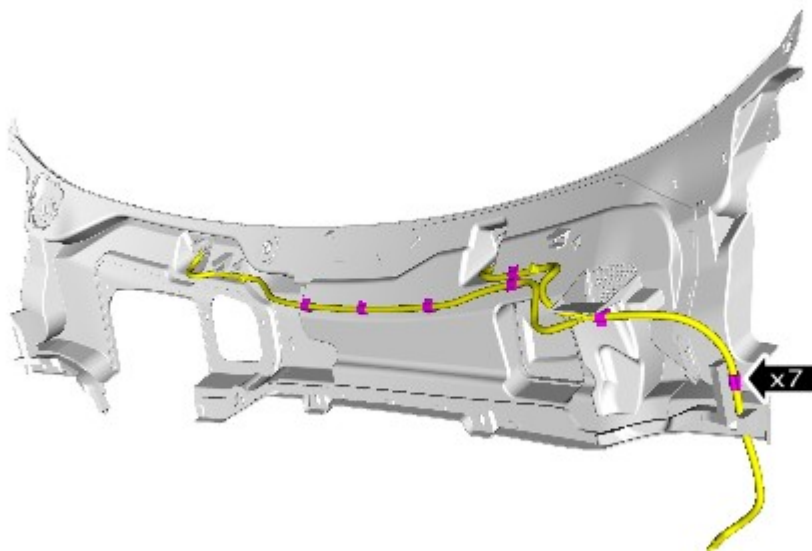
13.  NOTE: Do not disassemble further if the component is removed for access only.



E166583

Vehicles without heated washers

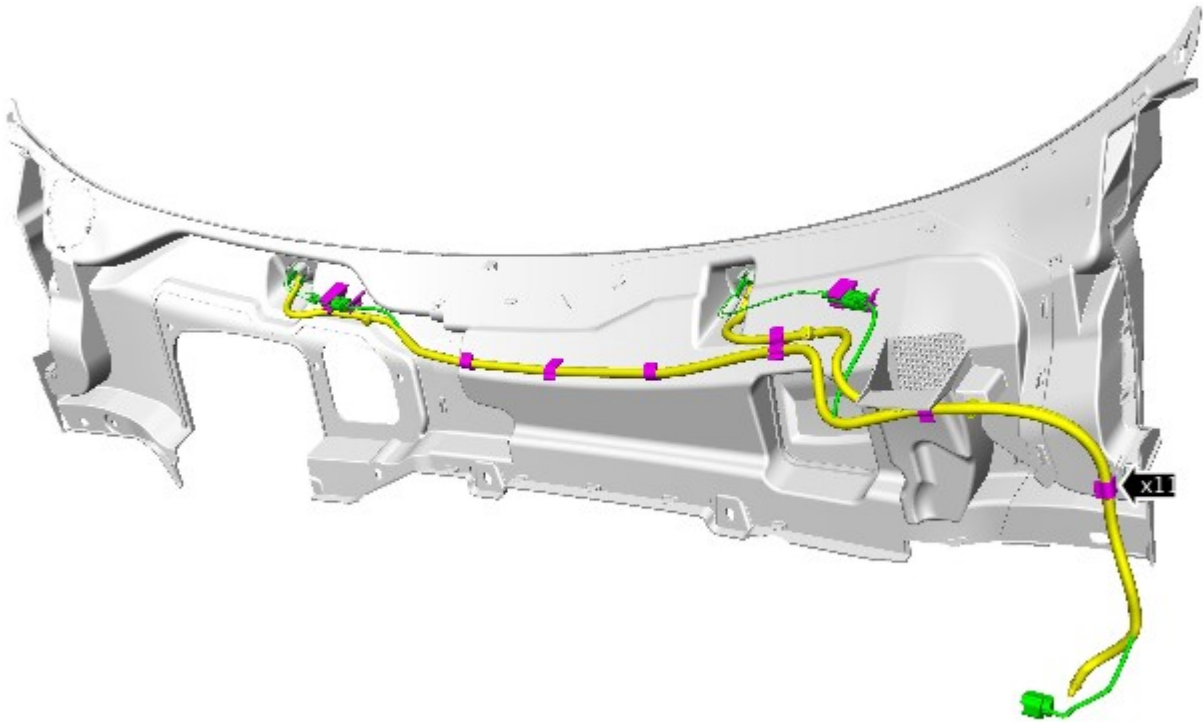
14.



E166584


Vehicles with heated washers

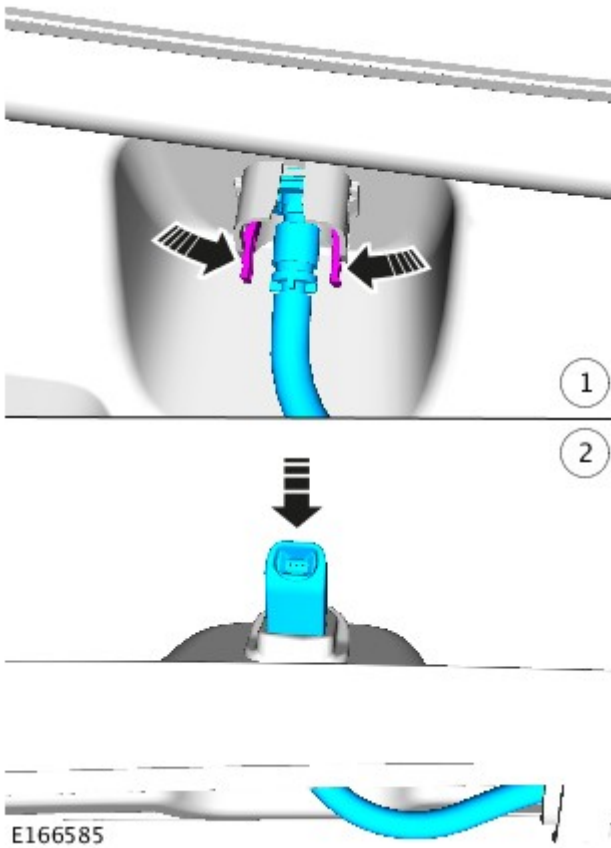
15.



E172110

All vehicles

16.  NOTE: Repeat the step for the other side.



Installation

1. To install, reverse the removal procedure.

Published: 30-Jun-2015

Starting System - INGENIUM I4 2.0L Diesel - Starter Motor

Removal and Installation

Removal

NOTES:



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



Removal steps in this procedure may contain installation details.

All vehicles

1.  **WARNING:** Make sure to support the vehicle with axle stands.

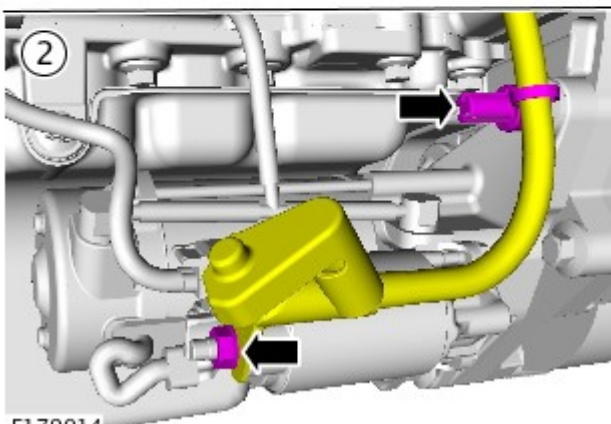
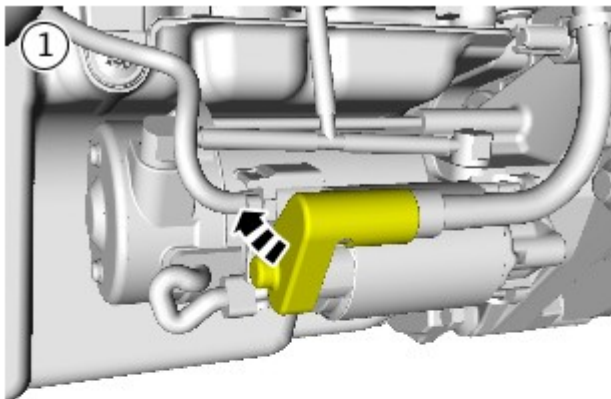
Raise and support the vehicle.

2. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-01 Battery, Mounting and Cables, Specifications).

3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

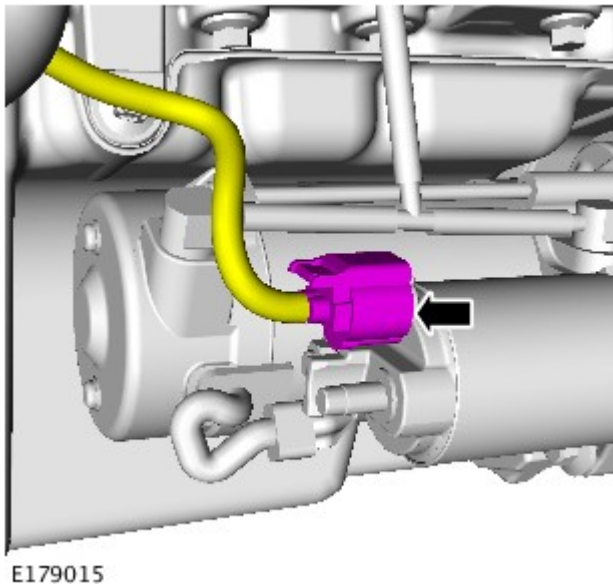
4. Torque: 10 Nm



E179014

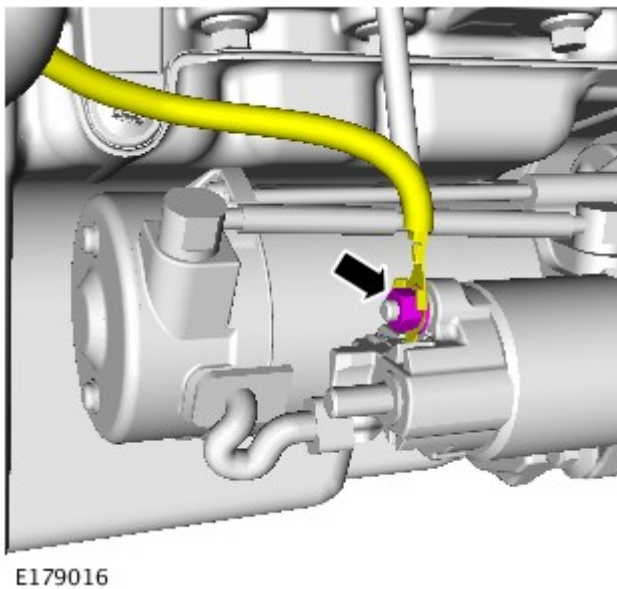
Vehicles with automatic transmission

5.



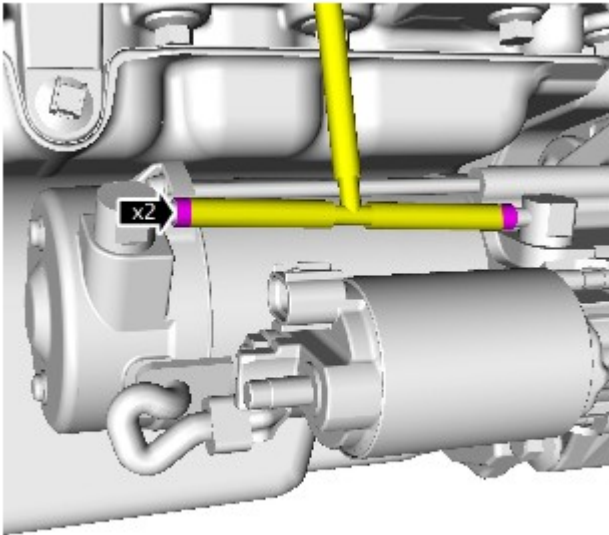
Vehicles with manual transmission

6. Torque: 7 Nm

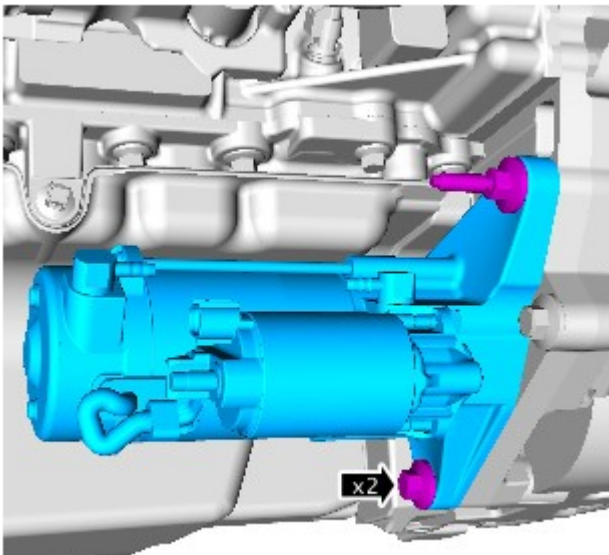


All vehicles

7.



E179017



E179018

8. Torque: 48 Nm

Installation

1. To install, reverse the removal procedure.

Published: 01-Oct-2013

Front End Body Panels - Engine Undershield

Removal and Installation

Removal


NOTES:




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



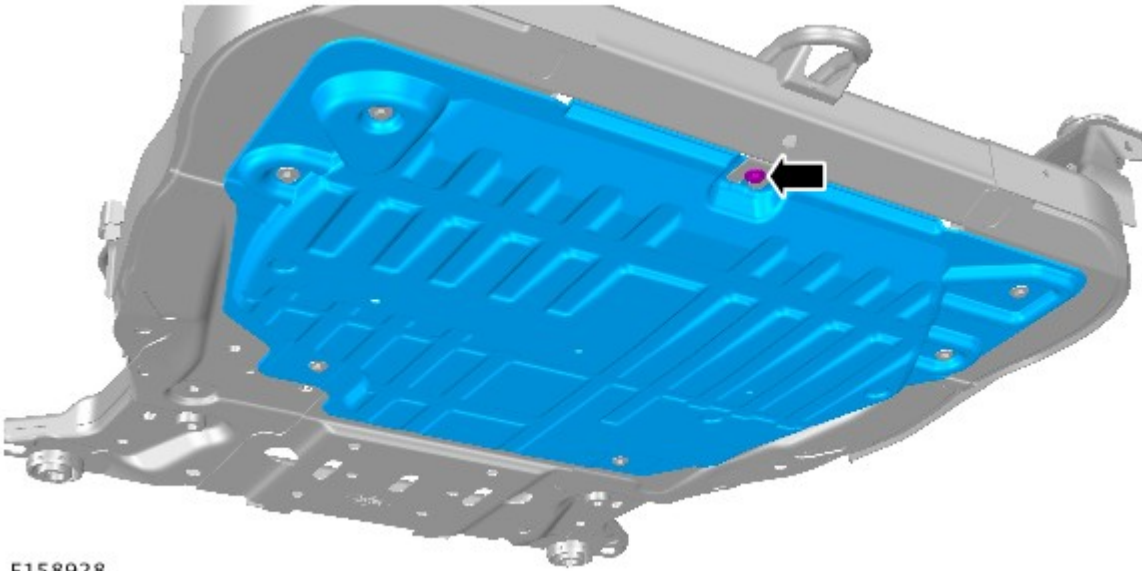
Removal steps in this procedure may contain installation details.

1.  **WARNING:** Make sure to support the vehicle with axle stands.

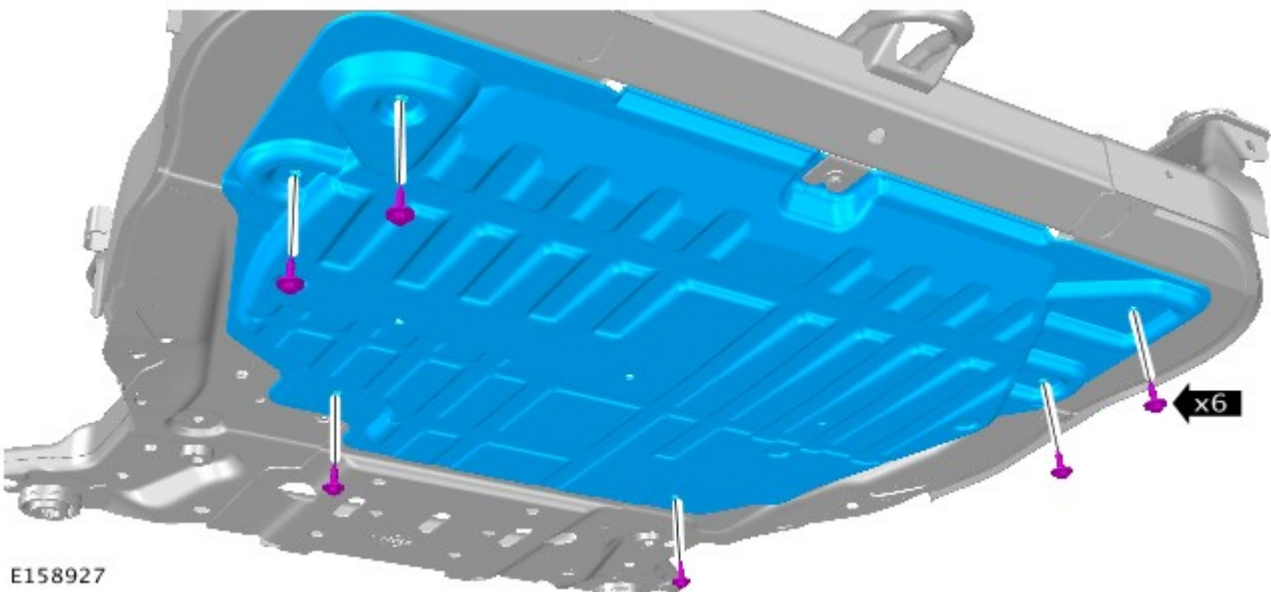
Raise and support the vehicle.


2.  NOTE: Loosen the bolt, but do not fully remove.

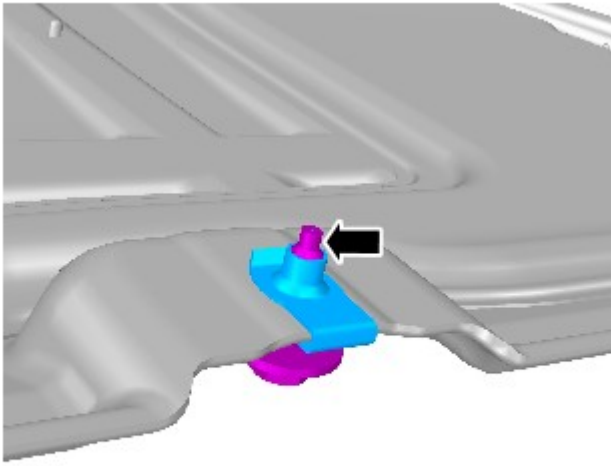
Torque: 10 Nm



3. Torque: 10 Nm



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



E158929

Installation



- 1. To install, reverse the removal procedure.

Published: 18-Oct-2016

Front Drive Halfshafts - Front Halfshaft RH RHD AWD/LHD AWD




Removal and Installation


Special Tool(s)

 <p>205-857 E79462</p>	205-857 Remover, Halfshaft
 <p>205-872 E91955</p>	205-872 Installer, Transfer Case Seal

Removal

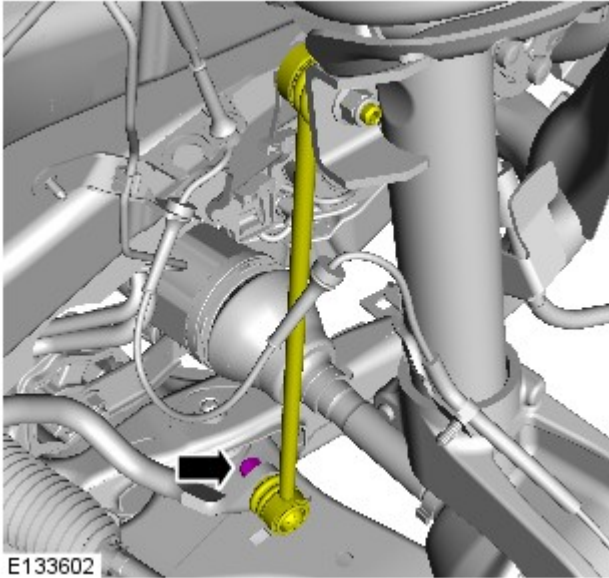
CAUTIONS:

-  Nuts and bolts must be tightened with the weight of the vehicle on the suspension.
-  Do not allow halfshafts to hang unsupported at one end or joint damage will occur.
-  Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

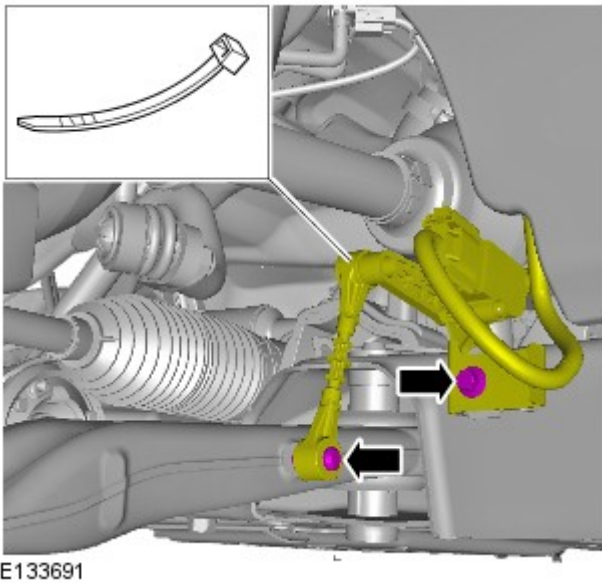
1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).



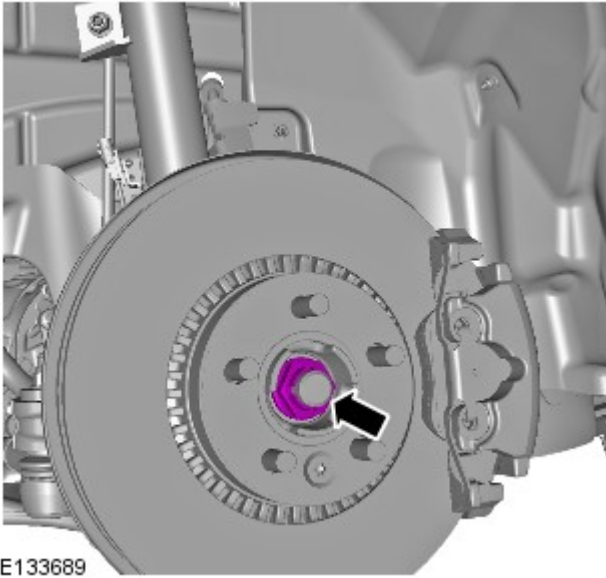
3.  **CAUTION:** Discard the nut.



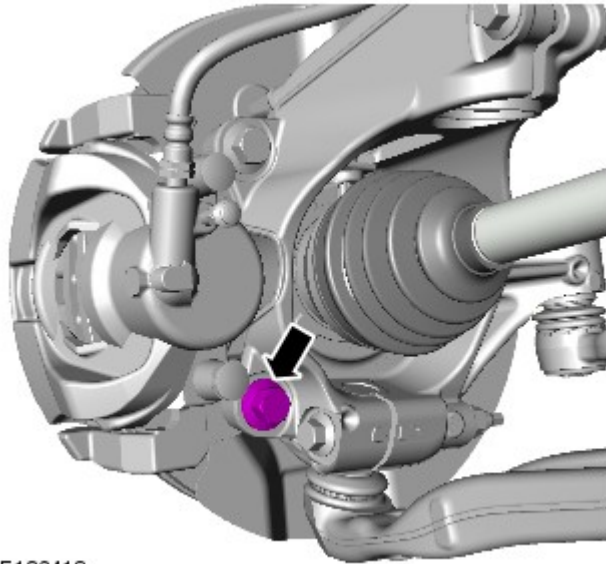
- 4.

5.  **WARNING:** Make sure that a new nut is installed.

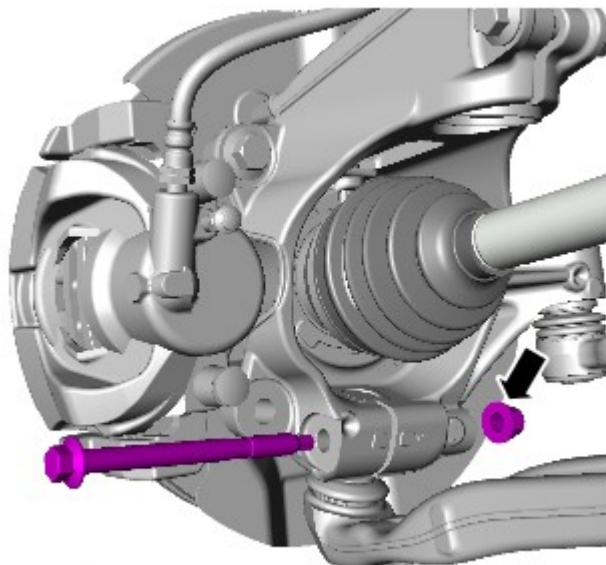
-  **CAUTION:** Discard the nut.



E133689



E136418

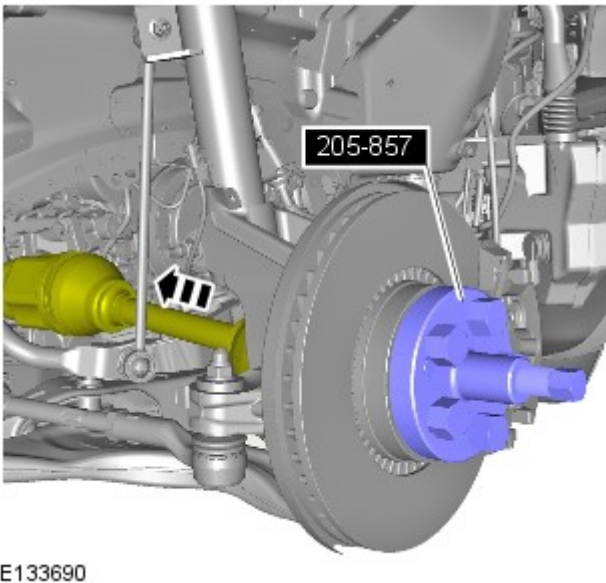
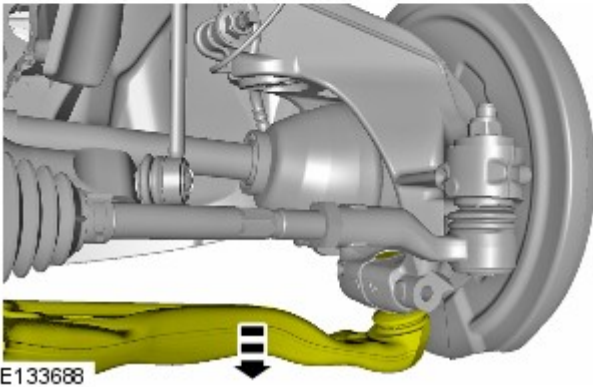
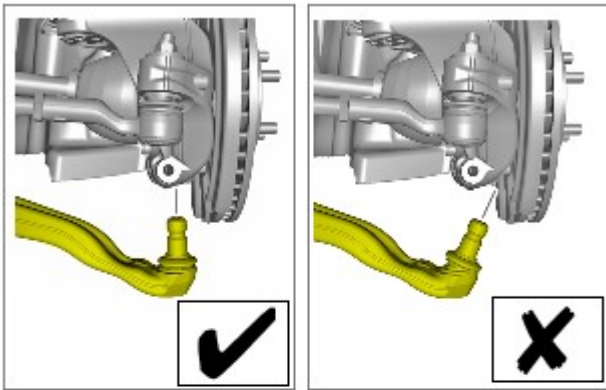


E136419

6.  CAUTION: Discard the bolt.

- 7.

8.



9. CAUTIONS:



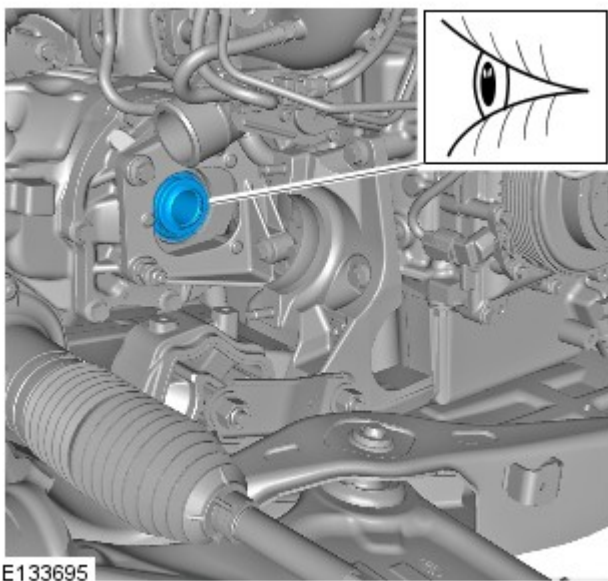
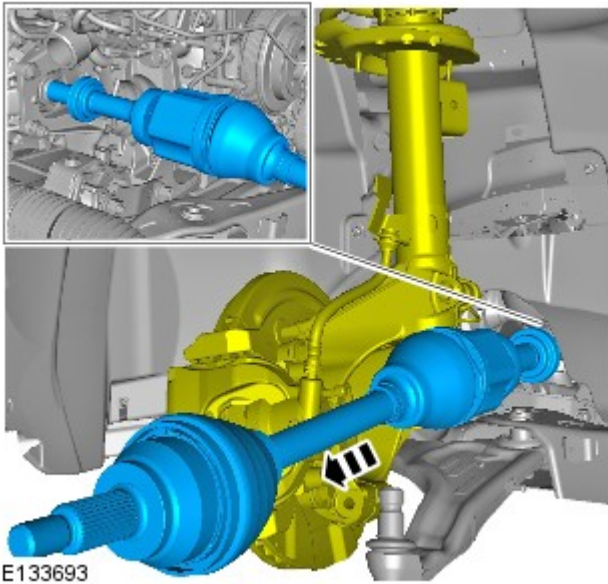
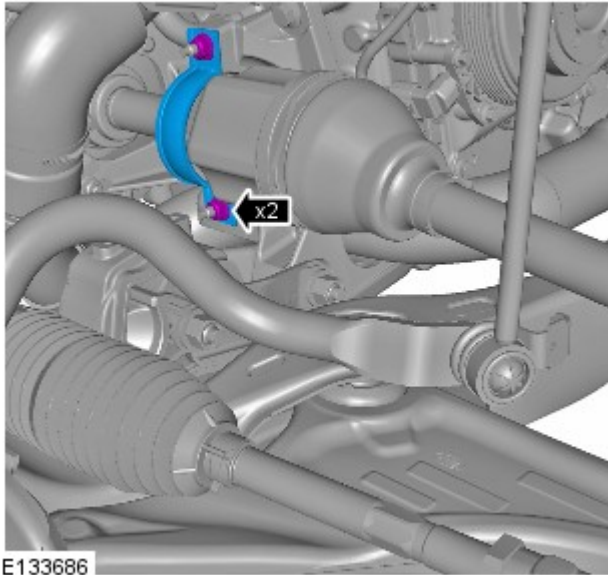
Make sure that the driveshaft is supported with suitable retaining straps.




Do not use a hammer to detach the halfshaft from the hub assembly, failure to follow this instruction may result in damage to the halfshaft.

Special Tool(s): [205-857](#)


10.



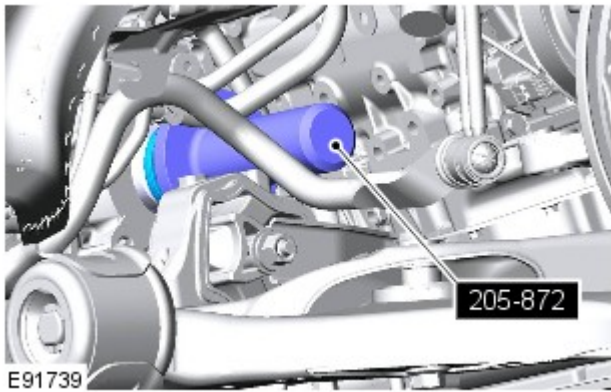
11.  **WARNING:** Be prepared to collect escaping fluids.

 **CAUTION:** Keep the halfshaft horizontal to avoid damaging the oil seal.

12. **CAUTIONS:**

 **Inspect the seal, replace if damaged**

 **Take extra care not to damage the mating faces.**



1. CAUTIONS:



Make sure that the mating faces are clean and free of corrosion and foreign material.

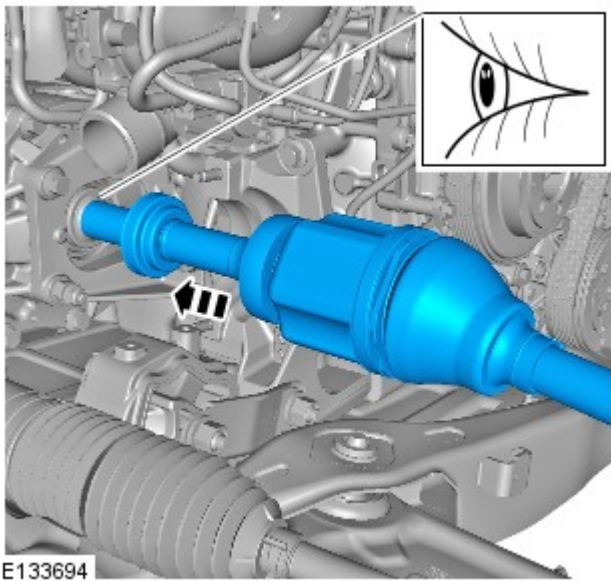


Make sure the seal is installed correctly.



NOTE: This step is only required if previously removed.

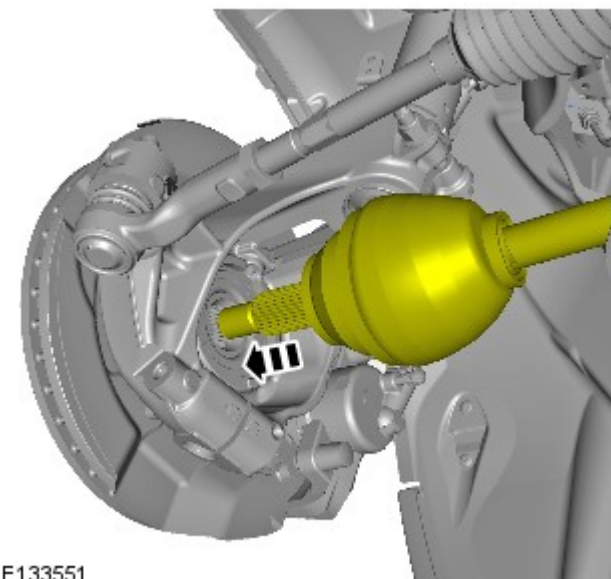
Special Tool(s): [205-872](#)



2.



CAUTION: Keep the halfshaft horizontal to avoid damaging the oil seal.

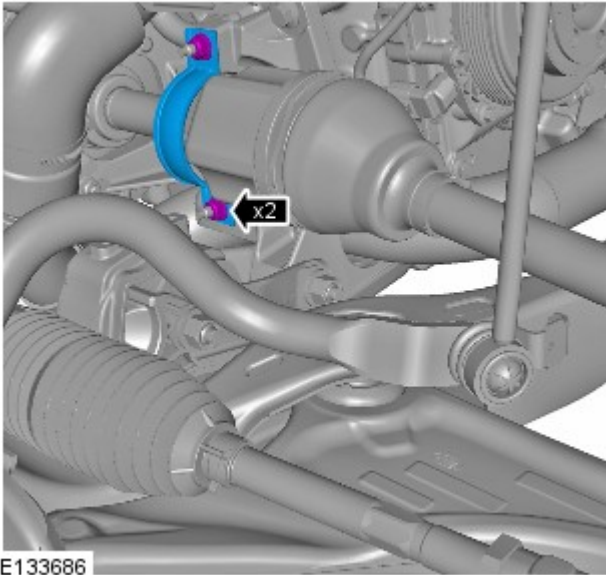


3.



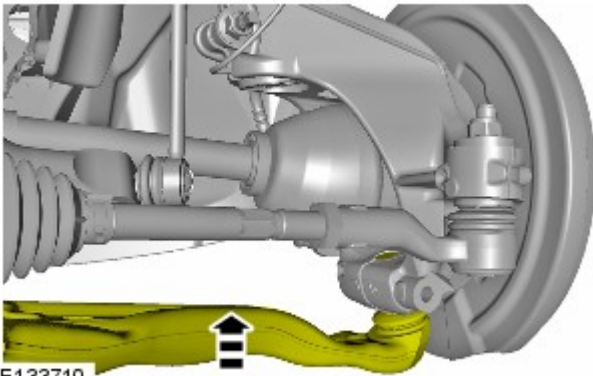
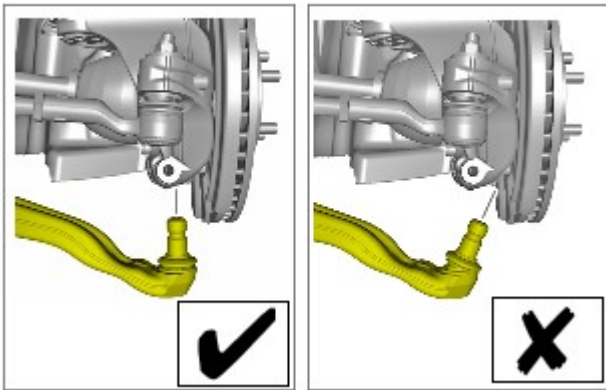
CAUTION: LH illustration shown, RH is similar.

4. Torque: 25 Nm



E133686

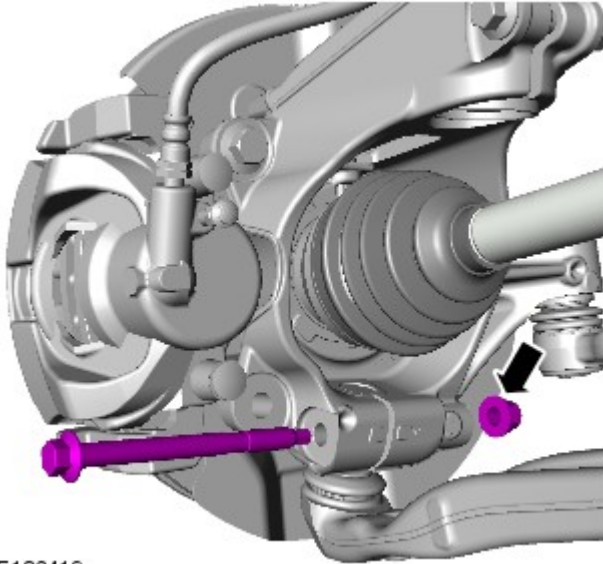
5.



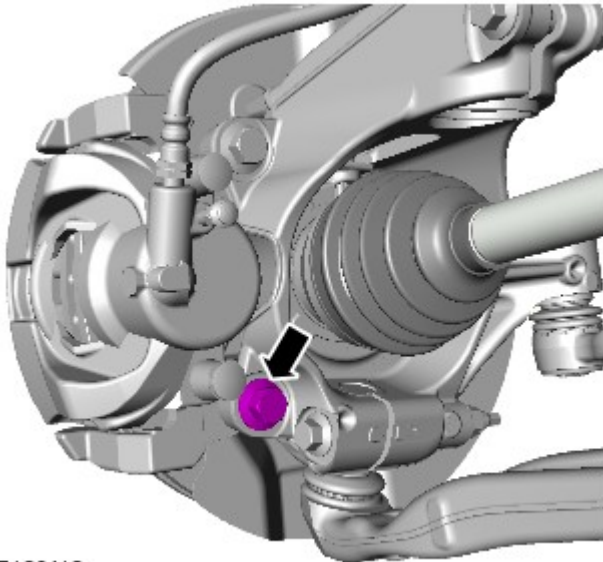
E133710

6.  CAUTION: Make sure that a new bolt is installed.

Torque:
 Stage 1: 80 Nm
 Stage 2: 180°



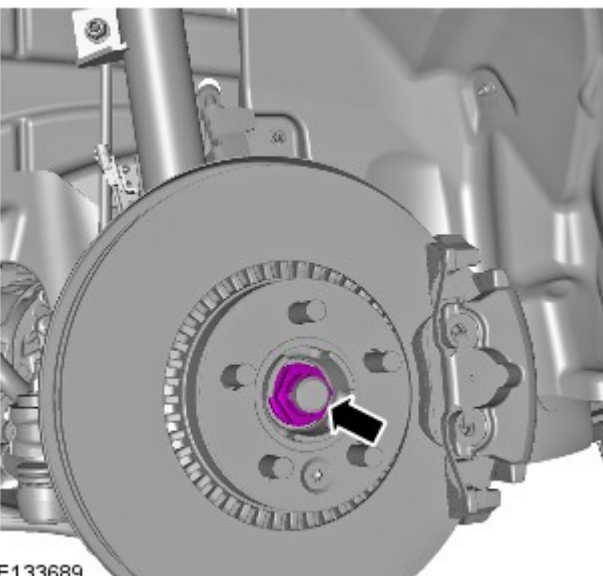
E136419



E136418

7.  **CAUTION:** Make sure that a new bolt is installed.

Torque:
 Stage 1: 90 Nm
 Stage 2: 120°



E136689

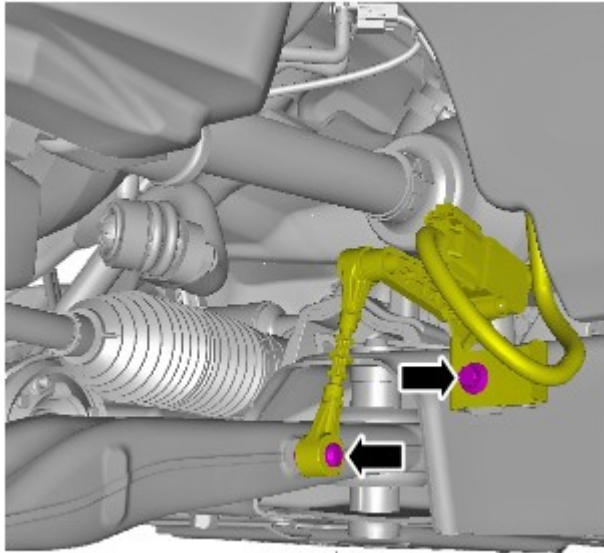
8.  **WARNING:** Make sure that a new nut is installed.

CAUTIONS:

 Do not use air tools to install the nut. Failure to follow this instruction may result in damage to the component.

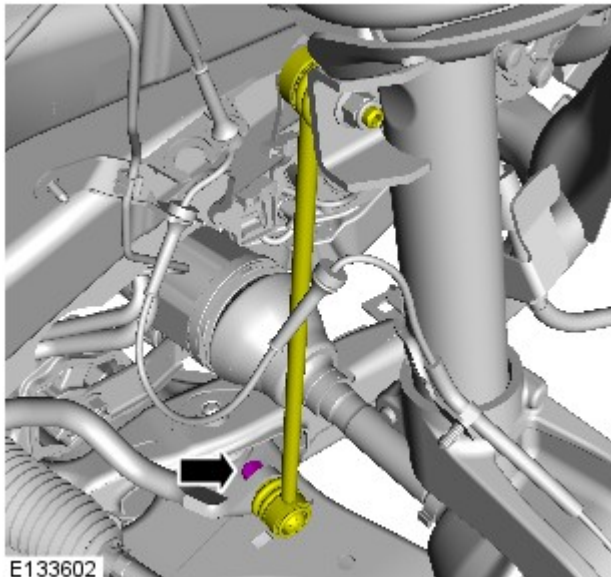
 Install the halfshaft nut finger tight.

Torque:
 Stage 1: 100 Nm
 Stage 2: 90°




E133692

9. Torque: 10 Nm

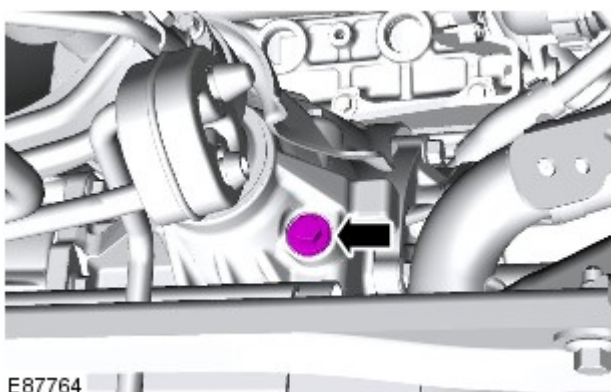


E133602


10.  **WARNING:** Make sure that a new nut is installed.

Torque: 65 Nm

11. Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).



E87764

12.  **CAUTION:** The fluid filler plug is not a fluid level plug.

Check and top-up the transfer case fluid level.

13. Using only four wheel alignment equipment approved by Land Rover, check and adjust the wheel alignment.

Refer to: [Four-Wheel Alignment](#) (204-00 Suspension System - General Information, General Procedures).

Automatic Transmission/Transaxle - Transmission Fluid Level Check

General Procedures

Check

WARNINGS:



Be prepared to collect escaping fluids.



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



CAUTION: Vehicle must be horizontal during this operation.




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

1. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

2. Connect the Land Rover equipment.

3. Start and run the engine.


4. Select terrain response mode. Grass/Gravel/Snow.

5.  WARNING: Make sure that all four wheels are off the ground for this step.




NOTE: Move the transmission control switch (TCS) from D to S then using the steering paddles pause in each gear for a minimum 10 seconds until you reach 4th gear. (max 2000rpm)

Using the diagnostic equipment monitor the transmission fluid temperature until 35 degrees celsius is reached.

6.  CAUTION: Decelerate the wheels until they stop, then turn the (TCS) back into the P position.

Make sure that torque converter is full of oil by raising the engine speed to 2000rpm for 10 seconds, return to idle speed.

7.  CAUTION: Engine must be running to carry out the fluid level check.

8. CAUTIONS:



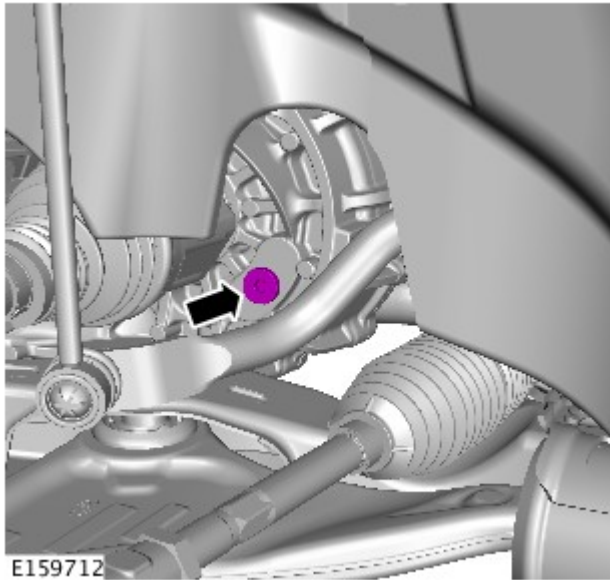
Transmission fluid temperature must not exceed 45 degrees celsius.



Discard the sealing plug.

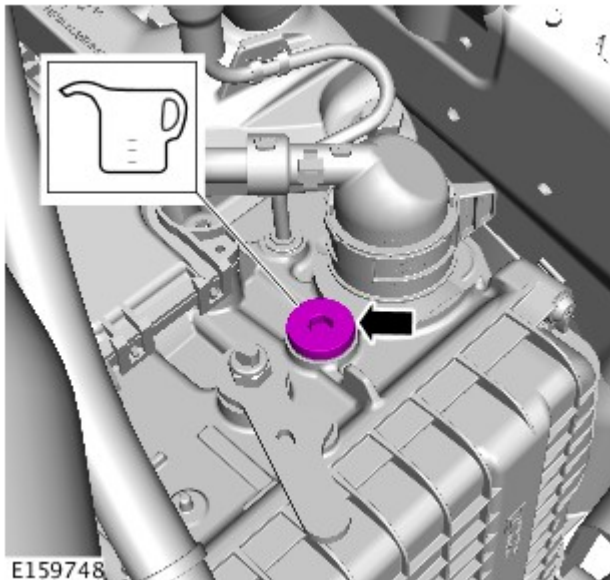


Drain the fluid into a suitable container.



NOTE: With the engine running a small amount of automatic transmission fluid should drip out of the level plug.

When transmission fluid temperature reaches 37 degrees celsius, remove the level plug and wait until oil stops dripping out.



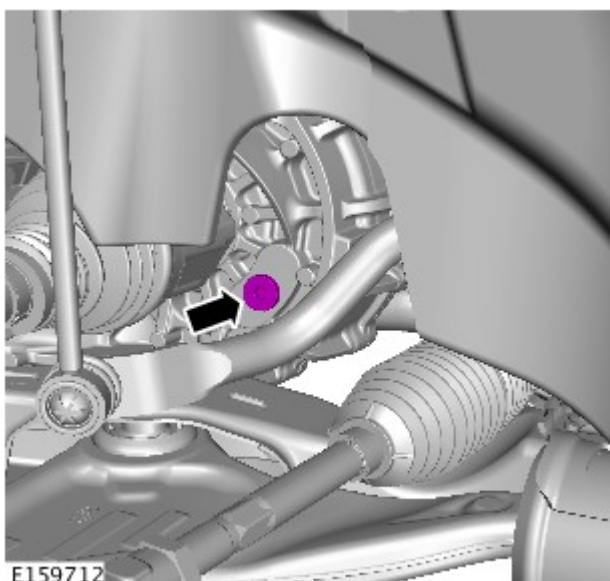
9.



CAUTION: Install a new sealing plug.

If the transmission fluid does not come out of the transmission fluid level plug hole the transmission fluid level is insufficient. If this is the case add the transmission fluid in 0.5 litre units into the transmission fluid fill plug hole until fluid comes out.

Torque: 35 Nm



10.



CAUTION: Install a new sealing plug.



NOTE: If the temperature has exceeded 45 degrees celsius before the plug is re-fitted, you must start the procedure again.

Torque: 35 Nm

11. Switch off the engine.

12. Remove the container.

13. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

14. Lower the vehicle.

15. Disconnect the diagnostic tool.

Published: 01-Oct-2013

Front End Body Panels - Engine Undershield

Removal and Installation

Removal

NOTES:



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



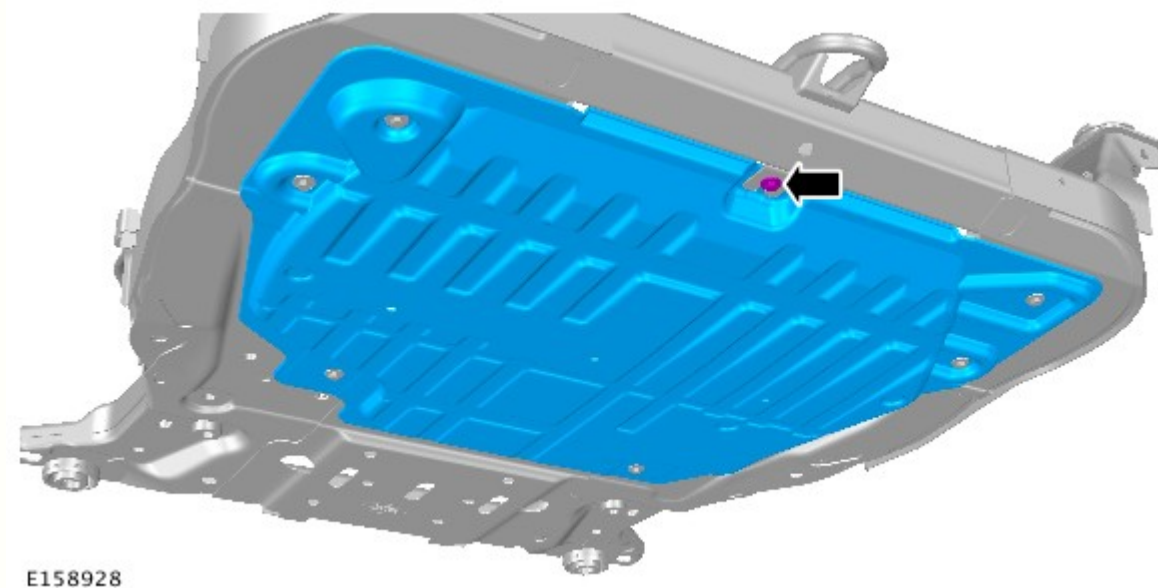
Removal steps in this procedure may contain installation details.

1.  **WARNING:** Make sure to support the vehicle with axle stands.

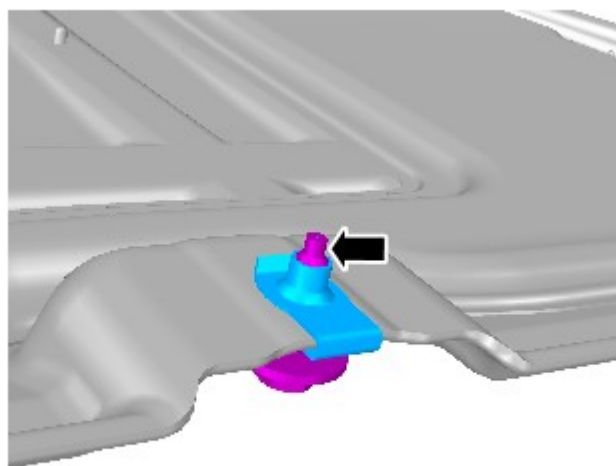
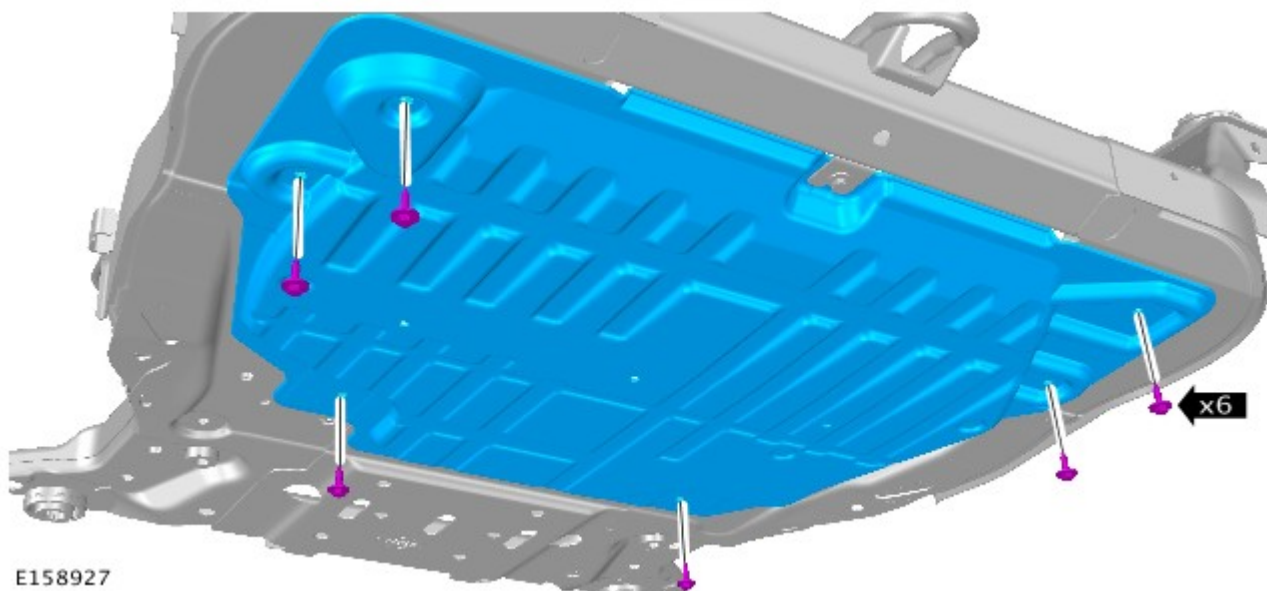
Raise and support the vehicle.


2.  **NOTE:** Loosen the bolt, but do not fully remove.

Torque: 10 Nm



3. *Torque:* 10 Nm



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

Installation

1. To install, reverse the removal procedure.

Automatic Transmission/Transaxle - Transmission Fluid Drain and Refill

General Procedures

Draining

WARNINGS:



Be prepared to collect escaping fluids.



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

CAUTIONS:



Make sure that the area around the component is clean and free of foreign material.

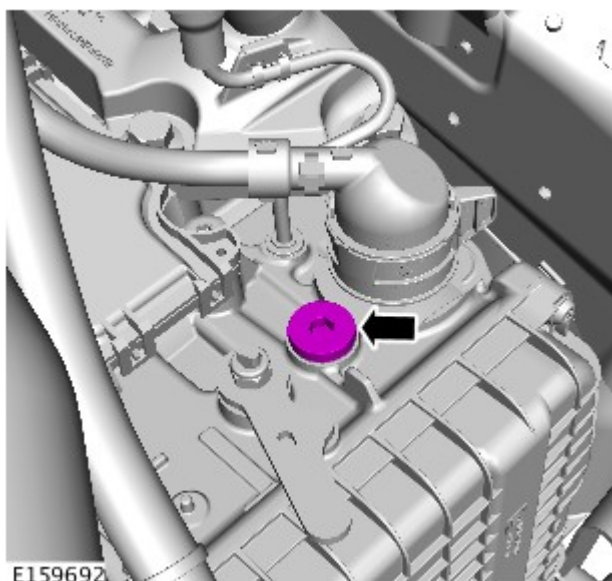


Vehicle must be horizontal during this operation.



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

1. Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel, Removal and Installation).



- 2.



NOTE: Discard the sealing plug.

3. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

- 4.



CAUTION: The ambient temperature should not be below 20 degrees celsius.

NOTES:

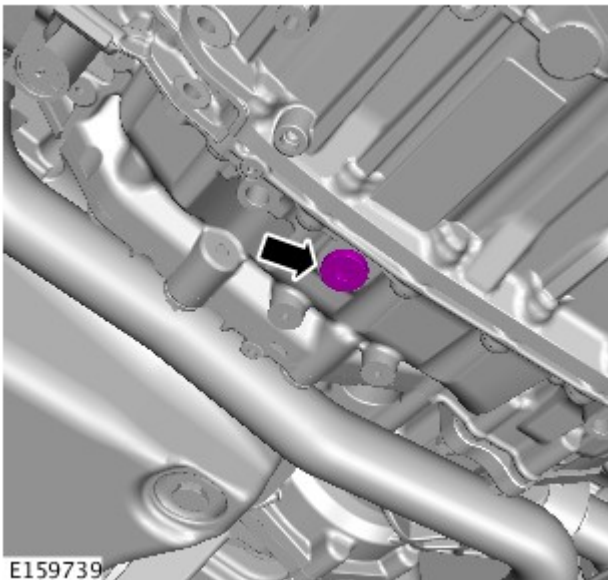
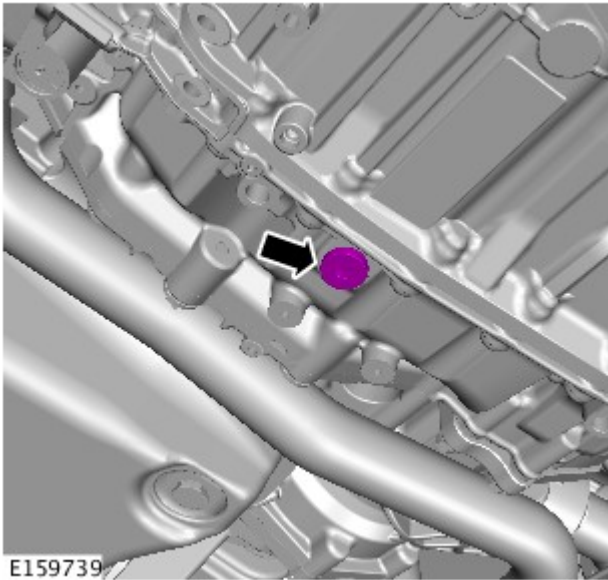


Drain the fluid into a suitable container.



Discard the sealing plug.

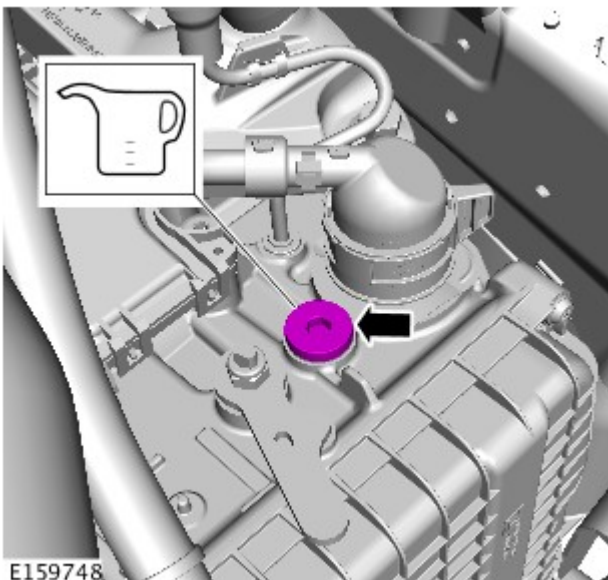
Allow the fluid to drain until the flow stops.



5.  **CAUTION:** Install a new sealing plug.

Torque: 35 Nm

6. Lower the Vehicle.



7. **CAUTIONS:**

 Install a new sealing plug.

 Use transmission fluid meeting Landrover specification.

Fill the transmission with 3.5 litres of oil.

Refer to: [Specifications](#) (307-01 Automatic Transmission/Transaxle, Specifications).

Torque: 35 Nm

8. Carry out transmission fluid level check.

Refer to: [Transmission Fluid Level Check](#) (307-01 Automatic Transmission/Transaxle, General Procedures).

Published: 02-Oct-2015

Automatic Transmission/Transaxle -

Maintenance



CAUTION: Use only shell L12108 (ZF Lifeguard 8) Automatic transmission fluid. Use of any other fluids may result in a transmission malfunction or failure.

Description	Intervals
Normal maintenance	Filled for life.
Severe duty maintenance	Change the fluid at 48,000 km (30,000 miles) intervals.

Capacities

	Litres
Transmission Fluid	6.5

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
9HP48 Transmission fluid	Shell L12108 (ZF Lifeguard 8)
Metal surface cleaner	WSW-M5B392-A
High temperature grease	Molecote FB180
Connection sleeve grease	IYX500050

Torque Specifications

Description	Nm	lb-ft	lb-in
Main control valve body retaining bolts	8	-	71
Transmission control module	24	18	-
Torque converter retaining nuts	60	44	-
Transmission fluid cooler retaining bolts	10	-	88
Transmission fluid level plug	35	26	-
Transmission fluid drain plug	35	26	-
Transmission fluid fill plug	35	26	-
Transmission fluid pan retaining bolts	9	-	79
External oil feed pipe retaining bolts	10	-	88
Transmission end cover retaining bolts	10	-	88

Torque Specifications

Transmission Bolts	Nm	lb-ft	lb-in
Diesel transmission retaining bolts	60	44	-
Petrol transmission retaining bolts	48	35	-

Published: 17-Nov-2015

Intake Air Distribution and Filtering - INGENIUM I4 2.0L Diesel - Air Cleaner

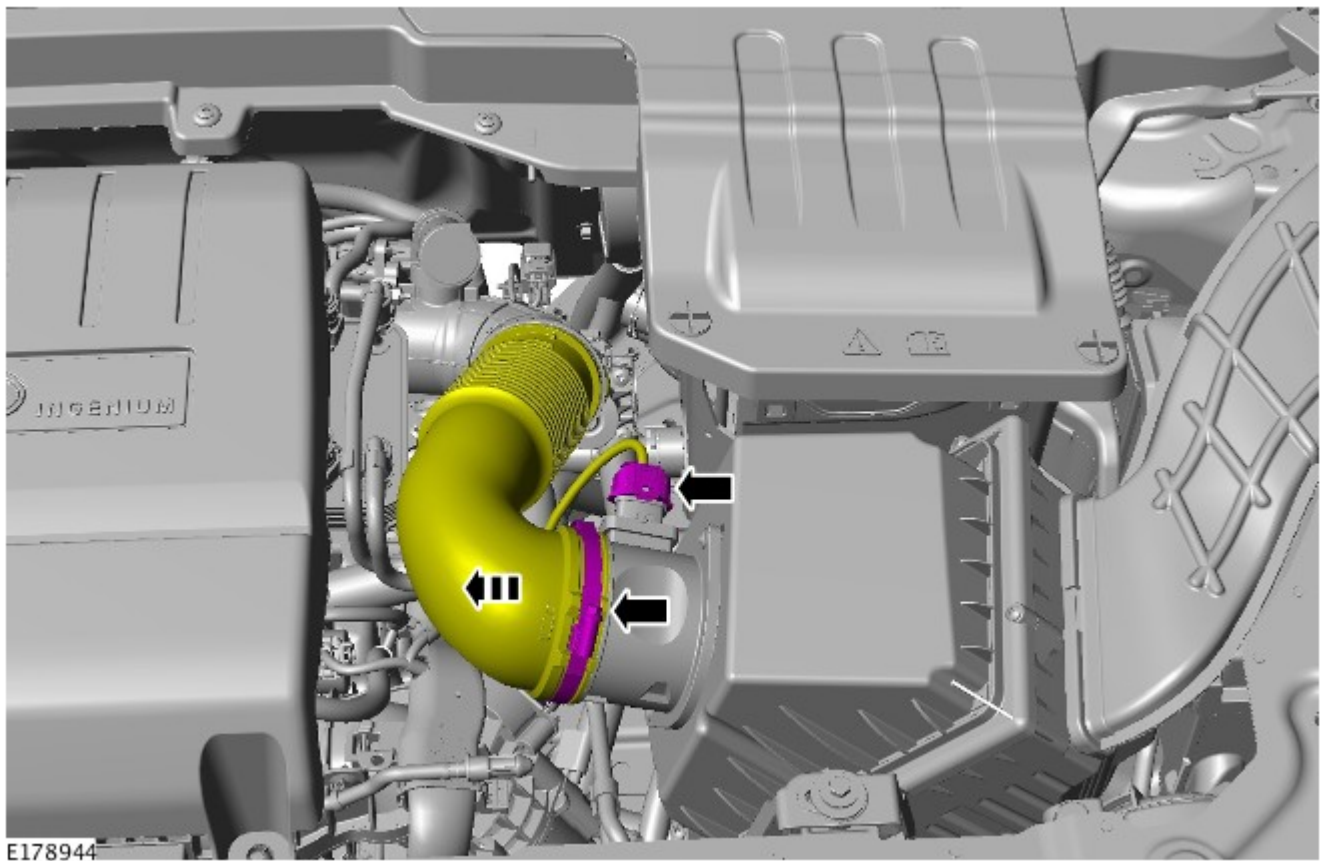
Removal and Installation

Removal

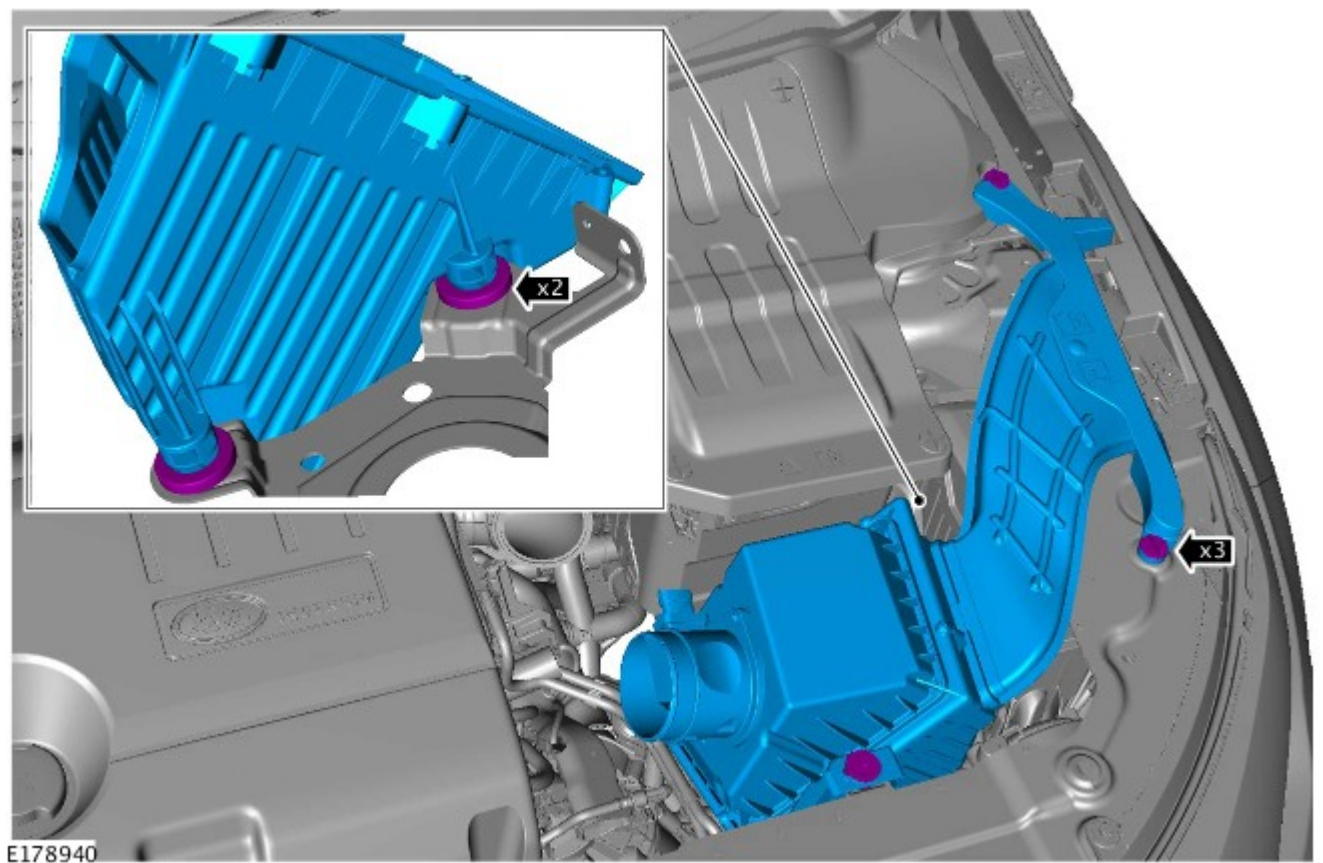


NOTE: Removal steps in this procedure may contain installation details.

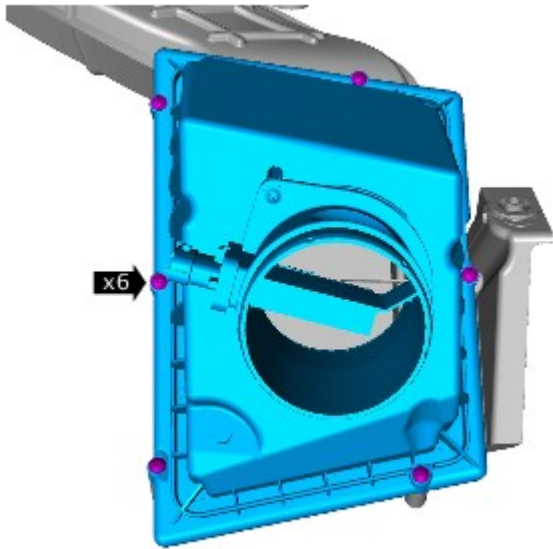
1. Torque: 3.5 Nm



2. Torque: 8 Nm

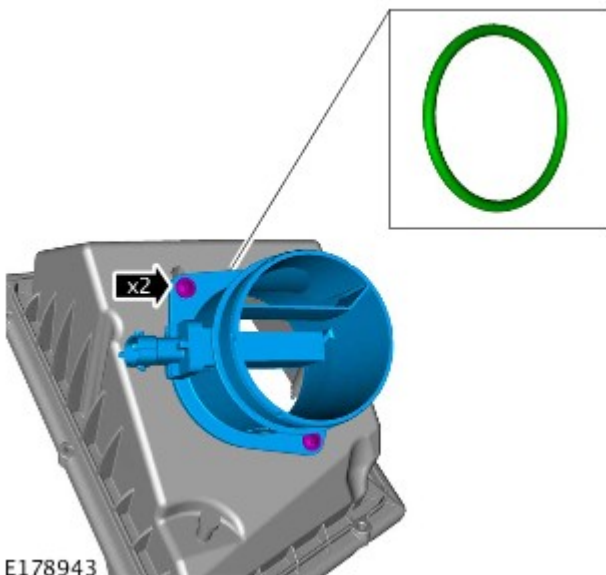


3. Torque: 2 Nm



E178946

4. Do not disassemble further if the component is removed for access only.

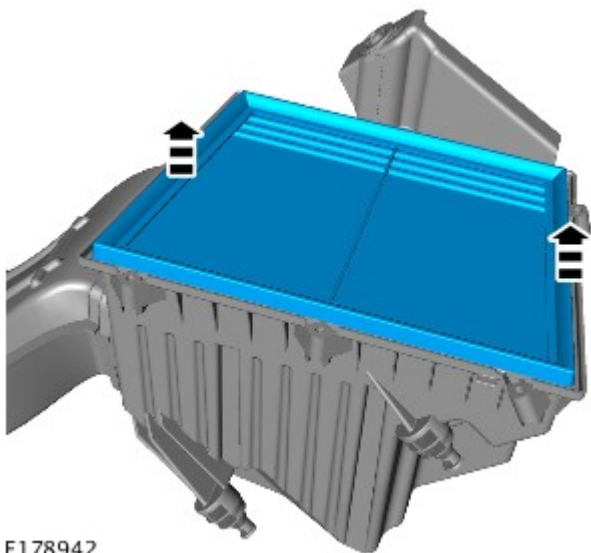


E178943

5.  **CAUTION:** Inspect the O-ring seal, install a new component if damaged.

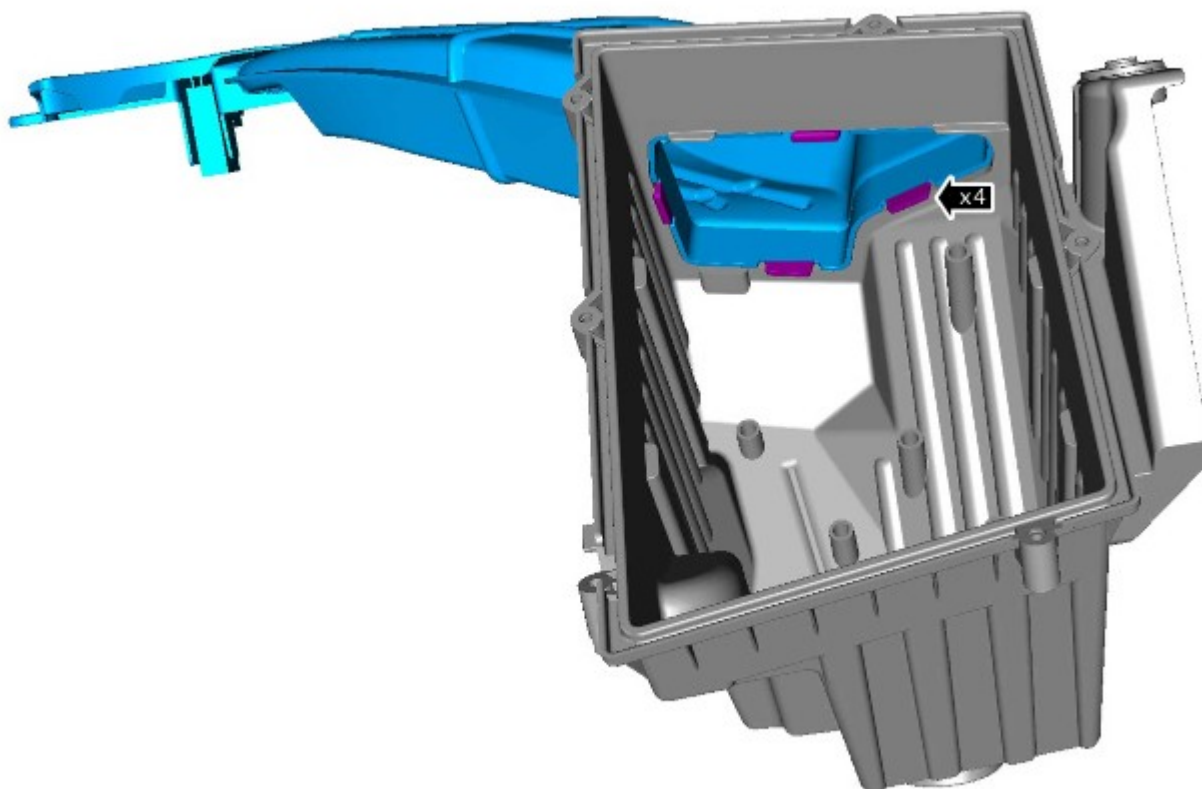
Torque: 1.9 Nm

6.



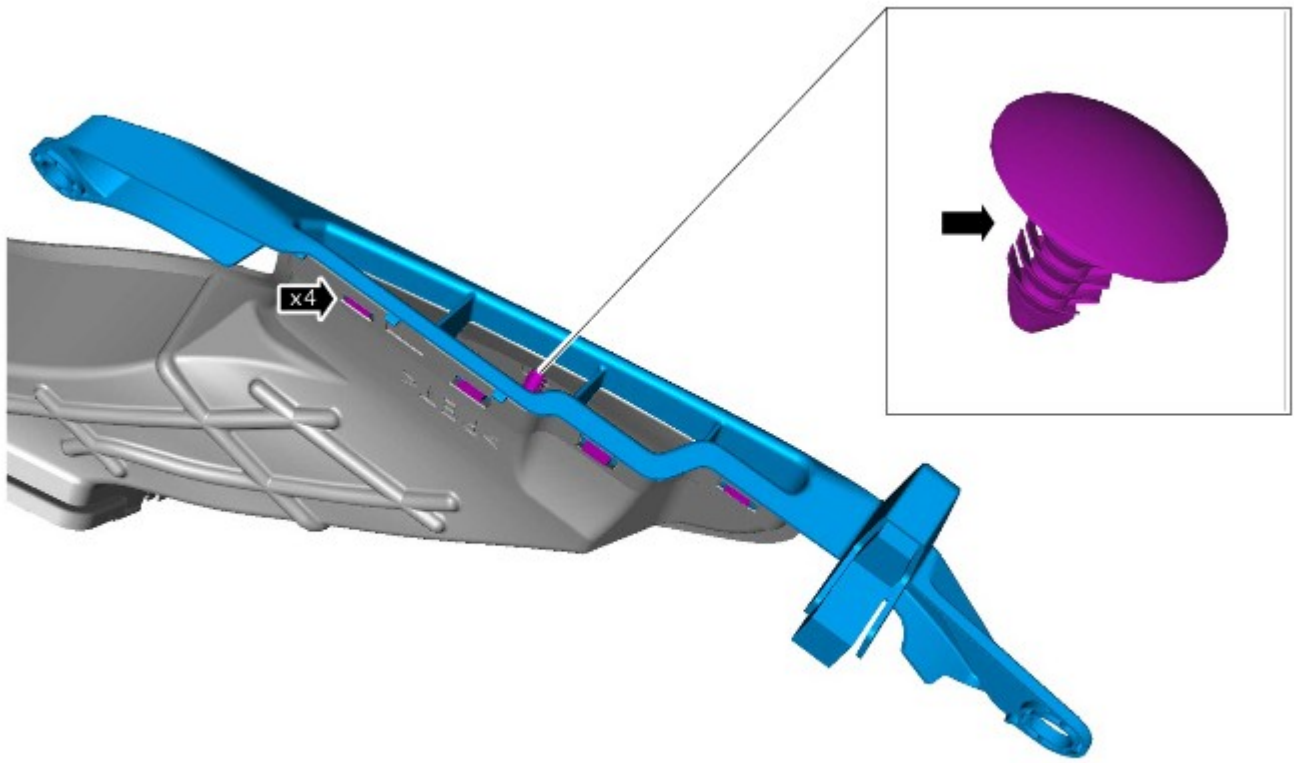
E178942

7.



E178941

8.



E178945

Installation

1. To install, reverse the removal procedure.

Published: 01-Oct-2013

Automatic Transmission/Transaxle - Transmission Fluid Level Check

General Procedures

Check

WARNINGS:



Be prepared to collect escaping fluids.



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



CAUTION: Vehicle must be horizontal during this operation.




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

1. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

2. Connect the Land Rover equipment.

3. Start and run the engine.


4. Select terrain response mode. Grass/Gravel/Snow.

5.  **WARNING:** Make sure that all four wheels are off the ground for this step.




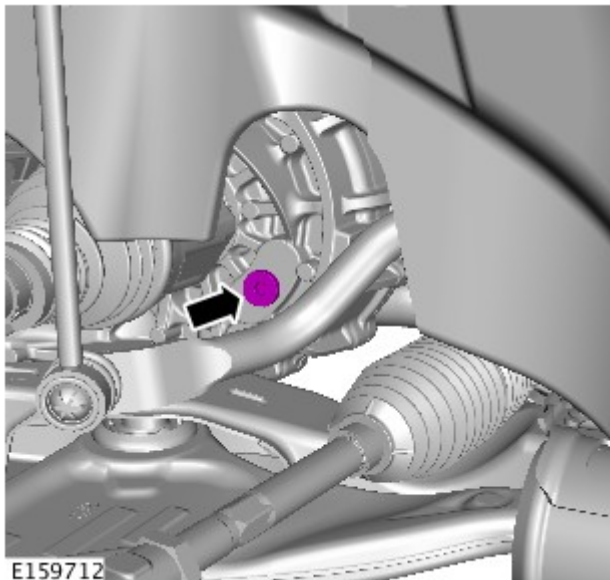
- NOTE:** Move the transmission control switch (TCS) from D to S then using the steering paddles pause in each gear for a minimum 10 seconds until you reach 4th gear. (max 2000rpm)

Using the diagnostic equipment monitor the transmission fluid temperature until 35 degrees celsius is reached.

6.  **CAUTION:** Decelerate the wheels until they stop, then turn the (TCS) back into the P position.

Make sure that torque converter is full of oil by raising the engine speed to 2000rpm for 10 seconds, return to idle speed.

7.  **CAUTION:** Engine must be running to carry out the fluid level check.



8. **CAUTIONS:**



Transmission fluid temperature must not exceed 45 degrees celsius.



Discard the sealing plug.

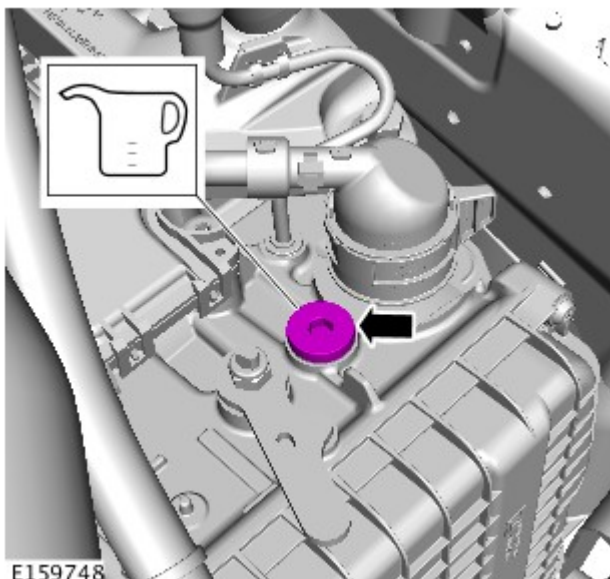


Drain the fluid into a suitable container.



NOTE: With the engine running a small amount of automatic transmission fluid should drip out of the level plug.

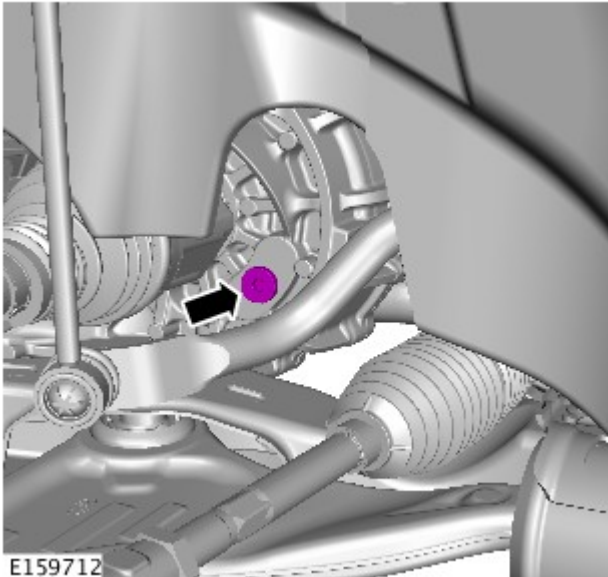
When transmission fluid temperature reaches 37 degrees celsius, remove the level plug and wait until oil stops dripping out.



9.  **CAUTION:** Install a new sealing plug.

If the transmission fluid does not come out of the transmission fluid level plug hole the transmission fluid level is insufficient. If this is the case add the transmission fluid in 0.5 litre units into the transmission fluid fill plug hole until fluid comes out.

Torque: 35 Nm



10.  **CAUTION:** Install a new sealing plug.

 **NOTE:** If the temperature has exceeded 45 degrees celsius before the plug is re-fitted, you must start the procedure again.

Torque: 35 Nm

11. Switch off the engine.
12. Remove the container.
13. Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).
14. Lower the vehicle.
15. Disconnect the diagnostic tool.

Published: 01-Oct-2013

Front End Body Panels - Engine Undershield

Removal and Installation

Removal


NOTES:



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



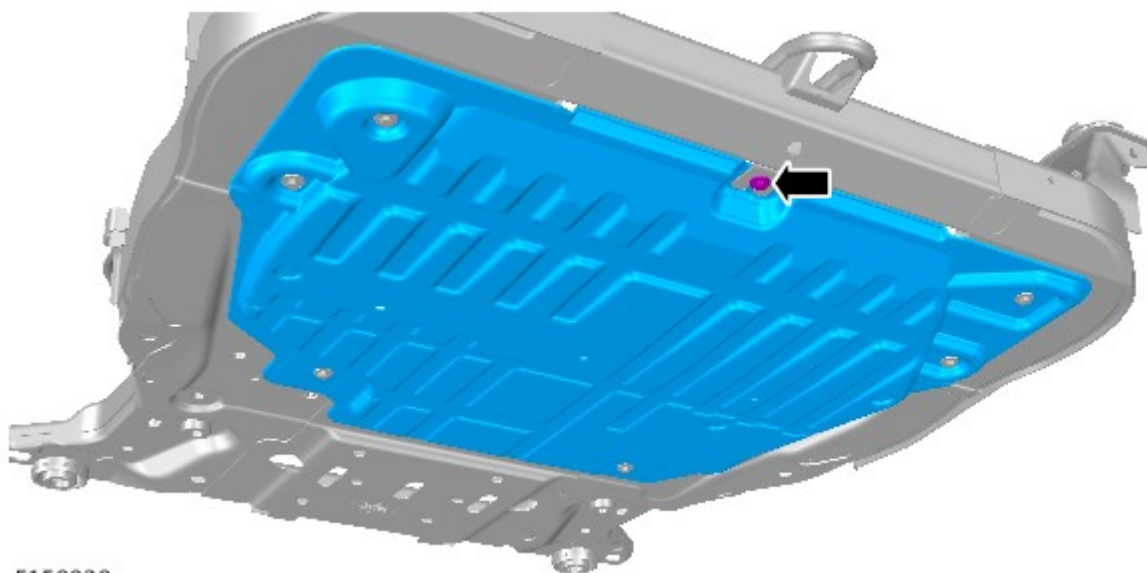
Removal steps in this procedure may contain installation details.

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

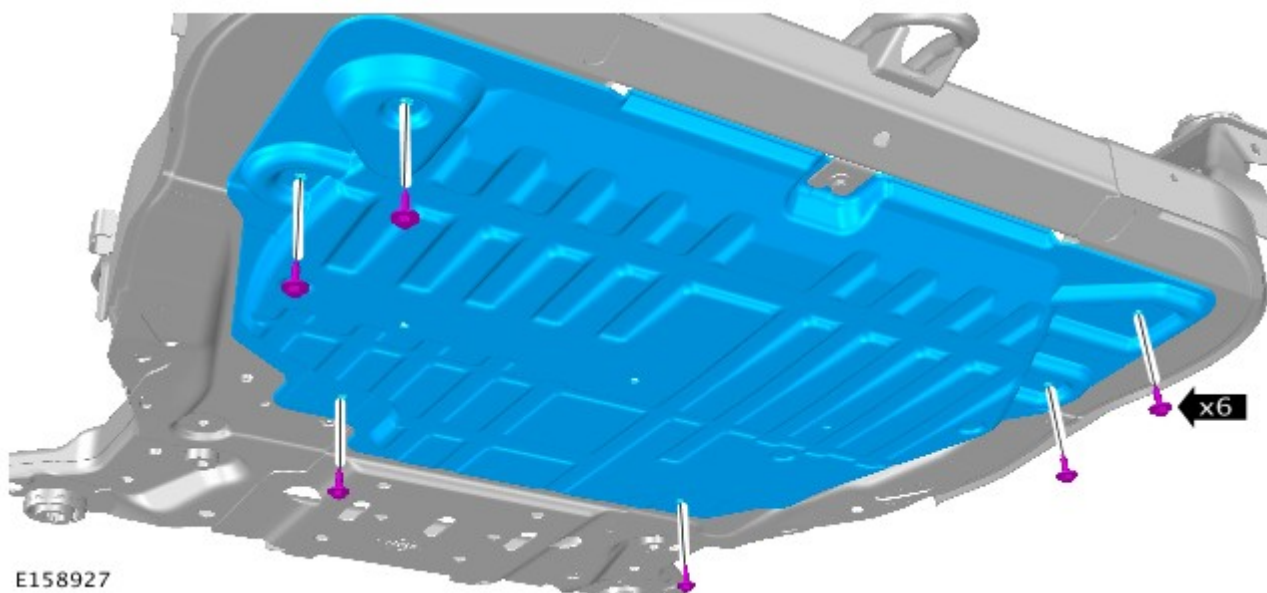
2.  **NOTE:** Loosen the bolt, but do not fully remove.

Torque: 10 Nm




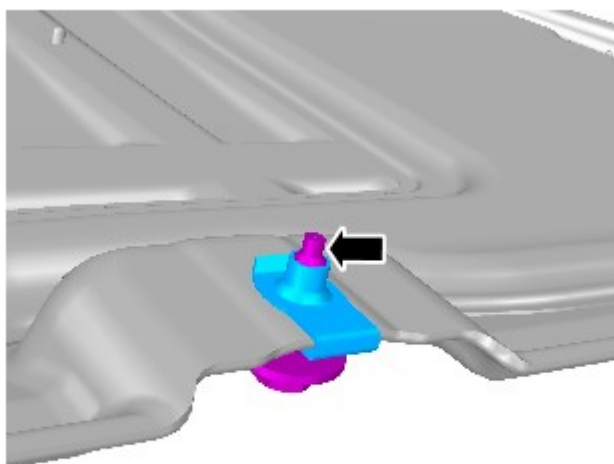
E158928

3. Torque: 10 Nm



E158927

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



E158929

Installation

1. To install, reverse the removal procedure.

Transmission/Transaxle Cooling - Transmission Cooling

Diagnosis and Testing

Principles of Operation

For a detailed description of the Automatic Transmission Cooling system, refer to the relevant Description and Operation section in the workshop manual. REFER to: [Transmission Cooling](#) (307-02 Transmission/Transaxle Cooling, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

NOTES:



If a control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.



When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.



Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern
2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

Mechanical
<ul style="list-style-type: none">• Automatic transmission fluid cooler• Automatic transmission fluid leaks

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index

5. Check DDW for open campaigns. Refer to the corresponding bulletins and SSMs which may be valid for the specific customer complaint and carry out the recommendations as required

Symptom Chart

Symptom	Possible Causes	Action
Automatic transmission overheating	<ul style="list-style-type: none">• Radiator airflow restricted• Automatic transmission fluid cooler internal restriction/blockage• Automatic transmission fluid cooler internal failure - Thermostatic valve stuck closed	<ul style="list-style-type: none">• Check the radiator for external restrictions• Flush out the automatic transmission fluid cooler with new automatic transmission fluid. If the flushing is unsuccessful, install a new transmission fluid cooler• Check the operation of the thermostatic valve. Install a new automatic transmission fluid cooler as necessary

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Transmission Control Module \(TCM\)](#) (100-00 General Information, Description and Operation).

General Information - Diagnostic Trouble Code (DTC) Index DTC: Transmission Control Module (TCM)

Description and Operation

Transmission Control Module (TCM)

CAUTIONS:



Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.



Extreme cleanliness must be exercised when carrying out repairs to the transmission or transmission components.

NOTES:



If a control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.



Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).



When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.



Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.



Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.










If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.



















Check DDW for open campaigns. Refer to the corresponding bulletins and SSMs which may be valid for the specific customer complaint and carry out the recommendations as required.










The table below lists all Diagnostic Trouble Codes (DTCs) that could be logged in the Transmission Control Module (TCM). For additional diagnosis and testing information, refer to the relevant Diagnosis and Testing section in the workshop manual. For additional information, refer to: [Diagnostics - Vehicles With: 9HP48 9-Speed Automatic Transmission - AWD](#) (307-01 Automatic Transmission/Transaxle, Diagnosis and Testing).











DTC	Description	Possible Causes	Action
P0219-64	Engine Overspeed Condition - Signal plausibility failure	<ul style="list-style-type: none">Engine speed has exceeded the maximum plausible speed	<ul style="list-style-type: none">Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P0501-64	Vehicle Speed Sensor A Circuit Range/Performance - Signal plausibility failure	<ul style="list-style-type: none">Missing/invalid data from the anti-lock brake system control module	<ul style="list-style-type: none">Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
P0501-86	Vehicle Speed Sensor A Circuit Range/Performance - Signal invalid	<ul style="list-style-type: none">Missing/invalid data from the anti-lock brake system control module	<ul style="list-style-type: none">Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index










P0561-62	System Voltage Unstable - Signal compare failure	 <p>NOTE: Circuit reference - VBATT / GND -</p> <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0562-1C	System Voltage Low - Circuit voltage out of range	 <p>NOTE: Circuit reference - VBATT / GND -</p> <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance Battery/charging system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Refer to the relevant section of the workshop manual and check the battery and charging system
P0562-21	System Voltage Low - Signal amplitude < minimum	 <p>NOTE: Circuit reference - VBATT / GND -</p> <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance Battery/charging system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Refer to the relevant section of the workshop manual and check the battery and charging system
P0563-22	System Voltage High - Signal amplitude > maximum	<ul style="list-style-type: none"> Battery/charging system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer to the relevant section of the workshop manual and check the battery and charging system
P0600-04	Serial Communication Link - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0601-41	Internal Control Module Memory Checksum Error - General checksum failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P0605-41	Internal Control Module Read Only Memory (ROM) Error - General checksum failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module







P0606-04	Control Module Processor - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0606-62	Control Module Processor - Signal compare failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0606-64	Control Module Processor - Signal plausibility failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P060A-04	Internal Control Module Monitoring Processor Performance - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0613-04	TCM Processor - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0613-47	TCM Processor - Watchdog/safety microcontroller failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P062C-86	Internal Control Module Vehicle Speed Performance - Signal invalid	 NOTE: Circuit reference - N_T / N_OUT / SENSOR GND - <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Output shaft speed sensor circuit short circuit to ground, short 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary






		circuit to power, open circuit, high resistance • Transmission control module internal failure	• Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P062F-04	Internal Control Module EEPROM Error - System internal failures	• Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0631-62	VIN Not Programmed or Incompatible - TCM - Signal compare failure	• Transmission control module previously installed on another vehicle • New transmission control module installed and VIN not yet programmed	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Install the original or a new transmission control module as necessary • Using the manufacturer approved diagnostic system, configure the transmission control module as a new module
P0657-13	Actuator Supply Voltage A Circuit/Open - Circuit open	 NOTE: Circuit reference - UDRMV1 / UDRMV2 - • Pressure control valves power circuit open circuit, high resistance • Solenoid valves power circuit open circuit, high resistance • Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Refer to the electrical circuit diagrams and check the pressure control valves power circuit for open circuit, high resistance. Repair the wiring harness as necessary • Refer to the electrical circuit diagrams and check the solenoid valves power circuit for open circuit, high resistance. Repair the wiring harness as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P06A6-01	Sensor Reference Voltage A Circuit Range/Performance - General electrical failure	 NOTE: Circuit reference - VS_9V / SENSOR GND - • Automatic transmission sensor power or ground circuit open circuit, high resistance • Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Refer to the electrical circuit diagrams and check the automatic transmission sensor power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P06A7-01	Sensor Reference Voltage B Circuit Range/Performance - General electrical failure	 NOTE: Circuit reference - VS_5V / SENSOR GND - • Automatic transmission sensor power or ground circuit open circuit, high resistance • Transmission control module internal failure	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. • Refer to the electrical circuit diagrams and check the automatic transmission sensor power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module











P0700-02	Transmission Control System (MIL Request) - General signal failure	<ul style="list-style-type: none"> Transmission fault 	 NOTE: This DTC is for event information only and does not indicate a fault. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other transmission related DTCs and perform the relevant corrective actions
P0701-98	Transmission Control System Range/Performance - Component or system over temperature	<ul style="list-style-type: none"> Transmission cooling system fault 	<ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the transmission cooling system. Using the manufacturer approved diagnostic system, clear the DTCs and retest
P0702-04	Transmission Control System Electrical - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0702-06	Transmission Control System Electrical - Algorithm based failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P0710-27	Transmission Fluid Temperature Sensor A Circuit - Signal rate of change above threshold	 NOTE: Circuit reference - T_OIL+ / T_OIL- - <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	<p>NOTES:</p>  Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.
			 After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0710-64	Transmission Fluid Temperature Sensor A Circuit - Signal plausibility failure	 NOTE: Circuit reference - T_OIL+ / T_OIL- - <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	<p>NOTES:</p>  Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.
			 After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary







			<ul style="list-style-type: none">Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0712-11	Transmission Fluid Temperature Sensor A Circuit Low - Circuit short to ground	<div> NOTE: Circuit reference - T_OIL+ / T_OIL- -</div> <ul style="list-style-type: none">Automatic transmission fluid temperature sensor circuit short circuit to groundTransmission control module internal failure	<p>NOTES:</p> <div> Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.</div> <div> After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</div> <ul style="list-style-type: none">Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessaryUsing the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0713-13	Transmission Fluid Temperature Sensor A Circuit High - Circuit open	<div> NOTE: Circuit reference - T_OIL+ / T_OIL- -</div> <ul style="list-style-type: none">Automatic transmission fluid temperature sensor circuit open circuit, high resistanceTransmission control module internal failure	<p>NOTES:</p> <div> Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.</div> <div> After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</div> <ul style="list-style-type: none">Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessaryUsing the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0715-12	Input/Turbine Shaft Speed Sensor A Circuit - Circuit short to battery	<div> NOTE: Circuit reference - N_T / SENSOR GND -</div> <ul style="list-style-type: none">Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistanceTransmission control module internal failure	<div> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</div> <ul style="list-style-type: none">Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessaryUsing the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0716-64	Input/Turbine Shaft Speed Sensor A Circuit	<div> NOTE: Circuit reference - N_T / SENSOR GND -</div> <ul style="list-style-type: none">Input shaft speed sensor circuit short circuit to ground, short circuit to power,	<div> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</div> <ul style="list-style-type: none">Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed





	Range/Performance - Signal plausibility failure	open circuit, high resistance <ul style="list-style-type: none"> Transmission control module internal failure 	sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0717-14	Input/Turbine Shaft Speed Sensor A Circuit No Signal - Circuit short to ground or open	 NOTE: Circuit reference - N_T / SENSOR GND - <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P071A-07	Transmission Mode Switch A Circuit - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0720-12	Output Shaft Speed Sensor Circuit - Circuit short to battery	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to power. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0721-02	Output Shaft Speed Sensor Circuit Range/Performance - General signal failure	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0721-64	Output Shaft Speed Sensor Circuit Range/Performance	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the






	- Signal plausibility failure	circuit to power, open circuit, high resistance <ul style="list-style-type: none"> Transmission control module internal failure 	output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0722-14	Output Shaft Speed Sensor Circuit No Signal - Circuit short to ground or open	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0725-83	Engine Speed Input Circuit - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Engine system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P072A-63	Stuck in Neutral - Circuit/component protection time-out	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: This DTC is always accompanied by other DTCs which indicate which component is affected. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other transmission related DTCs and perform the relevant corrective actions
P072F-07	Stuck in Gear 4 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0730-00	Incorrect Gear Ratio - No sub type information	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P073E-07	Unable to Engage Reverse - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission





P0741-07	Torque Converter Clutch Circuit Performance/Stuck Off - Mechanical failures	<ul style="list-style-type: none"> • Torque converter pressure control valve solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance • Torque converter or automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition: <ul style="list-style-type: none"> - Automatic transmission fluid normal: Install a new torque converter - Automatic transmission fluid dirty or contaminated: Install a new automatic transmission
P074C-24	Unable to Engage Gear 4 - Signal stuck high	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new valve body and drain and refill the automatic transmission fluid. Clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P077B-92	Output Speed Sensor Circuit - Direction Error - Performance or incorrect operation	<ul style="list-style-type: none"> • Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance 	<ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary
P077E-64	Transmission Fluid Temperature Measurement System - Multiple Sensor Correlation - Signal plausibility failure	<ul style="list-style-type: none"> • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0780-62	Shift Error - Signal compare failure	<ul style="list-style-type: none"> • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0780-93	Shift Error - No operation	<ul style="list-style-type: none"> • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module










P0780-94	Shift Error - Unexpected operation	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0795-04	Pressure Control Solenoid C - System internal failures	<ul style="list-style-type: none"> Engine system fault Transmission control module is not configured correctly 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P07B3-11	Transmission Park Position Sensor/Switch A Circuit Low - Circuit short to ground	 NOTE: Circuit reference - L3 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07B4-15	Transmission Park Position Sensor/Switch A Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - L3 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07B9-11	Transmission Park Position Sensor/Switch B Circuit Low - Circuit short to ground	 NOTE: Circuit reference - L4 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07BA-15	Transmission Park Position Sensor/Switch B Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - L4 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module











P07D4-07	Transmission Mode Switch F Circuit - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Check the automatic transmission serial number: <ul style="list-style-type: none"> Serial number is less than 91782: Install a new automatic transmission Serial number is greater than 91781: Refer to the relevant section of the workshop manual and check the automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P07D9-07	Gear 8 Incorrect Ratio - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DC-07	Incorrect Shift from Gear 1 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DD-07	Incorrect Shift from Gear 2 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DE-07	Incorrect Shift from Gear 3 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
	Incorrect Shift		 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.











P07DF-07	from Gear 4 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	<ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E0-07	Incorrect Shift from Gear 5 - Mechanical failures	<ul style="list-style-type: none"> Engine system fault Accessory drive belt components incorrectly installed Driveline imbalance Driveline components excessively worn Wheel/tire imbalance Engine mount damaged Transmission mount damaged Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Check the installation of the accessory drive belt components Check the driveline for debris around rotating components Check the driveline for excessive wear or backlash Check the wheels and tires for snow or mud packing and correct balance Check the engine mounts for damage Check the transmission mounts for damage Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E1-07	Incorrect Shift from Gear 6 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E2-07	Incorrect Shift from Gear 7 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E3-07	Incorrect Shift from Gear 8 - Mechanical failures	<ul style="list-style-type: none"> Engine system fault Accessory drive belt components incorrectly installed Driveline imbalance Driveline components excessively worn Wheel/tire imbalance Engine mount damaged Transmission mount damaged 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Check the installation of the accessory drive belt components Check the driveline for debris around rotating components Check the driveline for excessive wear or backlash Check the wheels and tires for snow or mud packing and correct balance Check the engine mounts for damage Check the transmission mounts for damage Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and












		<ul style="list-style-type: none"> Automatic transmission internal failure 	perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E4-64	Unable to Engage Park - Signal plausibility failure	<ul style="list-style-type: none"> Park position sensor mountings loose Valve block internal failure 	 NOTE: After installing a new valve block, perform routines - Transmission Valve Block , Transmission Control Module Adaption . <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (5.5Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P07E7-07	Stuck in Drive - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Check the automatic transmission serial number: <ul style="list-style-type: none"> Serial number is less than 81206: Install a new automatic transmission Serial number is greater than 81205: Refer to the relevant section of the workshop manual and check the automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P07F6-07	Gear 9 Incorrect Ratio - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07FA-07	Incorrect Shift From Gear 9 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
		<ul style="list-style-type: none"> One or more automatic transmission 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement) , Transmission Control Module Adaption .












P0801-94	Reverse Inhibit Control Circuit/Open - Unexpected operation	<ul style="list-style-type: none"> solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P084F-29	Park/Neutral Switch Output Circuit - Signal invalid	 NOTE: Circuit reference - P-SIG - <ul style="list-style-type: none"> Park lock fault Park lock engaged signal circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other park lock related DTCs and perform the relevant corrective actions Refer to the electrical circuit diagrams and check the park lock engaged signal circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0850-29	Park/Neutral Switch Input Circuit - Signal invalid	 NOTE: Circuit reference - L3 / L4 - <ul style="list-style-type: none"> Service park release lever in release position Park position sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose 	 NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption. <ul style="list-style-type: none"> Check parklock mechanism by engaging and disengaging the parking lock several times. Check that the service park release lever is in the normal position Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation).






		<ul style="list-style-type: none"> Park lock mechanical failure 	<p>The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P0893-07	Multiple Gears Engaged - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	<p> NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0932-14	Hydraulic Pressure Sensor Circuit - Circuit short to ground or open	<p> NOTE: Circuit reference - VOUT_PR -</p> <ul style="list-style-type: none"> Pressure sensor signal circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new pressure sensor as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0933-62	Hydraulic Pressure Sensor Range/Performance - Signal compare failure	<p> NOTE: Circuit reference - VOUT_PR -</p> <ul style="list-style-type: none"> Pressure sensor signal circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new pressure sensor as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0935-12	Hydraulic Pressure Sensor Circuit High - Circuit short to battery	<p> NOTE: Circuit reference - VOUT_PR -</p> <ul style="list-style-type: none"> Pressure sensor signal circuit short circuit to power Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to power. Repair the wiring harness or install a new pressure sensor as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0936-64	Hydraulic Pressure Sensor Circuit Intermittent - Signal plausibility failure	<ul style="list-style-type: none"> Automatic transmission internal failure 	<p> NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
	Hydraulic Pressure		<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p>






P0942-62	Unit - Signal compare failure	<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0962-11	Pressure Control Solenoid A Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT5 - <ul style="list-style-type: none"> System pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the system pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0963-15	Pressure Control Solenoid A Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT5 - <ul style="list-style-type: none"> System pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the system pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0973-14	Shift Solenoid A Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT6 - <ul style="list-style-type: none"> Dog clutch 'A' solenoid circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'A' solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0974-12	Shift Solenoid A Control Circuit High - Circuit short to battery	 NOTE: Circuit reference - OUT6 - <ul style="list-style-type: none"> Dog clutch 'A' solenoid circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'A' solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0975-19	Shift Solenoid B Control Circuit Range/Performance - Circuit current above threshold	 NOTE: Circuit reference - OUT0 - <ul style="list-style-type: none"> Multiplate clutch 'B' pressure control valve solenoid circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module






P0976-11	Shift Solenoid B Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT0 - <ul style="list-style-type: none"> • Multiplate clutch 'B' pressure control valve solenoid circuit short circuit to ground • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0977-15	Shift Solenoid B Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT0 - <ul style="list-style-type: none"> • Multiplate clutch 'B' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the Multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0978-19	Shift Solenoid C Control Circuit Range/Performance - Circuit current above threshold	 NOTE: Circuit reference - OUT1 - <ul style="list-style-type: none"> • Multiplate clutch 'C' pressure control valve solenoid circuit short circuit to power • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0979-11	Shift Solenoid C Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT1 - <ul style="list-style-type: none"> • Multiplate clutch 'C' pressure control valve solenoid circuit short circuit to ground • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0980-15	Shift Solenoid C Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT1 - <ul style="list-style-type: none"> • Multiplate clutch 'C' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module







P0981-19	Shift Solenoid D Control Circuit Range/Performance - Circuit current above threshold	 NOTE: Circuit reference - OUT2 - <ul style="list-style-type: none"> • Multiplate clutch 'D' pressure control valve solenoid circuit short circuit to power • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0982-11	Shift Solenoid D Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT2 - <ul style="list-style-type: none"> • Multiplate clutch 'D' pressure control valve solenoid circuit short circuit to ground • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0983-15	Shift Solenoid D Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT2 - <ul style="list-style-type: none"> • Multiplate clutch 'D' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0984-19	Shift Solenoid E Control Circuit Range/Performance - Circuit current above threshold	 NOTE: Circuit reference - OUT3 - <ul style="list-style-type: none"> • Multiplate clutch 'E' pressure control valve solenoid circuit short circuit to power • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0985-11	Shift Solenoid E Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT3 - <ul style="list-style-type: none"> • Multiplate clutch 'E' pressure control valve solenoid circuit short circuit to ground • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
		 NOTE: Circuit reference - OUT3 -	








P0986-15	Shift Solenoid E Control Circuit High - Circuit short to battery or open	<ul style="list-style-type: none"> • Multiplate clutch 'E' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0998-14	Shift Solenoid F Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT7 - <ul style="list-style-type: none"> • Dog clutch 'F' solenoid circuit short circuit to ground, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the dog clutch 'F' solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0999-12	Shift Solenoid F Control Circuit High - Circuit short to battery	 NOTE: Circuit reference - OUT7 - <ul style="list-style-type: none"> • Dog clutch 'F' solenoid circuit short circuit to power • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the dog clutch 'F' solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099B-14	Shift Solenoid G Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> • Park lock solenoid circuit short circuit to ground, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099C-12	Shift Solenoid G Control Circuit High - Circuit short to battery	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> • Park lock solenoid circuit short circuit to power • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099E-14	Shift Solenoid H Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT9 - <ul style="list-style-type: none"> • Park lock control solenoid circuit short circuit to ground, open circuit, high resistance 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the park lock control solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary






		<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099F-12	Shift Solenoid H Control Circuit High - Circuit short to battery	 NOTE: Circuit reference - OUT9 - <ul style="list-style-type: none"> Park lock control solenoid circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park lock control solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P164C-62	Internal Control Module Start-Stop Performance - Signal compare failure	<ul style="list-style-type: none"> Engine system fault <ul style="list-style-type: none"> Stop/start system 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P1706-94	High Vehicle Speed Observed in Park - Unexpected operation	 NOTE: Circuit reference - L3 / L4 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw
P1707-72	Transfer Case Neutral or Park/Neutral Indication Circuit - Actuator stuck open	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> Service park release lever in release position Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Park lock mechanical failure 	 NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption. <ul style="list-style-type: none"> Check that the service park release lever is in the normal position Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block




P1707-74	Transfer Case Neutral or Park/Neutral Indication Circuit - Actuator slipping	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> Service park release lever in release position Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Park lock mechanical failure 	 NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption. <ul style="list-style-type: none"> Check that the service park release lever is in the normal position Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P1707-77	Transfer Case Neutral or Park/Neutral Indication Circuit - Commanded position not reachable	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> Service park release lever in release position Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Park lock mechanical failure 	 NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption. <ul style="list-style-type: none"> Check that the service park release lever is in the normal position Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P1710-86	Transmission Control Module Solenoid/Internal Ground Circuit - Signal invalid	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module




P174E-62	Output Shaft Speed / ABS Wheel Speed Correlation - Signal compare failure	<ul style="list-style-type: none"> Missing/invalid data from the anti-lock brake system control module Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1758-19	Pressure Solenoid Control System Incorrect Current - Circuit current above threshold	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1758-62	Pressure Solenoid Control System Incorrect Current - Signal compare failure	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1770-04	Clutch Solenoid Circuit - System internal failures	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P177F-07	Transmission Friction Element B or D - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and


			perform a road test using all gears. If the fault persists, install a new automatic transmission
P178A-07	Transmission Friction Element B or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P178C-07	Transmission Friction Element C or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P178D-07	Transmission Friction Element D or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P181F-18	Clutch Control System Performance - Circuit current below threshold	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2544-86	Torque Management Request Input Signal A - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2545-86	Torque Management Request Input Signal A Range/Performance - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module





P2546-86	Torque Management Request Input Signal A Low - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2547-86	Torque Management Request Input Signal A High - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2638-86	Torque Management Feedback Signal A Range/Performance - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2701-07	Transmission Friction Element B Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P2702-07	Transmission Friction Element C Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P2703-07	Transmission Friction Element D Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
	Transmission		 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Check the automatic transmission serial number:

P2704-07	Friction Element E Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	<ul style="list-style-type: none"> Serial number is less than 63584: Install a new automatic transmission Serial number is greater than 63583: Refer to the relevant section of the workshop manual and check the automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P2711-94	Unexpected Mechanical Gear Disengagement - Unexpected operation	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2763-15	Torque Converter Clutch Pressure Control Solenoid Control Circuit High - Circuit short to battery or open	<p> NOTE: Circuit reference - OUT4 -</p> <ul style="list-style-type: none"> Torque converter pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2764-11	Torque Converter Clutch Pressure Control Solenoid Control Circuit Low - Circuit short to ground	<p> NOTE: Circuit reference - OUT4 -</p> <ul style="list-style-type: none"> Torque converter pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
			NOTES:

P2787-4B	Clutch Temperature Too High - Over temperature	<ul style="list-style-type: none"> Paddle switch fault Automatic transmission fluid level low Transmission cooling system fault 	 This DTC may be induced by the driver using the paddle switches excessively.  This DTC may be induced by a paddle switch fault that causes excessive gear shifts. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for paddle switch related DTCs and perform the relevant corrective actions Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary Refer to the relevant section of the workshop manual and check the transmission cooling system. Using the manufacturer approved diagnostic system, clear the DTCs and retest
P2793-94	Gear Shift Direction Circuit - Unexpected operation	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
U0001-81	High Speed CAN Communication Bus - Invalid serial data received	<ul style="list-style-type: none"> Invalid data received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-82	High Speed CAN Communication Bus - Alive/sequence counter incorrect / not updated	<ul style="list-style-type: none"> Invalid data received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-83	High Speed CAN Communication Bus - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Invalid data received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-86	High Speed CAN Communication Bus - Signal invalid	<ul style="list-style-type: none"> Invalid signal received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid signal source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-87	High Speed CAN Communication Bus - Missing message	<ul style="list-style-type: none"> Missing message from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the missing message source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
		<ul style="list-style-type: none"> Engine control module power 	

U0073-00	Control Module Communication Bus A Off - No sub type information	<ul style="list-style-type: none"> or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Engine system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the engine control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0100-87	Lost Communication With ECM/PCM A - Missing message	<ul style="list-style-type: none"> Engine control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Engine system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the engine control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0121-87	Lost Communication With Anti-Lock Brake System (ABS) Control Module - Missing message	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Anti-lock brake system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0300-00	Internal Control Module Software Incompatibility - No sub type information	<ul style="list-style-type: none"> Car configuration file mismatch with vehicle specification Transmission control module is not configured correctly 	<p> NOTE: After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software
U0302-57	Software Incompatibility with Transmission Control Module - Invalid/incomplete software component	<ul style="list-style-type: none"> Car configuration file mismatch with vehicle specification Transmission control module is not configured correctly 	<p>NOTES:</p> <p> After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs.</p> <p> After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest

		<ul style="list-style-type: none"> Incorrect transmission control module installed 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software Install a new transmission control module as necessary
U0401-02	Invalid Data Received From ECM/PCM A - General signal failure	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-64	Invalid Data Received From ECM/PCM A - Signal plausibility failure	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-67	Invalid Data Received From ECM/PCM A - Signal incorrect after event	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-82	Invalid Data Received From ECM/PCM A - Alive/sequence counter incorrect / not updated	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-83	Invalid Data Received From ECM/PCM A - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0415-27	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Signal rate of change above threshold	<ul style="list-style-type: none"> Missing/invalid data from the anti-lock brake system control module 	<div>  <p>NOTE: This DTC is set when the automatic transmission output shaft speed rate of change is implausible. This can occur if the brakes lock during braking because of an anti-lock brake system fault.</p> </div> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0415-82	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Alive/sequence counter incorrect / not updated	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Anti-lock brake system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0415-83	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index

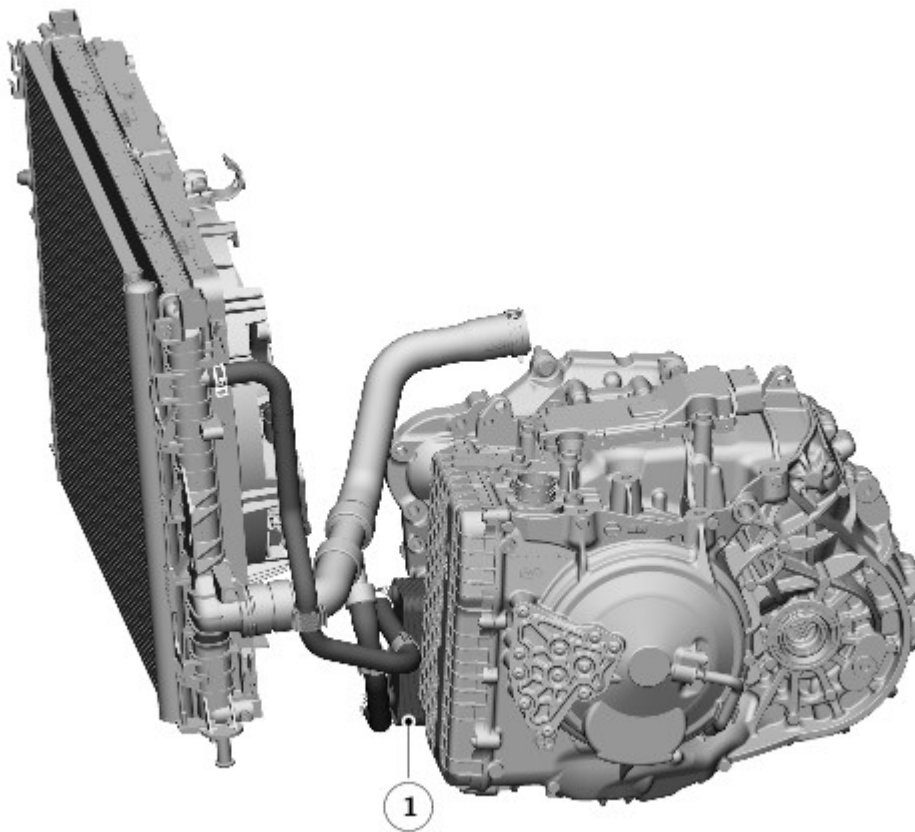
		<ul style="list-style-type: none"> • Anti-lock brake system fault 	
U0422-86	Invalid Data Received From Body Control Module - Signal invalid	 NOTE: Circuit reference - IGN - <ul style="list-style-type: none"> • Missing/invalid data from the central junction box • Ignition signal circuit short circuit to ground, short circuit to power, open circuit, high resistance 	<ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check the central junction box for related DTCs and refer to the relevant DTC index • Refer to the electrical circuit diagrams and check the ignition signal circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary
U2101-56	Control Module Configuration Incompatible - Invalid/incomplete configuration	<ul style="list-style-type: none"> • Transmission control module is not configured correctly • Car configuration file mismatch with vehicle specification • Incorrect transmission control module installed 	NOTES:  After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs.  After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software • Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest • Install a new transmission control module as necessary
U3000-56	Control Module - Invalid/incomplete configuration	<ul style="list-style-type: none"> • Mis-match between transmission control module configuration and valve block specification 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, configure the transmission control module as a new module. Perform routine - Transmission Valve Block. Clear the DTCs and retest. If the fault persists, install a new transmission control module
U3000-9A	Control Module - Component or system operating conditions	<ul style="list-style-type: none"> • Engine system fault 	<ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index

Published: 30-Sep-2014

Transmission/Transaxle Cooling - Transmission Cooling

Description and Operation

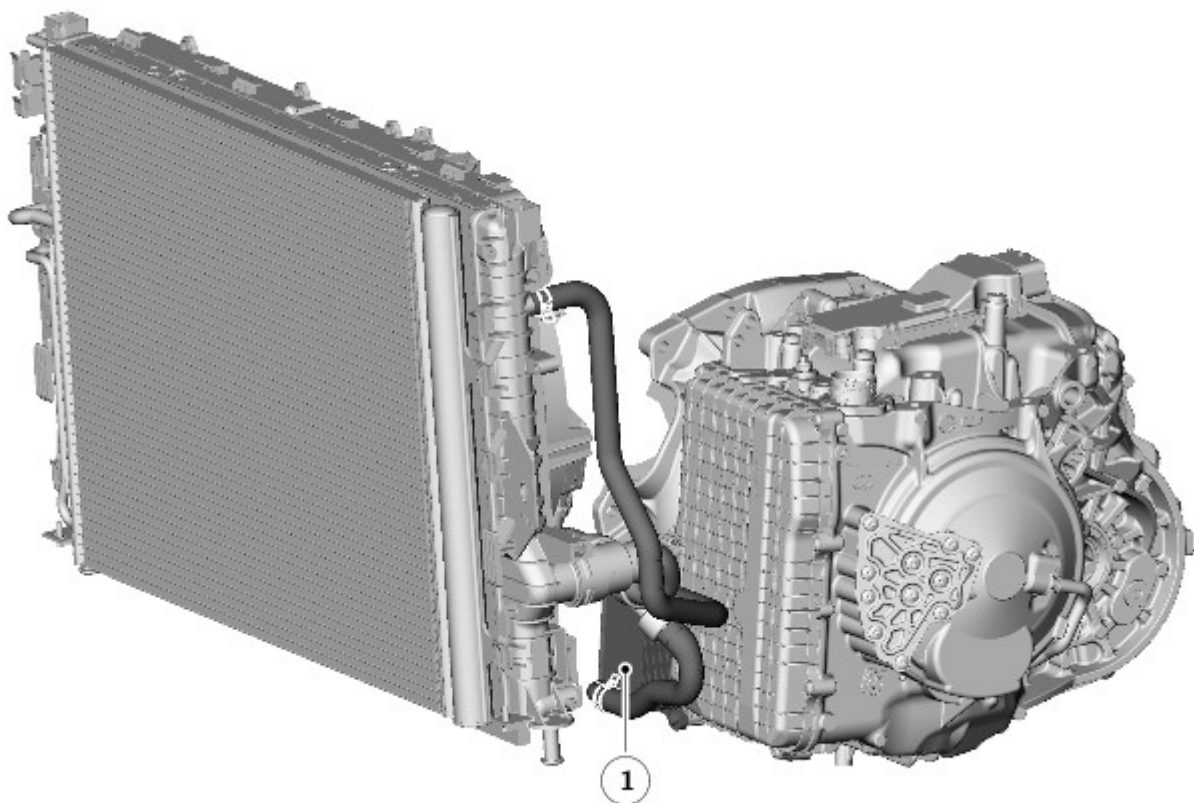
COMPONENT LOCATION - ZF 9HP48 TRANSMISSION TD4 2.2L DIESEL



E160602

Item	Description
1	Automatic Transmission Fluid (ATF) cooler

COMPONENT LOCATION - ZF 9HP48 TRANSMISSION GTDi 2.0L PETROL



E160603

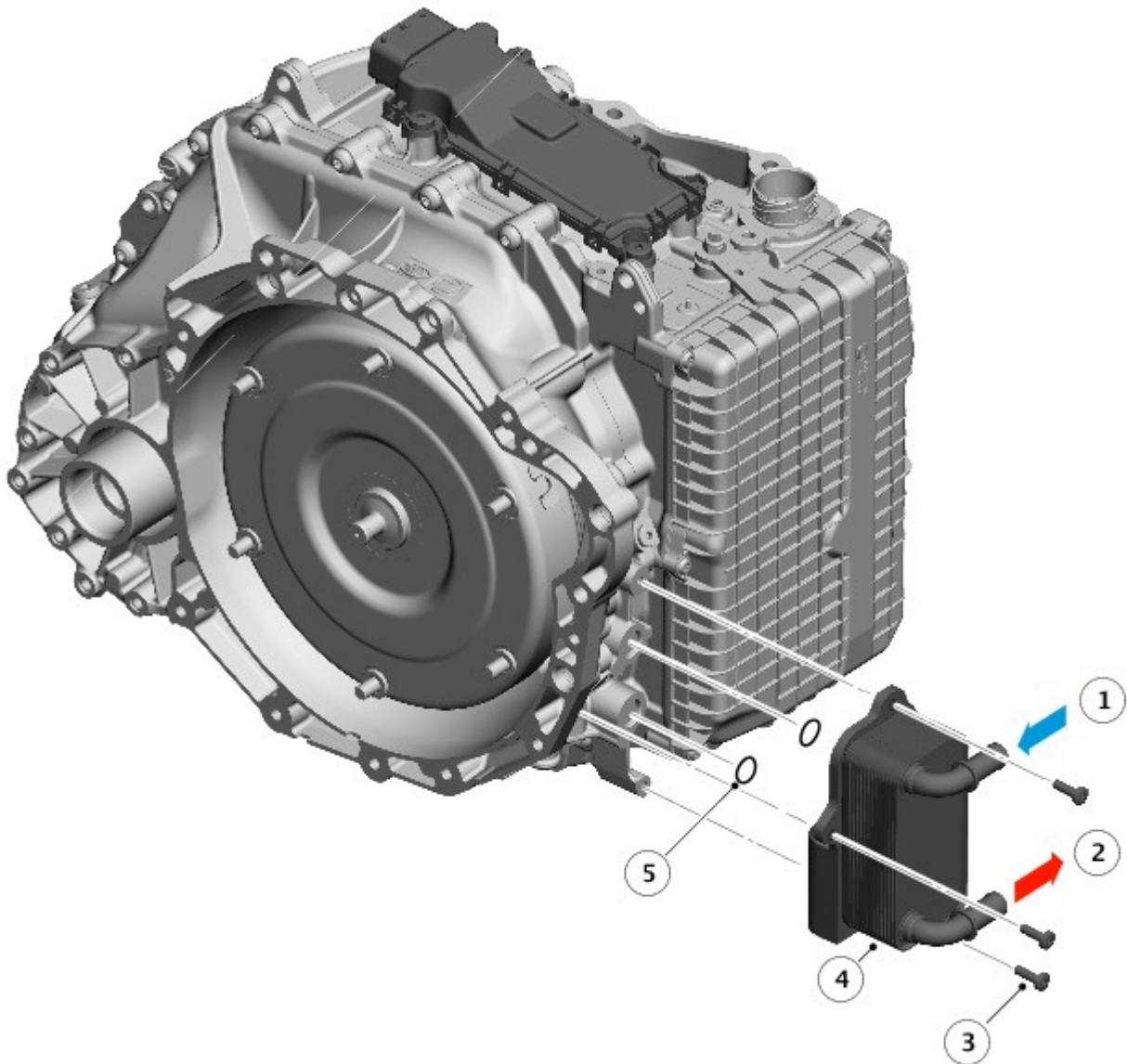
Item	Description
1	Automatic Transmission Fluid (ATF) cooler

OVERVIEW

The ZF 9HP48 automatic transmission uses an external ATF (automatic transmission fluid) cooler to reduce the temperature of the transmission fluid.

A plate type cooler uses engine coolant to reduce the ATF temperature.

DESCRIPTION



E160604

Item	Description
1	Engine coolant inlet
2	Engine coolant outlet
3	Torx screw (3 off)
4	ATF Cooler
5	Seals

The ATF cooler is located on the transmission main casing. The ATF cooler is an aluminium housing comprising louvred fins and plates. The plates allow a cross-flow of ATF and engine coolant through the ATF cooler. The plates are immersed in the engine coolant from the 'cold' side of the radiator which provides cooling of the ATF by the temperature differential between the ATF and the engine coolant.

The engine cooling system has a low temperature zone in the top third of the radiator. The engine coolant flow through this section of the radiator is restricted by the ATF cooler. Therefore the engine coolant has a slower flow rate across the cooling tubes of this section of the radiator. This cools the engine coolant more than the lower part of the radiator and consequently provides increased cooling of the ATF .

The ATF cooler has an integral thermostatic valve, which controls the ATF flow through the cooler. Flow is restricted to improve ATF warm-up time. The thermostatic valve is closed at temperatures of 78°C (172°F) and below, starts to open at temperatures of between 78 and 84°C (172 and 183°F) and is fully open at temperatures of 96°C (204°F) and higher.

OPERATION

Automatic Transmission Fluid (ATF) Cooler

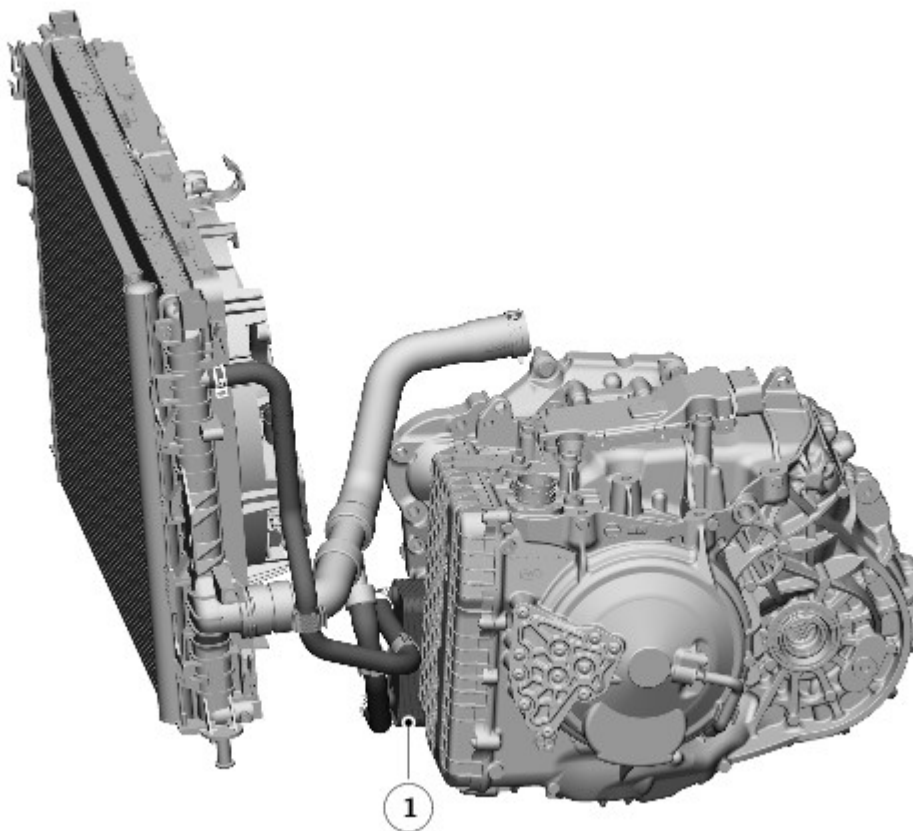
Engine coolant is circulated through the ATF cooler which cools the ATF flowing through the ATF cooler by the temperature differential between the two fluids.

Published: 30-Sep-2014

Transmission/Transaxle Cooling - Transmission Cooling

Description and Operation

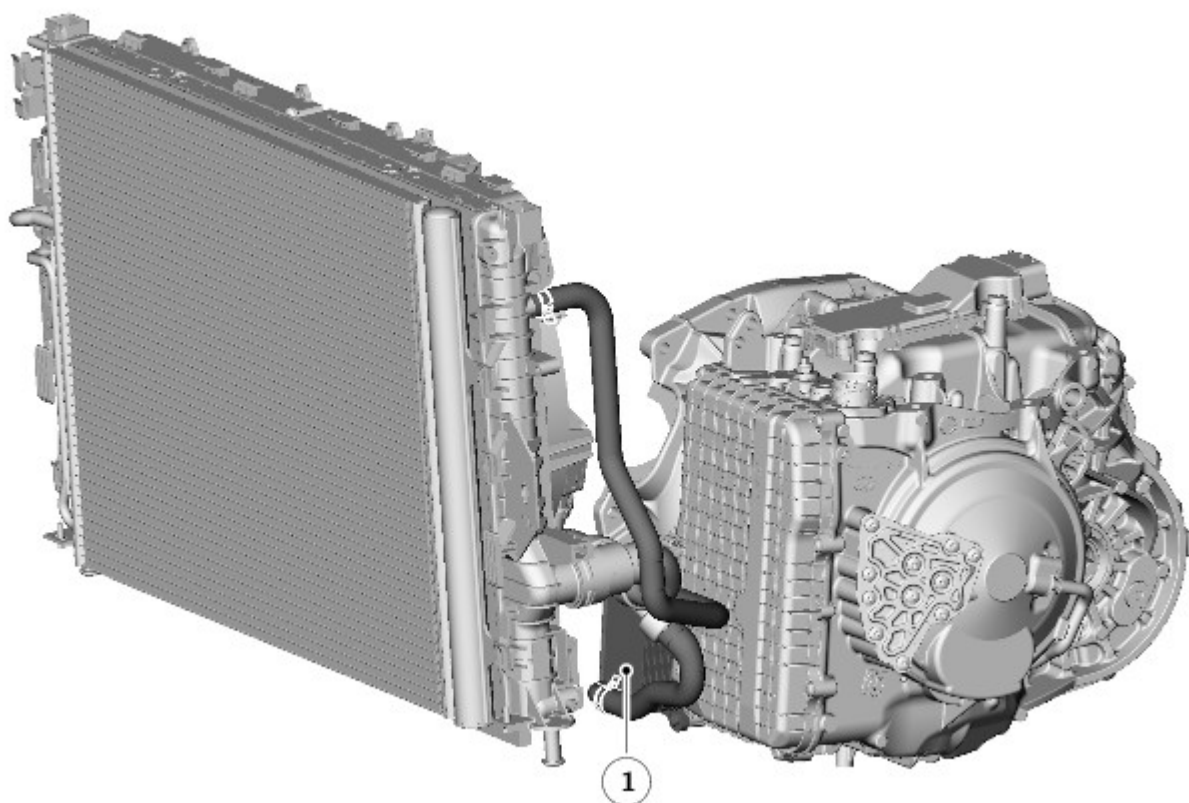
COMPONENT LOCATION - ZF 9HP48 TRANSMISSION TD4 2.2L DIESEL



E160602

Item	Description
1	Automatic Transmission Fluid (ATF) cooler

COMPONENT LOCATION - ZF 9HP48 TRANSMISSION GTDi 2.0L PETROL



E160603

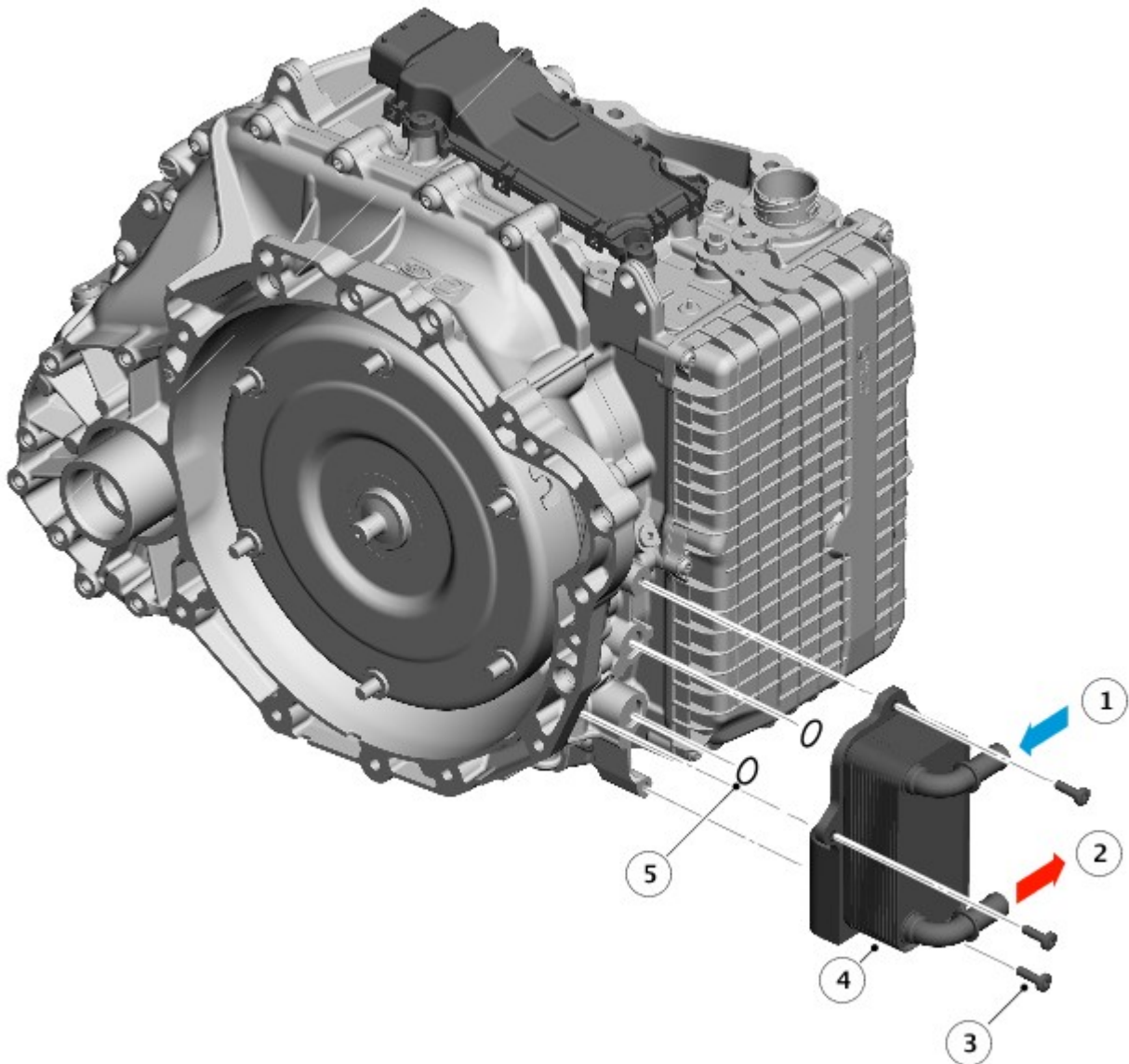
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The ZF 9HP48 automatic transmission uses an external [ATF \(automatic transmission fluid\)](#) cooler to reduce the temperature of the transmission fluid.

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E160604

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OPERATION

Automatic Transmission Fluid (ATF) Cooler

Engine coolant is circulated through the **ATF** cooler which cools the **ATF** flowing through the **ATF** cooler by the temperature differential between the two fluids.

Published: 26-Aug-2014

Automatic Transmission/Transaxle External Controls - External Controls

Diagnosis and Testing

Principles of Operation

For a detailed description of the Automatic Transmission External Controls, refer to the relevant Description and Operation section in the workshop manual.

REFER to: [External Controls](#) (307-05 Automatic Transmission/Transaxle External Controls, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

NOTES:



If a control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.



When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.



Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern
2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

Electrical
<ul style="list-style-type: none">• Fuses• Wiring harnesses and connectors• Transmission control module• Transmission control switch

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index
5. Check DDW for open campaigns. Refer to the corresponding bulletins and SSMs which may be valid for the specific customer complaint and carry out the recommendations as required

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.

REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Transmission Control Module \(TCM\)](#) (100-00 General Information, Description and Operation) /

[Diagnostic Trouble Code \(DTC\) Index - DTC: Transmission Control Switch \(TCS\)](#) (100-00 General Information, Description and Operation).

Published: 29-Sep-2016

General Information - Diagnostic Trouble Code (DTC) Index DTC: Transmission Control Module (TCM)

Description and Operation

Transmission Control Module (TCM)

CAUTIONS:



Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.



Extreme cleanliness must be exercised when carrying out repairs to the transmission or transmission components.

NOTES:



If a control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.



Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).



When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.



Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.



Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.











If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.



















Check DDW for open campaigns. Refer to the corresponding bulletins and SSMS which may be valid for the specific customer complaint and carry out the recommendations as required.











The table below lists all Diagnostic Trouble Codes (DTCs) that could be logged in the Transmission Control Module (TCM). For additional diagnosis and testing information, refer to the relevant Diagnosis and Testing section in the workshop manual. For additional information, refer to: [Diagnostics - Vehicles With: 9HP48 9-Speed Automatic Transmission - AWD](#) (307-01 Automatic Transmission/Transaxle, Diagnosis and Testing).









DTC	Description	Possible Causes	Action
P0219-64	Engine Overspeed Condition - Signal plausibility failure	<ul style="list-style-type: none"> Engine speed has exceeded the maximum plausible speed 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P0501-64	Vehicle Speed Sensor A Circuit Range/Performance - Signal plausibility failure	<ul style="list-style-type: none"> Missing/invalid data from the anti-lock brake system control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
P0501-86	Vehicle Speed Sensor A Circuit Range/Performance - Signal invalid	<ul style="list-style-type: none"> Missing/invalid data from the anti-lock brake system control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
P0561-62	System Voltage Unstable - Signal compare failure	 NOTE: Circuit reference - VBATT / GND - <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary









		<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0562-1C	System Voltage Low - Circuit voltage out of range	 NOTE: Circuit reference - VBATT / GND - <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance Battery/charging system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Refer to the relevant section of the workshop manual and check the battery and charging system
P0562-21	System Voltage Low - Signal amplitude < minimum	 NOTE: Circuit reference - VBATT / GND - <ul style="list-style-type: none"> Transmission control module power or ground circuit open circuit, high resistance Battery/charging system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer to the electrical circuit diagrams and check the transmission control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Refer to the relevant section of the workshop manual and check the battery and charging system
P0563-22	System Voltage High - Signal amplitude > maximum	<ul style="list-style-type: none"> Battery/charging system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Main ECU Supply Voltage (0xDD02). Refer to the relevant section of the workshop manual and check the battery and charging system
P0600-04	Serial Communication Link - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0601-41	Internal Control Module Memory Checksum Error - General checksum failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P0605-41	Internal Control Module Read Only Memory (ROM) Error - General checksum failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0606-04	Control Module Processor - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module








P0606-62	Control Module Processor - Signal compare failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0606-64	Control Module Processor - Signal plausibility failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P060A-04	Internal Control Module Monitoring Processor Performance - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0613-04	TCM Processor - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0613-47	TCM Processor - Watchdog/safety microcontroller failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P062C-86	Internal Control Module Vehicle Speed Performance - Signal invalid	 NOTE: Circuit reference - N_T / N_OUT / SENSOR GND - <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P062F-04	Internal Control Module EEPROM		 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.






	Error - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0631-62	VIN Not Programmed or Incompatible - TCM - Signal compare failure	<ul style="list-style-type: none"> Transmission control module previously installed on another vehicle New transmission control module installed and VIN not yet programmed 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Install the original or a new transmission control module as necessary Using the manufacturer approved diagnostic system, configure the transmission control module as a new module
P0657-13	Actuator Supply Voltage A Circuit/Open - Circuit open	 <p>NOTE: Circuit reference - UDRMV1 / UDRMV2 -</p> <ul style="list-style-type: none"> Pressure control valves power circuit open circuit, high resistance Solenoid valves power circuit open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure control valves power circuit for open circuit, high resistance. Repair the wiring harness as necessary Refer to the electrical circuit diagrams and check the solenoid valves power circuit for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P06A6-01	Sensor Reference Voltage A Circuit Range/Performance - General electrical failure	 <p>NOTE: Circuit reference - VS_9V / SENSOR GND -</p> <ul style="list-style-type: none"> Automatic transmission sensor power or ground circuit open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the automatic transmission sensor power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P06A7-01	Sensor Reference Voltage B Circuit Range/Performance - General electrical failure	 <p>NOTE: Circuit reference - VS_5V / SENSOR GND -</p> <ul style="list-style-type: none"> Automatic transmission sensor power or ground circuit open circuit, high resistance Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the automatic transmission sensor power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0700-02	Transmission Control System (MIL Request) - General signal failure	<ul style="list-style-type: none"> Transmission fault 	 <p>NOTE: This DTC is for event information only and does not indicate a fault.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other transmission related DTCs and perform the relevant corrective actions
	Transmission Control System Range/Performance		











P0701-98	- Component or system over temperature	<ul style="list-style-type: none"> Transmission cooling system fault 	<ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the transmission cooling system. Using the manufacturer approved diagnostic system, clear the DTCs and retest
P0702-04	Transmission Control System Electrical - System internal failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0702-06	Transmission Control System Electrical - Algorithm based failures	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P0710-27	Transmission Fluid Temperature Sensor A Circuit - Signal rate of change above threshold	 NOTE: Circuit reference - T_OIL+ / T_OIL- - <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	NOTES:  Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.  After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0710-64	Transmission Fluid Temperature Sensor A Circuit - Signal plausibility failure	 NOTE: Circuit reference - T_OIL+ / T_OIL- - <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	NOTES:  Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.  After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
		 NOTE: Circuit reference - T_OIL+ / T_OIL- -	NOTES:  Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.






P0712-11	Transmission Fluid Temperature Sensor A Circuit Low - Circuit short to ground	<ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit short circuit to ground Transmission control module internal failure 	 After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Oil Temperature (0x1E69). Refer to the electrical circuit diagrams and check the automatic transmission fluid temperature sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0713-13	Transmission Fluid Temperature Sensor A Circuit High - Circuit open	 NOTE: Circuit reference - T_OIL+ / T_OIL- - <ul style="list-style-type: none"> Automatic transmission fluid temperature sensor circuit open circuit, high resistance Transmission control module internal failure 	<p>NOTES:</p>  Automatic transmission fluid temperature sensor resistance specification is 1 kΩ at 25°C.
P0715-12	Input/Turbine Shaft Speed Sensor A Circuit - Circuit short to battery	 NOTE: Circuit reference - N_T / SENSOR GND - <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0716-64	Input/Turbine Shaft Speed Sensor A Circuit Range/Performance - Signal plausibility failure	 NOTE: Circuit reference - N_T / SENSOR GND - <ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
		 NOTE: Circuit reference - N_T / SENSOR GND -	






P0717-14	Input/Turbine Shaft Speed Sensor A Circuit No Signal - Circuit short to ground or open	<ul style="list-style-type: none"> Input shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Turbine Speed (0x1E72). Refer to the electrical circuit diagrams and check the input shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P071A-07	Transmission Mode Switch A Circuit - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0720-12	Output Shaft Speed Sensor Circuit - Circuit short to battery	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to power. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0721-02	Output Shaft Speed Sensor Circuit Range/Performance - General signal failure	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0721-64	Output Shaft Speed Sensor Circuit Range/Performance - Signal plausibility failure	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module





P0722-14	Output Shaft Speed Sensor Circuit No Signal - Circuit short to ground or open	 NOTE: Circuit reference - N_OUT / SENSOR GND - <ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0725-83	Engine Speed Input Circuit - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Engine system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P072A-63	Stuck in Neutral - Circuit/component protection time-out	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: This DTC is always accompanied by other DTCs which indicate which component is affected. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other transmission related DTCs and perform the relevant corrective actions
P072F-07	Stuck in Gear 4 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0730-00	Incorrect Gear Ratio - No sub type information	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P073E-07	Unable to Engage Reverse - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
		<ul style="list-style-type: none"> Torque converter pressure control valve solenoid circuit short circuit to 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short





P0741-07	Torque Converter Clutch Circuit Performance/Stuck Off - Mechanical failures	<ul style="list-style-type: none"> ground, short circuit to power, open circuit, high resistance Torque converter or automatic transmission internal failure 	<ul style="list-style-type: none"> circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition: <ul style="list-style-type: none"> Automatic transmission fluid normal: Install a new torque converter Automatic transmission fluid dirty or contaminated: Install a new automatic transmission
P074C-24	Unable to Engage Gear 4 - Signal stuck high	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new valve body and drain and refill the automatic transmission fluid. Clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P077B-92	Output Speed Sensor Circuit - Direction Error - Performance or incorrect operation	<ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary
P077E-64	Transmission Fluid Temperature Measurement System - Multiple Sensor Correlation - Signal plausibility failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0780-62	Shift Error - Signal compare failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0780-93	Shift Error - No operation	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0780-94	Shift Error - Unexpected operation	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module










P0795-04	Pressure Control Solenoid C - System internal failures	<ul style="list-style-type: none"> Engine system fault Transmission control module is not configured correctly 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P07B3-11	Transmission Park Position Sensor/Switch A Circuit Low - Circuit short to ground	 NOTE: Circuit reference - L3 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07B4-15	Transmission Park Position Sensor/Switch A Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - L3 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07B9-11	Transmission Park Position Sensor/Switch B Circuit Low - Circuit short to ground	 NOTE: Circuit reference - L4 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07BA-15	Transmission Park Position Sensor/Switch B Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - L4 - <ul style="list-style-type: none"> Park position sensor circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P07D4-07	Transmission Mode Switch F Circuit - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Check the automatic transmission serial number: <ul style="list-style-type: none"> Serial number is less than 91782: Install a new automatic transmission Serial number is greater than 91781: Refer to the relevant section of the workshop manual and check the













			automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P07D9-07	Gear 8 Incorrect Ratio - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DC-07	Incorrect Shift from Gear 1 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DD-07	Incorrect Shift from Gear 2 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DE-07	Incorrect Shift from Gear 3 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07DF-07	Incorrect Shift from Gear 4 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
		<ul style="list-style-type: none"> Engine system fault 	











P07E0-07	Incorrect Shift from Gear 5 - Mechanical failures	<ul style="list-style-type: none"> Accessory drive belt components incorrectly installed Driveline imbalance Driveline components excessively worn Wheel/tire imbalance Engine mount damaged Transmission mount damaged Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Check the installation of the accessory drive belt components Check the driveline for debris around rotating components Check the driveline for excessive wear or backlash Check the wheels and tires for snow or mud packing and correct balance Check the engine mounts for damage Check the transmission mounts for damage Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E1-07	Incorrect Shift from Gear 6 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E2-07	Incorrect Shift from Gear 7 - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07E3-07	Incorrect Shift from Gear 8 - Mechanical failures	<ul style="list-style-type: none"> Engine system fault Accessory drive belt components incorrectly installed Driveline imbalance Driveline components excessively worn Wheel/tire imbalance Engine mount damaged Transmission mount damaged Automatic transmission internal failure 	 <p>NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index Check the installation of the accessory drive belt components Check the driveline for debris around rotating components Check the driveline for excessive wear or backlash Check the wheels and tires for snow or mud packing and correct balance Check the engine mounts for damage Check the transmission mounts for damage Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
			 <p>NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption.</p>











P07E4-64	Unable to Engage Park - Signal plausibility failure	<ul style="list-style-type: none"> • Park position sensor mountings loose • Valve block internal failure 	<ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (5.5Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P07E7-07	Stuck in Drive - Mechanical failures	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Check the automatic transmission serial number: <ul style="list-style-type: none"> - Serial number is less than 81206: Install a new automatic transmission - Serial number is greater than 81205: Refer to the relevant section of the workshop manual and check the automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P07F6-07	Gear 9 Incorrect Ratio - Mechanical failures	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P07FA-07	Incorrect Shift From Gear 9 - Mechanical failures	<ul style="list-style-type: none"> • Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0801-94	Reverse Inhibit Control Circuit/Open - Unexpected operation	<ul style="list-style-type: none"> • One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary













		<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P084F-29	Park/Neutral Switch Output Circuit - Signal invalid	 <p>NOTE: Circuit reference - P-SIG -</p> <ul style="list-style-type: none"> Park lock fault Park lock engaged signal circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Transmission control module internal failure 	 <p>NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other park lock related DTCs and perform the relevant corrective actions Refer to the electrical circuit diagrams and check the park lock engaged signal circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0850-29	Park/Neutral Switch Input Circuit - Signal invalid	 <p>NOTE: Circuit reference - L3 / L4 -</p> <ul style="list-style-type: none"> Service park release lever in release position Park position sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Park lock mechanical failure 	 <p>NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Check parklock mechanism by engaging and disengaging the parking lock several times. Check that the service park release lever is in the normal position Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block






P0893-07	Multiple Gears Engaged - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0932-14	Hydraulic Pressure Sensor Circuit - Circuit short to ground or open	 NOTE: Circuit reference - VOUT_PR - <ul style="list-style-type: none"> Pressure sensor signal circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new pressure sensor as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0933-62	Hydraulic Pressure Sensor Range/Performance - Signal compare failure	 NOTE: Circuit reference - VOUT_PR - <ul style="list-style-type: none"> Pressure sensor signal circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new pressure sensor as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0935-12	Hydraulic Pressure Sensor Circuit High - Circuit short to battery	 NOTE: Circuit reference - VOUT_PR - <ul style="list-style-type: none"> Pressure sensor signal circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the pressure sensor signal circuit for short circuit to power. Repair the wiring harness or install a new pressure sensor as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0936-64	Hydraulic Pressure Sensor Circuit Intermittent - Signal plausibility failure	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P0942-62	Hydraulic Pressure Unit - Signal compare failure	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module





P0962-11	Pressure Control Solenoid A Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT5 - <ul style="list-style-type: none"> System pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the system pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0963-15	Pressure Control Solenoid A Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT5 - <ul style="list-style-type: none"> System pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the system pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0973-14	Shift Solenoid A Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT6 - <ul style="list-style-type: none"> Dog clutch 'A' solenoid circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'A' solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0974-12	Shift Solenoid A Control Circuit High - Circuit short to battery	 NOTE: Circuit reference - OUT6 - <ul style="list-style-type: none"> Dog clutch 'A' solenoid circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'A' solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0975-19	Shift Solenoid B Control Circuit Range/Performance - Circuit current above threshold	 NOTE: Circuit reference - OUT0 - <ul style="list-style-type: none"> Multiplate clutch 'B' pressure control valve solenoid circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
	Shift Solenoid B Control Circuit Low	 NOTE: Circuit reference - OUT0 - <ul style="list-style-type: none"> Multiplate clutch 'B' pressure control valve 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.





P0976-11	- Circuit short to ground	<p>solenoid circuit short circuit to ground</p> <ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0977-15	Shift Solenoid B Control Circuit High - Circuit short to battery or open	<p> NOTE: Circuit reference - OUT0 -</p> <ul style="list-style-type: none"> Multiplate clutch 'B' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the Multiplate clutch 'B' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0978-19	Shift Solenoid C Control Circuit Range/Performance - Circuit current above threshold	<p> NOTE: Circuit reference - OUT1 -</p> <ul style="list-style-type: none"> Multiplate clutch 'C' pressure control valve solenoid circuit short circuit to power Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0979-11	Shift Solenoid C Control Circuit Low - Circuit short to ground	<p> NOTE: Circuit reference - OUT1 -</p> <ul style="list-style-type: none"> Multiplate clutch 'C' pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0980-15	Shift Solenoid C Control Circuit High - Circuit short to battery or open	<p> NOTE: Circuit reference - OUT1 -</p> <ul style="list-style-type: none"> Multiplate clutch 'C' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'C' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
	Shift Solenoid D Control Circuit	<p> NOTE: Circuit reference - OUT2 -</p> <ul style="list-style-type: none"> Multiplate clutch 'D' pressure control valve 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p>








P0981-19	Range/Performance - Circuit current above threshold	<p>solenoid circuit short circuit to power</p> <ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0982-11	Shift Solenoid D Control Circuit Low - Circuit short to ground	<p> NOTE: Circuit reference - OUT2 -</p> <ul style="list-style-type: none"> Multiplate clutch 'D' pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0983-15	Shift Solenoid D Control Circuit High - Circuit short to battery or open	<p> NOTE: Circuit reference - OUT2 -</p> <ul style="list-style-type: none"> Multiplate clutch 'D' pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'D' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0984-19	Shift Solenoid E Control Circuit Range/Performance - Circuit current above threshold	<p> NOTE: Circuit reference - OUT3 -</p> <ul style="list-style-type: none"> Multiplate clutch 'E' pressure control valve solenoid circuit short circuit to power Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0985-11	Shift Solenoid E Control Circuit Low - Circuit short to ground	<p> NOTE: Circuit reference - OUT3 -</p> <ul style="list-style-type: none"> Multiplate clutch 'E' pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0986-15	Shift Solenoid E Control Circuit High - Circuit short to battery or open	<p> NOTE: Circuit reference - OUT3 -</p> <ul style="list-style-type: none"> Multiplate clutch 'E' pressure control valve solenoid circuit short circuit to power, open 	<p> NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.</p> <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the multiplate clutch 'E' pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary







		circuit, high resistance <ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0998-14	Shift Solenoid F Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT7 - <ul style="list-style-type: none"> Dog clutch 'F' solenoid circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'F' solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P0999-12	Shift Solenoid F Control Circuit High - Circuit short to battery	 NOTE: Circuit reference - OUT7 - <ul style="list-style-type: none"> Dog clutch 'F' solenoid circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the dog clutch 'F' solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099B-14	Shift Solenoid G Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> Park lock solenoid circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099C-12	Shift Solenoid G Control Circuit High - Circuit short to battery	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> Park lock solenoid circuit short circuit to power Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P099E-14	Shift Solenoid H Control Circuit Low - Circuit short to ground or open	 NOTE: Circuit reference - OUT9 - <ul style="list-style-type: none"> Park lock control solenoid circuit short circuit to ground, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the park lock control solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
		 NOTE: Circuit reference - OUT9 -	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.







P099F-12	Shift Solenoid H Control Circuit High - Circuit short to battery	<ul style="list-style-type: none"> • Park lock control solenoid circuit short circuit to power • Transmission control module internal failure 	<ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the park lock control solenoid circuit for short circuit to power. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P164C-62	Internal Control Module Start-Stop Performance - Signal compare failure	<ul style="list-style-type: none"> • Engine system fault <ul style="list-style-type: none"> - Stop/start system 	<ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
P1706-94	High Vehicle Speed Observed in Park - Unexpected operation	 NOTE: Circuit reference - L3 / L4 - <ul style="list-style-type: none"> • Park position sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance • Park position sensor mountings loose 	<ul style="list-style-type: none"> • Refer to the electrical circuit diagrams and check the park position sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw
P1707-72	Transfer Case Neutral or Park/Neutral Indication Circuit - Actuator stuck open	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> • Service park release lever in release position • Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance • Park position sensor mountings loose • Park lock mechanical failure 	 NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption. <ul style="list-style-type: none"> • Check that the service park release lever is in the normal position • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
		 NOTE: Circuit reference - OUT8 -	 NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption. <ul style="list-style-type: none"> • Check that the service park release lever is in the normal position • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to



P1707-74	Transfer Case Neutral or Park/Neutral Indication Circuit - Actuator slipping	<ul style="list-style-type: none"> • Service park release lever in release position • Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance • Park position sensor mountings loose • Park lock mechanical failure 	<p>power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). <p>The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P1707-77	Transfer Case Neutral or Park/Neutral Indication Circuit - Commanded position not reachable	 NOTE: Circuit reference - OUT8 - <ul style="list-style-type: none"> • Service park release lever in release position • Park lock solenoid circuit short circuit to ground, short circuit to power, open circuit, high resistance • Park position sensor mountings loose • Park lock mechanical failure 	 NOTE: After installing a new valve block, perform routines - Transmission Valve Block, Transmission Control Module Adaption. <ul style="list-style-type: none"> • Check that the service park release lever is in the normal position • Refer to the electrical circuit diagrams and check the park lock solenoid circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). <p>The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw</p> <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new valve block
P1710-86	Transmission Control Module Solenoid/Internal Ground Circuit - Signal invalid	<ul style="list-style-type: none"> • One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance • Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> • Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary • Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
		<ul style="list-style-type: none"> • Missing/invalid data from the anti-lock brake system control module 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.




P174E-62	Output Shaft Speed / ABS Wheel Speed Correlation - Signal compare failure	<ul style="list-style-type: none"> Output shaft speed sensor circuit short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index Using the manufacturer approved diagnostic system, check datalogger signal - Transmission Output Shaft Speed (0x1E68). Refer to the electrical circuit diagrams and check the output shaft speed sensor circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new sensor unit as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1758-19	Pressure Solenoid Control System Incorrect Current - Circuit current above threshold	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1758-62	Pressure Solenoid Control System Incorrect Current - Signal compare failure	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P1770-04	Clutch Solenoid Circuit - System internal failures	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P177F-07	Transmission Friction Element B or D - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission


P178A-07	Transmission Friction Element B or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P178C-07	Transmission Friction Element C or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P178D-07	Transmission Friction Element D or E - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P181F-18	Clutch Control System Performance - Circuit current below threshold	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2544-86	Torque Management Request Input Signal A - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2545-86	Torque Management Request Input Signal A Range/Performance - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
	Torque Management Request Input		 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption.





P2546-86	Signal A Low - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2547-86	Torque Management Request Input Signal A High - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2638-86	Torque Management Feedback Signal A Range/Performance - Signal invalid	<ul style="list-style-type: none"> Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new transmission control module
P2701-07	Transmission Friction Element B Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P2702-07	Transmission Friction Element C Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P2703-07	Transmission Friction Element D Apply Time Range/Performance - Mechanical failures	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, clear the DTCs and perform a road test using all gears. If the fault persists, install a new automatic transmission
P2704-07	Transmission Friction Element E Apply Time	<ul style="list-style-type: none"> Automatic transmission internal failure 	 NOTE: A new automatic transmission is supplied complete with a new transmission control module. After installing a new automatic transmission, perform routines - Configure New Module (Including Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Check the automatic transmission serial number: <ul style="list-style-type: none"> - Serial number is less than 63584: Install a new automatic transmission - Serial number is greater than 63583: Refer to the relevant section of the workshop manual and check the

	Range/Performance - Mechanical failures		automatic transmission fluid level. Rectify any fluid leaks and top up as necessary. Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software. Clear the DTCs and retest. If the fault persists, install a new automatic transmission
P2711-94	Unexpected Mechanical Gear Disengagement - Unexpected operation	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Park position sensor mountings loose Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, check that the park position sensor mounting is secured at the correct torque (6Nm) and rectify as required. To gain access to the park position sensor mounting, it is first necessary to remove the ten mounting bolts of the main control valve body and lift the valve body unit from the transmission housing (see Steps 1 - 5 in the Removal Instructions referenced below). NOTE: New oil tubes must be installed when the unit is reassembled. For additional information, refer to: (307-01 Automatic Transmission/Transaxle) Main Control Valve Body - GTDi 2.0L Petrol/GTDi 2.0L Petrol - SULEV (Removal and Installation), Main Control Valve Body - INGENIUM I4 2.0L Diesel (Removal and Installation). The park position sensor is located inside the main casing, adjacent to the electrical connector. The sensor is secured to a boss in the main casing with a screw Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2763-15	Torque Converter Clutch Pressure Control Solenoid Control Circuit High - Circuit short to battery or open	 NOTE: Circuit reference - OUT4 - <ul style="list-style-type: none"> Torque converter pressure control valve solenoid circuit short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
P2764-11	Torque Converter Clutch Pressure Control Solenoid Control Circuit Low - Circuit short to ground	 NOTE: Circuit reference - OUT4 - <ul style="list-style-type: none"> Torque converter pressure control valve solenoid circuit short circuit to ground Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement) , Transmission Control Module Adaption . <ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the torque converter pressure control valve solenoid circuit for short circuit to ground. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
			NOTES:  This DTC may be induced by the driver using the paddle switches excessively.

P2787-4B	Clutch Temperature Too High - Over temperature	<ul style="list-style-type: none"> Paddle switch fault Automatic transmission fluid level low Transmission cooling system fault 	 This DTC may be induced by a paddle switch fault that causes excessive gear shifts. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for paddle switch related DTCs and perform the relevant corrective actions Refer to the relevant section of the workshop manual and check the automatic transmission fluid level and condition. Rectify any fluid leaks and top up as necessary Refer to the relevant section of the workshop manual and check the transmission cooling system. Using the manufacturer approved diagnostic system, clear the DTCs and retest
P2793-94	Gear Shift Direction Circuit - Unexpected operation	<ul style="list-style-type: none"> One or more automatic transmission solenoid circuits short circuit to ground, short circuit to power, open circuit, high resistance Transmission control module internal failure 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check for other solenoid circuit related DTCs and perform the relevant corrective actions. Refer to the electrical circuit diagrams and check the automatic transmission solenoid circuits for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness or install a new solenoid as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control module
U0001-81	High Speed CAN Communication Bus - Invalid serial data received	<ul style="list-style-type: none"> Invalid data received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-82	High Speed CAN Communication Bus - Alive/sequence counter incorrect / not updated	<ul style="list-style-type: none"> Invalid data received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-83	High Speed CAN Communication Bus - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Invalid data received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid data source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-86	High Speed CAN Communication Bus - Signal invalid	<ul style="list-style-type: none"> Invalid signal received from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the invalid signal source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
U0001-87	High Speed CAN Communication Bus - Missing message	<ul style="list-style-type: none"> Missing message from another control module via the high speed CAN bus (powertrain) 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the snapshot data to determine the missing message source control module. Check the relevant control module for related DTCs and refer to the relevant DTC index
		<ul style="list-style-type: none"> Engine control module power or ground circuit open circuit, high resistance 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the engine control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary

U0073-00	Control Module Communication Bus A Off - No sub type information	<ul style="list-style-type: none"> High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Engine system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0100-87	Lost Communication With ECM/PCM A - Missing message	<ul style="list-style-type: none"> Engine control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Engine system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the engine control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0121-87	Lost Communication With Anti-Lock Brake System (ABS) Control Module - Missing message	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Anti-lock brake system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0300-00	Internal Control Module Software Incompatibility - No sub type information	<ul style="list-style-type: none"> Car configuration file mismatch with vehicle specification Transmission control module is not configured correctly 	 NOTE: After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software
U0302-57	Software Incompatibility with Transmission Control Module - Invalid/incomplete software component	<ul style="list-style-type: none"> Car configuration file mismatch with vehicle specification Transmission control module is not configured correctly Incorrect transmission control module installed 	NOTES:  After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs.  After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software Install a new transmission control module as necessary

U0401-02	Invalid Data Received From ECM/PCM A - General signal failure	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-64	Invalid Data Received From ECM/PCM A - Signal plausibility failure	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-67	Invalid Data Received From ECM/PCM A - Signal incorrect after event	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-82	Invalid Data Received From ECM/PCM A - Alive/sequence counter incorrect / not updated	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0401-83	Invalid Data Received From ECM/PCM A - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Missing/invalid data from the engine control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index
U0415-27	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Signal rate of change above threshold	<ul style="list-style-type: none"> Missing/invalid data from the anti-lock brake system control module 	 <p>NOTE: This DTC is set when the automatic transmission output shaft speed rate of change is implausible. This can occur if the brakes lock during braking because of an anti-lock brake system fault.</p> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0415-82	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Alive/sequence counter incorrect / not updated	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Anti-lock brake system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index
U0415-83	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module - Value of signal protection calculation incorrect	<ul style="list-style-type: none"> Anti-lock brake system control module power or ground circuit open circuit, high resistance High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance Anti-lock brake system fault 	<ul style="list-style-type: none"> Refer to the electrical circuit diagrams and check the anti-lock brake system control module power and ground circuits for open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary Using the manufacturer approved diagnostic system, check the anti-lock brake system control module for related DTCs and refer to the relevant DTC index

U0422-86	Invalid Data Received From Body Control Module - Signal invalid	 NOTE: Circuit reference - IGN - <ul style="list-style-type: none"> Missing/invalid data from the central junction box Ignition signal circuit short circuit to ground, short circuit to power, open circuit, high resistance 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the central junction box for related DTCs and refer to the relevant DTC index Refer to the electrical circuit diagrams and check the ignition signal circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary
U2101-56	Control Module Configuration Incompatible - Invalid/incomplete configuration	<ul style="list-style-type: none"> Transmission control module is not configured correctly Car configuration file mismatch with vehicle specification Incorrect transmission control module installed 	NOTES:  After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs.  After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, re-configure the transmission control module with the latest level software Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest Install a new transmission control module as necessary
U3000-56	Control Module - Invalid/incomplete configuration	<ul style="list-style-type: none"> Mis-match between transmission control module configuration and valve block specification 	 NOTE: After installing a new transmission control module, perform routines - Configure New Module (Without Transmission Replacement), Transmission Control Module Adaption. <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, configure the transmission control module as a new module. Perform routine - Transmission Valve Block. Clear the DTCs and retest. If the fault persists, install a new transmission control module
U3000-9A	Control Module - Component or system operating conditions	<ul style="list-style-type: none"> Engine system fault 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the engine control module for related DTCs and refer to the relevant DTC index

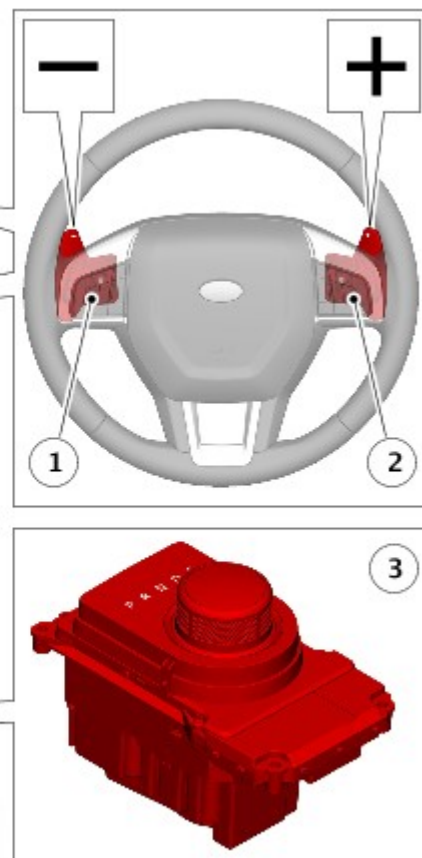
Published: 30-Sep-2014

Automatic Transmission/Transaxle External Controls - External Controls

Description and Operation

COMPONENT LOCATION

E163235



Item	Description
1	Downshift paddle switch
2	Upshift paddle switch
3	Transmission Control Switch (TCS)

OVERVIEW

The external controls comprise a rotary **TCS (transmission control switch)** and two steering wheel mounted paddle switches.

The **TCS** transmits driver transmission selections to the **TCM (transmission control module)** for transmission mode selections. The paddle switches allow the driver to initiate gear shifts in all transmission modes; 'D' drive, 'S' manual CommandShift™.

DESCRIPTION

TRANSMISSION CONTROL SWITCH

The **TCS** is a rotary switch installed in the floor console and controls the driver transmission selections.

The **TCM** allows the transmission to be operated as a conventional automatic unit by selecting P R N D on the **TCS**. Rotation of the **TCS** allows the selection of P R N D S. Depressing and rotating the **TCS** clockwise from the D position, S mode can be selected. The **TCS** is a fully electronic rotary transmission switch with no mechanical connection to the transmission. Mechanical operation of the transmission corresponding to selections made on the **TCS** is performed by the **TCM** on the transmission casing.

For additional information, refer to: Transmission Description (307-01, Description and Operation).

The **TCS** rises from its housing once the engine is running. When the engine is stopped, with the **TCS** in any position other than 'N', it retracts into the housing again. If the **TCS** is in position 'N' when the engine is stopped, it remains in the raised position for up to 10 minutes, for use in a drive-through car wash for example. After 10 minutes the **TCS** automatically retracts. The **TCS** also retracts if 'P' is selected within the 10 minute period. If the **TCS** does not rise from the housing when the engine is started, but electrical power is supplied to the **TCS**, the retracted **TCS** can still be rotated to make selections.

If electrical power to the **TCS** is lost, the **TCS** will not rise from the housing when the engine is started and the retracted **TCS** cannot be rotated. The **TCS** contains an internal shift lock solenoid to prevent the switch from being rotated when the engine is not running.

The engine can be stopped with the **TCS** in any position. Once the engine is stopped the switch will automatically reset to the 'P' position and the transmission Park lock will be engaged, except if the **TCS** is in the 'N' position when the engine is stopped.

LED (light emitting diode) 's on the **TCS** illuminate to display the selected position. If the brake pedal is not depressed when a selection is made, the selected position **LED** flashes and the mode selection is not performed.

PADDLE SWITCHES

Two gear change paddle switches are fitted at the rear of the steering wheel and allow the driver to operate the transmission as a semi-automatic manual transmission using the CommandShift™ feature. Each paddle switch has three connections; ground, illumination **PWM (pulse width modulation)** supply and ground switch signal.

The left paddle switch (-) controls the downshifts and the right paddles switch (+) controls the upshifts.

EMERGENCY PARK RELEASE

The 'shift by wire' control system has no mechanical or electrical EPR provision to remove the vehicle from Park in the event of a system fault.

The Service Park Release (SPR) procedure must be used to rotate the transmission selector shaft manually to the 'N' (Neutral) position. Refer to the relevant service procedure or the Automatic Transmission Description and Operation section. For additional information, refer to: Transmission Description (307-01, Description and Operation).

OPERATION

TRANSMISSION CONTROL SWITCH (TCS)

Rotation of the **TCS** to any of the five positions is sensed by the **TCM** via the high speed **CAN (controller area network)** powertrain systems bus. The **TCM** reacts according to the selected position if all parameters for that selection are met.

The **TCS** has a magnetic system using Hall effect sensors to determine the position of the switch. The 'S' (Sport) position selection allows the **TCM** to operate the transmission as a semi-automatic 'CommandShift™' system. Gear selections are sensed by the **TCM** when the driver operates the steering wheel paddle switches. Once the **TCS** position is confirmed, the **TCS** outputs applicable information on the high speed **CAN** powertrain systems bus, which is received by the **TCM** to activate the correct gear and by the instrument cluster to display the selected mode or gear in the instrument cluster message center.

The paddle switches can be used on a temporary basis when the **TCS** is in the 'D' (Drive) position to override the automatic gear selection if required.

PADDLE SWITCHES

The paddle switches are hardwired to the speed control switch on the steering wheel. Operation of a paddle switch completes a ground path to the speed control switch. The speed control switch converts the completed ground signal into a **LIN (local interconnect network)** signal which is passed via the clockspring to the **CJB (central junction box)**. The **CJB** converts the signal into a high speed **CAN** powertrain systems bus signal to the **TCM**.

Pulling the left downshift (-) paddle switch provides down changes and pulling the right upshift (+) paddle switch provides up changes. The first operation of either paddle switch, after 'S' sport mode is selected, puts the transmission into permanent manual CommandShift™. Rotation of the **TCS** back to the 'D' (Drive) position returns the transmission to conventional automatic operation.

Temporary operation of CommandShift™ mode can also be operated with the **TCS** in the 'D' (Drive) position. Operation of either the upshift or downshift paddle switches activates the manual CommandShift™ mode operation. If the **TCS** is in 'D' (Drive), CommandShift™ will cancel after a time period or can be cancelled by pressing and holding the upshift (+) paddle switch for approximately 2 seconds.

The operation of the paddle switches is configurable by the driver using the menu in the instrument cluster. The menu allows the driver to select operation of the paddle switches in 'S' (Sport) only (default setting for NAS and China market vehicles) or in 'D' (Drive) and 'S' (Sport) (default setting all other markets).

NEUTRAL AND SHIFT LOCK

The shift lock strategy is controlled by the **TCM**. Shift lock is activated when the **TCS** is in 'P' or 'N' and the engine is running.

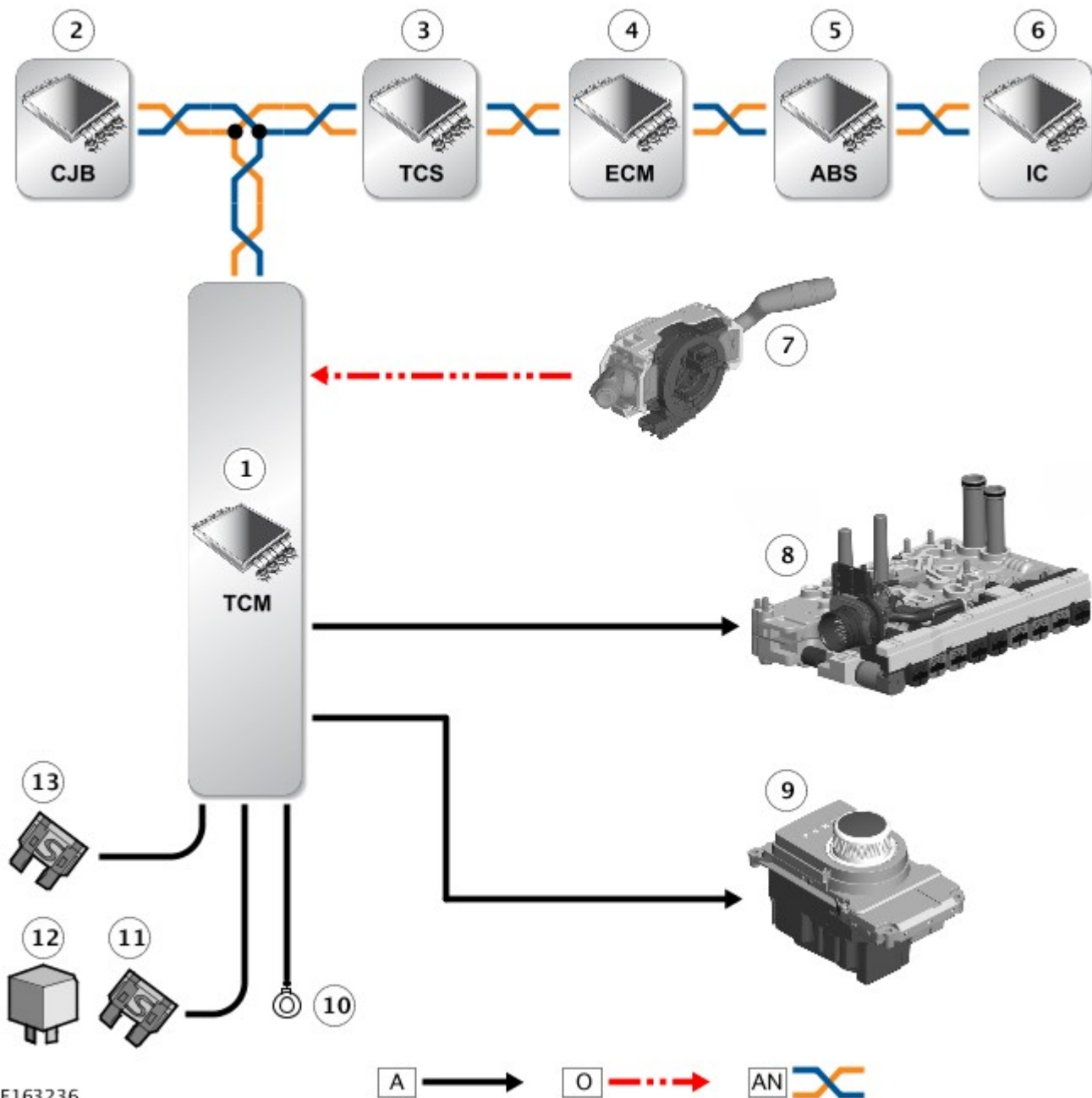
The shift lock is a requirement for the **TCS**. The switch is always locked at ignition on (power mode 6) when the engine is not running, except after an engine stall when the selector is not in 'P' (Park) or 'N' (Neutral). If, when driving with the **TCS** in 'S' (Sport), 'D' (Drive) or 'R' (Reverse) at a speed of more than 10 km/h (6 mph), the driver selects 'P' (Park) or 'N' (Neutral) without the brake pedal depressed, the **TCS** will be immediately locked once the vehicle speed falls to below 10 km/h (6 mph).

With the brake pedal pressed, the **TCS** will remain unlocked for as long as the brake pedal remains pressed, regardless of vehicle speed. The **TCM** will only engage the shift lock once the vehicle speed is less than 10 km/h (6 mph). If the driver selects 'N' and releases the brake pedal with a vehicle speed of less than 10 km/h (6 mph), the **TCS** will be locked 2 seconds after 'N' (Neutral) is selected. The **TCS** will remain locked until the driver presses the brake pedal again.

CONTROL DIAGRAM



NOTE: A = Hardwired; O = LIN Bus; AN = High speed CAN powertrain systems



Item	Description
1	Transmission Control Module (TCM)
2	Central Junction Box (CJB)
3	Transmission Control Switch (TCS)
4	Engine Control Module (ECM)
5	Anti-lock Brake System (ABS) control module
6	Instrument Cluster (IC)
7	Clockspring - paddle switch inputs
8	Valve block
9	Transmission Control Switch (TCS)
10	Ground
11	Fuse - ignition supply from ignition relay
12	Ignition relay (CJB)
13	Fuse - Permanent battery supply

General Information - Diagnostic Trouble Code (DTC) Index DTC: Transmission Control Switch (TCS)

Description and Operation

Transmission Control Switch (TCS)



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

NOTES:



If a control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.



Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).



When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the digital multimeter leads into account.



Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.



Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.








If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.



Check DDW for open campaigns. Refer to the corresponding bulletins and SSMs which may be valid for the specific customer complaint and carry out the recommendations as required.

The table below lists all Diagnostic Trouble Codes (DTCs) that could be logged in the Transmission Control Switch (TCS). For additional diagnosis and testing information, refer to the relevant Diagnosis and Testing section in the workshop manual. For additional information, refer to: [External Controls](#) (307-05 Automatic Transmission/Transaxle External Controls, Diagnosis and Testing).

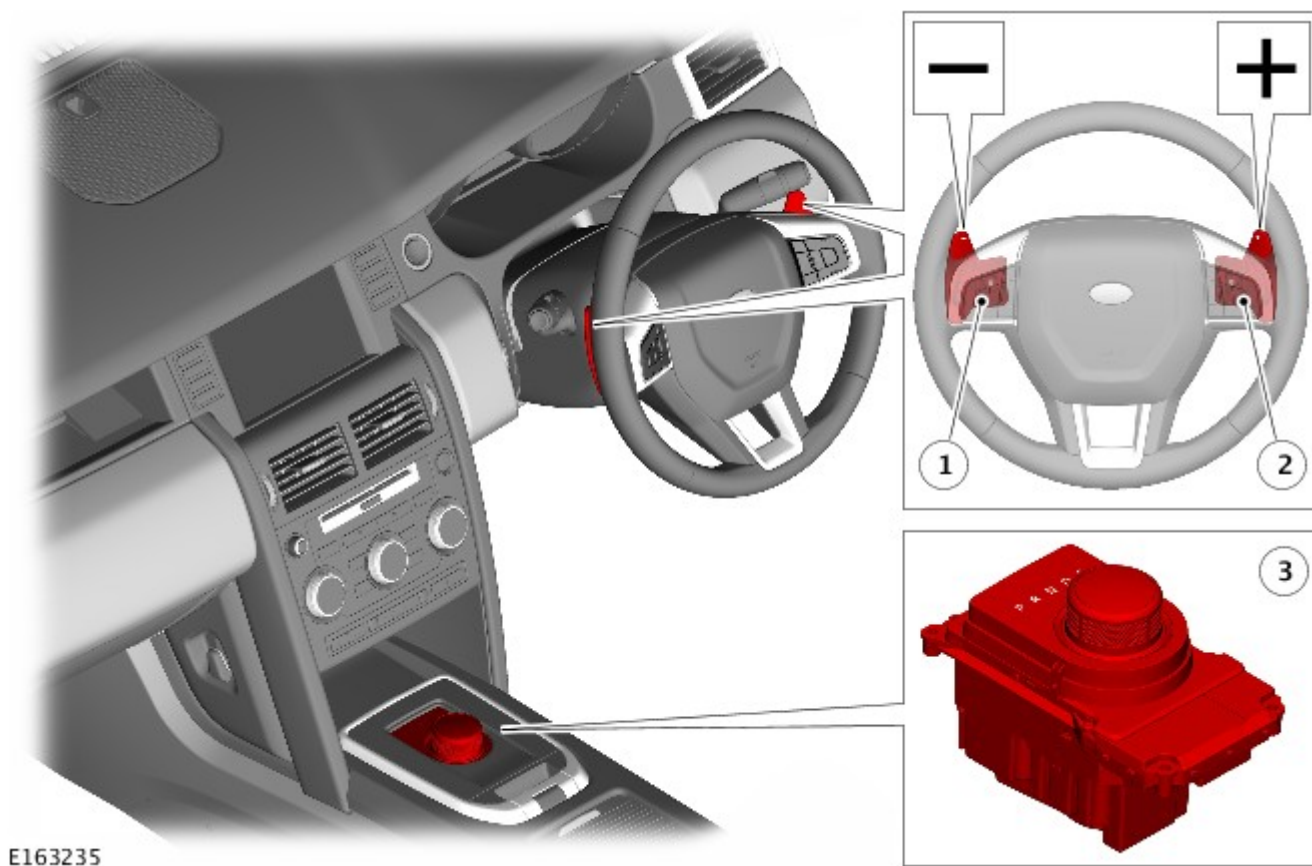
DTC	Description	Possible Causes	Action
P084F-11	Park/Neutral Switch Output Circuit - Circuit short to ground	 NOTE: Circuit reference - P/N SIGNAL - <ul style="list-style-type: none">Park/neutral signal circuit short circuit to ground	<ul style="list-style-type: none">Refer to the electrical circuit diagrams and check the park/neutral signal circuit for short circuit to ground. Repair the wiring harness as necessary
P084F-12	Park/Neutral Switch Output Circuit - Circuit short to battery	 NOTE: Circuit reference - P/N SIGNAL - <ul style="list-style-type: none">Park/neutral signal circuit short circuit to power	<ul style="list-style-type: none">Refer to the electrical circuit diagrams and check the park/neutral signal circuit for short circuit to power. Repair the wiring harness as necessary
P084F-13	Park/Neutral Switch Output Circuit - Circuit open	 NOTE: Circuit reference - P/N SIGNAL - <ul style="list-style-type: none">Park/neutral signal circuit open circuit, high resistance	<ul style="list-style-type: none">Refer to the electrical circuit diagrams and check the park/neutral signal circuit for open circuit, high resistance. Repair the wiring harness as necessary
	Gear Shift Control		

P085D-68	Module A Performance - Event information	<ul style="list-style-type: none"> Transmission control switch internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control switch
P085D-96	Gear Shift Control Module A Performance - Component internal failure	<ul style="list-style-type: none"> Transmission control switch internal failure 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control switch
P085D-97	Gear Shift Control Module A Performance - Component or system operation obstructed or blocked	<ul style="list-style-type: none"> Transmission control switch movement obstructed Transmission control switch internal failure 	<div>  <p>NOTE: This DTC may be induced by the driver holding the transmission control switch and opposing its automatic movement.</p> </div> <ul style="list-style-type: none"> Check the operation of the transmission control switch and ensure nothing is jamming or obstructing the mechanism. Rectify as necessary Using the manufacturer approved diagnostic system, clear the DTCs and retest. If the fault persists, install a new transmission control switch
U0028-87	Vehicle Communication Bus A - Missing message	<ul style="list-style-type: none"> Missing/invalid data from the transmission control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the transmission control module for related DTCs and refer to the relevant DTC index
U0028-88	Vehicle Communication Bus A - Bus off	<ul style="list-style-type: none"> High speed CAN bus (powertrain) circuit short circuit to ground, short circuit to power, open circuit, high resistance 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, perform a CAN network integrity test. Refer to the electrical circuit diagrams and check the high speed CAN bus (powertrain) circuit for short circuit to ground, short circuit to power, open circuit, high resistance. Repair the wiring harness as necessary
U0028-92	Vehicle Communication Bus A - Performance or incorrect operation	<ul style="list-style-type: none"> Missing/invalid data from the transmission control module 	<ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check the transmission control module for related DTCs and refer to the relevant DTC index
U3000-00	Control Module - No sub type information	<ul style="list-style-type: none"> Car configuration file mismatch with vehicle specification Incorrect transmission control switch installed 	<div>  <p>NOTE: After updating the car configuration file, set the ignition to on and wait 30 seconds before clearing the DTCs.</p> </div> <ul style="list-style-type: none"> Using the manufacturer approved diagnostic system, check and up-date the car configuration file as necessary. Clear the DTCs and retest Install a new transmission control switch as necessary

Automatic Transmission/Transaxle External Controls - External Controls

Description and Operation

COMPONENT LOCATION



E163235

Item	Description
1	Downshift paddle switch
2	Upshift paddle switch
3	Transmission Control Switch (TCS)

OVERVIEW

The external controls comprise a rotary **TCS** (transmission control switch) and two steering wheel mounted paddle switches.

The **TCS** transmits driver transmission selections to the **TCM** (transmission control module) for transmission mode selections. The paddle switches allow the driver to initiate gear shifts in all transmission modes; 'D' drive, 'S' manual CommandShift™.

DESCRIPTION

TRANSMISSION CONTROL SWITCH

The **TCS** is a rotary switch installed in the floor console and controls the driver transmission selections.

The **TCM** allows the transmission to be operated as a conventional automatic unit by selecting P R N D on the **TCS**. Rotation of the **TCS** allows the selection of P R N D S. Depressing and rotating the **TCS** clockwise from the D position, S mode can be selected. The **TCS** is a fully electronic rotary transmission switch with no mechanical connection to the transmission. Mechanical operation of the transmission corresponding to selections made on the **TCS** is performed by the **TCM** on the transmission casing.

For additional information, refer to: Transmission Description (307-01, Description and Operation).

The **TCS** rises from its housing once the engine is running. When the engine is stopped, with the **TCS** in any position other than 'N', it retracts into the housing again. If the **TCS** is in position 'N' when the engine is stopped, it remains in the raised position for up to 10 minutes, for use in a drive-through car wash for example. After 10 minutes the **TCS** automatically retracts. The **TCS** also retracts if 'P' is selected within the 10 minute period. If the **TCS** does not rise from the housing when the engine is started, but electrical power is supplied to the **TCS**, the retracted **TCS** can still be rotated to make selections.

If electrical power to the **TCS** is lost, the **TCS** will not rise from the housing when the engine is started and the retracted **TCS** cannot be rotated. The **TCS** contains an internal shift lock solenoid to prevent the switch from being rotated when the engine is not running.

The engine can be stopped with the **TCS** in any position. Once the engine is stopped the switch will automatically reset to the 'P' position and the transmission Park lock will be engaged, except if the **TCS** is in the 'N' position when the engine is stopped.

LED (light emitting diode) 's on the **TCS** illuminate to display the selected position. If the brake pedal is not depressed when a selection is made, the selected position **LED** flashes and the mode selection is not performed.

PADDLE SWITCHES

Two gear change paddle switches are fitted at the rear of the steering wheel and allow the driver to operate the transmission as a semi-automatic manual transmission using the CommandShift™ feature. Each paddle switch has three connections; ground, illumination **PWM (pulse width modulation)** supply and ground switch signal.

The left paddle switch (-) controls the downshifts and the right paddles switch (+) controls the upshifts.

EMERGENCY PARK RELEASE

The 'shift by wire' control system has no mechanical or electrical EPR provision to remove the vehicle from Park in the event of a system fault.

The Service Park Release (SPR) procedure must be used to rotate the transmission selector shaft manually to the 'N' (Neutral) position. Refer to the relevant service procedure or the Automatic Transmission Description and Operation section. For additional information, refer to: Transmission Description (307-01, Description and Operation).

OPERATION

TRANSMISSION CONTROL SWITCH (TCS)

Rotation of the **TCS** to any of the five positions is sensed by the **TCM** via the high speed **CAN (controller area network)** powertrain systems bus. The **TCM** reacts according to the selected position if all parameters for that selection are met.

The **TCS** has a magnetic system using Hall effect sensors to determine the position of the switch. The 'S' (Sport) position selection allows the **TCM** to operate the transmission as a semi-automatic 'CommandShift™' system. Gear selections are sensed by the **TCM** when the driver operates the steering wheel paddle switches. Once the **TCS** position is confirmed, the **TCS** outputs applicable information on the high speed **CAN** powertrain systems bus, which is received by the **TCM** to activate the correct gear and by the instrument cluster to display the selected mode or gear in the instrument cluster message center.

The paddle switches can be used on a temporary basis when the **TCS** is in the 'D' (Drive) position to override the automatic gear selection if required.

PADDLE SWITCHES

The paddle switches are hardwired to the speed control switch on the steering wheel. Operation of a paddle switch completes a ground path to the speed control switch. The speed control switch converts the completed ground signal into a **LIN (local interconnect network)** signal which is passed via the clockspring to the **CJB (central junction box)**. The **CJB** converts the signal into a high speed **CAN** powertrain systems bus signal to the **TCM**.

Pulling the left downshift (-) paddle switch provides down changes and pulling the right upshift (+) paddle switch provides up changes. The first operation of either paddle switch, after 'S' sport mode is selected, puts the transmission into permanent manual CommandShift™. Rotation of the **TCS** back to the 'D' (Drive) position returns the transmission to conventional automatic operation.

Temporary operation of CommandShift™ mode can also be operated with the **TCS** in the 'D' (Drive) position. Operation of either the upshift or downshift paddle switches activates the manual CommandShift™ mode operation. If the **TCS** is in 'D' (Drive), CommandShift™ will cancel after a time period or can be cancelled by pressing and holding the upshift (+) paddle switch for approximately 2 seconds.

The operation of the paddle switches is configurable by the driver using the menu in the instrument cluster. The menu allows the driver to select operation of the paddle switches in 'S' (Sport) only (default setting for NAS and China market vehicles) or in 'D' (Drive) and 'S' (Sport) (default setting all other markets).

NEUTRAL AND SHIFT LOCK

The shift lock strategy is controlled by the **TCM**. Shift lock is activated when the **TCS** is in 'P' or 'N' and the engine is running.

The shift lock is a requirement for the **TCS**. The switch is always locked at ignition on (power mode 6) when the engine is not running, except after an engine stall when the selector is not in 'P' (Park) or 'N' (Neutral). If, when driving with the **TCS** in 'S' (Sport), 'D' (Drive) or 'R' (Reverse) at a speed of more than 10 km/h (6 mph), the driver selects 'P' (Park) or 'N' (Neutral) without the brake pedal depressed, the **TCS** will be immediately locked once the vehicle speed falls to below 10 km/h (6 mph).

10	Ground
11	Fuse - ignition supply from ignition relay
12	Ignition relay (CJB)
13	Fuse - Permanent battery supply

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Automatic Transmission/Transaxle External Controls - Transmission Control Switch (TCS) Knob

Removal and Installation

Removal

NOTES:



Removal steps in this procedure may contain installation details.



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



1. CAUTIONS:



Do not start the engine.



Care must be taken to avoid damaging the surrounding components.

Installation

1.



CAUTION: Make sure that a new component is installed.



NOTE: Make sure to install the TCS plastic carrier to the TCS knob.

To install, reverse the removal procedure.

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Automatic Transmission/Transaxle External Controls - Transmission Control Switch (TCS)

Removal and Installation

Removal

NOTES:



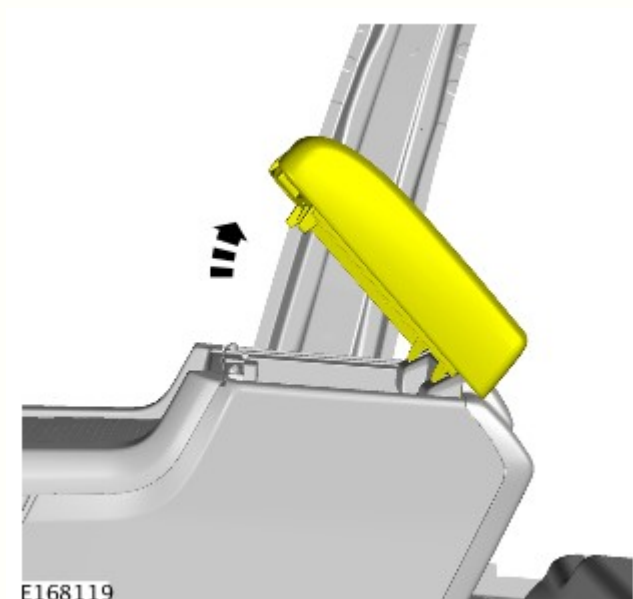
Some variation in the illustrations may occur, but the essential information is always correct.



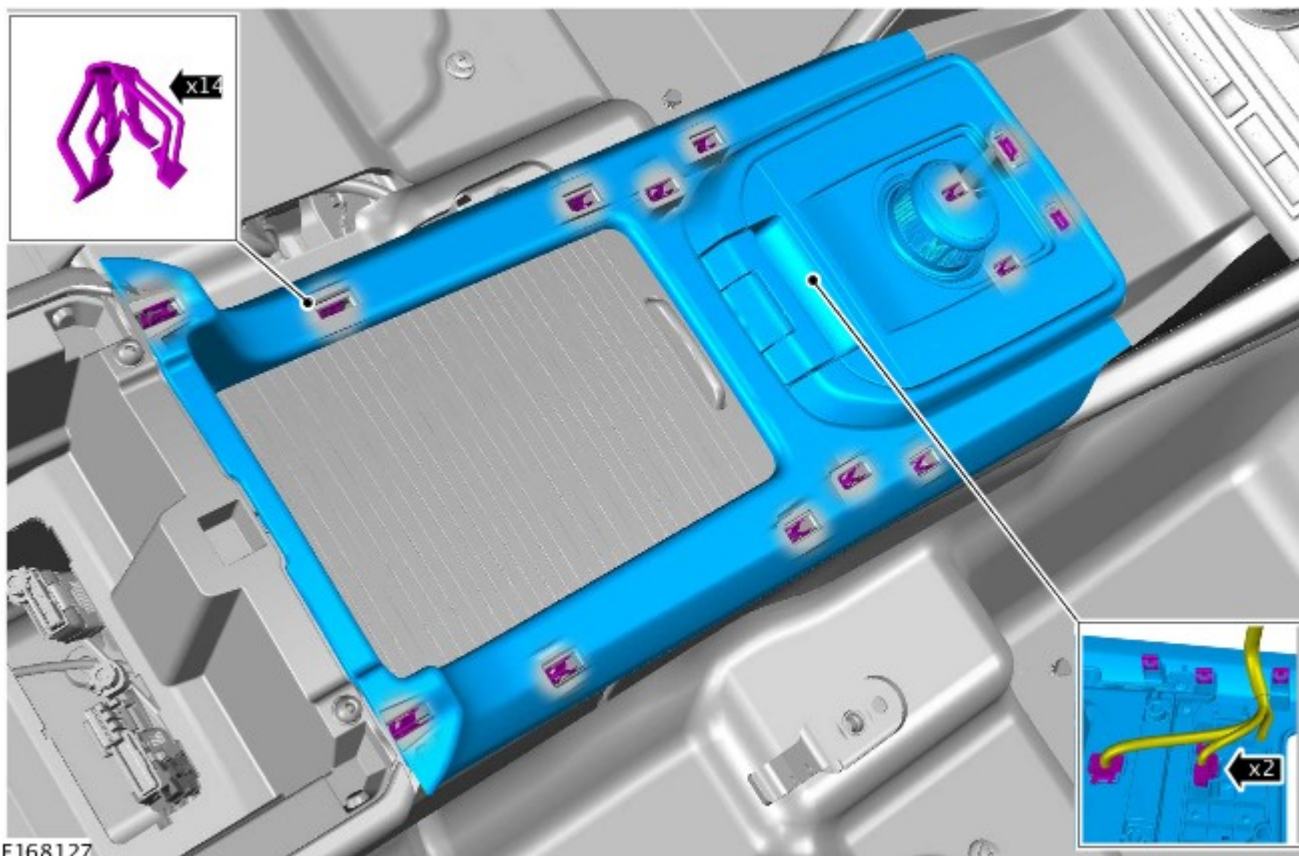
Removal steps in this procedure may contain installation details.

1. Refer to: Specifications (414-01, Specifications).

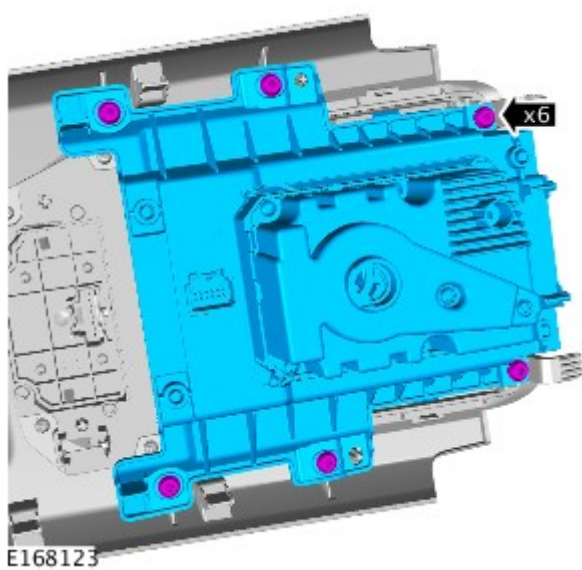
2.



3.



4.



Installation

1. To install, reverse the removal procedure.