

Preview Solution CBR-343-7

AMT Gear Box Air Leaks

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Valid for all Mack and Volvo chassis with an AMT

On **Volvo chassis with an I-Shift** and **Mack chassis with an mDRIVE transmission**, there have been reports of complete shift assemblies and TECUs being replaced due to technicians being unable to pinpoint the source of the air leak.

Complaint:

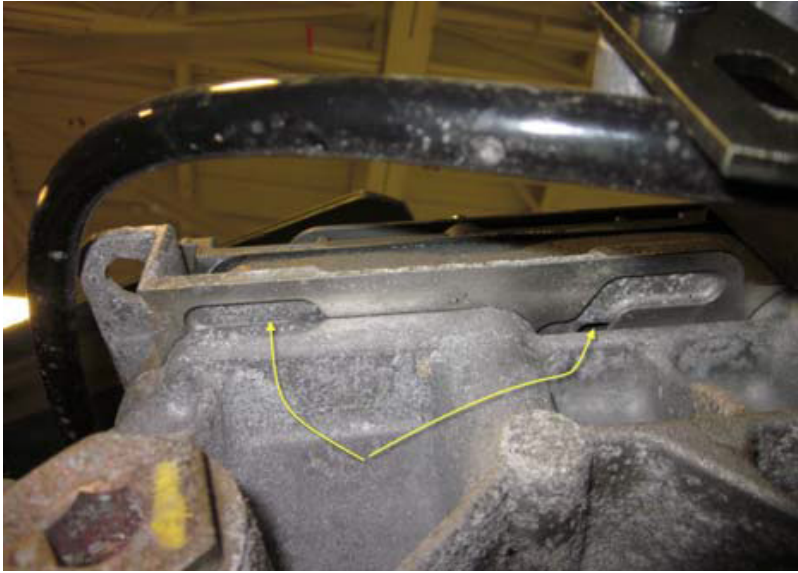
Air Leak from the TECU Vent

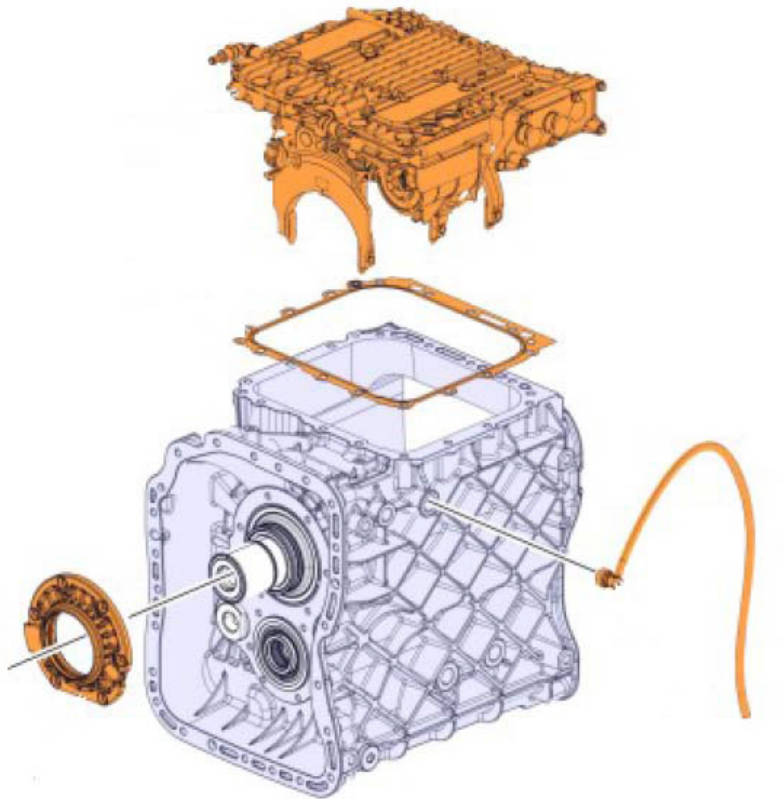
- **AMT-D:** An air leak is present at all times from the left or right side vent of the TECU (Transmission Electronic Control Unit). Refer to Figures 2 and 3.
- **AMT-C:** An air leak is present at all times from the gearbox case vent tube. Refer to Figure 5.

Cause:

- **AMT-C & AMT-D:** One or more TECU shift valves may be stuck open, allowing air to escape through the venting solenoid. This issue can be intermittent. Testing has shown that exercising the valves with TT by forcing shifts may temporarily resolve the leak, but the valve may become stuck again.
- **TECU to Control Housing Seals:** Leaks from these seals can cause similar symptoms. These should be inspected before considering the replacement of major components.
- **Internal Leaks:** A leak between ports in the TECU due to a failed gasket can cause erratic or undesired shifting, as air bleeds into the wrong ports. The seals should be pliable with a peaked appearance; flattened sealing surfaces indicate a bad seal.







Repair:

- Replace faulty TECU to Control housing seals and retest.
- Replace the TECU if necessary.

Complaint:

Air Leak During Shifting or Incomplete Gear Engagement

Symptoms:

- Air leak occurs only during shifting.
- Certain gears are unavailable during operation.
- Slow shifting accompanied by an air leak.

Causes:

1. Shift Control Housing Leaks:

- These leaks are typically due to screws backing out of the shift piston covers (see Figure 4), allowing the end cap to vent air during a shift.
- This issue usually affects only one shifter and in one direction.

- It may result in random gear unavailability, causing the TECU to avoid these gears during operation.
- A key cycle typically resets this, requiring the unit to relearn the affected gears.

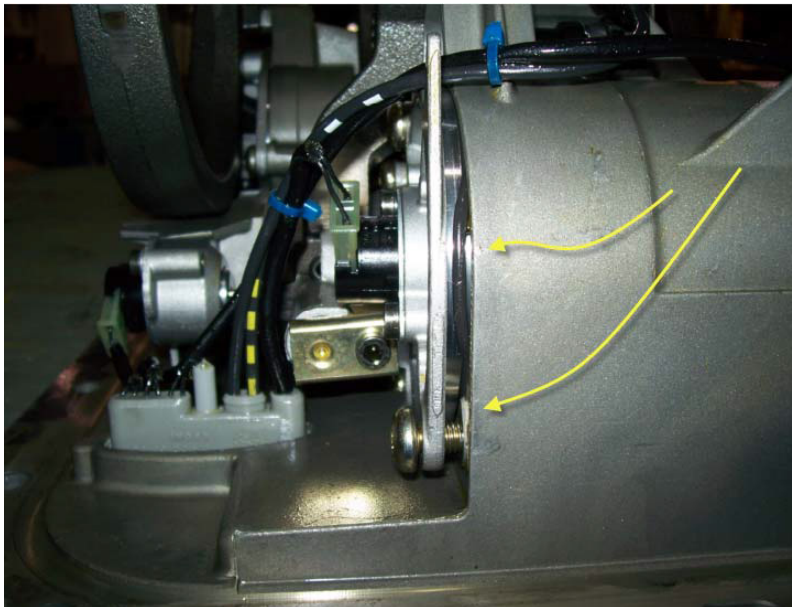
2. Other Issues:

- Broken shift forks, piston rods, or cracked internal pistons can also cause air leaks.
- A broken rod can be detected by manipulating the shift forks after removing the control shift housing; one fork will feel unattached.
- **AMT-C:** With external vent tubes, these failures will vent air from the tubes on the right side of the gearbox.
- **AMT-D:** Internally vented through the TECU, with leaks appearing at the TECU vents.

Note: Do not transfer external vent tubes from an AMT-C to an AMT-D gearbox during repair.

3. Shift Piston Failures:

- Broken or cracked internal shift pistons will cause air leaks during shifting, accompanied by slow shifts.
- These failures will vent through the TECU vents on all AMT versions.
- Leaks can also be caused by a leaking countershaft brake assembly, CVU, or CCA. Testing is needed before replacing the control housing assembly.



Repair:

Replace the shift control housing, unless other damage is found.

Complaint:

Slow Gear Engagement from Neutral or Poor Shift Quality

Symptoms:

- Delayed gear engagement from neutral.
- Slow shifting between gears.
- Harsh shifting.
- Air leak heard from the clutch/flywheel housing.

Causes:

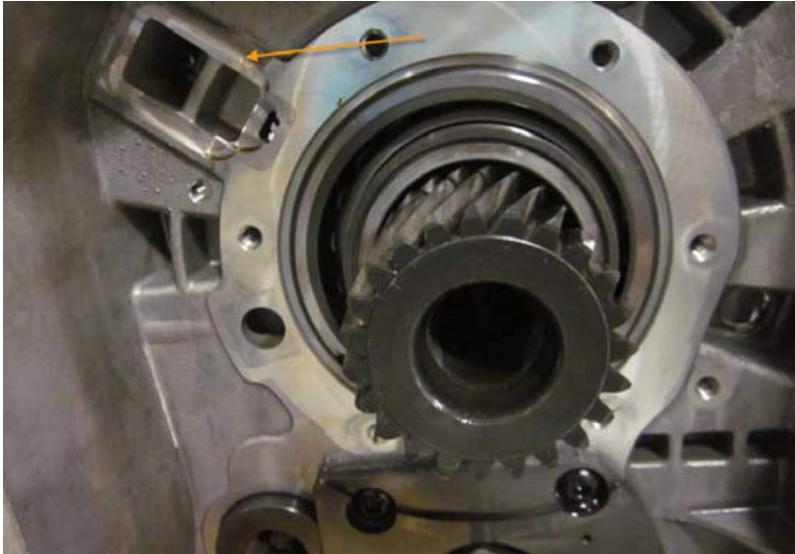
1. **Clutch Control Actuator (CCA) Leak:**
 - Air leak from the Clutch Control Actuator inside the clutch housing.
2. **Countershaft Brake Assembly Leak:**
 - Perform clutch release tests using Tech Tool (TT) and listen for excessive air escape.
 - Some air venting is normal, but prolonged blasts of air indicate an issue.

Repair Procedure:

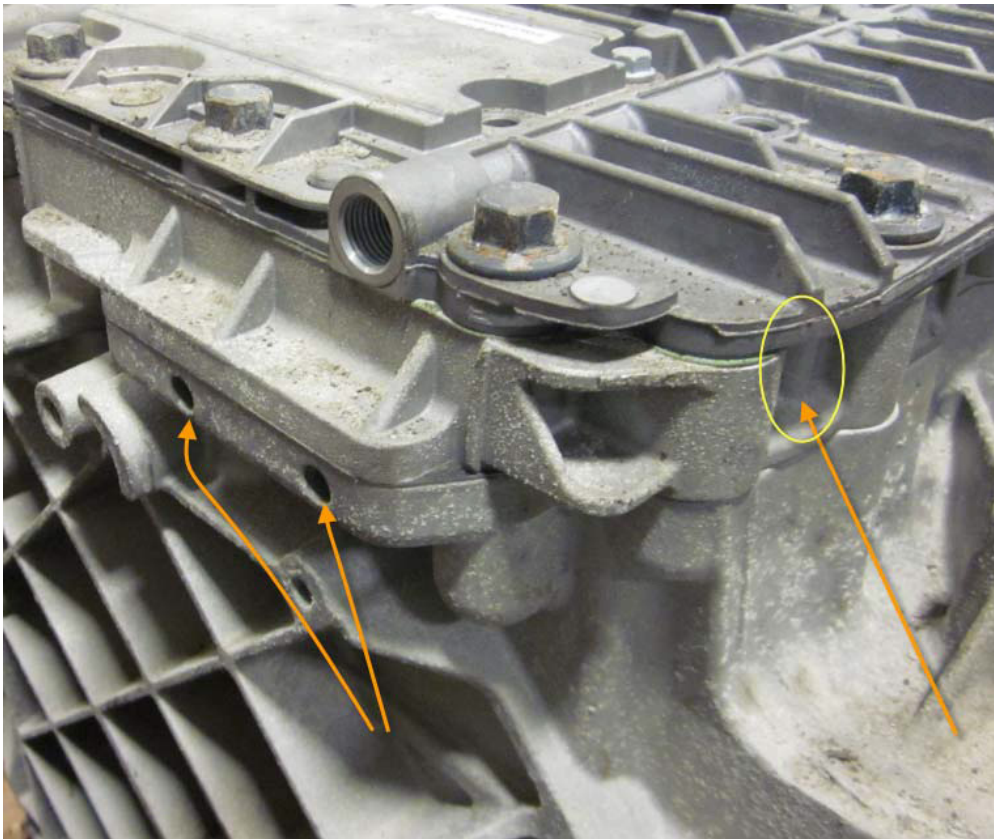
1. **Inspect and Replace:**
 - Identify and replace the source of the leak.
2. **Investigate the Leak Using Tech Tool:**
 - Use **Test 4111-08-04-01** - PWM Valves Clutch Activation, Transmission Removed.
 - Or use **Test 4111-08-03-06** - PWM Valves Clutch Activation, to pressurize the clutch system and check for leaks.

Internal AMT-D venting

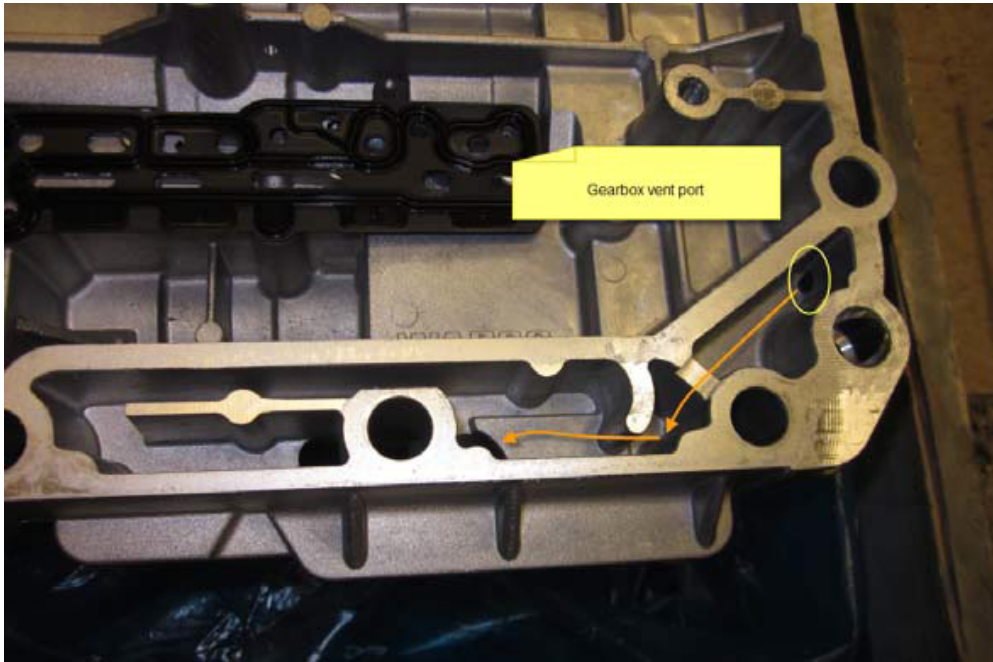
Vent Location: The internal venting of the AMT-D is provided in the bearing retainer plate for the rear main shaft bearing. This allows venting and oil separation for return back to the gearbox.



Bearing Retainer Removed: The AMT-D gearbox vents through a port in the main case, leading into the control housing and TECU, and is vented through the ports on the left side of the main case.



The vent port is cast and drilled in the main case, leading to the control housing and TECU.



Internal ports in the control housing and the air path for gearbox case venting.

Related links and attachments

No links or attachments available



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Live UI

to help improve the content of this article

4111-08-03-06 PWM Valves Clutch Activation

Simulation

Information >> Conditions >> Execution

Purpose

Check the clutch PWM valves and check for air leakage

Components to be tested are:

Clutch system

Description

- A leak check can be performed by either listening or using soapy water
- Air will be applied and released to the clutch PWM valves in order to disengage and engage the clutch to check for proper operation (Transmission installed Only)

Selections

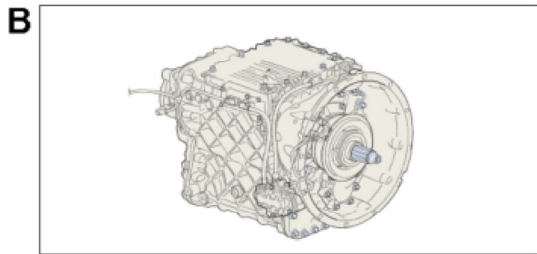
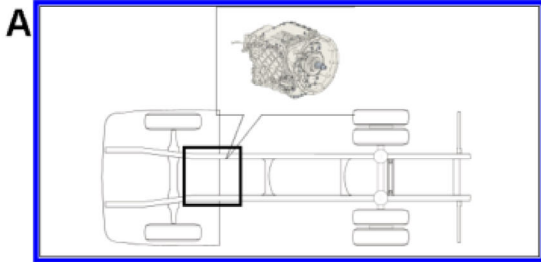
Select the illustration corresponding to the method or test to be performed

A

Transmission installed

B

Transmission removed









4111-08-03-06 PWM Valves Clutch Activation

Simulation

Information >> Conditions >> Execution

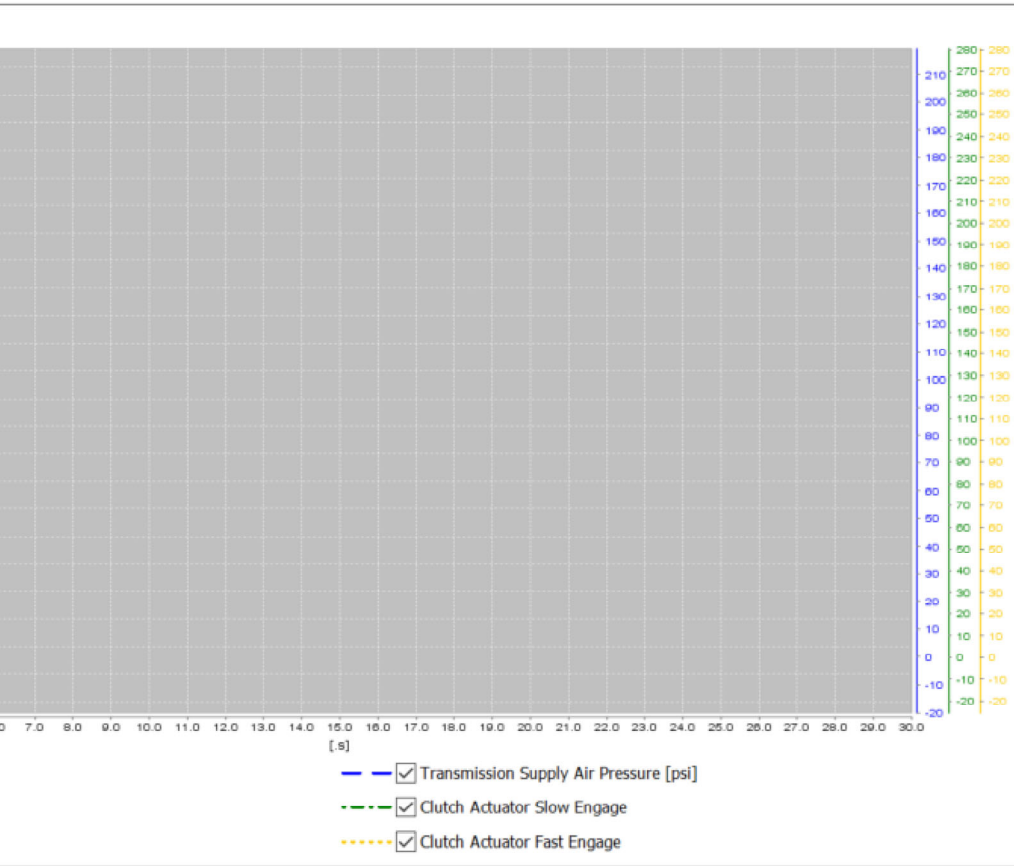
Automatically checked conditions

- 1 Engine not running
- 2 The product must be stationary
- 3 Air pressure above 94 psi

1	 = 0 rpm	0 rpm	
2	 = 0 mph	0 mph	
3	 > 94 psi	99 psi	



Clutch Cylinder Position
Transmission Supply Air Pressure



4111-08-03-06 PWM Valves Clutch Activation

Simulation

Information >> Conditions >> Execution

Action

- Engage and disengage the clutch with the buttons
- Listen to the component and verify that it activates
- Perform leak check by listening or using soapy water

PWM Valves Clutch Activation

Note: Disengaging the clutch will apply air and engaging the clutch will release the air

Slow disengagement

Fast disengagement

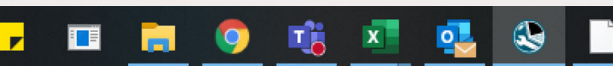
Slow engagement

Fast engagement

Test result

Select one of the following alternatives

- OK
- Not OK



4313-08-04-01 Solenoid valve, Transmission brake (Input shaft brake/Countershaft brake)(Transmission removed)

Simulation

Information >> Conditions >> Execution

Purpose

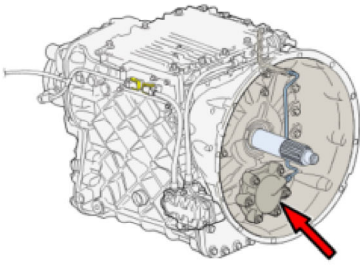
Check for air leaks on the transmission brake (countershaft brake / input shaft brake) while operating the solenoid valve

Components to be tested are:

Transmission brake (countershaft brake / input shaft brake) control air system

Description

During the test the Transmission Control Module (TCM) will activate the transmission solenoid valve for the transmission brake (countershaft brake / input shaft brake) actuator



4313-08-04-01 Solenoid valve, Transmission brake (Input shaft brake/Countershaft brake)(Transmission removed)

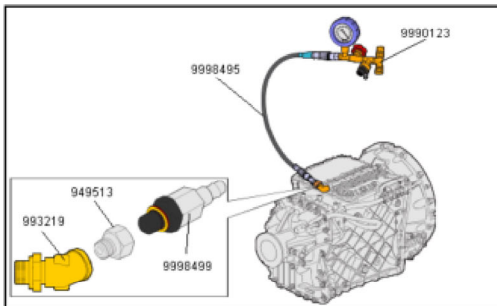
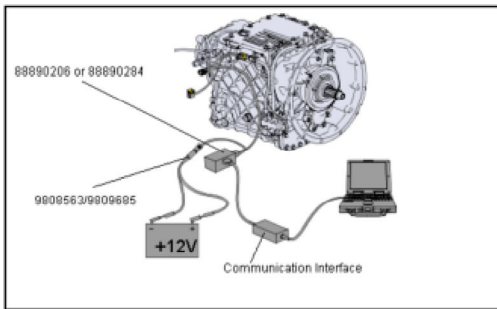
Simulation

Information >> Conditions >> Execution

If performing a transmission removed operation and Tech Tool is connected to the product's main diagnostic connector, you must first click Finish Work under the Product tab, then the transmission using the special tools displayed in the illustration

Action

- Connect special tools according to illustration
- Apply compressed air to supply the transmission with a minimum of 700kPa (100 psi) to a maximum of 1000kPa (145 psi)



4313-08-04-01 Solenoid valve, Transmission brake (Input shaft brake/Countershaft brake)(Transmission removed)

Simulation

Information >> Conditions >> Execution

Automatically checked conditions

- 1 Transmission Supply voltage above 10 V
- 2 Air pressure above 94 psi

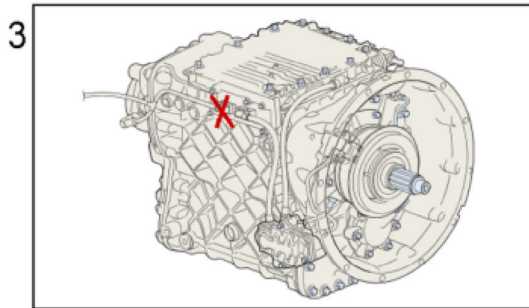
Manual conditions


- 3 Transmission Control Module (TCM) disconnected from vehicle communication connector



Confirmed

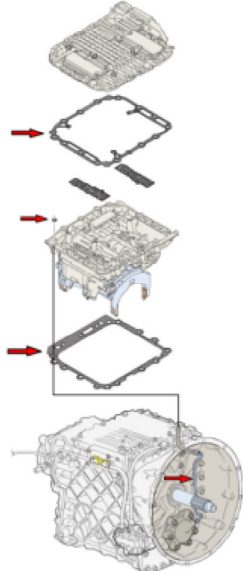
1  > 10 V 10.5 V 

2  > 94 psi 99 psi 




 94 psi Air pressure

Solenoid valve
 




4313-08-04-01 Solenoid valve, Transmission brake (Input shaft brake/Countershaft brake)(Transmission removed)

 Simulation

Information >> Conditions >> Execution

Action

 If performing a transmission removed operation and Tech Tool is connected to the product's main diagnostic connector, you must first click Finish Work under the Product tab, then click the Solenoid valve icon to perform the test using the special tools displayed in the illustration

- Start the test
- Perform leak check by listening or using soapy water

Test result

Select one of the following alternatives

- OK
- Not OK

