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**Title:** S13 Integrated Powertrain Known Leaks

**Applies To:** S13 Integrated Powertrain

## Change Log

Please refer to the change log text box below for recent changes to this article:

04/24/2025 - Clarified Transmission section 1.2  
04/15/2025 - Initial Article Release.

## Description

This article is to walk through and assist the technician in diagnosing and repairing some of the known leaks around the **S13 Integrated Powertrain**.

## Symptoms

**Diagnostic Trouble Codes & Dashboard Indicator Lights:**

DTC/Light	Description
No Faults or Warning Lights	

**Customer Observations or Concerns:**

- Oil Leak
- Coolant Leak

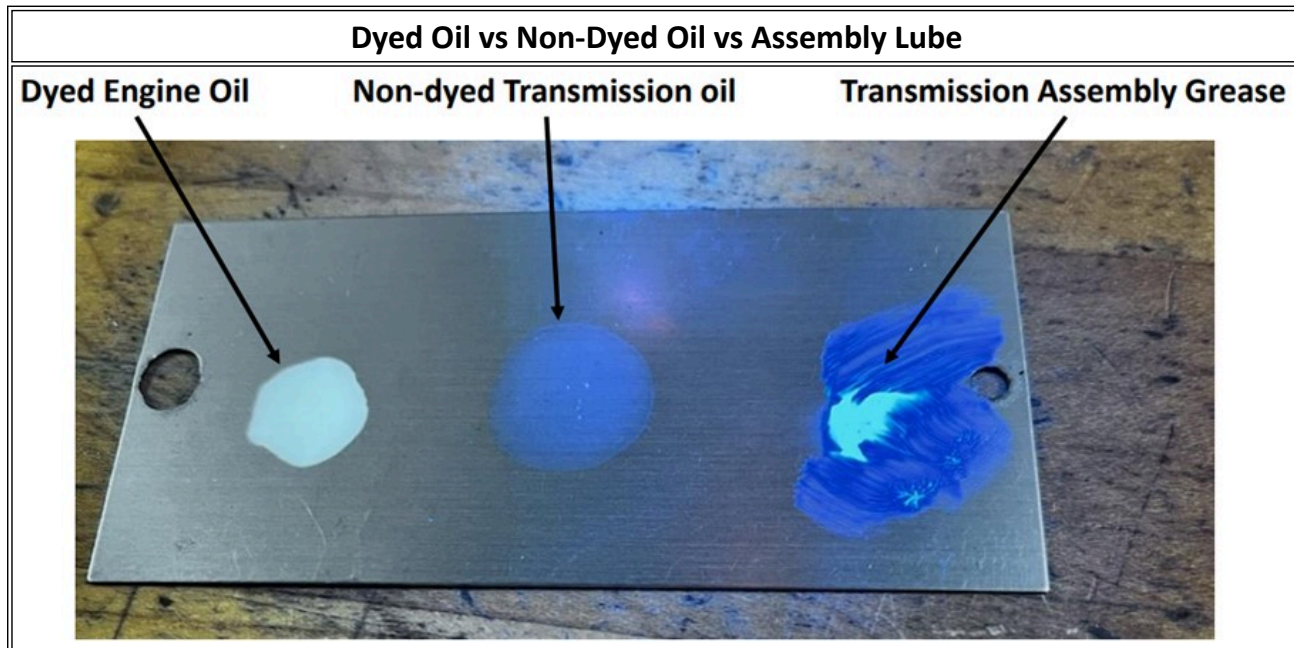
**Prior to performing any diagnostics, please note:**

- **S13 Engine:** The engine comes with dye in the oil from the factory, which will glow under UV light.
- **T14 Transmission:** The transmission does NOT have dye in the oil.

## Best Practices

- **Oil Detection:** If oil is seen, use UV light as a first-pass detection method. Be sure to clean all the oil off using an engine degreaser. After cleaning, monitor with UV light to identify where the oil leak reappears for proper leak source identification.

- **Assembly Lube and Fuel:** These can also glow under UV light. Be cautious when identifying the type of fluid. If in doubt, clean the area and monitor for the dye to reappear.
- **UV Light Tips:** If the dye is hard to see, do not add more dye. Instead, try using a different UV light, as each UV light has different wavelengths that react better or worse to various dyes
- Below is an image showing different glow reactions of fluids under UV light.



### Special Tools / Software

Tool Description	Tool Number	Comments	Instructions
UV Light	N/A		Locally Sourced

### Service Parts Information

Kit Description	Part Number	Quantity Required	Notes
Not Applicable	N/A	N/A	

### Known Leaks Table of Contents

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**WARNING!** To prevent property damage, personal injury, and / or death, park vehicle on a hard, flat surface, turn the engine off, set the parking brake, and install wheel chocks to prevent the vehicle from moving in either direction.

**WARNING!** To prevent property damage, personal injury, and / or death, if the vehicle must be raised, do not work under the vehicle supported only by jacks. Jacks can slip or fall over.

**WARNING!** To prevent personal injury and / or death, always wear safe eye protection when performing vehicle maintenance.

**WARNING!** To prevent property damage, personal injury, and / or death, keep flames or sparks away from vehicle and do not smoke while servicing the vehicle's batteries. Batteries expel explosive gases.

**WARNING!** To prevent property damage, personal injury, and / or death, remove the ground cable from the negative terminal of the battery box before disconnecting any electrical components. Always connect the ground cable last.

## **Known Leak Identification and Recommended Repair Directions**

Below, you will find visual guidance to help identify known leaks and provide direction on how to address them once identified.

### **1. Engine Oil Leaks**

#### **1.1 Rear Gear Housing Boss Leak Near Air Compressor**

**Observation:** This will present itself as a leak at the bottom of the gear housing, right under the air compressor mounting, and could be easily mistaken for an air compressor gasket leak. Please reference the pictures below to assist in identifying if the leak is present at the gear housing boss section. **Keep in mind** that oil can travel down and may originate higher in the area. If oil is observed at the gear housing to block joint by the

compressor, focus on looking higher for a possible different leak. Reference "[1.7 Gear Housing Joint Between Air Compressor and HP Fuel Pump](#)" below in this article if the leak is following the joint seam.

**NOTE:** Below Figure 1, the air compressor is removed to assist in showing the area in question; the compressor does not need to be removed to inspect for the boss leak.

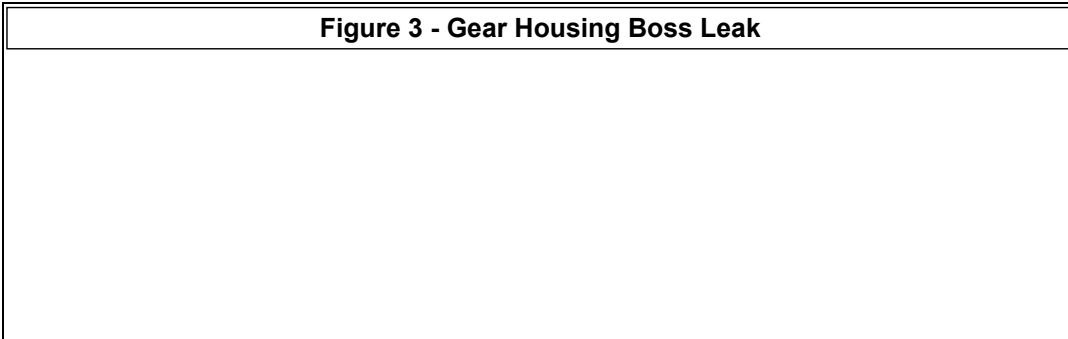
**Figure 1 - Gear Housing Boss Leak**

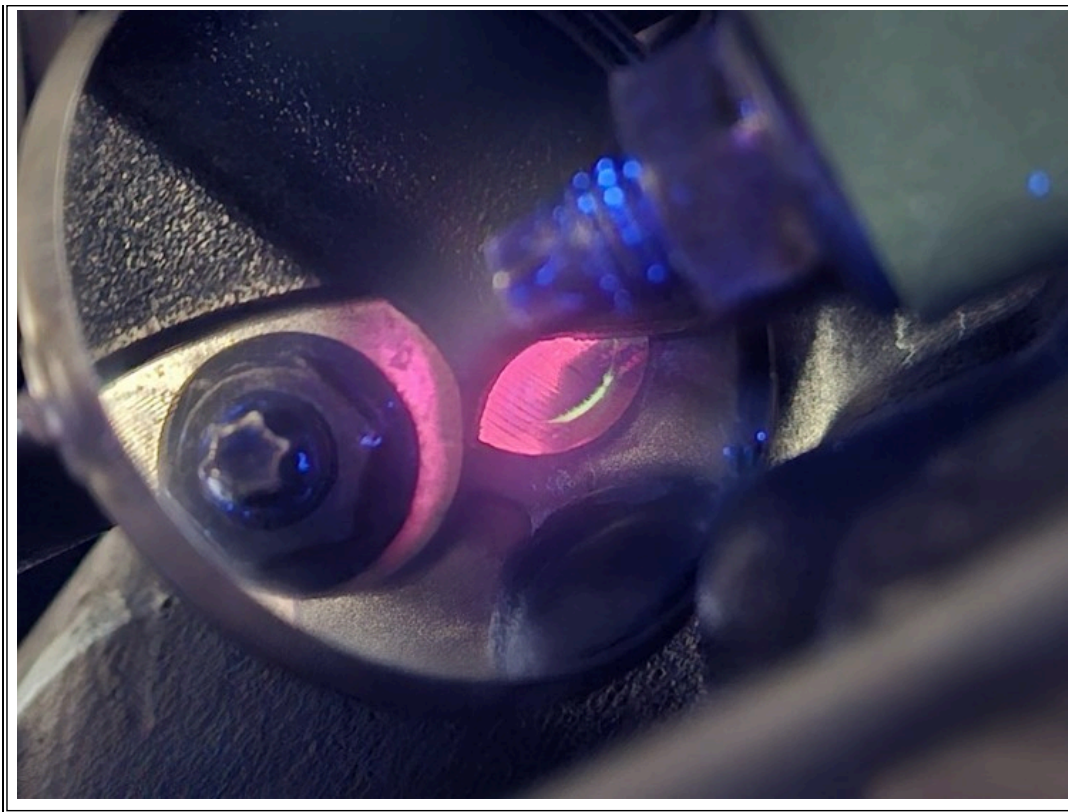


**Figure 2 - Gear Housing Boss Leak**



**Figure 3 - Gear Housing Boss Leak**



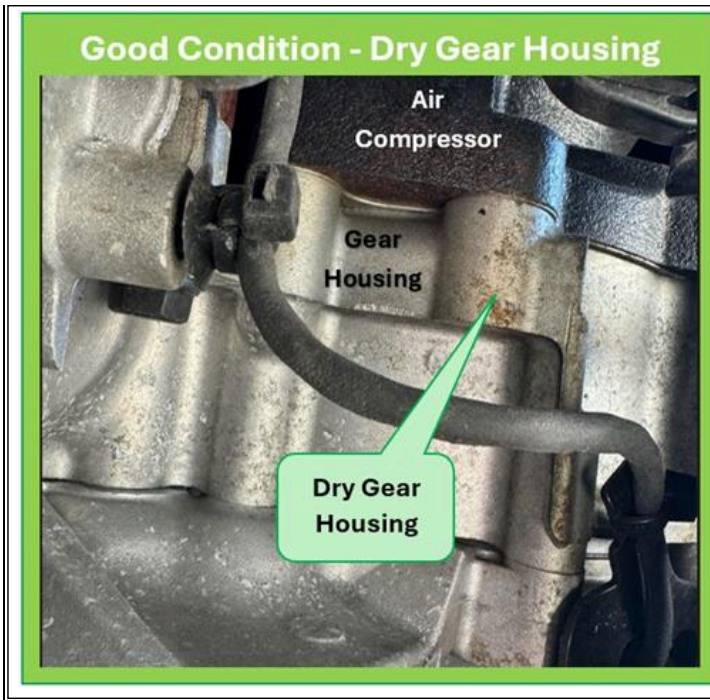


**Repair Direction:** If the specific leak is observed as depicted in the examples above, please follow [IK1201501 - S13 Gear Housing Leak \(By The Air Compressor\)](#).

## **1.2 Air Compressor Mounting**

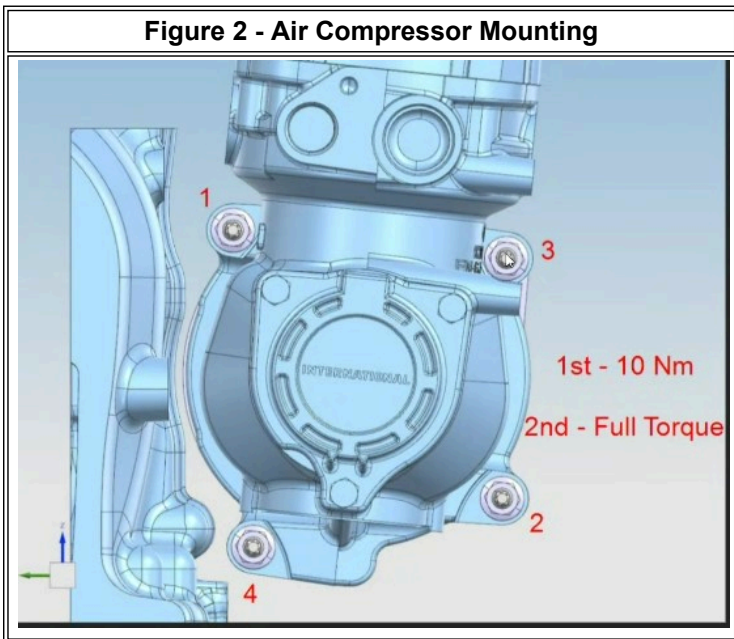
**Observation:** Oil drips may form right under the air compressor mounting. Additionally, drips could start trailing back towards the gear housing and forming at the bottom of the gear housing. Reference the image below. **Keep in mind** that oil can travel down. Ensure there is no oil following the gear housing to block joint alongside the air compressor (reference [1.7 Gear Housing Joint Between Air Compressor and HP Fuel Pump](#)) or originating from the machined boss area (reference [1.1 Rear Gear Housing Boss Leak Near Air Compressor](#)).

**Figure 1 - Air Compressor Mounting**



**Repair Direction:**

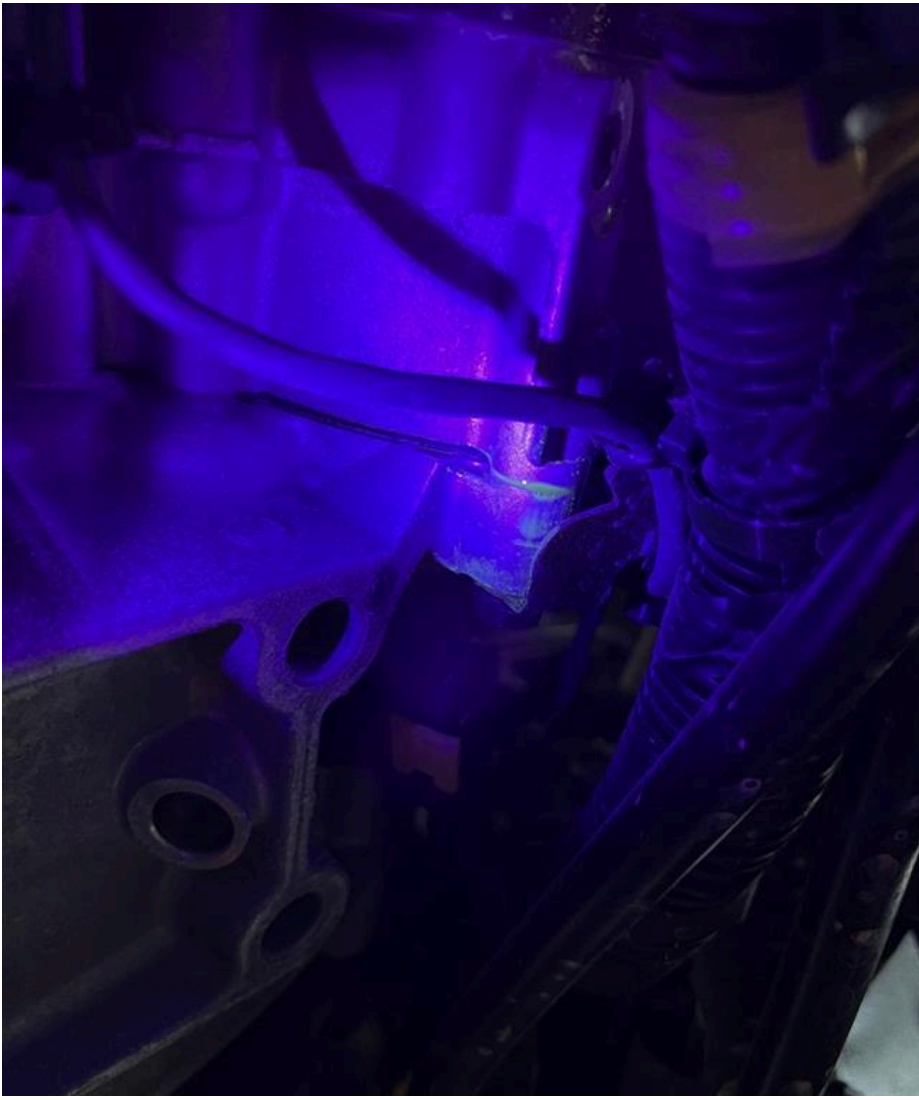
1. Remove the air compressor and discard the gasket.
2. Inspect the lower mounting studs if any oil appears to be leaking past the threads of the stud - if so, remove the stud, clean the threads, apply blue loctite and reinstall the stud (torque to 10Nm).
3. Install new gasket, torque the 4 nuts to 45Nm in two stages (1st stage torque all to 10Nm, 2nd stage torque all to 45Nm) following the pattern shown in the image below (Air Compressor Mounting - Figure 2).



**1.3 Flywheel Housing to Gear Housing Joint**

**Observation:** The leak is typically noticed on the driver side, bottom of the engine. The oil will leak down the seam between the flywheel housing and the gear housing, collecting on the lower bolt (right by the harness support bracket). Reference the image below (Flywheel Housing Leak - Figure 1).

**Figure 1 - Flywheel Housing Leak**



**Repair Direction:** Follow the procedure in the manual to remove and reseal the flywheel housing.

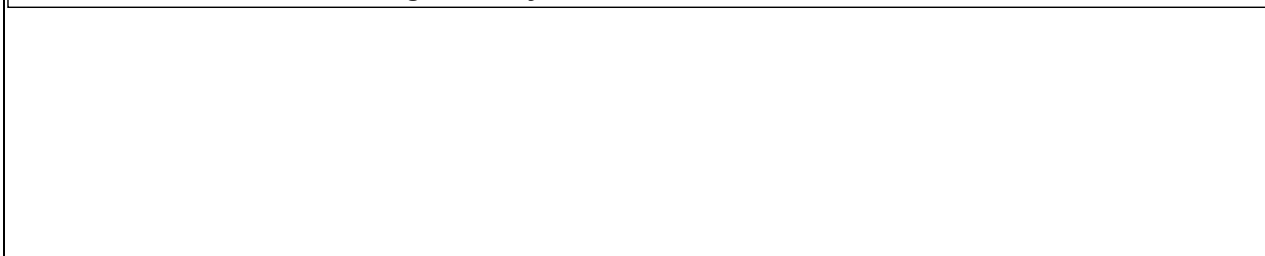
S13 Integrated Powertrain Manual --> 12 - Engine --> Engine --> International S13 Diesel Engine --> Component Replacement Procedures --> Flywheel --> Flywheel Housing Removal / Flywheel Housing Installation

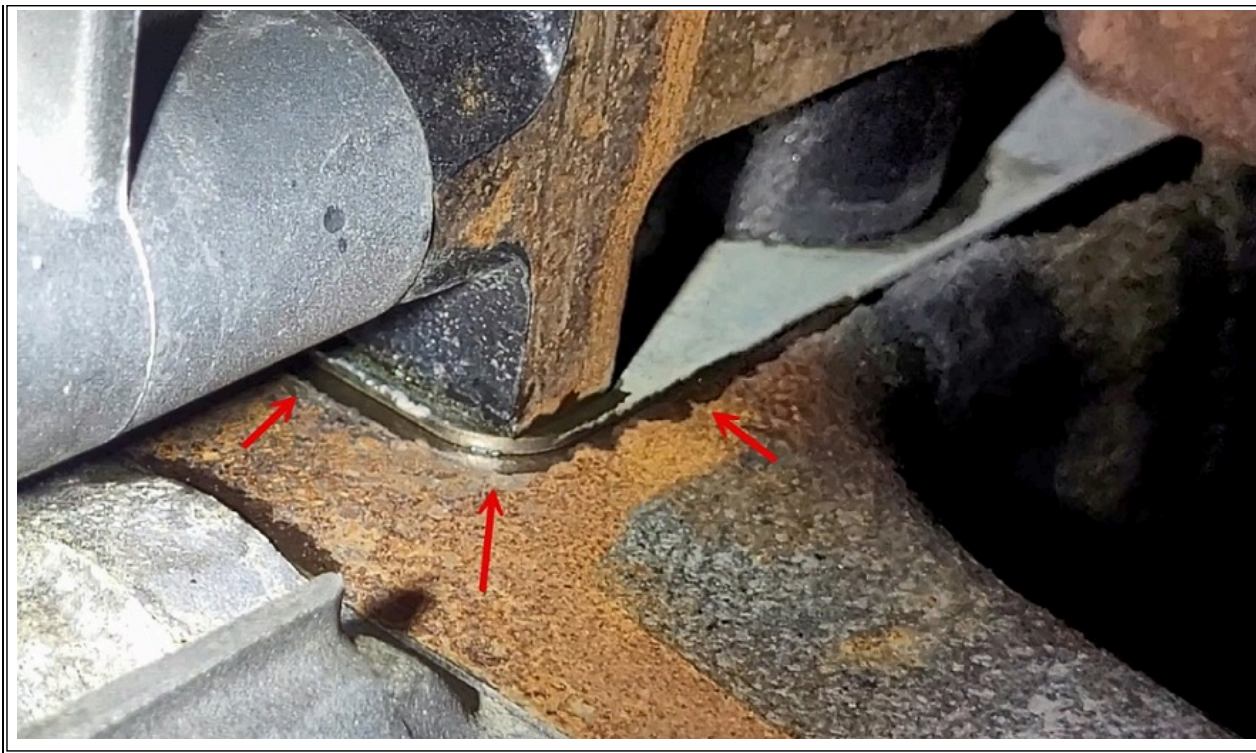
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#### **1.4 Cylinder Head Gasket Area Oil Leak**

**Observation:** Oil collects and wets the cylinder head block deck, following the outline of the gasket, commonly on the passenger/exhaust side of the engine. To avoid confusing it with a coolant leak, use a UV light to verify the type of fluid. Reference the picture below (Cylinder Head Gasket Oil Leak - Figure 1).

**Figure 1 - Cylinder Head Gasket Oil Leak**





**Repair Direction:** If the leak is observed at the head gasket area, please take clear pictures identifying the source of the leak and open a technical support case file for the latest repair direction, provide the pictures in the case

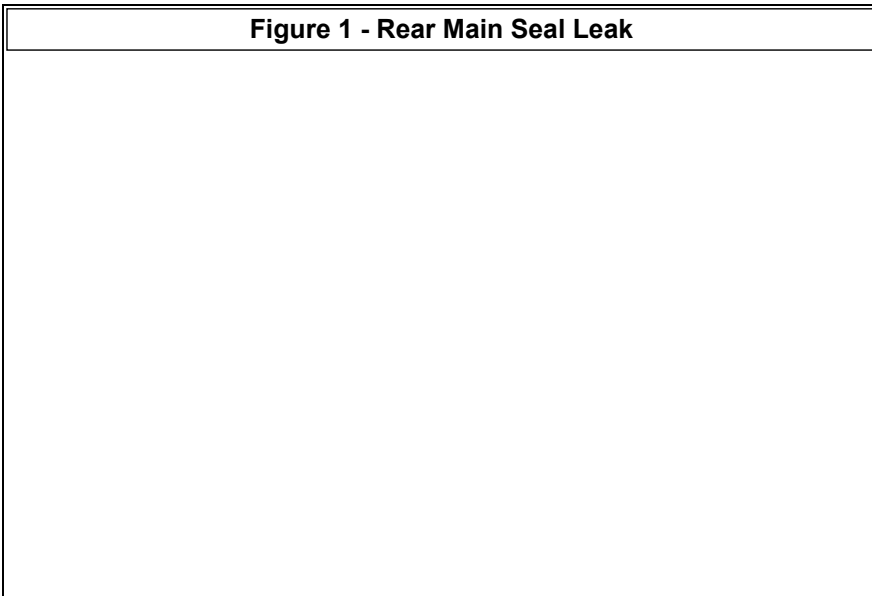
### **1.5 Rear Main Crankshaft Seal**

**Observation:** Oil is observed seeping out through the clutch inspection port. When the plug is removed, some accumulated oil can be seen on the plug if the leak is severe. Additionally, since the clutch spins at high speeds, the air turbulence may coat the entire area with oil, making it difficult to determine the source of the leak.

**NOTE:** Prior to major disassembly, verify whether it is engine or transmission oil. Keep in mind that if the vehicle has not had an oil change, the engine oil has dye added from the factory, while the transmission oil does not. Compare the glow of the oil using a UV light on the dipstick with what is observed from the leak to determine if the oil is engine oil or transmission oil.

After transmission removal, check the rear main crankshaft seal; oil will be pooling at the bottom of the seal as shown in the Figure below. Inspect the flywheel bolts removed to ensure the threads of the bolts are dry. If the flywheel bolt threads are wet, proceed to the next section in this article (**1.6 Rear Main Crank Gear Bolt Holes**).

**Figure 1 - Rear Main Seal Leak**





**NOTE:** Oil could also be coming out of the rear main crank gear bolt holes, which could make it appear like a rear main seal leak. If there is any evidence of oil seeping through the bolt holes after removing the crank gear bolts, please reference the next section in this article ([1.6 Rear Main Crank Gear Bolt Holes](#)) for observation and direction on addressing the leak.

**Repair Direction:** Follow the procedure in the manual to remove and reseal the Rear Main Crankshaft Seal.

S13 Integrated Powertrain Manual --> 12 - Engine --> Engine --> International S13 Diesel Engine --> Component Replacement Procedures --> Crankcase --> Rear Crankshaft Seal Removal / Rear Crankshaft Seal Installation

- If the clutch is contaminated with oil, the clutch disc and cover will have to be replaced as well

### **1.6 Rear Main Crank Gear Bolt Holes**

**Observation:** Oil is observed seeping out through the clutch inspection port. When the plug is removed, some accumulated oil can be seen on the plug if the leak is severe. Additionally, since the clutch spins at high speeds, the air turbulence may coat the entire area with oil, making it difficult to determine the source of the leak.

**NOTE:** Prior to major disassembly, verify whether it is engine or transmission oil. Keep in mind that if the vehicle has not had an oil change, the engine oil has dye added from the factory, while the transmission oil does not. Compare the glow of the oil using a UV light on the dipstick with what is observed from the leak to determine if the oil is engine oil or transmission oil.

When the flywheel crankshaft gear bolts are removed, wetness on the threads will be observed. Additionally, when looking at the bolt holes, oil can be seen inside, and some oil residue might be trailing directly aligned with the removed bolt heads on the face of the crankshaft gear. Reference figures 1, 2, and 3 below.

**Figure 1 - Crankshaft Gear Bolt Hole Leak**

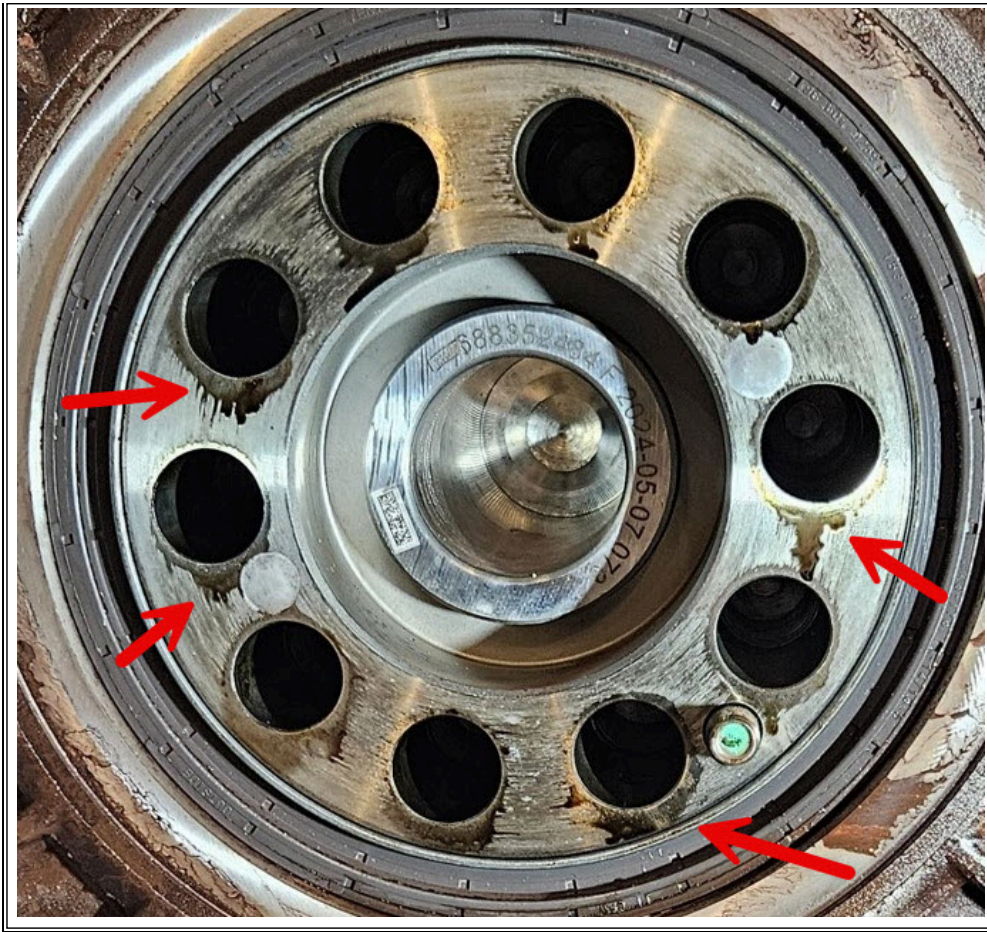


Figure 2 - Crankshaft Gear Bolt Hole Leak

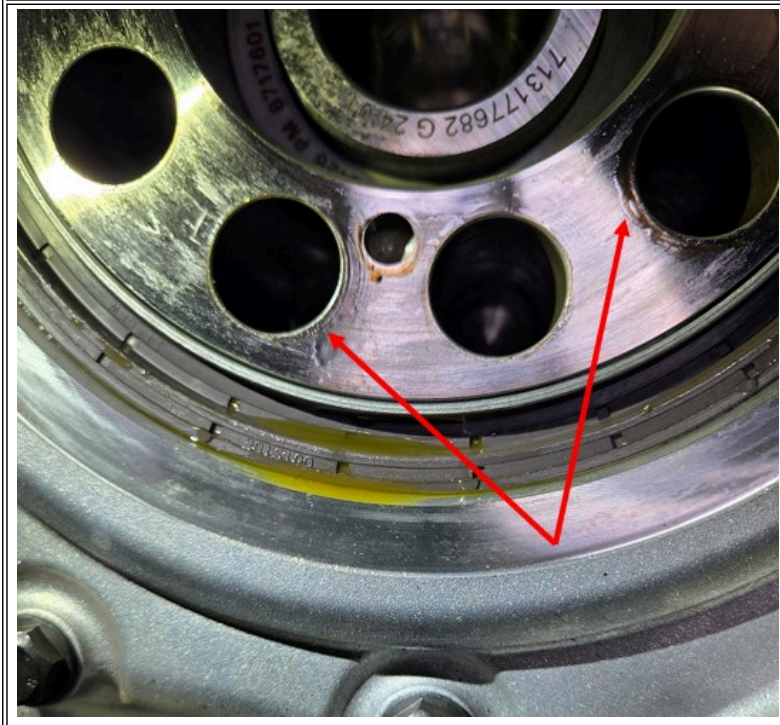


Figure 3 - Crankshaft Gear Bolt Hole Leak



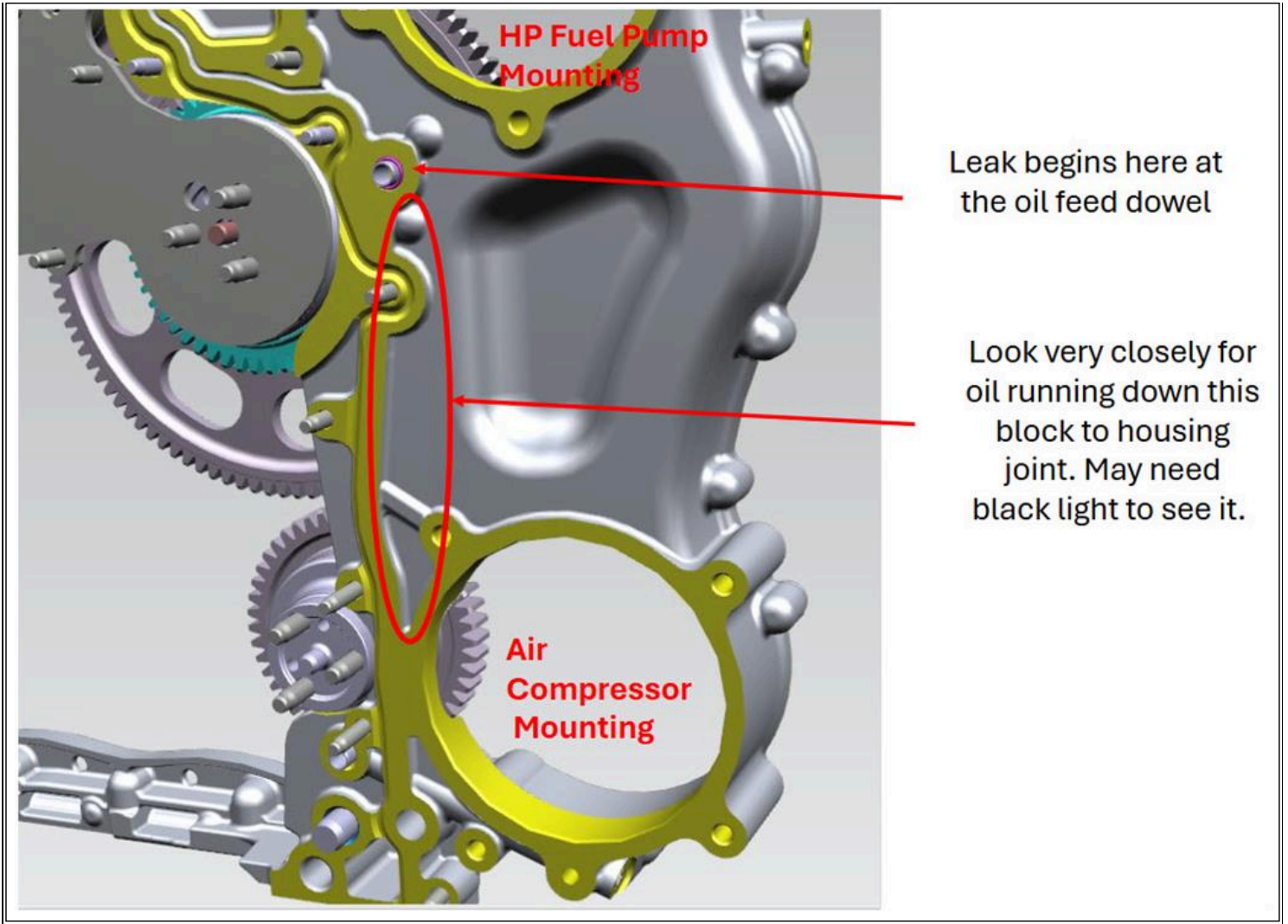
**Repair Direction:** If the leak is observed at the crankshaft gear bolt holes, please take pictures showing wetness in the bolt holes to the best of the ability and open a technical support case file for the latest repair direction, provide the pictures in the case

- If the clutch is contaminated with oil, clutch disc and cover will have to be replaced as well

### **1.7 Gear Housing Joint Between Air Compressor and HP Fuel Pump**

**Observation:** An oil leak would be observed near the bottom of the gear housing, near or under the compressor, following the joint seam between the gear housing and the block. Using a UV light, focus on the joint seam behind and above the air compressor but below the high-pressure fuel pump. Reference figure 1 below. This might require a borescope camera with UV light to see the leak clearly.

**Figure 1 - Gear Housing Joint Between Air Compressor and HP Fuel Pump**



**Repair Direction:** If this specific leak is observed between the air compressor and the HP fuel pump at the gear housing to block joint, please take pictures identifying the source of the leak (borescope may be needed) and open a technical support case file for the latest repair direction, attach pictures to the case

## **2. Engine Coolant Leaks**

### **2.1 Behind the Turbo - Rubber Joint At Coolant Distribution**

**Observation:** The complaint and observation would be a coolant leak and coolant drips on the passenger side towards the rear of the engine. The coolant leak originates at one of the two clamps (upper and/or lower) at the rear coolant rubber tube leading to the thermostat housing. Please reference figures 1 and 2 below for the location of the leak.

**Figure 1 - Coolant Leak Behind the Turbo**

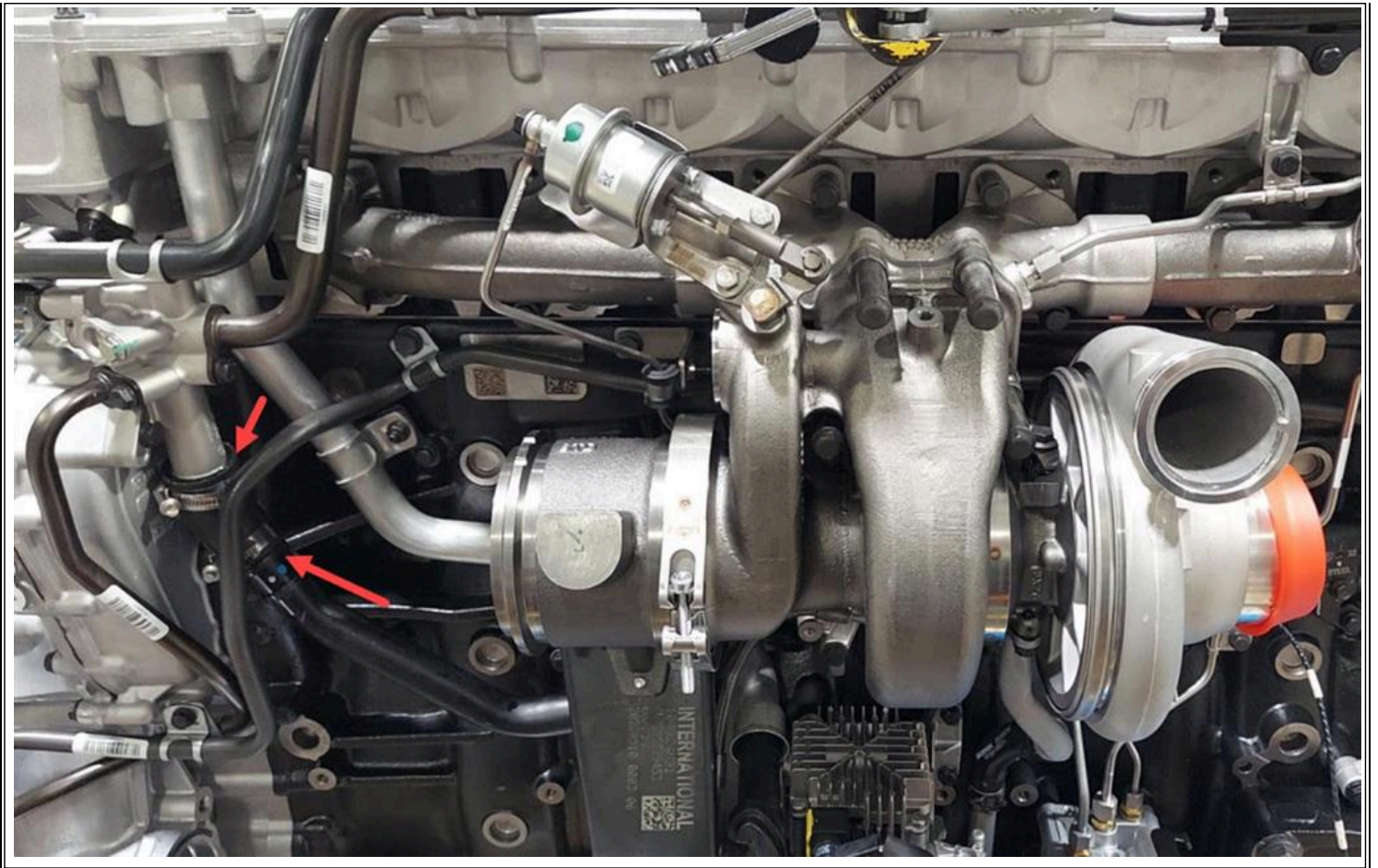


Figure 2 - Coolant Leak Behind the Turbo

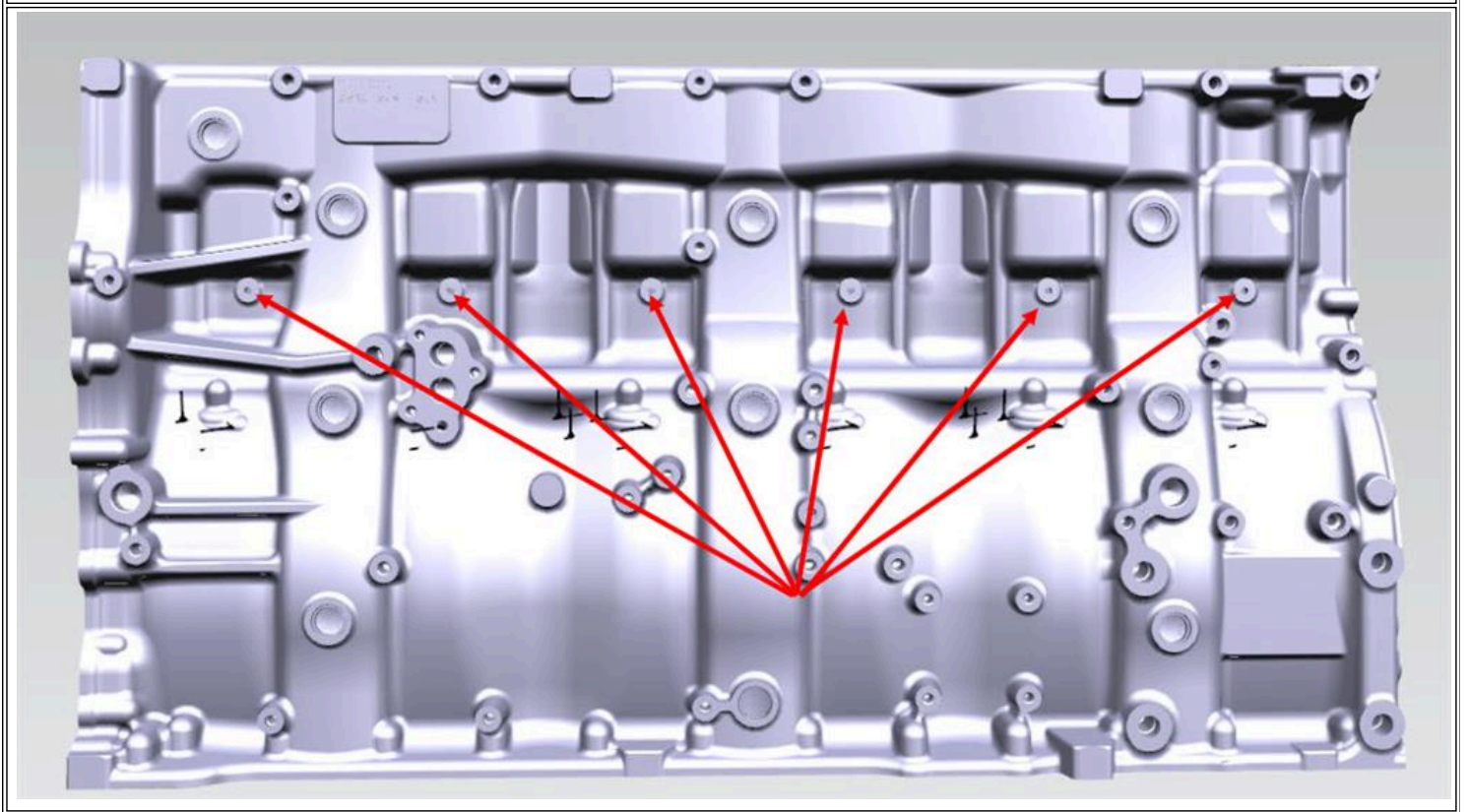


**Repair Direction:** If the leak is observed behind the turbo at the rubber boot in either the upper or lower clamp, follow [IK1201507 - S13 Leaks at the Coolant Return Pipe Hose Clamps](#)

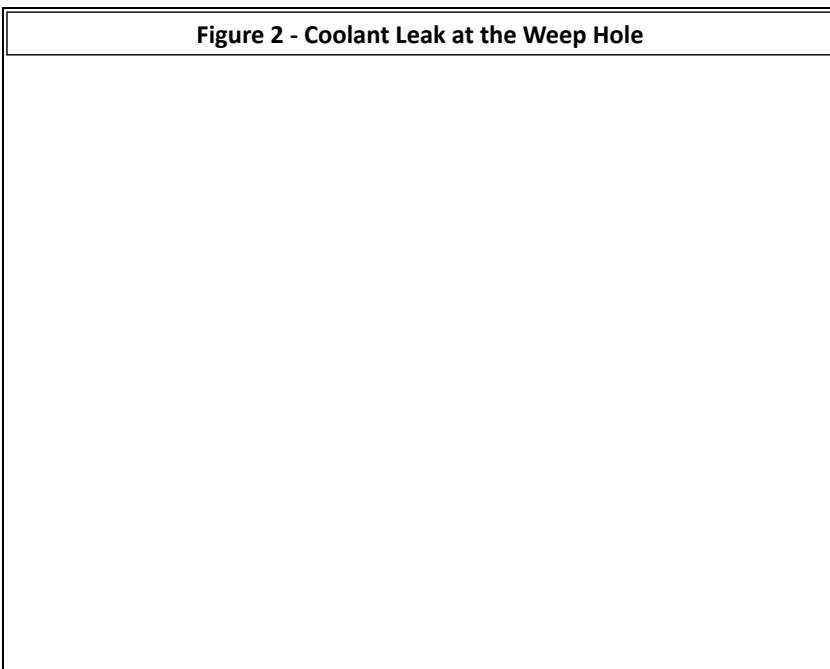
## **2.2 Passenger Side Block Seeping Through Weep Hole**

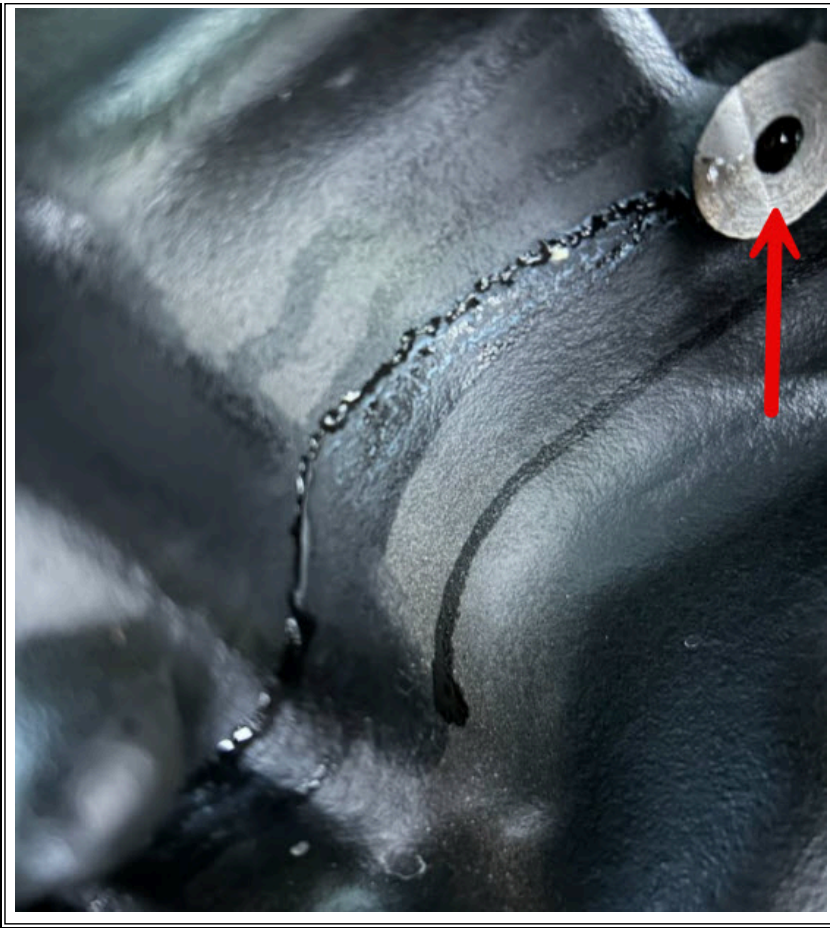
**Observation:** The complaint would be losing coolant and possible coolant staining on the passenger side of the block, right below the weep holes. The weep holes are located at about mid-height of the engine, with a single weep hole per cylinder (reference figure 1 for weep hole locations). This leak indicates a leak past a cylinder liner O-ring. Reference figure 2 below to help identify the weep hole leak.

**Figure 1 - Weep Hole Locations**



**Figure 2 - Coolant Leak at the Weep Hole**





**Repair Direction:** If a coolant leak at a weep hole is observed, please take pictures of the weep hole that is leaking and start technical support case file for the latest repair direction, attach pictures to the case

### **2.3 Cylinder Head Gasket Area**

**Observation:** The complaint would be losing coolant, with trails and coolant staining commonly on the passenger side of the engine block, right below the cylinder head deck. Reference figures 1 and 2 below for leak examples.

**Figure 1 - Coolant Leak at the Cylinder Head**



Figure 2 - Coolant Leak at the Cylinder Head



**Repair Direction:** If the coolant leak at the cylinder head is observed, please take pictures identifying the source of the leak and start technical support case file for the latest repair direction, attach pictures to the case

# 1. Transmission Oil Leaks

## 1.1 Rear Output Yoke

**Observation:** The complaint would be a leak at the rear of the transmission along side of possible fault code being present and light on the dash. Leak would originate at the rear output of the transmission indicating the rear output seal leaking, and as the yoke spins, it will throw oil around in the circular motion covering components below and above with oil making everything seem oily and damp (reference figures 1 and 2).

**NOTE:** If the vehicle has logged SPN 191 FMI 2 fault code, check the output yoke for play, pull the output speed sensor for inspection and check if there is any metal noticed on the tip of the sensor (reference figure 3 below)

Figure 1 - Rear Output Yoke Leak

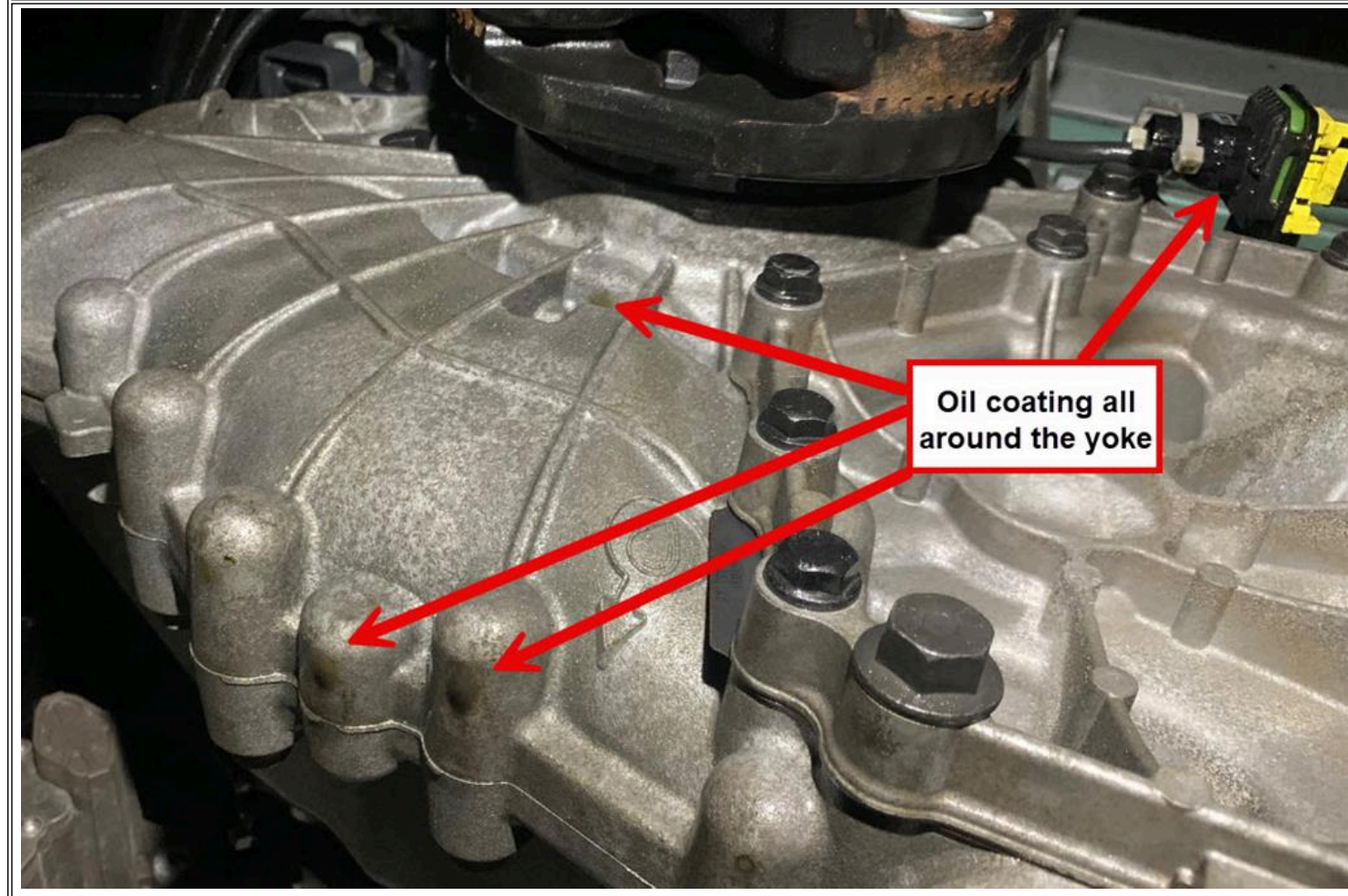


Figure 2 - Rear Output Yoke Leak

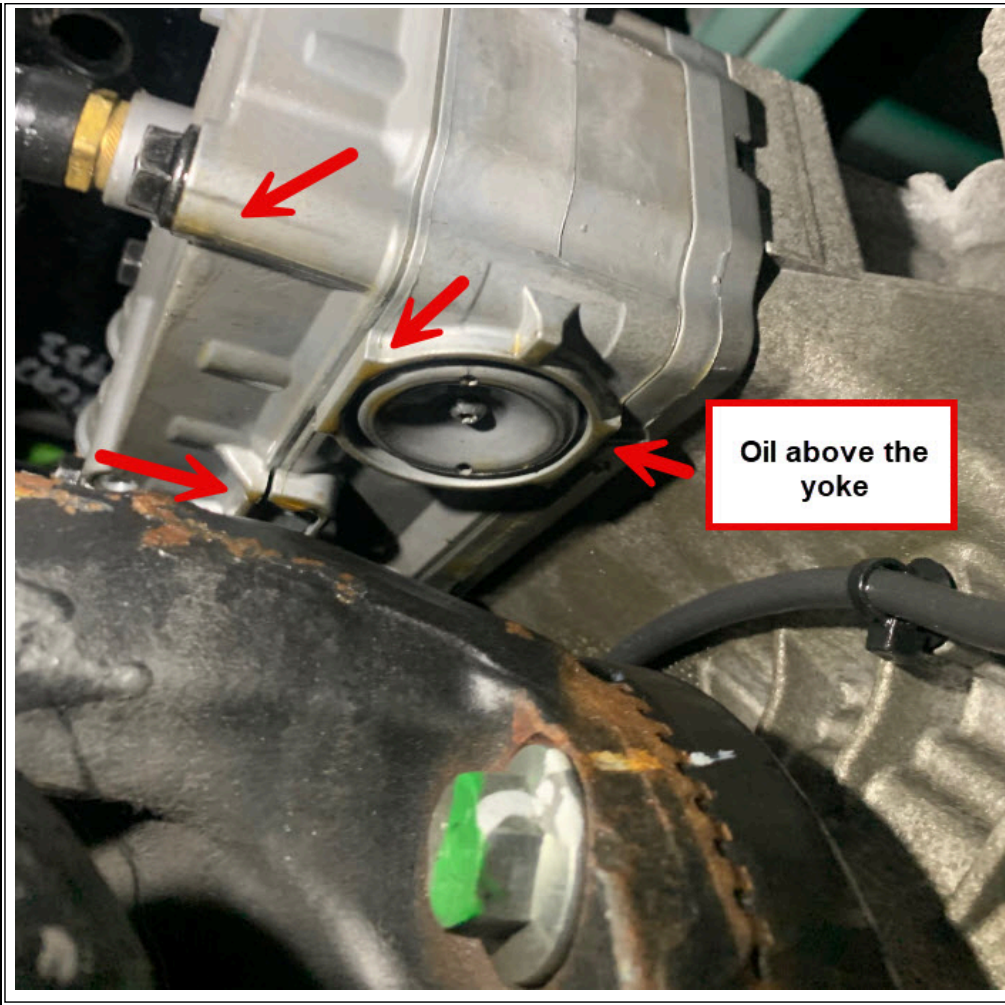


Figure 3 - Output Speed Sensor Metal Debris



**Repair Direction:**

- If the vehicle only has a output seal leak without fault codes, excessive play, or any metal noticed, go to: S13 Integrated Powertrain Manual --> 13 - Transmission --> Automated Manual Transmission --> International T14 Transmission --> Component Replacement Procedures --> Output Flange and Output Flange Seal Removal / Output Flange and Output Flange Seal Installation
- If fault 191-2 is present, excessive play on the output is noticed, and metal is found on the output speed sensor, please take pictures of the metal found, proceed with opening a technical support case file for the latest repair directions, and attach pictures to the case

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**1.2 On the Side and Under the ECA (Electronic Clutch Actuator)**

**Observation:** Vehicle would have visible leak under the transmission originating from the driver side. Oil may be seen running down the ECA (Electronic Clutch Actuator) and collecting at the bottom of the transmission. Refer to figures 1 and 2.

**Figure 1 - Oil Leak at the ECA**

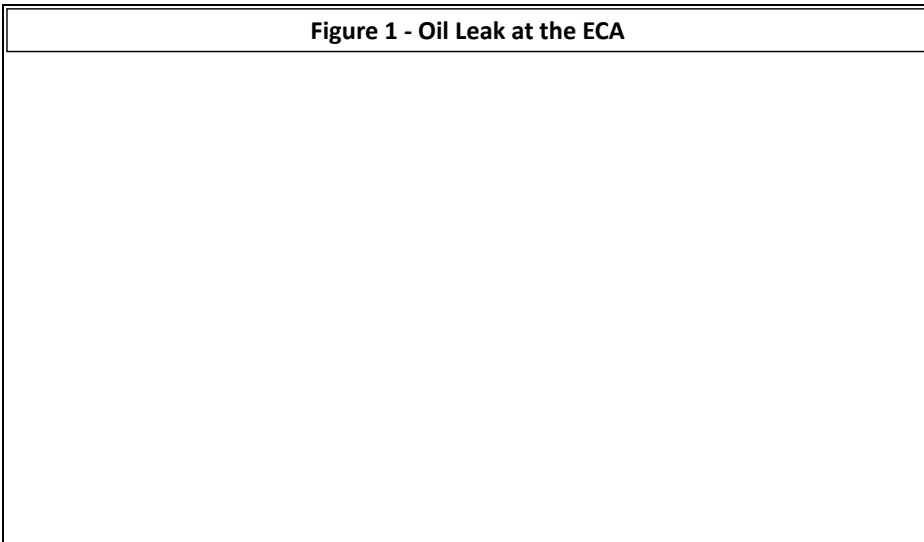
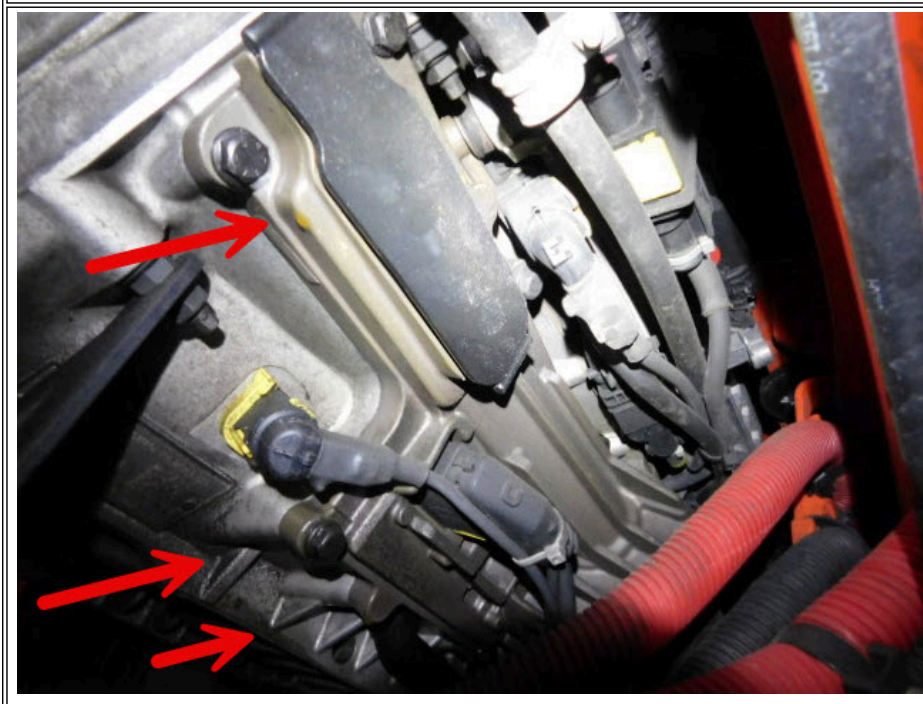




Figure 2 - Oil Leak at the ECA



#### Repair Direction:

- Gather as clear pictures as possible showing the leak.
- Remove the fill plug and note down the oil level if it seems low.
- Remove the ECA and inspect for wetness at the pointed galley in Figure 3 - ECA Removed, take any pictures that may showing the leak/wetness.
- If wetness is observed, remove the main valve body assembly, inspect the condition of the green O-Ring as called out in Figure 4 - Main Valve Body Removed. If the o-ring is found damaged or missing, replace it and reassemble the transmission following Service procedure outlined in the manual. Reference the following NOTE below

**NOTE:** There will be oil present in the housing behind the main valve body assembly, this is normal. System is designed for shift rails to pass slight amount of oil so they self lubricate, oil that collects in the housing then flows back into the sump through one of the drilled passages. The galley with the green o-ring called out in Figure 4 is the same galley behind the ECA as called out in Figure 3. If the green

**o-ring is left out, not installed properly, or gets pinched due to slippage during installation process, the collected oil will run down into the ECA area and this will result in an external transmission leak.**

- If the o-ring is in a good condition, inspect the 3 air ports at the top for wetness (reference Figure 5- Air Ports Behind the Main Valve Body), if oil or wetness is observed at/in the air ports, take pictures showing the wetness in the area.
- Once all the pictures are taken, please proceed with opening with technical support case file and provide all the pictures in the case for review and latest repair directions.

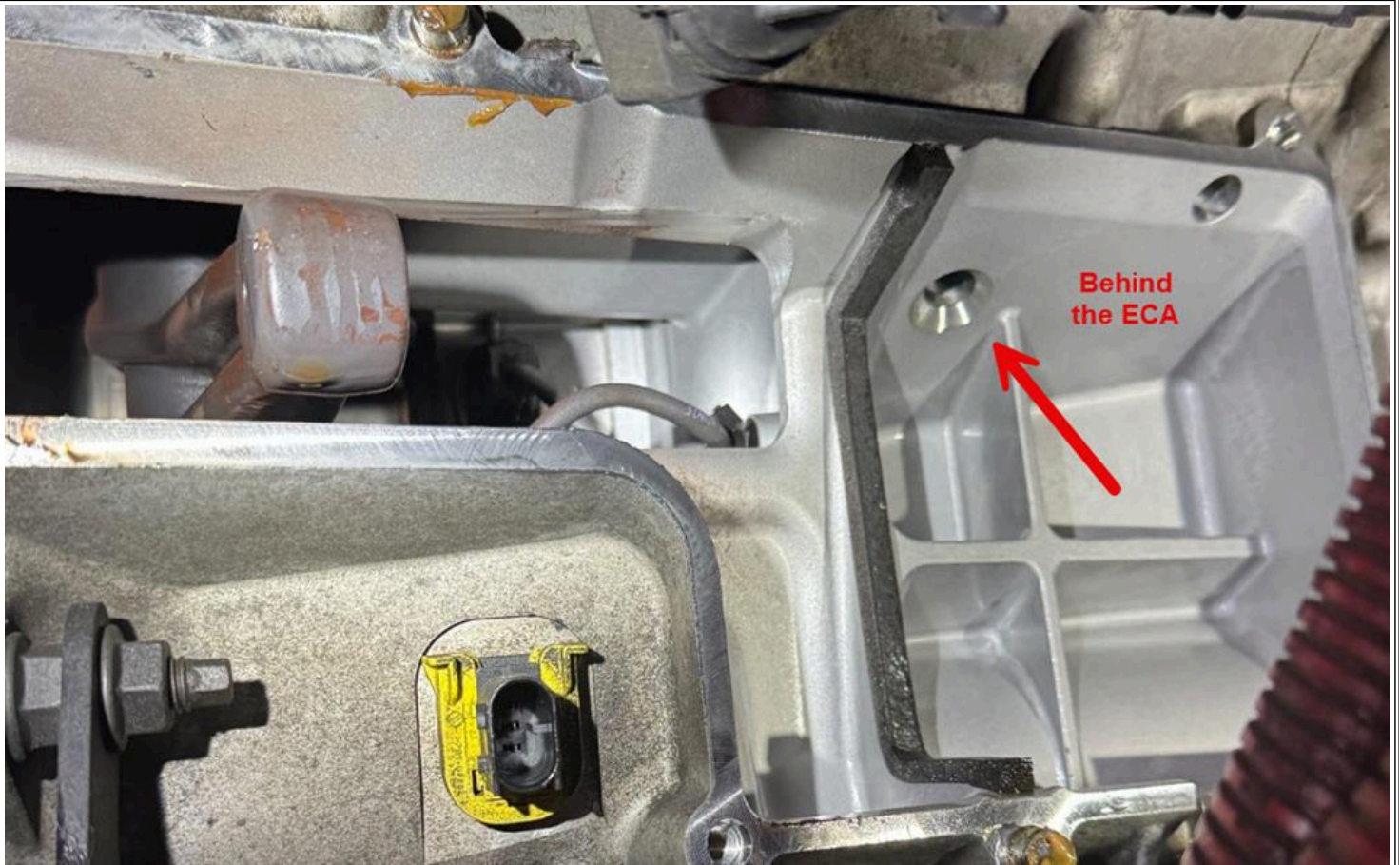
**Part Number Reference:**

Green O-Ring called out in Figure 4 - 104229N1

Black O-Rings in shift actuators that position sensors sit in - 105465N1

Green O-Ring on the position sensor harness connector that sits in the housing - 104440N1

**Figure 3 - ECA Removed**



**Figure 4 - Main Valve Body Removed**

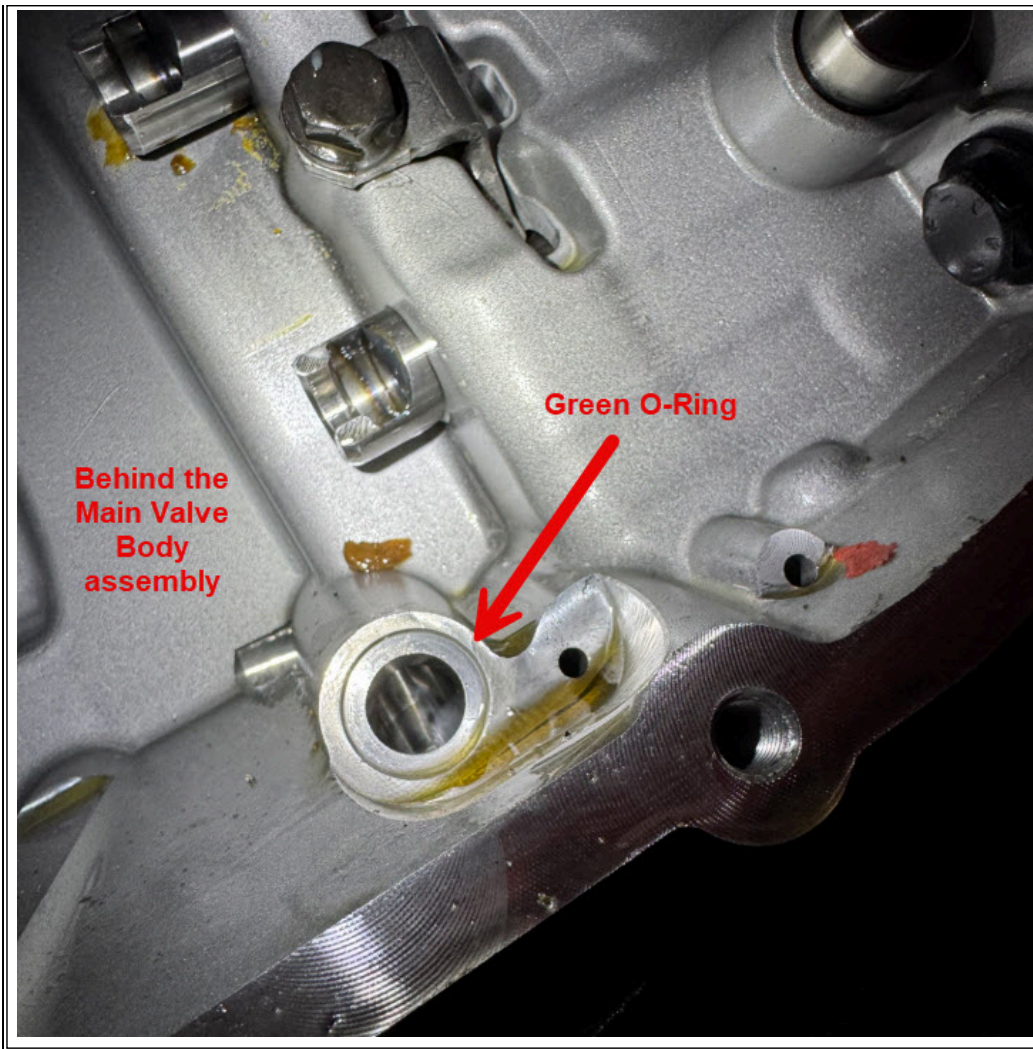
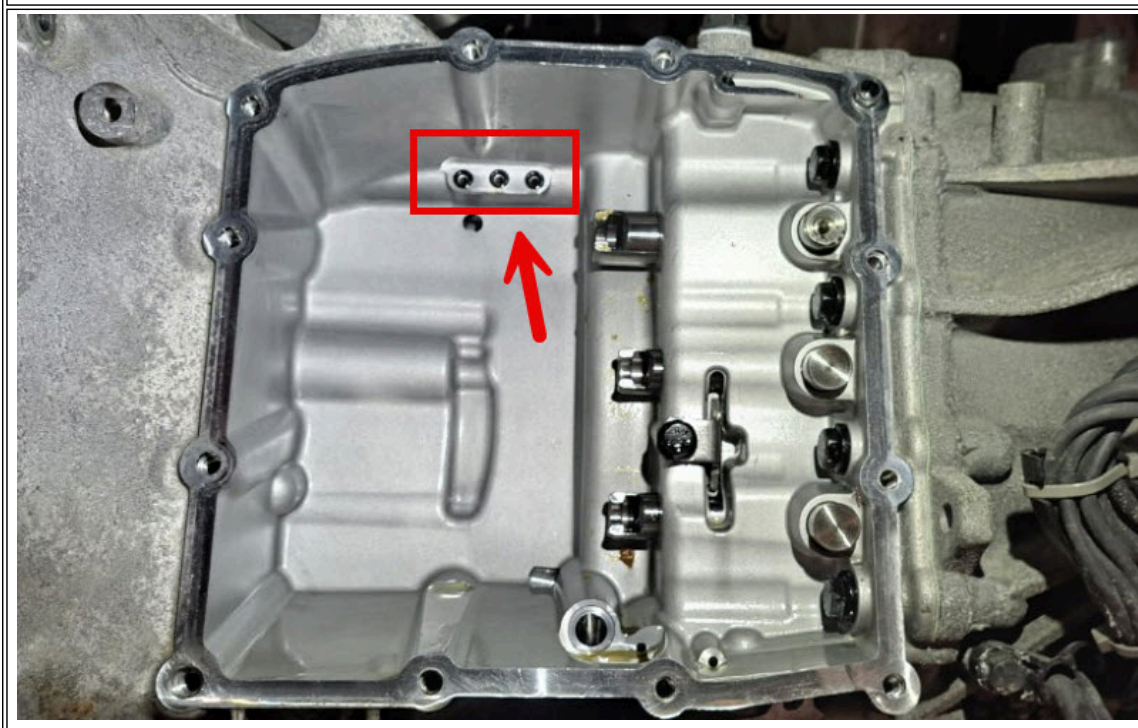


Figure 5 - Air Ports Behind the Main Valve Body



### 1.3 Main Front Cover

**Observation:** Oil is observed seeping out through the clutch inspection port. When the plug is removed, some accumulated oil can be seen on the plug if the leak is severe. Additionally, since the clutch spins at high speeds, the air turbulence may coat the entire area with oil, making it difficult to determine the source of the leak.

**NOTE:** Prior to major disassembly, verify whether it is engine or transmission oil. Keep in mind that if the vehicle has not had an oil change, the engine oil has dye added from the factory, while the transmission oil does not. Compare the glow of the oil using a UV light on the dipstick with what is observed from the leak to determine if the oil is engine oil or transmission oil.

Once it is confirmed that the oil is transmission oil, the transmission will need to be removed for further inspection. Oil is commonly observed in one of the 2 locations shown in figures 1 and 2. This leak would be coming from behind the front cover as it mates to the transmission case

Figure 1 - Possible Leak Locations Behind the Front Cover

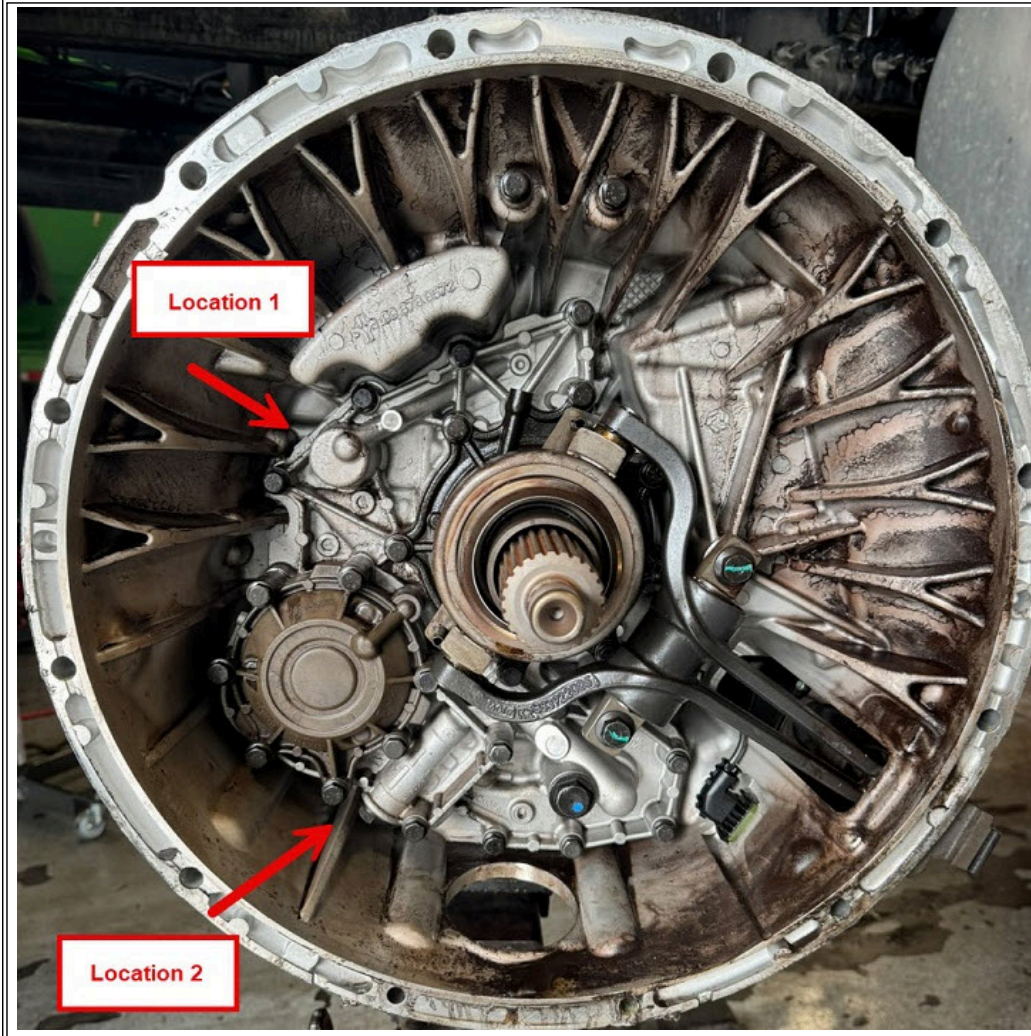
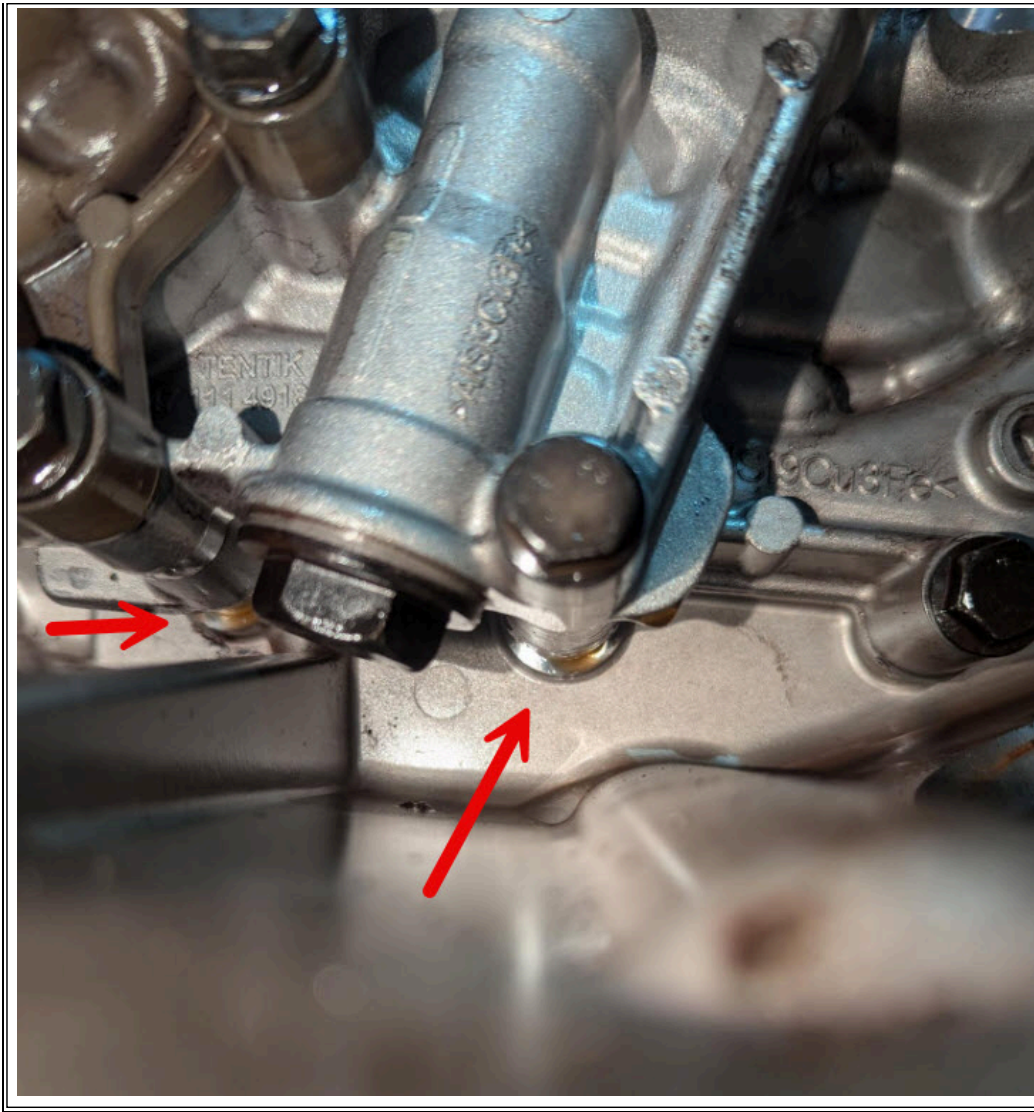


Figure 2 - Location 2 Leak Example



**Repair Direction:** If the leak is observed behind the transmission front cover where it mates to the transmission case, please take pictures trying to identify the source to the best of the ability and open a technical support case for the latest repair directions, attach pictures to the case

**NOTE:** If the clutch is contaminated with oil, clutch disc and cover will have to be replaced as well.

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## **2. Transmission Coolant Leaks**

### **2.1 Leak at Transmission Cooler - Rubber Joints**

**Observation:** Complaint and observation: Coolant loss and an observed leak on the passenger side of the transmission. Coolant could be seen seeping through at the joints of rubber coolant hoses and at the hard lines near the transmission cooler area. There are two sections of rubber hose on the supply side of the cooler and two sections of rubber hose on the return side of the cooler, making a total of four rubber hoses that could leak at the joints. Refer to figures 1, 2, and 3.

**Figure 1 - Transmission Cooler Hose Leak**

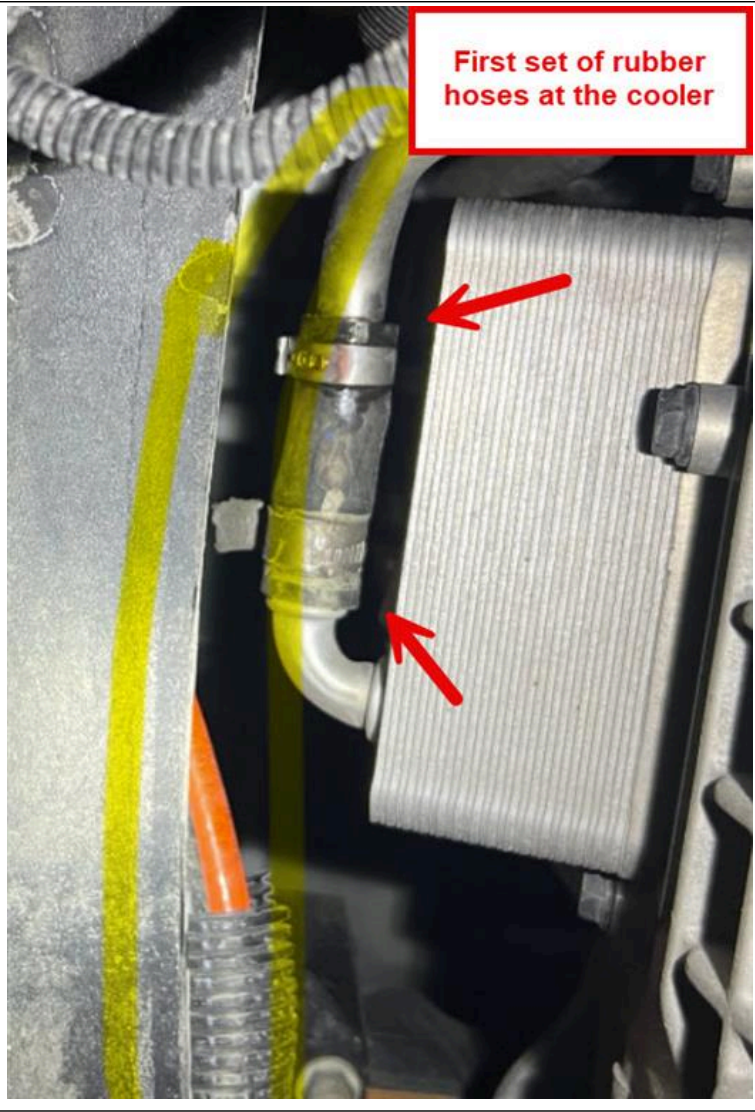


Figure 2 - Transmission Cooler Hose Leak

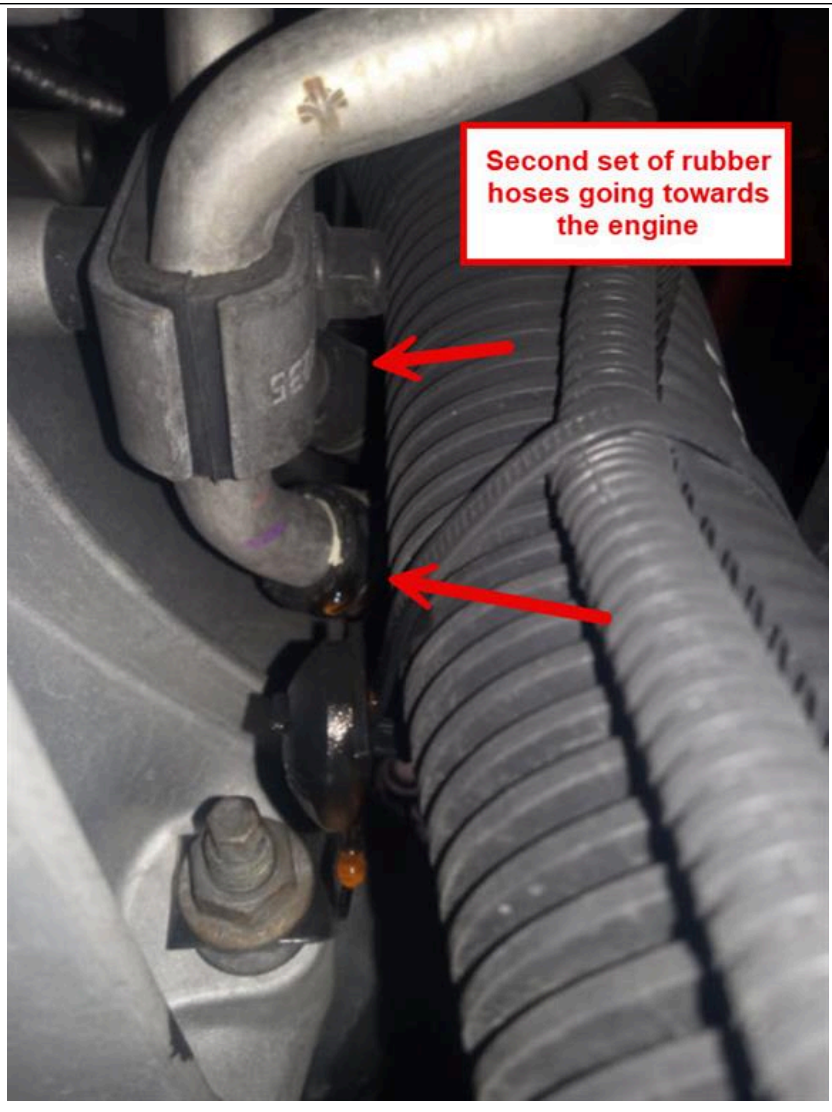


Figure 3 - Transmission Cooler Hose Leak



**Repair Direction:** If the leak is observed at any of the rubber hose joints near the transmission cooler, please reference to IKnow article [IK1300194 - S13/T14 Transmission Cooler Pipe or Clamp Leak Troubleshooting and Repairs](#).

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## **Warranty Information**

### **Warranty Claim Coding:**

Refer to the [Warranty Coding Manual](#) for Group and Noun Codes.

### **Standard Repair Time(s):**

Refer to the [SRT Manual](#) for Repair Times

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## **Other Resources**

[Master Service Information Site](#)

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### Feedback Information

Viewed: 405

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Not Helpful: 0

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