

# Subaru 4EAT Diagnosis and Service

Changing the engine oil would seem to be such a simple procedure. Yet a mistake can yield catastrophic results. The transmission in the photo above was being replaced due to a differential failure. The differential failure was not caused by a part failure, but rather by operator error. The differential fluid had been drained during an oil service, rather than the engine oil. The drained fluid was not replaced, and a few hundred miles later, the differential was destroyed.

This error may have been caused by unfamiliarity with Subaru vehicles or simple inattentiveness. In any case, it's not a mistake any of us would want to make. Although we ran this information in an earlier *End Wrench*, seeing the destroyed transaxle drove home the fact that some technicians still need to be reminded of the correct service procedures.

When performing an oil change service on Subaru vehicles, don't confuse the drain plugs and filters located under the vehicle. Subaru models produced over the past several years feature an under-engine cover. This cover greatly reduces the accumulation of dirt and grime on the engine and also reduces the overall coefficient of drag of the vehicle. However, it does limit

the access to the engine oil drain plug and engine oil filter.

Items to remember when performing services on Subaru vehicles:

- The engine oil filter is located at the front of the engine.
- The engine oil pan and 17 mm oil drain plug are painted black and are located directly under the engine — above the under-engine cover.
- The engine oil dipstick is located under the hood, on the front driver's corner of the engine.
- The transmission front differential is bright aluminum with a gold-colored 21 mm drain plug. This housing is bolted directly behind the engine and is filled with GL-5 gear oil.
- The differential dipstick is located under the hood near the firewall, on the passenger side of the differential housing.
- The transmission pan is black. Its 17 mm drain plug is located on the driver's side of the pan. The drain plug is normally silver in color, but black drain plugs have also been installed on occasion. The transmission is filled with Genuine Subaru factory fill AT/PS Fluid P/N SOA868V9240.
- 1999 and later Subaru vehicles

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equipped with automatic transmissions have a screw-on filter on the driver's side of the transmission. Do not confuse this with the engine oil filter. The transmission filter does not require service under normal conditions.

- The automatic transmission fluid dipstick is under the hood, on the driver's side of the car near the firewall.
- All three dipsticks have yellow handles for easy identification.
- Always confirm proper lubricant levels in each unit after performing any service.

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*Engine oil drain plug (engine undercover in place)*



*Differential drain plug*



*Transmission drain and filter*



*Transmission dipstick*



*Differential dipstick (4EAT)*

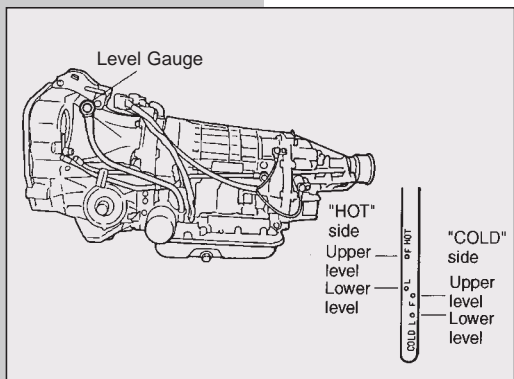


## 4EAT Diagnosis and Service

### ATF and Differential Level Inspection

#### ATF Level

1) Raise the ATF temperature to 60 to 80 degrees C (140 to 176 degrees F) from 40 to 60 degrees C (104 to 140 degrees F) (when cold) by driving a distance of 5 to 10 km (3 to 6 miles).



Measuring ATF level

*Note: The ATF level varies with fluid temperature. Pay attention to the fluid temperature when checking oil level.*

2) Make sure the vehicle is level. After selecting all positions (P, R, N, D, 3, 2, 1), set the selector lever in "P" range. Measure fluid level with the engine idling.

*Note: After running, idle the engine for one or two minutes before measurement.*

3) If the fluid level is below the center between upper and lower marks, add Genuine Subaru factory fill AT/PS Fluid P/N SOA868V9240 until the fluid level is found within the specified range (above the center between upper and lower marks). When the transmission is hot, the level should be above the center of upper and lower marks, and when it is cold, the level should be found below the center of these two marks.

#### Caution:

- Use care not to exceed the upper limit level.
- ATF level varies with temperature. Remember that the addition of fluid to the upper limit mark when the transmission is cold will result in the over-filling of fluid.

4) Time Required to Reach Proper Operating Temperature

- *By idling the engine*

The time required for the transmission fluid temperature to rise to 60 degrees C (140 degrees F) when the atmospheric temperature is 0 degrees C

(32 degrees F is more than 25 minutes). The time required for the transmission fluid temperature to rise to 30 degrees C (86 degrees F) when the atmospheric temperature is 0 degrees C (32 degrees F) is approximately eight minutes.

- *By running the vehicle*

The time for the transmission fluid temperature to rise to 60 degrees C (140 degrees F) with atmospheric temperature of 0 degrees C (32 degrees F) is more than 10 minutes.

5) Method for checking fluid level upon delivery or at periodic inspection:

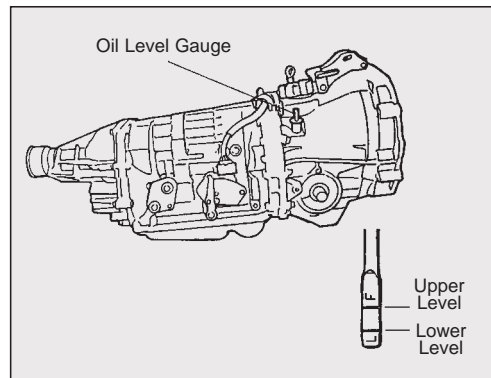
- Check fluid level after a warm-up run of approximately 10 minutes. During the warm-up period, the automatic transmission functions can also be checked.

#### Differential Gear Oil Level

1) Ensure the vehicle is on a level surface and the parking brake is set.

*Note: Do not check the oil level nor add oil to the case with the front end of the vehicle raised; this will result in an incorrect reading of the oil level.*

2) Check whether the oil level is between the upper (FF) and lower (LF) marks. If it is below the lower limit mark, add oil until the level reaches the upper mark.



Measuring differential gear oil level

#### Oil Leakage

It is difficult to accurately determine the precise position of an oil leak, since the surrounding area also becomes wet with oil. The points listed below should be checked for fluid leakage. Checking

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method is as follows:

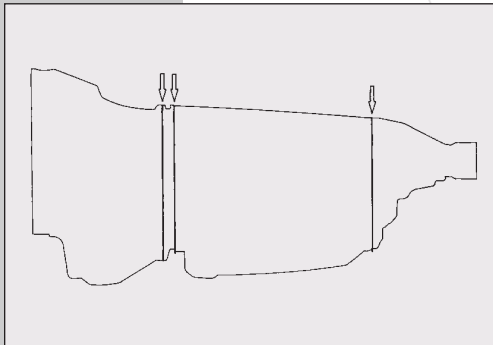
(1) Place the vehicle on a lift, and check whether the leaking oil is ATF or not. The ATF is wine red in color, and can be discriminated easily from engine oil and gear oil.

(2) Wipe clean the leaking oil and dust from a suspected area, using a noninflammable organic solvent such as carbon tetrachloride.

(3) Run the engine to raise the fluid temperature, and set the selector lever to "D" in order to increase the fluid pressure and quickly detect a leaking point. Also check for fluid leaks while shifting select lever to "R", "2", and "1."

The places where oil seals and gaskets are applied are:

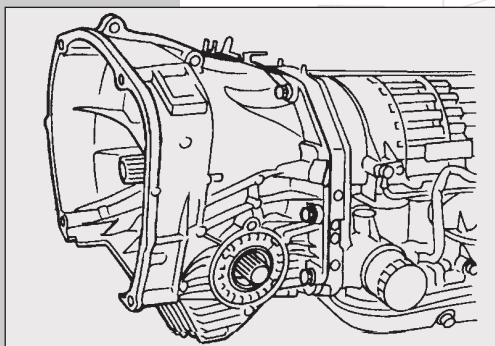
### 1) Jointing portion of the case



Potential mating surface leakage areas

- Transmission case and oil pump housing jointing portion
- Torque converter clutch case and oil pump housing jointing portion
- Transmission case and extension case jointing portion

### 2) Torque converter clutch case



Torque converter clutch case

- Engine crankshaft oil seal
- Torque converter clutch impeller sleeve oil seal
- ATF cooler pipe connector
- Torque converter clutch
- Torque converter clutch case
- Axle shaft oil seal

• O-ring on the outside diameter of axle shaft oil seal holder

- O-ring on the differential oil gauge
- Differential oil drain plug
- Location of steel balls

### 3) Oil pump housing

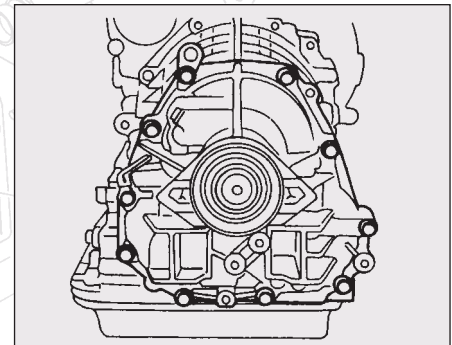
- Oil pump housing (defective casting)
- O-ring on the test plugs

- Differential gear breather

### 4) Automatic transmission case

- Transmission case (defective casting)
- Mating surface of oil pan
- O-ring on the test plugs
- Oil supply pipe connector
- ATF cooler pipe connector and gasket
- Oil pan drain plug
- O-ring on the transmission harness holder
- Oil pump plugs
- ATF breather
- Shift lever oil seal
- O-ring on the vehicle speed sensor 2 (Front)
- O-ring on the turbine revolution sensor
- ATF filter oil seal

### 5) Extension case



Extension case

- Extension case (defective casting)
- O-ring on the vehicle speed sensor 1 (Rear)
- Rear drive shaft oil seal
- O-ring on the test plugs

## Self-Diagnostics

### Abnormal Display On AT Oil Temp Indicator

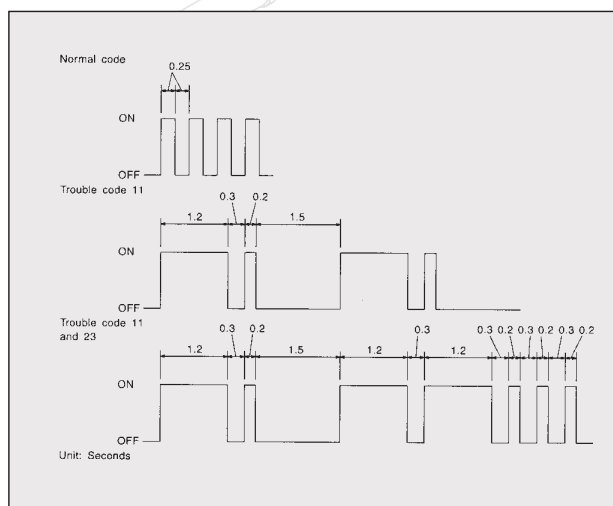
When any on-board diagnostics item is malfunctioning, the display on the AT OIL TEMP indicator light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a trouble code during on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP indicator does not show a problem (although a problem is occurring), the problem can

be determined by checking the performance characteristics of each sensor using the Select Monitor. The indicator signal is as shown in the figure below.

### Reading Trouble Codes Using the Indicator Light

The AT OIL TEMP indicator light flashes the code corresponding to the faulty part.

The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”



Trouble Code Flash Sequence

### Clear Memory

The current trouble codes shown on the display are cleared by turning the ignition switch OFF after conducting on-board diagnostics operation. Previous trouble codes, however, cannot be cleared since they are stored in the TCM memory, which is operating on the back-up power supply. These trouble codes can be cleared by removing the specified fuse (located under the right or left lower position of the instrument panel).

*Clear Memory: Removal of No. 4 fuse (for at least one minute)*

- The No. 4 fuse is located in the line to the memory back-up power supply of the TCM. Removal of this fuse clears the previous trouble codes stored in the TCM memory.
- Be sure to remove the No. 4 fuse for at least the specified length of time. Otherwise, trouble codes may not be cleared.

Trouble Code	Item	Content of Diagnosis
11	Engine speed signal	Detects open or shorted input signal circuit
27	ATF temperature sensor	Detects open or shorted input signal circuit
31	Throttle position sensor	Detects open or shorted input signal circuit
33	Vehicle speed sensor 2 (front)	Detects open or shorted input signal circuit
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit
38	Torque control signal	Detects open or shorted input signal circuit
45	Intake manifold pressure signal	Detects open or shorted input signal circuit
71	Shift solenoid 1	Detects open or shorted output signal circuit
72	Shift solenoid 2	Detects open or shorted output signal circuit
73	Low clutch timing solenoid	Detects open or shorted output signal circuit
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit
75	Line pressure duty solenoid	Detects open or shorted output signal circuit
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit
77	Lock-up duty solenoid	Detects open or shorted output signal circuit
79	Transfer duty solenoid	Detects open or shorted output signal circuit
93	Vehicle speed sensor 1 (rear)	Detects open or shorted input signal circuit