

**ATF** is JWS3309 or Dexron III but not both. JWS3309 is the **ATF** specification set by Aisin Warner, the manufacturer of the AW55-50 transmission. Any JWS3309 **ATF** should be ok in a **Volvo**.

This transmission is used by Toyota (who own 30% of AW), Nissan, Ford, GMC, Saab, Saturn and **Volvo** to name a few. Each sells a JWS3309 **ATF** under its own brand.

JWS3309 **ATF** is characterized by its additive package that is designed for the paper friction discs of the AW50 and for long change intervals.

There are at least 3 manufacturers of JWS3309 **ATF**: Mobil (JWS3309 **ATF**), Castrol (Transmax J), and Idemitsu (**ATF** HP, sold by Cottmann Transmissions amongst others). If I had to guess, Idemitsu is Toyota's OEM. FWIW, I suspect that none of these ATF's are purely synthetic (no big deal), but are blends of conventional and synthetic basestocks.

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## **AW55-50**

Volvo C70, S40, S60, S70, S80, S90, V40,

V50, V70, XC70 and the XC90

Some Volvo models have a Neutral Control feature. This is when the computer turns off the C1 clutch when the vehicle comes to a complete stop for more than 2 seconds with the brake applied. This is a feature that the customer should never feel, but quite frequently you will get a harsh re-engagement and sometimes a downshift thud when the C1 clutch releases. Volvo has software updates to fix this as well as flare 2-3 shifts, harsh down shifts and harsh garage shifts. Most manufacturers have software upgrades for this transmission. Check with your local dealer for the latest upgrades available for your application.

As with almost all newer transmissions, the AW55-50 relies on adaptive strategy to adjust the shift feel for each shift. Whenever the transmission is overhauled or replaced, the valve body is replaced or the transmission control module (TCM) is replaced, the shift adapts must be cleared and relearned. Failure to perform these procedures can result in shift feel and downshift clunk complaints, as well as reduced transmission life. Some vehicles relearn slowly and need to be relearned with a dealer equivalent scan tool. You don't want to damage your fresh overhaul waiting for the computer to relearn its adapts.

## **Volvo Shift Modes**

**Economy Mode** – This mode is used by TCM under normal acceleration. The TCM provides the earliest possible upshifts and lockup for best economy. The TCM adjusts oil pressure to provide smooth shifts and engagements.

**Sport Mode** – The TCM changes from economy to sport mode if the accelerator pedal is pressed down quickly and the vehicle exceeds 31MPH. In sports mode the shift points are raised to provide the best performance and down shifting occurs at lower engine RPM. When the accelerator pedal is moved less quickly, the TCM resumes economy mode automatically.

**Extreme Mode** – Extreme mode is another way of saying kick-down. The TCM selects the lowest possible gear, for the vehicle speed, when the throttle is depressed to the floor.

**Winter Mode** – Winter mode is selected by using the “W” button on the top panel of the gear selector assembly. A warning lamp in the instrument cluster illuminates when winter mode has been selected. When winter mode is activated, the transmission will start out in 3rd gear to provide maximum traction on slippery surfaces. Depending on manual gear selection, the following shift combinations can be obtained.

- D – The transaxle starts in 3rd gear, automatically shifting between 3rd, 4th, and 5th gears.
- 4 – The transaxle starts in 3rd gear and automatically shifts to 4th gear earlier than economy mode in D range. 5th gear is locked out.
- 3 – The transaxle starts in 3rd gear with no up shifts or down shifts.
- L – The transaxle starts in 2nd gear with no up shifts or down shifts.

At wide-open throttle in winter mode, the transaxle uses all gears for maximum performance.

**Catalytic Converter Start** – This function helps the engine to reach operating temperature by preventing converter lockup and delaying the 1-2 and 2-3 upshifts when the engine is cold. This is a normal function.

**Temperature Controlled Lock-up** – If the transmission temperature rises excessively as a result of a heavy load with high ambient temperature conditions, the torque converter clutch is

applied to reduce heat generated by the torque converter. If the temperature drops below 20°C, (68°F), lock-up will be inhibited.

**Slipping Lock-up** – Slipping lock-up mode allows for a smoother lock-up engagement while reducing vibration and noise. The computer maintains a 50 to 200 RPM torque converter clutch slip in this mode. The following conditions must be met for this mode to activate:

- Gear shifter must be in the D, 4, or 3 position.
- Transmission must be in 3rd, 4th, or 5th gear.
- The transmission input speed must be 1100 RPM or higher and the throttle opening must be 35% or less.
- Engine coolant must reach a certain temperature.
- Transmission oil temperature must be at least 40°C (104°F), but not to exceed 120°C (248°F).

Note: The friction properties of this transmission fluid are different from other fluids due to the large amount of converter clutch slip. Failure to use the correct fluid will cause transmission damage

and codes.

**Driving Uphill** – To reduce shift business, the TCM may change the shift pattern slightly when driving uphill.

**Neutral Control** – (This function is not available on all models). Neutral control is when the TCM disengages the forward clutch, (C1), at a stop with the brake applied. This reduces the load on the engine, therefore reducing engine vibration and improving fuel economy. When the brake is released the forward clutch engages. The following conditions must be met before the neutral control function will be allowed:

- Manual shifter must be in D, 4 or 3. Neutral control will not work in winter mode or when Geartronic is selected.
- Transmission oil temperature must be above 10°C or 50°F.
- Throttle position must be less than 3%.
- Brake pedal must be depressed.
- Vehicle speed must be zero MPH.

- Engine speed must be less than 1500 RPM.
- There is a 2 second delay once the vehicle has stopped in the D position and a 5 second delay when shifted from N to D.

### **Shifting using Geartronic**

When the shifter is moved to the Geartronic position, the transmission remains in the hydraulic “D” position. When the shifter is moved to the + or – positions, the gear selector module sends a signal

to the TCM to shift the transmission up or down. The driver information module changes the symbol on the instrument cluster from D to the gear that has been selected. A signal is sent to the gear selector module to light the M and turn off the other LED’s on the shifter console. The TCM determines if the shift can be carried out and activates the appropriate solenoids. The TCM will override the driver’s command under certain circumstances. The following applies during Geartronic shifting:

- Only 1st, 2nd, or 3rd gears can be selected from a stop. The transmission will not up shift into 4th gear until a speed of at least

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- Only 1st, 2nd, or 3rd gears can be selected from a stop. The transmission will not up shift into 4th gear until a speed of at least 19MPH has been reached. The transmission will not up shift into 5th until a speed of at least 25MPH has been reached.
  - Automatic downshifting occurs below certain speeds if driver forgets to manually down shift transmission. Manual upshifting is required after automatic downshifting has occurred.
  - Kick-down is not available in Geartronic mode.
  - The TCM will not allow the transmission to be manually downshifted if the engine speed would exceed 6000 RPM.
  - If the transmission temperature gets too high, the TCM will select the correct gear so that lockup can be used.
  - Torque converter lock-up is only possible in 3rd, 4th, and 5th.
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## **AW55-50 Shift Adapt Procedure**

By Jeff Parlee – Director of Product Support at ValveBody Xpress

The AW55-50 transmission uses adaptive learn technology to adjust shift pressure and line pressure which controls the feel of up shifts, down shifts, the neutral control function and garage shift engagements. Performing the adaptive learn procedure is necessary whenever the transmission is rebuilt or replaced, the valve body is replaced or the TCM is replaced. The TCM is always adapting, but at an extremely slow rate. To quickly clear and relearn the adapts, the TCM must be placed into the adaptation mode.

Performing the adaptive learn procedure on a Volvo requires a VADIS, (Volvo factory scanner), to put the TCM in the “Control Module Adaptation” mode. Some vehicles do not have this function available and will need to have the TCM software reflashed so that the control module adaptation mode will work.

The TCM will not go into adaptation mode unless the transmission oil temperature is between 150F and 230F. The TCM will not adapt in Geartronic or Winter Mode. While the TCM is in the Adaptation Mode, the orange triangle in the center of the instrument cluster will flash when the adapt is complete for a particular shift.

To adapt the up shifts:

- Use the “D” position. Accelerate from a stop at a light throttle, about 1400 RPM’s, through the gears to fourth, keeping the throttle steady. Come to a stop and repeat until the orange triangle flashes after each shift.
- Next, accelerate from a stop through all five gears at a throttle opening of about 1800 RPM’s, keeping the throttle steady. Come to a stop and repeat until the orange triangle flashes after each shift.
- Finally, accelerate through the gears at a throttle opening of 2500 RPM’s. Repeat until the orange triangle flashes after each shift.

To adapt the down shifts:

- Use “D” position. While driving at about 45 MPH in 5th gear, release the throttle and lightly brake to a stop. Repeat this procedure until the orange triangle flashes after each downshift.

To adapt the garage shifts:

- With the engine idling and the brake pedal depressed, shift to “N” and wait five seconds, now shift to “R”, wait five seconds and shift to “N”. Repeat this procedure until the orange triangle flashes.

- Repeat the above procedure for “D”.

To Adapt the Neutral Control Function:

Note: Not every Volvo has the Neutral Control Function.

- While driving at about 5 MPH in “D”, slowly come to a stop. Repeat this procedure until the orange triangle flashes.

- With the engine idling and the brake pedal depressed, move the shifter to “D” and wait about 25 seconds for the orange triangle to flash. This lets you know that the TCM is ready to adapt. Once the flash is seen, release the brake and allow the vehicle to crawl forward. Repeat this procedure until the orange triangle flashes just after the brake pedal is released.

Once all of the adapts have been learned, turn off the ignition and the TCM will exit the adaptation mode.

For more precise information see Volvo Tech Bulletin # 43-27 for 2001 S60, V70, V70VC, and XC90 2.5T. For all other Volvos using the AW55-50 transmission, see Volvo Tech Bulletin # 43-20

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## **AW55-50 Differences between Manufacturers - Part One**

<http://www.sonnax.com/tech-articles/TASC-TIP-06-08.pdf>