Volvo Cars of North America, Inc
Rockleigh, New Jersey

Service Bulletin Cars

850/S70/V70/C70 1996-1998

Section	Group	No.	Year	Month
2	23	0059	02	07

Reference: This Service Bulletin replaces the previous SB 23-0059 dated January 2002 and supersedes TNN 28-40 dated December 2001, which both should be discarded.

Purpose: Revised repair verification driving cycle, Service Manual TP 2308202 M4.4 and TP 2301202 M4.3

Affected vehicles: Vehicles equipped with Motronic 4.4 or Motronic 4.3 Engine Management System

OBD II Readiness Codes: Revised Reset Instructions

Background:

The MY 1996, 1997 and 1998 Volvo 850/S70/V70/C70s require an extended driving period in order to reset readiness codes from INCOMPLETE to COMPLETE. When verifying an emission related repair, the TRIP identified in Section KKKK of the Engine Management System Service Manual TP 2308202 M 4.4 or Section EBU of the Engine Management System Service Manual TP 2301202 M 4.3 may not allow all of the diagnostic monitors to run.

The following instructions, which supersede TRIP instructions contained in the above-referenced service manual, will exercise all of the diagnostic monitors on these models. As long as no diagnostic trouble codes have been stored, the readiness codes will be set to COMPLETE upon completion of two consecutive trips driven according to the instructions.

"Fixed Right -- First Time"

Service personnel: Please circulate, read and initial

Service Manager	Parts Manager	Workshop Manager		Workshop Foreman		Service Technicians					

OBD II Readiness Codes: Revised Reset Instructions

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1

Introduction

This on-road driving sequence will allow all of the diagnostic functions an opportunity to run. After **two** correct, consecutive TRIPS, the readiness codes should be set to COMPLETE, provided no diagnostic trouble codes have been stored.

2

General Instructions

No Diagnostic Trouble Codes (DTC) present in system.

Connect Volvo Systems Tester (VST). Enter the **DIAGNOSTIC CHECK** menu to verify if a trip has been completed (see page 5)

M 4.4
Flywheel adaptation must be completed (status **READY**)
TIP: Look in the Monitor Test Scroll List and find the entry **"F ADAP."** It will say either **READY** or **NOT READY**. If it says **READY**, continue. If it says **NOT READY**, go to page 6.

M 4.3
NOTE: The VST can not read the flywheel adaptation on M 4.3 vehicles. Therefore we must assume that they are not set. See page 6 to assure flywheel adaptive is set.

M 4.3

When interrogated using a generic OBD II scan tool, the MY 1996 Volvo 850, equipped with Bosch Motronic 4.3 Engine Management System, may experience all of the Readiness Codes changing from COMPLETE to INCOMPLETE when the ignition key is cycled. This behavior applies to all 1996 M 4.3 850s and cannot be corrected. **DO NOT** turn the engine off until after the Enhanced Inspection/Maintenance OBD II check has been completed.

In order to insure EVAP leakage detection completion, the fuel level in the car should be above ¼ and below ¾ tank.

Air conditioning (A/C) must be off during idle periods. A/C compressor activation during the Evap diagnostic may Interrupt the Evap test.

Select a suitable route where it is possible to safely stop at the side of the road. Obey all traffic regulations and posted speed limits.

Engine temperature at start must be between +29ºC (84ºF) +49ºC (122ºF). If engine temperature is below +29ºC, start engine to warm up over +29ºC and then shut off. Restart engine when coolant temperature is between +29ºC-+49ºC.
TIP: The coolant temperature can be read out from the **SCROLL LIST** using the Volvo Systems Tester (VST).

Another confirmation that the ECU has seen the correct start criteria is to access the EFI code 112 in the **DIAGNOSTIC CHECK** menu. With ignition key in position 2, engine off, access the **DIAGNOSTIC CHECK** menu and press enter. The EFI codes will appear. Scroll down until you get to EFI 112.

Start engine, go directly from position 2 to position 3 do not cycle key. The EFI 112 status should then change from **NOT TESTED** to **TESTED**. This indicates that the ECU has seen the correct start criteria.

3

Trip Instructions

Start Engine

- Accelerate gently to 1500 - 2000 rpm, manual gear box equipped, gear selection dependent on highway
- Drive for 6 minutes at 1500 - 2000 rpm
- Safely stop the car and idle engine for 70 seconds

  [Fuel Trim adaptive functions are checked by the above steps.]

- Accelerate gently to 1600 – 2000 rpm
- Drive for 6 minutes at 1600 - 2000 rpm, manual gear box equipped, gear selection dependent on highway
- Stop the car and idle engine for 70 seconds

  [Secondary Air diagnosis should be carried out at this time (if equipped).]

- Accelerate gently to at least 45 mph, drive for 5 minutes at 1800 - 2200 rpm, manual gear box equipped, gear selection dependent on highway
- Top the car and idle engine for 60 seconds

  [EVAP Leakage diagnosis should be carried out at this time]

- Accelerate gently to at least 45 mph, drive for 4 minutes at 1800 - 2200 rpm, manual gear box equipped, gear selection dependent on highway
- Stop the car and idle engine for 60 seconds
- Accelerate gently to 1800 – 2200 rpm
  NOTE: Repeat this last step 3 - 4 times. To set the cycle flag for idle air adaptation diagnosis the engine needs to come to idle 7 times. Under normal driving conditions you come idle 7 times very easily, but during the forced **"TRIP**" there are just 3 idle phases
- STOP, DO NOT SHUT OFF ENGINE, trip completed move gear selector to neutral apply parking brake
- Check that all diagnostic functions are completed, using Volvo Systems Tester (see below)
- The diagnostic check will now say, **"TRIP COMPLETED"**.
- M 4.4 systems will also display either **READINESS = YES** or **NO** based on completion of 2 "**TRIPS**".
  M 4.3 systems will not display the READINESS code, but 2 complete "**TRIPS**" will set the READINESS code.
- If all diagnostic functions are NOT completed there are ways to rerun portions of the trip, see the descriptions following.

- STOP, DO NOT SHUT OFF ENGINE, trip completed move gear selector to neutral apply parking brake
- Check that all diagnostic functions are completed, using Volvo Systems Tester (see below)
- The diagnostic check will now say, **"TRIP COMPLETED"**.
- M 4.4 systems will also display either **READINESS = YES** or **NO** based on completion of 2 "**TRIPS**".
  M 4.3 systems will not display the READINESS code, but 2 complete "**TRIPS**" will set the READINESS code.
- If all diagnostic functions are NOT completed there are ways to rerun portions of the trip, see the descriptions following.

Using the Volvo Systems tester, VST, you can determine if all diagnostic functions were completed. If any one or more were not tested you can rerun only that portion of the TRIP. To determine which diagnostic functions have not been completed, using the VST enter the **DIAGNOSTIC CHECK** menu. At the **TRIP/READINESS** window press enter. Here the EFI codes representing individual diagnostic functions will be displayed. Note the ones that are **NOT TESTED**. Below are the specifics on how you can address individual codes:

NOTE: The VST does not continuously provide "online" updates. If you want to check the status of readiness before, during or after a drive cycle you must always exit the VST Diagnostic Test and reenter.

EFI 233, Adaptive Idle Air trim. After completing the trip and seeing that this function is not set, idle the Engine for 60 seconds, press the accelerator and rev up the Engine above 1500 rpm for a few seconds, return to Idle for 60 seconds. Continue this until EFI 233 is completed.

EFI 425/436, Rear oxygen sensor, Accelerate to at least 45 mph, drive for 5 minutes at 1800-2200 rpm.

EFI 435, Front heated oxygen sensor, slow response. Drive the car with an Engine speed between approximately 2200 to 2800 rpm and a load between 1,1to 1,8 ms (LOAD -TL). Automatic gearbox equipped, use low gear if necessary.

- drive for 2 minutes at 1800 – 2200 rpm, manual gear box equipped gear selection dependent on highway
- accelerate directly to 3000 – 3500 rpm for 30 seconds, manual gear box equipped in **third** gear
- reduce rpm to 1800 – 2200 for 2 minutes, manual gear box equipped in **fifth** gear
- accelerate directly to 3000 – 3500 rpm for 30 seconds, manual gear box equipped in **third** gear
- reduce rpm to 2300 – 2500 for 2 minutes, manual gear box equipped in **forth** gear

EFI 611/612, Fuel tank system. Run the quick test in VST for Leakage detection monitoring. (ACTIVATION->ACTIVATE DIAG->LEAKAGEDIAGNOSIS

EFI 442+445-448,Pulsed Secondary Air Injection system, Run the Quick test in VST for the Pulsed Secondary Air system monitoring (ACTIVATION->ACTIVATE DIAG->SAS DIAGNOSIS)

Again: Please note that although the readiness codes may present as INCOMPLETE, this condition will not inhibit the OBDII system from monitoring, detecting, and subsequently storing a corresponding DTC in system memory.

VST Screen Navigation for OBD II TRIP and Flywheel Readiness

M 4.3 Readiness

Enter group 2 ENGINE and select Motronic 4.3

DIAGNOSTIC TEST
MONITOR TEST
FREEZE TEST
↑▲ / ▼ / ENTER / EXIT

ENTER DIAGNOSTIC TEST

READ DTCs
ERASE DTCs
RESET ADAPTION
DTM 2
DTM 3
DIAGNOSTIC CHECK
↑▲ / ▼ / ENTER / EXIT

ENTER DIAGNOSTIC CHECK

W. CYCLE = NO
D. CYCLE = NO
TRIP = NO

PRESS ENTER

2-1-2 = NOT TESTED
1-5-3 = NOT TESTED
5-2-1 = NOT TESTED
5-2-2 = NOT TESTED

M 4.4 Readiness

Enter group 2 ENGINE and select Motronic 4.4

DIAGNOSTIC TEST
MONITOR TEST
READ CM ID
↑▲ / ▼ / ENTER / EXIT

ENTER DIAGNOSTIC TEST

READ DTCs
ERASE DTCs
ACTIVATION
RESET ADAPTION
DIAGNOSTIC CHECK
↑▲ / ▼ / ENTER / EXIT

ENTER DIAGNOSTIC CHECK

W. CYCLE = NO
D. CYCLE = NO
TRIP = NO
READINESS = NO

PRESS ENTER

EFI - 212 = NOT TEST
EFI - 153 = NOT TEST
EFI - 521 = NOT TEST
EFI - 522 = NOT TEST

M 4.4 Flywheel

Enter group 2 ENGINE and select Motronic 4.4

DIAGNOSTIC TEST
MONITOR TEST
READ CM ID
↑▲ / ▼ / ENTER / EXIT

ENTER MONITOR TEST

SCROLL LIST

ENTER SCROLL LIST and scroll to find FLYWHEEL ADAPTIVE VALUES

F ADAP = NOT READY
F ADAP B = 0.0XXX%
F ADAP C = 0.0XXX%
F ADAP D = 0.0XXX%

These screens show the codes that will be tested during the TRIP.
As each DTC is checked, the status will change to "TESTED".
If you exit the screen and then return, only the untested codes will appear.
This way, you can see how the TRIP is proceeding and what still needs to be tested.
If any codes remain untested at the end of the TRIP, see page 4.

Setting the Flywheel Adaptive Values to "READY"

Background:

The ECM monitors crankshaft speed variations to help detect misfire. In order to make misfire detection very accurate, the ECM uses an adaptive program to make sure that any variations in flywheel speed are due to the actions of misfire rather than small manufacturing tolerance variations which are normally present in the flywheel trigger wheel teeth. This adaptive process occurs naturally during normal driving.

If the battery is disconnected or if the Flywheel Adaptive values are reset, the Flywheel Adaptive status
("**F ADAP**") will change from READY to NOT READY. In order to be able to successfully perform an OBD II **TRIP**, the flywheel status must be changed to READY before starting the **TRIP**.

The Flywheel Adaptive program is only active during engine fuel cut-off. That means that the program only adapts when the throttle is closed, the engine speed is decreasing, and the ECM has turned off the fuel injectors. That is the only time that crankshaft speed variations are so small that it is reliable to start the adaptive process. The ECM will use one section of the flywheel signal as a reference, and "adapt" the other sections of the signal so that they match. After a certain period of time, when the ECM is satisfied that the different sections of the flywheel signal look the same, the adaptive process stops and the Flywheel Adaptive status changes to "**READY**".

Driving to change the Flywheel Status to READY:

- Hook up the VST and go into the Monitor Test Scroll List (see page 5)
- Find the Flywheel Status and the Flywheel Adaptive values (**F ADAP**, **F ADAP B**, **F ADAP C**, etc.)

  NOTE: These scroll list parameters are only available for M 4.4. The procedure works for M 4.3, but you can not check to see if the Flywheel Adaptive Status has changed to **READY**.
- Drive the car in 2nd or 3rd gear (2500 – 3500 rpm) and decelerate without using the brake (a long downhill is helpful for this but not necessary). The flywheel adaptive values should begin to change.
- Repeat the decelerations until the adaptive values stop changing. At that time, the Flywheel Status changes to **READY**.
- Now you can let the engine temperature cool down to between 29 °C – 49 °C so you can begin the **TRIP.**

WARRANTY STATEMENT: All Claims should be submitted on a long form with claim type 02 (emission). Labor time claimed should be actual time up to 3 hours. The repair text should also include "reset readiness code". All claims are subject to Volvo claim documentation requirements (i.e.: hard copy, punch time, etc.).

Operation No	Labor description	Time Allowance
01235-6	Readiness Code Reset	up to: 3.0 hr