



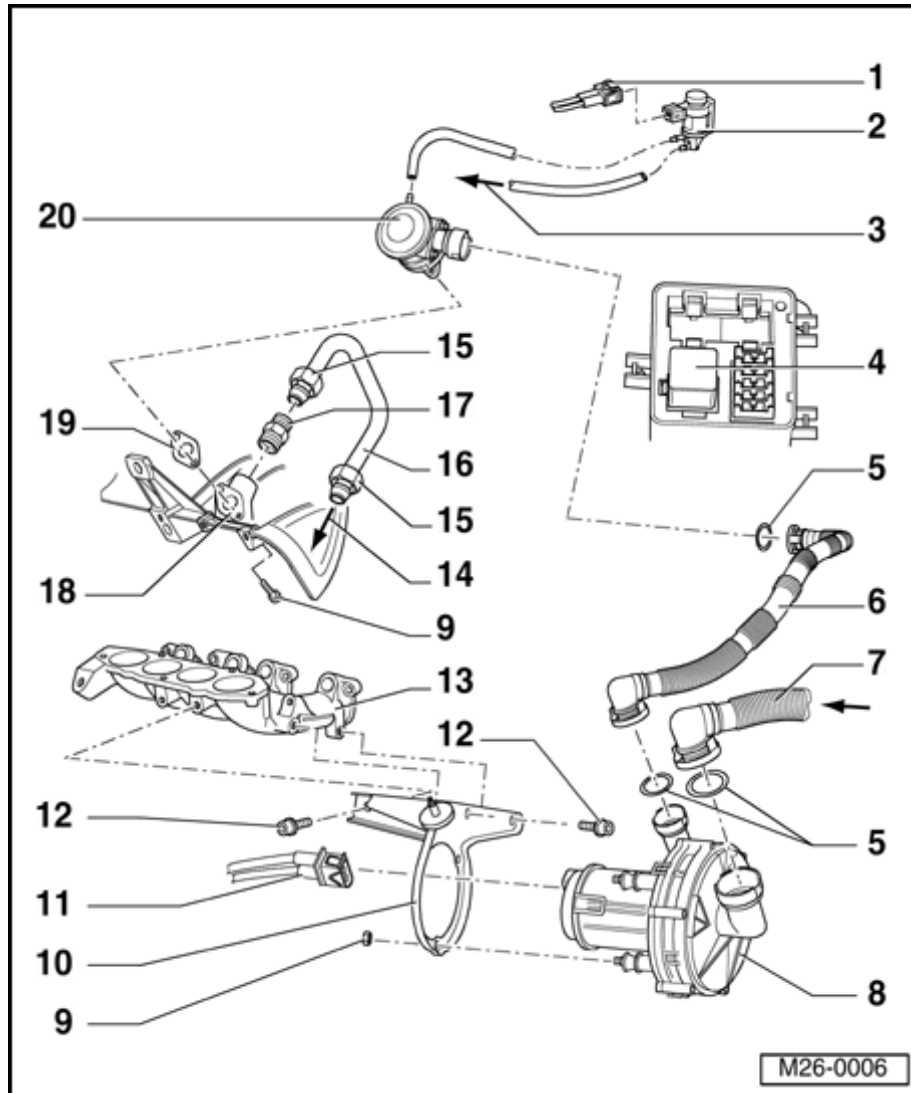
Secondary Air Injection system

Function

The Secondary Air Injection system blows in air behind the exhaust valves during cold start (+5 °C to +33 °C Engine Coolant Temperature) for 100 seconds, maximum. This produces an oxygen-rich exhaust gas, causing afterburning and reducing the duration of the catalyst heat-up phase. Activation is initiated by the Motronic Engine Control Module -J220- via the Secondary Air Injection pump relay -J229- to the Secondary Air Injection solenoid valve -N112-¹⁾ and combi-valve.

Also, after each subsequent engine start (up to a 96 °C max. Engine Coolant Temperature), the Secondary Air Injection system will switch on for 10 seconds during idle and is then monitored by the system. During this procedure the oxygen sensor must be active.

¹⁾ Only engine code AEG



Secondary Air Injection system components, removing and installing

Note:

- ◆ Components marked with an * are checked via the On Board Diagnostic (OBD) system

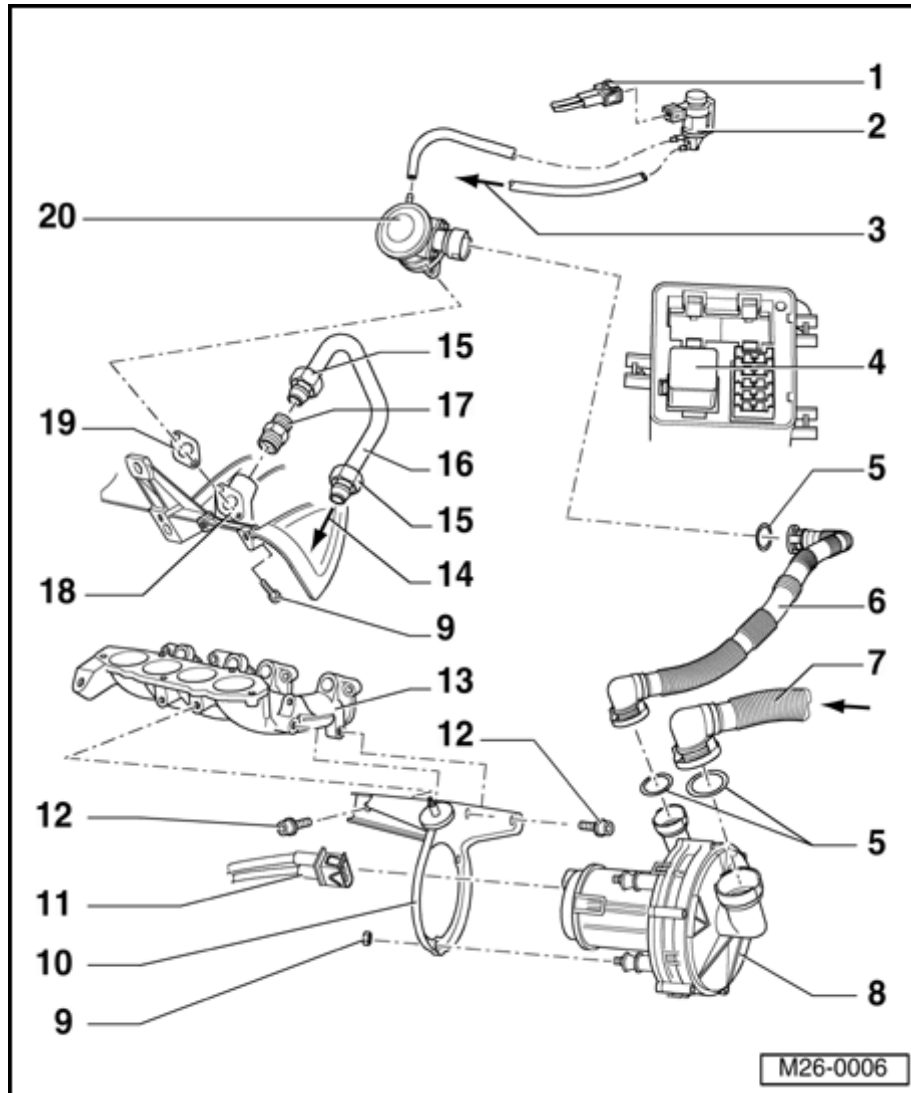
⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AVH, Repair Group 01](#)

- ◆ Components marked with ** are checked via Output Diagnostic Test mode

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AVH, Repair Group 01](#)



1 - 2-pin harness connector

- ◆ Black

2 - Secondary Air Injection valve -N112-*/**

- ◆ Only engine code AEG
- ◆ Fastened to cowl panel

3 - To connection on pipe to brake booster

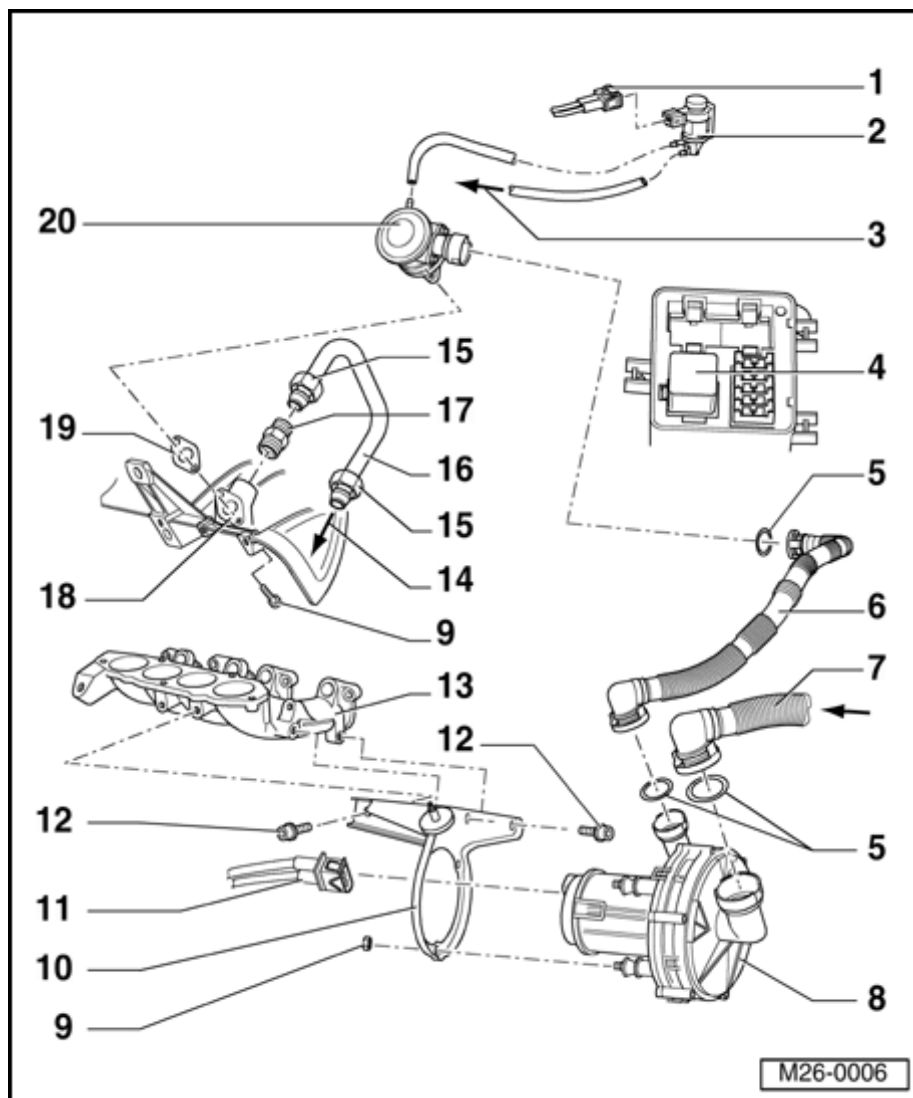
- ◆ Only engine code AEG
- ◆ Ensure it is tightly seated

4 - Secondary Air Injection pump motor relay -J299-*/**

- ◆ Engine compartment left, on fuse/relay panel next to brake master cylinder
- ◆ Relay designation "100"

5 - O-ring

- ◆ Replace if damaged



12 - 25 Nm (18 ft lb)

13 - Intake manifold - lower section

14 - To union on exhaust manifold

15 - 30 Nm (22 ft lb)

16 - Connecting pipe

17 - 35 Nm (26 ft lb)

18 - Warm air collector plate

19 - Gasket

◆ Always replace

20 - Combi-valve

◆ No connection on secondary air injection valve for engine code AVH, AZG

◆ Checking ⇒ [Page 26-28](#)

◆ Removing and installing: ⇒ [Page 26-39](#)



Combi-valve, checking

(Engine code AEG)

Special tools

- ◆ V.A.G 1390 Hand vacuum pump

Test requirements

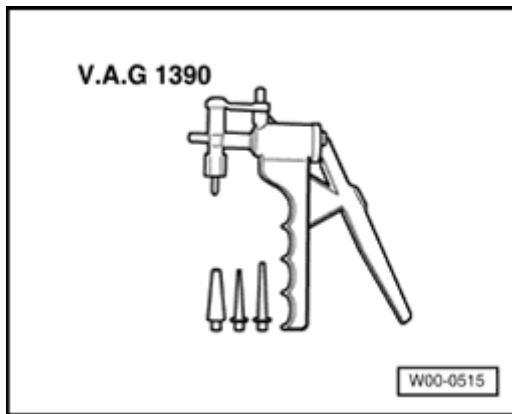
- ◆ No Diagnostic Trouble Codes (DTCs) stored in DTC memory:

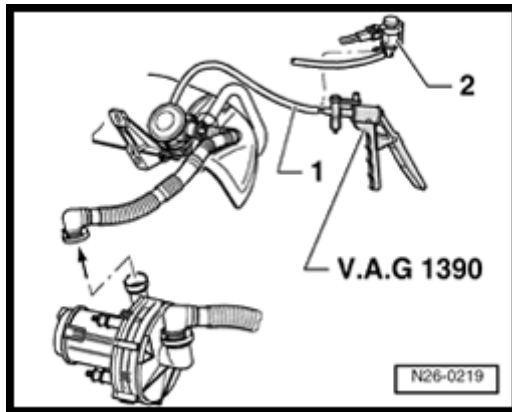
⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

- ◆ Output diagnostic test mode, activating:

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

- ◆ Vacuum lines and seals not leaking
- ◆ Vacuum lines not clogged or crimped





Test procedure

- Remove upper engine cover.
- Disconnect vacuum hose -1- from Secondary Air Injection solenoid valve -N112-
-2-.
- Connect V.A.G 1390 hand vacuum pump to vacuum hose -1-.

Note:

Do not use compressed air during the following check!

- Remove pressure hose (arrow) between Secondary Air Injection pump motor and connecting pipe.

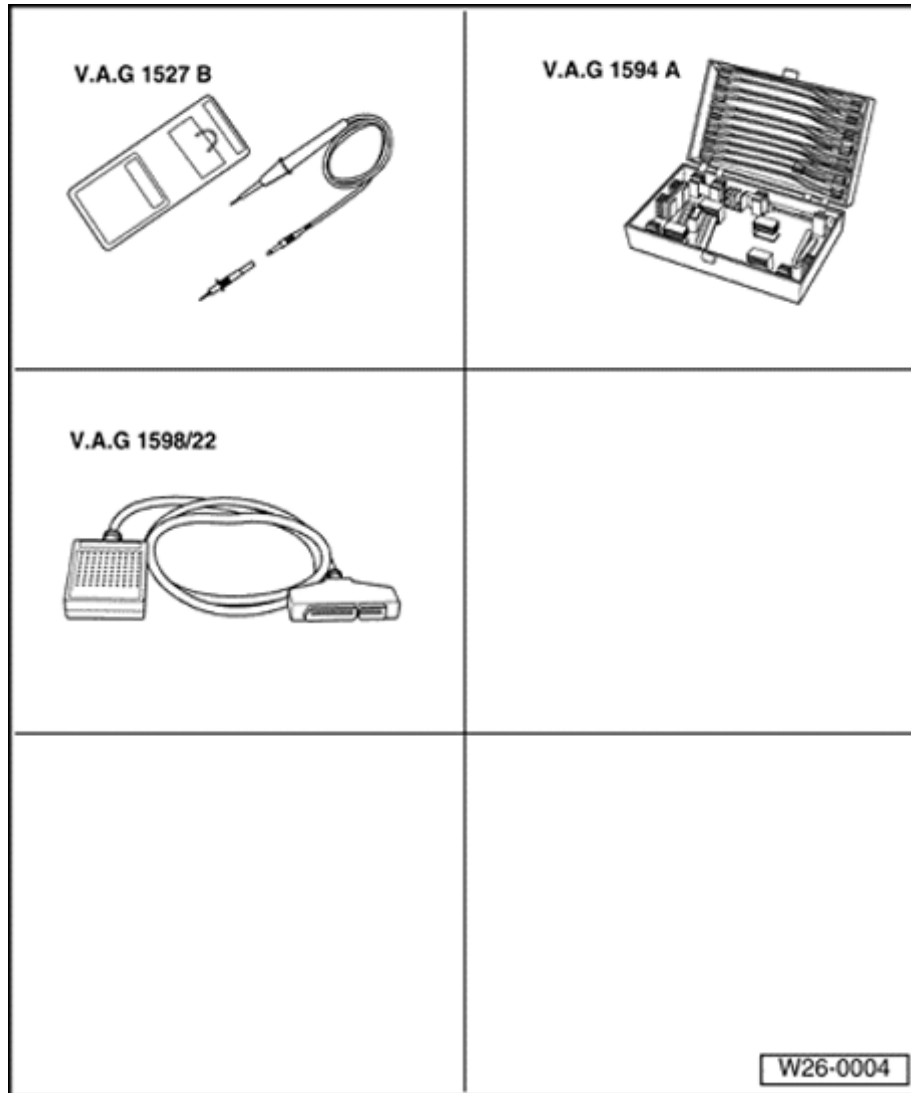
Note:

Press together at ends to release.

- Blow into pressure hose with slight pressure (arrow).
 - Combi-valve must remain closed.
- Operate hand vacuum pump.
 - Combi-valve must open.

If combi-valve does not open:

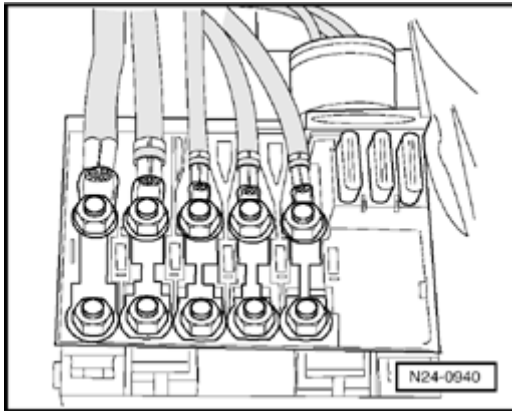
- Replace combi-valve ⇒ [Page 26-39](#) .



Secondary Air Injection pump motor -V101-, checking

Special tools

- ◆ V.A.G 1527B Voltage tester
- ◆ VW 1594 Adaptor set
- ◆ V.A.G 1598/22 Test Box for engine code AEG
- ◆ V.A.G 1598/31 Test Box for engine codes AVH, AZG (not shown)



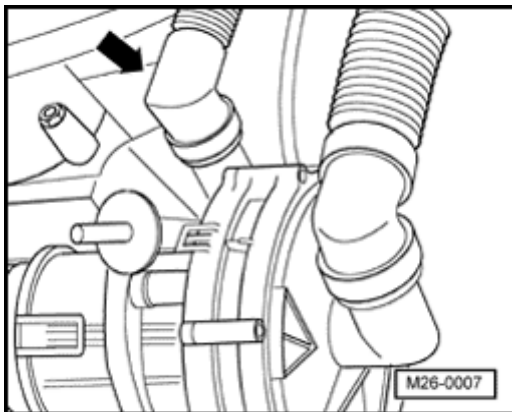
A

Test conditions

- ◆ Main fuses must be OK.
- ◆ Battery voltage 11.5 V minimum.

Test procedure

- Remove upper engine cover.



A

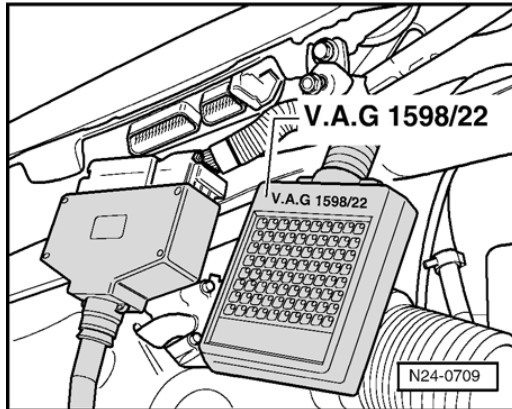
- Remove pressure hose on Secondary Air Injection pump motor (arrow).

Note:

Press together at end to release.

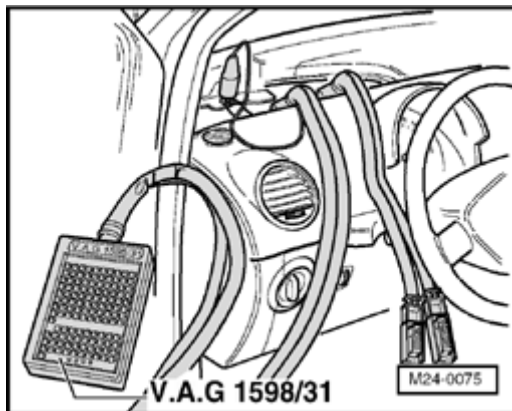
- Remove windshield wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment, Repair Group 92](#)



A

- For engine code AEG connect V.A.G 1598/22 Test Box to ECM wiring harness.



A

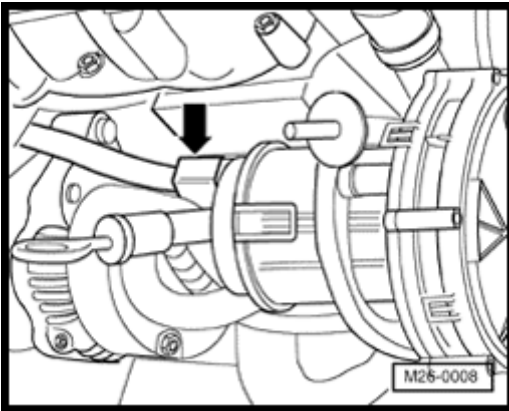
- For engine code AVH, AZG connect V.A.G 1598/31 Test Box to ECM wiring harness.
- Switch ignition ON.
- Bridge Test Box sockets with jumper wires from VW 1594 adaptor kit.
- Engine code AEG: Socket 01 + 30
- Engine codes AVH, AZG: Socket 01 + 9
- Secondary Air Injection pump motor -V101- must run and air must exit from the connecting hose.

If motor runs, but no air exits hose:

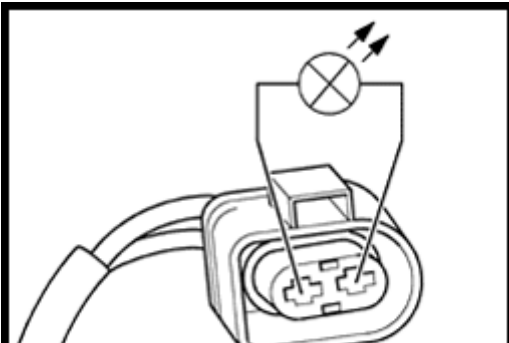


- Switch ignition OFF.
- Replace Secondary Air Injection pump motor - V101- ⇒ [Page 26-26](#) (item 8).

If the Secondary Air pump motor -V101- does not run:



- A** - Pull 2-pin connector off Secondary Air pump motor -V101- (arrow).



- A** - Connect V.A.G 1527 B Voltage Tester to terminals of wiring connector using jumper wires from VW 1594 Adaptor kit.
 - LED must light-up

If LED lights up (voltage supply OK):

- Replace Secondary Air Injection pump motor -V101- ⇒ [Page 26-26](#) (item 8).



LED does not light up:

- Reconnect 2-pin harness connector.
- Perform output diagnostic test and check activation of Secondary Air Injection pump motor relay -J299-:

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

- Check Diagnostic Trouble Code (DTC) memory:

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AVH, Repair Group 01](#)

- Display Readiness code:

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

⇒ *Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code(s): AVH, Repair Group 01*

- Readiness code must be reset if ECM is subject to low voltage with ignition ON or if DTC memory is erased.

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

⇒ *Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code(s): AVH, Repair Group 01*



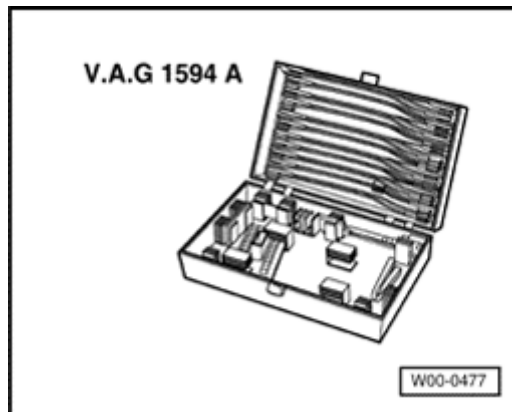
Secondary Air Injection solenoid valve - N112-, checking

(Engine code AEG)

Special tools

A

- ◆ V.A.G 1594 A or VW 1594 Adaptor kit

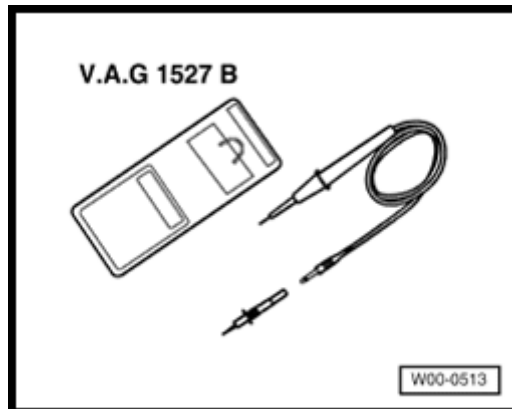


A

- ◆ V.A.G 1527 B Voltage Tester

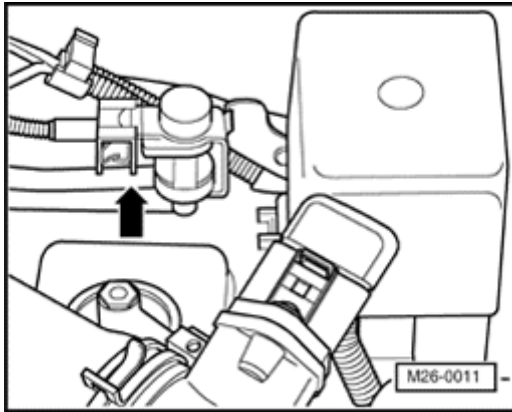
Checking requirements

- Engine oil temperature 5 to 33 °C
- Secondary Air Injection pump motor -V101- OK ⇒ [Page 26-30](#)





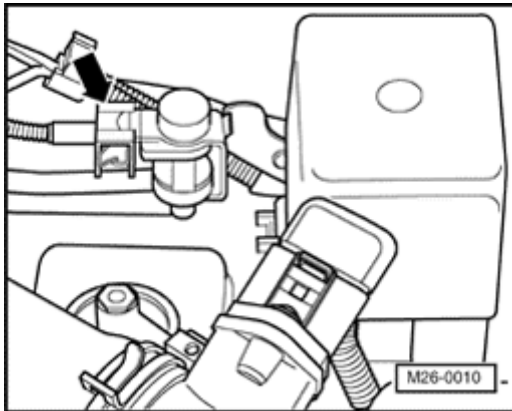
Test sequence

**A**

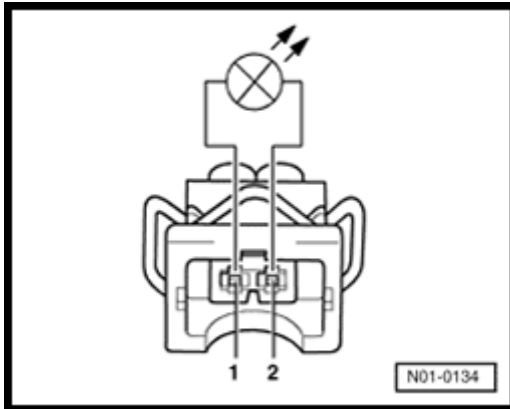
- Pull vacuum hose (arrow) off Secondary Air Injection solenoid valve -N112- -1-.
- Start engine and let run at idle.
 - When Secondary Air Injection pump motor -V101- runs, intake manifold vacuum must be perceptible at disconnected vacuum port.

If no vacuum perceptible:

- Switch engine OFF.

**A**

- Disconnect 2-pin harness connector from Secondary Air Injection solenoid valve -N112- (arrow).



A

- Connect V.A.G 1527 B Voltage Tester to disconnected connector using jumper wires from VW 1594 Adaptor kit.
- Start engine and let idle.
 - LED must light up.

LED lights up (voltage supply OK):

- Replace Secondary Air Injection solenoid valve -N112- ⇒ [Page 26-25](#) (item 2).

If LED does not light up:

- Connect 2-pin harness connector.
- Perform output diagnostic test and check activation of Secondary Air Injection solenoid valve N112

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

- Check Diagnostic Trouble Code (DTC) memory:

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)

- Display Readiness code:

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\):](#)

AEG, Repair Group 01



- Readiness code must be reset if ECM is subject to low voltage with ignition ON or if DTC memory is erased.

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 01](#)



Combi-valve, removing and installing

Special tools

- ◆ V.A.G 1331 Torque wrench 5 to 50 Nm (3.7 to 37 ft lb), or equivalent
- ◆ VAS 5085 conductor

Note:

- ◆ *Always replace all seals and gaskets*
- ◆ *A second technician is required for installation.*

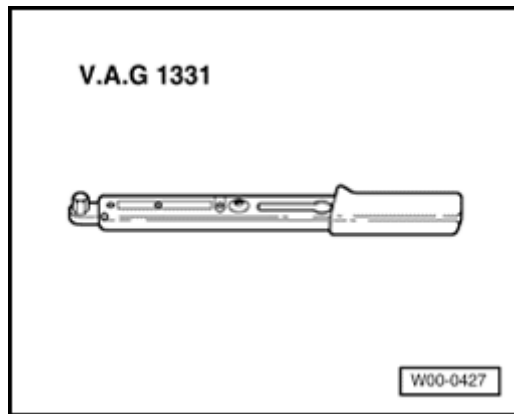
Removing

- Remove engine cover.
- Remove intake hose between Air Cleaner and Secondary Air Injection pump motor -V101-.

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AEG, Repair Group 24](#)

⇒ [Repair Manual, 2.0 Liter 4-Cyl. 2V Fuel Injection & Ignition, Engine Code\(s\): AVH, Repair Group 24](#)

- Remove pressure hose between Secondary Air Injection pump motor -V101- and combi-valve from combi-valve.



**Note:**

Press together at end to release.

- For engine code AEG remove vacuum hose from combi-valve.

- Loosen sealing nuts on connecting pipe.

- Remove protective cover for right drive shaft.

- Unscrew connector pipe from exhaust manifold.

- Unscrew combi-valve using ratchet handle and 4 mm allen socket.

Installing

- Thread front bolts through warm air collector plate from below using tool.

- Second technician stops fasteners turning from above.

- Install 4 mm inner hex with ratchet handle in screw head.
- Have second technician position combi-valve from above and also guide it during fastening of second bolt.

Tightening torque: 10 Nm (7 ft lb)

Note:

Assembly is the reverse of the disassembly procedure.

◆ Tightening torques ⇒ [Page 26-24](#)