

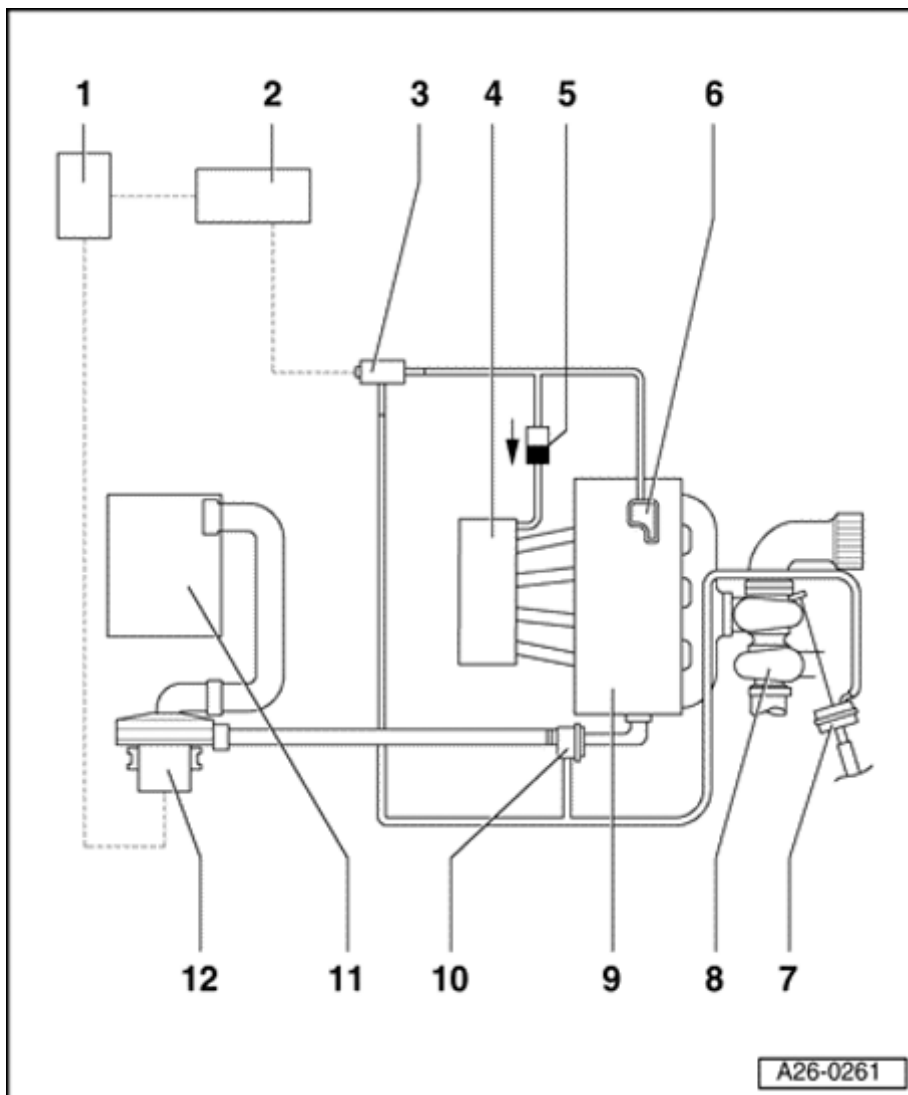
## Secondary Air Injection (AIR) system, checking

The Secondary Air Injection (AIR) system causes the catalytic converter to heat up more quickly, resulting in earlier operating readiness following cold start.

### Principle

Due to over-enrichment of the mixture during the cold start phase, there is an increased amount of uncombusted carbon monoxide in the exhaust. Secondary Air Injection (AIR) improves secondary oxidation in the catalytic converter and therefore reduces emissions. The heat produced by secondary oxidation greatly reduces start-up

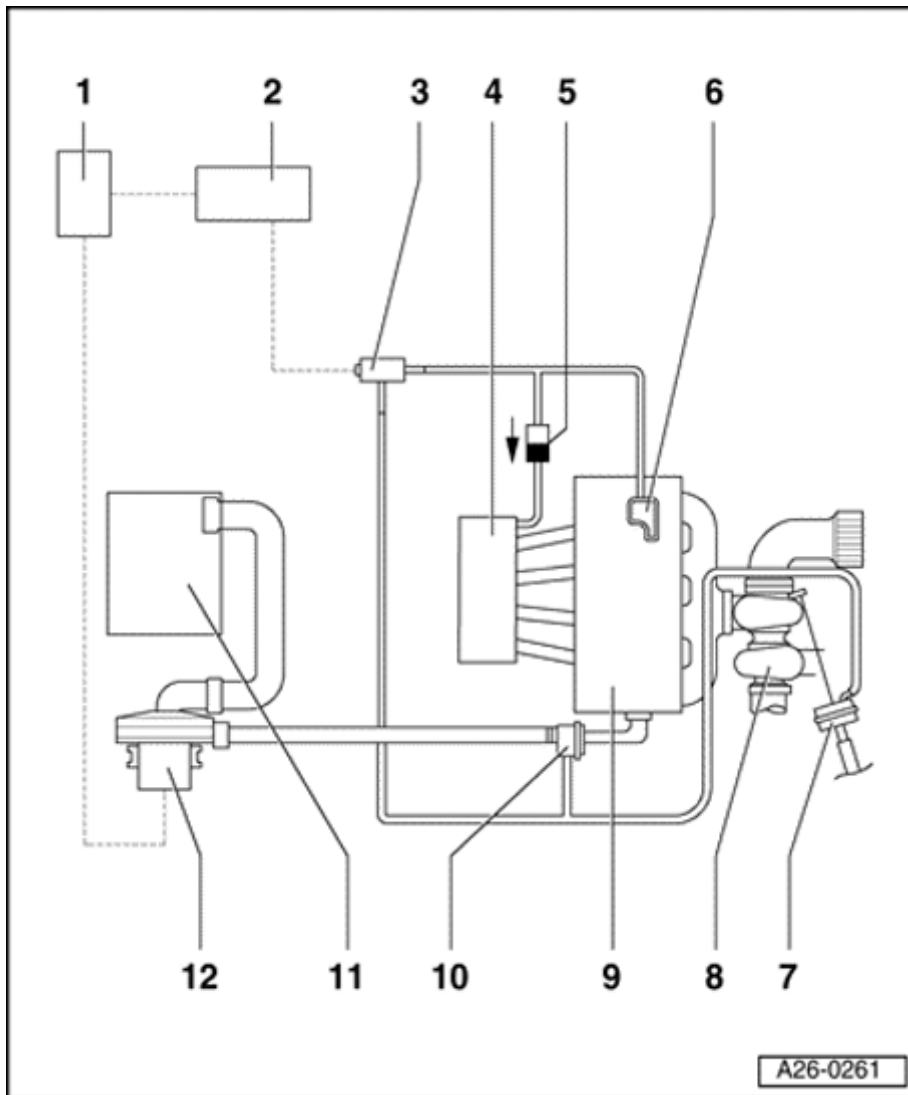
time for the catalytic converter, therefore improving exhaust quality during the cold start phase significantly.



### Function

- ◆ In the cold start phase, the ECM -2- activates the secondary air pump -12- via the relay for Secondary Air Injection (AIR) pump -1-. Air reaches the combination valve for Secondary Air Injection (AIR) -10-. The Secondary Air Injection (AIR) valve -3- is activated in parallel, which allows the vacuum to reach the combination valve for Secondary Air Injection (AIR) -10- and the vacuum diaphragm for charge air pressure regulation -7-. The combination valve for Secondary Air Injection (AIR)

thereby  
opens the  
path for  
secondary  
air to the  
exhaust  
channels of  
the cylinder  
head.

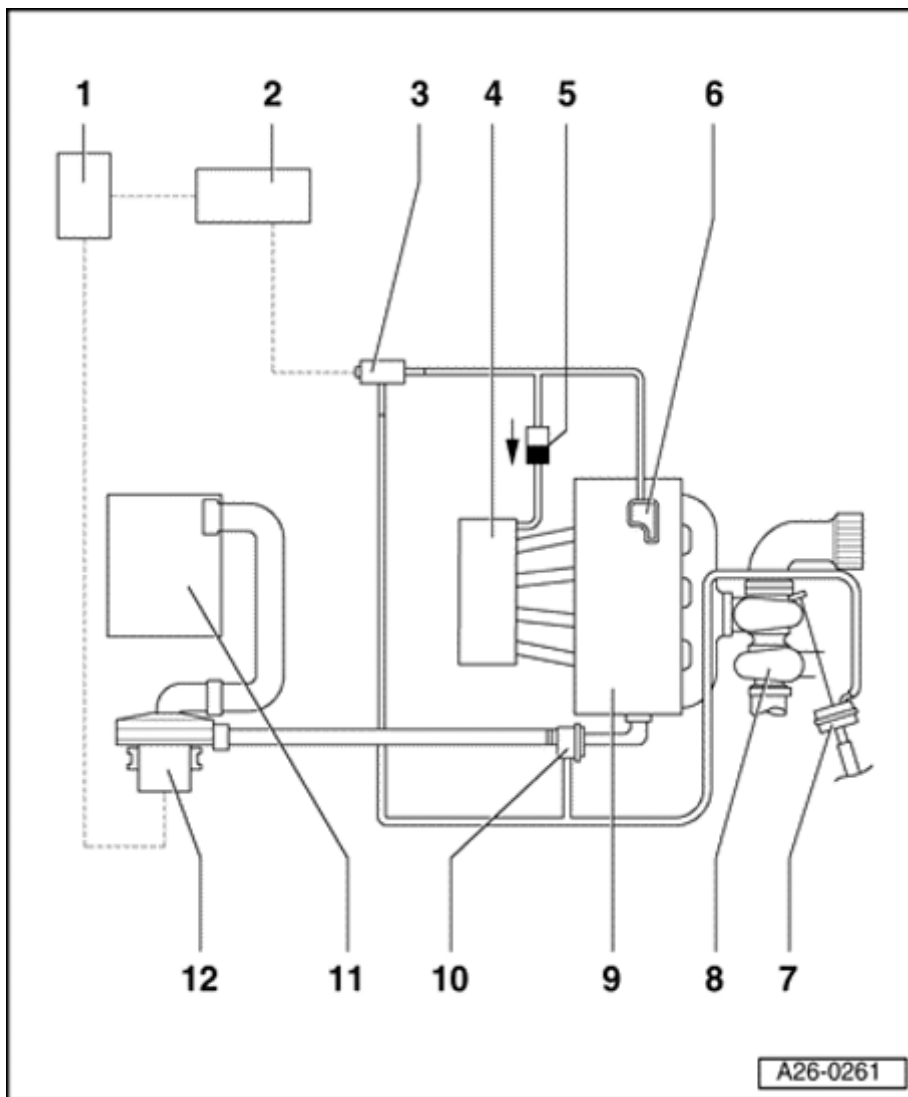


◆ To prevent unnecessary heating, secondary air is diverted passed the turbocharger -8-. For this, the charge air pressure regulation pressure unit opens the charge air pressure valve. The pressure unit, designed as a double reservoir, has a vacuum connection for this on the intake side.

- 1 - Secondary Air Injection (AIR) pump relay- J299-**
- 2 - Motronic Engine Control Module (ECM) - J220-**
- 3 - Secondary Air Injection (AIR) solenoid valve - N112 ➡-**

**4 - Intake  
manifold**

26-32



**5 - Check-valve**

- ◆ Installed position (light/dark half): Arrow points in direction of flow, as shown in figure.

**6 - Vacuum reservoir**

**7 - Pressure unit for charge air pressure regulation**


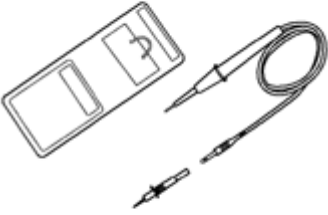
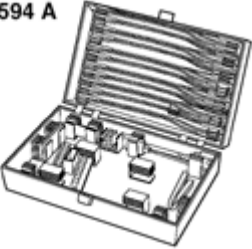

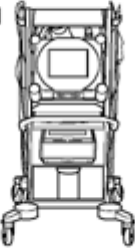
**8 - Turbocharger**

**9 - Cylinder head**

**10 - Combination-valve for secondary air injection (AIR)**

**11 - Air filter housing**

**12 - Secondary Air Injection (AIR) pump motor - V101-**

<p>V.A.G 1526 A</p> 	<p>V.A.G 1527 B</p> 
<p>V.A.G 1594 A</p> 	<p>V.A.G 1598/31</p> 
<p>VAS 5051</p> 	<p>G24-0023</p>

**Secondary Air Injection (AIR) solenoid valve -**  
 ← N112 → -,  
**checking**

**Special tools and equipment**

- ◆ VAG1526A
- ◆ VAG1527B
- ◆ VAG1594A
- ◆ VAG1598/31
- ◆ VAS5051
- or
- ◆ VAG1551 with VAG1551/3A







Component location ⇒ Overview of component locations

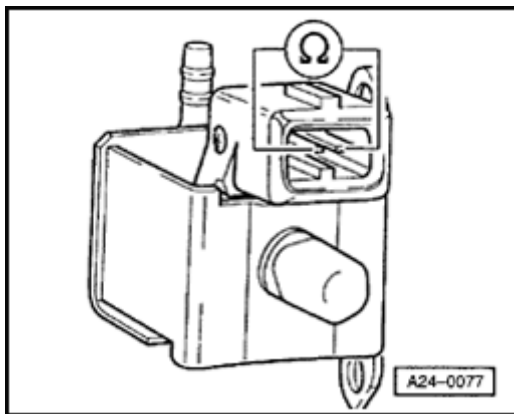
⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Injection & Ignition, Engine Code\(s\): AMU, Repair Group 24, Fuel preparation, injection](#)

### Test requirement:



- Output Diagnostic Test Mode (DTM) performed

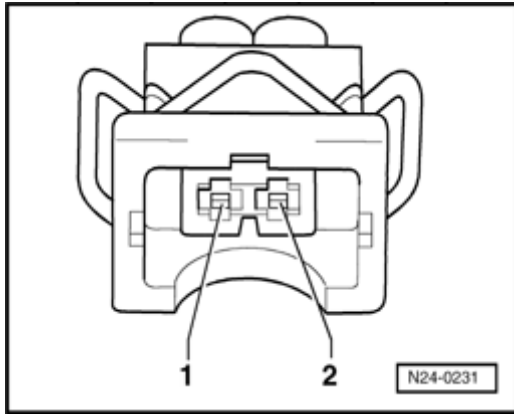
### Checking internal resistance

- Disconnect harness connector from Secondary Air Injection (AIR) valve -  N112  -.
- Connect multimeter at valve for resistance measurement.
  - ◆ Specified value: 25 - 35 Ω
- If specified value is not obtained, replace Secondary Air Injection (AIR) solenoid valve  N112  -.



### Checking voltage supply

- Disconnect harness connector from Sec Air Injection (AIR) valve -  N112  -.



- Connect VAG1527B voltage tester as foll

Harness connector terminal	Measure to
1	Engine Ground (GN

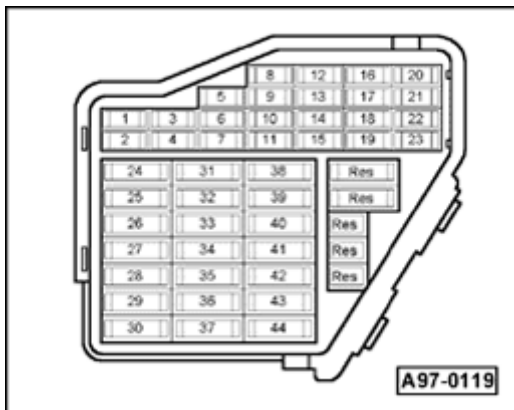
- Operate starter briefly (engine can also s
  - ◆ LED must light up.

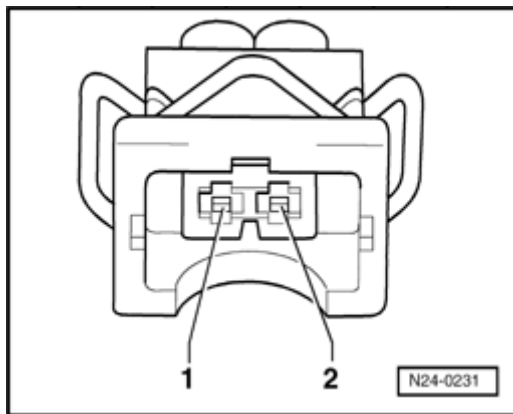
If LED does not light up:

- Perform the following tests marked with c



- Check fuse -S243- (in fuse holder, posit





- Check wire connection from terminal 1 of connector via fuse - S243- (in fuse holder, socket 43) to Fuel Pump (FP) relay for open circuit:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

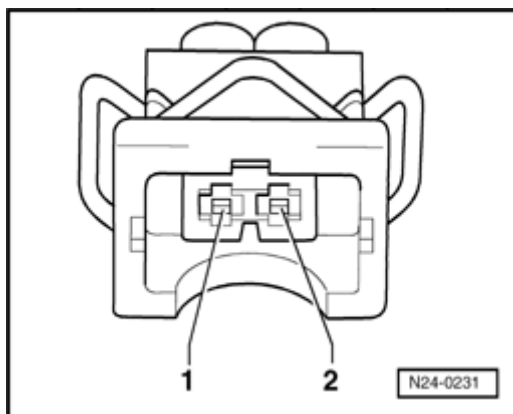
- Check Fuel Pump (FP) relay



⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code\(s\): AMU, Repair Group 24, Fuel preparation, injection](#)

#### Checking activation

- Connect VAG1527B voltage tester as follows:

Harness connector terminal	Measure to
2	B+



- Initiate output Diagnostic Test Mode (DT) activate Secondary Air Injection (AIR) solenoid valve -  N112  -

⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turb Injection & Ignition, Engine Code\(s\): AMU, Repair Group 24, Fuel preparation, injection](#)

Output Diagnostic Test Mode



Secondary air injection solenoid valve -



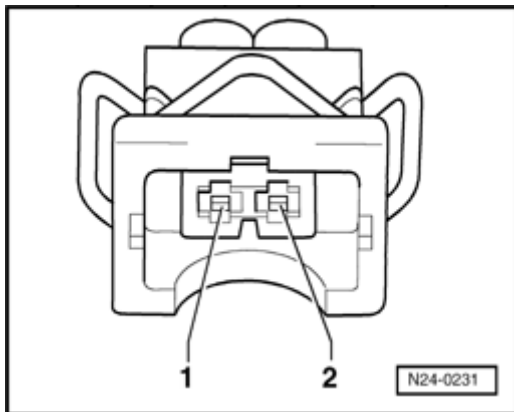
Indicated on display

- ◆ LED must blink.

If LED does not blink or if it remains constant

- Connect VAG1598/31 test box at wiring to ECM, do not connect ECM.

⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turb Injection & Ignition, Engine Code\(s\): AMU, Group 24, Fuel preparation, injection](#)

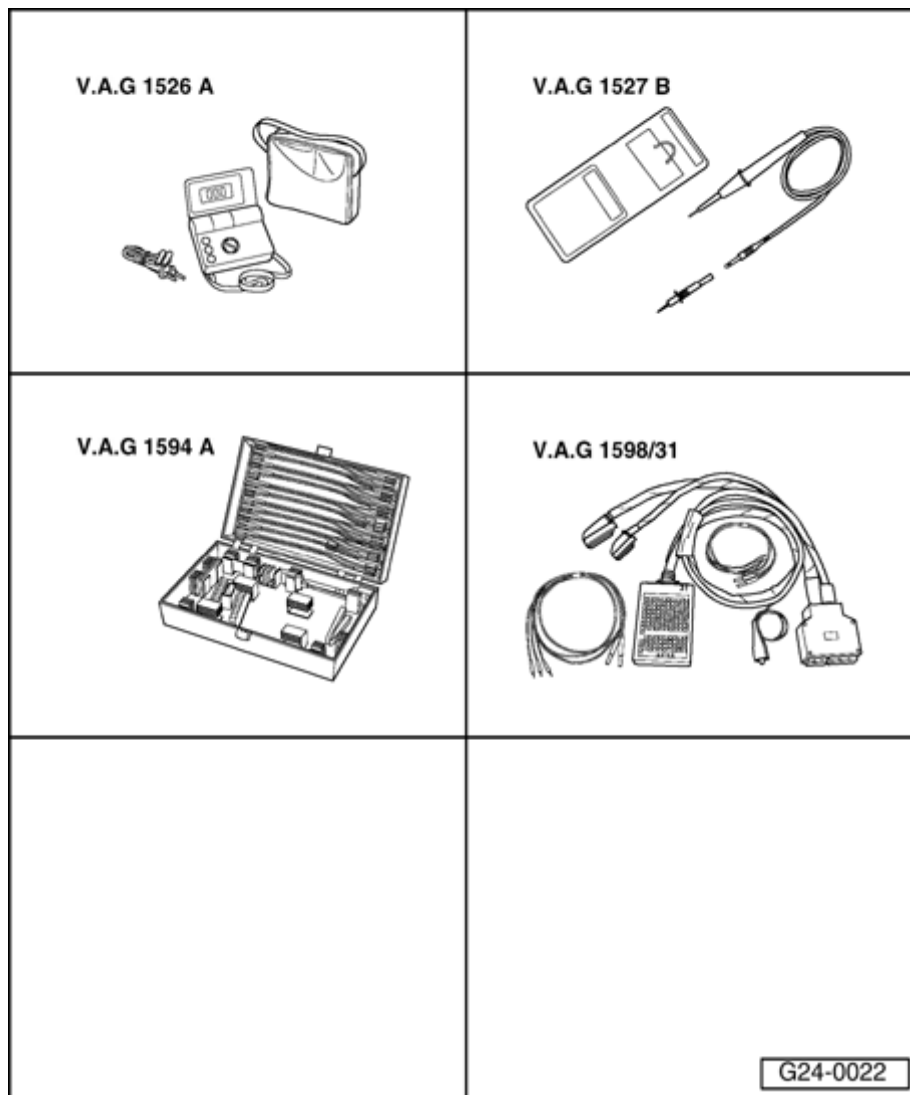


- Check the following wire connections for correct circuit and short circuit to Ground (GND)

Harness connector terminal	VAG 1598/31 test box Bushing
2	9

- Repair open circuit or short circuit if necessary
- If wire connection is OK: Replace Engine Control Module (ECM)

⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turb Injection & Ignition, Engine Code\(s\): AMU, Group 24, Fuel preparation, injection](#)



## Secondary Air Injection (AIR) pump relay -J299- and activation, checking

### Special tools and equipment

- ◆ VAG1526A
- ◆ VAG1527B
- ◆ VAG1594A
- ◆ VAG1598/31

Component location ⇒ Overview of component locations

⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code\(s\): AMU, Repair Group 24, Fuel preparation, injection](#)

- Initiate output Diagnostic Test Mode (DTM) and activate Secondary Air Injection (AIR) pump relay -J299-

⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code\(s\): AMU, Repair Group 24, Fuel preparation, injection](#)

- ◆ Secondary Air Injection (AIR) pump relay (under cover, left at bulkhead) must trigger and the Secondary Air Injection (AIR) pump motor -V101- must run.

A - If relay does not trigger:

- Check voltage supply of the Secondary Air Injection (AIR) pump relay ⇒ [Page 26-40](#) .
- Check activation of the Secondary Air Injection (AIR) pump relay ⇒ [Page 26-42](#) .

B - If relay triggers, but Secondary Air Injection (AIR) pump does not run:

- Check voltage supply of the Secondary Air Injection (AIR) pump motor ⇒ [Page 26-43](#) .

### Checking voltage supply of Secondary Air Injection (AIR) pump relay

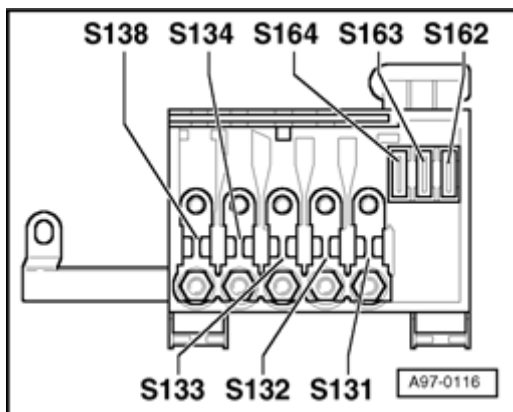
- Switch ignition off.
- Remove Secondary Air Injection (AIR) pump relay
- Connect multimeter for voltage measurement follows:

Relay carrier below cover, left at bulkhead terminal	Measure
1	Engine Control (GNI)

- ◆ Specified value: approx. battery voltage

If specified value is not obtained:

- Perform the following tests marked with c
- Check fuse -S131- (50 A) in main fuse box/battery.
- Check wire connection from B+ (terminal fuse -S131- for Secondary Air Injection pump relay -J299- (below cover, left at bulkhead) for open circuit.



⇒ *Electrical Wiring Diagrams, Troubleshooting Component Locations*

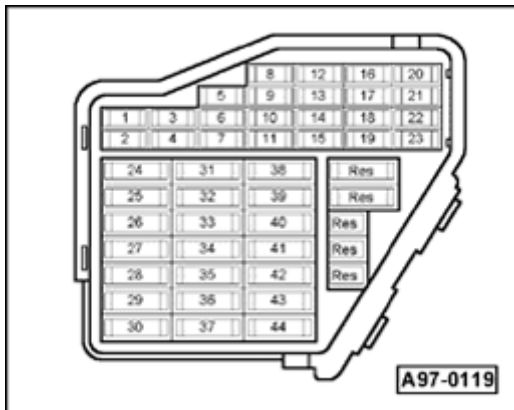
- Connect multimeter for voltage measurement follows:

<b>Relay carrier below cover, left at bulkhead terminal</b>	<b>Measure</b>
3	Engine C (GNI

- Operate starter briefly (engine can also start)
  - ◆ Specified value: approx. battery voltage

If specified value is not obtained:

- Perform the following tests marked with c



- Check fuse -S243- (in fuse holder, position 3)
- Check wire connection from B+ (terminal 30) to fuse -S131- for Secondary Air Injection pump relay -J299- (below cover, left at bulkhead) for open circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting Component Locations*



### Check activation of the Secondary Air Injection (AIR) pump relay

- Switch ignition off.
- Remove Secondary Air Injection (AIR) pump relay
- Connect multimeter for voltage measurement as follows:

Relay carrier below cover, left at bulkhead terminal	Measure to
4	B+

- Initiate output Diagnostic Test Mode (DTM) and activate Secondary Air Injection (AIR) pump relay -J299-

⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code\(s\): AMU, Repair Group 24, Fuel preparation, injection](#)

◆ Specified value: approx. battery voltage

If specified value is not obtained:

- Switch ignition off.
- Connect VAG1598/31 test box at wiring harness to ECM, do not connect ECM.

⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code\(s\): AMU, Repair Group 24, Fuel preparation, injection](#)

- Check the following wire connection for open circuit and short circuit to Ground (GND) and B+:

<b>Relay carrier below cover, left at bulkhead</b>	<b>VAG 1598/31 testing box</b>
<b>terminal</b>	<b>Bushing</b>
4	66

- Repair open circuit or short circuit if necessary.

If no malfunctions are detected:

- Replace Secondary Air Injection (AIR) pump relay -J299-.

#### **Check voltage supply of the Secondary Air Injection (AIR) pump motor**

- Remove connector for Secondary Air Injection (AIR) pump motor -V101-.
- Connect VAG1527B voltage tester between terminals 1 and 2
- Initiate output Diagnostic Test Mode (DTM) and activate Secondary Air Injection (AIR) pump relay -J299-

⇒ [Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code\(s\): AMU, Repair Group 24, Fuel preparation, injection](#)

◆ LED must light up.

If LED does not light up:

- Perform the following tests marked with dots:

- Check wire connection from connector at Secondary Air Injection (AIR) pump motor - V101- to Secondary Air Injection (AIR) pump relay -J299- (in relay carrier below cover, left at bulkhead) for open circuit:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Check wire connection from connector at Secondary Air Injection (AIR) pump motor - V101- to Ground (GND) point in engine compartment, left, for open circuit:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

If no malfunctions are detected:

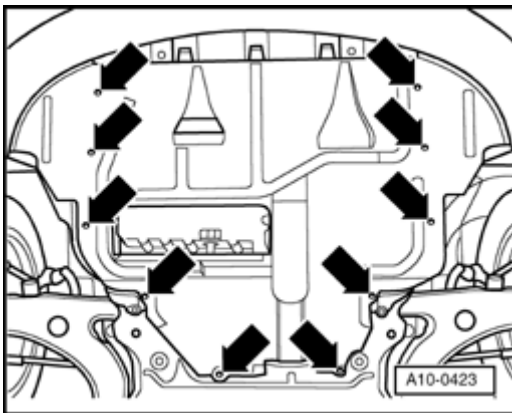
- Replace Secondary Air Injection (AIR) pump motor -V101-.

## Secondary air system components, removing and installing

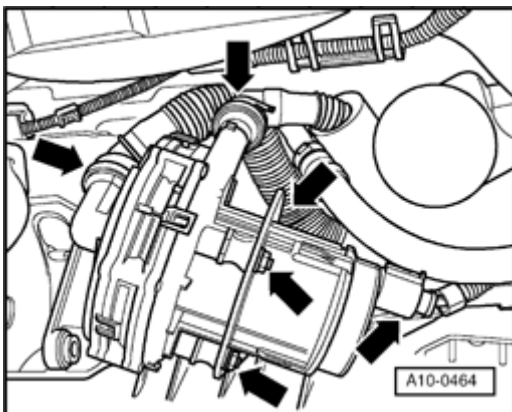
- Testing secondary air system

⇒ [Repair Manual. 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code\(s\): AMU](#)

### A- Secondary air pump motor

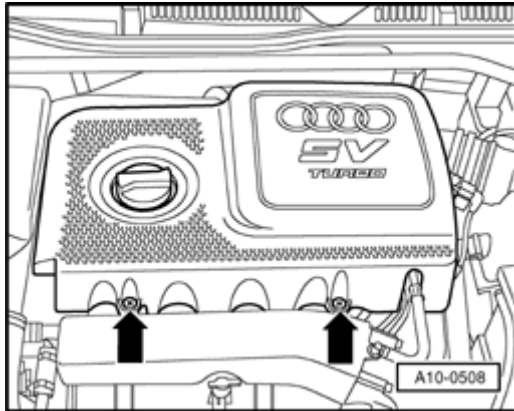


- ✦ - Remove center section of noise insulation.

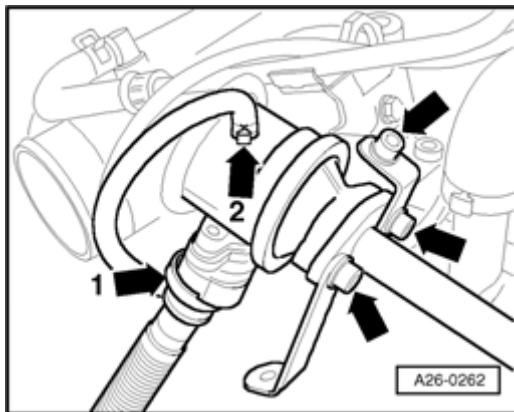


- ✦ - Disconnect hoses and connectors on secondary air pump
- Remove secondary air pump

## B- Mechanical secondary air valve (combination valve)



- ✦ - Remove engine cover panel.



- ✦ - Disconnect vacuum hose -1- and connecting pipe -2- at combination valve.
- Unbolt combination valve from bracket -arrows-.