- **Exhaust system components, removing and installing**
- Catalyst, checking
- Exhaust manifold, front exhaust pipe and catalyst with attachments
- Silencer with mountings
- **Secondary air system**
- Combi-valve, checking
- Combi-valve, removing and installing
- Function
- Secondary air inlet valve, checking
- Secondary air pump motor, checking
- Secondary air system components, removing and installing
- Secondary air system, overview
Notes:

- After working on the exhaust system ensure that the system is not under stress, and that it has sufficient clearance from the bodywork. If necessary, loosen double and single clamps and align silencer and exhaust pipe so that sufficient clearance is maintained to the bodywork and the support rings are evenly loaded.

- Replace self-locking nuts.

Checking catalyst ⇒ Page 26-9

Special tools and equipment

- 3337 Ring spanner for Lambda probe
Exhaust manifold, front exhaust pipe and catalyst with attachments

1 - Turbocharger
2 - Gasket for front exhaust pipe
   - Replace
3 - Front exhaust pipe with catalyst
4 - Lambda probe 1 in front of catalyst (G39), 50 Nm
   - Grease only the threads with "G 052 112 A3;" "G 052 112 A3" must not get into the slots on the probe body
   - Remove and install with ring spanner 3337
   - Checking:
Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 24
5 - 6 - pin connector
- Black
- For Lambda probe 1 before catalyst (G39) and Lambda probe heating (Z19)
- Right on underside of vehicle

6 - 4 - pin connector
- Brown
- For Lambda probe 2 after catalyst (G130) and Lambda probe heating (Z29)
7 - Lambda probe 2 after catalyst (G130), 50 Nm
- Fitting location: in catalyst
- Grease only the threads with "G 052 112 A3;" "G 052 112 A3" must not get into the slots on the probe body
- Remove and install with ring spanner 3337
- Checking:
  ⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 24

8 - To center silencer

9 - 40 Nm
- Replace
Silencer with mountings

1 - From catalyst
2 - Double clamp
   - Note installation position ⇒ Fig. 1
3 - 25 Nm
4 - Mounting
   - Note installation position ⇒ Fig. 2
5 - Center silencer
   - Aligning ⇒ Fig. 4
6 - Separating point

- As standard, center and rear silencers are installed as a single component. In cases of repair the center and rear silencer are supplied individually and with a double clamp for connecting.
- Cut through connecting pipe with body saw e.g. V.A.G 1523 at right angles at the separating point ⇒ Fig. 3

7 - Mounting

8 - Bracket

9 - Rear silencer

10 - Mounting

- With retaining ring
11 - 20 Nm
12 - Tunnel bridge
13 - 40 Nm
14 - Washer
Fig. 1 Checking installation position of double clamp
- Position double clamp with approx. 5 mm clearance to the appropriate marking.
  - Marking A ( - arrow 1 - ) for vehicles with automatic gearbox
  - Marking S ( - arrow 2 - ) for vehicles with manual gearbox

Fig. 2 Installation position of mounting
- Angled side on foot of mounting ( - arrow - ) points forward.
Fig. 3 Separating point on exhaust pipe
- Separate exhaust pipe at right angles at separating point - arrow 2 - .
- When installing fit repair type double clamp - 4 - at side markings - arrows 1 and 3 - .
- Tightening torque: 40 Nm

Fig. 4 Aligning central silencer stress free
- The support pin on exhaust pipe must align parallel with tunnel bridge (dimension - x - on left and right the same).
Catalyst, checking

Special tools and equipment
- V.A.G 1551 Fault reader

Notes:
The vehicle system tester V.A.G 1552 can be used instead of the fault reader V.A.G 1551, but a print-out is not possible.
- V.A.G 1551/3 Cable
- V.A.G 1788/10 speed regulator
Test sequence
- Connect fault reader V.A.G 1551 (V.A.G 1552). Start engine and select engine control unit with "Address word" 01. Connecting fault reader and selecting engine control unit:

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01

Notes:
The diagnosis will only be terminated if the Lambda probe ageing diagnosis is first successfully completed.

Work step 5: Lambda probe ageing diagnosis (probe dynamics)

Indicated on display:
- Press keys 0 and 4 for the "Introduce basic setting" function and confirm entry with Q key.

Indicated on display:
- Press keys 0, 3 and 4 for display group number 34 and confirm entry with Q key.
- Maintain the engine speed at 1800-2200 rpm until the display in display zone 4 jumps from "Test OFF" to "Test ON."

- Continue to maintain the speed at 2800-3200 rpm until the specification "Cat B1 OK" appears in display zone 4.

If the diagnosis is initiated from engine control unit the display in display zone 4 jumps from "Test OFF" to "Test ON."

| Display group 34: Lambda probe ageing diagnosis Bank 1 (probe dynamics) | Display zones |
|---|---|---|---|
| Display | xxxx rpm | xxxx °C | xx.xx | Indicated on display: (1-4 – Display zones) |
| Indicated | Engine speed (in steps of 40) | Catalyst temperature | Probe dynamics Bank 1 Lambda probe 1 | Diagnosis condition and diagnosis result |
| Working range | 0-6800 rpm | --- | 0.00-1.99 | --- |
| Specified value | 2280-2760/min | mind. 400°C | > 0.80 | B1-S1 iO |
If the display does not indicate as described:
- Press → key.
- If DTC memory has been erased or the engine control unit separated from the permanent positive, the readiness code must be generated again.

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Repair Group 01

If the display indicates as described:
- Press C key.
Work step 6: Catalyst diagnosis

<table>
<thead>
<tr>
<th>Basic setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input display group number XXX</td>
</tr>
</tbody>
</table>

Indicated on display:
- Press keys 0, 4 and 6 for "display group number 46" and confirm entry with Q key.

<table>
<thead>
<tr>
<th>System in basic setting</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
</table>

Indicated on display: (1-4 = Display zones)
- Continue to maintain the speed at 2800-3200 rpm until the specification "Cat B1 OK" appears in display zone 4.
- Check catalyst conversion (amplitude condition) in display zone 3:
  - Specification: max. 0.50
  - Allow engine to run at increased idling speed until specification: "Cat B1 OK." is displayed in display zone 4.

Notes:
The catalytic converter diagnostic lasts approx. 100 seconds. If no result is displayed within 15 seconds, change RPMs within specified range.
### Display Group 45: Catalyst Diagnosis Bank 1

<table>
<thead>
<tr>
<th>Display zones</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>xxxx rpm</td>
<td>xxxx °C</td>
<td></td>
<td>Test OFF/Test ON Cat B1 OK. Cat B1 n. OK.</td>
</tr>
<tr>
<td>Indicated</td>
<td>Engine speed (in steps of 40)</td>
<td>Catalyst temperature</td>
<td>Catalyst conversion (amplitude condition)</td>
<td>Diagnosis condition and Diagnosis result</td>
</tr>
<tr>
<td>Working range</td>
<td>0-6800 rpm</td>
<td>---</td>
<td>0.00–1.00</td>
<td>---</td>
</tr>
<tr>
<td>Specified value</td>
<td>2230–2760/min</td>
<td>400.0–550.0 °C</td>
<td>Manual transmission: max 0.33 Automatic transmission: max 0.40</td>
<td>Cat B1 iO</td>
</tr>
</tbody>
</table>

If the display does not indicate as described:
- Press → key.
- Check DTC memory:
  ⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
- Read out readiness code:
  ⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
- If DTC memory has been erased or the engine control unit separated from the permanent positive, the readiness code must be generated again.

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01

If the display indicates as described:
- Remove the engine speed adjuster V.A.G 1788/10 from accelerator pedal.
- Press C key.
Function

The secondary air system blows air in behind the exhaust valve for 100 seconds during a cold start (+5°C - +33°C coolant temperature). This produces an oxygen rich exhaust gas, causes afterburning and reduces the heating-up phase of the catalyst. Activation occurs from the Motronic control unit (J220) via the secondary air pump relay (J299) to secondary air inlet valve (N112, change-over valve) and combi-valve.

Additionally, after each subsequent engine start (up to max. 96°C engine temperature), the secondary air system will switch in for 10 seconds during idling and will be checked by the On Board Diagnostic (OBD). When this occurs, the Lambda control must be active.
Secondary air system components, removing and installing

Notes:
- Components marked with an * are checked by the On Board Diagnostic (OBD).
- Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
- Components marked with ** are checked by the Output Diagnostic Test Mode (DTM).
- Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01

1 - Gasket
- Replace
2 - Combi - valve
- Checking ⇒ Page
- Removing and installing ⇒ Page 26-32

3 - Connecting pipe/hose
- To distributor piece at vacuum reservoir on cylinder head cover
4 - Secondary air inlet valve (N112)*/**
- Fastened to cylinder head cover

5 - Connector
- Black, 2 - pin

6 - O - Ring
- Replace if damaged

7 - Secondary air pump relay (J299)*/**
- In relay/fuse box (pushed into cable guide next to brake master cylinder)

8 - Pressure hose
- Ensure seated tightly
Press together at front to release

9 - 10 Nm
10 - Bracket
11 - Retaining clip
12 - Intake hose
   ✦ From upper air filter housing
   ✦ Ensure seated tightly
   ✦ Press together at front to release
13 - Secondary air pump motor (V101)**
   ✦ Checking ⇒ Page 26-23
14 - Bracket
   ✦ For secondary air pump motor
- Secured to intake manifold
15 - 25 Nm
16 - Intake pipe
17 - Cylinder head
Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Secondary air system (Page 26-20)

Secondary air system, overview

1 - Secondary air inlet valve (N112)**
2 - Vacuum reservoir
3 - Recirculating valve for turbocharger (N249)
4 - Non - return valve
5 - Overrun shut - off valve
6 - Brake servo
7 - Air cleaner with air mass meter - G70
8 - Secondary air pump motor (V101)**
9 - Combination valve
10 - Fuel pressure regulator
11 - Intake pipe
Combi - valve, checking

Special tools and equipment

- V.A.G 1390 Hand vacuum pump

Check conditions

- No malfunction stored in DTC memory

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
  - Output Diagnostic Test Mode (DTM) carried out

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
  - Vacuum pipes and hose connections free of leaks
  - Vacuum pipes not blocked/kinked
Test sequence
- Remove engine cover.

- Pull vacuum hose - 1 - off secondary air inlet valve - 2 - (N112).
- Connect hand vacuum pump V.A.G 1390 to vacuum hose - 1 - .

Notes:
Do not use compressed air during the following check!
- Remove pressure hose - arrow - between secondary air pump motor and connecting pipe and blow in with slight pressure.
- Both combi - valves must be closed.

Notes:
Press buttons on hose couplings to do this.
- With slight pressure, blow into pressure hose (arrow).
- Combi - valve must be closed.
- Operate hand vacuum pump.
- Combi - valve must open.
If the combi - valve does not open:
- Replace the corresponding combi - valve ⇒ Page 26-32.
Secondary air pump motor, checking

Special tools and equipment
- V.A.G 1527B Diode test lamp
- V.A.G 1594 A Adapter set
- V.A.G 1598/22 Test box
The main fuses must be OK
- The battery voltage must be at least 11.5 V
- Output Diagnostic Test Mode (DTM) carried out

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01

Test sequence
- Remove engine cover.

- Remove pressure hose at motor for secondary air pump (arrow).

Notes:
Press buttons on hose couplings to do this.
- Remove inner plenum chamber cover, left side.

Î Repaire Manual, Body-Interior, Repair Group 68

Â
- Connect test box V.A.G 1598/31 to control unit wiring harness. The engine control unit is not connected by this action.
- Switch ignition on.
- Bridge test box sockets 01 + 50 with aux. cables from V.A.G 1594.
- The secondary air pump motor must run and air must exit the connecting hose.

If the motor runs, but no air exits:
- Switch ignition off.
- Replace secondary air pump motor.

If the secondary air pump motor does not run:
- Pull 2 - pin connector off secondary air pump motor (V101).
- Connect diode test lamp V.A.G 1527B to disconnected connector using aux. cables from V.A.G 1594.
- The LED must light up.

LED lights up (voltage supply OK):
- Switch ignition off.
- Replace secondary air pump motor.

LED does not light up:
- Reconnect 2-pin connector.
- Initiate the output Diagnostic Test Mode (DTM) and activate the activated charcoal filter solenoid valve - N80.

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
- Check DTC memory.

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Secondary air system (Page 26-27)

- Read out readiness code.

⇒  Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01

- If the fault memory has been erased or the engine control unit separated from the permanent positive, the readiness code must be generated again.

⇒  Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
Secondary air inlet valve, checking

Special tools and equipment

- Adapter set V.A.G 1594
- Diode test lamp V.A.G 1527B

Test conditions
- Engine oil temperature 5-33°C
- Secondary air pump motor OK
Test sequence

- Pull vacuum hose - arrow - off non - return valve - 1 - .
- Start engine and run at idling speed.
- When the secondary air pump motor runs, vacuum must be perceptible at the secondary air inlet valve connection.

If no intake manifold vacuum is perceptible:
- Switch ignition off.

- Pull 2 - pin connector off secondary air inlet valve.
- Using aux. cables from V.A.G 1594 connect diode test lamp V.A.G 1527B to disconnected connector.
- Start engine and run at idling speed.
- The LED must light up.

LED lights up (voltage supply OK):
- Switch ignition off.
- Replace secondary air inlet valve.

LED does not light up:
- Connect 2-pin harness connector.
- Initiate the output Diagnostic Test Mode (DTM) and activate the activated charcoal filter solenoid valve - N80.

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
- Check DTC memory.

⇒ Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
- Read out readiness code.

  ⇒  Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01

- If the DTC memory has been erased or the engine control unit separated from the permanent positive, the readiness code must be generated again.

  ⇒  Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01
Combi - valve, removing and installing

Special tools and equipment

![V.A.G 1331 Torque wrench (5-50 Nm)](image)

**Notes:**

*Always replace all gaskets and O-rings.*

**Removing**

- Remove engine cover.
- Remove intake air hose.

⇒ Repair Manual, *1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition*, Repair Group 24
- Remove pressure hose between combi-valve and secondary air pump at combi-valve.

**Notes:**

*Press buttons on hose couplings to do this.*

- Pull vacuum hose off combi-valve.

- Unbolt combi-valve. For this, use flexible insert and 4 mm - socket head from 3/8" socket set.

**Installing**

The rest of the assembly is basically a reverse of the dismantling sequence.

Tightening torques ⇒ [Page 26-17](#).