Workshop Manual

Audi TT 2007 ➢

Injection and ignition system (6-cyl. 3.2 ltr. 4-valve injection engine)									
Engine ID	BUB	CBR A							

Edition 07.2007

List of Workshop Manual Repair GroupsList of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Repair Group

24 - Mixture preparation - injection

28 - Ignition system

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

Contents

24 – Mixture preparation - injection

1 Safety precautions and rules for cleanliness

1.1 Safety precautions

Observe the following to prevent injuries to persons and damage to the injection and ignition system:

- Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- Always switch off ignition before washing engine.
- Faults are stored in engine control unit if electrical connectors have been unplugged:

– With ignition switched off, connect vehicle diagnostic, testing and information system -VAS 5051B- .

– Start “Guided Functions” mode.

– Generate readiness code in engine control unit.

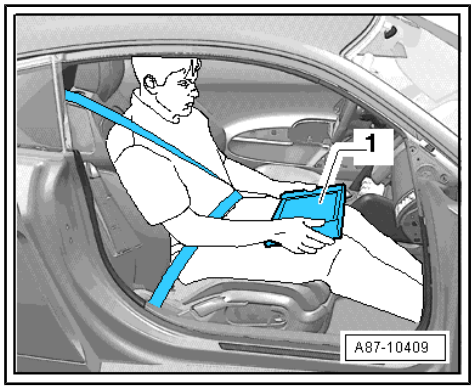
> **Caution**
>
> *To prevent damage to the electronic components when disconnecting the battery:*
>
> - *Observe notes on procedure for disconnecting the battery.*
> - *Always switch off the ignition before disconnecting the battery.*

– Disconnect battery ⇒ Rep. Gr. 27 .

When working on the fuel system note the following warnings:

> **WARNING**
>
> *Risk of injury - fuel system operates under high pressure.*
>
> - *Wrap a cloth around the connection before opening the fuel system. Then release pressure by carefully loosening the connection.*

Note the following if testers and measuring instruments have to be used during a road test:



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Injuries can also be caused if the passenger's airbag is triggered in a collision.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*

TT Coupé:

Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.

TT Roadster:

- *Move the passenger's seat back as far as it will go.*
- *Use only vehicle diagnosis and service information system -VAS 5052- or diagnosis system -VAS 5053- .*
- *The test equipment -1- must rest flat on the passenger's thighs (as shown in illustration) and must be operated by the passenger.*

1.2 Rules for cleanliness when working on fuel supply system and injection system

Even small amounts of dirt can cause malfunctions. For this reason, please observe the following rules when working on the fuel supply system and injection system:

- Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- Seal off open lines and connections with clean plugs or sealing caps immediately.
- Place parts that have been removed on a clean surface and cover them over. Use only lint-free cloths.
- Carefully cover or seal open components if repairs cannot be carried out immediately.
- Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).
- When the system is open: Do not work with compressed air. Do not move the vehicle unless absolutely necessary.
- Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

2 Injection system

2.1 Test data

Engine data		3.2 ltr. / 4V / 184 kW engine
Idling speed Cannot be adjusted; regulated by idling speed stabilisation		600 ... 700 rpm[1)]
Maximum rpm governed by deactivation of fuel injectors		approx. 6,500 rpm
Fuel pressure at idling speed		approx. 4.0 bar
Residual pressure after 10 minutes		at least 3.0 bar
Injectors	Spray pattern	Two-hole nozzle / same for all injectors
	Injection quantity (30 sec.)	128 … 140 ml

• [1)] Current values ⇒ Data sheets for exhaust emission test.

2.2 Overview of fitting locations

1 - 3-pin connector

- ❑ For knock sensor 1 - G61-
- ❑ Fitting location ⇒ page 9

2 - Knock sensor 1 -G61-

- ❑ Fitting location ⇒ page 9

3 - Activated charcoal filter solenoid valve 1 -N80-

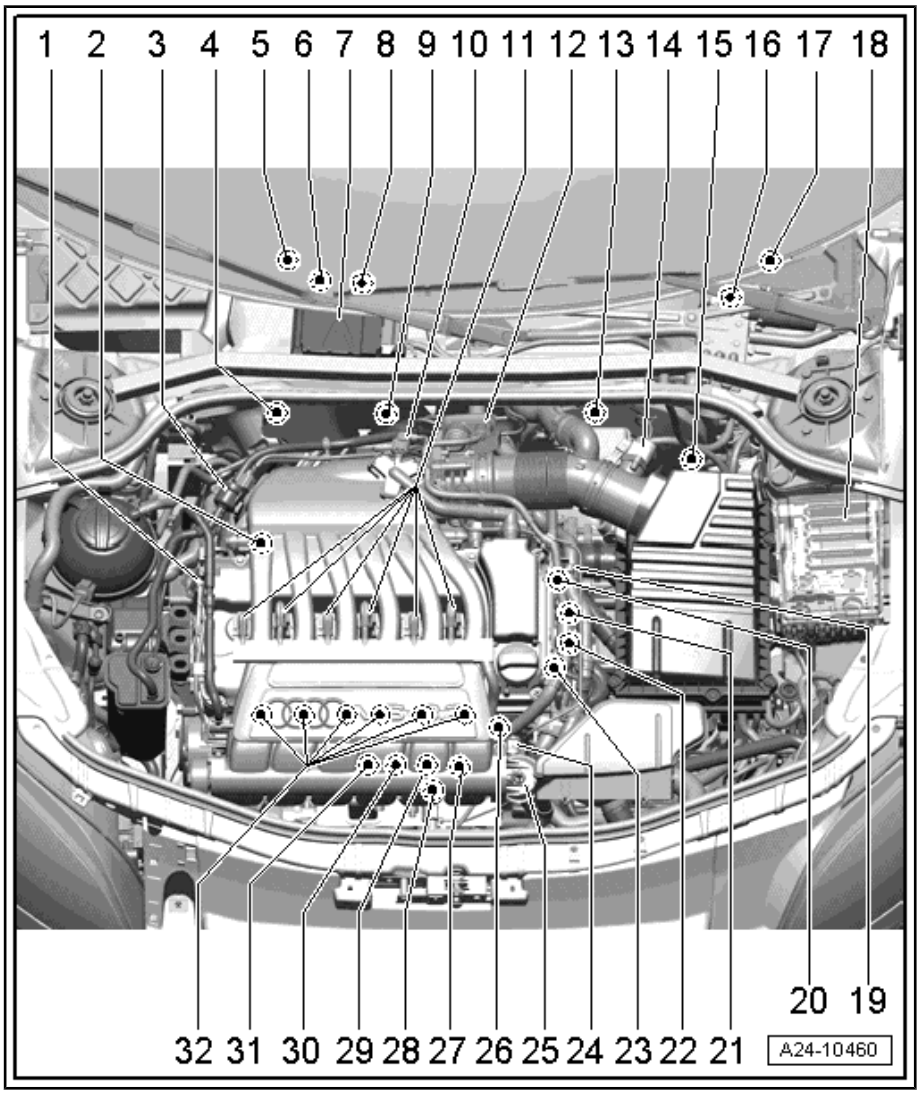
4 - Lambda probe before catalytic converter -G39- with Lambda probe heater -Z19-

- ❑ Fitting location ⇒ page 7
- ❑ Removing and installing ⇒ page 32

5 - Electrical connectors

- ❑ For Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter -Z29-
- ❑ For Lambda probe 2 after catalytic converter - G131- with Lambda probe 2 heater after catalytic converter -Z30-
- ❑ Fitting location ⇒ page 7

6 - Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalyt-



ic converter -Z29-

- ❑ Fitting location ⇒ page 7
- ❑ Removing and installing ⇒ page 33

7 - Engine control unit -J623-

- ❑ Removing and installing ⇒ page 35

8 - Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-

- ❑ Fitting location ⇒ page 7
- ❑ Removing and installing ⇒ page 33

9 - Lambda probe 2 before catalytic converter -G108- with Lambda probe 2 heater -Z28-

- ❑ Fitting location ⇒ page 7
- ❑ Removing and installing ⇒ page 32

10 - Heating element for crankcase breather -N79-

11 - Ignition coils with output stages

- ❑ Cylinder 1 ignition coil 1 with output stage -N70-
- ❑ Cylinder 2 ignition coil 2 with output stage -N127-
- ❑ Cylinder 3 ignition coil 3 with output stage -N291-
- ❑ Cylinder 4 ignition coil 4 with output stage -N292-
- ❑ Cylinder 5 ignition coil 5 with output stage -N323-
- ❑ Cylinder 6 ignition coil 6 with output stage -N324-
- ❑ Removing and installing ⇒ page 43

12 - Throttle valve module -J338-

- ❑ Including throttle valve drive for electric throttle -G186- , throttle valve drive angle sender 1 for electric throttle -G187- and throttle valve drive angle sender 2 for electric throttle -G188-

13 - Electrical connectors

- ❑ For Lambda probe, before catalytic converter -G39- with Lambda probe heater -Z19-
- ❑ For Lambda probe 2, before catalytic converter -G108- with Lambda probe 2 heater -Z28-
- ❑ Fitting location ⇒ page 6

14 - Air mass meter -G70-

- ❑ Removing and installing ⇒ page 14

15 - Clutch position sender -G476-

- ❑ For vehicles with manual gearbox
- ❑ Fitting location ⇒ page 6 .

16 - Accelerator position sender -G79- and accelerator position sender 2 -G185-

Fitting location ⇒ page 6

17 - Instrument cluster

- ❑ With exhaust emissions warning lamp -K83-

18 - Electronics box in engine compartment

- ❑ With fuel pump relay -J17-
- ❑ With Motronic current supply relay -J271-
- ❑ With secondary air pump relay -J299-
- ❑ Fitting locations ⇒ page 8

19 - Sender 1 for secondary air pressure -G609-

- ❑ Only for engine code CBRA
- ❑ Fitting location ⇒ page 10

20 - Hall sender 2 -G163-

- ❑ Fitting location ⇒ page 9

21 - Exhaust camshaft control valve 1 -N318-

- ❑ Brown connector
- ❑ Fitting location ⇒ page 9

22 - Inlet camshaft control valve 1 -N205-

- ❑ Black connector
- ❑ Fitting location ⇒ page 9

23 - Hall sender -G40-

- ❑ Fitting location ⇒ page 9

24 - Coolant temperature sender -G62-

- ❑ Fitting location ⇒ page 8

25 - Vacuum unit for intake manifold flaps

- ❑ Checking ⇒ page 20
- ❑ Removing and installing ⇒ page 22

26 - Engine speed sender -G28-

- ❑ Fitting location ⇒ page 8

27 - Variable intake manifold change-over valve -N156-

- ❑ Fitting location ⇒ page 8

28 - Secondary air pump motor -V101-

- ❑ Removing and installing ⇒ Rep. Gr. 26

29 - Checking secondary air inlet valve -N112- and secondary air inlet valve 2 -N320-

- ❑ Only for engine code CBRA
- ❑ Fitting location ⇒ page 9

30 - Knock sensor 2 -G66-

- ❑ Fitting location ⇒ page 9

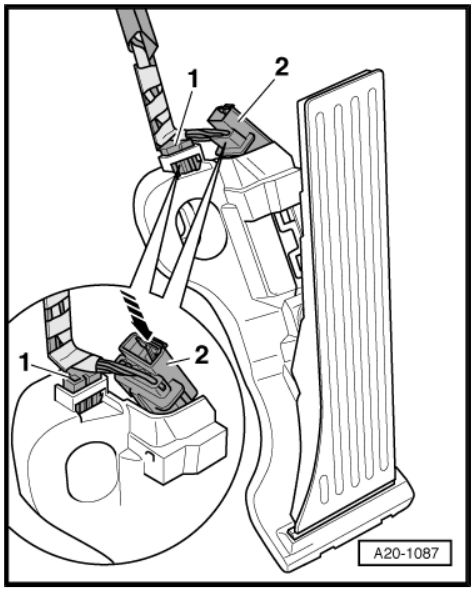
31 - 3-pin connector

- ❑ For engine speed sender -G28-
- ❑ Fitting location ⇒ page 8

32 - Injectors

- ❑ Cylinder 1 injector for cylinder 1 -N30-
- ❑ Cylinder 2 injector for cylinder 2 -N31-
- ❑ Cylinder 3 injector for cylinder 3 -N32-
- ❑ Cylinder 4 injector for cylinder 4 -N33-
- ❑ Cylinder 5 injector for cylinder 5 -N83-
- ❑ Cylinder 6 injector for cylinder 6 -N84-
- ❑ Checking injection quantity and spray pattern; checking for leaks ⇒ page 29
- ❑ Removing and installing ⇒ page 27

Fitting location of accelerator position sender -G79- with accelerator position sender 2 -G185-

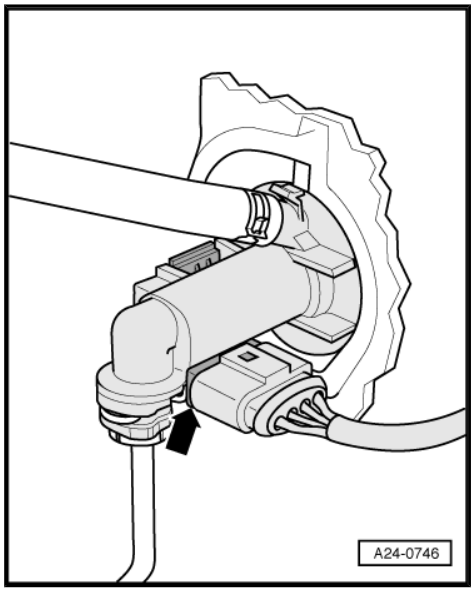


- To unplug the electrical connector -2- press the release tab and pull off the cable guide -1-.
- Removing and installing ⇒ Rep. Gr. 20

Note

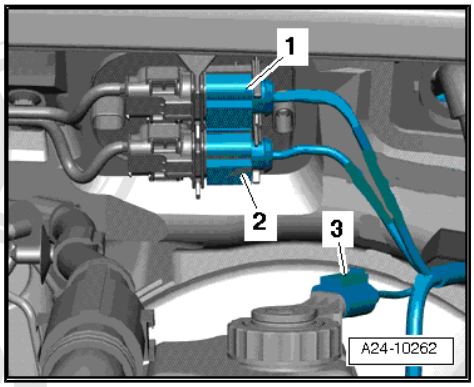
Diagram shows set-up on left-hand drive vehicles.

Fitting location of clutch position sender -G476-



- On clutch master cylinder-arrow-.
- Removing and installing ⇒ Rep. Gr. 30

Fitting location of connectors for Lambda probes before catalytic converter



1 - Lambda probe 2 before catalytic converter -G108- with Lambda probe 2 heater -Z28-

2 - Lambda probe before catalytic converter -G39- with Lambda probe heater -Z19-

Note

Disregard -item 3-.

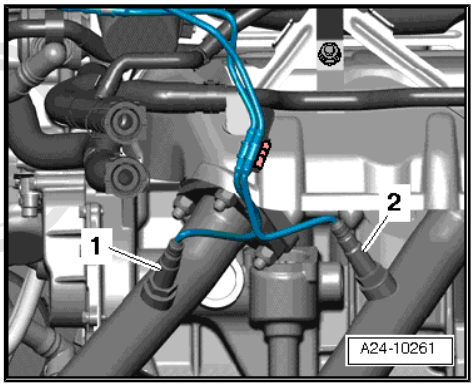
Fitting location and tightening torque of Lambda probes before catalytic converter

♦ In front exhaust pipe

1 - Lambda probe 2 before catalytic converter -G108- with Lambda probe 2 heater -Z28-

2 - Lambda probe before catalytic converter -G39- with Lambda probe heater -Z19-

– Tighten Lambda probes to 55 Nm.



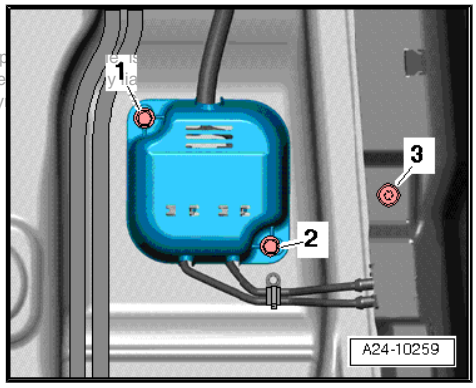
Fitting location of connectors for Lambda probes after catalytic converter

♦ On underside of vehicle (right-side)

– Remove nuts -1- and -2- on retainer for electrical connectors.

Note

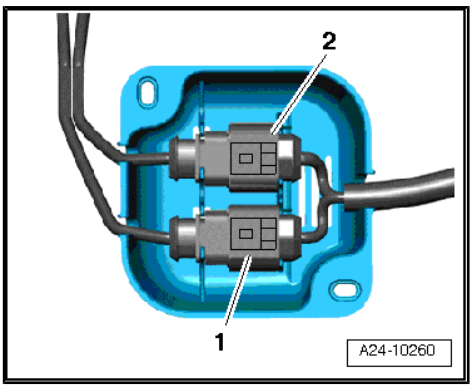
Disregard -item 3-.



– Detach cover.

1 - Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalytic converter -Z29-

2 - Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-



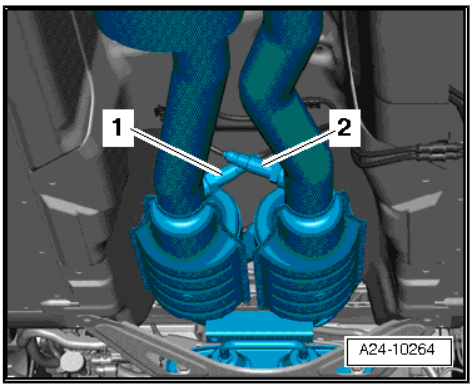
Fitting location and tightening torque of Lambda probes after catalytic converter

♦ In catalytic converters.

1 - Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-

2 - Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalytic converter -Z29-

– Tighten Lambda probes to 55 Nm.



Fitting locations in electronics box in engine compartment

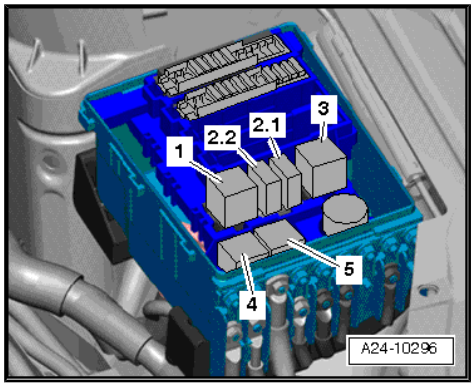
2.1 - Electric fuel pump 2 relay -J49-

2.2 - Continued coolant circulation relay -J151-

3 - Secondary air pump relay -J299-

4 - Motronic current supply relay -J271-

5 - Fuel pump relay -J17-

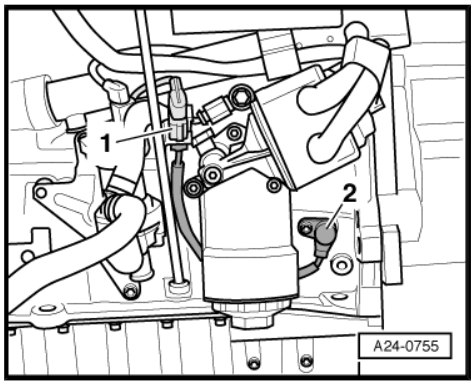


Fitting location: engine speed sender -G28- with 3-pin connector

- At front of engine.

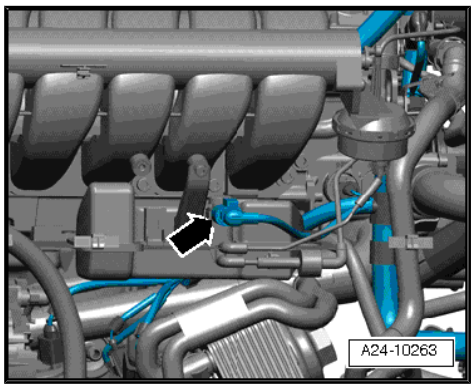
1 - 3-pin connector

2 - Engine speed sender -G28-



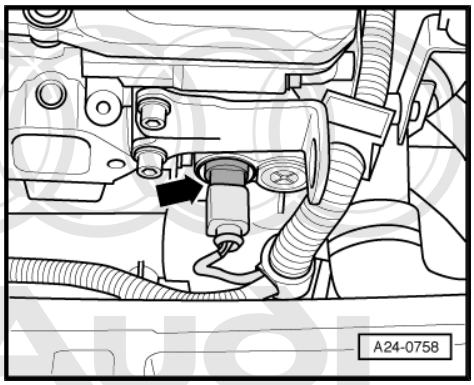
Fitting location of intake manifold change-over valve -N156-

- On vacuum reservoir (at front of engine) -arrow-.



Fitting location of coolant temperature sender -G62-

- At front left of cylinder head -arrow-.
- Removing and installing ⇒ Rep. Gr. 19

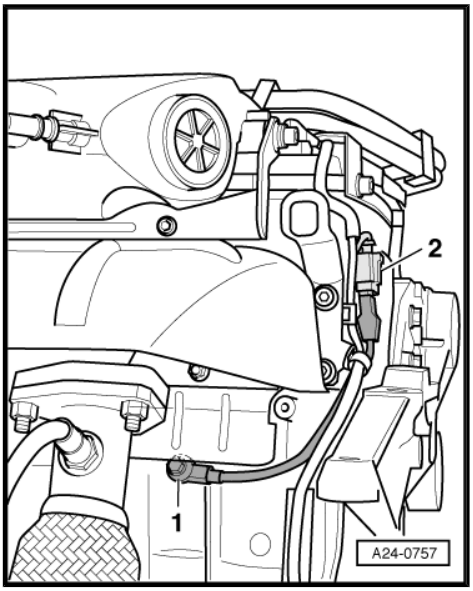


Fitting location of knock sensor 1 -G61-

- At rear right on cylinder block.

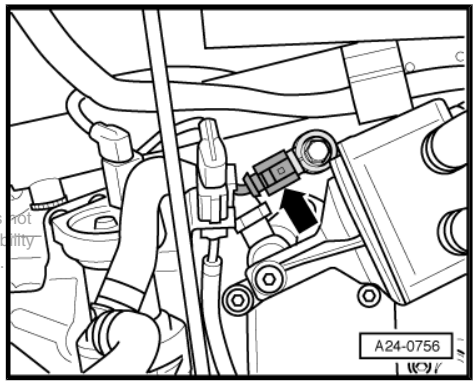
1 - Knock sensor 1 -G61-

2 - 3-pin connector



Fitting location of knock sensor 2 -G66-

- At front of cylinder block -arrow-.



Fitting location of Hall sender and camshaft control valves

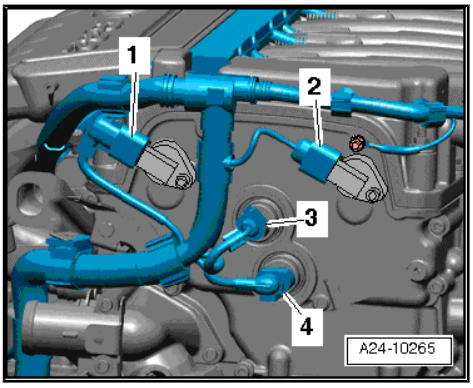
- On left side of cylinder head.

1 - Hall sender -G40-

2 - Hall sender 2 -G163-

3 - Inlet camshaft control valve 1 -N205-

4 - Exhaust camshaft control valve 1 -N318-



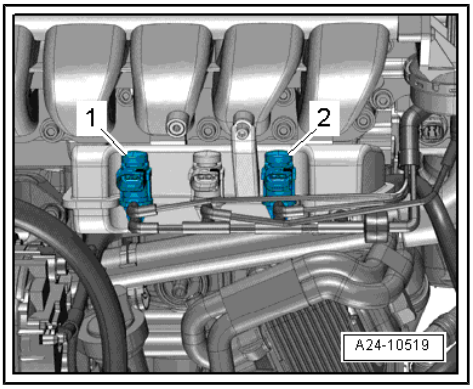
Fitting location of secondary air inlet valves (engine code CBRA)

- At vacuum reservoir (at front of engine)

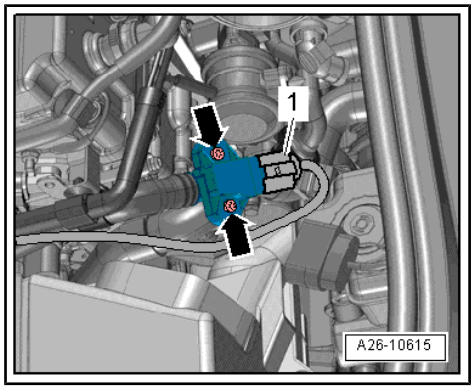
1 - Secondary air inlet valve -N112-

2 - Secondary air inlet valve 2 -N320-

- Removing and installing ⇒ Rep. Gr. 26



Fitting location of sender 1 for secondary air pressure -G609- (engine code CBRA)



- ♦ Near throttle valve module -J338-

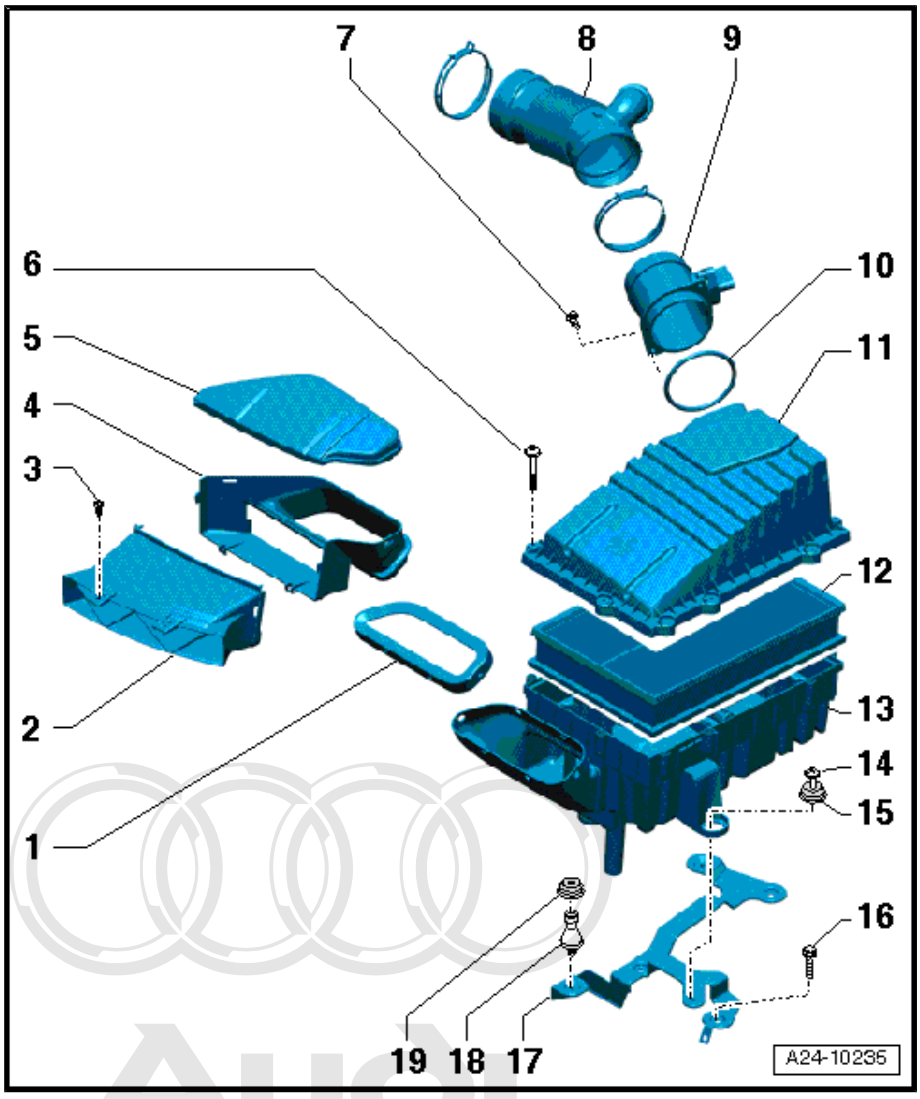
1 - Sender 1 for secondary air pressure -G609-

- ♦ Removing and installing ⇒ Rep. Gr. 26

Note

Disregard -arrows-.

2.3 Air cleaner - exploded view



1 - Gasket

- ❑ Clipped into air cleaner housing (bottom section)

2 - Front air duct

- ❑ Clean out dirt, leaves and salt deposits

3 - Bolt

- ❑ 2 Nm

4 - Lower part of air duct

- ❑ Clean out dirt, leaves and salt deposits

5 - Air duct cover

6 - Bolt

- ❑ 5 Nm

7 - Bolt

- ❑ 3 Nm

8 - Air hose

9 - Air mass meter -G70-

- ❑ Removing and installing ⇒ page 14

10 - Seal

- ❑ Renew if damaged

11 - Air cleaner housing (top section)

- ❑ Removing and installing ⇒ “2.4 Removing and installing air filter element”, page 12

12 - Air filter element

- ❑ Removing and installing ⇒ page 12
- ❑ Always use genuine part for air filter element
- ❑ Observe change intervals ⇒ Maintenance ; Booklet 810

13 - Air cleaner housing (bottom section)

- ❑ Removing and installing ⇒ page 13
- ❑ Clean out dirt, leaves and salt deposits

14 - Bolt

- ❑ 10 Nm

15 - Rubber grommet

- ❑ Captive

16 - Bolt

- ❑ 10 Nm

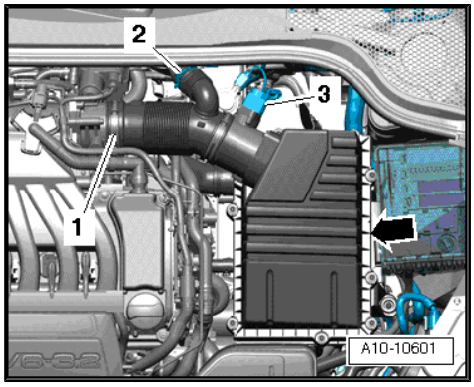
17 - Bracket for air cleaner housing

18 - Retaining peg

- ❑ 10 Nm

19 - Rubber grommet

2.4 Removing and installing air filter element



Removing

– Detach resonance pipe -2- from air intake hose.

– Disconnect air intake hose -1- from throttle valve module -J338- .

– Detach electrical connector -3- for air mass meter -G70- .

– Detach air cleaner housing (top section) -arrow- and take out air filter element.

Installing

• Tightening torque ⇒ page 10 .

Installation is carried out in the reverse order; note the following:

To ensure the proper function of the air mass meter it is important to observe the following notes and instructions.

Note

♦ *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*

♦ *Always use genuine part for air filter element.*

♦ *The air cleaner housing MUST be clean.*

♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

♦ *To prevent malfunctions, cover all critical parts of the engine air intake tract (air mass meter, intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*

♦ *Please observe requirements for disposal.*

– Blow out water drain (small hole in bottom section of air cleaner housing) with compressed air.

– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.

– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).

– Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.

– When installing the air filter element, check that it is properly centred in the retainer in the air cleaner housing (bottom section).

– Fit the top section of the air cleaner housing carefully on the bottom section, without using force. Make sure the top section of the air cleaner housing is fitted straight on the air filter element (note position of sealing lip on air filter element).

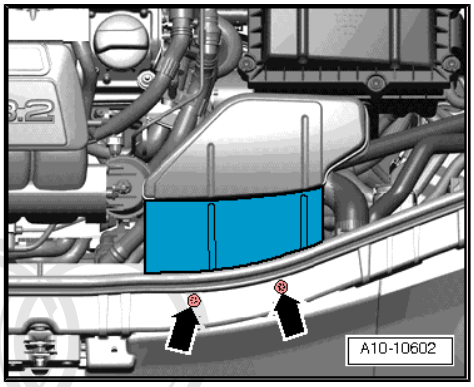
– Ensure secure fit of intake hose at air mass meter.

2.5 Removing and installing air cleaner housing

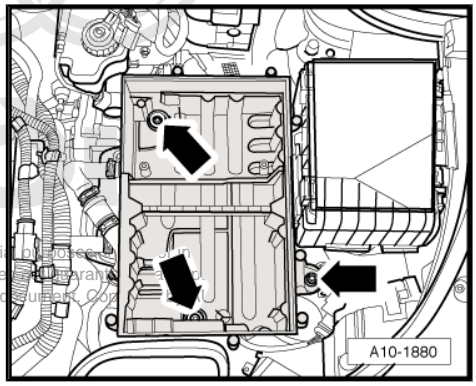
Removing

– Remove air filter element ⇒ page 12 .

– Unscrew bolts -arrows- and remove air duct.



– Unscrew air cleaner housing (lower section) -arrows-.



Installing

• Tightening torques ⇒ page 10 .

Installation is carried out in the reverse order; note the following.

Note

♦ *The air cleaner housing MUST be clean.*

♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

♦ *To prevent malfunctions, cover all critical parts of the engine air intake tract (air mass meter, intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*

– Blow out water drain (small hole in bottom section of air cleaner housing) with compressed air.

– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.

– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).

– Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.

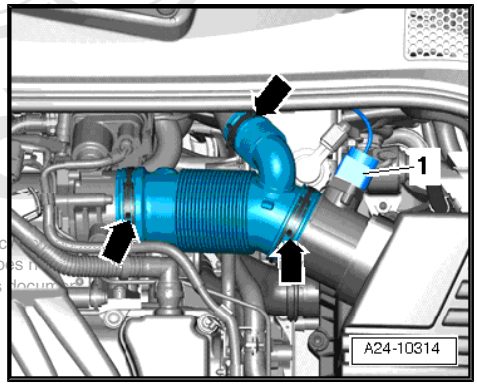
– Fit the top section of the air cleaner housing carefully on the bottom section, without using force. Make sure the top section of the air cleaner housing is fitted straight on the air filter element (note position of sealing lip on air filter element).

2.6 Removing and installing air mass meter -G70-

Removing

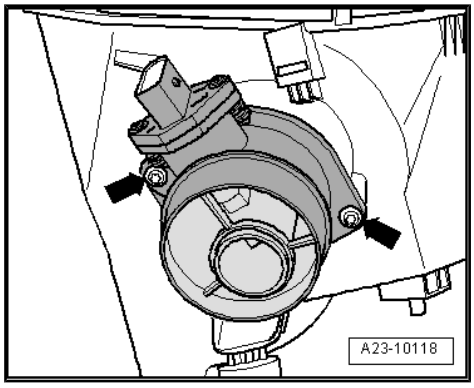
– Detach electrical connector -1- for air mass meter -G70- .

– Detach air intake hose -arrows-.



– Remove bolts -arrows-.

– Then carefully pull air mass meter -G70- out of guide on air cleaner housing (top section).



Installing

• Tightening torque ⇒ page 10 .

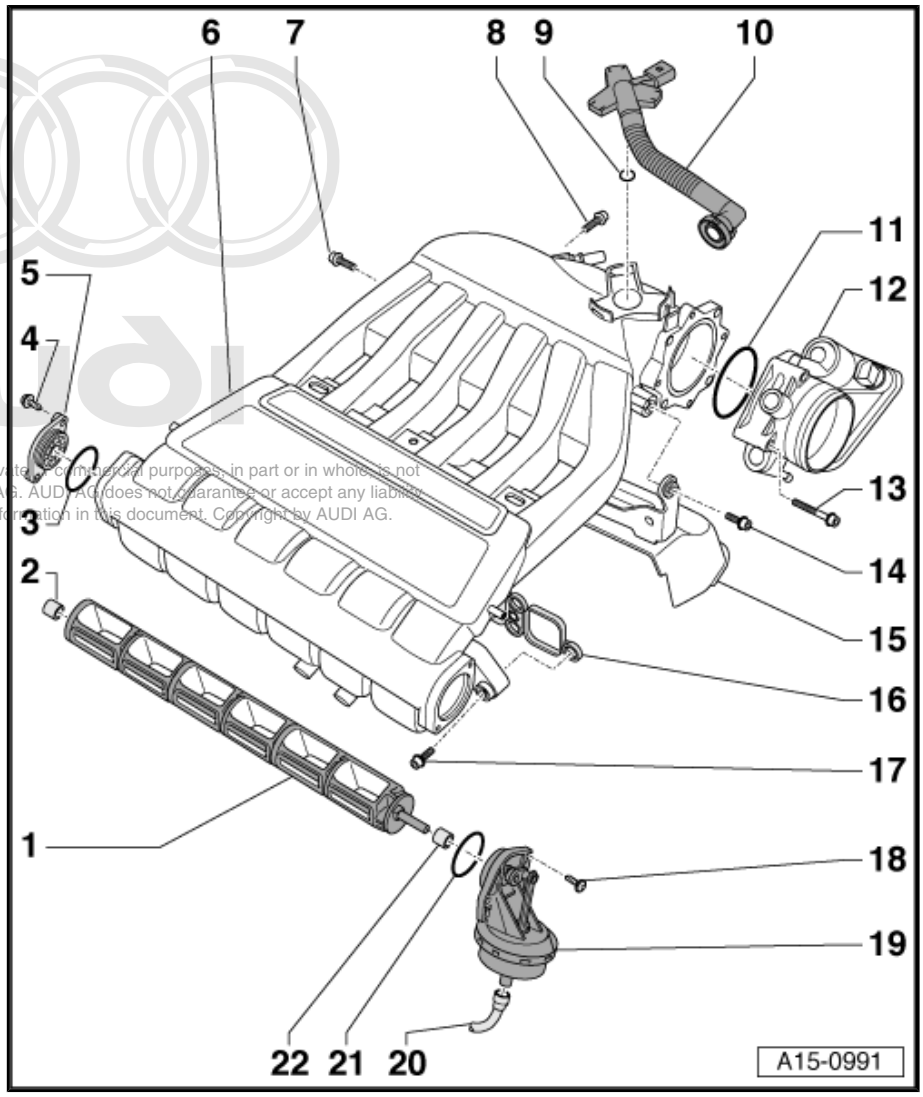
Installation is carried out in the reverse order; note the following.

To ensure the proper function of the air mass meter it is important to observe the following notes and instructions.

Note

- *Renew O-ring.*
- *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- *Always use genuine part for air filter element.*
- *Use silicone-free lubricant when fitting air intake hose.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

2.7 Intake manifold - exploded view



1 - Change-over barrel

2 - Bearing bush

3 - O-ring

- ❑ Renew

4 - Bolt

5 - Bearing cap

6 - Intake manifold

7 - Bolt

- ❑ 20 Nm

8 - Bolt

- ❑ 20 Nm

9 - Seal

10 - Connection for crankcase breather

- ❑ With heater element for crankcase breather -N79-

11 - O-ring

12 - Throttle valve module -J338-

- ❑ Removing and installing ⇒ page 19

13 - Bolt

- ❑ 10 Nm

14 - Bolt

- ❑ 20 Nm

15 - Heat shield for exhaust manifold

- ❑ With support for intake manifold

16 - Gasket

- ❑ Renew
- ❑ Insert into intake manifold

17 - Bolt

- ❑ 13 Nm

18 - Bolt

- ❑ 10 Nm

19 - Vacuum unit

- ❑ For intake manifold flaps
- ❑ Checking ⇒ page 20
- ❑ Removing and installing ⇒ page 22

20 - Vacuum connection

- ❑ To intake manifold change-over valve -N156-

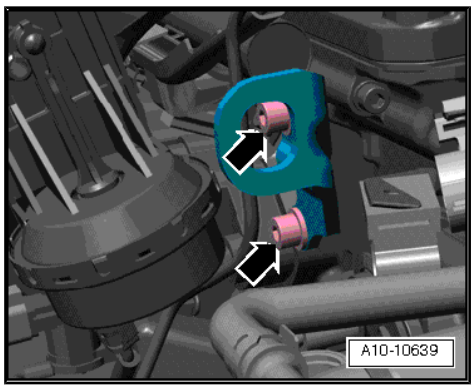
21 - O-ring

- ❑ Renew

22 - Bearing bush

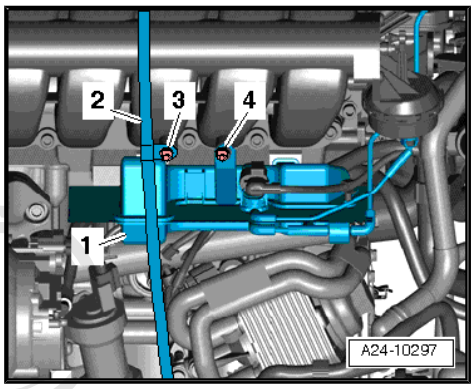
Engine lifting eye to cylinder head: tightening torque

Tighten bolts -arrows- to 20 Nm.



Oil dipstick and vacuum reservoir: tightening torques

Tighten bolts -3- and -4- to 5 Nm.



2.8 Removing and installing intake manifold

Removing

Note

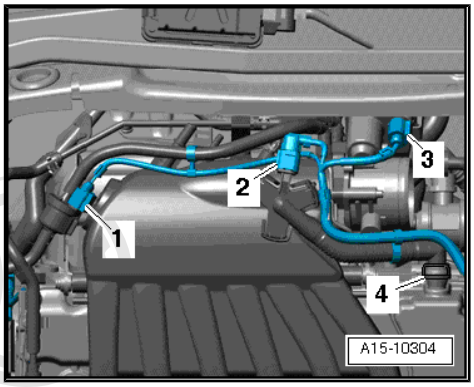
All cable ties which are released or cut open when removing must be refitted in the same position when installing.

Caution

Observe notes on procedure for disconnecting the battery ⇒ Rep. Gr. 27 .

- Disconnect earth wire at battery with ignition switched off.
- Remove air filter element ⇒ page 12 .
- Remove air cleaner housing ⇒ page 13 .

– Unplug electrical connectors -1, 2, 3- and move wiring clear.
– Remove crankcase breather hose -4-.
– Remove ignition coils ⇒ page 43 .
– Remove throttle valve module -J338- ⇒ page 19 .



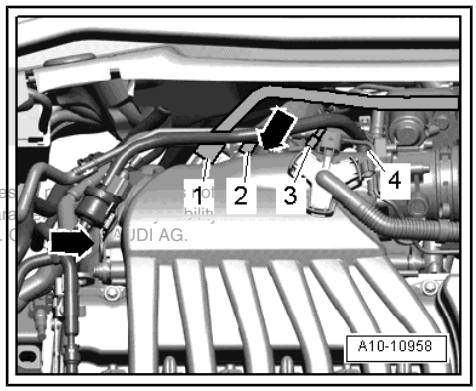
– Disconnect vacuum hoses -1, 3, 4- at rear of intake manifold.

Vehicles with engine code letters CBRA:

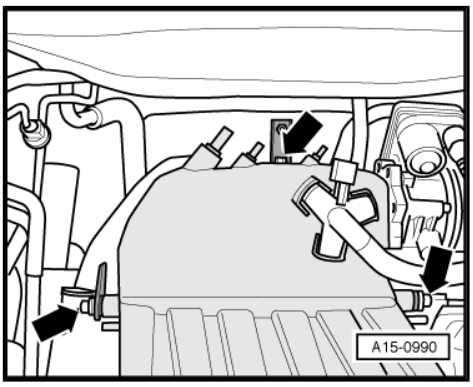
– Disconnect vacuum hose -2- leading to fuel system diagnostic pump -V144- .

All vehicles (continued):

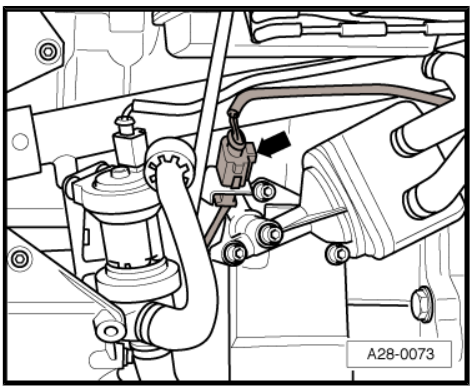
– Unbolt hose bracket from intake manifold -arrows- and move clear to rear, with hoses attached.



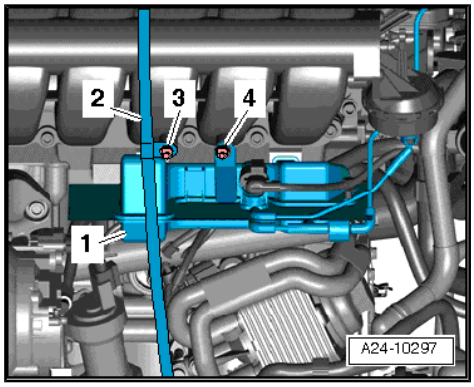
– Remove rear securing bolts -arrows- for intake manifold.



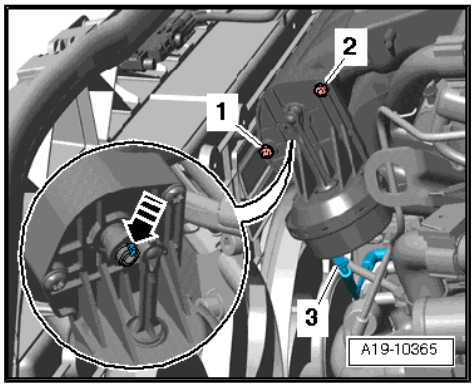
– Unhook connector -arrow- for engine speed sender -G28- from bracket on guide tube for oil dipstick.



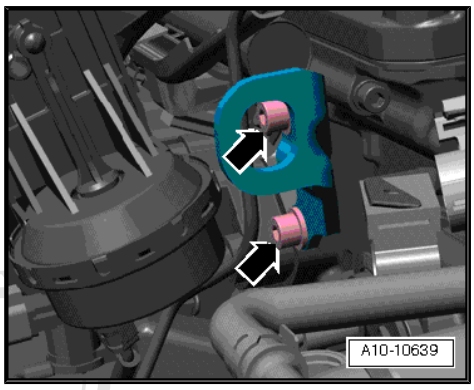
– Pull out oil dipstick.
– Remove bolt -3-, pull out guide tube for oil dipstick -2- and move clear to one side.
– Unscrew bolt -4- and detach vacuum reservoir -1- from intake manifold.
– Move vacuum reservoir to side (hoses remain attached).



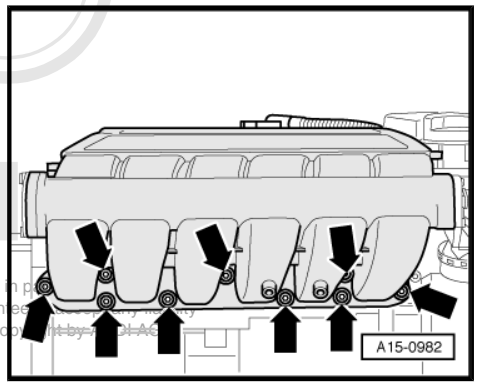
– Release relay lever -arrow- and detach.
– Remove bolts -1- and -2-.
– Detach vacuum unit for intake manifold change-over and move to side with vacuum hose -3- connected.



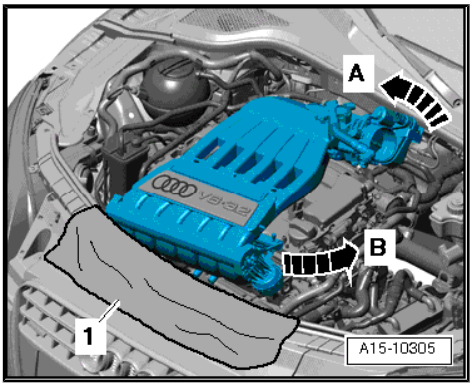
– Unscrew bolts -arrows- and remove engine lifting eye (left-side).



– Unscrew bolts -arrows- at front of intake manifold.



– To avoid damaging the surface of the intake manifold, place a clean cloth -1- over the lock carrier.
– Swing the intake manifold forwards -arrow A- and take it out to the left -arrow B-.



Note

Cover or plug the intake ports in the cylinder head with a clean cloth or foam plastic to prevent small items from dropping in.

Installing

• Tightening torques ⇒ page 15 .

Installation is carried out in the reverse order; note the following:

Note

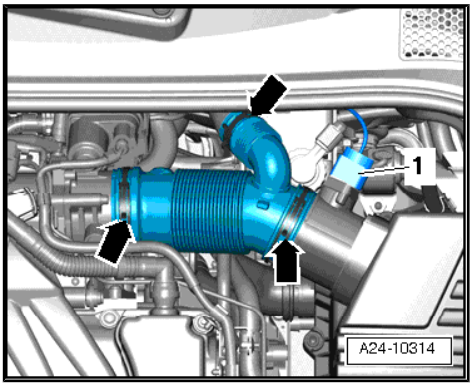
Renew seals and gaskets.

– Install ignition coils ⇒ page 43 .
– Install throttle valve module -J338- ⇒ page 19 .
– Install air cleaner housing ⇒ page 13 .
– Install air filter element ⇒ page 12 .
– Connect earth strap to battery ⇒ Rep. Gr. 27 .

2.9 Removing and installing throttle valve module -J338-

Removing

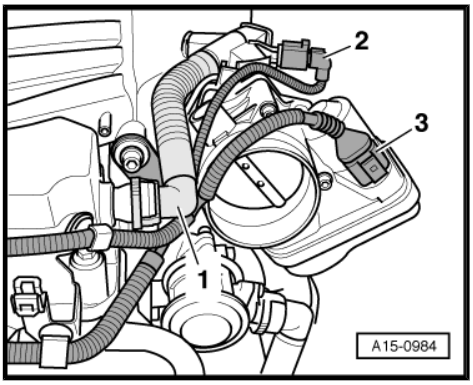
– Detach air intake hose -arrows-.



Note

Disregard -item 1-.

– Unplug electrical connector -3-.
– Remove crankcase breather hose -1-.
– Move Lambda probe wiring at throttle valve module -J338- clear

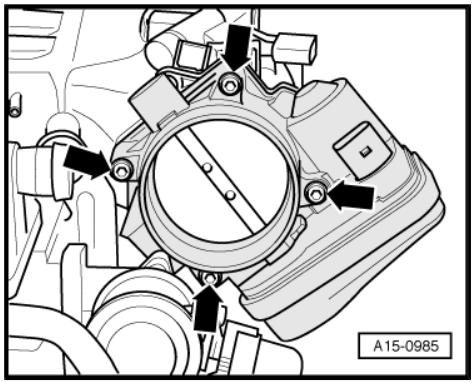


Note

Disregard -item 2-.

– Remove bolts -arrows-.

– Detach throttle valve module -J338- from intake manifold.



Installing

• Tightening torque ⇒ page 15 .

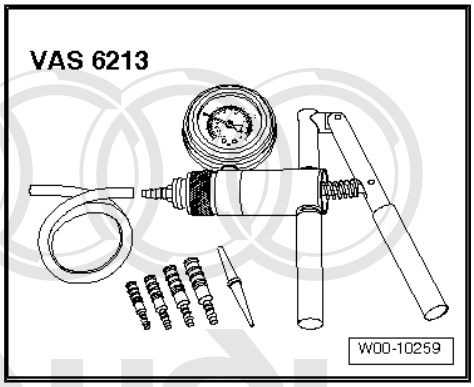
Install in reverse order.

2.10 Checking vacuum unit for intake manifold flaps

Only perform this test if there is a loss of engine torque, poor flexibility or lack of pulling power.

Special tools and workshop equipment required

♦ Hand-operated vacuum pump -VAS 6213-

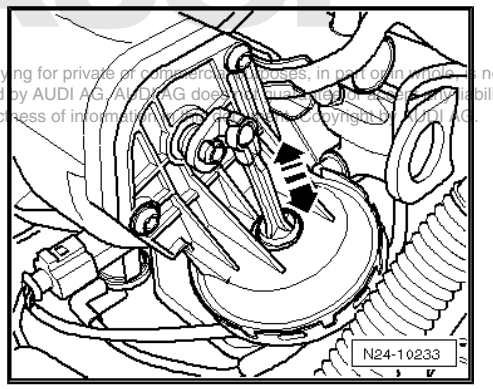


Procedure

– Start engine.

– Abruptly floor accelerator pedal and observe linkage at vacuum unit.

• The linkage should move -arrow-.



Proceed as follows if the linkage on the vacuum unit does not move:

♦ Check vacuum system for leaks.

♦ Check that linkage of change-over mechanism moves freely.

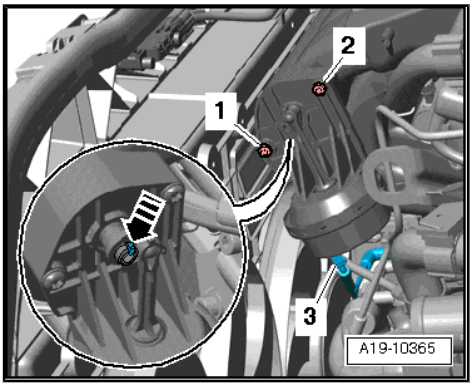
♦ Check proper connection of vacuum lines.

♦ Check vacuum hoses.

If no fault is found:

– Remove air cleaner housing ⇒ page 13 .

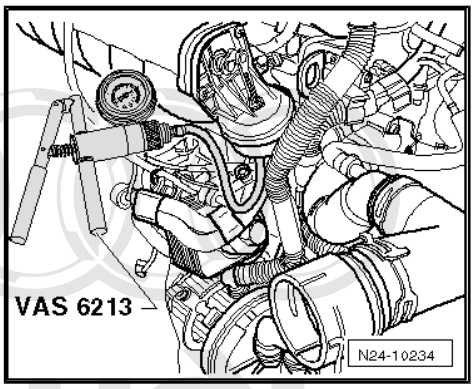
– Detach vacuum hose -3- from vacuum unit.



Note

Disregard items marked -1-, -2- and -arrows-.

– Connect hand-operated vacuum pump -VAS 6213- to vacuum unit as shown in illustration.



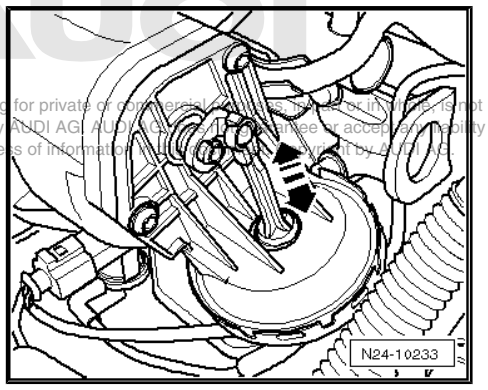
– Use hand-operated vacuum pump to generate vacuum.

– At the same time observe linkage at vacuum unit:

• The linkage should move -arrow-.

– Vent vacuum hand pump.

• The linkage should return to its original position.



Note

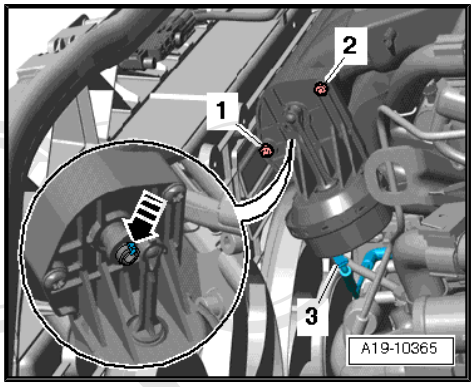
Observe the movement of the linkage over the complete range of travel. It should move steadily and smoothly.

If the linkage on the vacuum unit does not move, or only moves jerkily:

– Renew vacuum unit ⇒ page 22 .

2.11 Removing and installing vacuum unit for intake manifold flaps

Removing



– Release relay lever -arrow- and detach.
– Remove bolts -1- and -2-.
– Pull vacuum unit off intake manifold.
– Detach vacuum hose -3- from vacuum unit.

Installing

• Tightening torque ⇒ page 15 .

Installation is carried out in the reverse order; note the following:

Note

Renew O-ring.

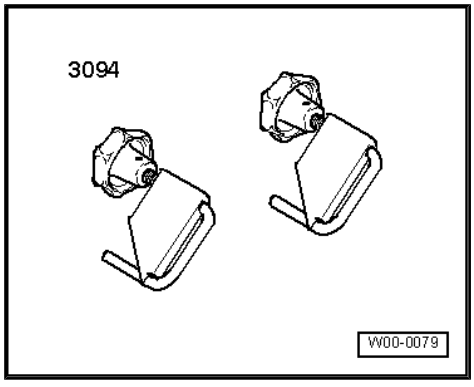
2.12 Checking fuel pressure regulator and residual pressure

Note

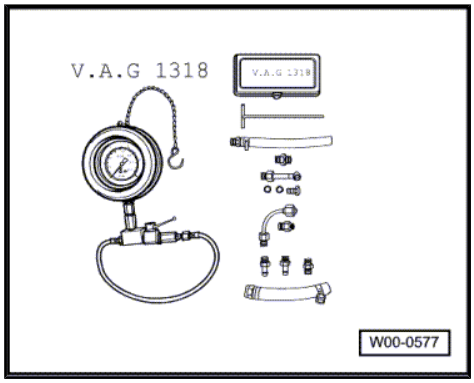
The fuel pressure regulator is integrated in the fuel filter and cannot be renewed on its own.

Special tools and workshop equipment required

♦ Hose clamps for hoses up to 25 mm -3094-



♦ K-Jetronic tester -V.A.G 1318- with adapters -V.A.G 1318/11- , -V.A.G 1318/17- and -V.A.G 1318/23-

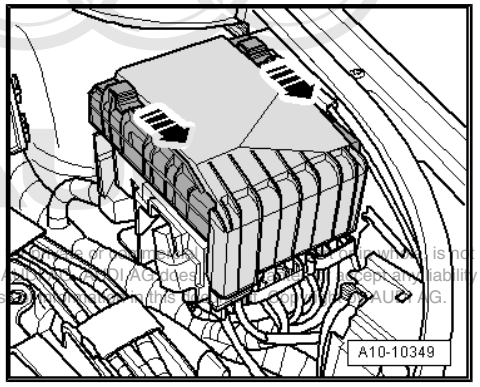


Procedure

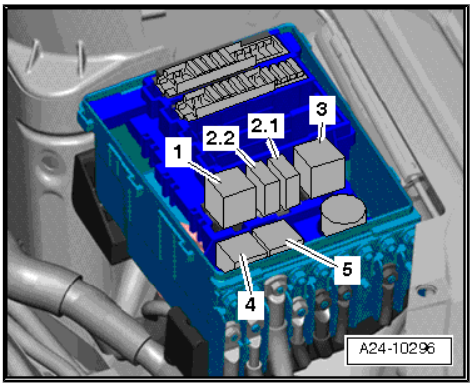
- Fuel pump relay OK.
- Fuel pump OK; checking ⇒ Rep. Gr. 20 .
- Fuel filter OK
- Battery voltage at least 12.5 V.

Measuring fuel pressure:

– Press the two clips in direction of the -arrows- and remove cover from electronics box in engine compartment.



– Disconnect electric fuel pump 2 relay -J49- -item 2.1-.

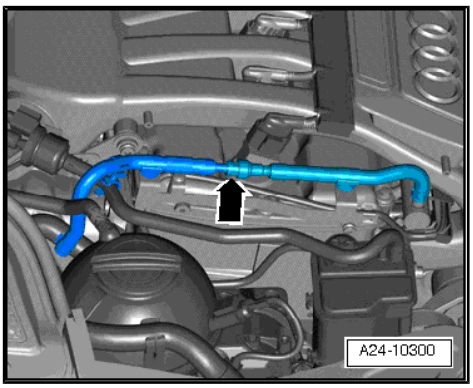


Note

Disconnecting the electric fuel pump 2 relay -J49- will prevent the fuel pump from being activated when the driver's door is opened.

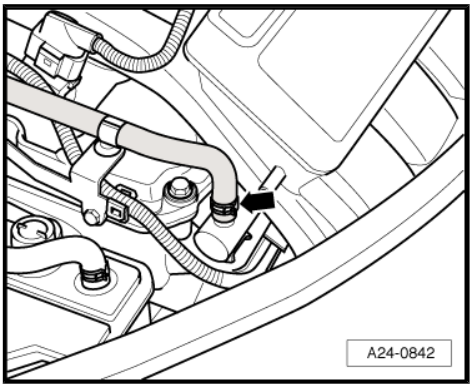
WARNING

The fuel system is pressurised. Before opening the system place a clean cloth around the connection. Then release pressure by carefully loosening the connection.

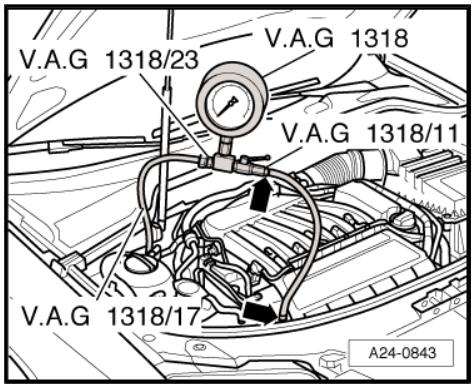


– Disconnect fuel supply pipe -arrow- by pulling release ring.

– Disconnect fuel supply pipe -arrow- at fuel rail.



– Connect the K-Jetronic tester -V.A.G 1318- with adapters -V.A.G 1318/11- , -V.A.G 1318/17- and -V.A.G 1318/23- .
– Connect pressure tester to fuel supply hose.
– Connect a fuel-resistant auxiliary hose between fuel rail and tester.



Note

Use hose clips -arrows- to secure the auxiliary hose.

– Open cut-off valve on pressure tester.
• Lever points in direction of flow.
– Start the engine and run at idling speed.
– Measure the fuel pressure.
• Specification: approx. 4.0 bar
– Switch off ignition.

If specification is not obtained:

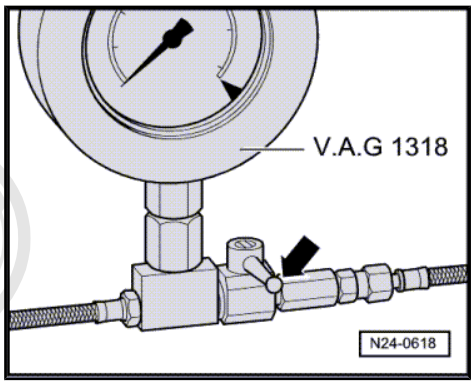
– Check fuel pump delivery rate ⇒ Rep. Gr. 20 .

Checking leakage and residual pressure:

– Check leak-tightness and residual pressure by watching the drop in pressure on the pressure gauge.
• After 10 minutes pressure should still be at least 3.0 bar.

If the residual pressure drops below 3.0 bar:

– Start the engine and run at idling speed.
– Allow pressure to build up, then switch off ignition. At the same time close cut-off valve of K-Jetronic tester -V.A.G 1318- .
• Lever is at right angle to direction of flow -arrow-.
– Observe pressure drop on pressure gauge.



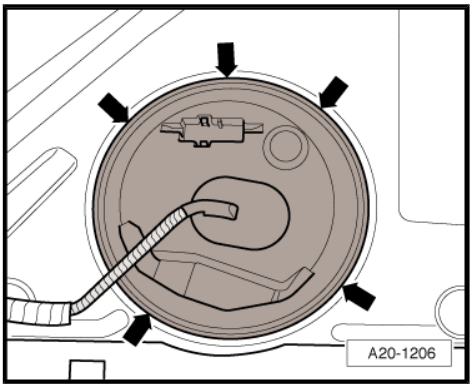
If the pressure drops again:

– Check pipe connections, injectors and O-rings on fuel rail for leaks.
– Check pressure gauge for leaks.

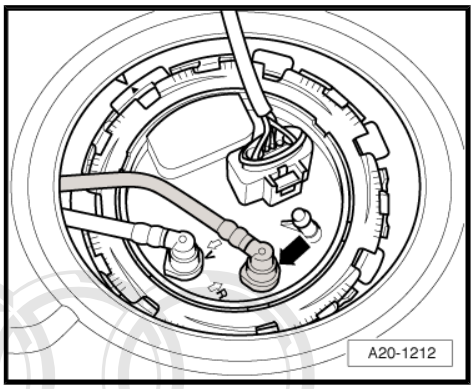
If the pressure now does not drop:

– Open cut-off valve on pressure gauge (lever points in direction of flow).
– Remove rear seat bench ⇒ Rep. Gr. 72 .

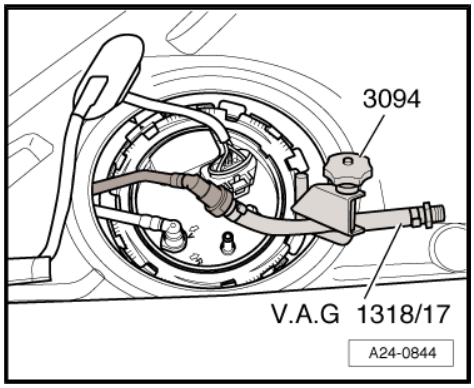
– Unclip the retaining tabs -arrows- for the flange cover (right-side).



– Disconnect fuel return pipe -arrow- by pressing release tab.



– Connect adapter hose -1318/17-1- to fuel return pipe.
– Clamp off adapter hose using hose clamp -3094- .



Note

Do not attach hose clamp -3094- directly to fuel pipe - Danger of damage.

– Cover the return pipe connection with a cloth.
– Start the engine and briefly run at idling speed.
– Allow pressure to build up, then switch off ignition.
– Observe pressure drop on pressure gauge.

If pressure does not drop, non-return valve of fuel pump is defective.

– Renew fuel pump ⇒ Rep. Gr. 20 .

If the pressure drops again:

– Renew fuel filter with integral fuel pressure regulator ⇒ Rep. Gr. 20 .

Note

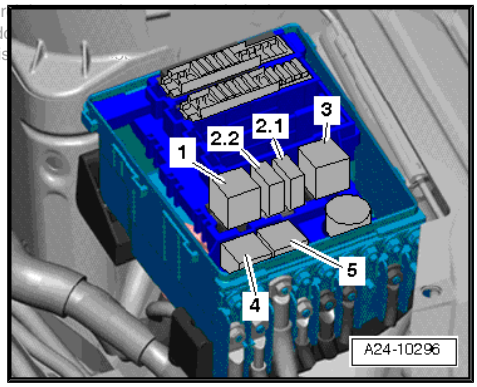
Before removing the pressure tester, release the fuel pressure by opening the cut-off valve. Hold a container under the connection.

– Installation is carried out in the reverse order; note the following:

Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

– Fit electric fuel pump 2 relay -J49- -item 2.1- back into relay and fuse holder.
– Install rear seat bench ⇒ Rep. Gr. 72 .



2.13 Fuel rail with injectors - exploded view

1 - Fuel rail

2 - Fuel hose

> **WARNING**
>
> *Unplug electric fuel pump 2 relay -J49- before detaching fuel hose ⇒ page 28 .*

3 - Bolt

- ❑ 10 Nm

4 - O-ring

- ❑ Removing and installing ⇒ page 27
- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

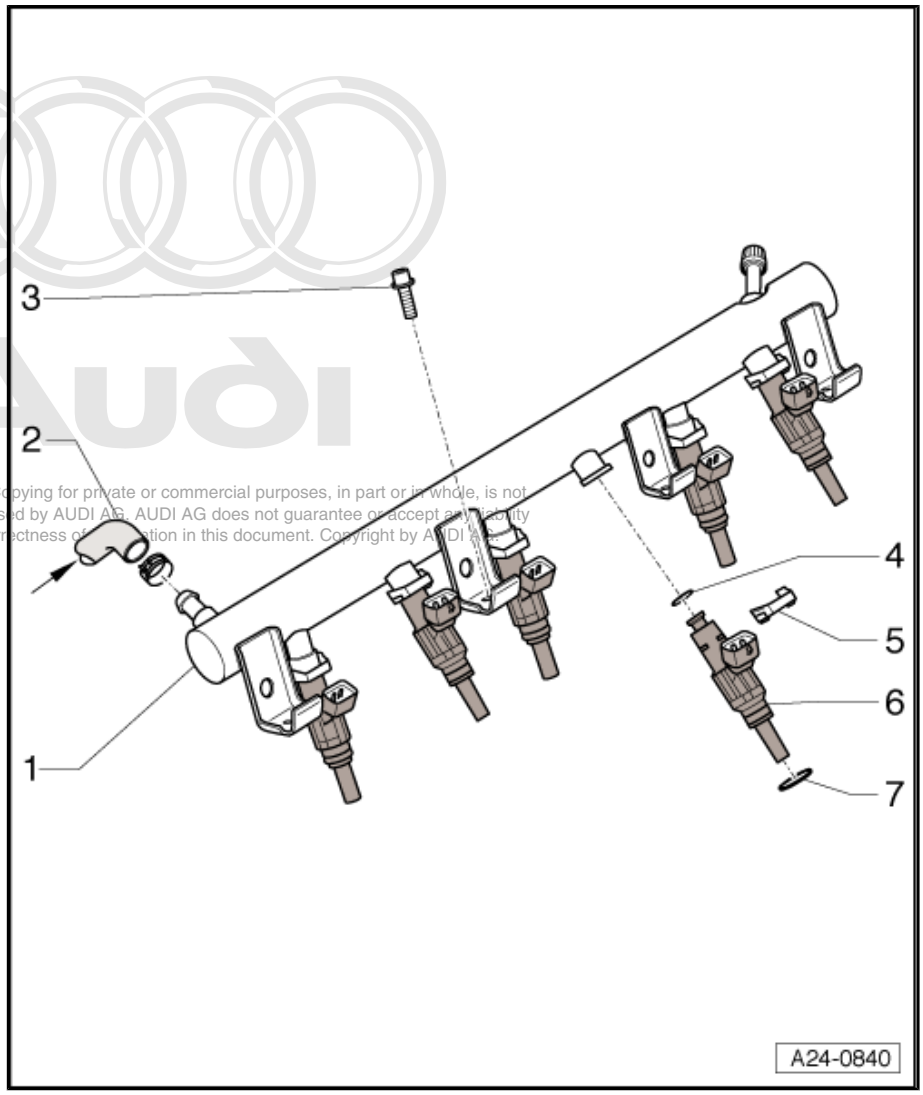
5 - Retaining clip

- ❑ After installing injector, make sure the retaining clip is seated correctly.

6 - Injector

7 - O-ring

- ❑ Removing and installing ⇒ page 27
- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

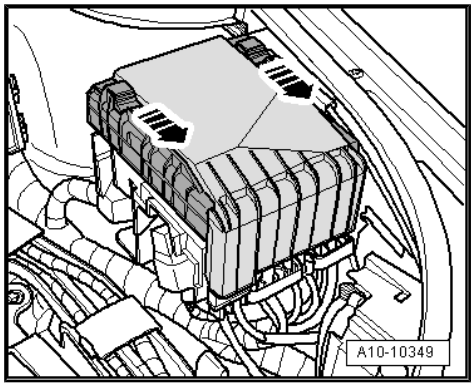


2.14 Removing and installing injectors

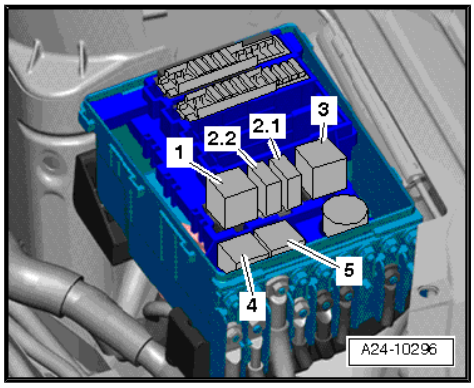
Removing

> **WARNING**
>
> *The fuel system is pressurised. Wrap a cloth around the connection before opening the system. Then release pressure by carefully loosening the connection.*

– Press the two clips in direction of the -arrows- and remove cover from electronics box in engine compartment.



– Detach electric fuel pump 2 relay -J49- -item 2.1-.

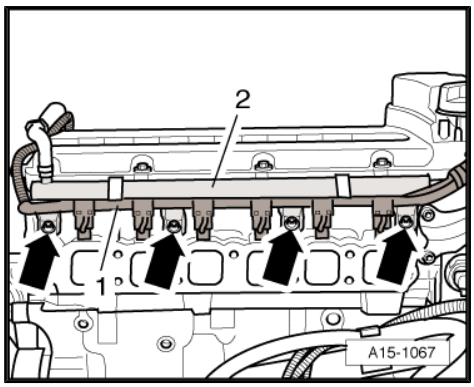


Note

Disconnecting the electric fuel pump 2 relay -J49- will prevent the fuel pump from being activated when the driver's door is opened.

– Remove intake manifold ⇒ page 16 .

– Move wiring harness -1- at fuel rail clear.
– Remove bolts -arrows-.
– Detach fuel rail -2- with injectors from cylinder head and lay it aside with fuel hose connected.
– Pull off retaining clip and detach appropriate injector.



Installing

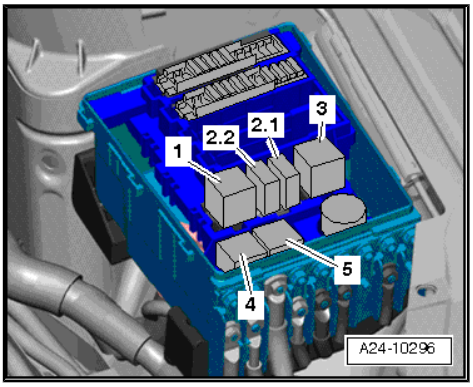
• Tightening torque ⇒ page 27 .

Installation is carried out in the reverse order; note the following:

• Renew the O-rings at all opened connections. (When renewing the front O-ring, ensure that the plastic cap is not removed from the injector head. The O-ring must be pulled off over the plastic cap).
• Lubricate the O-rings with clean engine oil.
• Make sure injectors are installed in correct position.
• Make sure retaining clips are properly connected.
• Position fuel rail together with injectors (properly secured) against intake manifold and press into place evenly.

– Install intake manifold ⇒ page 16 .

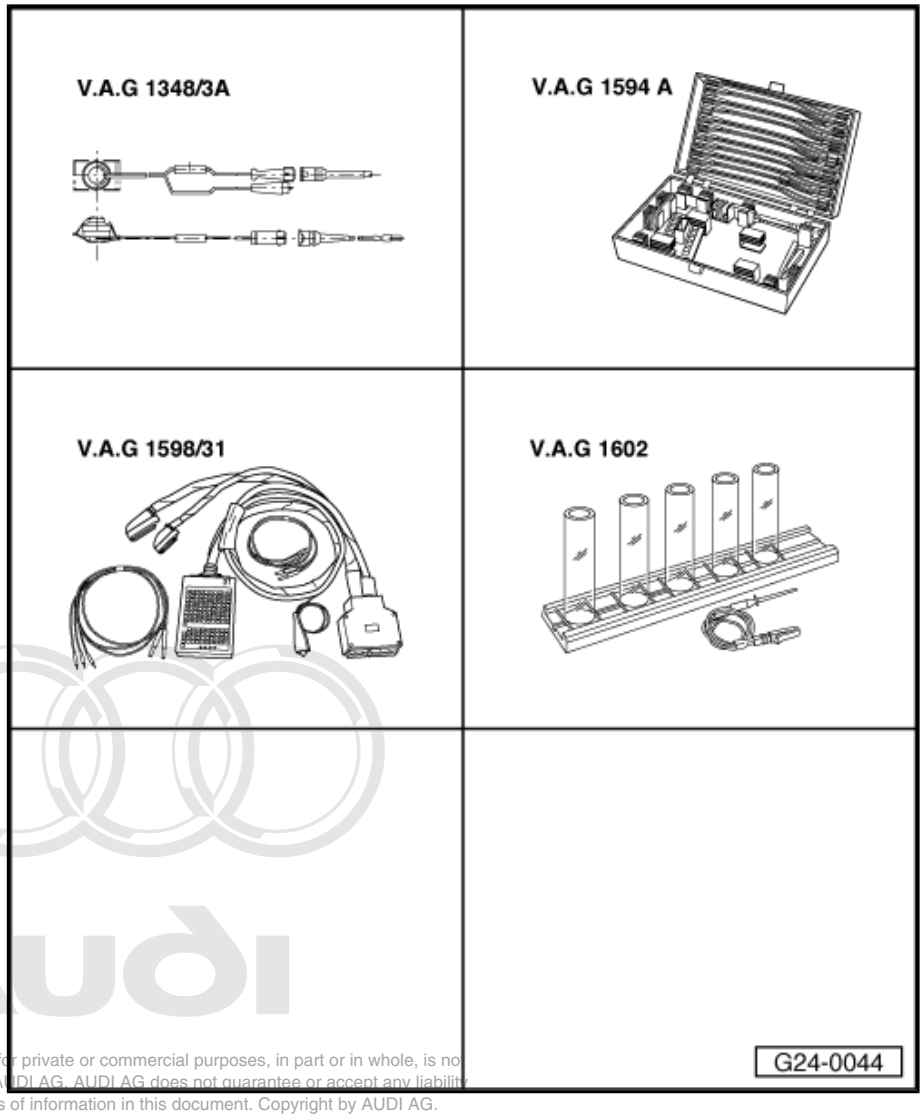
– Fit electric fuel pump 2 relay -J49- -item 2.1- back into relay and fuse holder.



2.15 Checking injection quantity and spray pattern of injectors; checking for leaks

Special tools and workshop equipment required

- Remote control -V.A.G 1348/3A- for V.A.G 1348 with adapter cable - V.A.G 1348/3-2-
- Auxiliary measuring set - V.A.G 1594C-
- Adapter cable, 121-pin - V.A.G 1598/31- (test box)
- Injection rate tester - V.A.G 1602-



Procedure

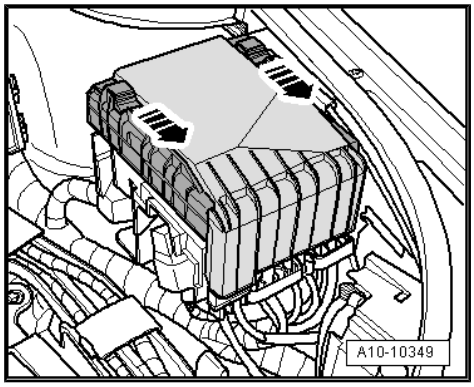
- Fuel pressure OK; testing ⇒ page 22 .

– Remove intake manifold ⇒ page 16 .

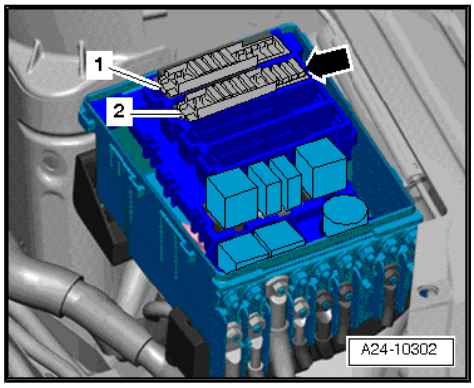
– Remove fuel rail together with injectors ⇒ page 27 . Fuel hose remains connected.

Checking for leaks

– Press the two clips in direction of the -arrows- and remove cover from electronics box in engine compartment.



– Detach fuse at “position 1” -arrow- from “fuse holder 2” (brown) -item 2-.



– Connect remote control -V.A.G 1348/3A- for V.A.G 1348 with adapter cable -V.A.G 1348/3-2- as follows:

♦ To contact for fuse for fuel pump (fuse is detached);

♦ To “+” wire at front of electronics box in engine compartment.

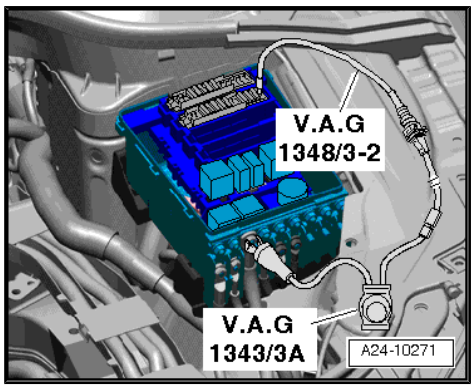
– Connect battery earth cable.

– Press remote control button -V.A.G 1348/3 A- .

• The fuel pump should run.

– Visually check the fuel injectors for leaks.

• When the fuel pump is running, no more than 1 to 2 drops a minute should escape from any one of the injectors.



If the fuel loss is greater:

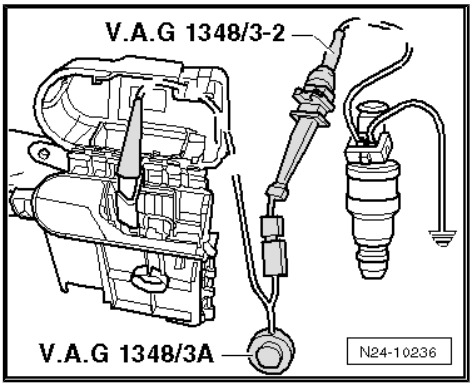
– Renew defective fuel injector ⇒ page 27 .

Checking injection quantity

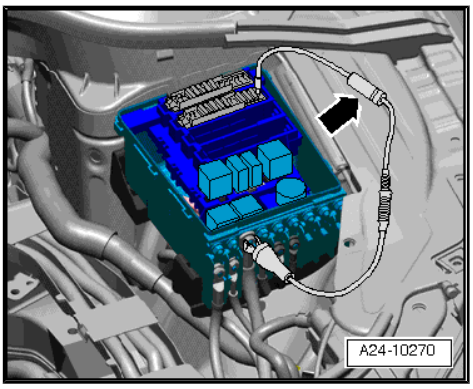
– Unplug electrical connectors for injectors.

– Place one injector in a measuring glass for injection rate tester -V.A.G 1602- .

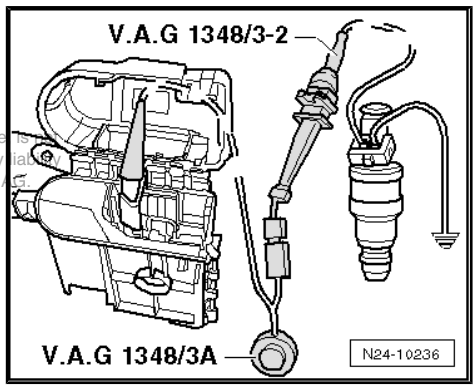
– Using a test lead and crocodile clamp from auxiliary measuring set -V.A.G 1594C- , connect one contact of injector to earth “–”.
– Connect second contact of injector to remote control - V.A.G 1348/3 A- using adapter cable -V.A.G 1348/3-2- .
– Connect crocodile clamp to battery “+” (positive terminal in engine compartment).



– Connect test lead from auxiliary measuring set -V.A.G 1594C- with in-line fuse -arrow- to contact for fuse for fuel pump (fuse is detached).
– Connect test lead to “+” wire on front side of electronics box in engine compartment.
• The fuel pump should run.



– Press remote control button -V.A.G 1348/3 A- for 30 seconds.
– Carry out test for all fuel injectors using a new test glass each time.



Note

Also check the spray pattern when testing the injection rate. The spray pattern should be the same for all injectors.

– After all six injectors have been activated:
– Disconnect test lead (to switch off fuel pump).
– Place measuring glasses on a level surface.
• Specification: 128 ... 140 ml for each injector.

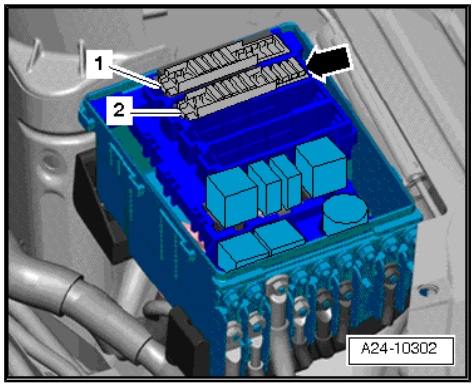
If the measured values for one or more of the fuel injectors do not meet the specification:

– Renew defective injector ⇒ page 27 .

If the measured values for all the injectors are outside the specification:

– Check fuel pressure ⇒ page 22 .
– Install injectors together with fuel rail ⇒ page 28 .
– Install intake manifold ⇒ page 16 .

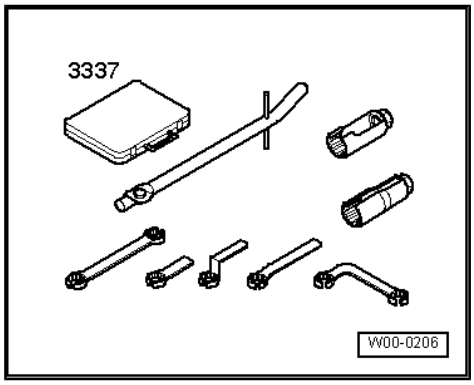
– Fit fuse on “position 1” -arrow- back in “fuse holder 2” (brown) -item 2-.



2.16 Removing and installing Lambda probes (before catalytic converter)

Special tools and workshop equipment required

♦ Lambda probe open ring spanner set -3337-



Removing

– Remove air filter element ⇒ page 12 .

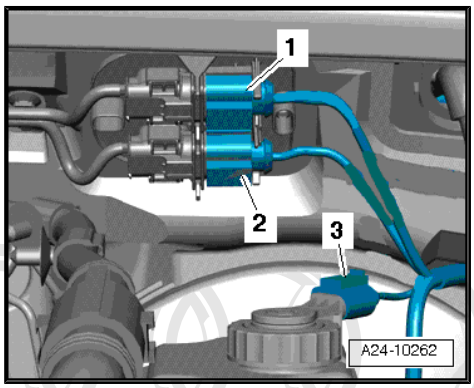
– Remove air cleaner housing ⇒ page 13 .

– Unplug corresponding electrical connector.

1 - Lambda probe 2 before catalytic converter -G108- with Lambda probe 2 heater -Z28-

2 - Lambda probe before catalytic converter -G39- with Lambda probe heater -Z19-

– Move electrical wiring to corresponding Lambda probe clear.



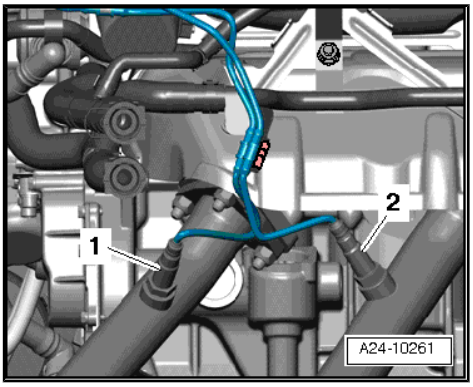
Note

Disregard -item 3-.

– Unscrew corresponding Lambda probe using ring spanner -3337/1- .

1 - Lambda probe 2 before catalytic converter -G108- with Lambda probe 2 heater -Z28-

2 - Lambda probe before catalytic converter -G39- with Lambda probe heater -Z19-



Installing

- Tightening torque ⇒ page 7 .

Installation is carried out in the reverse order; note the following:

Note

- *New Lambda probes are coated with an assembly paste.*
- *If reinstalling the old Lambda probes, coat the threads with high-temperature paste ⇒ Electronic parts catalogue .*
- *The assembly paste/high-temperature paste must not get into the slots on the probe body.*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*

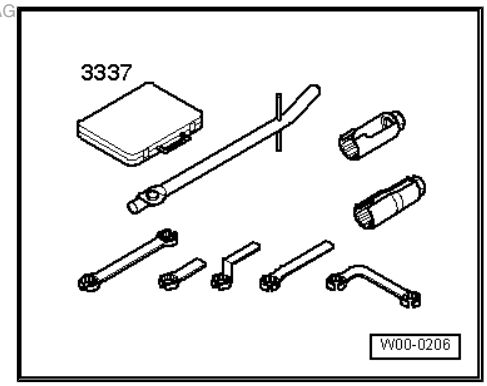
– Install air cleaner housing ⇒ page 13 .

– Install air filter element ⇒ page 12 .

2.17 Removing and installing Lambda probes (after catalytic converter)

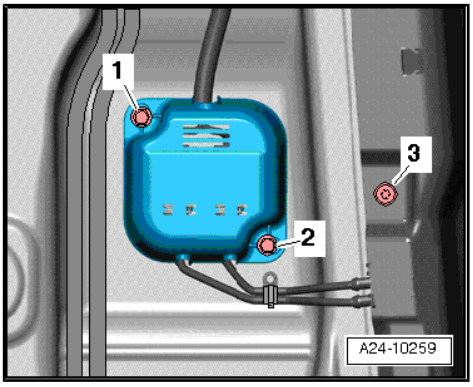
Special tools and workshop equipment required

- Lambda probe open ring spanner set -3337-



Removing

– Remove nuts -1- and -2- on retainer for electrical connectors on underside of vehicle (right-side).



Note

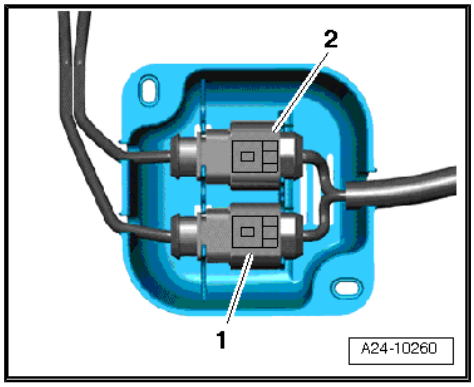
Disregard -item 3-.

– Remove cover and unplug corresponding electrical connector.

1 - Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalytic converter -Z29-

2 - Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-

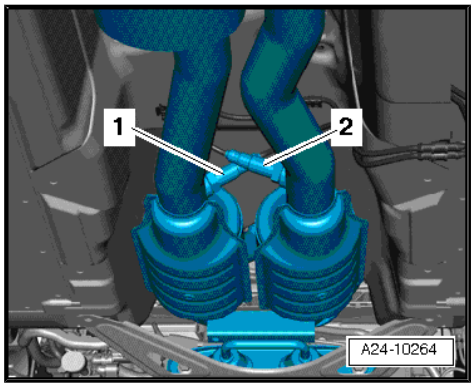
– Remove plug connector from retainer and move wiring to corresponding Lambda probe clear.



– Unscrew corresponding Lambda probe using ring spanner -3337/1- .

1 - Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-

2 - Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalytic converter -Z29-



Installing

• Tightening torque ⇒ page 7 .

Installation is carried out in the reverse order; note the following:

Note

- *New Lambda probes are coated with an assembly paste.*
- *If reinstalling the old Lambda probes, coat the threads with high-temperature paste ⇒ Electronic parts catalogue .*
- *The assembly paste/high-temperature paste must not get into the slots on the probe body.*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- *Fit all cable ties in the original positions when installing.*

3 Engine control unit -J623-

3.1 Wiring and component check with test box

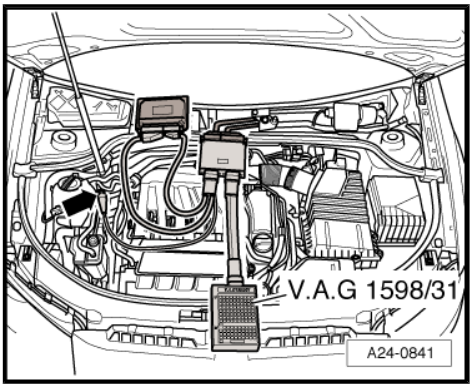
Special tools and workshop equipment required

- Adapter cable, 121-pin -V.A.G 1598/31- (test box)

Note

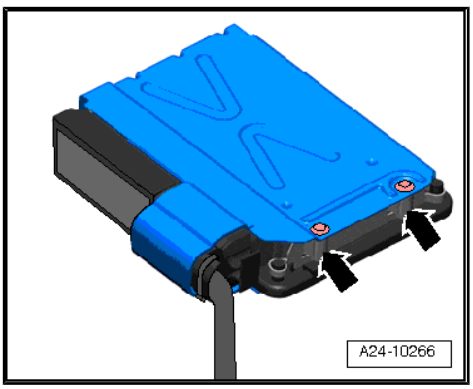
- *The adapter cable, 121-pin -V.A.G 1598/31- (test box) is designed for simultaneous connection to the wiring harness leading to the engine control unit and to the engine control unit itself.*
- *The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).*
- *The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.*
- *Always use auxiliary measuring set -V.A.G 1594C- to connect test equipment (e.g. voltage tester -V.A.G 1527B- , hand-held multimeter -V.A.G 1526C- etc.).*

Procedure



– Remove engine control unit -J623- ⇒ page 35 .
– Connect adapter cable, 121-pin -V.A.G 1598/31- (test box) to multi-pin connectors of wiring harness.
– Connect earth clip of test box to earth.
– The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test adapter.
– Carry out test as described in relevant repair procedures.
– After completing test, re-install engine control unit ⇒ page 35 .

3.2 Removing and installing engine control unit -J623-

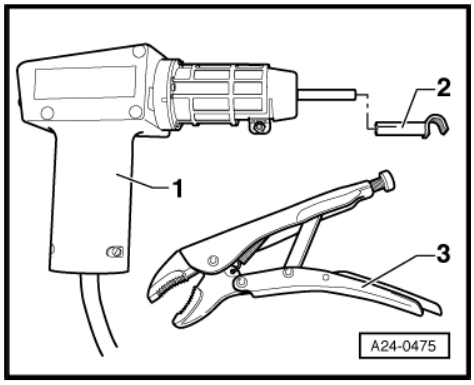


The multi-pin connectors of the engine control unit are enclosed in a protective housing, which is secured by a locking device and shear bolts -arrows-. To make it more difficult to unscrew the shear bolts, the threads have additionally been coated with locking fluid.

The protective housing has to be removed before multi-pin connectors can be unplugged from engine control unit (e.g. to connect test box or renew engine control unit).

Special tools and workshop equipment required

♦ Hot air blower, 220 V/ 50 HZ -VAS 1978/14- -item 1-



♦ Shrink element for hot air blower -VAS 1978/15- -item 2-

♦ Vice-grip pliers -3- (commercially available)

Removing

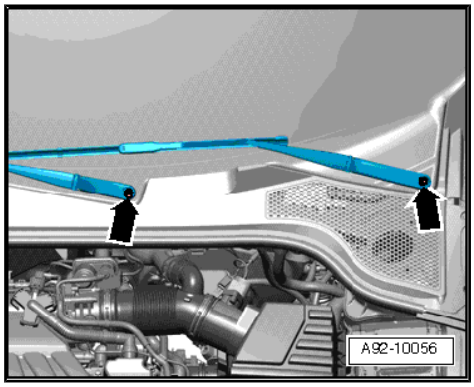
– Switch off ignition and remove ignition key.

– Pry off caps on windscreen wiper arms with a screwdriver.

– Loosen nuts -arrows- several turns.

– Tilt windscreen wiper arms one by one and loosen from wiper shafts.

– Remove nuts completely and take off wiper arms.

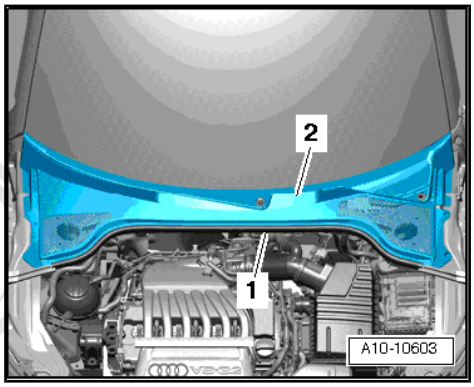


Note

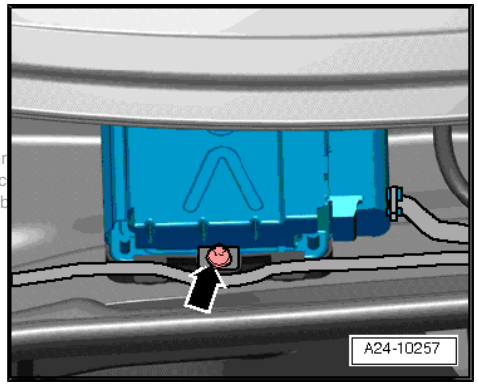
Use puller (commercially available) to remove wiper arm if necessary.

– Pull off rubber seal -1- and remove plenum chamber cover -2- (carefully pull plenum chamber cover off retainer at windscreen).

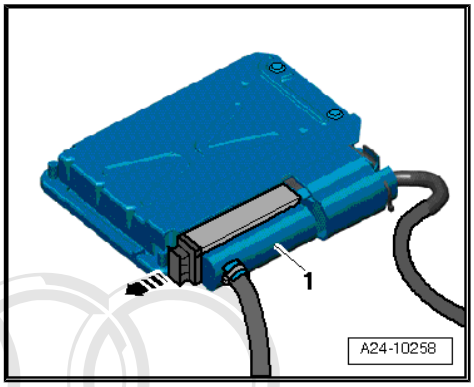
– Detach engine wiring harness at rear plenum chamber panel.



– Remove bolt -arrow- and detach engine control unit from retainer.



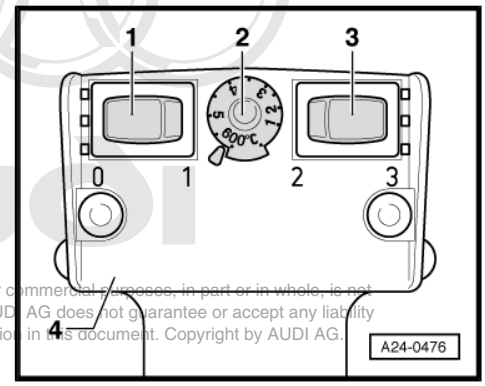
– Unplug electrical connector -arrow- for body wiring harness -1-.



Caution

The following procedure must be followed exactly to prevent any damage (burning) to wiring, connectors, insulation and control units. Observe operating instructions for hot air blower.

– Select settings on hot-air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position "3".



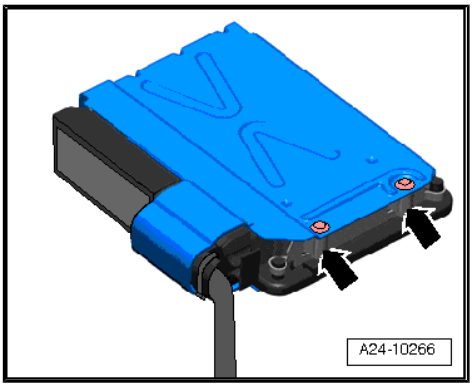
Note

- *Then use hot air blower to heat threaded holes in protective housing into which shear bolts have been screwed. This reduces the inhibiting action of the locking fluid on the shear bolt threads and makes it easier to unscrew these bolts.*
- *Cover up all painted parts to avoid any damage caused by hot air blower or vice-grip pliers.*

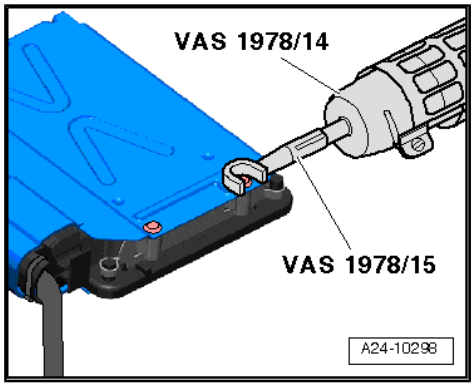
WARNING

Parts of the protective housing will become very hot as a result of heating the shear bolts. Take care to avoid burns. Try to ensure that only the thread is heated and none of the nearby components. These should be covered if necessary.

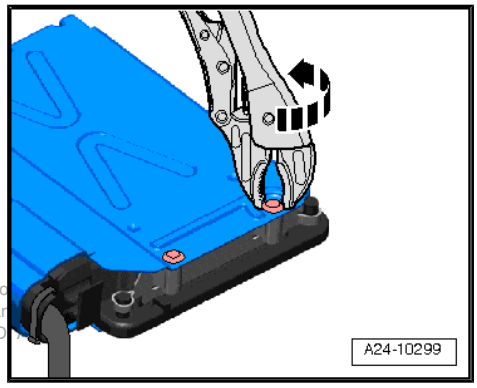
– Carry out the following operations on the two shear bolts -arrows-, one after the other.



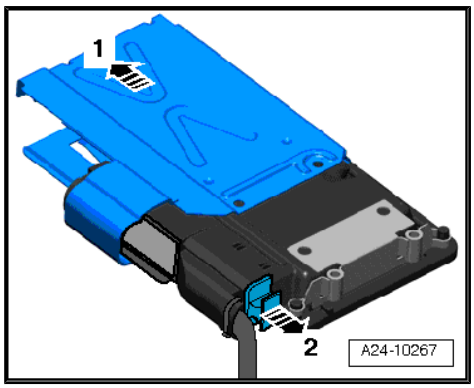
– Fit shrink element for hot air blower -VAS 1978/15- to hot air blower 220 V/ 50 HZ -VAS 1978/14- .
– Place the shrink element for hot air blower close to the shear bolt on the protective housing.
– Switch on the hot air blower and heat the bolt for 20 ... 25 seconds.



– Grasp the bolt head with the vice-grip pliers and unscrew the shear bolt.



– Slide back protective housing -arrow 1-.
– Unplug electrical multi-pin connector -arrow 2-.



Note

When the connectors are disconnected from the engine control unit, the learnt values are erased but the contents of the fault memory remain intact.

Installing

Installation is carried out in the reverse order; note the following:

– Reinstall the engine control unit into the protective housing.
– Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
– Use new shear bolts.

After installing a new engine control unit, the following operations must be performed:

– Activate engine control unit in “Guided Functions” under the test procedure / function “Renew engine control unit” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

28 – Ignition system

1 General notes and safety precautions

1.1 General notes on ignition system

- A voltage of at least 12.5 V is required for proper operation of electrical components.
- If the engine starts, runs for a short period and then cuts out after completing fault finding, repairs or component tests, this may be due to the immobiliser disabling the engine control unit. The fault memory must then be interrogated and, if necessary, the control unit must be adapted.

1.2 Safety precautions

Observe the following to prevent injuries to persons and damage to the injection and ignition system:

- Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- Always switch off ignition before washing engine.
- Faults are stored in engine control unit if electrical connectors have been unplugged:

– With ignition switched off, connect vehicle diagnostic, testing and information system -VAS 5051B- .

– Start “Guided Functions” mode.

– Generate readiness code in engine control unit.

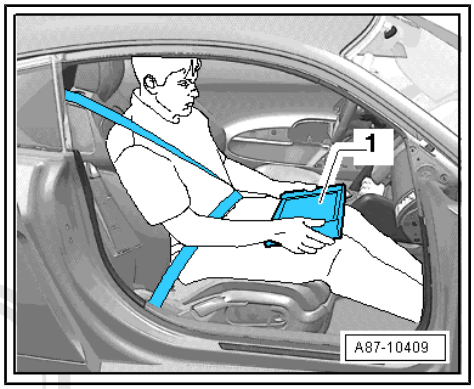
Caution

To prevent damage to the electronic components when disconnecting the battery:

- *Observe notes on procedure for disconnecting the battery.*
- *Always switch off the ignition before disconnecting the battery.*

– Disconnect battery ⇒ Rep. Gr. 27 .

Note the following if testers and measuring instruments have to be used during a road test:



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Injuries can also be caused if the passenger's airbag is triggered in a collision.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*

TT Coupé:

Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.

TT Roadster:

- *Move the passenger's seat back as far as it will go.*
- *Use only vehicle diagnosis and service information system -VAS 5052- or diagnosis system -VAS 5053- .*
- *The test equipment -1- must rest flat on the passenger's thighs (as shown in illustration) and must be operated by the passenger.*

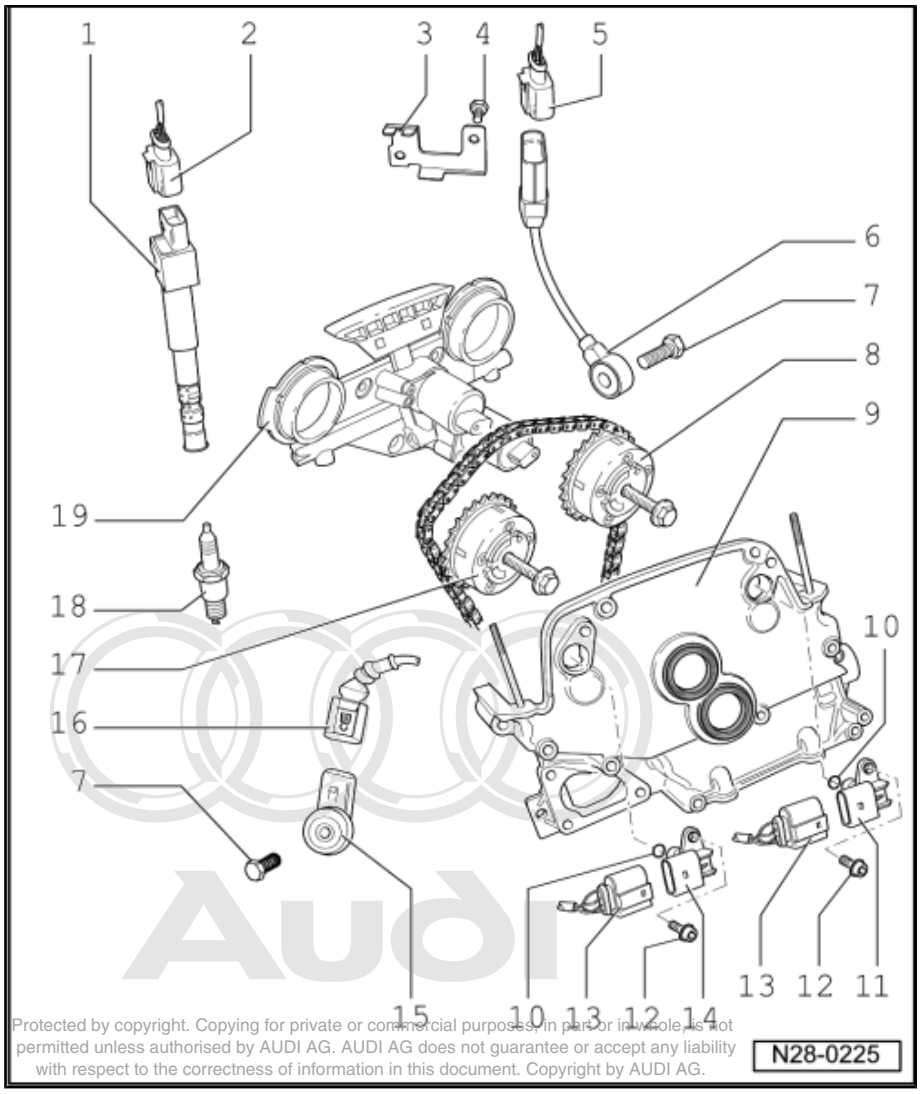
2 Servicing ignition system

2.1 Test data

Test data	3.2 ltr. / 4V / 184 kW engine
Idling speed Cannot be adjusted; regulated by idling speed stabilisation	600 ... 700 rpm[1)]
Maximum rpm governed by deactivation of fuel injectors	approx. 6,500 rpm
Ignition timing Not adjustable (determined by control unit)	
Ignition system	Multi-coil system with 6 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Designation of spark plugs	⇒ Data sheets for exhaust emission test

- [1)]Current values ⇒ Data sheets for exhaust emission test.

2.2 Ignition system - exploded view



1 - Ignition coils with output stages

- ❑ Cylinder 1 ignition coil 1 with output stage -N70-
- ❑ Cylinder 2 ignition coil 2 with output stage -N127-
- ❑ Cylinder 3 ignition coil 3 with output stage -N291-
- ❑ Cylinder 4 ignition coil 4 with output stage -N292-
- ❑ Cylinder 5 ignition coil 5 with output stage -N323-
- ❑ Cylinder 6 ignition coil 6 with output stage -N324-
- ❑ Removing and installing ⇒ page 43

2 - 4-pin connector

- ❑ For ignition coils with output stage

3 - Bracket

- ❑ For connector for knock sensor 1 -G61-

4 - Bolt

- ❑ 10 Nm

5 - 3-pin connector

- ❑ Black
- ❑ With gold-plated contacts

6 - Knock sensor 1 -G61-

7 - Bolt

- ❑ 20 Nm
- ❑ To ensure correct operation of the knock sensor, it is important to adhere to the specified tightening torque.

8 - Camshaft adjuster

- ❑ Exhaust side
- ❑ With sender wheel for Hall sender 2 -G163-
- ❑ Adjusting valve timing after re-installation ⇒ Rep. Gr. 13

9 - Upper cover for camshaft timing chain

- ❑ Removing and installing ⇒ Rep. Gr. 13

10 - Seal

- ❑ Renew

11 - Hall sender 2 -G163-

- ❑ For exhaust camshaft

12 - Bolt

- ❑ 10 Nm

13 - 3-pin connector

- ❑ Black
- ❑ With gold-plated contacts

14 - Hall sender -G40-

- ❑ For inlet camshaft

15 - Knock sensor 2 -G66-

16 - 2-pin connector

- ❑ Black
- ❑ With gold-plated contacts

17 - Camshaft adjuster

- ❑ Inlet side
- ❑ With sender wheel for Hall sender -G40-
- ❑ Adjusting valve timing after re-installation ⇒ Rep. Gr. 13

18 - Spark plug

- ❑ Current values ⇒ Data sheets for exhaust emission test
- ❑ Removing and installing ⇒ Maintenance ; Booklet 810

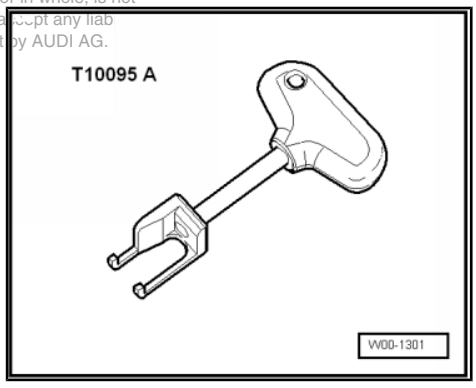
19 - Valve timing housing

- ❑ For variable valve timing
- ❑ Removing and installing ⇒ Rep. Gr. 13

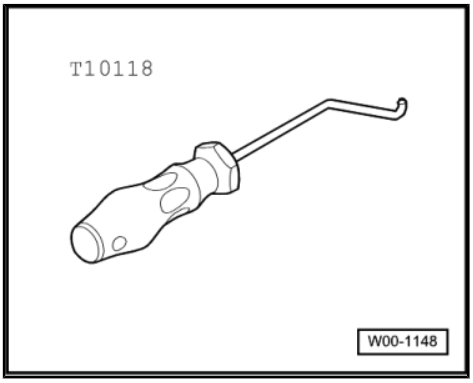
2.3 Removing and installing ignition coils

Special tools and workshop equipment required

- ♦ Puller -T10095 A-

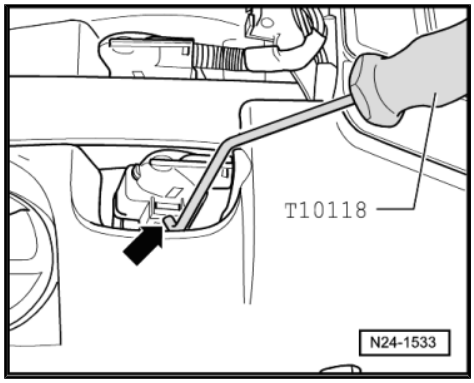


- ♦ Assembly tool -T10118-

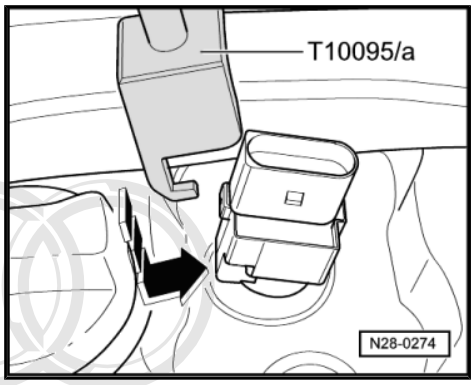


Removing

– Detach electrical connectors at ignition coils by releasing tab -arrow- with assembly tool -T10118- and carefully pulling connector.



– Attach puller -T10095 A- to ignition coils as shown in illustration -arrow- and remove ignition coils one at a time.



Installing

Installation is carried out in the reverse order; note the following:

– Insert the ignition coils into the holes so that the flat edges align with one another -arrows-.