Workshop Manual

Fabia II 2007 ➤ , Fabia II 2009 ➤ , Fabia II 2011 ➤ , Rapid India 2011 ➤ , Rapid NH 2013 ➤ , Rapid NH 2014 ➤ , Roomster 2006 ➤

1.6/77 kW MPI engine									
Engine ID	BTS	CFNA	CLSA						

Edition 03.2014

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

Repair Group

00 - Technical data
01 - Self-diagnosis
10 - Removing and installing engine
13 - Crankshaft group
15 - Cylinder head, valve gear
17 - Lubrication
19 - Cooling
20 - Fuel supply system
24 - Mixture preparation - injection
26 - Exhaust system
28 - Ignition system

Contents

00 - Technical data 1
1 Technical data 1
1.1 Engine number 1
1.2 Engine characteristics 1

01 - Self-diagnosis 3
1 Self diagnosis, safety measures, cleanliness regulations, directions 3
1.1 Self-diagnosis 3
1.2 Safety precautions when working on the fuel supply system 3
1.3 Rules of cleanliness to observe when working on the fuel supply system 4
1.4 Safety measures to apply when working on the fuel injection and ignition system 4
1.5 General notes on the injection system 5
1.6 General notes on the ignition system 5
1.7 Supplementary instructions and assembly work on vehicles with an air conditioning system 5

10 - Removing and installing engine 7
1 Removing and installing engine 7
1.1 Removing engine 7
1.2 Securing the engine to the assembly stand 11
1.3 Install 12
1.4 Assembly bracket 14

13 - Crankshaft group 16
1 Cylinder block - Belt pulley side 16
1.1 V-ribbed belt drive - Summary of components 16
1.2 Removing and installing V-ribbed belt 18
1.3 Camshaft drive - Summary of components 20
1.4 Camshaft drive - Summary of components 23
1.5 Removing and installing the timing case 26
2 Cylinder block, sealing flange and flywheel 30
2.1 Cylinder block - Summary of components 30
2.2 Replacing crankshaft seal on belt pulley side 32
2.3 Tightening process of the screw for crankshaft belt pulley 33
2.4 Removing and installing flywheel 36
2.5 Removing and installing drive plate 37
2.6 Replacing the sealing flange for crankshaft - gearbox side 39
3 Pistons and conrods 48
3.1 Piston and conrod - Summary of components 48
3.2 Inspect piston, piston rings and cylinder bore 49
3.3 Separating new conrod 50

15 - Cylinder head, valve gear 52
1 Cylinder head 52
1.1 Distinguishing features of cylinder heads 52
1.2 Cylinder head - Summary of components (version A) 52
1.3 Cylinder head - Summary of components (version B) 54
1.4 Check the timing for the cylinder head version A 56
1.5 Check the timing for the cylinder head version B 57
1.6 Setting the timing for the cylinder head version A 59
1.7 Setting the timing for the cylinder head version B 63
1.8 Removing and installing timing chain and drive chain for cylinder head version A 67

1.9 Removing and installing timing chain and drive chain of the oil pump for cylinder head version B . . . 73
1.10 Removing and installing camshaft housing . . . 79
1.11 Removing and installing the cylinder head . . . 83
1.12 Testing the compression . . . 85
2 Valve gear . . . 87
2.1 Valve gear - Summary of components (version A) . . . 87
2.2 Valve gear - Summary of components (version A) . . . 89
2.3 Valve gear - Summary of components (version B) . . . 92
2.4 Reworking valve seats . . . 93
2.5 Inspect valve guides . . . 96
2.6 Removing and installing valve stem seals . . . 97

17 - Lubrication . . . 100
1 Removing and installing parts of the lubrication system . . . 100
1.1 Lubrication system - Summary of components . . . 100
1.2 Lubrication system - Summary of components . . . 102
1.3 Removing and installing oil pan . . . 105
1.4 Removing and installing oil pump . . . 107
1.5 Testing oil pressure and oil pressure switch F1 . . . 109

19 - Cooling . . . 111
1 Removing and installing parts of the cooling system . . . 111
1.1 Parts of cooling system on the side next to the body - Summary of components . . . 111
1.2 Cooling system attached to engine - Summary of components . . . 116
1.3 Connection diagram for coolant hoses . . . 118
1.4 Draining and filling up coolant . . . 118
1.5 Removing and installing radiator . . . 119
1.6 Checking the coolant system for leaktightness . . . 120
1.7 Removing and installing coolant pump . . . 123

20 - Fuel supply system . . . 124
1 Removing and installing parts of the fuel supply system . . . 124
1.1 Fuel tank with attached parts and fuel filter - Summary of components . . . 124
1.2 Fuel tank with attached parts and fuel filter - Summary of components . . . 126
1.3 Fuel tank with attached parts and fuel filter - Summary of components . . . 128
1.4 Extract fuel from the fuel tank . . . 130
1.5 Removing and installing fuel delivery unit . . . 132
1.6 Removing and installing the sender for fuel gauge display G . . . 134
1.7 Removing and installing the fuel tank . . . 135
1.8 Separating quick couplings . . . 138
2 Testing parts of fuel supply system . . . 143
2.1 Testing fuel pump . . . 143
2.2 Venting air from the fuel system . . . 148
2.3 Switching off the fuel delivery unit using the crash signal . . . 149
3 Accelerator pedal . . . 150
3.1 Accelerator pedal module - Summary of components . . . 150
4 Activated charcoal container system . . . 151
4.1 Activated charcoal container system - Summary of components . . . 151
4.2 Activated charcoal container system - Summary of components . . . 152
4.3 Activated charcoal container system - Summary of components . . . 153
4.4 Checking the fuel tank venting . . . 154
4.5 Checking the fuel tank venting . . . 154
4.6 Checking the fuel tank venting . . . 155

24 - Mixture preparation - injection . . . 157

1 **Fuel Injection System** 157
1.1 Injection and ignition system - Overview of fitting locations 157
1.2 Intake manifold - Summary of components 159
1.3 Fuel strip with injection valves - Summary of components 160
1.4 Air filter housing - Summary of components 161
1.5 Removing and installing engine speed sender G28 161
1.6 Removing and installing air filter housing 162
1.7 Removing and installing injection valves 163
1.8 Checking the tightness of the injection valves and the fuel injection rate 164
1.9 Clean throttle valve control unit J338 167
2 **Engine control unit** 169
2.1 Removing and installing engine control unit J623 169

26 - Exhaust system 171
1 **Removing and installing parts of the exhaust system** 171
1.1 Exhaust manifold and pre-exhaust pipe - Summary of components 171
1.2 Exhaust manifold and pre-exhaust pipe - Summary of components 172
1.3 Exhaust gas system - Summary of components 174
1.4 Exhaust gas system - Summary of components 175
1.5 Middle and rear silencer - Summary of components 177
1.6 Middle and rear silencer - Summary of components 177
1.7 Middle and rear silencer - Summary of components 178
1.8 Middle and rear silencer - Summary of components 179
1.9 Replacing middle or rear silencer 180
1.10 Aligning exhaust system free of stress 181
1.11 Inspecting the exhaust system for leaktightness 182

28 - Ignition system 183
1 **Ignition system** 183
1.1 Ignition system - Summary of components 183
1.2 Removing and installing ignition coils with power output stages 184

00 – Technical data

1 Technical data

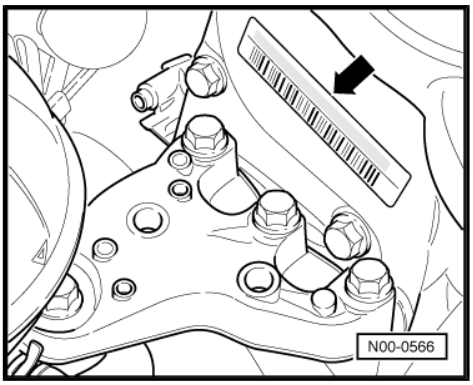
(SRL000678; Edition 03.2014)

1.1 Engine number

The engine identification characters and the engine number can be found on the sticker -arrow- at the timing case.

In addition, the engine identification characters are indicated on the vehicle data sticker and also at the front on the cylinder block on the connecting flange for gearbox.

The engine number consists of 9 characters. The first part represents the “engine code” (a maximum of 3 identification letters), the second part the “serial number”. If more than 999.999 engines with the same engine code were produced then the first digit of the six part section will be replaced by a letter.



1.2 Engine characteristics

Edition 03.2014; version 4.0

Identification characters		BTS	CFNA	CLSA
Manufactured	Fabia II	04.07 ▸ 07.10	06.10 ▸	08.10 ▸
	Roomster	05.06 ▸ 07.10	06.10 ▸	
	Rapid NH		02.13 ▸	
	Rapid NK		03.14 ▸	
	Rapid NA			09.11 ▸
Exhaust limit values conforming to		EU-4, EU-2 DDK	EU-4, EU-2 DDK	EU-4 IND (BS4)
Displacement	cm ^{3}	1598	1598	1598
Power output	kW at rpm	77/5600	77/5600	77/5600
Torque	Nm at rpm	153/3800	153/3800	153/3800
Bore	∅ mm	76.5	76.5	76.5
Stroke	mm	86.9	86.9	86.9
Compression		10.5 : 1	10.5 : 1	10.5 : 1
Cylinder / valves per cylinder		4/4	4/4	4/4
Fuel - RON	min.	unleaded 95 [1)]	unleaded 95 [1)]	unleaded 95 [1)]
Ignition system, fuel injection		Motronic ME 7.5.20	Magneti Marelli 7GV	Magneti Marelli 7GV
Firing order		1-3-4-2	1-3-4-2	1-3-4-2
Knock control		yes	yes	yes
Self-diagnosis		yes	yes	yes
Lambda control		yes	yes	yes
Catalytic converter		yes	yes	yes
Balancing shaft		no	no	no
Exhaust gas recirculation		no	no	no

[1)] At least 91 RON in exceptional cases; although engine output is reduced.

01 – Self-diagnosis

1 Self diagnosis, safety measures, cleanliness regulations, directions

1.1 Self-diagnosis

This Rep.-Gr. is deleted.

For this use “Vehicle self-diagnosis”, “Measuring method” and “Fault finding” ⇒ Vehicle diagnostic tester.

1.2 Safety precautions when working on the fuel supply system

WARNING

The fuel feed line is pressurized! Place a clean cleaning cloth around the connection point before detaching wiring. Reduce pressure by carefully removing the wiring.

WARNING

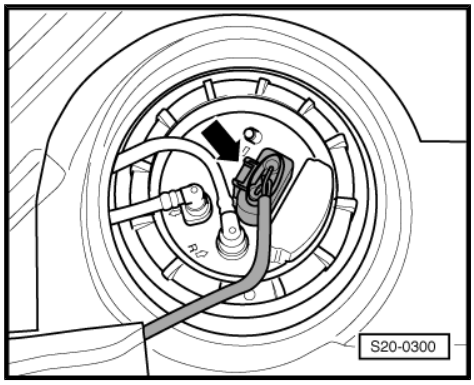
When undertaking all assembly work, particularly in the engine compartment due to its cramped construction, please observe the following:

- *Lay lines of all kinds (e.g. fuel, hydraulic fluid, the activated charcoal container system, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- *Ensure that there is adequate free access to all moving or hot components.*

When removing and installing the fuel gauge sender or the fuel delivery unit from a full or partly filled fuel tank, pay attention to the following points:

- The extraction hose of an exhaust extraction system which is switched on, must be positioned close to the assembly opening of the fuel tank in order to extract the released fuel vapours, even before the work is commenced. If no exhaust extraction system is available, a radial fan (motor not in air flow of fan) with a delivery volume of more than 15 m^3/h must be used.
- Avoid skin contact with fuel! Wear fuel-resistant gloves!

- The fuel delivery unit is activated when the ignition is switched on and by the door contact switch of the driver door. For safety reasons, before opening the fuel system and in the event that the battery is not disconnected, the plug -arrow- must be disconnected from the fuel delivery unit or the fuse for the voltage supply of the fuel delivery unit must be pulled out according to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



1.3 Rules of cleanliness to observe when working on the fuel supply system

Pay careful attention to the following rules of cleanliness when working on the fuel supply or fuel injection systems:

- Thoroughly clean the connection points and their surroundings before releasing.
- Place removed parts on a clean surface and cover. Do not use fuzzy cloths!
- Carefully cover or seal opened or removed components if the repair is not carried out immediately.
- Only install clean parts: Remove spare parts from their wrapping immediately before fitting. Do not use any parts which have been stored unwrapped (e.g. in tool boxes).
- When the system is open: Avoid using compressed air whenever possible. Avoid moving the vehicle.

1.4 Safety measures to apply when working on the fuel injection and ignition system

WARNING

The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

Observe the following points to prevent injury to persons and/or damage to the injection and ignition system:

- Do not touch or remove ignition leads with the engine running or at start speed.
- Ignition must be switched off before disconnecting and reconnecting the cables of the fuel injection and the ignition system as well as of the test equipment.
- If the engine must be operated at starter speed, without it starting, e.g. during compression pressure testing: open the cover on the fuse holder underneath the dash panel and pull out the fuse for the injection valves - N30, N31, N32, N33- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

If test and measuring devices are required during test drives observe the following:

- Always secure the test and measuring devices on the rear seat and have a second person operate them there.

- If the test and measuring devices are operated from the passenger seat, the passenger could be injured by the release of the passenger airbag in the event of an accident.

1.5 General notes on the injection system

- The engine control unit is equipped with self-diagnosis. Before repairs as well as for fault finding first interrogate the fault memory ⇒ Vehicle diagnostic tester.
- Fuel hoses in the engine compartment must be secured with spring band clamps. The use of clamp-type or screw-type clips is not allowed.
- A minimum voltage of 11.5 V is required for perfect functioning of the electrical components.
- Do not use sealants containing silicone. Traces of silicone elements drawn in by the engine are not burnt in the engine and damage the lambda probes.
- Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the fault memory after having completed all inspections and repairs, and if necessary delete ⇒ Vehicle diagnostic tester.

Safety measures ⇒ page 4

1.6 General notes on the ignition system

Setting data, spark plugs:

- ⇒ Maintenance ; Booklet Fabia II .
- ⇒ Maintenance ; Booklet Roomster .
- ⇒ Maintenance ; Booklet Rapid NH .
- ⇒ Maintenance ; Booklet Rapid NA .

Repairing ignition ⇒ page 183 .

- Switch off the ignition before disconnecting and connecting the battery, as this may damage the 4AV control unit.
- The engine control unit and further components are equipped with self-diagnosis; inspect ⇒ Vehicle diagnostic tester.
- A minimum voltage of 11.5 V is required for perfect functioning of the electrical components.
- Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the fault memory after having completed all inspections and repairs, and if necessary delete ⇒ Vehicle diagnostic tester.

Safety measures ⇒ page 4 .

1.7 Supplementary instructions and assembly work on vehicles with an air conditioning system

WARNING

Do not open the refrigerant circuit of the air conditioning system.

Note

In order to avoid damage to the condenser as well as to the refrigerant lines and hoses of the air conditioning system, ensure that the lines and hoses are not over-tensioned, kinked or bent.

Steps which should be taken in order to remove and install the engine without opening the refrigerant circuit:

– Unscrew the holding clamp(s) on the refrigerent lines
– Remove V-ribbed belt ⇒ page 18 .
– Remove AC compressor ⇒ Heating, Air Conditioning; Rep. gr. 87 .
– Mount the air conditioning compressor and the condenser in such a way that the refrigerent lines/hoses are not under tension.

10 – Removing and installing engine

1 Removing and installing engine

Special tools and workshop equipment required

- Engine mount - T40075 A-
- Engine mount - MP1-202- for assembly stand - MP9-101-
- Assembly stand - MP9-101-
- Lifting device - MP9-201 (2024 A)-
- Workshop crane , e.g. -V.A.S 6100-
- Catch pan , e.g. -VAS 6208-
- Double ladder
- Pliers for spring strap clamps
- Wire
- Grease - G 000 100-
- Hot screw paste - G 052 112 A3-

1.1 Removing engine

Note

- *The engine is removed downwards together with the gearbox.*
- *All cable straps that have been loosened or cut open when the engine was removed must be fitted again in the same locations when the engine is installed again.*
- *Collect drained coolant in a clean container for reuse or proper disposal.*
- *Jacking up points for raising the vehicle:*
- ⇒ Maintenance ; Booklet Fabia II .
- ⇒ Maintenance ; Booklet Roomster .
- ⇒ Maintenance ; Booklet Rapid NH .
- ⇒ Maintenance ; Booklet Rapid NA .

– Observe all safety measures and notes for assembly work on the fuel supply, injection and ignition system; as well as the rules for cleanliness ⇒ page 3 .

WARNING

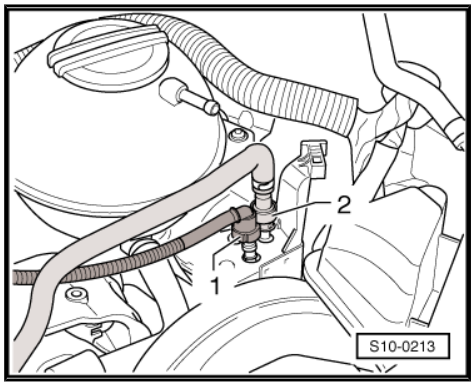
Observe measures when disconnecting the battery ⇒ Electrical System; Rep. gr. 27 .

– Remove battery and battery tray ⇒ Electrical System; Rep. gr. 27 .

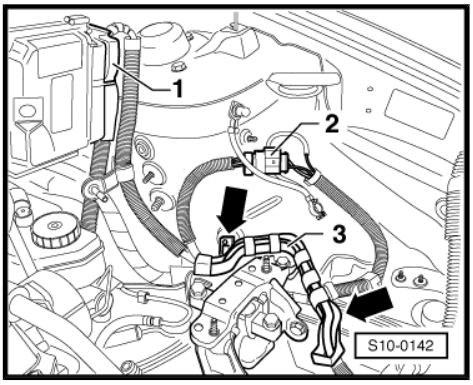
– Remove air filter housing with air guide ⇒ page 161 .

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 50 .

– Remove the front wheelhouse liners ⇒ Body Work; Rep. gr. 66 .
– Drain coolant ⇒ page 118 .
– Remove the coolant hoses from the radiator to the coolant regulator housing.
– Pull off coolant hoses from heat exchanger for heating.
– Detach coolant hoses from coolant expansion bottle.
– Disconnect plugs from radiator fan - V7- and from thermos-witch for radiator fan - F18- .
– Pull out the fuel feed line -2- (catch the fuel which flows out with a cleaning cloth) and the vent line -1-. Unlock the quick coupling and disconnect ⇒ page 138 .
– Seal the lines in order to prevent any dirt from penetrating into the fuel system.
– Disconnect the vacuum and bleeder hoses from the engine or from other components.



– Unplug connector -1- from the engine control unit.
– Unplug connector -2-.
– Unclip cable clip -3- -arrows-.



The engine is removed together with the wiring loom.

– Disconnect all cables for the engine, gearbox and starter motor which will get in the way during removal.

Vehicles fitted with a manual gearbox

– Remove shift mechanism from gearbox ⇒ Gearbox; Rep. gr. 34 .
– Remove slave cylinder ⇒ Gearbox; Rep. gr. 30 .

Note

Do not depress the clutch pedal.

Vehicles with automatic gearbox

– Remove shift mechanism from gearbox ⇒ Automatic Gearbox; Rep. gr. 37 .

Vehicles with air conditioning

WARNING

Do not open the refrigerant circuit of the air conditioning system.

Note

In order to avoid damage to the AC compressor as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

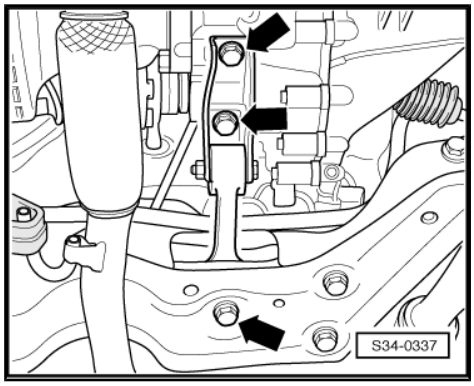
– Remove V-ribbed belt ⇒ page 18 .
– Remove AC compressor from holder ⇒ Heating, Air Conditioning; Rep. gr. 87 .
– Secure the air-conditioning compressor with attached lines to the assembly carrier.

Continued for all vehicles

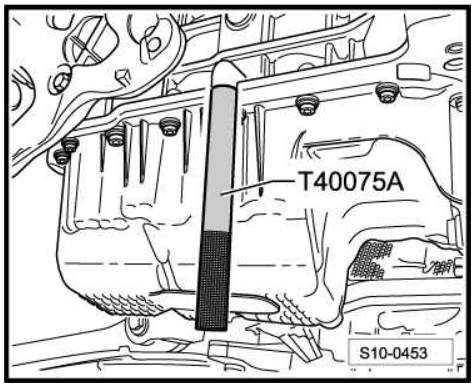
– Remove pre-exhaust pipe:

♦ Fabia II and Roomster vehicles with engine identification characters BTS ⇒ page 171 .
♦ Fabia II and Roomster vehicles with engine identification characters CFNA ⇒ page 172 .
♦ Fabia II vehicles with engine identification characters CLSA ⇒ page 174
♦ Rapid NH, NK vehicles with engine identification characters CFNA ⇒ page 175
♦ Rapid NA vehicles with engine identification characters CLSA ⇒ page 175

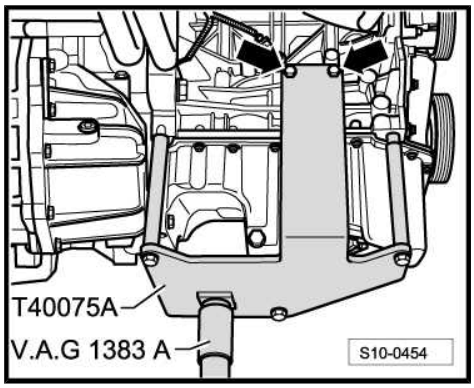
– Unbolt the pendulum support -arrows-.
– Unscrew drive shaft to the right and left of the gearbox and tie up ⇒ Body; Rep. gr. 40 .



– First of all tighten the bolt of the engine mount - T40075 A- at the front on the engine.



– Position the engine mount - T40075 A- in the engine/gearbox jack - V.A.G 1383 A- .
– Tighten engine mount - T40075 A- at the bolt.
– Screw engine mount - T40075 A- onto cylinder block reverse side to 20 Nm -arrows-.
– Slightly raise the engine/gearbox unit.

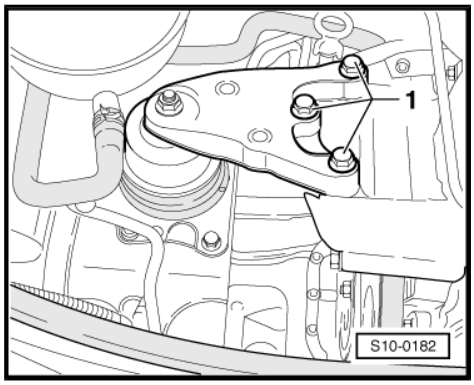


Note

Use double ladder to release the screws for the assembly bracket.

For vehicles with assembly bracket version 1

– Unscrew bolts -1-.

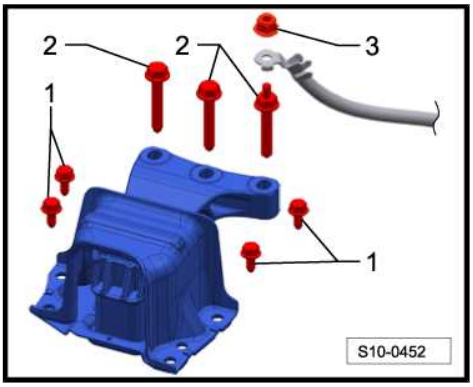


For vehicles with assembly bracket version 2

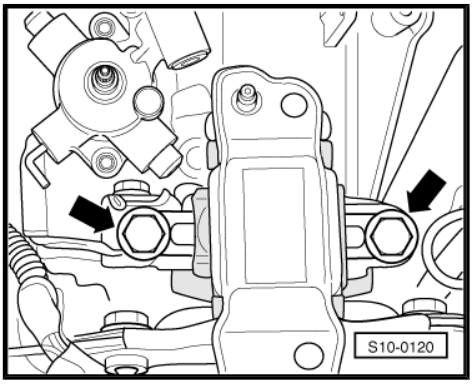
– Unscrew nut -3- and disconnect earth lead from engine mount.

– Unscrew bolts -2-.

For all vehicles



– Unscrew screws -arrows- and remove gearbox mount.



Note

- *Check whether all hose and line connections between engine, gearbox and body are released.*
- *Carefully lower engine with gearbox in order to avoid damage.*

– Pull engine/gearbox unit as far forward as possible and lower slowly downwards.

1.2 Securing the engine to the assembly stand

Special tools and workshop equipment required

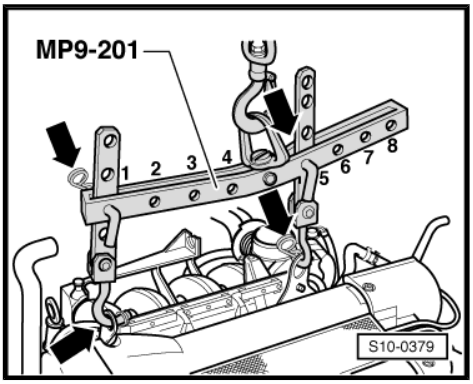
- Lifting device - MP9-201 (2024 A)-
- Engine mount - MP1-202- for assembly stand - MP9-101- , where necessary engine and gearbox jack - VAS 6095-
- Assembly stand - MP9-101-
- Workshop crane , e.g. -V.A.S 6100-

Secure the engine with engine mount - MP1-202- on the assembly stand - MP9-101- before performing assembly work.

– Unscrew gearbox from engine:

- ⇒ Manual gearbox; Rep. gr. 34 .
- ⇒ Automatic gearbox; Rep. gr. 37 .

– Hang lifting device - MP9-201- as follows and slightly raise engine with the workshop crane .



On the belt pulley side: 2. Hole of the extension in Position 1

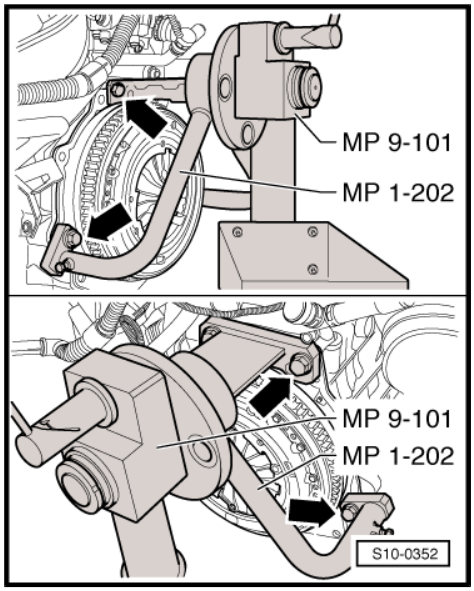
On the flywheel side: 1. Hole of the extension in Position 5

WARNING

Use securing pins on the hooks and rig pins -arrows-.

– Remove coolant regulator housing from the cylinder head.

– Screw engine mount - MP1-202- to engine and secure to the assembly stand - MP9-101- .



1.3 Install

Installation is performed in the reverse order, pay attention to the following points:

Note

- *When performing installation work replace the self-locking nuts.*
- *Replace screws which have been tightened to a torquing angle as well as gasket rings and seals.*
- *All cable straps should be fitted on again in the same place when installing.*
- *Secure all hose connections with corresponding hose clips.*

Vehicles fitted with a manual gearbox

Note

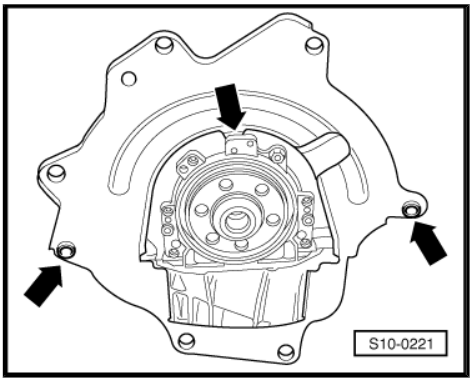
Clean the drive shaft serration and hub serration on used clutch discs, remove corrosion. Apply a very thin layer of grease - G 000 100- onto the serration. Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Remove all excess grease so that it does not get onto the friction surfaces of the clutch.

– Inspect clutch release bearing for wear, replace if necessary.
– Grease the clutch release bearing and guide bushing for release bearing with grease - G 000 100- .

Continued for all vehicles

– Check whether the dowel sleeves for centering the gearbox are present in the cylinder block, insert if necessary.

– Insert intermediate plate on sealing flange and push onto the dowel sleeves -arrows-.



– Install gearbox on engine:

♦ ⇒ Manual gearbox; Rep. gr. 34 .

♦ ⇒ Automatic gearbox; Rep. gr. 37 .

– When swiveling the unit, ensure adequate clearance particularly to the drive shafts.

– Align the engine and gearbox mounting so that it is stress-free through tapping movements.

Note

Tightening order and tightening torques of screws for assembly bracket ⇒ page 14 .

– Install drive shafts ⇒ Chassis; Rep. gr. 40 .

– Install pre-exhaust pipe:

♦ Fabia II and Roomster vehicles with engine identification characters BTS ⇒ page 171 .

♦ Fabia II and Roomster vehicles with engine identification characters CFNA ⇒ page 172 .

♦ Fabia II vehicles with engine identification characters CLSA ⇒ page 174

♦ Rapid NH, NK vehicles with engine identification characters CFNA ⇒ page 175

♦ Rapid NA vehicles with engine identification characters CLSA ⇒ page 175

Vehicles with air conditioning

– Install AC compressor at holder ⇒ Heating, Air Conditioning; Rep. gr. 87 .

– Install the V-ribbed belt ⇒ page 18 .

Continued for all vehicles

– Electrical connections and proper routing ⇒ Electrical System; Rep. gr. 97 .

Vehicles fitted with a manual gearbox

– Install slave cylinder ⇒ Gearbox; Rep. gr. 30 .

– Attach shift mechanism ⇒ Gearbox; Rep. gr. 34 .

Vehicles with automatic gearbox

– Attach the selector lever control cable at the gearbox ⇒ Automatic gearbox; Rep. gr. 37 .

Continued for all vehicles

– Install air filter housing ⇒ page 161 .

– Top up coolant ⇒ page 118 .

– Adapt the engine control unit to the throttle valve control unit - J338- ⇒ Vehicle diagnostic tester.

– Interrogate fault memory, rectify any faults existing and erase the fault memory ⇒ Vehicle diagnostic tester.

– Perform a test drive.

– Interrogate fault memory, rectify any faults existing and erase the fault memory ⇒ Vehicle diagnostic tester.

1.3.1 Tightening torques

Component		Nm
Screws and nuts	M6	9
	M7	13
	M8	20
	M10	40
	M12	70
deviations:		
Fixing screws of engine/gearbox: ◆ ⇒ Manual gearbox; Rep. gr. 34 . ◆ ⇒ Automatic gearbox; Rep. gr. 37 .		
Screws for assembly bracket ⇒ page 14 .		

1.4 Assembly bracket

Note

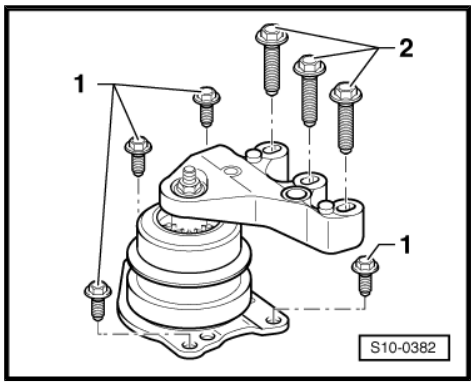
- *During installation, first insert all bolts for the bearing and tighten by hand at least 2 - 3 turns.*
- *Tighten screws for bracket in the sequence according to the numerical marking in the figures.*

1.4.1 Tightening torques

Assembly bracket - engine, version 1

1 - 20 Nm + torque a further 90° ($^1/_4$ turn) - replace

2 - 30 Nm + torque a further 90° ($^1/_4$ turn) - replace

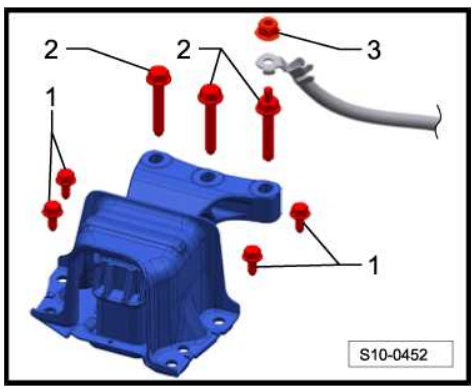


Assembly bracket - engine, version 2

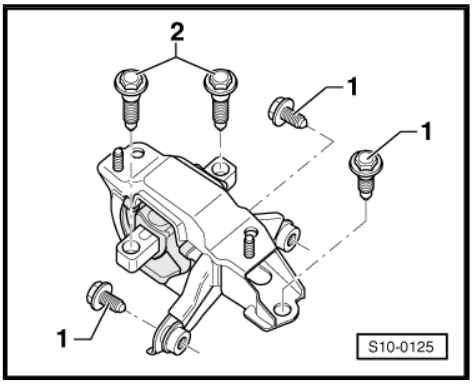
1 - 20 Nm + torque a further 90° ($^1/_4$ turn) - replace

2 - 30 Nm + torque a further 90° ($^1/_4$ turn) - replace

3 - 16 Nm



Assembly bracket - gearbox



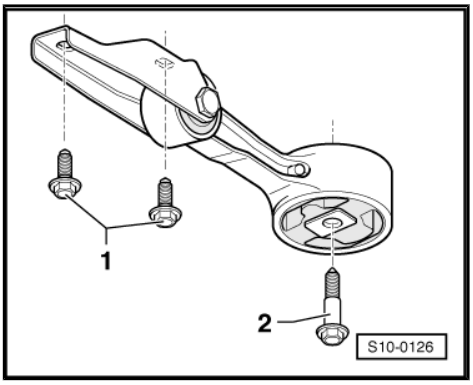
Note

Śruby -1- dokręcić w następującej kolejności: od tyłu, z przodu, następnie od góry.

1 - 50 Nm + torque a further 90° ($^1/_4$ turn) - replace

2 - 40 Nm + torque a further 90° ($^1/_4$ turn) - replace

Pendulum support



Note

Before tightening the screws -1- press off gearbox in the elongated holes of the pendulum support to the front in such a way that there is maximum distance between the gearbox and the assembly carrier.

1 - 30 Nm + torque a further 90° ($^1/_4$ turn) - replace

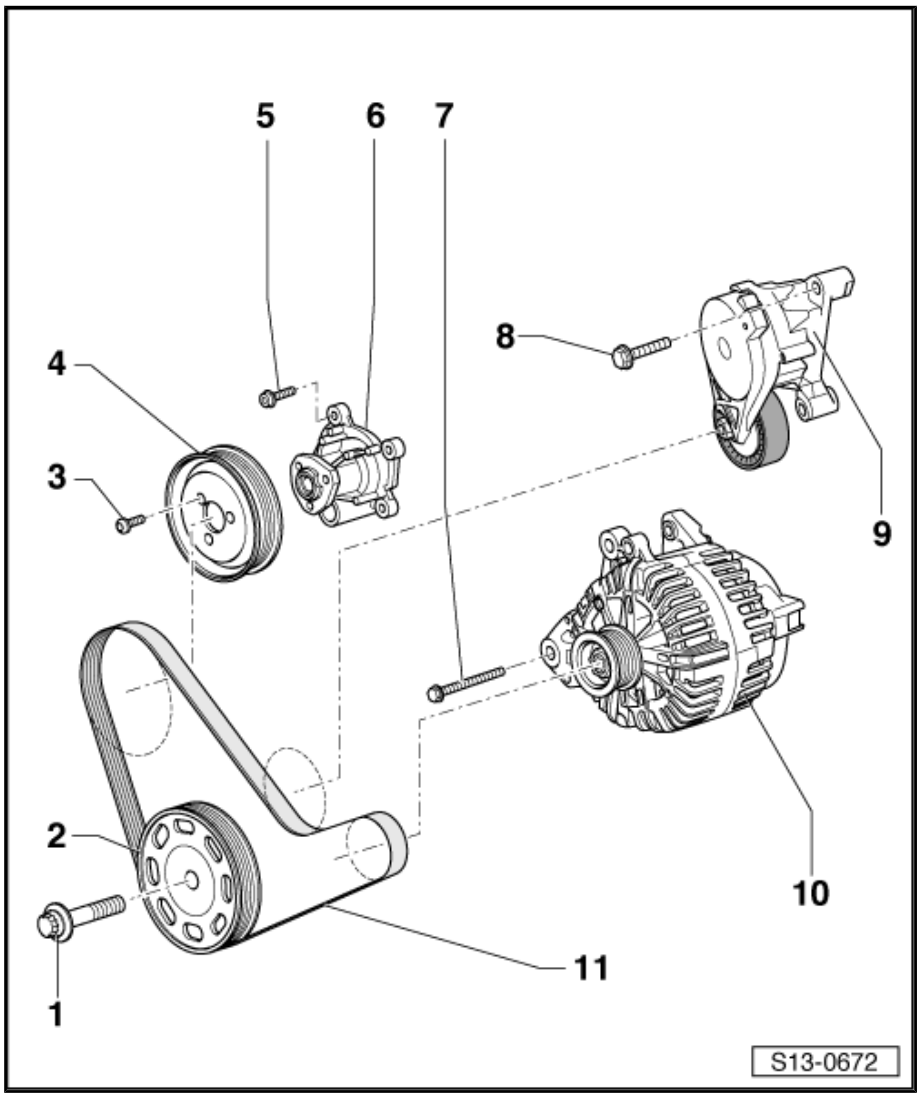
2 - 40 Nm + torque a further 90° ($^1/_4$ turn) - replace

13 – Crankshaft group

1 Cylinder block - Belt pulley side

1.1 V-ribbed belt drive - Summary of components

Vehicles without air conditioning



1 - Fixing screw

- ❑ replace
- ❑ pay attention to different version
- ❑ order of tightening ⇒ page 33
- ❑ The clamping surface of the fixing screw must be free of grease and oil.
- ❑ When loosening and tightening counterhold the belt pulley with the counterholder - T30004 (3415)- with bolts - T30004/1 (3415/1)- .

2 - Crankshaft-belt pulley

- ❑ Clamping surfaces must be free of oil and grease.

3 - 20 Nm

- ❑ When loosening and tightening, counterhold with adapted wrench for the water pump and power-assisted steering - MP1-308- .
- ❑ Adapt wrench for the water pump and power-assisted steering - MP1-308- ⇒ page 123

4 - Belt pulley for coolant pump

- ❑ removing and installing ⇒ page 123

5 - 10 Nm

6 - Coolant pump

- ❑ removing and installing ⇒ page 123

7 - 25 Nm

8 - 23 Nm

9 - Tensioning pulley

- ❑ swivel tensioning device for V-ribbed belt with open-end wrench to slacken the V-ribbed belt
- ❑ can be interlocked in released position with locating pin - T10060- or 4 mm hexagon socket wrench.

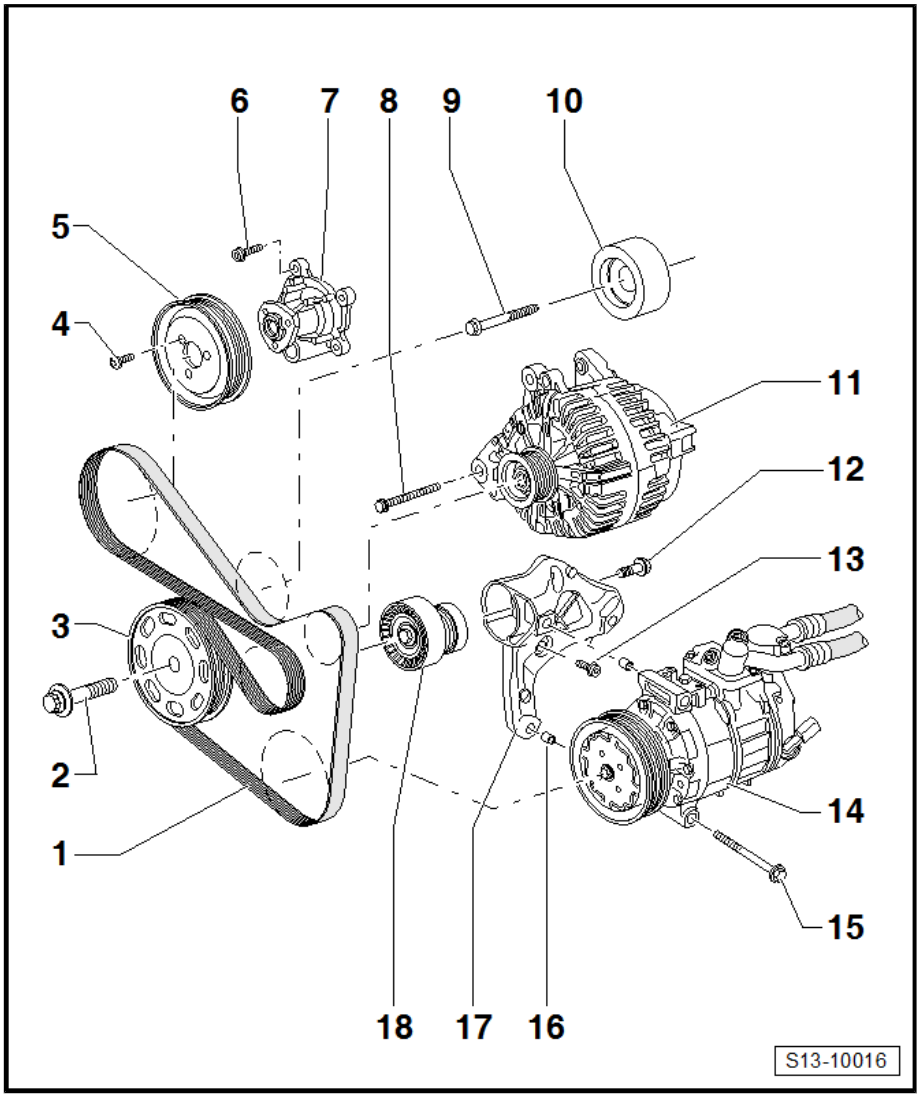
10 - Generator

- ❑ removing and installing ⇒ Electrical System; Rep. gr. 27
- ❑ to facilitate positioning, drive the threaded bushings of the retaining screws at the generator slightly backwards

11 - V-ribbed belt

- ❑ mark the direction of rotation with chalk or a felt-tip pen before removing
- ❑ check for wear
- ❑ do not kink
- ❑ removing and installing ⇒ page 18

Vehicles with air conditioning



1 - V-ribbed belt

- ❑ mark the direction of rotation with chalk or a felt-tip pen before removing
- ❑ check for wear
- ❑ do not kink
- ❑ removing and installing ⇒ page 18

2 - Fixing screw

- ❑ replace
- ❑ pay attention to different version
- ❑ order of tightening ⇒ page 33
- ❑ The clamping surface of the fixing screw must be free of grease and oil.
- ❑ When loosening and tightening counterhold the belt pulley with the counterholder - T30004 (3415)- with bolts - T30004/1 (3415/1)- .

3 - Crankshaft-belt pulley

- ❑ Clamping surfaces must be free of oil and grease.

4 - 20 Nm

- ❑ When loosening and tightening, counterhold with adapted wrench for the water pump and power-assisted steering - MP1-308- .
- ❑ Adapt wrench for the water pump and power-assisted steering - MP1-308- ⇒ page 123

5 - Belt pulley for coolant pump

- ❑ removing and installing ⇒ page 123

6 - 10 Nm

7 - Coolant pump

- ❑ removing and installing ⇒ page 123

8 - 25 Nm

9 - 40 Nm

10 - Guide pulley

11 - Generator

- ❑ removing and installing ⇒ Electrical System; Rep. gr. 27
- ❑ to facilitate positioning, drive the threaded bushings of the retaining screws at the generator slightly backwards

12 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

13 - 25 Nm

14 - AC compressor

- ❑ removing and installing ⇒ Air conditioning; Rep. gr. 87

15 - 25 Nm

16 - Fitting sleeve

17 - Bracket for AC compressor

18 - Tensioning pulley

- ❑ swivel with ring spanner to slacken the belt
- ❑ secure in the untensioned position with locking pin - T10060A- or 4 mm external hex socket
- ❑ to remove, release screw -Pos. 12-

1.2 Removing and installing V-ribbed belt

Special tools and workshop equipment required

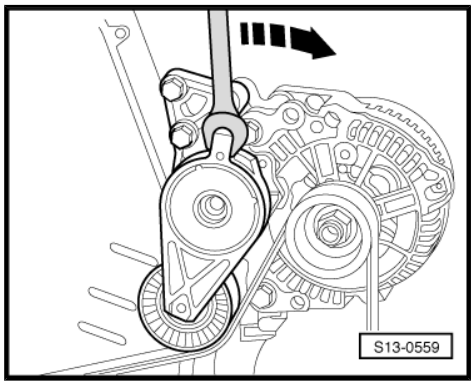
- ♦ Locking pin - T10060A- or 4 mm hexagon wrench

Removing

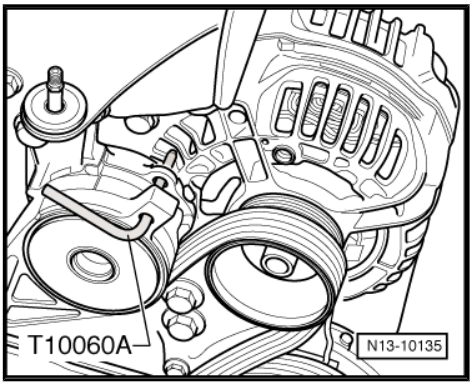
– Mark the rotation direction of the V-ribbed belt.

Vehicles without air conditioning

– Swivel tensioning pulley with an open-end wrench in -direction of arrow-.



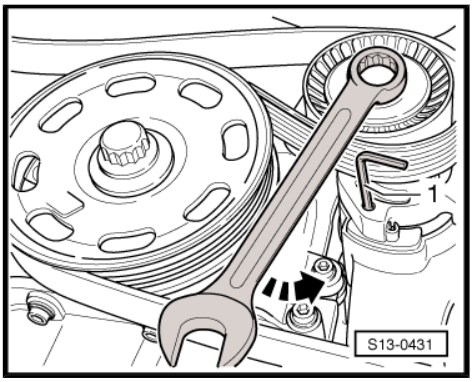
– Lock the tensioning pulley with the locking pin -T10060A- or with the 4 mm hexagon wrench.



Vehicles with air conditioning

– Swivel tensioning pulley with an open-end wrench in -direction of arrow-.

– Lock the tensioning pulley with the locking pin -T10060A- or with the 4 mm hexagon wrench -1-.



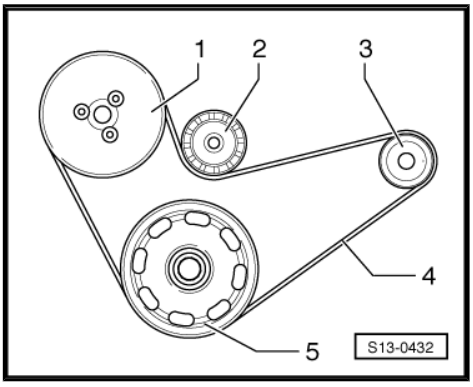
Continued for all vehicles

– Remove the release ribbed V-belt.

Install

Installation is performed in the reverse order, pay attention to the following points:

Routing of the ribbed V-belt - Vehicles without air conditioning



1 - Belt pulley for coolant pump

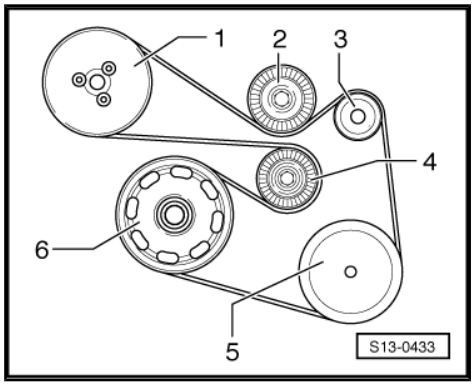
2 - Tensioning pulley

3 - Belt pulley for AC generator

4 - V-ribbed belt

5 - Crankshaft-belt pulley

Routing of the ribbed V-belt - Vehicles with air conditioning



1 - Belt pulley for coolant pump

2 - Guide pulley

3 - Belt pulley for AC generator

4 - Tensioning pulley

5 - Belt pulley for AC compressor

6 - Crankshaft-belt pulley

Note

- *Before fitting the V-ribbed belt make sure that all assemblies (generator, coolant pump, if necessary AC compressor) belt pulleys, tensioning and guide rollers are securely mounted.*
- *Replace damaged V-ribbed belt.*
- *If the belt is considerably worn it must be replaced.*
- *Do not bend or buckle the belt!*
- *Pay attention to the correct position and rotation direction of the V-ribbed belt in the belt pulley and rollers when installing it.*

– Lay the V-ribbed belt on the crankshaft belt pulley. Finally lay the V-ribbed belt on the tensioning pulley.

– Check correct positioning of the ribbed V-belt on the belt pulleys.

– Start engine and check ribbed V-belt run.

1.3 Camshaft drive - Summary of components

For engine with identification characters BTS

Caution

If considerable quantities of metal swarf or abrasion is found when carrying out engine repairs, this can be subject to damage to the crankshaft and conrod bearings. In order to avoid consequential damage, after the repair perform the following tasks:

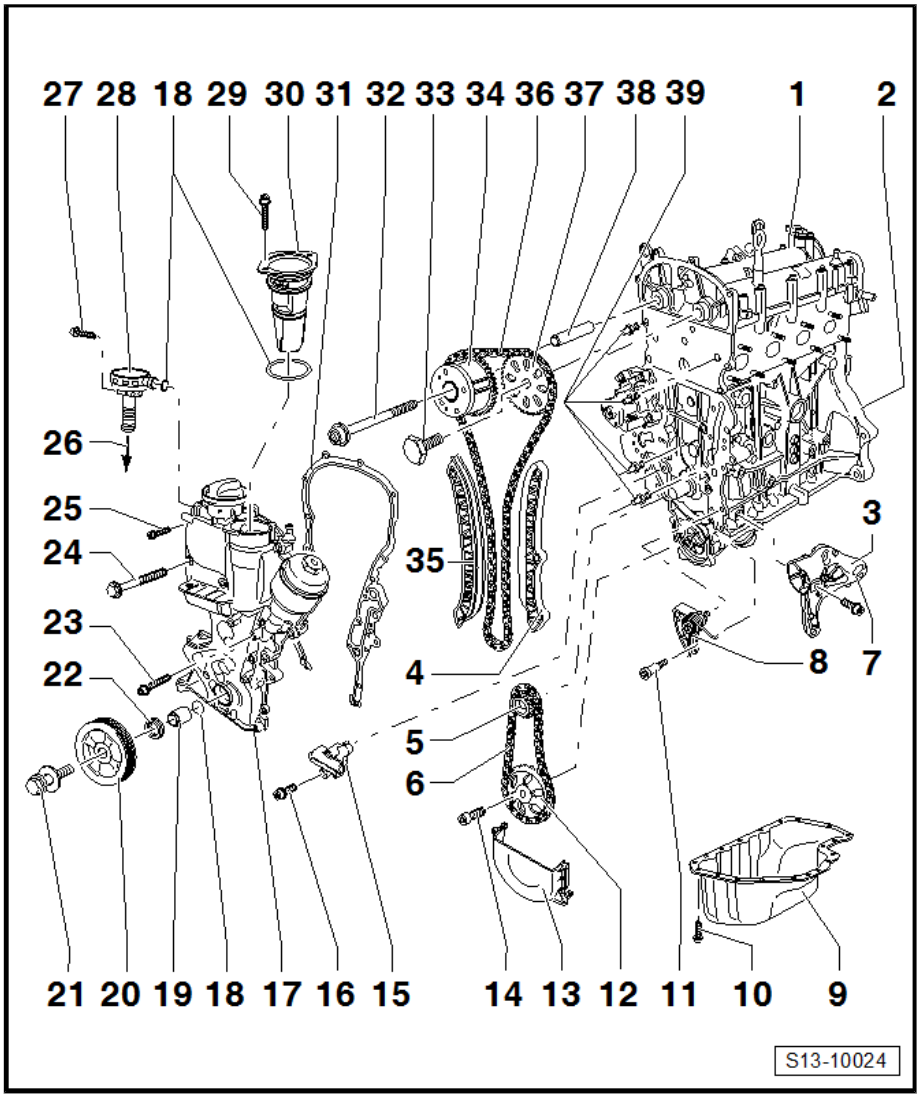
Carefully clean the oil galleries.

Replace engine oil cooler.

Replace oil filter element.

Note

Before assembly oil all bearing and contact surfaces.



1 - Cylinder head with camshaft housing

- ❑ removing and installing ⇒ page 83
- ❑ Camshaft housing with integrated camshaft bearings

2 - Cylinder block

3 - Support

- ❑ for tensioning pully and AC compressor

4 - Sliding rail

- ❑ for timing chain

5 - Sprocket

- ❑ for oil pump drive and timing chain
- ❑ Clamping surfaces must be free of oil and grease.
- ❑ removing and installing ⇒ page 67

6 - Drive chain

- ❑ for oil pump
- ❑ mark running direction (installed position) before removing
- ❑ removing and installing ⇒ page 67

7 - 25 Nm

8 - Chain tensioner with tensioning rail and tensioning spring

- ❑ for oil pump drive
- ❑ Tightening torque: 15 Nm
- ❑ only be replaced as a complete unit

9 - Oil pan

- ❑ removing and installing ⇒ page 105

10 - 13 Nm

11 - 15 Nm

12 - Sprocket

- ❑ for oil pump
- ❑ Counterhold sprocket with counterholder - T10172-

13 - Cover

14 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

15 - Chain tensioner

- ❑ for timing chain

16 - 9 Nm

17 - Timing case

- ❑ removing and installing ⇒ page 26
- ❑ to facilitate installation, screw two pin screws -M6 x 80- into the camshaft housing and the cylinder block

- ❑ to better guide the timing case, position the oil pan with two screws

18 - O-ring

- ❑ replace
- ❑ in the spacer sleeve -Position 19-

19 - Spacer sleeve

- ❑ Clamping surfaces must be free of oil and grease.
- ❑ Fitting position ⇒ page 34
- ❑ install with new O-ring -Position 18-

20 - Crankshaft-belt pulley

- ❑ Clamping surfaces must be free of oil and grease.
- ❑ Removing and installing V-ribbed belt ⇒ page 18

21 - Fixing screw

- ❑ for crankshaft - belt pulley
- ❑ replace
- ❑ The clamping surface of the fixing screw must be free of grease and oil.
- ❑ insert oiled (thread)
- ❑ tighten ⇒ page 33

22 - Gasket ring for crankshaft in timing case

- ❑ replace
- ❑ replace ⇒ page 32

23 - 10 Nm

- ❑ M6 x 45mm

24 - 50 Nm

25 - 10 Nm

- ❑ M6 x 22 mm
- ❑ insert using locking agent - D 000 600 A2-

26 - To intake manifold

27 - 10 Nm

28 - The vacuum regulating valve (PCV valve)

- ❑ with ventilation hose

29 - 10 Nm

30 - Oil separator

31 - Gasket

- ❑ replace

32 - 40 Nm + torque a further 90° ($^1/_4$ turn)

- ❑ replace
- ❑ Screw with left-hand thread
- ❑ Counterhold camshaft adjuster with counterholder - T10172-

33 - 50 Nm + torque a further 90° ($^1/_4$ turn)

- ❑ replace
- ❑ Counterhold sprocket with counterholder - T10172-

34 - Camshaft adjuster

- ❑ must not be disassembled
- ❑ removing and installing ⇒ page 67

35 - Tensioning rail

36 - Timing chain

- ❑ removing and installing ⇒ page 67

37 - Sprocket

- ❑ for exhaust camshaft
- ❑ removing and installing ⇒ page 67

38 - Guide bushing

39 - Guide bolt

- ❑ Tightening torque: 18 Nm

1.4 Camshaft drive - Summary of components

For engines with identification characters CFNA and CLSA

Caution

If considerable quantities of metal swarf or abrasion is found when carrying out engine repairs, this can be subject to damage to the crankshaft and conrod bearings. In order to avoid consequential damage, after the repair perform the following tasks:

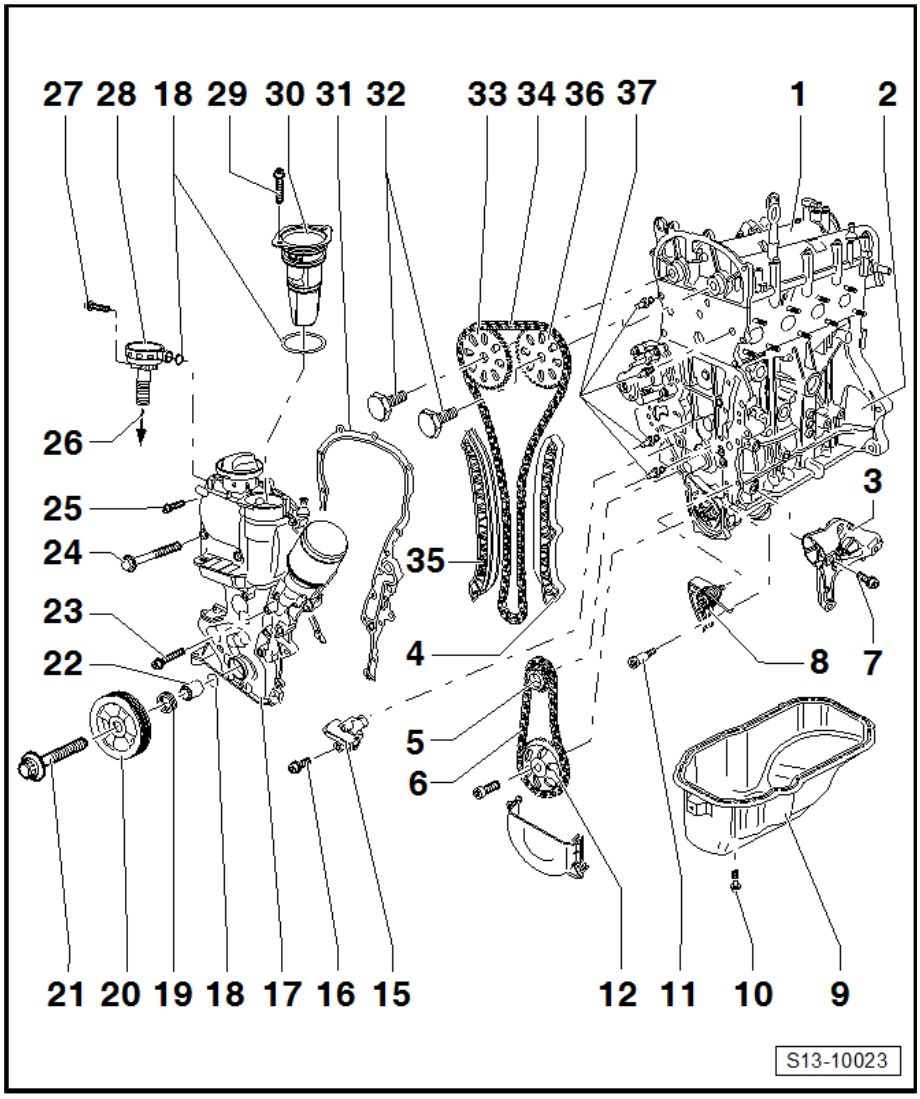
Carefully clean the oil galleries.

Replace engine oil cooler.

Replace oil filter element.

Note

Before assembly oil all bearing and contact surfaces.



1 - Cylinder head with camshaft housing

- ❑ removing and installing ⇒ page 83
- ❑ Camshaft housing with integrated camshaft bearings

2 - Cylinder block

3 - Support

- ❑ for tensioning pully and AC compressor

4 - Sliding rail

- ❑ for timing chain

5 - Sprocket

- ❑ for oil pump drive and timing chain
- ❑ Clamping surfaces must be free of oil and grease.
- ❑ removing and installing:

♦ Version A ⇒ page 67

♦ Version B ⇒ page 73

6 - Drive chain

- ❑ for oil pump
- ❑ mark running direction (installed position) before removing
- ❑ removing and installing:

♦ Version A ⇒ page 67

♦ Version B ⇒ page 73

7 - 25 Nm

8 - Chain tensioner with tensioning rail and tensioning spring

- ❑ for oil pump drive
- ❑ Tightening torque: 15 Nm
- ❑ only be replaced as a complete unit

9 - Oil pan

- ❑ removing and installing ⇒ page 105

10 - 13 Nm

11 - 15 Nm

12 - Sprocket

- ❑ for oil pump
- ❑ Counterhold sprocket with counterholder - T10172-

13 - Cover

14 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

15 - Chain tensioner

- ❑ for timing chain

16 - 9 Nm

17 - Timing case

- ❑ Illustration for engine with identification characters CFNA
- ❑ The illustration of the housing for engine with identification characters CLSA is identical to the illustration for engine with identification characters BTS
- ❑ removing and installing ⇒ page 26
- ❑ to facilitate installation, screw two pin screws -M6 x 80- into the camshaft housing and the cylinder block
- ❑ to better guide the timing case, position the oil pan with two screws

18 - O-ring

- ❑ replace
- ❑ in the spacer sleeve -Position 22-

19 - Gasket ring for crankshaft in timing case

- ❑ replace
- ❑ replace ⇒ page 32

20 - Crankshaft-belt pulley

- ❑ Clamping surfaces must be free of oil and grease.
- ❑ Removing and installing V-ribbed belt ⇒ page 18

21 - Fixing screw

- ❑ for crankshaft - belt pulley
- ❑ replace
- ❑ The clamping surface of the fixing screw must be free of grease and oil.
- ❑ insert oiled (thread)
- ❑ tighten ⇒ page 33

22 - Spacer sleeve

- ❑ Clamping surfaces must be free of oil and grease.
- ❑ Fitting position ⇒ page 34
- ❑ install with new O-ring -Position 18-

23 - 10 Nm

- ❑ M6 x 45 mm

24 - 50 Nm

25 - 10 Nm

- ❑ M6 x 22 mm
- ❑ insert using locking agent - D 000 600 A2-

26 - To intake manifold

27 - 10 Nm

28 - The vacuum regulating valve (PCV valve)

- ❑ with ventilation hose

29 - 10 Nm

30 - Oil separator

31 - Gasket

- ❑ replace

32 - 50 Nm + torque a further 90° ($^1/_4$ turn)

- ❑ replace
- ❑ Counterhold sprocket with counterholder - T10172-

33 - Sprocket

- ❑ for inlet camshaft

❑ removing and installing:

- Version A ⇒ page 67
- Version B ⇒ page 73

34 - Timing chain

❑ removing and installing:

- Version A ⇒ page 67
- Version B ⇒ page 73

35 - Tensioning rail

36 - Sprocket

❑ for exhaust camshaft

❑ removing and installing:

- Version A ⇒ page 67
- Version B ⇒ page 73

37 - Guide bolt

❑ Tightening torque: 18 Nm

1.5 Removing and installing the timing case

Special tools and workshop equipment required

- Supporting device - MP9-200 (10-222A)-
- Counterholder - T30004 (3415)-
- Bolt - T30004/1 (3415/1)-
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Cleaning and degreasing agent , e.g. -D 009 401 04-
- Protective goggles and gloves

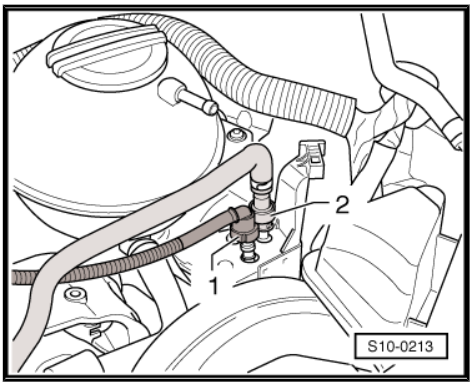
1.5.1 Removing

– Remove the air filter housing ⇒ page 161 .

– Unscrew vacuum regulating valve (PCV valve).

For vehicles Roomster

– Pull out the fuel feed line -2- (catch the fuel which flows out with a cleaning cloth) and the vent line -1-. Unlock the quick coupling and disconnect ⇒ page 138 .



– Remove activated charcoal filter and bracket.

Continued for all vehicles

– Remove the expansion reservoir and lay it to one side.

The coolant hoses remain connected.

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 50 .

– Remove the front right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .

– Remove V-ribbed belt ⇒ page 18 .

For vehicles with air conditioning

– Remove AC compressor with the refrigerant lines connected from the bracket ⇒ page 16 .

Observe instructions for assembly work on the air-conditioning system ⇒ page 5 .

– Remove holder for tensioning pulley and V-ribbed belt-guide pulley.

For vehicles without air conditioning

– Remove tensioning pulley for V-ribbed belt.

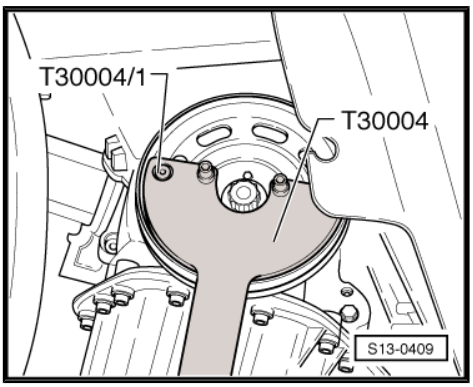
Continued for all vehicles

– Remove alternator ⇒ Electrical System; Rep. gr. 27 .

– Remove belt pulley for control pump ⇒ page 123 .

– Remove crankshaft belt pulley.

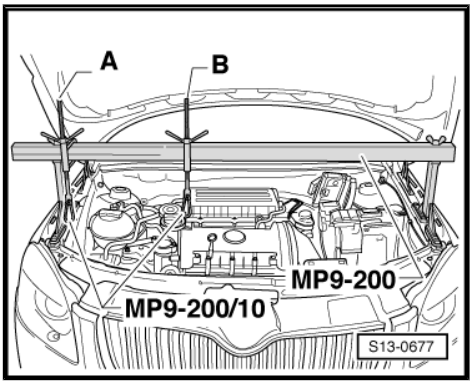
Counterhold belt pulley with counterholder - T30004- with bolt - T30004/1- .



– Removing the oil pan ⇒ page 105 .

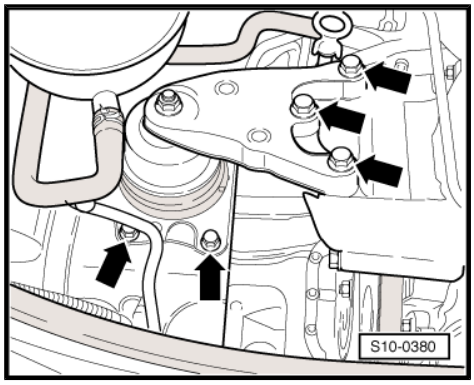
– Fit supporting device - MP9-200 (10-222A)- .

– Raise engine slightly via spindle -B-, allow spindle -A- to hang loosely.



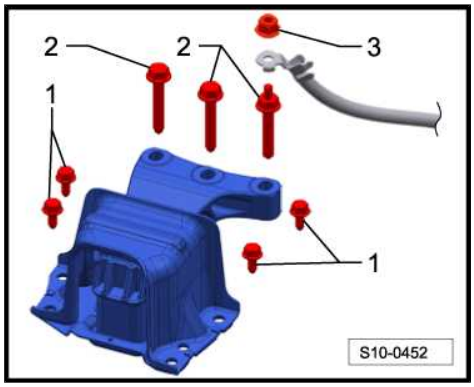
For vehicles with assembly bracket version 1

– Screw out screws -arrows- and remove engine mount.



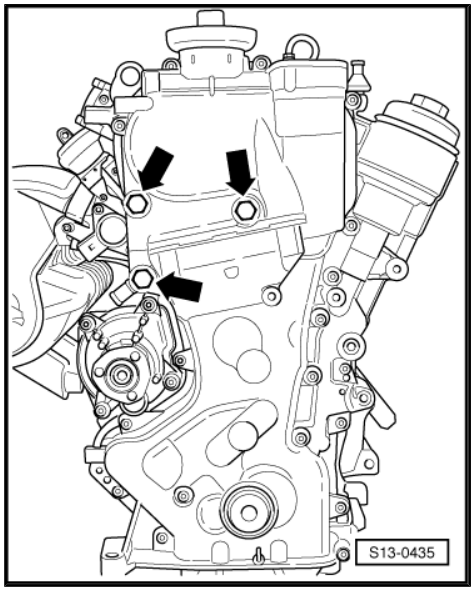
For vehicles with assembly bracket version 2

– Unscrew nut -3- and disconnect earth lead from engine mount.
– Release screws -2 and 1- and remove engine mounting.



For all vehicles

– Release the Allen screws of the control unit and the screws marked with the -arrows-.
– Remove timing case.
– Remove gasket of timing case.



1.5.2 Install

WARNING

Wear protective gloves when working with sealant and grease remover!

– Remove gasket residues on sealing surfaces with chemical sealant remover.
– Degrease the sealing surfaces.

Note

- *Make sure that the clamping surfaces of the belt pulley, the fixing screw, the spacer sleeve, the double chain sprocket and the front crankshaft journal are free of oil and grease.*
- *Make sure that the camshaft housing is not offset or tilted.*

– Carefully place the new gasket of the timing case onto the dowel pins.

– To facilitate installation, screw two pin screws -M6 x 80- into the cylinder head and the cylinder block.

– Position the timing case onto the pin screws and the dowel pins.

– Tighten the fixing screws of the timing case diagonally and evenly:

- Tightening torque for screws M6: 10 Nm
- Tightening torque for screws M10: 50 Nm

The further assembly is carried out in reverse order to disassembly. Pay attention to the following:

Note

Install crankshaft belt pulley ⇒ page 33 .

2 Cylinder block, sealing flange and flywheel

2.1 Cylinder block - Summary of components

WARNING

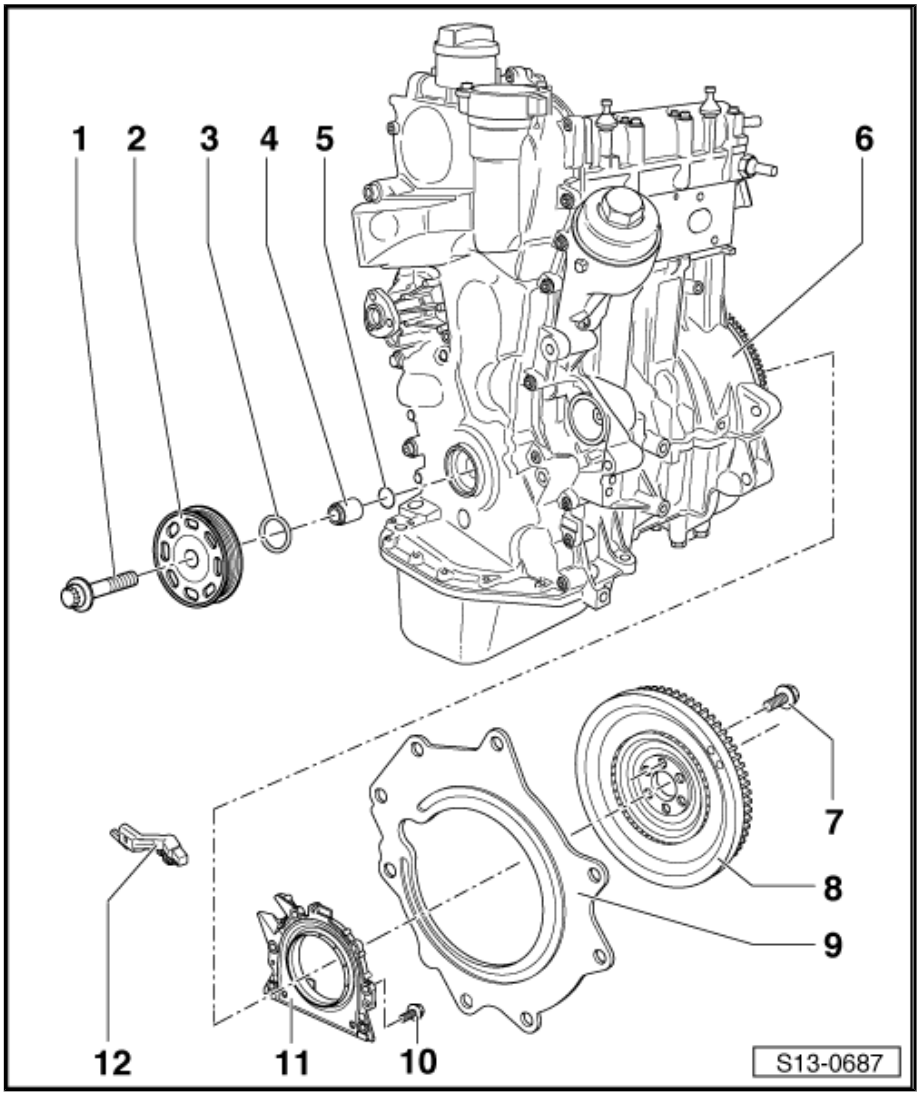
The crankshaft must not be removed. Merely releasing the crankshaft bearing cover screws will result in deformations of the bearing seats of the cylinder block. These deformations reduce the bearing clearance. Even if the bearing shells were not replaced, the changed bearing clearance may cause damage to the bearing.

If the bearing cover screws have been released, replace the complete cylinder block together with the crankshaft.

It is not possible to measure the crankshaft bearing clearance under workshop conditions.

Note

Repairs to the clutch ⇒ Gearbox; Rep. gr. 30 .



1 - Fixing screw

- ❑ for crankshaft - belt pulley
- ❑ replace
- ❑ The clamping surface of the fixing screw must be free of grease and oil.
- ❑ insert oiled (thread)
- ❑ tighten ⇒ page 33

2 - Belt pulley

- ❑ Clamping surfaces must be free of oil and grease.
- ❑ Removing and installing ribbed V-belt ⇒ page 18

3 - Gasket ring for crankshaft in timing case

- ❑ replace
- ❑ replace ⇒ page 32

4 - Spacer sleeve

- ❑ Clamping surfaces must be free of oil and grease.
- ❑ install with new O-ring -Position 5-
- ❑ Fitting position ⇒ page 34

5 - O-ring

- ❑ replace
- ❑ in the spacer sleeve -Position 4-

6 - Cylinder block

- ❑ Aluminium cylinder block with timing case shown for engine with identification characters BTS, CFNA
- ❑ for engine with identification characters CLSA made of grey cast iron

7 - 60 Nm + torque a further 90° ($^1/_4$ turn)

- ❑ replace

8 - Flywheel/drive plate

- ❑ removing and installing flywheel ⇒ page 36
- ❑ removing and installing driver disc ⇒ page 37

9 - Intermediate plate

- ❑ must be positioned on dowel sleeves
- ❑ do not damage during assembly work

10 - Screw

- ❑ replace
- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ Tighten to tightening torque for engine with grey cast iron block 8 Nm + 90° ($^1/_4$ turns)
- ❑ Tighten to tightening torque for engine with aluminium block 8 Nm + 45° ($^1/_8$ turns)

11 - Sealing flange with rotor and gasket ring

- ❑ always replace complete with rotor and gasket ring
- ❑ pay attention to different versions for manual gearbox and automatic gearbox ⇒ page 39

- ❑ replace the sealing flange for the crankshaft ⇒ page 39

12 - Engine speed sender - G28-

- ❑ with captive screw
- ❑ Tightening torque: 5 Nm
- ❑ Pay attention to the part number
- ❑ removing and installing ⇒ page 161

2.2 Replacing crankshaft seal on belt pulley side

Special tools and workshop equipment required

- ♦ Gasket ring extractor - MP1-226 (3203)-
- ♦ Assembly device - T10117-
- ♦ Counterholder - T30004 (3415)-
- ♦ Bolt - T30004/1 (3415/1)-

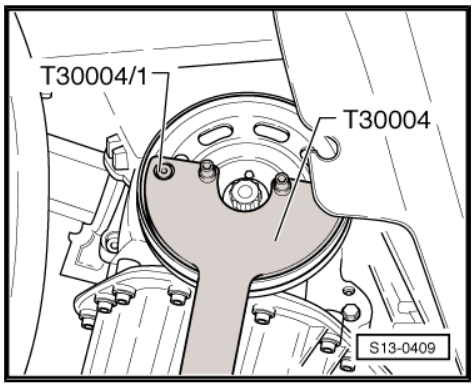
Removing

– Remove the bottom part of the right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .

– Remove V-ribbed belt ⇒ page 18 .

– Release fixing screw for crankshaft belt pulley.

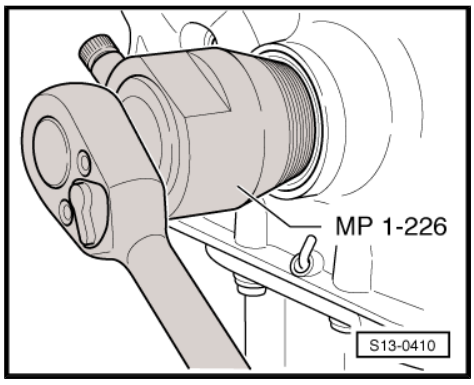
Counterhold crankshaft belt pulley with counterholder - T30004 - and bolt - T30004/1- .



– Release the fixing screw and remove the belt pulley from the crankshaft.

– Unscrew inner part of the gasket ring extractor - MP1-226- three turns (approx. 5 mm) out of the outer part and lock with knurled screw.

– Oil the thread head of the gasket ring extractor - MP1-226- , position and forcefully screw it into the gasket ring as far as possible.



– Release knurled screw and turn the inner side against the crankshaft until the gasket ring is pulled out.

– Remove the spacer sleeve from the crankshaft journal and clean the clamping surfaces of the crankshaft chain sprocket.

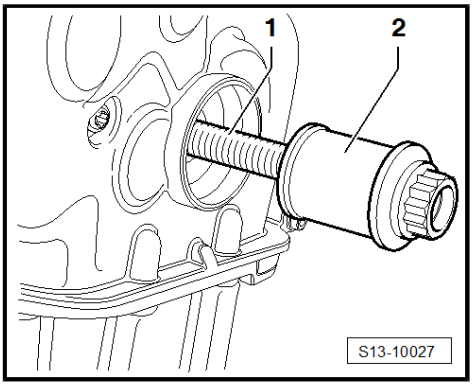
Install

Note

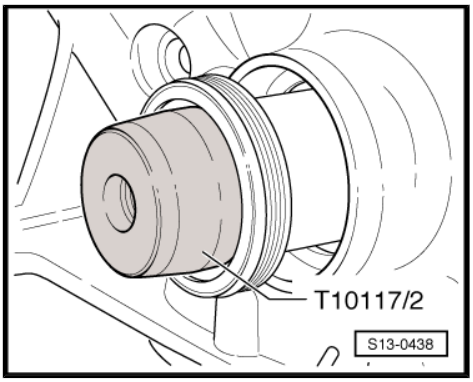
Make sure that the clamping surfaces of the fixing screw, the belt pulley, the spacer sleeve and the crankshaft chain sprocket are free of oil and grease.

– Replace the O-ring in the spacer sleeve ⇒ page 34 -Position 4-.

– First of all, slide a new spacer sleeve -2- onto the holding down bolt -1-.
– Screw the fixing screw -1- by about 2 turns into the crankshaft.
– Slide the spacer sleeve -2- onto the crankshaft journal as far as it will go.
– Release fixing screw (at the same time press the spacer sleeve against the crankshaft).

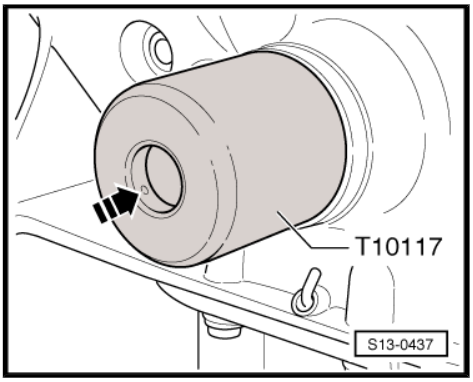


– Position the assembly device - T10117/2- in front of the spacer sleeve and slide the gasket ring onto the spacer sleeve.
– Remove the assembly device - T10117/2- from the spacer sleeve.



– Press the gasket ring with the assembly device - T10117- by striking uniformly up to the stop in the timing case.
– Tighten screw for crankshaft belt pulley ⇒ page 33 .

Further installation occurs in a similar way in reverse order to removal.



2.3 Tightening process of the screw for crankshaft belt pulley

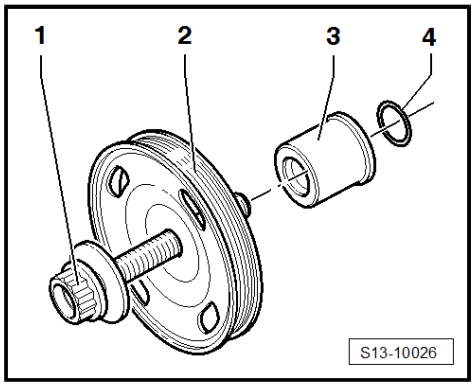
Special tools and workshop equipment required

- Counterholder - T30004 (3415)-
- Bolt - T30004/1 (3415/1)-

Conditions

- Timing o.k.
- Gasket ring for crankshaft in timing case removed.

Fitting position of the spacer sleeve



1 - Fixing screw

2 - Crankshaft-belt pulley

3 - Spacer sleeve

4 - O-ring in the spacer sleeve

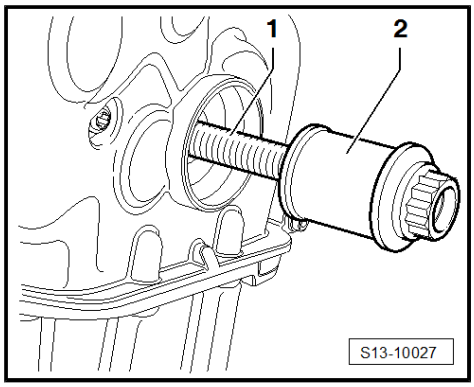
– Remove camshaft housing plastic cover and intake hose to air filter housing.

– Remove cap of outlet camshaft. Collect any engine oil which flows out with a cloth.

Note

Observe that all clamping surfaces of the fixing screw for the crankshaft belt pulley to the crankshaft chain sprocket are free of oil and grease.

– Replace the O-ring in the spacer sleeve ⇒ page 34 -Position 4-.



– First of all, slide the spacer sleeve -2- onto the holding down bolt -1-.

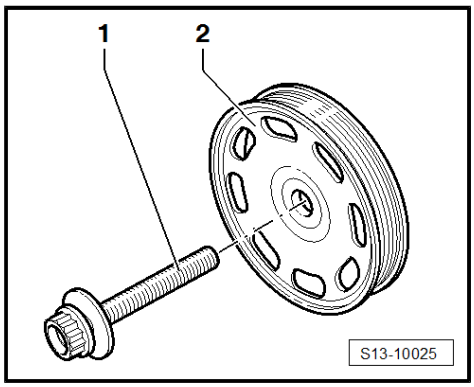
– Screw the fixing screw -1- by about 2 turns into the crankshaft.

– Slide the spacer sleeve -2- onto the crankshaft journal as far as it will go.

– Release fixing screw (at the same time press the spacer sleeve against the crankshaft).

– Install the new gasket ring for the crankshaft ⇒ page 32 .

– Slightly oil the first third of the thread of the new fixing screw.



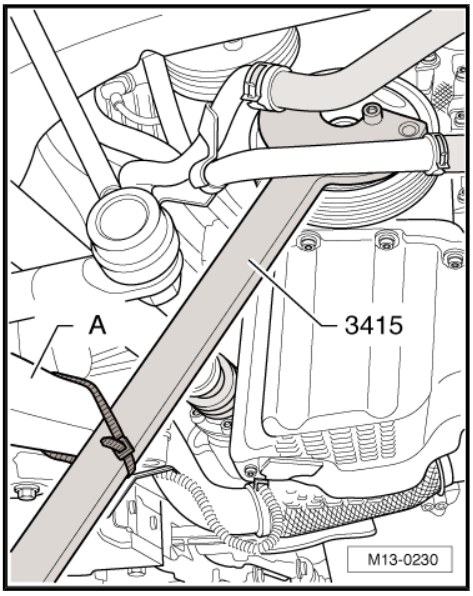
– Rotate the new holding down bolt -1- with crankshaft-belt pulley -2- into the crankshaft journal.

Always use a new fixing screw -1-.

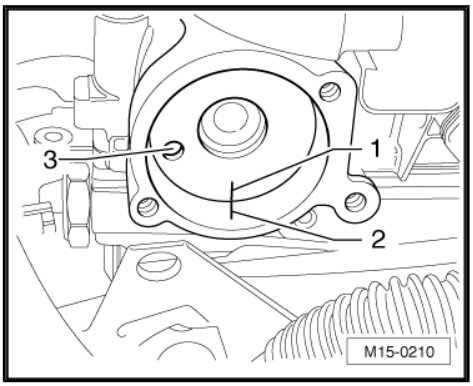
– Insert counterholder - 3415- with the bolt - 3415/1- into the holes of the crankshaft belt pulley, support counterholder at track control arm -A- and secure in this position with a cable strap. Tighten cable strap.

– Tighten fixing screw for crankshaft belt pulley to the 1st step as follows:

Tightening torque: 150 Nm



– Now mark the position of the outlet camshaft -1- to the camshaft housing -2- with a felt-tip pen. The position of the hole -3- is of no importance for the following inspection.

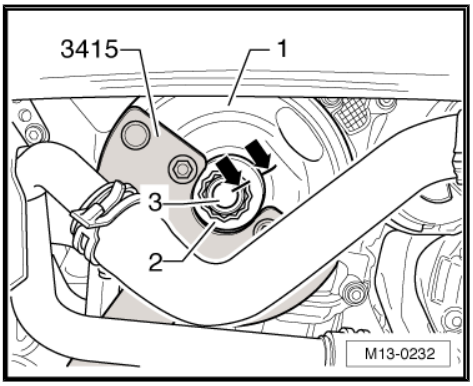


– Mark at this stage the position of the fixing screw -3- to the crankshaft belt pulley -1- -arrows-. The marking must not be performed on the washer -2-, because it does not turn along when tightening.

– Tighten fixing screw for crankshaft belt pulley to the 2nd step as follows:

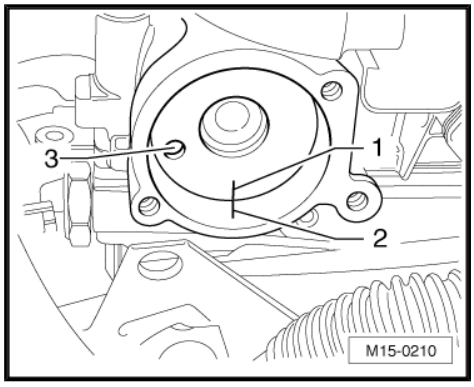
Torque screw a further 180° ($^1/_2$ turn).

Tightening may occur in successive stages.



– Check the position of the outlet camshaft.

• Both markings -1- and -2- must be aligned.



If both markings -1- and -2- are aligned:

– Test timing ⇒ page 56 .

This checks if the chain sprocket on the crankshaft has turned along when tightening the screw for the crankshaft belt pulley.

If both markings -1- and -2- are not aligned:

– Test timing:

♦ Version A ⇒ page 56 .

♦ Version B ⇒ page 57 .

If the timing is not correct:

– Setting the timing:

♦ Version A ⇒ page 59 .

♦ Version B ⇒ page 63 .

Note

First of all determine if the peg of the chain sprocket is still in the slot of the crankshaft.

– If the peg of the chain sprocket is no longer in the slot of the crankshaft, remove the chain sprocket and inspect for damage.

Replace the damaged chain sprocket.

If the timing is correct:

The crankshaft has turned to the crankshaft belt pulley.

– Remove crankshaft belt pulley, gasket ring and spacer sleeve.

– Clean all parts thoroughly. They must be free of oil and grease.

– Replace damaged component parts.

– Also throughly clean the clamping surface on the chain sprocket.

– Re-install component parts with new screw for crankshaft belt pulley.

2.4 Removing and installing flywheel

Special tools and workshop equipment required

♦ Counterholder - MP1-223 (3067)-

or

♦ Engine mount - MP1-202 (VW 540)-

♦ Bushing - T30010 (VW 540/1B)-

♦ Flywheel lock - MP1-504-

Removing

• Gearbox is removed.

– Remove clutch on vehicles with manual gearbox ⇒ Gearbox; Rep. gr. 30 .

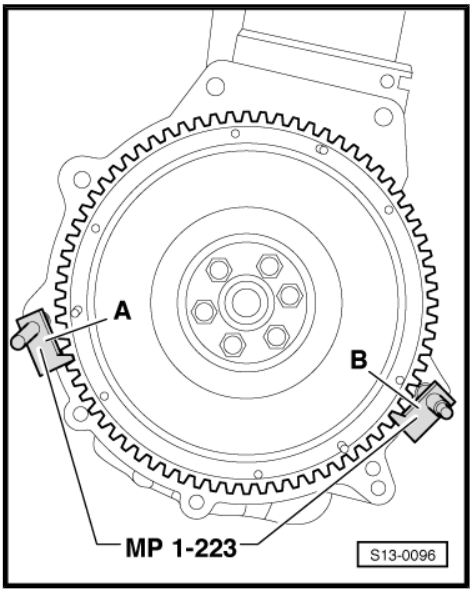
Engine installed

– Insert the counterholder - MP1-223 (3067)- into the bore hole on the cylinder block.

• Fitting position of the tool:

A - for tightening

B - for slackening



Engine removed

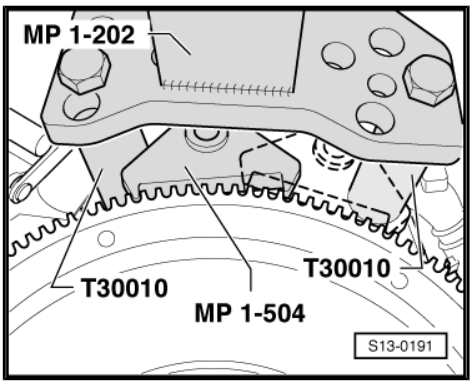
– Position the flywheel lock - MP1-504- on the starter ring gear of the flywheel disk and turn crankshaft until it rests against the sleeve - T30010- .

Continued for all

– Release screws and remove flywheel.

Install

Installation is performed in the reverse order, pay attention to the following points:



Note

Use new screws for attaching.

1. Screw in all the screws by hand.
2. Tighten all the screws crosswise to 60 Nm.
3. Torque all the screws crosswise a further 90° ($^1/_4$ turn).

2.5 Removing and installing drive plate

Special tools and workshop equipment required

♦ Counterholder for clutch - MP1-221 (VW 558)-

♦ Hexagon screw M8 x 45 and two nuts M10

♦ Depth gauge

or

♦ Engine mount - MP1-202 (VW 540)-

♦ Bushing - T30010 (VW 540/1B)-

♦ Flywheel lock - MP1-504-

Removing

• Gearbox is removed.

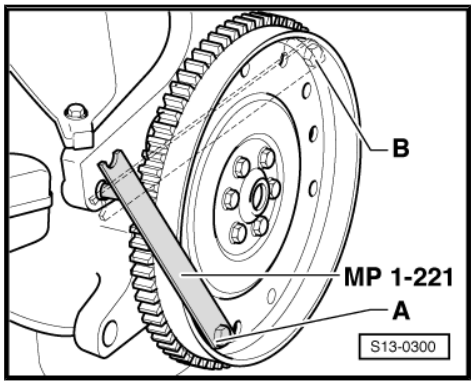
Engine installed

– Attach counterholder for clutch - MP1-221 (VW 558)- with M8x45 screw to the drive plate. Place two M10 nuts between the counterholder and the driver disc.

• Fitting position of the counterholder:

A - for slackening

B - for tightening



Engine removed

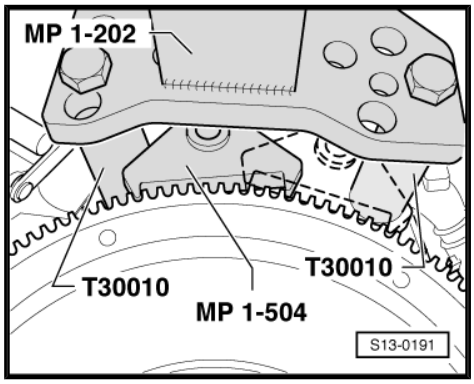
– Position the flywheel lock - MP1-504- on the starter ring gear of the drive plate and turn crankshaft until it rests against the sleeve - T30010- .

Continued for all

– Release screws and remove drive plate.

Install

Installation is performed in the reverse order, pay attention to the following points:



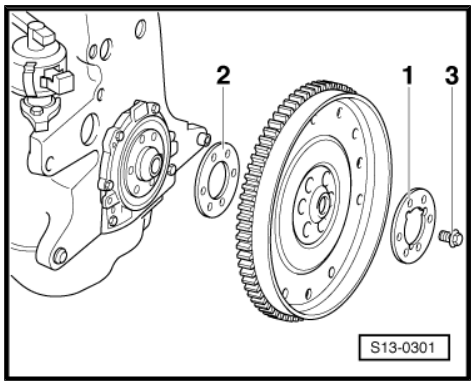
Note

Use new screws for attaching.

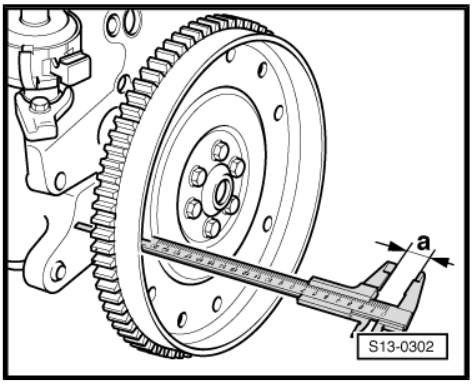
1. Screw in all the screws by hand.
2. Tighten all the screws crosswise to 60 Nm.
3. Torque all the screws crosswise a further 90° ($^1/_4$ turn).

– Insert the drive plate using the washer with recesses -1-.

– Insert new bolts -3- and tighten to 30 Nm.



– Check dimension -a- in three points and determine the mean value. Specified value: 19.7...21.3 mm.



Note

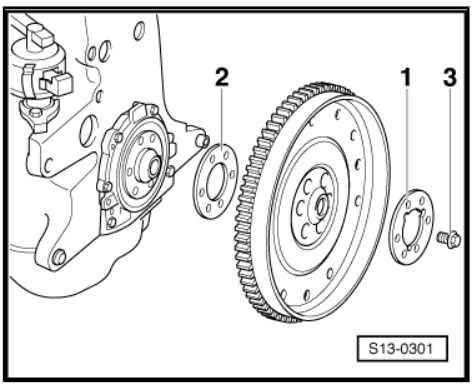
The measurement is made through the hole of the drive plate to the milled surface of the cylinder block.

If the specified value is not reached:

– Remove driver disc and use compensating washer -2-. Tighten screws -3- again to 30 Nm and again check the dimension -a-.

If the specified value is reached:

– Tighten screws -3- to 60 Nm and torque a further 90° ($^1/_4$ turn) (the tightening may occur in several stages).



2.6 Replacing the sealing flange for crankshaft - gearbox side

Special tools and workshop equipment required

- Assembly fixture - T10017- or -T10134-
- 3 hexagon screws M6 x 35 mm
- Feeler gauge
- Steel straightedge

2.6.1 Distinguishing features of the sealing flange of the assembly devices - T10017- and -T10134-

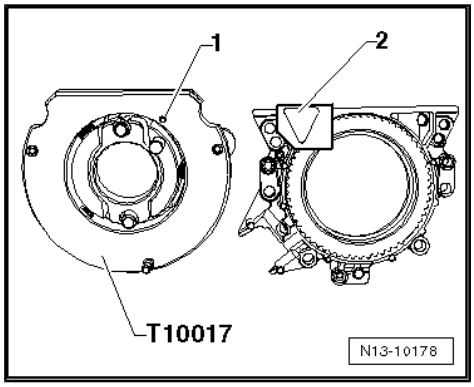
Note

- *Note that different sealing flanges may be installed depending on what transmission was used ⇒ ETKA - Electronic Catalogue of Original Parts .*
- *Use the corresponding assembly device for the relevant sealing flange.*

Install sealing flange for automatic gearbox with assembly device - T10017-

1 - Dowel pin

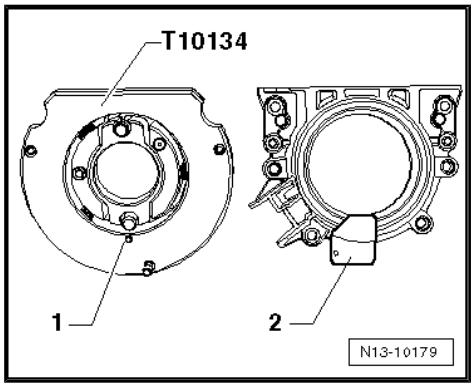
2 - Transport security (remove immediately before assembly)



Install sealing flange for manual gearbox with assembly device - T10134-

1 - Dowel pin

2 - Transport security (remove immediately before assembly)

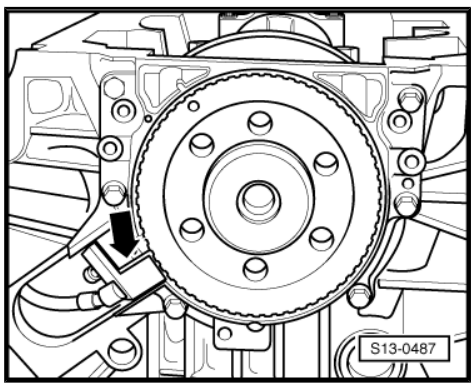


2.6.2 Removing sealing flange with rotor

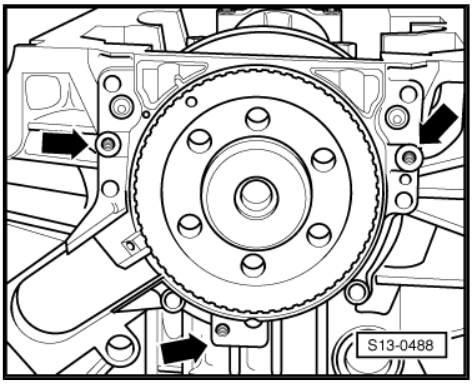
Note

These work sequences with the engine removed are shown for purposes of clear presentation. The work sequences are identical with the engine installed and gearbox removed.

– Remove flywheel ⇒ page 36 , if necessary drive plate ⇒ page 37 .
– Remove intermediate plate.
– Position crankshaft on TDC for cylinder 1:
♦ Version A ⇒ page 56 .
♦ Version B ⇒ page 57 .
– Removing the oil pan ⇒ page 105 .
– Remove engine speed sender -arrow-.
– Unscrew the fixing screws of the sealing flange.



– Screw 3 screws M6 x 35 mm into the threaded bores of the sealing flange -arrows-.
– Press out sealing flange together with rotor from the crankshaft by alternately screwing the screws into the sealing flange.



2.6.3 Installing sealing flange with rotor

Note

- *The sealing flange with PTFE gasket ring is provided with sealing lip supporting ring. This supporting ring is intended as an assembly sleeve and must not be removed before installing.*
- *Do not separate or turn to each other the sealing flange and rotor after removing them from the spare part package.*
- *The rotor is given its fitting location by positioning the assembly device - T10017- or - T10134- onto the positioning pin.*
- *The rotor has an elastomer layer on its sealing surface with the crankshaft. This layer must not be brought into contact with dirt or grease.*
- *The sealing flange and gasket ring form one unit and must be replaced together with the rotor.*
- *The fitting location of the assembly device - T10017- , or - T10134- to the crankshaft is determined by means of a guide bolt, which is guided through the threaded bore of the crankshaft.*
- *Unless otherwise indicated, the method for the assembly device - T10017- and -T10134- is identical.*

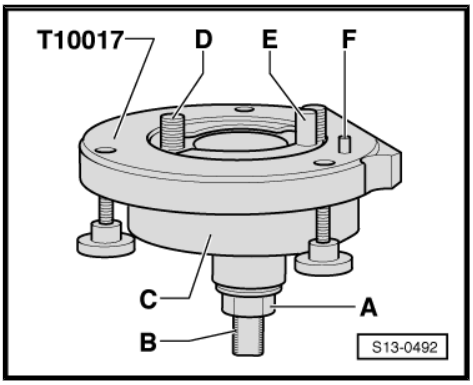
Assembly device - T10017- or -T10134-

A - Hexagon nut

B - Clamping surface

C - Assembly cup

D - Allan screw

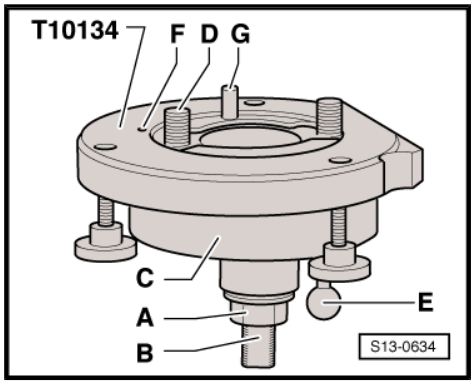


E - Guide bolts (for the assembly device - T10134- with red handle - for petrol engine)

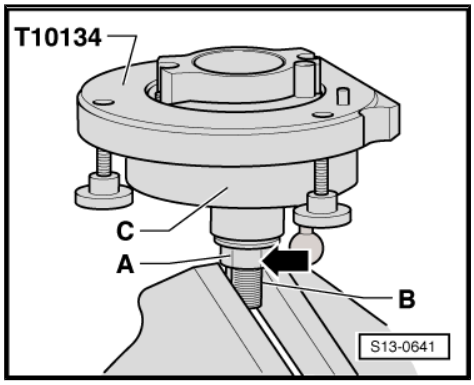
F - Positioning pin

G - Guide bolts (for the assembly device - T10134- with black handle - for diesel engine)

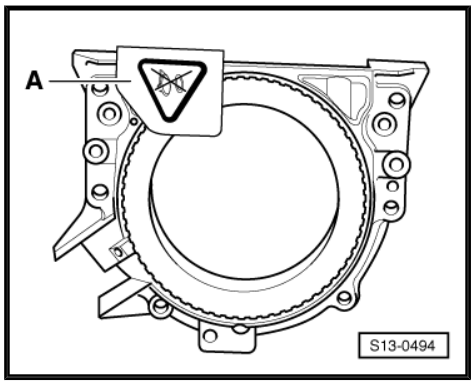
A - Mounting gasket ring with rotor on the assembly device - T10017- or -T10134-



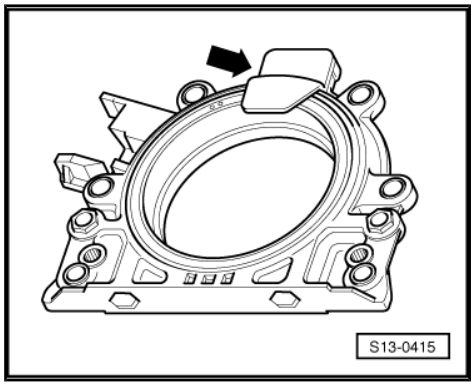
– Position nut -A- in the position tightly in front of the clamping surface -B- and grip assembly device - T10017- or -T10134- in the vice on the clamping surface -B- of the threaded spindle.



– Remove the securing clip -A- from the new sealing flange for assembly device - T10017- .



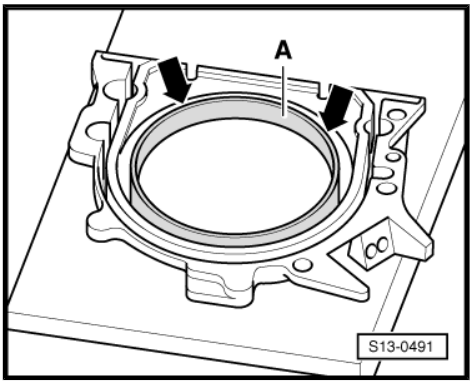
or remove the securing clip -arrow- from the new sealing flange for assembly device - T10134- .



Note

Do not remove or turn the rotor from the sealing flange.

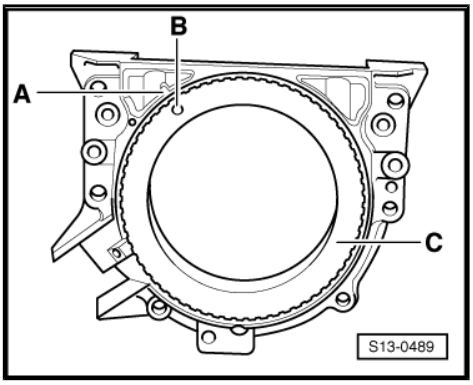
– Lay the front side of the sealing flange on a clean and level surface.
– Press the sealing lip supporting ring -A- -arrows-, until it rests on the level surface.



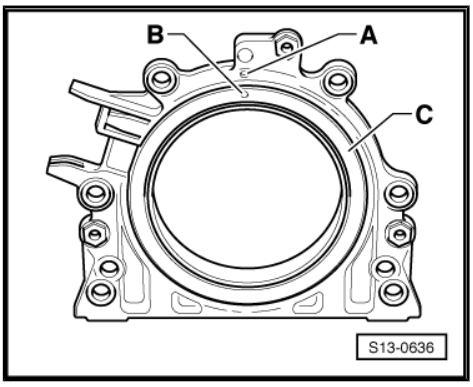
Note

The top side of the rotor and the front side of the sealing flange must be flush.

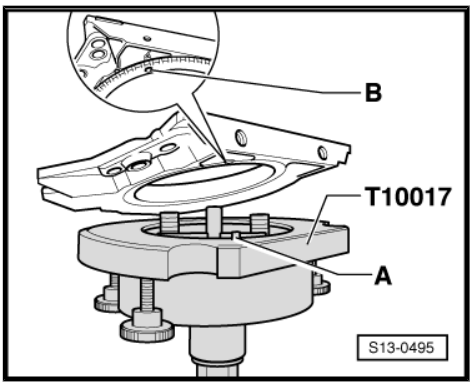
The locating hole -B- on the rotor -C- must be flush with the marking -A- on the sealing flange for assembly device - T10017-



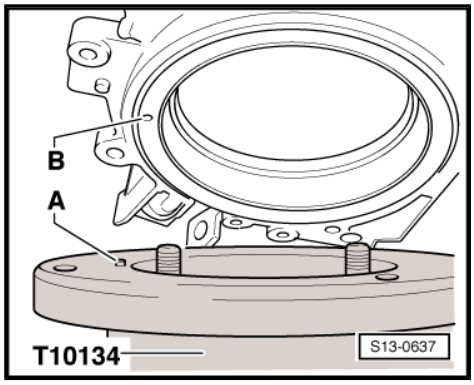
or on the sealing flange for assembly device - T10134- .



– Sealing flange with the front side to the assembly device - T10017-



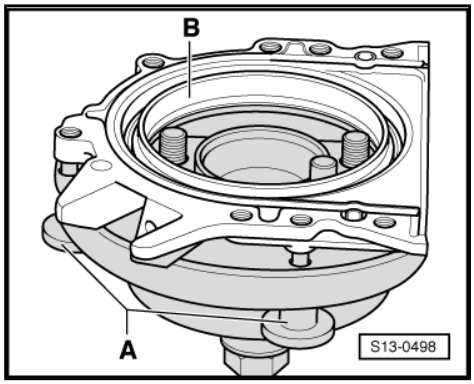
or place onto the assembly device - T10134- in such a way that the positioning pin -A- engages into the hole -B- of the rotor.



Note

Make sure the sealing flange lies flat on the assembly tool.

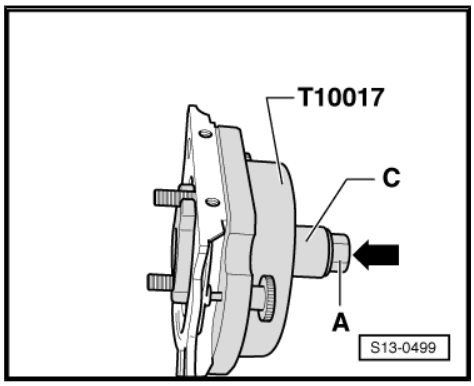
– When tightening the knurled screws -A- press the sealing flange and sealing lip supporting ring -B- on the surface of the assembly device in such a way that the positioning pin can no longer slide out of the rotor hole.



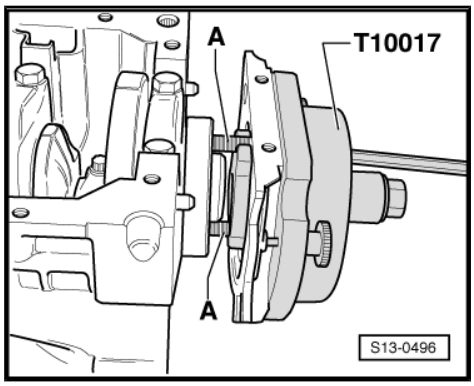
B - Mounting the assembly device - T10017- or -T10134- with sealing flange on the crankshaft flange

- The crankshaft flange must be free of grease and oil
- Crankshaft is at TDC for cylinder 1

– Unscrew hexagon nut -A- up to the end of the threaded spindle.

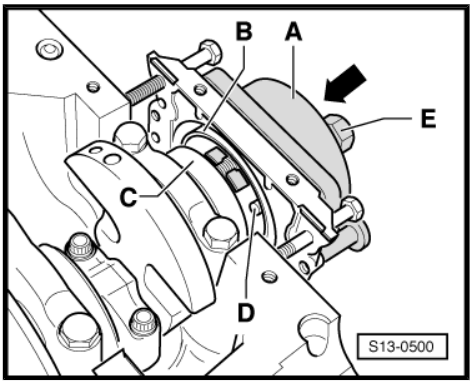


– Screw assembly tool with Allan screws -A- onto the crankshaft flange up to the stop.
– Screw in two screws M6 x 35 mm -A- by about 3 thread turns for the sealing flange guide into the cylinder block.



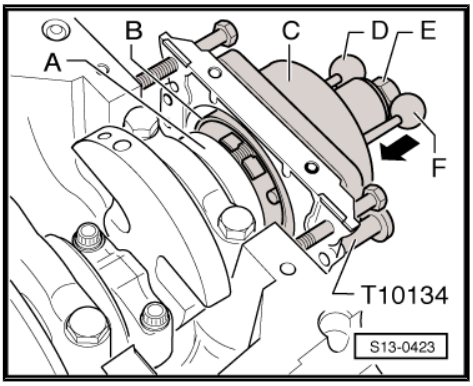
For assembly device - T10017-

– Move the assembly cup -A- by hand in the -direction of the arrow- until the rotor -B- rests on the crankshaft flange -C-. The guide bolts -D- on assembly device - T10017- must at the same time engage into the threaded bore of the crankshaft. This gives the rotor its final fitting location.



For assembly device - T10134-

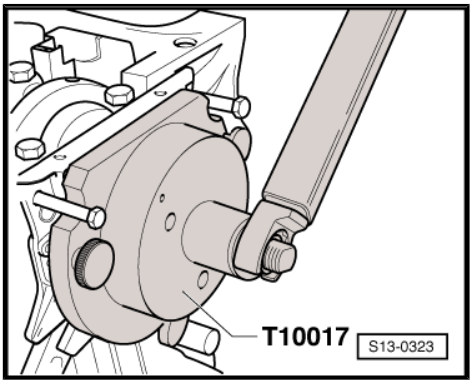
– Move the assembly cup -C- by hand in the -direction of the arrow- until the rotor -B- rests on the crankshaft flange -A-. Subsequently insert the guide bolt with red ball -F- fully into the threaded bore of the crankshaft. If the guide bolt is correctly seated, the handle is approx. 10 mm from the assembly cup -C-. This gives the rotor its final fitting location.



C - Pressing the rotor with assembly device - T10017- or -T10134- onto the crankshaft flange

– Screw in hexagon nut by hand onto the threaded spindle until it rests against the assembly cup.

– Tighten the hexagon nut of the assembly device using a torque wrench with adapter. Tightening torque: 35 Nm.



Note

After tightening the hexagon nut to 35 mm there must still be a narrow gap between the cylinder block and the sealing flange.

D - Inspecting the fitting position of the rotor on the crankshaft

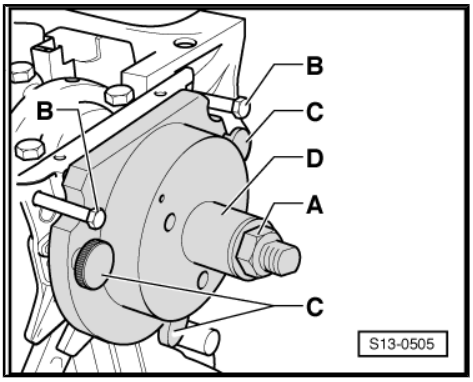
– Unscrew hexagon nut -A- up to the end of the threaded spindle.

– Unscrew two M6 x 35 mm screws -B- from the cylinder block.

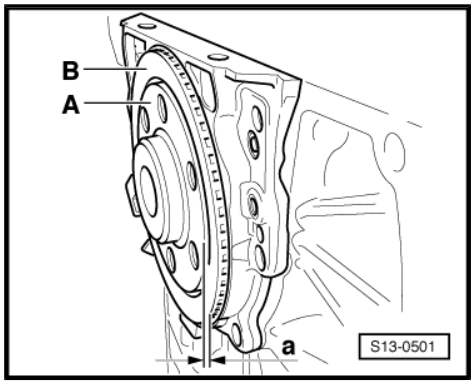
– Unscrew three knurled screws -C- from the sealing flange.

– Unscrew two Allen screws and remove assembly device - T10017- or -T10134- .

– Remove sealing lips supporting ring.



The fitting position of the rotor on the crankshaft is accurate if there is a distance -a- of 0.5 mm between the crankshaft flange -A- and the rotor -B-.



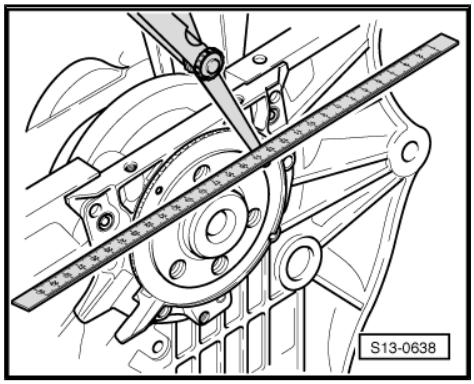
– Position the steel striaghtedge onto the crankshaft flange.
– Measure the distance between the steel straightedge and the rotor with a feeler gauge.

If the measured distance is less than 0.5 mm:

– Press down rotor ⇒ page 46 .

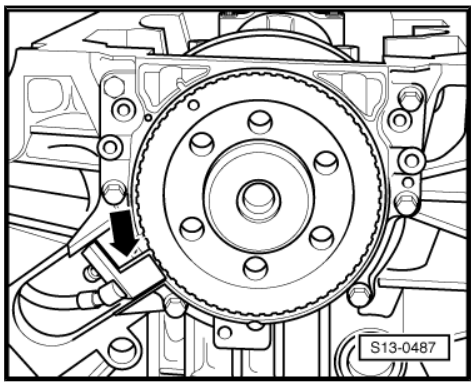
If the dimension is correct:

– Tighten the new fixing screws of the sealing alternately cross-wise. Tightening torque: 12 Nm.

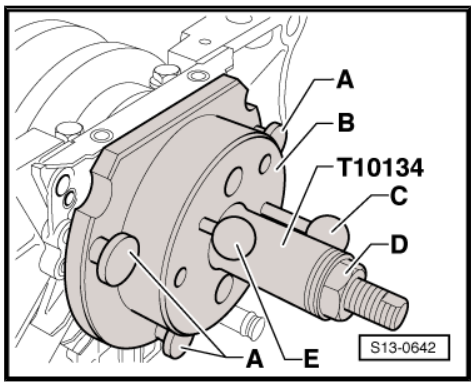


– Install engine speed sender -arrow-. Tightening torque: 5 Nm.
– Installing the oil pan ⇒ page 105 .
– Installing intermediate plate.
– Install the flywheel or driver disc with new screws.

E - Pressing down the rotor



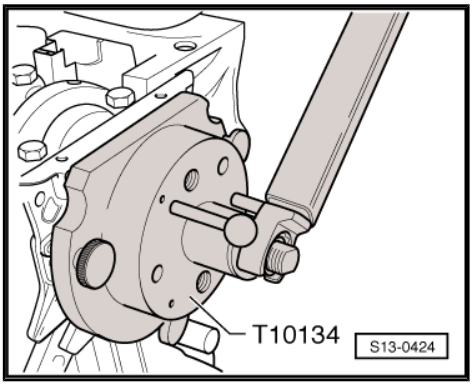
– Screw assembly device - T10017- or -T10134- with Allan screws onto the crankshaft flange up to the stop.
– Screw in 3 knurled screws -A- into the flange.
– Subsequently insert the guide bolt with red ball -E- fully into the threaded bore of the crankshaft. If the guide bolt is correctly positioned, then the handle has a distance of approx. 10 mm from the assembly cup -B-.



– Tighten the hexagon nut of the assembly device using a torque wrench with adapter. Tightening torque: 40 Nm.
– Again inspect the fitting position of the rotor on the crankshaft ⇒ page 45 .

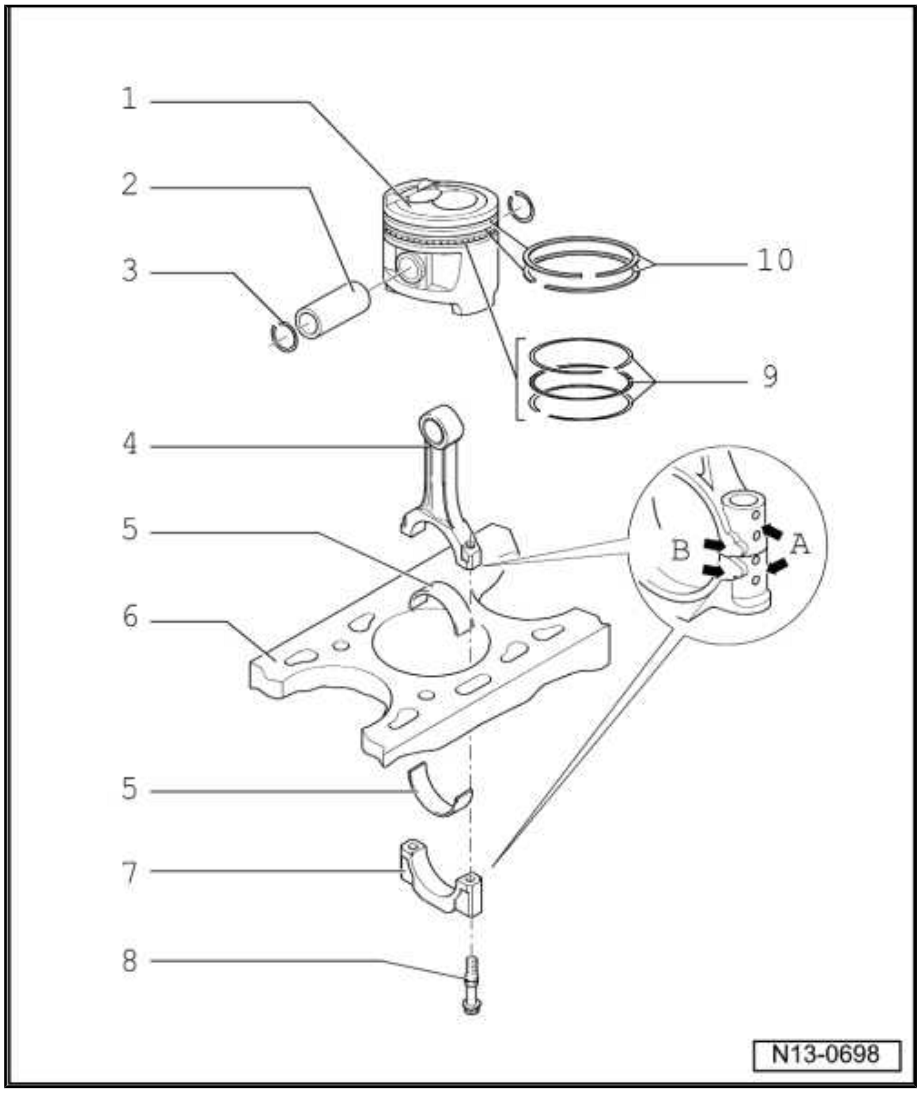
If the dimension -a- is again too small:

– Tighten the hexagon nut of the assembly device to 45 Nm.
– Again inspect the fitting position of the rotor on the crankshaft ⇒ page 45 .



3 Pistons and conrods

3.1 Piston and conrod - Summary of components



1 - Piston

- ❑ check ⇒ page 50
- ❑ mark installation position and matching cylinder
- ❑ arrow on the piston crown faces towards the belt pulley side
- ❑ Piston dimension (based on cylinder honing class): ∅ 76.46 mm or 76.48 mm ⇒ ETKA - Electronic Catalogue of Original Parts

2 - Piston pin

- ❑ if stiff, heat piston to 60° C
- ❑ use drift - T10046- for removing and installing
- ❑ Assignment ⇒ ETKA - Electronic Catalogue of Original Parts

3 - Circlip

4 - Conrod

- ❑ always replace as a set only
- ❑ separate new conrod ⇒ page 50
- ❑ mark matching cylinder -A-
- ❑ Fitting position: Markings -B- point towards belt pulley side
- ❑ located axially by pistons
- ❑ Assignment ⇒ ETKA - Electronic Catalogue of Original Parts

5 - Bearing shell

- ❑ pay attention to correct installation position ⇒ page 49
- ❑ do not mix up used bearing shells (mark)

6 - Cylinder block

- ❑ inspect cylinder bore ⇒ page 50
- ❑ Cylinder dimension (according to honing class): ∅ 76.51 mm or 76.53 mm

7 - Conrod bearing cap

- ❑ as a result of the conrods separated in the cracking process, the cover fits only in one position and only to the relevant conrod

8 - Conrod bolt, 30 Nm + torque a further + 90° (1/4 turn)

- ❑ replace
- ❑ Oil thread and contact surfaces

9 - Oil scraper ring

- ❑ carefully remove and install 3-part oil scraper rings by hand
- ❑ Inspect gap clearance ⇒ page 49
- ❑ End clearance cannot be measured

10 - Compression rings

- ❑ Offset joint 120°
- ❑ use piston ring pliers for removing and installing
- ❑ marking -TOP- must face towards piston crown
- ❑ Inspect gap clearance ⇒ page 49
- ❑ Inspect end clearance ⇒ page 49

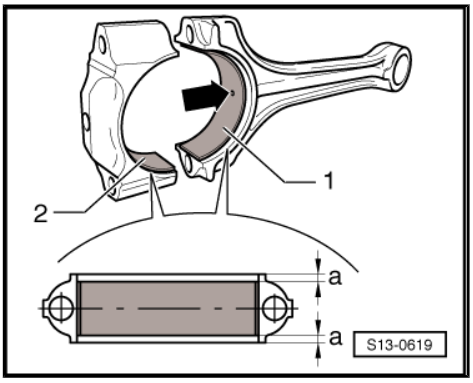
Bearing shell installation position

Bearing shell -1- with oil drilling -arrow- for conrod.

Bearing shell -2- without oil drilling for conrod bearing cap.

– Insert bearing shells in the conrod and in the conrod bearing cap centred.

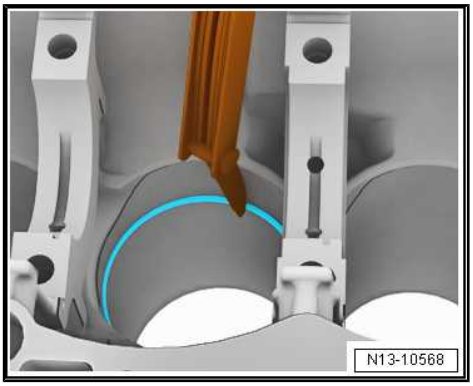
The dimension -a- must be the same on the right and left.



3.2 Inspect piston, piston rings and cylinder bore

Inspecting piston ring gap clearance

– Push in ring at right angles to the cylinder wall from the top through to the bottom cylinder opening, about 15 mm from the lower cylinder edge.

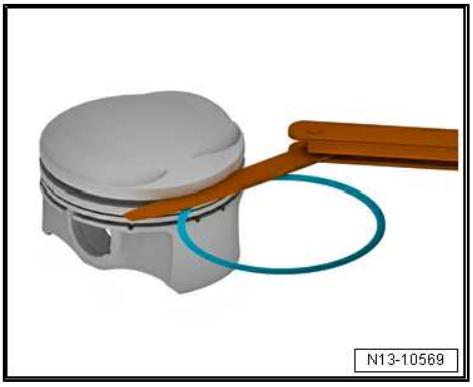


Piston ring dimensions in mm	new	Wear limit
1. Compression ring	0.20 … 0.50	1.0
2. Compression ring	0.40 … 0.60	1.0
Oil scraper ring	0.20 … 1.10	-[1)]

[1)] no specification possible for wear limit

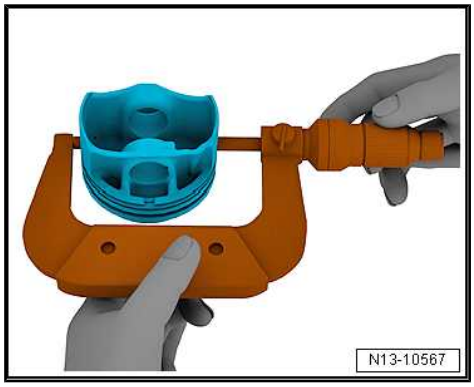
Inspect piston ring end clearance

– Clean annular grooves of piston before measurement is taken.



Piston ring dimensions in mm	new	Wear limit
1. Compression ring	0.04 … 0.08	0.15
2. Compression ring	0.02 … 0.08	0.15
Oil scraper ring	cannot be measured	

Inspecting pistons



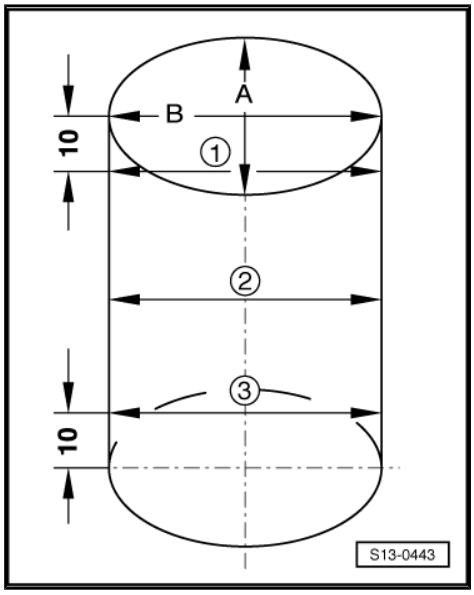
Special tools and workshop equipment required

- External micrometer 75...100 mm

– Measure about 10 mm from the lower edge, offset at right angles to the piston pin shaft.

- Variation compared to nominal diameter: 0.04 mm

Inspecting cylinder bore



Special tools and workshop equipment required

- Internal precision measuring instrument 50...100 mm

– Measure at three points crosswise in a transverse direction -A- and lengthwise -B-.

- Deviations from specified dimension: 0.08 mm

Note

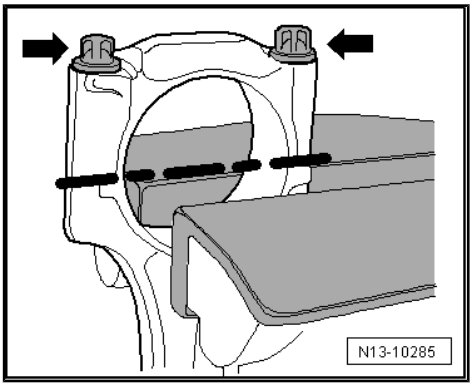
Do not measure the cylinder bore if the cylinder block is fixed to the assembly stand -MP9-101- with the engine mount -MP1-202- , as this may result in incorrect measurements.

3.3 Separating new conrod

It can happen that on new conrods, the provided separation point is not completely cracked. If the conrod bearing cap cannot be removed by hand, then proceed as follows:

– Mark the assignment of the conrod to the cylinder.

– Slightly tension the conrod, as shown in the illustration, in a vice provided with aluminium protective jaws.

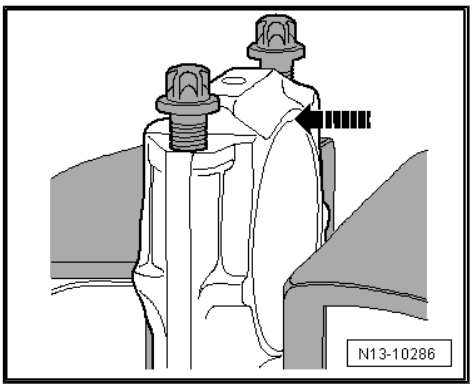


Note

- *Only tension the conrod slightly in order to avoid damage.*
- *The conrod is clamped below the broken line.*

– Unscrew both screws -arrows- by approx. 5 turns.

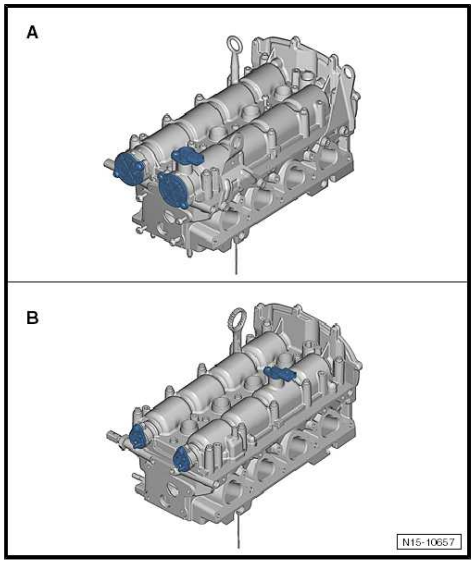
– Carefully knock against the conrod bearing cap with a plastic hammer in -direction of arrow- in order to loosen it.



15 – Cylinder head, valve gear

1 Cylinder head

1.1 Distinguishing features of cylinder heads



Version A

- The caps for the camshafts are screwed on with 2 screws.
- The hall sender - G40- is installed behind the 4th cylinder.
- Use the camshaft fixer/locator - T10171A- to check and set the timing.

Version B

- The caps for the camshafts are screwed on with 1 screw.
- The hall sender - G40- is installed behind the 2nd cylinder.
- Use two fixing bolts - T10414- to check and set the timing.

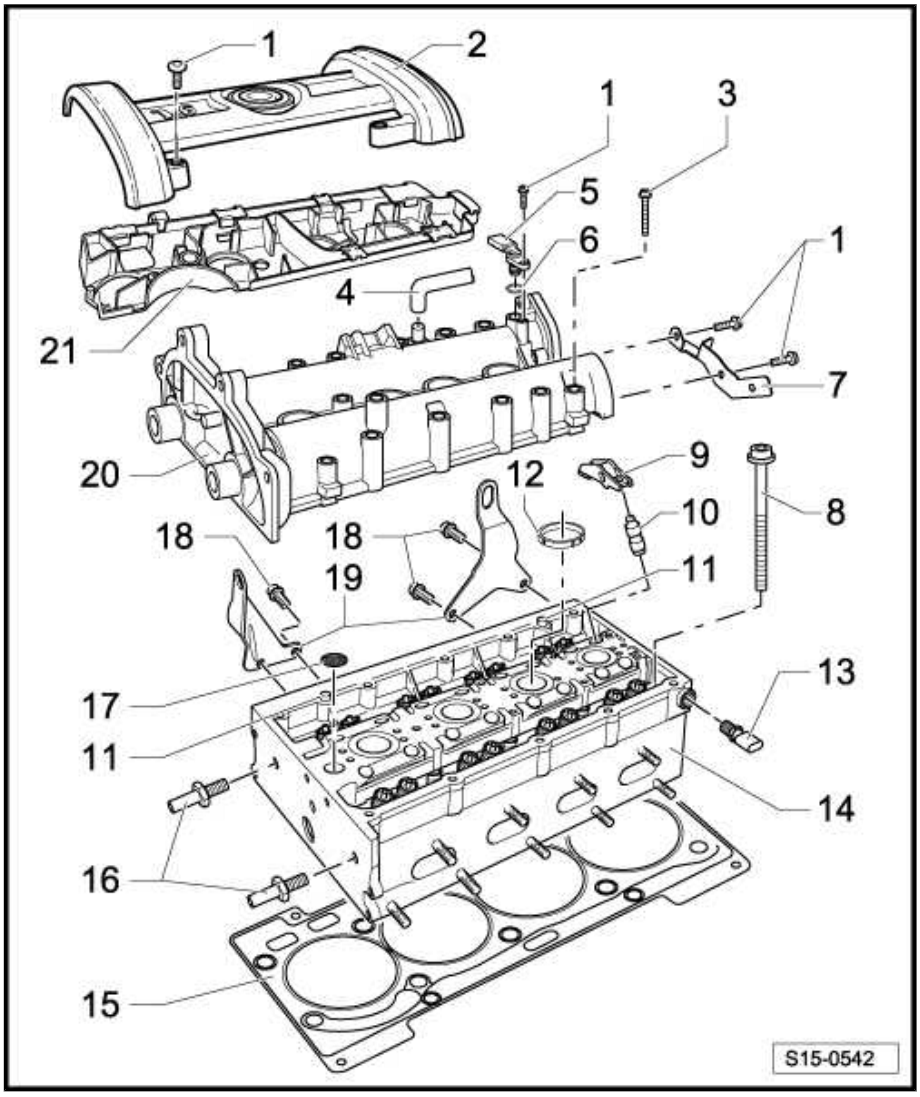
1.2 Cylinder head - Summary of components (version A)

For engine with identification characters BTS, CFNA, CLSA

Testing compression pressure ⇒ page 85 .

Note

- *When installing a replacement cylinder head, all the contact surfaces between the supporting elements, roller rocker arms and the cam tracks must be oiled before installing the camshaft housing.*
- *Do not remove the plastic bases supplied as a protection for the open valves until just before fitting on the cylinder head.*
- *If the cylinder head is replaced, also the entire coolant must be replaced.*
- *Disassembling and assembling intake manifold ⇒ page 159 .*



1 - 10 Nm

2 - Cover for camshaft housing

3 - 10 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ tighten from inside to outside

4 - to air filter housing

5 - Hall sender - G40-

6 - O-ring

- ❑ replace if damaged

7 - Support

8 - Cylinder head bolt

- ❑ replace
- ❑ observe the mounting instructions and sequence for loosening and tightening ⇒ page 83

9 - Roller rocker arm

- ❑ inspect roller bearings of roller for smooth operation
- ❑ oil contact surfaces
- ❑ to install, clip onto the supporting element and secure with locking clip

10 - Supporting element

- ❑ do not interchange
- ❑ with hydraulic valve clearance compensation
- ❑ oil contact surfaces

11 - Dowel pins

12 - Sealing ring

- ❑ replace
- ❑ 4 pieces
- ❑ inserted into the cylinder head

13 - Oil pressure switch - F1- , 25 Nm

- ❑ 0.05 MPa (0.5 bar)
- ❑ check ⇒ page 109
- ❑ Cut open gasket ring if leaking and replace

14 - Cylinder head

- ❑ removing and installing ⇒ page 83
- ❑ check for distortion ⇒ page 54
- ❑ Sealing surface to the camshaft housing must be free of oil and grease.
- ❑ after replacing fill entire system with fresh coolant

15 - Cylinder head gasket

- ❑ replace
- ❑ metal gasket

16 - Guide bolt

- ❑ Tightening torque: 20 Nm

17 - Oil filter

- ❑ inserted into cylinder head
- ❑ replace

18 - 20 Nm

19 - Lifting eyes

20 - Camshaft housing

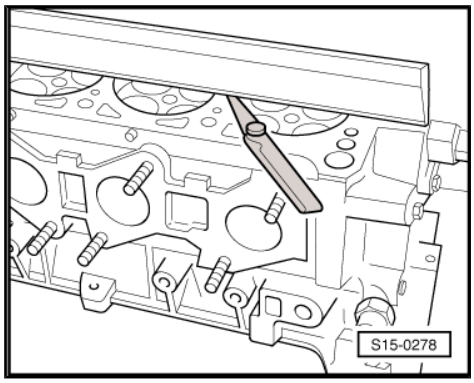
- ❑ removing and installing ⇒ page 79
- ❑ Sealing surface to the cylinder head must be free of oil and grease.

21 - Cable guide

- ❑ Screwed onto camshaft housing to 8 Nm

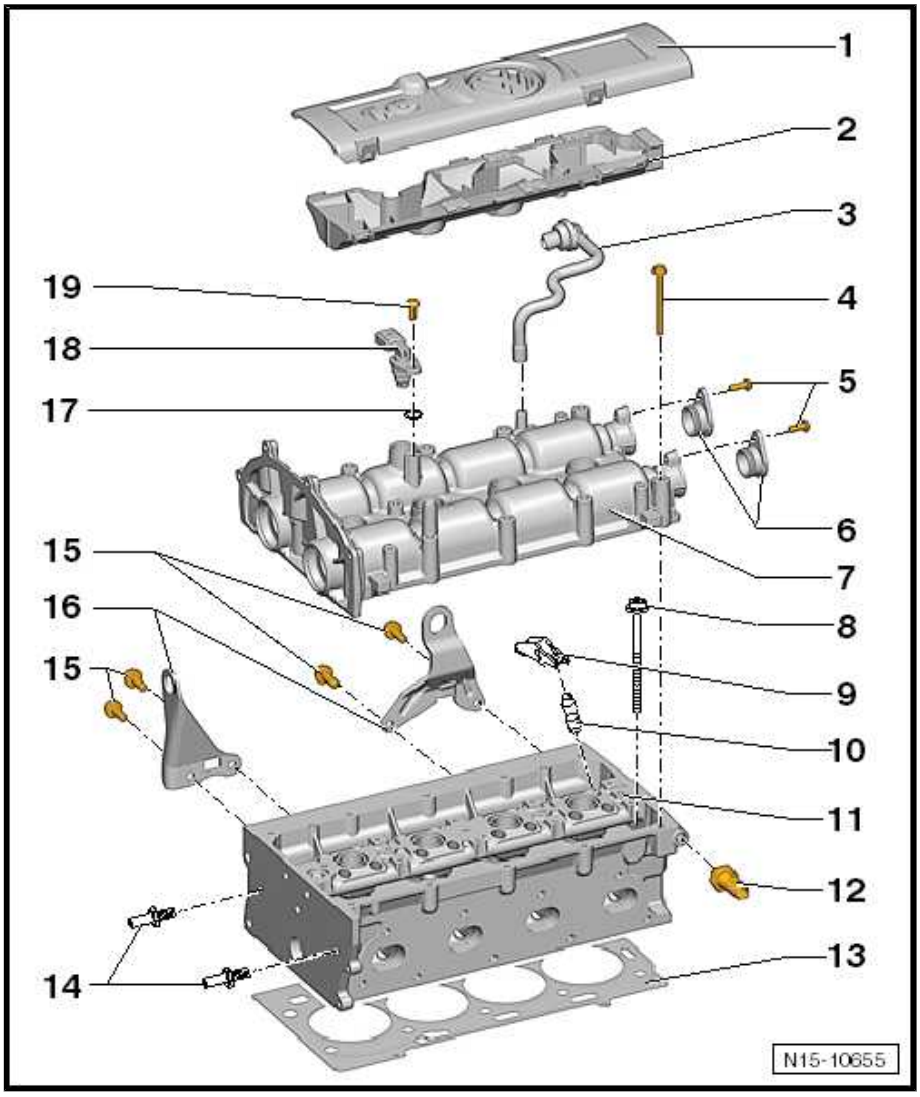
Inspecting the cylinder head for distortion

Maximum permissible deviation: 0.05 mm



1.3 Cylinder head - Summary of components (version B)

For engine with identification characters CFNA



1 - Cover for camshaft housing

2 - Cable guide

3 - to air filter housing

4 - 10 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ tighten from inside to outside

5 - 10 Nm

6 - Caps for camshafts

7 - Camshaft housing

- ❑ removing and installing ⇒ page 79
- ❑ Sealing surface to the cylinder head must be free of oil and grease.

8 - Cylinder head bolt

- ❑ replace
- ❑ observe the mounting instructions and sequence for loosening and tightening ⇒ page 83

9 - Roller rocker arm

- ❑ inspect roller bearings of roller for smooth operation
- ❑ oil contact surfaces
- ❑ to install, clip onto the supporting element and secure with locking clip

10 - Supporting element

- ❑ do not interchange
- ❑ with hydraulic valve clearance compensation
- ❑ oil contact surfaces

11 - Cylinder head

- ❑ removing and installing ⇒ page 83
- ❑ check for distortion ⇒ page 56
- ❑ Sealing surface to the camshaft housing must be free of oil and grease.
- ❑ after replacing fill entire system with fresh coolant

12 - Oil pressure switch - F1- , 25 Nm

- ❑ 0.05 MPa (0.5 bar)
- ❑ check ⇒ page 109
- ❑ Cut open gasket ring if leaking and replace

13 - Cylinder head gasket

- ❑ replace
- ❑ metal gasket

14 - Guide bolt

- ❑ Tightening torque: 20 Nm

15 - 20 Nm

16 - Lifting eyes

17 - O-ring

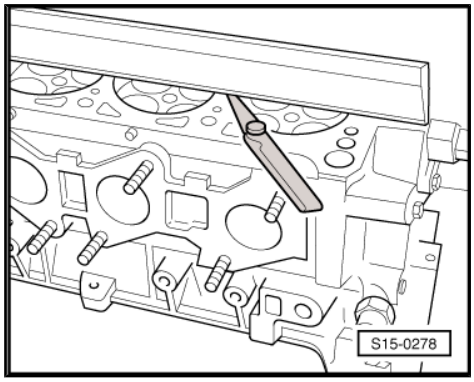
- ❑ replace if damaged

18 - Hall sender - G40-

19 - 10 Nm

Inspecting the cylinder head for distortion

Maximum permissible deviation: 0.05 mm



1.4 Check the timing for the cylinder head version A

For engine with identification characters BTS, CFNA, CLSA

Special tools and workshop equipment required

- ♦ Adapter for dial gauge - T10170-
- ♦ Camshaft fixer/locator - T10171A-
- ♦ Dial gauge

Test sequence

– Remove cover for camshaft housing and air filter housing ⇒ page 161 .

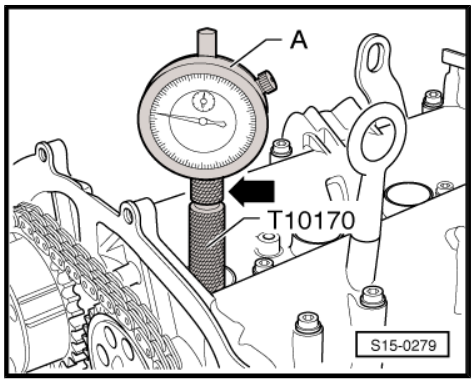
– Remove cap for camshafts.

– Remove ignition coil from cylinder 1 ⇒ page 184 and release the spark plug.

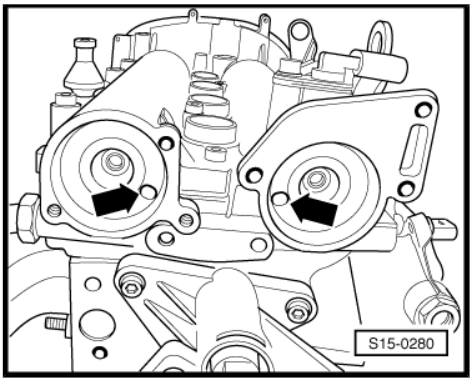
– Screw adapter for dial gauge - T10170- up to the stop into the spark plug thread.

– Insert the dial gauge -A- with extension - T10170/1- up to the stop and fix in place using the clamping screw -arrow-.

– Rotate the crankshaft in direction of rotation of engine on TDC for cylinder 1. Note down the position of the small pointer of the dial gauge.



The holes -arrows- in the camshafts must be positioned as shown. If necessary rotate the crankshaft a further revolution (360°).

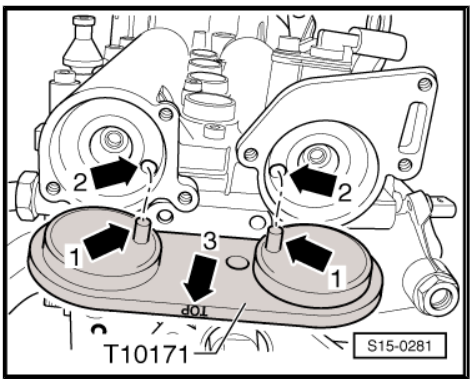


Note

- *If the crankshaft was turned more than 0.01 mm past the top dead centre, the crankshaft must once again be turned approx 45° in the opposite direction of rotation of the engine. Then position the crankshaft in direction of rotation of engine on top dead centre of cylinder 1.*
- *Permissible deviation from TDC for cylinder 1: ± 0.01 mm.*

– Insert camshaft fixer/locator - T10171A- up to the stop into the holes in the camshaft housing.

• The locking bolts -arrows 1- must engage in the holes -arrows 2-. The inscription “TOP” -arrow 3- must be at the top.



If the camshaft fixer/locator - T10171A- is not insertable up to the stop in the camshaft openings, the timing is not correct and must be set again ⇒ page 59 .

The timing is O.K., if the camshaft fixer/locator - T10171A- can be inserted up to the stop into the camshaft openings.

The further assembly is carried out in reverse order to disassembly. However, pay attention to the following:

- Replace the gasket rings for the caps of the camshafts and oil before assembly.

1.5 Check the timing for the cylinder head version B

For engine with identification characters CFNA

Special tools and workshop equipment required

- Adapter for dial gauge - T10170-
- Fixing bolt - T10414- , 2 pieces
- Dial gauge

Test sequence

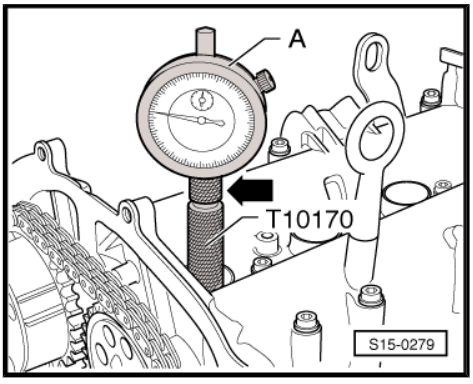
– Remove cover for camshaft housing and air filter housing ⇒ page 161 .

– Remove ignition coil from cylinder 1 ⇒ page 184 and release the spark plug.

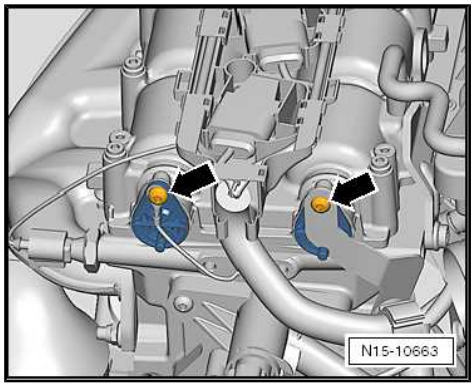
– Screw adapter for dial gauge - T10170- up to the stop into the spark plug thread.

– Insert the dial gauge -A- with extension - T10170/1- up to the stop and fix in place using the clamping screw -arrow-.

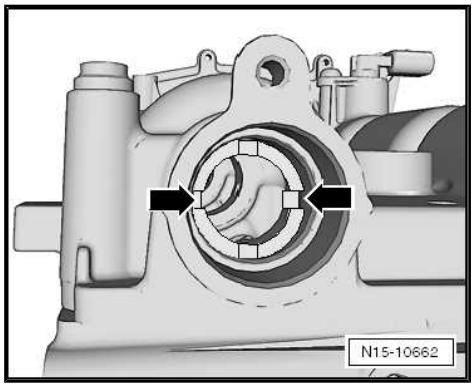
– Rotate the crankshaft in direction of rotation of engine on TDC for cylinder 1. Note down the position of the small pointer of the dial gauge.



– Remove caps -arrows- for camshafts.



The holes -arrows- in the camshafts must be positioned as shown, if necessary rotate the crankshaft a further revolution (360°).



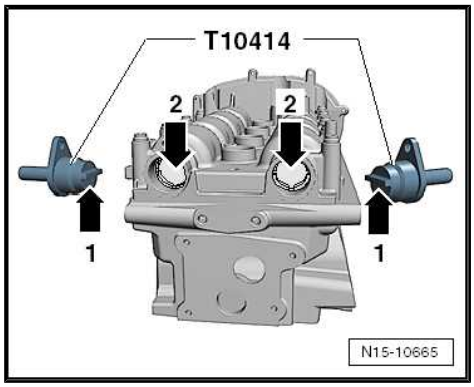
Note

- *If the crankshaft is turned more than 0.01 mm past the top dead centre, the crankshaft must once again be turned approx 45° in the opposite direction of rotation of the engine. Then position the piston for cylinder 1 on top dead centre by turning in direction of rotation of engine.*
- *Permissible deviation for setting the piston for cylinder 1 on top dead centre: ± 0.01 mm*

– Insert the fixing bolt - T10414- up to the stop into the camshaft openings.

The interlocking lugs -arrow 1- must engage in the holes -arrow 2- of the camshafts.

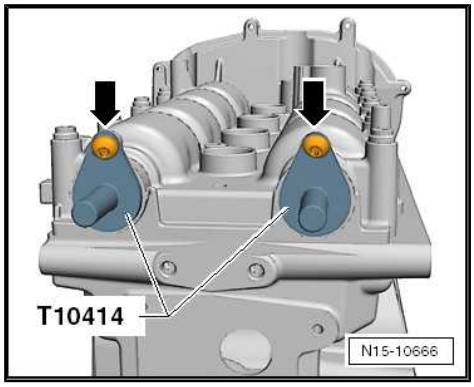
If the fixing bolt - T10414- is not insertable up to the stop in the camshaft openings, the timing is not correct and must be set again ⇒ page 63 .



- The timing is O.K., if the fixing bolts - T10414- slide fully into the camshaft openings and can be secured with the fixing screws -arrows- for the caps of the camshafts.

The further assembly is carried out in reverse order to disassembly. However, pay attention to the following:

- Replace the gasket rings for the caps of the camshafts and oil before assembly.



1.6 Setting the timing for the cylinder head version A

For engine with identification characters BTS, CFNA, CLSA

Special tools and workshop equipment required

- Adapter for dial gauge - T10170-
- Camshaft fixer/locator - T10171A-
- Counterholder - T10172-
- Counterholder - T30004 (3415)-
- Rig pin - T40011-
- Dial gauge

Work procedure

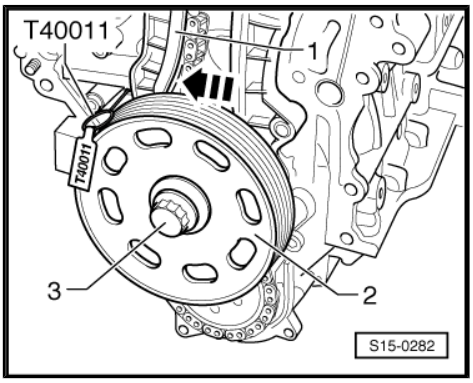
– Remove cover for camshaft housing and air filter housing ⇒ page 161 .

– Remove cap for camshafts.

– Remove timing case ⇒ page 26 .

– Insert the spacer sleeve, the crankshaft belt pulley -2- and the fixing screw -3- in order to turn the crankshaft. Tighten the crankshaft screw (to do so, use the counterholder - T30004-).

– Remove ignition coil from cylinder 1 ⇒ page 184 and release the spark plug.

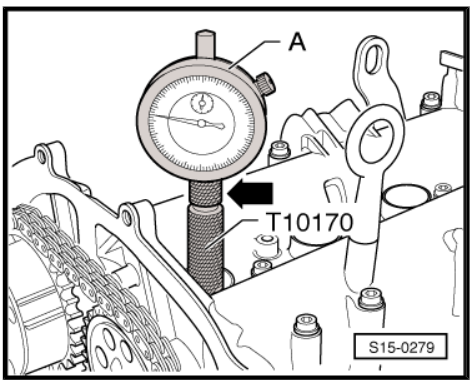


– Screw adapter for dial gauge - T10170- up to the stop into the spark plug thread.

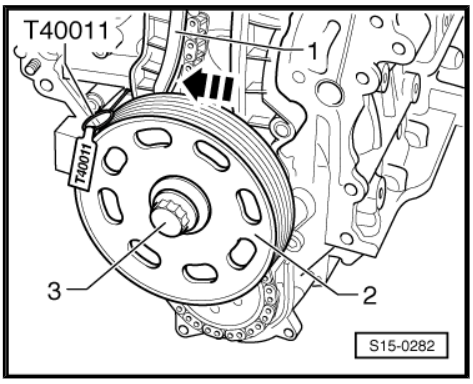
– Insert the dial gauge -A- with extension - T10170/1- up to the stop and fix in place using the clamping screw -arrow-.

– Rotate the crankshaft in direction of rotation of engine on TDC for cylinder 1. Note down the position of the small pointer of the dial gauge.

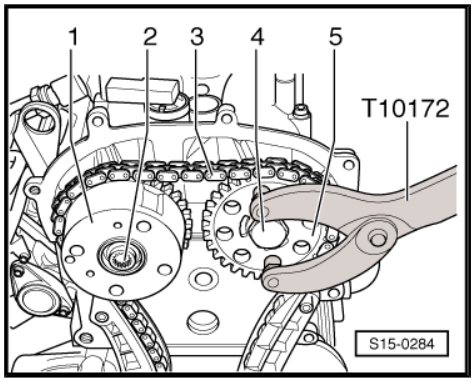
– Turn crankshaft 45° in the opposite direction of rotation of the engine.



– Press the tensioning rail -1- in -direction of arrow- and interlock the piston with the rig pin - T40011- .



– Mark with a suitable felt-tip pen the direction of rotation of the timing chain -3-.



For engine with identification characters BTS

Note

The fixing screw of the camshaft adjuster -2- has a left-hand thread.

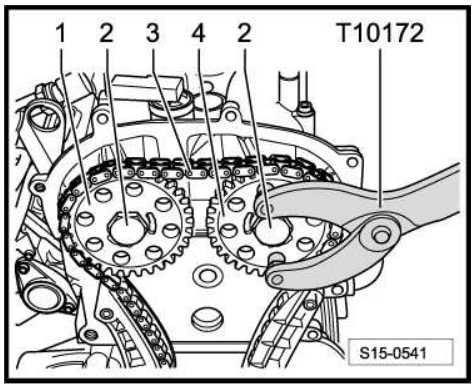
– Release screws -2- and -4- and remove the camshaft adjuster -1- with the timing chain -3-. Use counterholder - T10172- to counterhold.

– Mount again camshaft adjuster -1-.

– Replace screws -2- and -4- and tighten the screw -2- to 40 Nm and the screw -4- to 50 Nm. Use counterholder - T10172- to counterhold.

For engine with identification characters CFNA, CLSA

– Release screws -2- and remove chain sprocket of inlet camshaft -1- with timing chain -3-. Use counterholder - T10172- for this purpose.



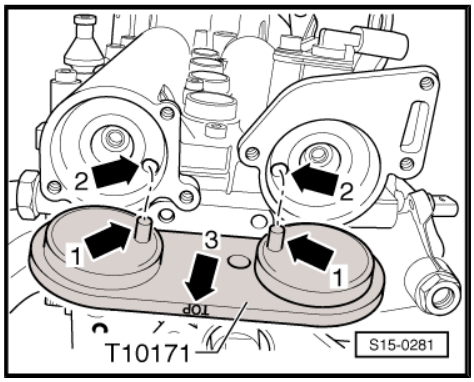
– Re-insert the chain sprocket of the inlet camshaft -1-.

– Replace the screws -2- and tighten to 50 Nm. Use counterholder - T10172- to counterhold.

Continued for all engines

– Turn the inlet and exhaust camshaft until the camshaft fixer/locator - T10171A- can be inserted up to the stop into the camshaft openings.

• The locking bolts -arrows 1- must engage in the holes -arrows 2-. The inscription “TOP” -arrow 3- must be at the top.



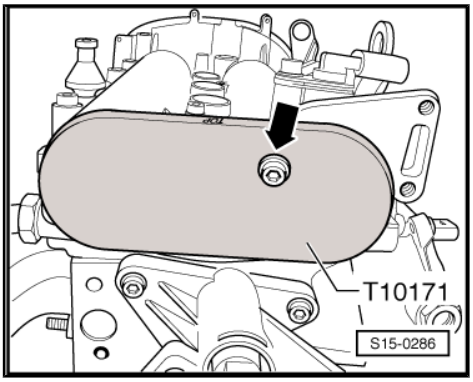
Note

When turning, the camshafts must not be moved axially.

– To secure the camshaft fixer/locator - T10171A- screw in a M6 screw -arrow- by hand; do not tighten.

– Slacken screws of the camshaft sprockets.

Absolutely use counterholder - T10172- .



Caution

Do not use the camshaft fixer/locator - T10171A- as a counterholder.

– Removing the camshaft chain sprocket.

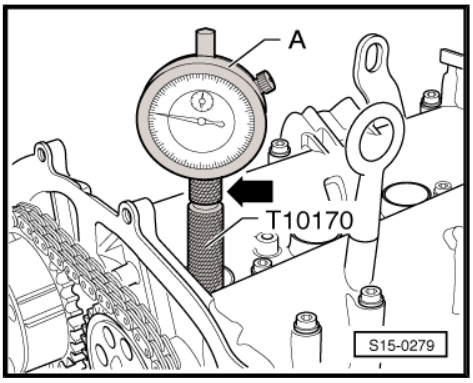
– Place the timing chain onto the camshaft chain sprockets in compliance with the running direction and reinsert the removed camshaft chain sprocket.

– Screw in the camshaft screws so far so that the camshaft chain sprockets can be turned.

– Tighten the timing chain, by pulling out the rig pin - T40011- .

– Rotate crankshaft to TDC for cylinder 1.

Permissible deviation from TDC for cylinder 1: ± 0.01 mm.

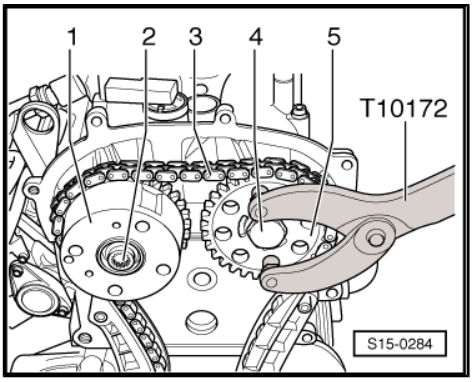


Note

If the crankshaft was turned more than 0.01 mm past the top dead centre, the crankshaft must once again be turned approx 45° in the opposite direction of rotation of the engine. Then position the crankshaft in direction of rotation of engine on top dead centre of cylinder 1.

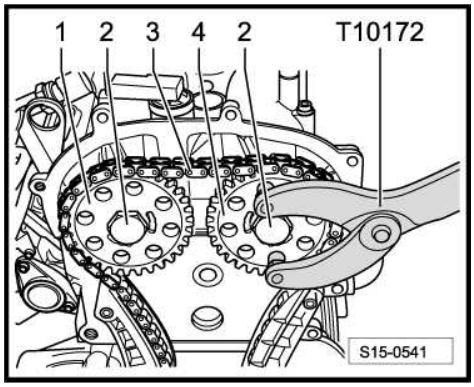
For engine with identification characters BTS

– Hold the camshaft chain sprockets -1- and -5- in this position with the counterholder - T10172- and tighten the screw -2- (left-hand thread) to 40 Nm and the screw -4- to 50 Nm.



For engine with identification characters CFNA, CLSA

– Hold the camshaft chain sprockets -1- and -4- in this position with the counterholder - T10172- and tighten screws -2- to 50 Nm.



Continued for all engines

Note

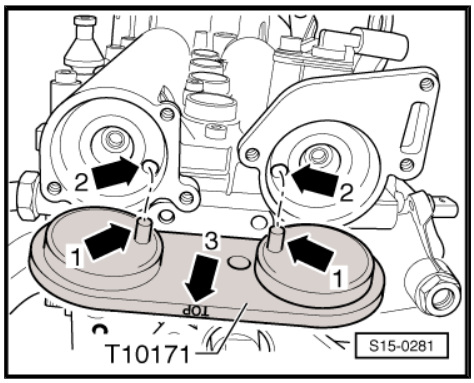
When tightening the camshaft screws, the crankshaft must not turn and the timing chain -3- must remain tightened.

– Remove the camshaft fixer/locator - T10171A- .

– Turn the crankshaft in direction of rotation of engine by 2 turns on TDC for cylinder 1.

Permissible deviation from TDC for cylinder 1: ± 0.01 mm.

– Insert camshaft fixer/locator - T10171A- up to the stop into the holes in the camshaft housing.



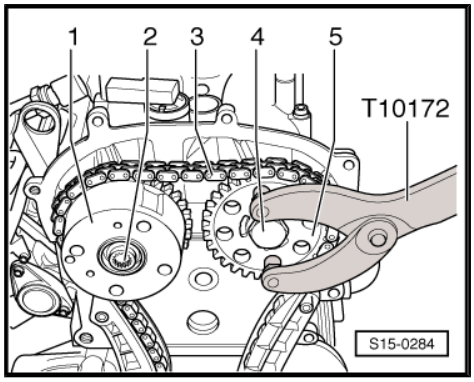
If the camshaft fixer/locator - T10171A- is not insertable.

– Repeat setting.

If the camshaft fixer/locator - T10171A- is insertable.

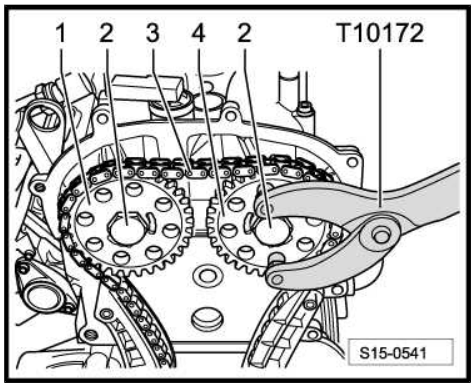
For engine with identification characters BTS

– Remove the camshaft fixer/locator - T10171A- , hold the camshaft chain sprockets with the counterholder - T10172- and torque the screws -2- (left-hand thread) and -4- a further 90° $^{1}/_{4}$ turn with a rigid wrench.



For engine with identification characters CFNA, CLSA

– Remove the camshaft fixer/locator - T10171A- , hold the camshaft chain sprockets with the counterholder - T10172- and torque the screws -2- a further $^{1}/_{4}$ turn (90°) with a rigid wrench.



Continued for all engines

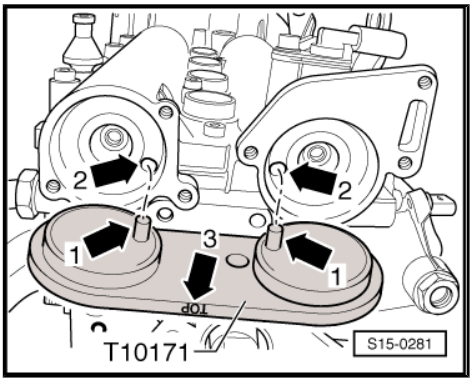
Note

- *On engine with identification characters BTS, the fixing screw of the camshaft adjuster -2- has a left-hand thread.*
- *The camshaft chain sprockets must not turn when tightening.*

– Turn again the crankshaft in direction of rotation of engine by 2 turns on TDC for cylinder 1.

Permissible deviation from TDC for cylinder 1: ± 0.01 mm.

– Insert camshaft fixer/locator - T10171A- up to the stop into the holes in the camshaft housing.



If the camshaft fixer/locator - T10171A- is not insertable.

– Repeat setting.

The further assembly is carried out in reverse order to disassembly. However, pay attention to the following:

- Before installing, undo the holding down bolts, remove the crankshaft-belt pulley and spacer sleeve.
- Install timing case ⇒ page 26 .
- Replace the gasket rings for the caps of the camshafts and oil before assembly.

1.7 Setting the timing for the cylinder head version B

For engine with identification characters CFNA

Special tools and workshop equipment required

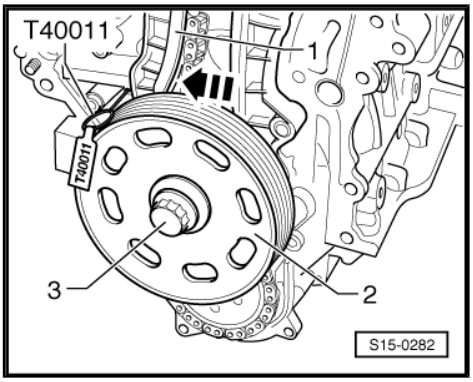
- Adapter for dial gauge - T10170-
- Fixing bolt - T10414- , 2 pieces
- Counterholder - T10172-
- Counterholder - T30004 (3415)-
- Rig pin - T40011-
- Dial gauge

Work procedure

– Remove timing case ⇒ page 26 .

– Insert the spacer sleeve, the crankshaft belt pulley -2- and the fixing screw -3- in order to turn the crankshaft. Tighten the crankshaft screw (to do so, use the counterholder - T30004-).

– Remove ignition coil from cylinder 1 ⇒ page 184 and release the spark plug.

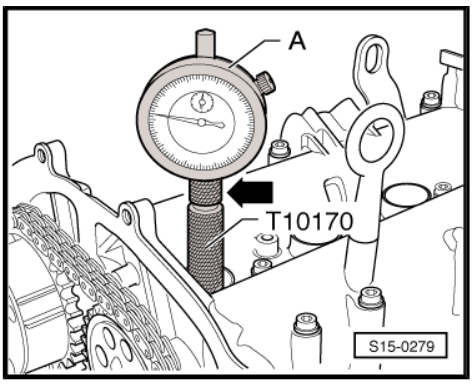


– Screw adapter for dial gauge - T10170- up to the stop into the spark plug thread.

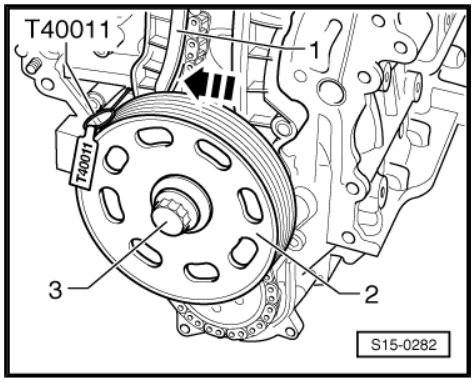
– Insert the dial gauge -A- with extension - T10170/1- up to the stop and fix in place using the clamping screw -arrow-.

– Rotate the crankshaft in direction of rotation of engine on TDC for cylinder 1. Note down the position of the small pointer of the dial gauge.

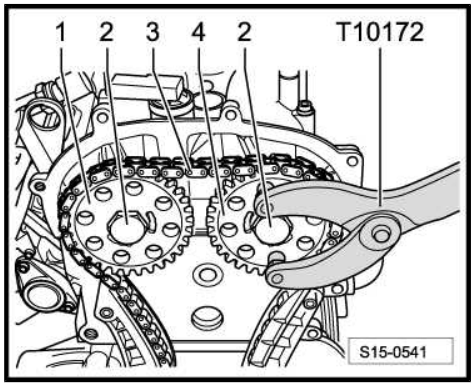
– Turn crankshaft 45° in the opposite direction of rotation of the engine.



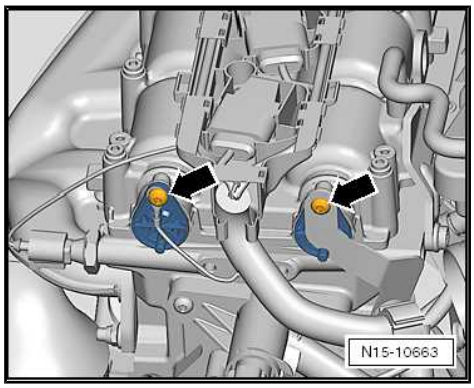
– Press the tensioning rail -1- in -direction of arrow- and interlock the piston with the rig pin - T40011- .



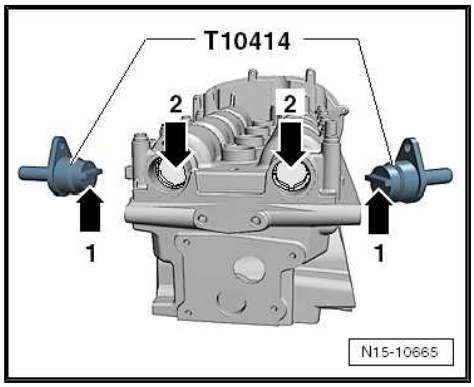
– Mark with a suitable felt-tip pen the direction of rotation of the timing chain -3-.
– Release screws -2- and remove the camshaft chain sprockets -1- and -4- with the timing chain -3-. Use counterholder - T10172- to counterhold.
– Re-insert camshaft chain sprockets -1- and -4-.
– Replace the screws -2- and tighten to 50 Nm. Use counterholder - T10172- to counterhold.



– Remove caps -arrows- for camshafts.
– Turn the camshafts until the fixing bolts - T10414- slide into the inlet and outlet camshafts up to the stop.



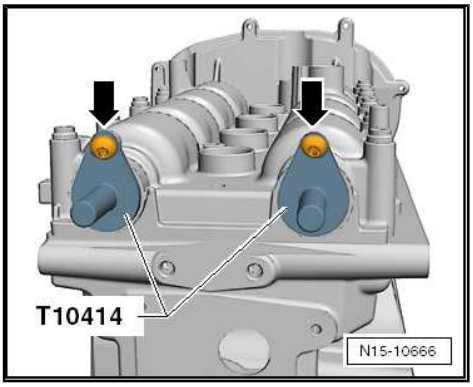
The interlocking lugs -arrow 1- must engage in the holes -arrow 2- of the camshafts.



Note

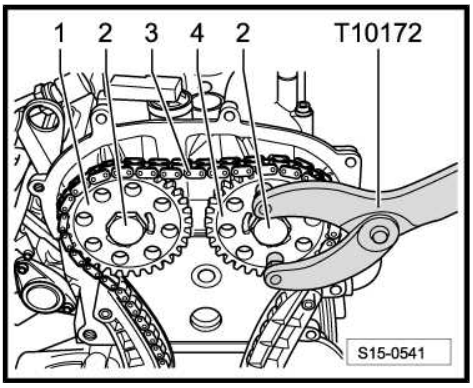
When turning, the camshafts must not be moved axially.

– To secure the fixing bolts - T10414- , screw in the fixing screws -arrows- for the caps of the camshafts by hand, do not tighten forcefully.



– Release screws -2- of camshaft chain sprockets.

Absolutely use counterholder - T10172- .

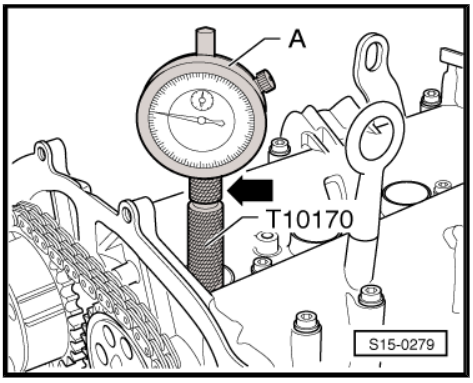


Caution

Do not use the fixing bolts - T10414- as a counterholder.

– Remove a camshaft chain sprocket.
– Place the timing chain onto the camshaft chain sprockets in compliance with the running direction and reinsert the removed camshaft chain sprocket.
– Screw in the camshaft screws so far so that the camshaft chain sprockets can be turned.
– Tighten the timing chain, by pulling out the rig pin - T40011- .
– Rotate crankshaft to TDC for cylinder 1.

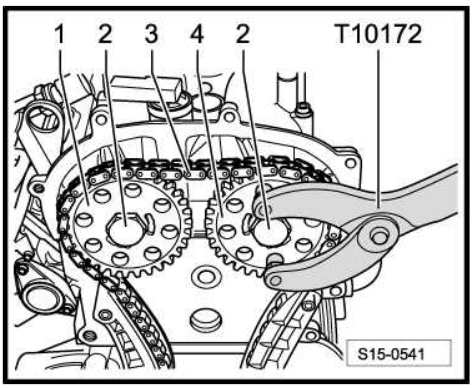
Permissible deviation from TDC for cylinder 1: ± 0.01 mm



Note

If the crankshaft was turned more than 0.01 mm past the top dead centre, the crankshaft must once again be turned approx 45° in the opposite direction of rotation of the engine. Then position the crankshaft in direction of rotation of engine on top dead centre of cylinder 1.

– Hold the camshaft chain sprockets -1- and -4- in this position with the counterholder - T10172- and tighten screws -2- to 50 Nm.



Note

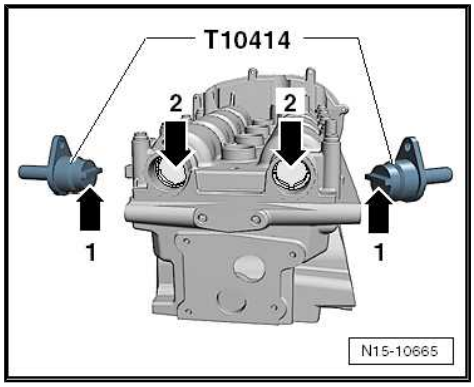
When tightening the camshaft screws, the crankshaft must not turn and the timing chain -3- must remain tightened.

– Remove the two locking bolts - T10414- .
– Once again turn the crankshaft by 2 turns in the direction of rotation of the engine on TDC for cylinder 1.

Permissible deviation from TDC for cylinder 1: ± 0.01 mm

– Insert the two fixing bolts - T10414- again into the camshafts up to the stop.

The interlocking lugs -arrow 1- must engage in the holes -arrow 2- of the camshafts.

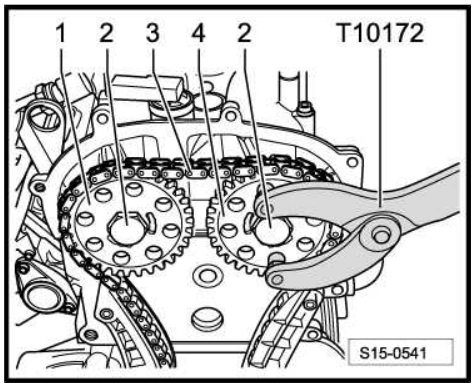


If the fixing bolts - T10414- are not insertable:

– Repeat setting ⇒ page 63 .

If the fixing bolts - T10414- are insertable:

– Remove both fixing bolts - T10414- , hold the camshaft chain sprockets with the counterholder - T10172- and torque the screws -2- a further 90° ($^1/_4$ turn) with a rigid wrench.



Continued for all engines

Note

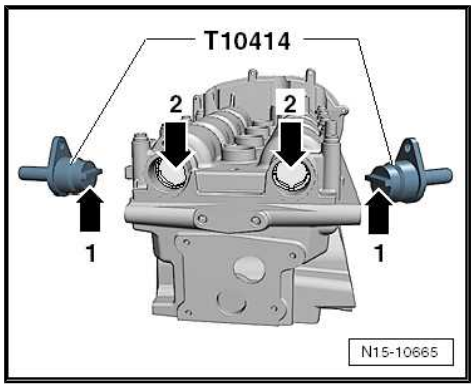
The camshaft chain sprockets must not turn when tightening.

– Once again turn the crankshaft by 2 turns in the direction of rotation of the engine on TDC for cylinder 1.

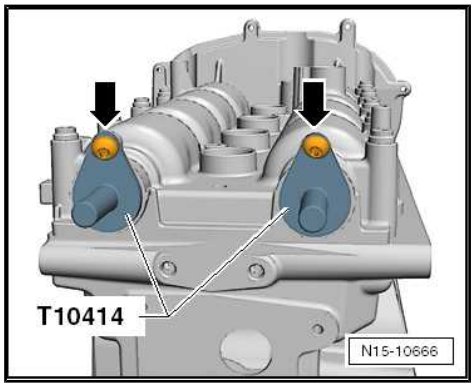
  Permissible deviation from TDC for cylinder 1: ± 0.01 mm

– Insert the two fixing bolts - T10414- again into the camshafts up to the stop.

The interlocking lugs -arrow 1- must engage in the holes -arrow 2- of the camshafts.



• The timing is O.K., if the fixing bolts - T10414- slide fully into the camshaft openings and can be secured with the fixing screws -arrows- for the caps of the camshafts.



If the fixing bolts - T10414- cannot be inserted into the camshaft holes up to the stop, the timing is incorrect:

– Repeat setting ⇒ page 63 .

The further assembly is carried out in reverse order to disassembly. However, pay attention to the following:

♦ Before installing, undo the holding down bolts, remove the crankshaft-belt pulley and spacer sleeve.

♦ Install timing case ⇒ page 26 .

♦ Install the V-ribbed belt ⇒ page 18 .

♦ Replace the gasket rings for the caps of the camshafts and oil before assembly.

1.8 Removing and installing timing chain and drive chain for cylinder head version A

For engine with identification characters BTS, CFNA, CLSA

Special tools and workshop equipment required

- Counterholder - T30004 (3415)-
- Extractor - T10094A-
- Adapter for dial gauge - T10170-
- Camshaft fixer/locator - T10171A-
- Counterholder - T10172-
- Rig pin - T40011-
- Dial gauge

Removing

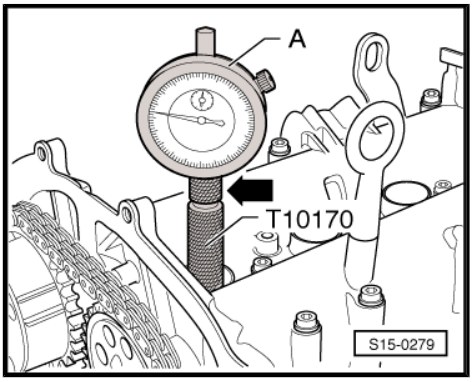
– Unscrew cap for camshafts.

– Remove ignition coil from cylinder 1 ⇒ page 184 and release the spark plug.

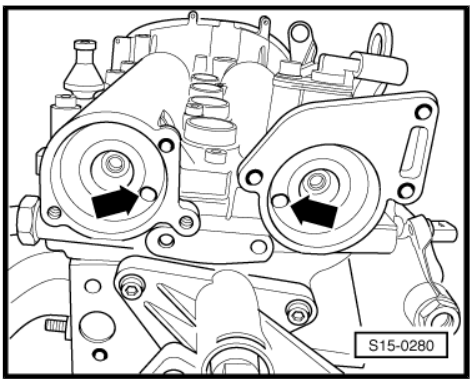
– Screw adapter for dial gauge - T10170- up to the stop into the spark plug thread.

– Insert the dial gauge -A- with extension - T10170/1- up to the stop and fix in place using the clamping screw -arrow-.

– Rotate the crankshaft in direction of rotation of engine on TDC for cylinder 1. Note down the position of the small pointer of the dial gauge.



The holes -arrows- in the camshafts must be positioned as shown. If necessary rotate the crankshaft a further revolution (360°).

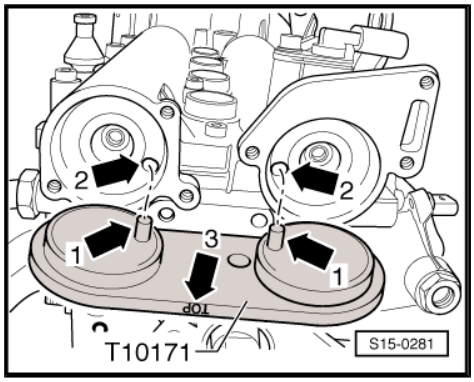


Note

- *If the crankshaft was turned more than 0.01 mm past the top dead centre, the crankshaft must once again be turned approx 45° in the opposite direction of rotation of the engine. Then position the crankshaft in direction of rotation of engine on top dead centre of cylinder 1.*
- *Permissible deviation from TDC for cylinder 1: ± 0.01 mm.*

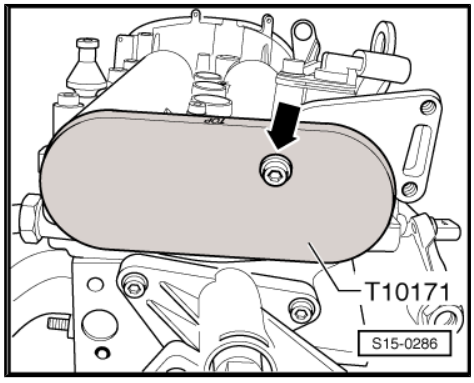
– Insert camshaft fixer/locator - T10171A- up to the stop into the holes in the camshaft housing.

• The locking bolts -arrows 1- must engage in the holes -arrows 2-. The inscription “TOP” -arrow 3- must be at the top.

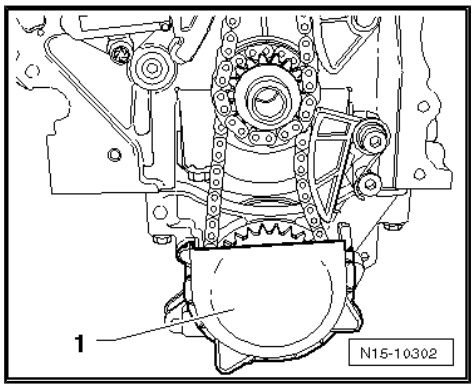


– To secure the camshaft fixer/locator - T10171A- screw in a M6 screw -arrow- by hand; do not tighten.

– Remove timing case ⇒ page 26 .

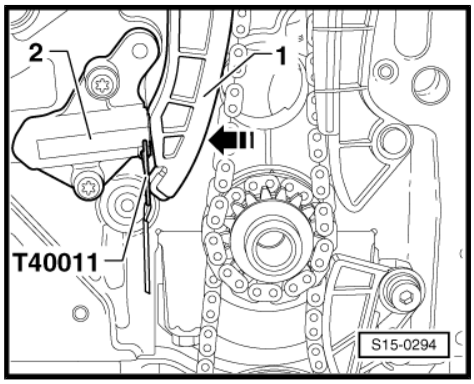


– Pull off cover -1- from chain sprocket of oil pump.

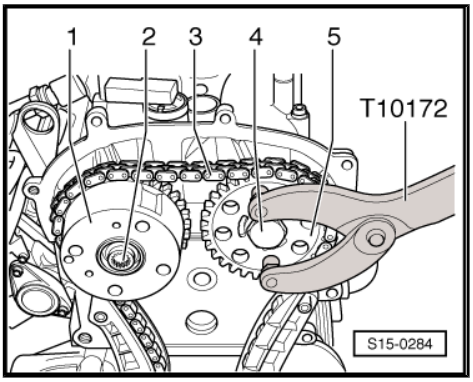


– Press the tensioning rail by hand in the -direction of the arrow- and interlock the piston with the rig pin - T40011- .

– Remove chain tensioner -2-.



– Mark with a suitable felt-tip pen the direction of rotation of the timing chain -3-.



For engine with identification characters BTS

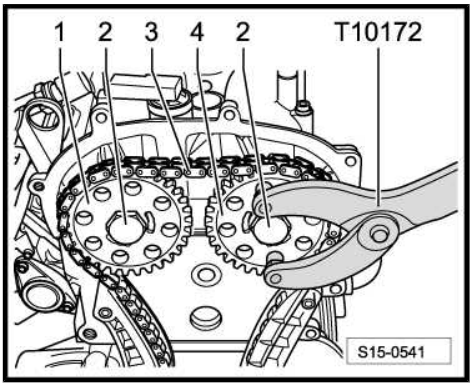
Note

The fixing screw of the camshaft adjuster -2- has a left-hand thread.

– Release screws -2- and -4- and remove the camshaft adjuster -1- with the timing chain -3-. Use counterholder - T10172- to counterhold.

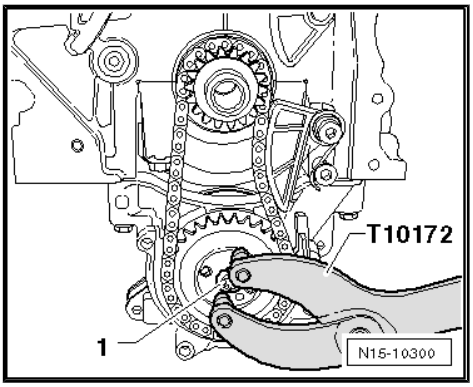
For engine with identification characters CFNA, CLSA

– Release screws -2- and remove chain sprocket of inlet camshaft -1- with timing chain -3-. Use counterholder - T10172- to counterhold.



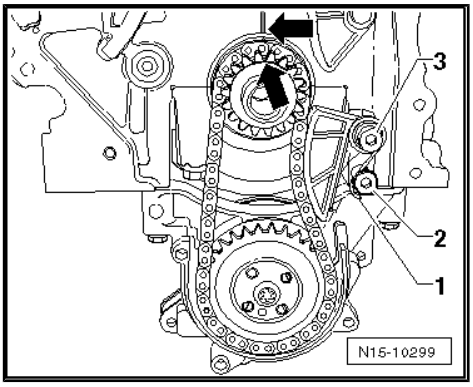
Continued for all engines

– Hold chain sprocket of oil pump with counterholder - T10172- and slacken fixing screw -1-.

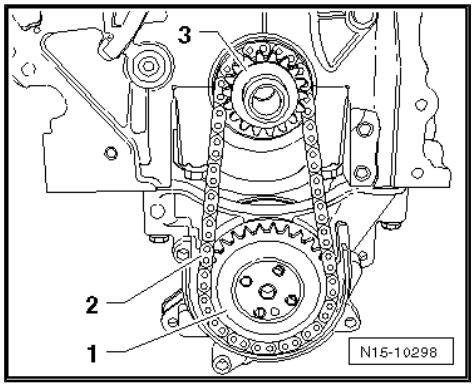


– Lever out tensioning spring -1- at the screw -2- with a screwdriver and remove tensioning spring -1-.

– Unscrew fixing screw -3- and remove the chain tensioner.



– Mark with a suitable felt-tip pen the direction of rotation of the drive chain for oil pump -2-.
– Unscrew the fixing screw of the chain sprocket -1- and remove the chain sprockets -1- and -3- together with the drive chain for oil pump -2-.



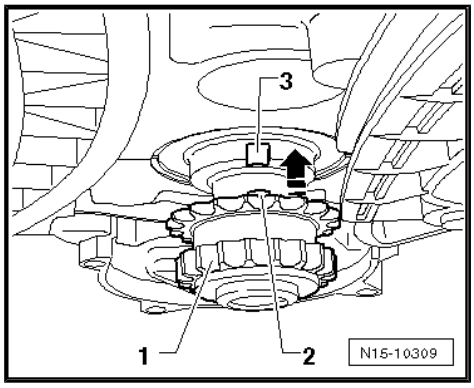
Install

- The crankshaft must be positioned on TDC for cylinder 1.

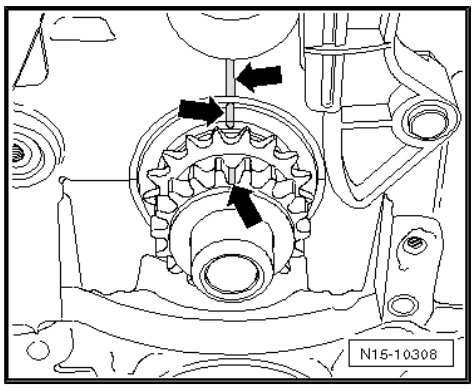
– Push chain sprocket -1- in -direction of arrow- up to the stop onto the crankshaft journal.

Caution

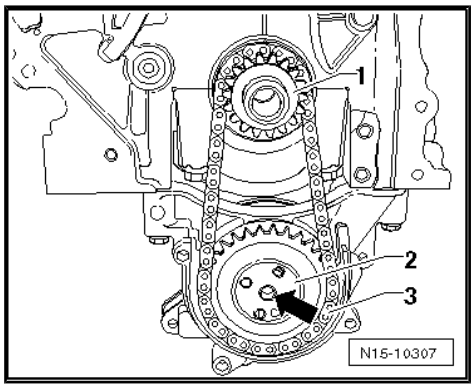
The integrated peg -2- of the chain sprocket -1- must fit into the slot -3- at the crankshaft stub.



– Mark the positions of the chain sprocket and the crankshaft to the cylinder block with a felt-tip pen.



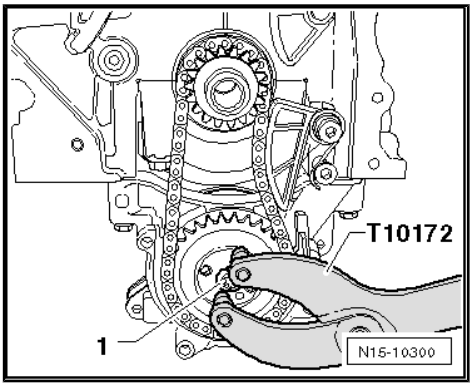
– Fit the drive chain for oil pump -3- onto the chain sprocket -1-.
– Place the chain sprocket of the oil pump -2- into the drive chain for oil pump -3- and position onto the drive shaft of the oil pump.



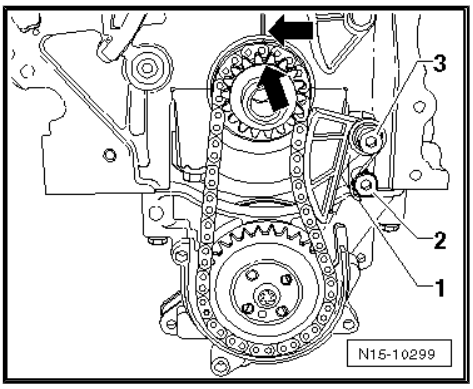
Note

- *Observe the marking of the running direction on the drive chain for oil pump.*
- *The chain sprocket of the oil pump only adapts to one postion on the drive shaft of the oil pump -arrow-.*

– Hold the chain sprocket of the oil pump with the counterholder - T10172- .
– Tighten fixing screw -1- to 20 Nm + torque a further 90° ($^1/_4$ turn).



– Position the chain sprocket onto the drive chain for the oil pump and tighten the fixing screw -3- to 15 Nm.
– Lever the tensioning spring -1- onto the screw -2- with a screwdriver.

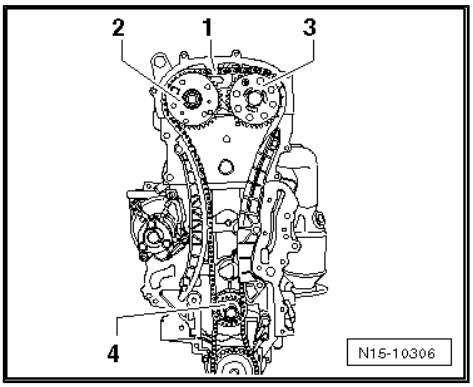


Note

- *Observe the markings -arrows-.*
- *The crankshaft should not turn.*

For engine with identification characters BTS

– Screw on the chain sprocket -3- by hand with a new fixing screw.
– Place the timing chain -1- onto the chain sprocket of the crankshaft -4-, the chain sprocket of the outlet camshaft -3- and screw on the camshaft adjuster -2- with a new fixing screw.

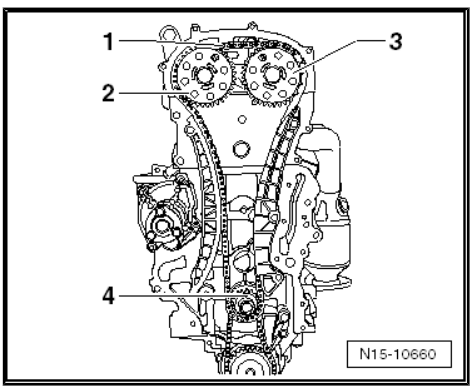


Note

- *Observe the marking of the running direction on the timing chain -1-.*
- *Make sure that the guide sleeve is installed between the inlet camshaft and camshaft adjuster.*
- *On engine with identification characters BTS, the fixing screw of the camshaft adjuster -2- has a left-hand thread.*

For engine with identification characters CFNA, CLSA

– Screw on the chain sprocket -3- by hand with a new fixing screw.
– Place the timing chain -1- onto the chain sprocket of the crankshaft -4-, the chain sprocket of the outlet camshaft -3- and screw on the chain sprocket of the inlet camshaft -2- with a new fixing screw.

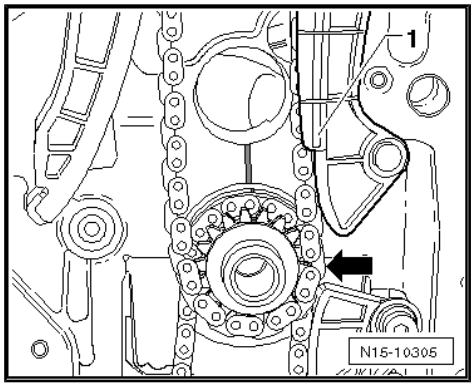


Note

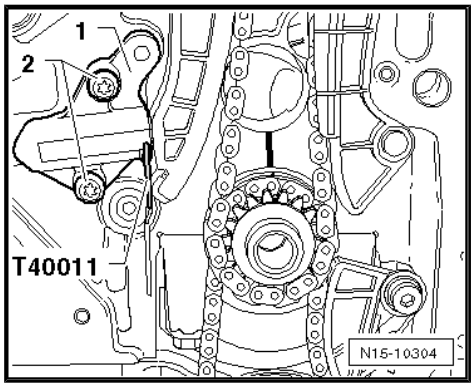
Observe the marking of the running direction on the timing chain -1-.

Continued for all engines

The timing chain must rest on the sliding rail -1- and on the chain sprocket of the crankshaft -arrow-.

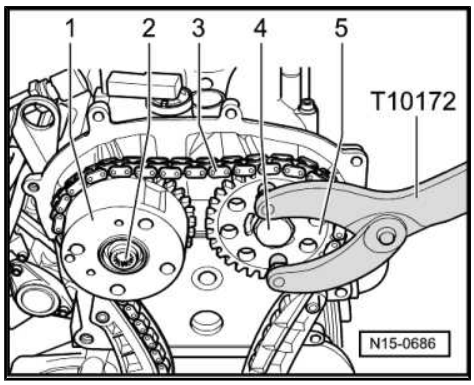


– Install the chain tensioner -1- and tighten the fixing screws -2- to 9 Nm.
– Tighten the timing chain, by pulling out the rig pin - T40011- from the chain tensioner.
– Check markings on the chain sprocket of the crankshaft and on the cylinder block; they must be positioned opposite to each other.



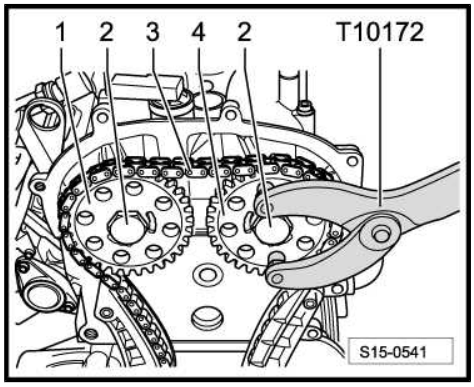
For engine with identification characters BTS

– Tighten the fixing screw -2- to 40 Nm and the screw -4- to 50 Nm (use counterholder - T10172-).



For engine with identification characters CFNA, CLSA

– Tighten fixing screws -2- to 50 Nm (use counterholder - T10172-).



Continued for all engines

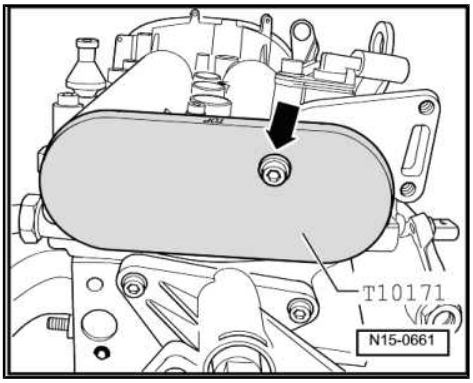
Note

- *First the fixing screws -2- and -4- are tightened to the torquing angle 90° (1/4 turn), after which the timing is checked.*
- *On engine with identification characters BTS, the fixing screw of the camshaft adjuster -2- has a left-hand thread.*

– Screw out screws -arrow- and remove the camshaft fixer/locator - T10171A- from the camshaft housing.

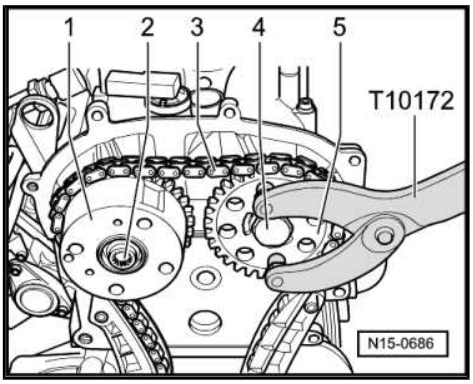
– Test timing ⇒ page 56 .

If timing is o.k.:



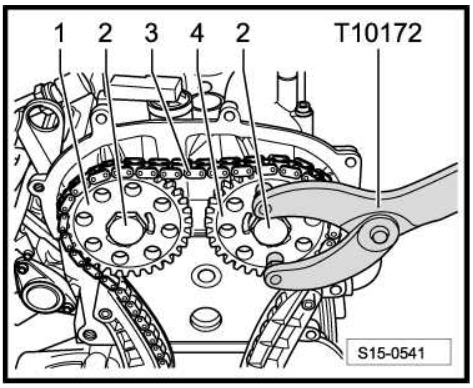
For engine with identification characters BTS

– Hold the camshaft sprockets with the counterholder - T10172- and torque the fixing screws -2- (left-hand thread) and -4- a further 90° ($^1/_4$ turn) with a rigid wrench.



For engine with identification characters CFNA, CLSA

– Hold the camshaft sprockets with the counterholder - T10172- and torque the fixing screws -2- a further 90° ($^1/_4$ turn) with a rigid wrench.



Continued for all engines

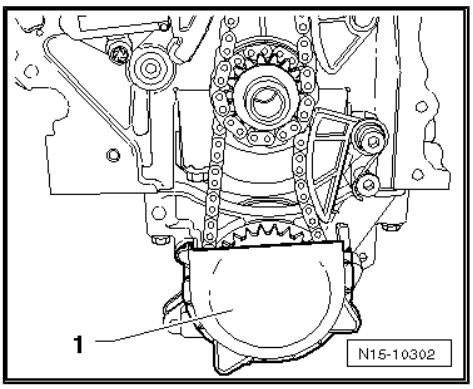
Note

- *On engine with identification characters BTS, the fixing screw of the camshaft adjuster -2- has a left-hand thread.*
- *The camshaft chain sprockets must not turn when tightening.*

– Install cover for oil pump gear -1-.

– Install timing case ⇒ page 26 .

The further assembly is carried out in reverse order to disassembly.



1.9 Removing and installing timing chain and drive chain of the oil pump for cylinder head version B

For engine with identification characters CFNA

Special tools and workshop equipment required

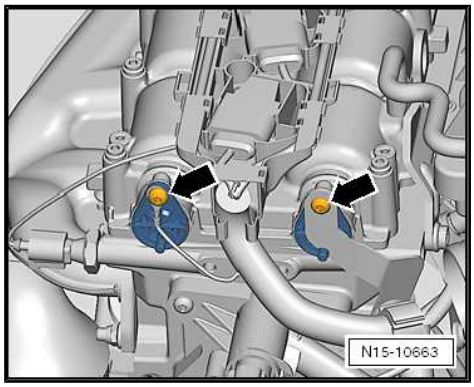
- Counterholder - T30004 (3415)-

- Extractor - T10094A-
- Adapter for dial gauge - T10170-
- Fixing bolt - T10414- , 2 pieces
- Counterholder - T10172-
- Rig pin - T40011-
- Dial gauge

Removing

– Remove caps -arrows- for camshafts.

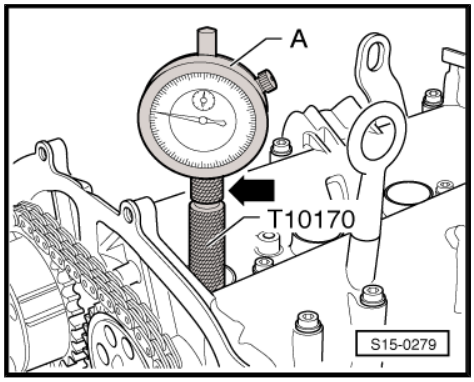
– Remove ignition coil from cylinder 1 ⇒ page 184 and release the spark plug.



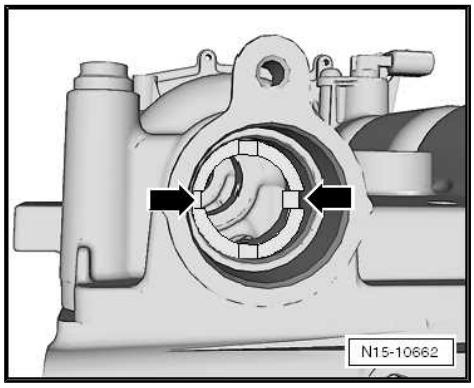
– Screw adapter for dial gauge - T10170- up to the stop into the spark plug thread.

– Insert the dial gauge -A- with extension - T10170/1- up to the stop and fix in place using the clamping screw -arrow-.

– Rotate the crankshaft in direction of rotation of engine on TDC for cylinder 1. Note down the position of the small pointer of the dial gauge.



The holes -arrows- in the camshafts must be positioned as shown, if necessary rotate the crankshaft a further revolution (360°).

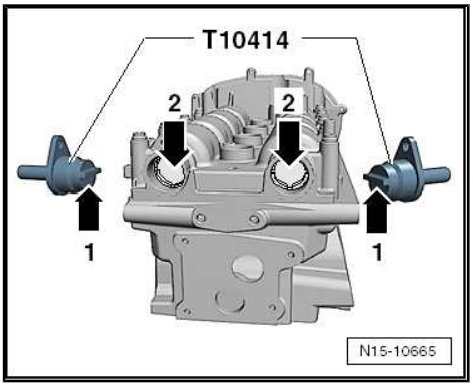


Note

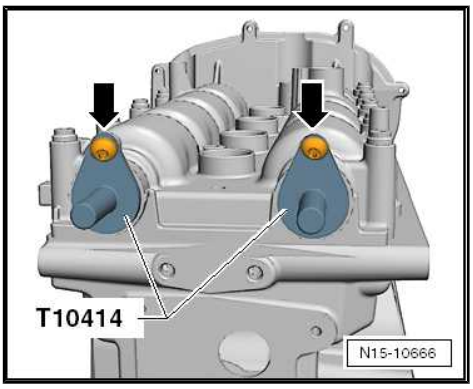
- *If the crankshaft was turned more than 0.01 mm past the top dead centre, the crankshaft must once again be turned approx 45° in the opposite direction of rotation of the engine. Then position crankshaft in direction of rotation of engine on TDC for cylinder 1.*
- *Permissible deviation from TDC for cylinder 1: ± 0.01 mm.*

– Insert the fixing bolt - T10414- up to the stop into the camshaft openings.

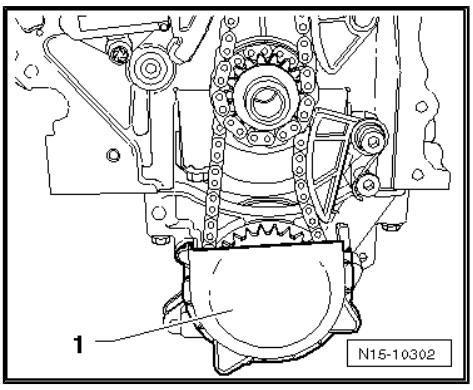
The interlocking lugs -arrow 1- must engage in the holes -arrow 2- of the camshafts.



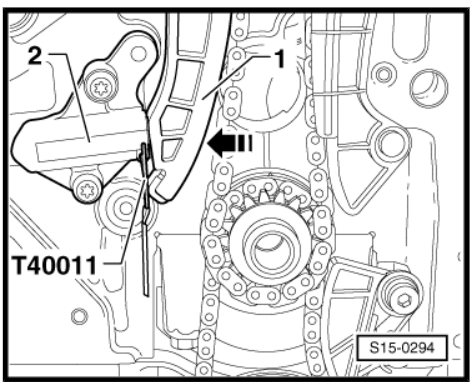
– To secure the fixing bolts - T10414- , screw in the fixing screws -arrows- for the caps of the camshafts by hand, do not tighten forcefully.
– Remove timing case ⇒ page 26 .



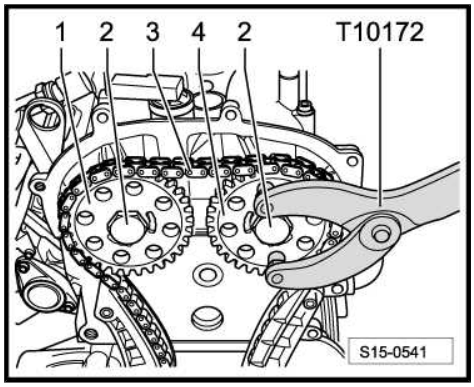
– Pull off cover -1- from chain sprocket of oil pump.



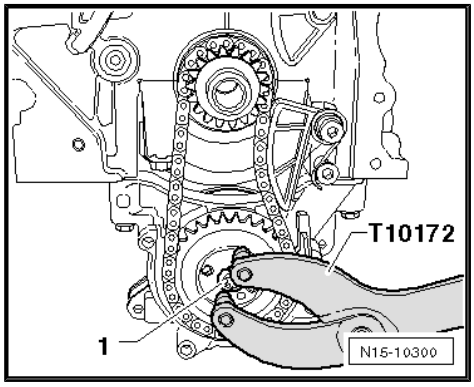
– Press the tensioning rail by hand in the -direction of the arrow- and interlock the piston with the rig pin - T40011- .
– Remove chain tensioner -2-.



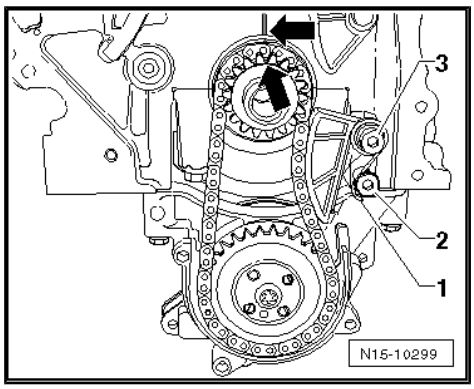
– Mark with a suitable felt-tip pen the direction of rotation of the timing chain -3-.
– Release screws -2- and remove chain sprocket of inlet camshaft -1- with timing chain -3-. Use counterholder - T10172- to counterhold.



– Hold chain sprocket of oil pump with counterholder - T10172- and slacken fixing screw -1-.



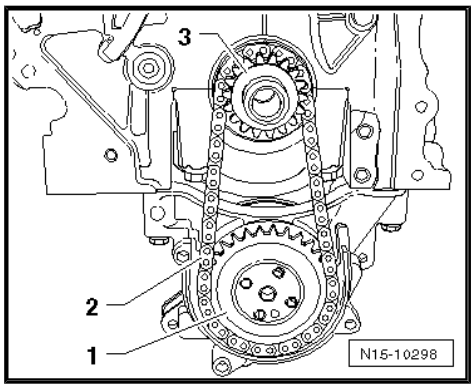
– Lever out tensioning spring -1- at the screw -2- with a screwdriver and remove tensioning spring -1-.
– Unscrew fixing screw -3- and remove the chain tensioner.



– Mark with a suitable felt-tip pen the direction of rotation of the drive chain for oil pump -2-.
– Unscrew the fixing screw of the chain sprocket -1- and remove the chain sprockets -1- and -3- together with the drive chain for oil pump -2-.

Install

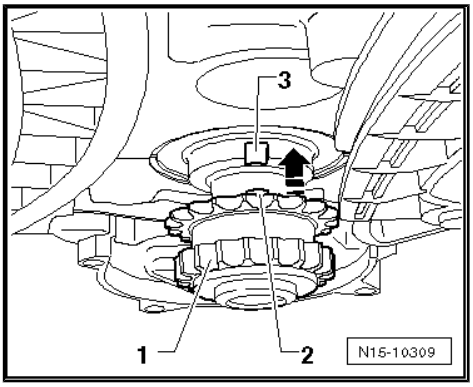
• The crankshaft must be positioned on TDC for cylinder 1.



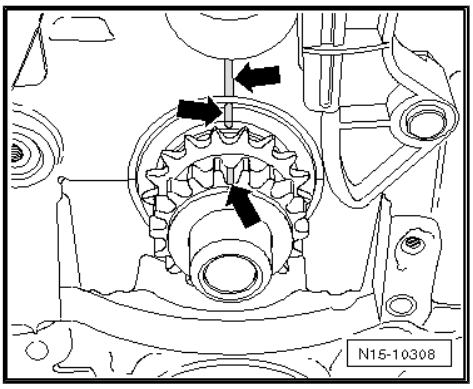
– Push chain sprocket -1- in -direction of arrow- up to the stop onto the crankshaft journal.

Caution

The integrated peg -2- of the chain sprocket -1- must fit into the slot -3- at the crankshaft stub.

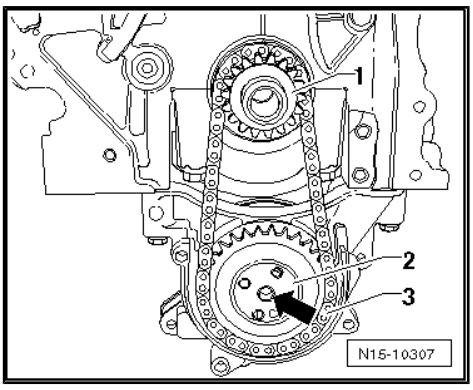


– Mark the positions of the chain sprocket and the crankshaft to the cylinder block with a felt-tip pen.



– Fit the drive chain for oil pump -3- onto the chain sprocket -1-.

– Place the chain sprocket of the oil pump -2- into the drive chain for oil pump -3- and position onto the drive shaft of the oil pump.

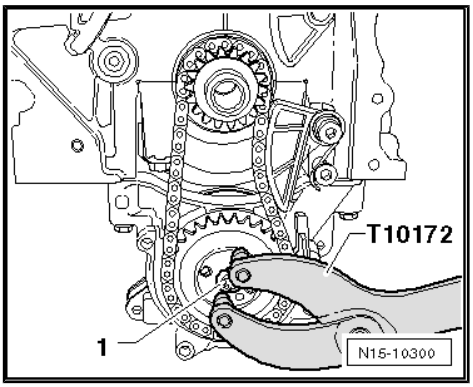


Note

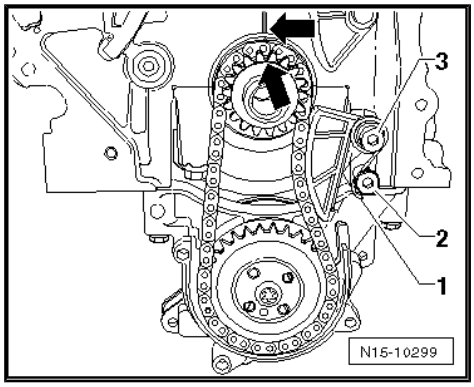
- *Observe the marking of the running direction on the drive chain for oil pump.*
- *The chain sprocket of the oil pump only adapts to one postion on the drive shaft of the oil pump -arrow-.*

– Hold the chain sprocket of the oil pump with the counterholder - T10172- .

– Tighten the new fixing screw -1- to 20 Nm + torque a further 90° ($^1/_4$ turn).



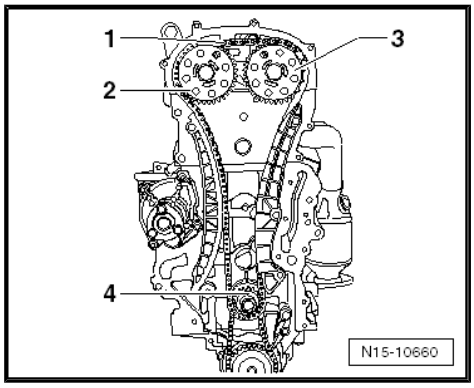
– Position the chain sprocket onto the drive chain for the oil pump and tighten the fixing screw -3- to 15 Nm.
– Lever the tensioning spring -1- onto the screw -2- with a screwdriver.



Note

- *Observe the markings -arrows-.*
- *The crankshaft should not turn.*

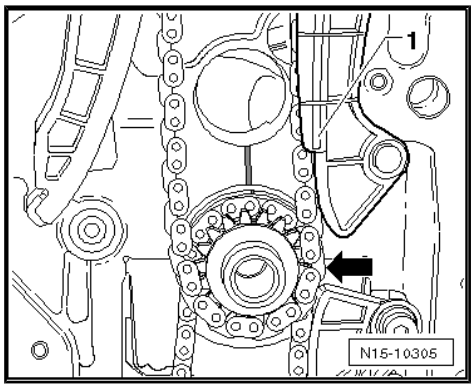
– Screw on the chain sprocket -3- by hand with a new fixing screw.
– Place the timing chain -1- onto the chain sprocket of the crankshaft -4-, the chain sprocket of the outlet camshaft -3- and screw on the chain sprocket of the inlet camshaft -2- with a new fixing screw.



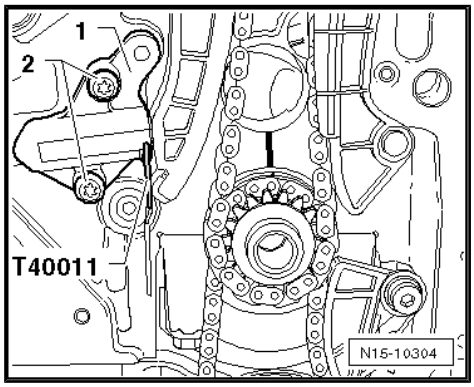
Note

Observe the marking of the running direction on the timing chain -1-.

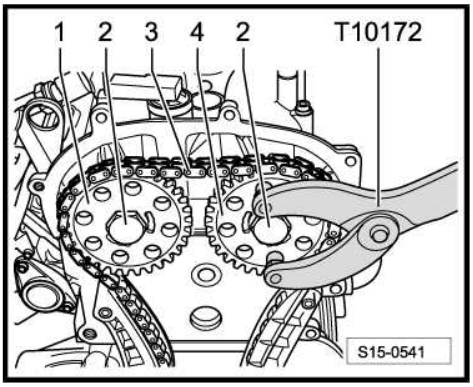
The timing chain must rest on the sliding rail -1- and on the chain sprocket of the crankshaft -arrow-.



– Install the chain tensioner -1- and tighten the fixing screws -2- to 9 Nm.
– Tighten the timing chain, by pulling out the rig pin - T40011- from the chain tensioner.
– Check markings on the chain sprocket of the crankshaft and on the cylinder block; they must be positioned opposite to each other.



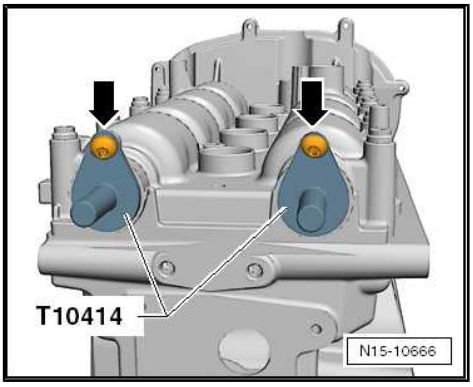
– Tighten fixing screws -2- to 50 Nm (use counterholder - T10172-).



Note

First the fixing screws -2- are tightened to the torquing angle 90° (1/4 turn), after which the timing is checked.

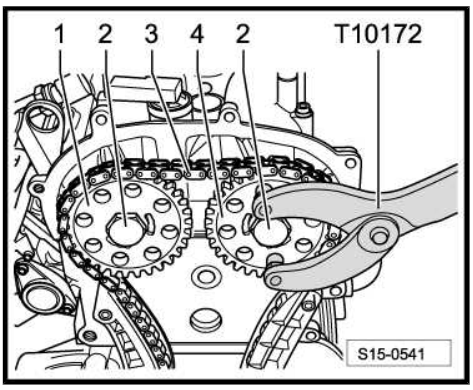
– Unscrew the securing screws -arrows- and remove both fixing bolts - T10414- .



– Test timing ⇒ page 57 .

If timing is o.k.:

– Hold the camshaft sprockets with the counterholder - T10172- and torque the fixing screws -2- a further 90° (1/4 turn) with a rigid wrench.



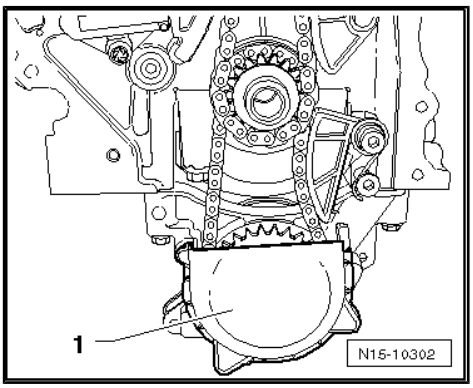
Note

The camshaft chain sprockets must not turn when tightening.

– Install cover for oil pump gear -1-.

– Install timing case ⇒ page 26 .

The further assembly is carried out in reverse order to disassembly.



1.10 Removing and installing camshaft housing

Observe safety measures ⇒ page 4 .

Observe rules for cleanliness ⇒ page 4 .

Special tools and workshop equipment required

- Camshaft fixer/locator - T10171A- , for cylinder head version A
- Fixing bolt - T10414- , 2 pieces, for cylinder head version B
- Two pin screws (M6 x 80)
- Sealant - D 188 003 A1-
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Cleaning and degreasing agent, e.g. - D 009 401 04-
- Protective goggles and gloves

Removing

- The ignition must be switched off and the ignition key must be withdrawn.

Note

- *On this engine the camshafts are located in the camshaft housing. Before removing the camshaft housing, the timing case must be removed ⇒ page 26 .*
- *Do not rework the sealing surface of the camshaft housing.*
- *The camshafts must only be replaced complete with camshaft housing for the cylinder head version -B-. Distinguishing features of the engines ⇒ page 52 .*
- *Removing and installing camshafts:*

- Engines with identification characters BTS ⇒ page 87 .
- Engines with identification characters CFNA, CLSA, version A ⇒ page 89 .
- Engines with identification characters CFNA, version B ⇒ page 92 .

– Remove plastic cover for camshaft housing.
– Remove timing case ⇒ page 26 .
– Position the crankshaft on TDC for cylinder 1, then turn back the crankshaft approx. 45° in the opposite direction of rotation of the engine and remove the camshaft chain sprockets with the timing chain:

- Engines with identification characters BTS ⇒ page 20 .
- Engines with identification characters CFNA, CLSA ⇒ page 23 .

– Unscrew earth lead from camshaft housing.
– Removing ignition coils ⇒ page 184 .
– Remove cable guide with wiring loom from camshaft housing.
– Pull out oil dipstick.
– Removing the intake manifold ⇒ page 159 .
– Unscrew left lifting eye.
– Slacken the bolts of the camshaft housing crosswise from the outside to the inside.
– Release screws and remove camshaft housing.

Install

Condition

- The pistons must not be positioned at top dead centre.

WARNING

Wear protective gloves when working with sealant and grease remover!

– Remove residual sealant on the cylinder head and camshaft housing using a chemical sealant remover.

Note

Ensure that no dirt and sealant residues get into the cylinder head or camshaft housing.

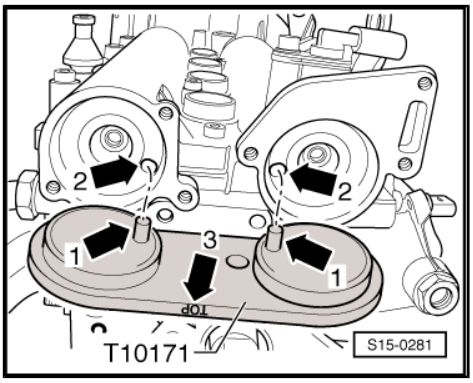
Cylinder head version A

– Turn the inlet and outlet camshaft until the camshaft fixer/locator - T10171A- can be inserted up to the stop into the holes of the camshafts.

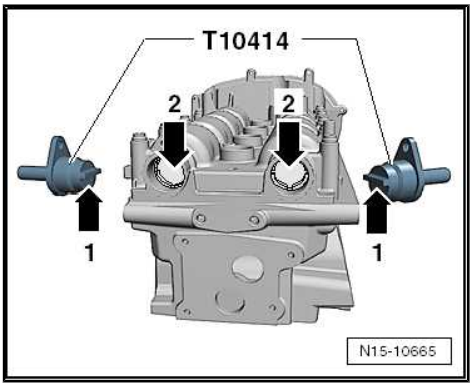
– To secure the camshaft fixer/locator - T10171A- screw in M6 screw by hand; do not tighten.

Cylinder head version B

– Turn the camshafts until the fixing bolts - T10414- slide into the inlet and outlet camshafts up to the stop.



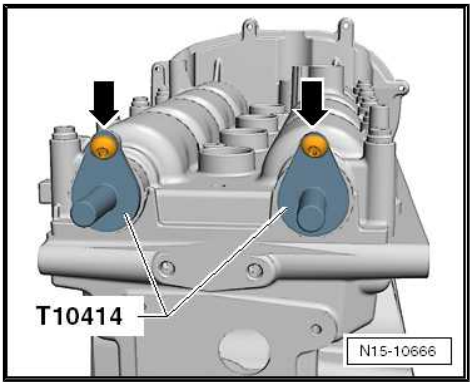
The interlocking lugs -arrow 1- must engage in the holes -arrow 2- of the camshafts.



Note

When turning, the camshafts must not be moved axially.

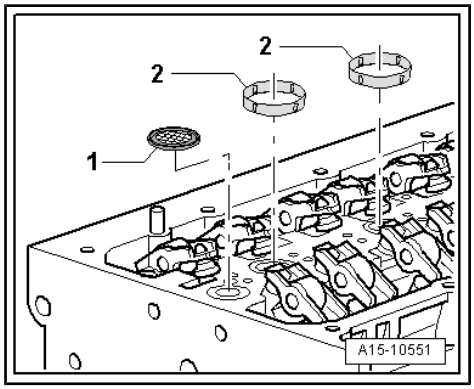
– To secure the fixing bolts - T10414- , screw in the fixing screws -arrows- for the caps of the camshafts by hand, do not tighten forcefully.



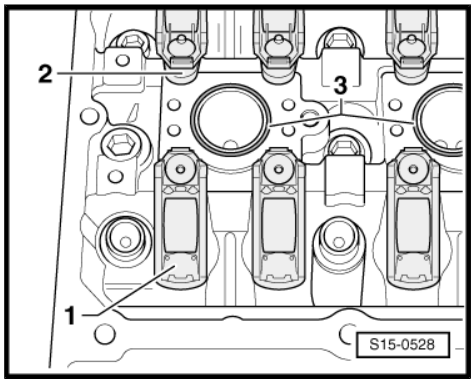
Continued for all engines

– Carefully clean and degrease the sealing surfaces. They must be free of oil and grease.

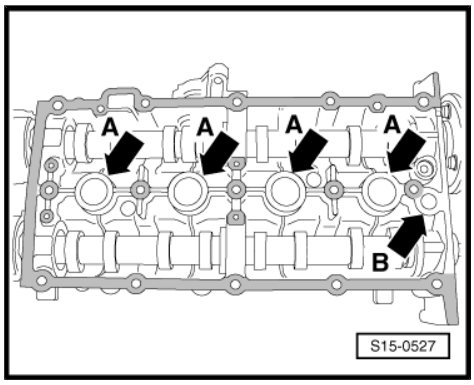
– Replace oil strainer -1- and insert in the cylinder head.
– Insert 4 new gasket rings -2- into the grooves of the cylinder head.



– Ensure that all the roller arms are correctly positioned on the valve stem ends -1- and are clipped in place on the relevant hydraulic supporting elements -2-.
– Screw in two pin screws (M6 x 80) into the cylinder head before fitting on the camshaft housing.



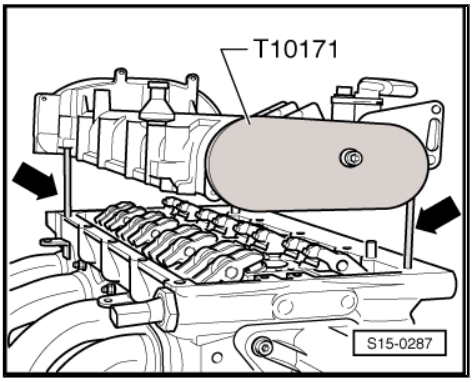
– Apply a thin coating of sealant uniformly on the clean sealing surface of the camshaft housing (see grid surfaces in the illustration).



Note

- *Do not apply sealant in the area of the -arrows A-. Here the cylinder head is sealed with the inserted gasket rings.*
- *No sealant must be applied in the area -arrow B-. Here the oil strainer seals.*
- *The sealant must not be applied too thickly, as otherwise excess sealant may penetrate into the oil bores and possibly cause engine damage.*

– Carefully place the camshaft housing vertically from above onto the pin screws -arrows- and the dowel pins of the cylinder head.



Note

Make sure that no residues of oil drop down onto the sealing flange and the camshaft housing does not tilt.

– Tighten the new fixing screws of the camshaft housing diagonally and evenly from the inside to the outside.

Tightening torque: 10 Nm + torque a further 90° ($^1/_4$ turn)

Note

After installing the camshaft housing, allow the sealant to dry for about 30 minutes.

– Setting the timing:

- Version A ⇒ page 59 .
- Version B ⇒ page 63 .

The further assembly is carried out in reverse order to disassembly. Pay attention to the following:

- Install timing case ⇒ page 26 .
- Pay attention to the required measures after connecting the battery ⇒ Electrical System; Rep. gr. 27 .
- Interrogate fault memory, rectify any faults existing and erase the fault memory ⇒ Vehicle diagnostic tester.

1.11 Removing and installing the cylinder head

Observe safety measures ⇒ page 3 .

Observe rules for cleanliness ⇒ page 4 .

Special tools and workshop equipment required

- Supporting device - MP9-200 (10-222A)-
- Hook - MP9-200/10 (10-222A/10)-
- Support - T10358-
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Protective goggles and gloves

Condition

- The engine must not exceed the temperature of 35 °C, because the cylinder head could twist when loosening the cylinder head screws.

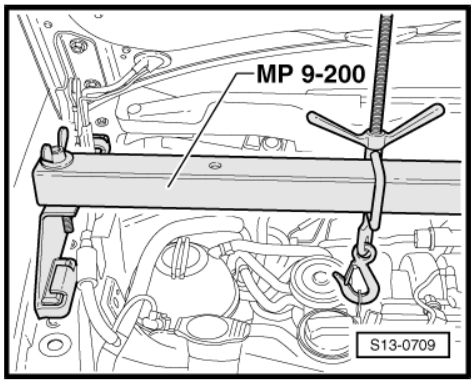
Removing

– Remove the air filter housing ⇒ page 161 .

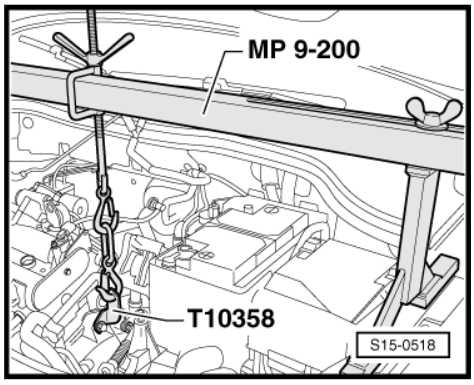
– Drain the coolant from the cooling system and the charge air cooling system ⇒ page 118 .

– Remove fuel strip together with injectors.

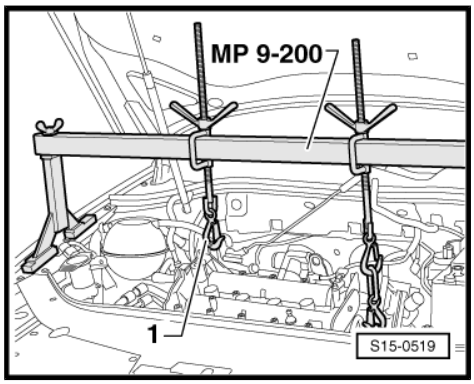
– Removing the intake manifold ⇒ page 159 .
– Position the supporting device - MP9-200 (10-222A)- with two hooks - MP9-200/10- .
– Hook the right hook into the right lifting eye of the engine and pre-tension via the spindle, however do not raise.
– First of all do not attach the left hook.
– Remove timing case ⇒ page 26 .
– Remove timing chain and drive chain for oil pump:
♦ Version A ⇒ page 67 .
♦ Version B ⇒ page 73 .
– Remove coolant regulator housing from cylinder head ⇒ page 116 .
– Remove exhaust manifold:
♦ Fabia II and Roomster vehicles with engine identification characters BTS ⇒ page 171 .
♦ Fabia II and Roomster vehicles with engine identification characters CFNA ⇒ page 172 .
♦ Fabia II vehicles with engine identification characters CLSA ⇒ page 174
♦ Rapid NH, NK vehicles with engine identification characters CFNA ⇒ page 175
♦ Rapid NA vehicles with engine identification characters CLSA ⇒ page 175



– Unscrew the fixing screw for the gearbox and screw down the bracket - T10358- as shown.
– Hang the hook of the supporting device - MP9-200- at the bracket - T10358- as shown.
– Turn the spindle until the hook is slightly tensioned.

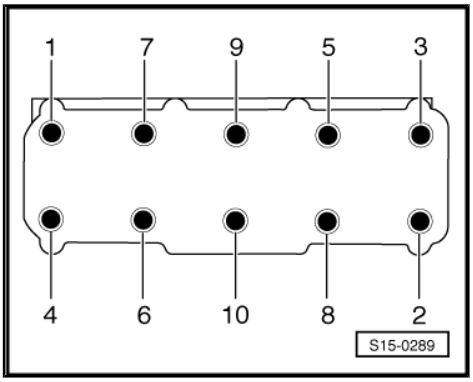


– Unhook the hook -1- from the right lifting eye and push the spindle onto the supporting device - MP9-200- on the right.
– Removing the camshaft housing ⇒ page 79 .
– Remove the roller rocker arm together with the supporting elements and lay aside on a clean surface.
– Ensure that the roller rocker arms and the balancing elements are not mixed up.



– Release the cylinder head bolts in the specified sequence and remove.

– Carefully remove the cylinder head.



Install

Condition

- The pistons must not be positioned at top dead centre.

Note

♦ *Remove the new cylinder head gasket from its wrapping immediately before fitting.*

♦ *Treat the new seal with the utmost care. Any damage will result in leaks.*

WARNING

Wear protective googles and gloves when working with sealant and grease remover!

– Fill up the cylinder with clean cloths to prevent any dirt from getting between the cylinder barrel and the piston.

– Remove residual sealant on the contact surfaces of the cylinder head/cylinder block using a chemical sealant remover.

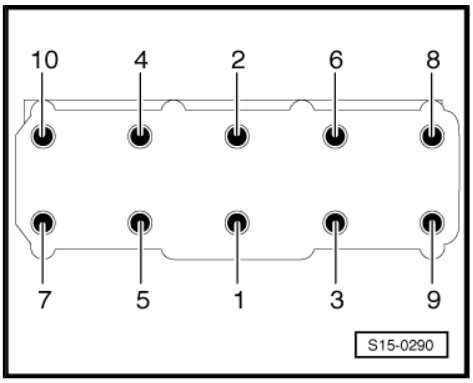
– Set pistons for cyl. 1 to TDC and turn back crankshaft slightly.

– Position the new cylinder heads. The text (part number) must be legible from above.

– Insert the cylinder head. Pay attention to the dowel pins in the cylinder block.

– Insert new cylinder head bolts and first tighten by hand.

– Tighten cylinder head bolts in the tightening order shown as follows:



♦ Tighten all screws to 30 Nm.

♦ Then, torque all bolts further to 90° ($^1/_4$ turn) with a rigid wrench.

♦ Finally, once again turn all bolts through a further 90° ($^1/_4$ turn).

– Insert the supporting elements in the cylinder head and position the relevant roller rocker arms on the valve stem ends and the supporting elements.

– Installing camshaft housing ⇒ page 79 .

– Setting the timing:

♦ Version A ⇒ page 59 .

♦ Version B ⇒ page 63 .

The further assembly is carried out in reverse order to disassembly.

1.12 Testing the compression

Special tools and workshop equipment required

♦ Compression tester , e.g. -V.A.G 1763-

Test condition

Oil temperature min. 30 °C

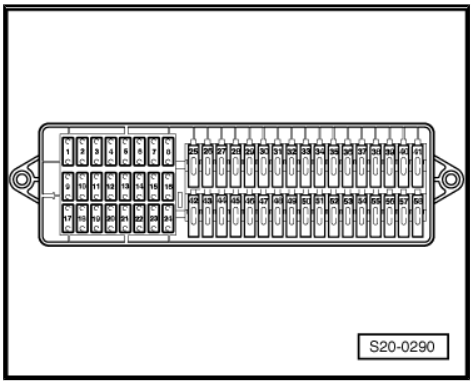
Test sequence

– Remove cover for camshaft housing.

– Remove the ignition coils and spark plugs ⇒ page 184 .

– Take off the cover in front of the fuse carrier below the dash panel and take the fuse for the voltage supply of the injection valves out of the fuse carrier in the dash panel ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Check compression pressure using the compression tester.



Note

Use of tester ⇒ Operating Instructions .

– Operate starter until the tester no longer indicates a pressure rise.

Compression readings

New engine	Wear limit	Difference between cylinders
1 - 1.5 MPa (10 - 15 bar)	0.7 MPa (7 bar)	0.3 MPa (3 bar)

– Screw in the spark plug with spark plug wrench and then tighten fully to 30 Nm.

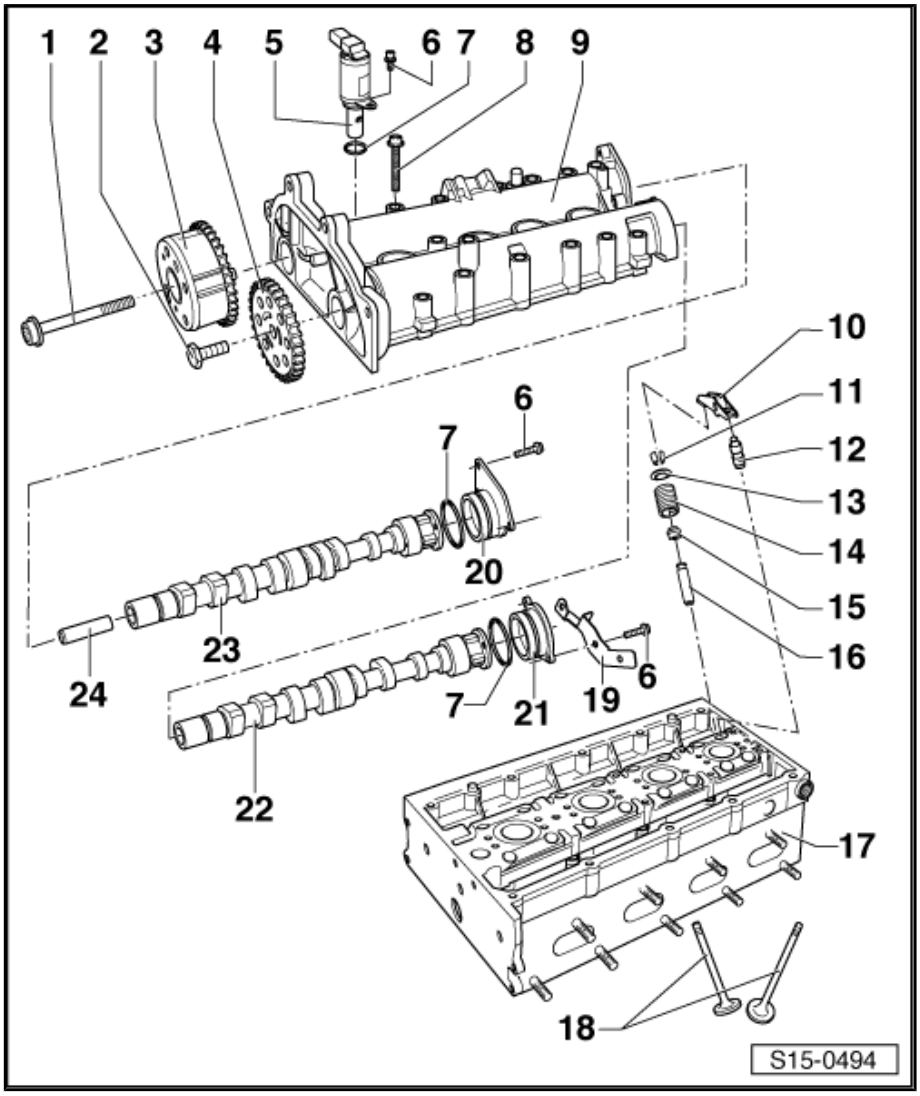
Further installation occurs in reverse order.

– Interrogate fault memory, rectify any faults existing and erase the fault memory ⇒ Vehicle diagnostic tester.

2 Valve gear

2.1 Valve gear - Summary of components (version A)

For engine with identification characters BTS



1 - 40 Nm + torque a further 90° (1/4 turn)

- ❑ Left-hand thread
- ❑ replace

2 - 50 Nm + torque a further 90° (1/4 turn)

3 - Camshaft adjuster

- ❑ for inlet valves
- ❑ with chain sprocket
- ❑ Observe the fitting position of the timing chain
- ❑ must not be disassembled
- ❑ removing and installing ⇒ page 59

4 - Sprocket

- ❑ for exhaust camshaft
- ❑ Observe the fitting position of the timing chain

5 - Camshaft adjustment valve 1 - N205-

6 - 10 Nm

7 - O-ring

- ❑ replace if damaged
- ❑ oil before the assembly

8 - 10 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ tighten from inside to outside

9 - Camshaft housing

- ❑ removing and installing ⇒ page 79

10 - Roller rocker arm

- ❑ inspect roller bearings of roller for smooth operation
- ❑ oil contact surfaces
- ❑ for installing, clip onto the supporting element and secure with locking clip

11 - Valve collets

12 - Supporting element

- ❑ do not interchange
- ❑ with hydraulic valve clearance compensation
- ❑ before installing check axial play of the camshaft ⇒ page 89

- ❑ oil contact surfaces

13 - Valve spring retainer

14 - Valve spring

- ❑ removing and installing ⇒ page 97

15 - Valve stem seal

- ❑ replace ⇒ page 97

16 - Valve guide

- ❑ not to be replaced
- ❑ check ⇒ page 96

17 - Cylinder head

- ❑ reworking valve seats ⇒ page 93
- ❑ reworking sealing surface ⇒ page 88

18 - Valves

- ❑ do not rework, only grinding in with grinding paste is permissible
- ❑ Valve dimensions ⇒ page 89

19 - Support

20 - Screw cap

- ❑ for hole of inlet camshaft

21 - Screw cap

- ❑ for hole of exhaust camshaft

22 - Exhaust camshaft

- ❑ do not mix up with inlet camshaft
- ❑ Inspecting axial play ⇒ page 89
- ❑ moisten with oil before installing (also axial bearing collar)

23 - Inlet camshaft

- ❑ do not mix up with exhaust camshaft
- ❑ Inspecting axial play ⇒ page 89
- ❑ moisten with oil before installing (also axial bearing collar)

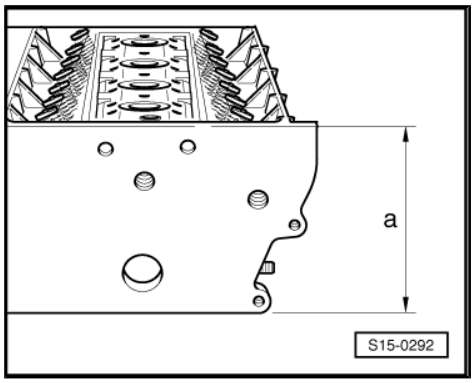
24 - Guide bushing

Reworking cylinder head sealing surface

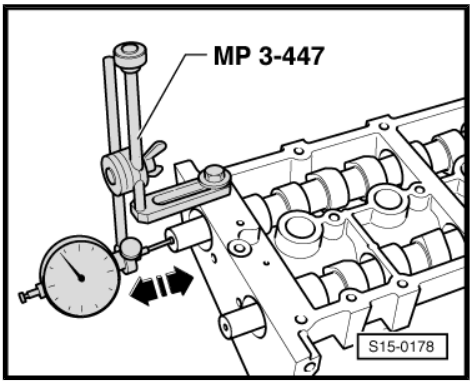
Reworking dimension of cylinder head: -a- at least 108.25 mm

Note

If the sealing surface is reworked, the valves should be set lower by the same amount (rework valve seat rings) otherwise the valves will strike the pistons. When doing this, ensure that the permissible minimum dimension - ⇒ page 94 - is maintained.



Checking the axial play of the camshaft



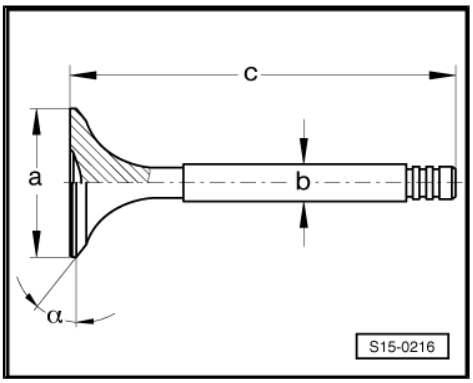
Special tools and workshop equipment required

- Universal dial gauge holder - MP3-447 (VW 387)-
- Dial gauge

Carry out measurement with the camshaft housing removed and the end covers installed.

Wear limit: max. 0.4 mm

Valve dimensions



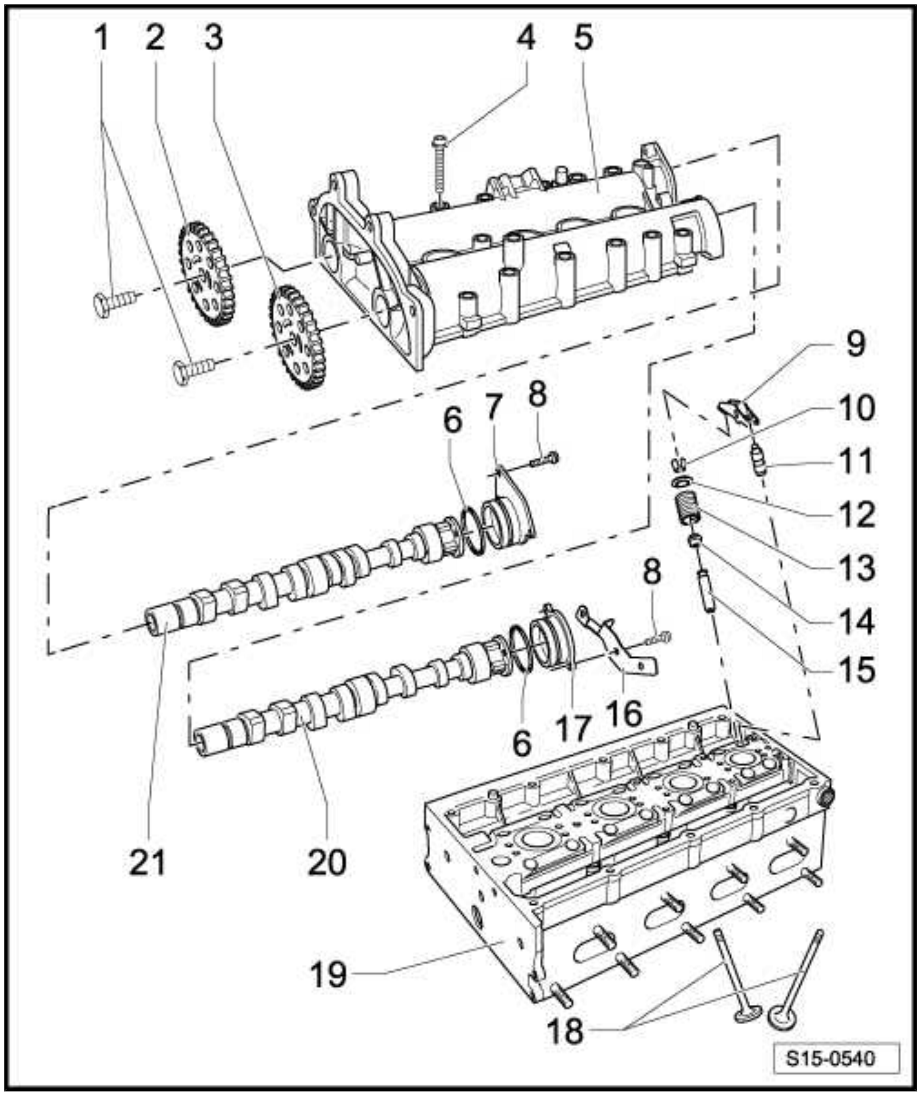
Note

Valves must not be reworked. Only grinding in with grinding paste in the valve seat is permissible.

Dimension		Inlet valve	Exhaust valve
∅ a	mm	29.5	26.0
∅ b	mm	5.973	5.953
c	mm	100.9	100.5
α	∠°	45	45

2.2 Valve gear - Summary of components (version A)

For engine with identification characters CFNA, CLSA



1 - 50 Nm + torque a further 90° (1/4 turn)

2 - Sprocket

- ❑ for inlet camshaft
- ❑ Observe the fitting position of the timing chain

3 - Sprocket

- ❑ for exhaust camshaft
- ❑ Observe the fitting position of the timing chain

4 - 10 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ tighten from inside to outside

5 - Camshaft housing

- ❑ removing and installing ⇒ page 79

6 - O-ring

- ❑ replace
- ❑ oil before the assembly

7 - Screw cap

- ❑ for hole of inlet camshaft

8 - 10 Nm

9 - Roller rocker arm

- ❑ inspect roller bearings of roller for smooth operation
- ❑ oil contact surfaces
- ❑ for installing, clip onto the supporting element and secure with locking clip

10 - Valve collets

11 - Supporting element

- ❑ do not interchange
- ❑ with hydraulic valve clearance compensation
- ❑ before installing check axial play of the camshaft ⇒ page 91
- ❑ oil contact surfaces

12 - Valve spring retainer

13 - Valve spring

- ❑ removing and installing ⇒ page 97

14 - Valve stem seal

- ❑ replace ⇒ page 97

15 - Valve guide

- ❑ not to be replaced
- ❑ check ⇒ page 96

16 - Support

17 - Screw cap

- ❑ for hole of exhaust camshaft

18 - Valves

- ❑ do not rework, only grinding in with grinding paste is permissible
- ❑ Valve dimensions ⇒ page 92

19 - Cylinder head

- ❑ reworking valve seats ⇒ page 93
- ❑ reworking sealing surface ⇒ page 91

20 - Exhaust camshaft

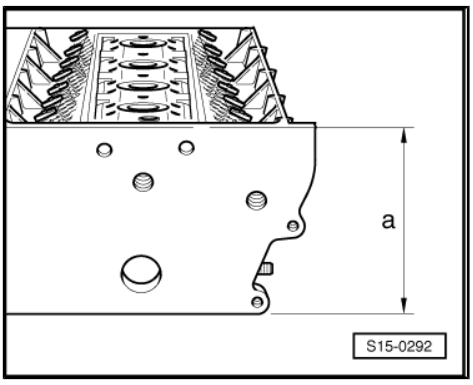
- ❑ do not mix up with inlet camshaft
- ❑ Inspecting axial play ⇒ page 91
- ❑ moisten with oil before installing (also axial bearing collar)

21 - Inlet camshaft

- ❑ do not mix up with exhaust camshaft
- ❑ Inspecting axial play ⇒ page 91
- ❑ moisten with oil before installing (also axial bearing collar)

Reworking cylinder head sealing surface

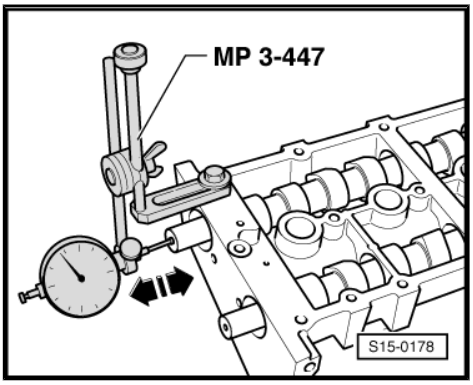
Reworking dimension of cylinder head: -a- at least 108.25 mm



Note

If the sealing surface is reworked, the valves should be set lower by the same amount (rework valve seat rings) otherwise the valves will strike the pistons. When doing this, ensure that the permissible minimum dimension - ⇒ page 94 - is maintained.

Checking the axial play of the camshaft



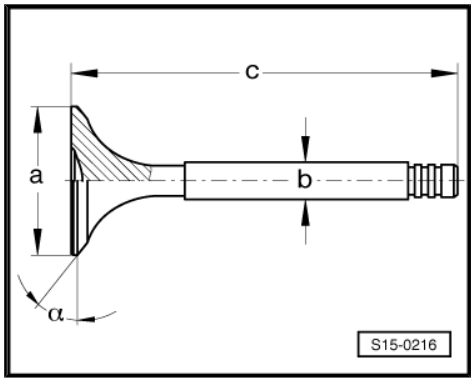
Special tools and workshop equipment required

- ♦ Universal dial gauge holder - MP3-447 (VW 387)-
- ♦ Dial gauge

Carry out measurement with the camshaft housing removed and the end covers installed.

Wear limit: max. 0.4 mm

Valve dimensions



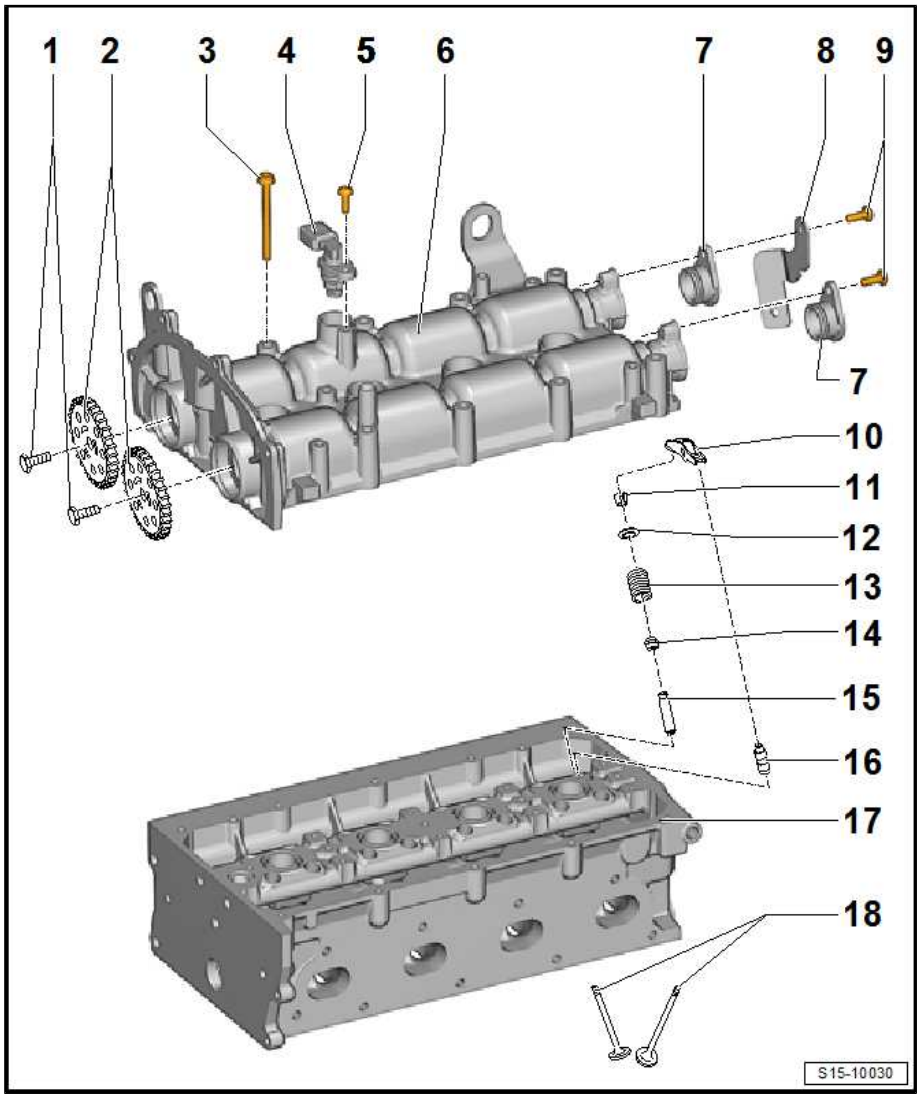
Note

Valves must not be reworked. Only grinding in with grinding paste in the valve seat is permissible.

Dimension		Inlet valve	Exhaust valve
∅ a	mm	29.5	26.0
∅ b	mm	5.973	5.953
c	mm	100.9	100.5
α	∠°	45	45

2.3 Valve gear - Summary of components (version B)

For engine with identification characters CFNA



1 - 50 Nm + torque a further 90° (1/4 turn)

2 - Sprocket

- ❑ for inlet / outlet camshaft
- ❑ Observe the fitting position of the timing chain

3 - 10 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ tighten from inside to outside

4 - Hall sender - G40-

- ❑ with O-ring
- ❑ replace the O-ring if it is damaged

5 - 10 Nm

6 - Camshaft housing

- ❑ removing and installing ⇒ page 79

7 - Screw cap

- ❑ for hole of camshaft

8 - Support

9 - 10 Nm

10 - Roller rocker arm

- ❑ inspect roller bearings of roller for smooth operation
- ❑ oil contact surfaces
- ❑ for installing, clip onto the supporting element and secure with locking clip

11 - Valve collets

12 - Valve spring retainer

13 - Valve spring

- ❑ removing and installing ⇒ page 97

14 - Valve stem seal

- ❑ replace ⇒ page 97

15 - Valve guide

- ❑ check ⇒ page 96

16 - Supporting element

- ❑ do not interchange
- ❑ with hydraulic valve clearance compensation
- ❑ before installing check axial play of the camshaft ⇒ page 91
- ❑ oil contact surfaces

17 - Cylinder head

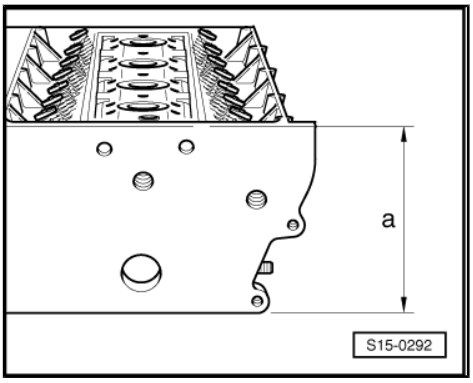
- ❑ reworking valve seats ⇒ page 93
- ❑ reworking sealing surface ⇒ page 93

18 - Valves

- ❑ do not rework, only grinding in with grinding paste is permissible
- ❑ Valve dimensions ⇒ page 93

Reworking cylinder head sealing surface

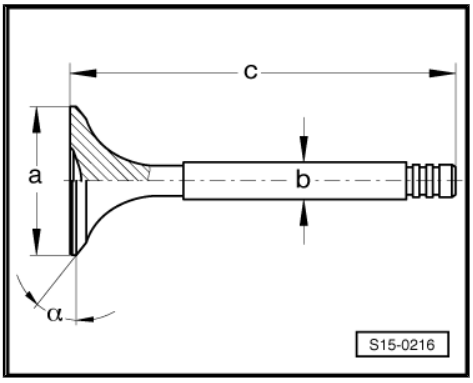
Reworking dimension of cylinder head: -a- at least 108.25 mm



Note

If the sealing surface is reworked, the valves should be set lower by the same amount (rework valve seat rings) otherwise the valves will strike the pistons. When doing this, ensure that the permissible minimum dimension - ⇒ page 94 - is maintained.

Valve dimensions



Note

Valves must not be reworked. Only grinding in with grinding paste in the valve seat is permissible.

Dimension		Inlet valve	Exhaust valve
∅ a	mm	29.5	26.0
∅ b	mm	5.973	5.953
c	mm	100.9	100.5
α	∠°	45	45

2.4 Reworking valve seats

Special tools and workshop equipment required

- ♦ Grinding paste

- Caliper gauge
- Milling cutter kit for reworking valve seats

Note

- *Only use milling cutters with carbide metal tips (min. 90 HRC).*
- *When carrying out repairs on engines with leaking valves, it is not sufficient to machine or replace the valve seats and valves. It is also necessary to inspect the valve guides for wear, particularly on engines with a high mileage* *⇒ page 96* *.*
- *Rework valve seats only sufficiently in order to obtain a proper contact pattern. Calculate the maximum permissible reworking dimension before commencing. If the reworking dimension is exceeded, the proper operation of the hydraulic valve clearance compensation is no longer ensured. If this is the case replace the cylinder head.*

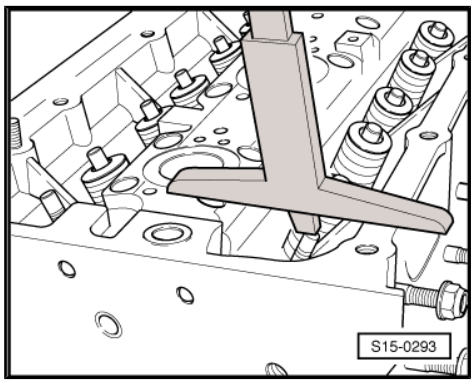
2.4.1 Calculating maximum permissible reworking dimension

– Insert valve and press firmly against the valve seat.

Note

If the valves are replaced when carrying out repair work, use new valves for the measurement.

– Measure distance between the valve stem end and the upper face of the cylinder head.
– Calculate max. permissible reworking dimension from the distance measured and the minimum dimension.



Minimum dimension: Inlet valve	7.6 mm
Minimum dimension: Exhaust valve	7.6 mm

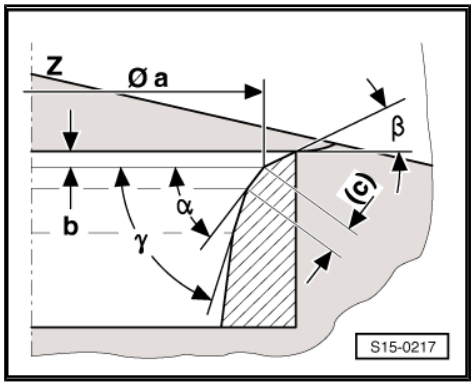
“Measured distance” - “minimum dimension” = “max. permissible reworking dimension”.

Example:

Measured distance	8.0 mm
- Minimum dimension	7.6 mm
= max. permissible reworking dimension [1]	0.4 mm

1) The max. permissible reworking dimension is shown in the figures for reworking the valve seats as dimension “b”.

Reworking inlet valve seat



a = ∅ 28.7 mm

b = max. permissible reworking dimension

c = 1.5...1.8 mm

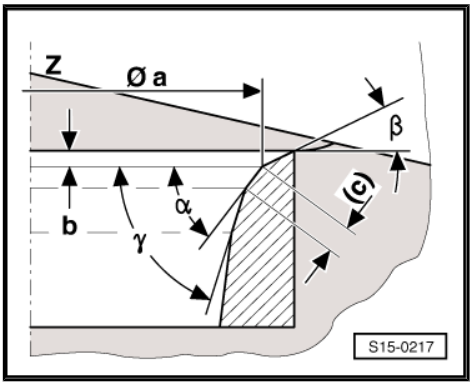
Z = Bottom edge of cylinder head

α = 45° valve seat angle

β = 30° top correction angle

γ = 60° bottom correction angle

Reworking exhaust valve seat



a = ∅ 25.0 mm

b = max. permissible reworking dimension

c = approx. 1.8 mm

Z = Bottom edge of cylinder head

α = 45° valve seat angle

β = 30° top correction angle

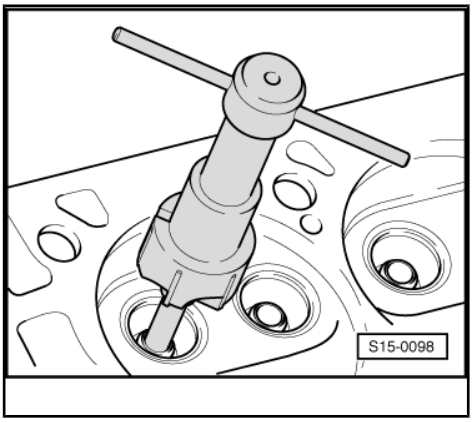
γ = 60° bottom correction angle

2.4.2 Work procedure

Reworking can be carried out by hand while complying with the following conditions:

- Only use milling cutters with carbide metal tips (min. 90 HRC).
- The wear of valve guides must not exceed the permissible dimension.
- Mill with the milling cutter using slight pressure in such a way that an even removal of swarfs is ensured over the whole working surface.

Reworking valve seats with milling cutters



– Place cylinder head on a felt base and secure to prevent it from turning.

– Match diameter of guide drift to diameter of valve guide.

Valve guide	∅ Guide drift in mm
Inlet valve	$6.0^{-0.01}$
Exhaust valve	

– Match diameter of milling cutter to diameter of valve seat.

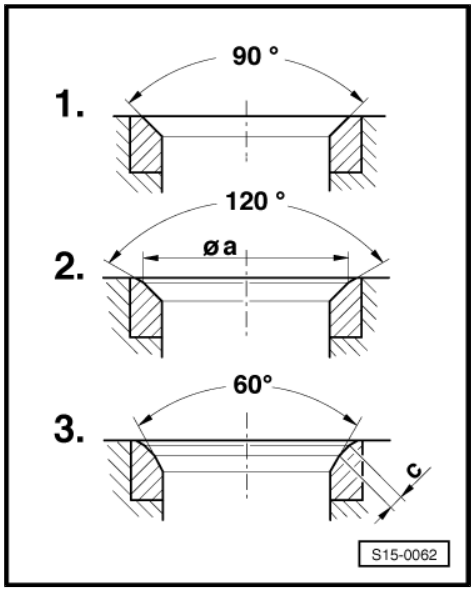
Valve seat	∅ Milling cutter 90° mm	∅ Milling cutter 120° mm	∅ Milling cutter 60° mm
Inlet valve	32	32	21/34
Exhaust valve	30	30	21/34

Milling sequence

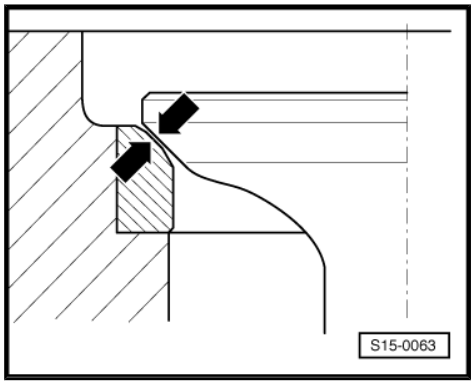
1 - Mill valve seat with 90° milling cutter until a perfect contact pattern is achieved. (Do not exceed maximum permissible reworking dimension!)

2 - Chamfer top correction angle with 120° milling cutter until the valve seat diameter -a- is achieved.

3 - Mill bottom correction angle with 60° milling cutter until valve seat width -c- is achieved.



- Grind in valve/valve seat with fine grinding paste so as to achieve a perfect contact pattern -arrows-.
- Check contact pattern e.g. with water colour (perfect contact pattern over entire circumference).
- Install valve springs.
- Inspect valves for tightness.



The tightness of the valves can be checked by filling petrol into the inlet and outlet canal (no petrol must flow out at the valve seat).

After completing the repair measure once again the distances between the valve stem ends and the upper face of the cylinder head and calculate the maximum permissible reworking dimension.

Note

If the reworking dimension is exceeded, proper operation of the valve gear is no longer assured and the cylinder head must be replaced.

2.5 Inspect valve guides

Special tools and workshop equipment required

- Universal dial gauge holder - MP3-447 (VW 387)-
- Dial gauge

Work procedure

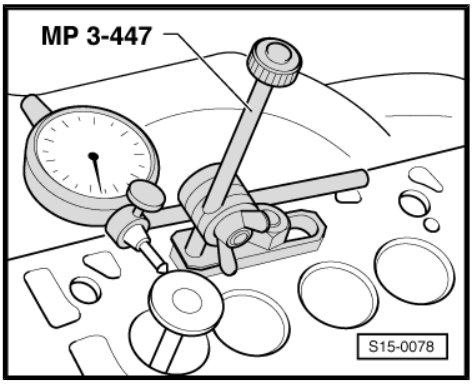
Note

If the valves are replaced when carrying out repair work, use new valves for the measurement.

- Insert valve into guide. The end of valve stem must be flush with guide. Because of the different stem diameters only use inlet valve in inlet guide or outlet valve in outlet guide.

– Determine valve rock.

Wear limit: 0.8 mm



Note

If the wear limit is exceeded, repeat measurement with new valves.

If the valve rock is exceeded:

– Replace the cylinder head.

2.6 Removing and installing valve stem seals

2.6.1 Removing and installing valve stem seals with cylinder head installed

Special tools and workshop equipment required

- Pressure hose - MP1-210 (VW 653/3)-
- Blank holder for valve spring - MP1-229 (3362)- with pressure plate - MP1-229/1 (3362/1)-
- Valve stem seal extractor - MP1-230 (3364)-
- Valve stem seal insertion tool - MP1-233 (3365)-

Removing

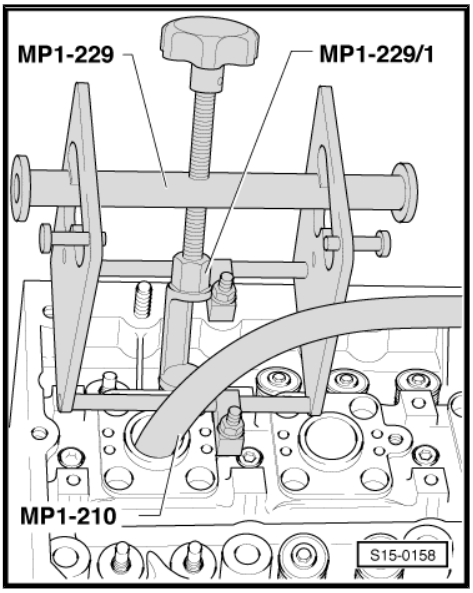
– Removing the camshaft housing ⇒ page 79 .

– Remove roller rocker arm and place on a clean surface. Make sure that you do not mix up the roller rocker arms.

– Remove ignition coils ⇒ page 184 and unscrew the spark plugs with spark plug wrench.

– Put the piston of the relevant cylinder at “bottom dead centre”.

– Screw on blank holder for valve spring - MP1-229- with pressure plate - MP1-229/1- .



– Screw the pressure hose - MP1-210- in the spark plug thread.

– Connect pressure hose - MP1-210- to compressed air (min. 0.6 MPa/6 bar overpressure) and remove the valve springs with blank holder for valve spring - MP1-229- .

– Pull off valve stem seal with extractor for valve stem seal - MP1-230- .

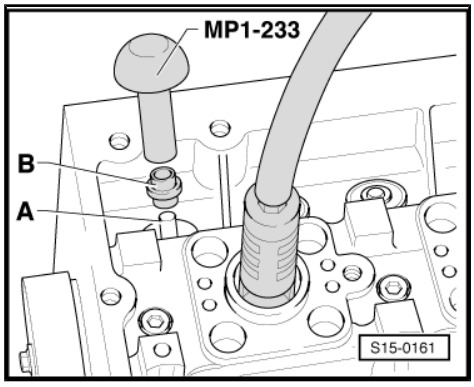
Install

– Insert the supplied plastic bushings on the relevant valve stem. This will prevent any damage to the new valve stem seal.

– Insert the new valve stem seal -B- in the insertion tool for valve stem seal - MP1-233- .

– Oil the sealing lip of the valve stem seal and carefully slide onto the valve guide -A-.

– Install again valve springs.



Further installation occurs in reverse order for removal, while paying attention to the following:

– Installing camshaft housing ⇒ page 79 .

2.6.2 Removing and installing valve stem seals with cylinder head removed

Special tools and workshop equipment required

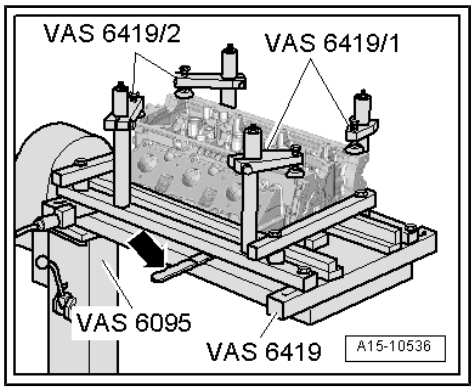
- Blank holder for valve spring - MP1-229 (3362)- with pressure plate - MP1-229/1 (3362/1)-
- Valve stem seal extractor - MP1-230 (3364)-
- Valve stem seal fitting tool - MP1-233 (3365)-
- Engine and gearbox support - VAS 6095-
- Cylinder head tensioning device - VAS 6419-

Removing

– Remove roller rocker arm and place on a clean surface. When doing this, ensure that roller rocker fingers are not interchanged.

– Insert the cylinder head tensioning device - VAS 6419- into the engine and gearbox jack - VAS 6095- .

– Tension the cylinder head in the cylinder head tensioning device, as shown in the illustration.

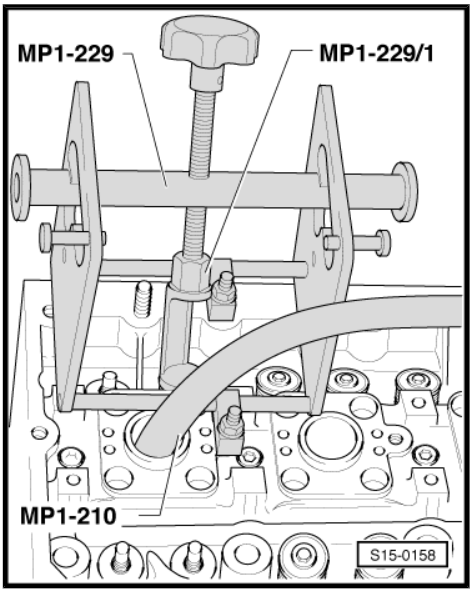


– Connect cylinder head tensioning device to compressed air.

– Adjust the air bellows with the lever -arrow- below the combustion chamber on which the valve stem seals should be removed.

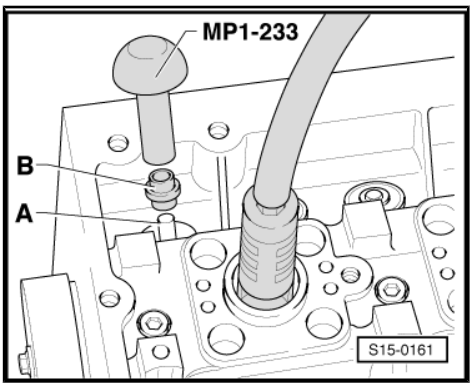
– Allow just enough air to flow into the air bag so that it applied to the valve disc.

– Screw on blank holder for valve spring - MP1-229- with pressure plate - MP1-229/1- .
– Remove valve springs with blank holder for valve spring - MP1-229- .
– Pull off valve stem seal with extractor for valve stem seal - MP1-230- .



Install

– Place plastic sleeve supplied on respective valve stem. This will prevent damage to new valve stem seal.
– Insert the new valve stem seal -B- in the insertion tool for valve stem seal - MP1-233- .
– Oil the sealing lip of the valve stem seal and carefully slide onto the valve guide -A-.
– Install again valve springs.



The further installation is carried out in reverse order to removal.

17 – Lubrication

1 Removing and installing parts of the lubrication system

1.1 Lubrication system - Summary of components

For engines with identification characters BTS

Note

- *If considerable quantities of metal swarf or abrasion is found in the engine oil when carrying out engine repairs, it is not sufficient to replace the oil filter. Carefully clean all oil galleries in order to avoid consequential damage.*
- *The oil level must not be above the max. marking - risk of damage to catalytic converter!*

Check the engine oil, amount of oil and oil specification:

1 - Dipstick
- ❑ Oil level must not exceed the max. marking!

2 - Double chain sprocket
- ❑ for timing chain drive and oil pump chain
- ❑ Observe installation position of crankshaft
- ❑ Clamping surfaces must be free of oil and grease.

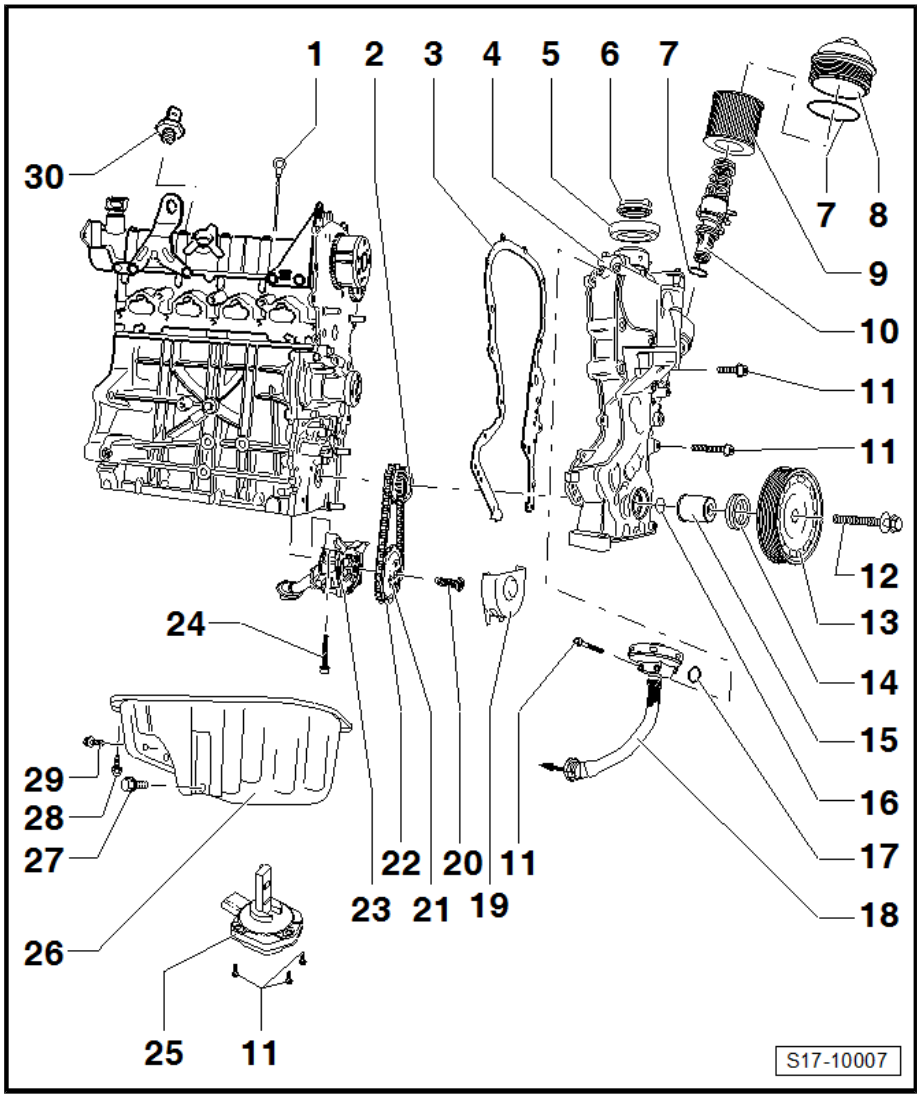
3 - Gasket
- ❑ replace
- ❑ must be positioned on centering pin

4 - Timing case
- ❑ removing and installing ⇒ page 26
- ❑ to facilitate installation, screw two pin screws - M6 x 80- into the camshaft housing and the cylinder block
- ❑ to better guide the timing case, position the oil pan with two screws

5 - Sealing ring
- ❑ replace if damaged

6 - Screw cap
- ❑ replace gasket ring if damaged

7 - O-ring
- ❑ replace



8 - Oil filter cover, 25 Nm

9 - Filter element

- ❑ Pay attention to change intervals:

♦ ⇒ Maintenance ; Booklet Fabia II

♦ ⇒ Maintenance ; Booklet Roomster

10 - Valve

- ❑ with short circuit valve

  Opening pressure: 0.25 MPa (2.5 bar)

- ❑ with non-return valve

11 - 10 Nm

12 - Fixing screw

- ❑ for crankshaft - belt pulley
- ❑ replace
- ❑ The clamping surface of the fixing screw must be free of grease and oil.
- ❑ insert oiled (thread)
- ❑ tighten ⇒ page 33

13 - Belt pulley

- ❑ The clamping surfaces of the belt pulley must be free of grease and oil.
- ❑ Removing and installing V-ribbed belt ⇒ page 18

14 - Gasket ring for crankshaft in timing case

- ❑ replace
- ❑ replace ⇒ page 32

15 - Spacer sleeve

- ❑ The clamping surfaces of the bushing must be free of grease and oil.
- ❑ install with new O-ring -Position 16-
- ❑ Fitting position ⇒ page 34

16 - O-ring

- ❑ replace
- ❑ in the spacer sleeve -Position 15-

17 - O-ring

- ❑ replace

18 - Oil separator

- ❑ with vacuum regulating valve (PCV valve) and ventilation hose

19 - Cover for chain sprocket

20 - 20 Nm + torque a further 90° ($^1/_4$ turn)

- ❑ replace

21 - Sprocket

- ❑ for oil pump
- ❑ when removing and installing counterhold chain sprocket with counterholder - T10172-

22 - Chain

- ❑ for oil pump
- ❑ mark running direction (installed position) before removing

23 - Oil pump

- ❑ must be replaced completely
- ❑ removing and installing ⇒ page 107

24 - 14 Nm + torque a further 90° (1/4 turn)

- ❑ replace

25 - Oil level and oil temperature sender - G266-

- ❑ replace if damaged
- ❑ check ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

26 - Oil pan

- ❑ removing and installing ⇒ page 105

27 - Oil drain plug, 30 Nm

- ❑ with captive seal
- ❑ replace

28 - Screw

- ❑ slacken and tighten only the bolts at the flywheel side with socket insert - T10058- .
- ❑ replace
- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ Tighten to tightening torque for engine with gray cast iron block 8 Nm + 90° (1/4 turns)
- ❑ Tighten to tightening torque for engine with aluminium block 8 Nm + 45° (1/4 turns)

29 - 45 Nm

30 - Oil pressure switch - F1- , 20 Nm

- ❑ Pressure switch 0.05 MPa (0.5 bar)
- ❑ check ⇒ page 109
- ❑ Cut open gasket ring if leaking and replace

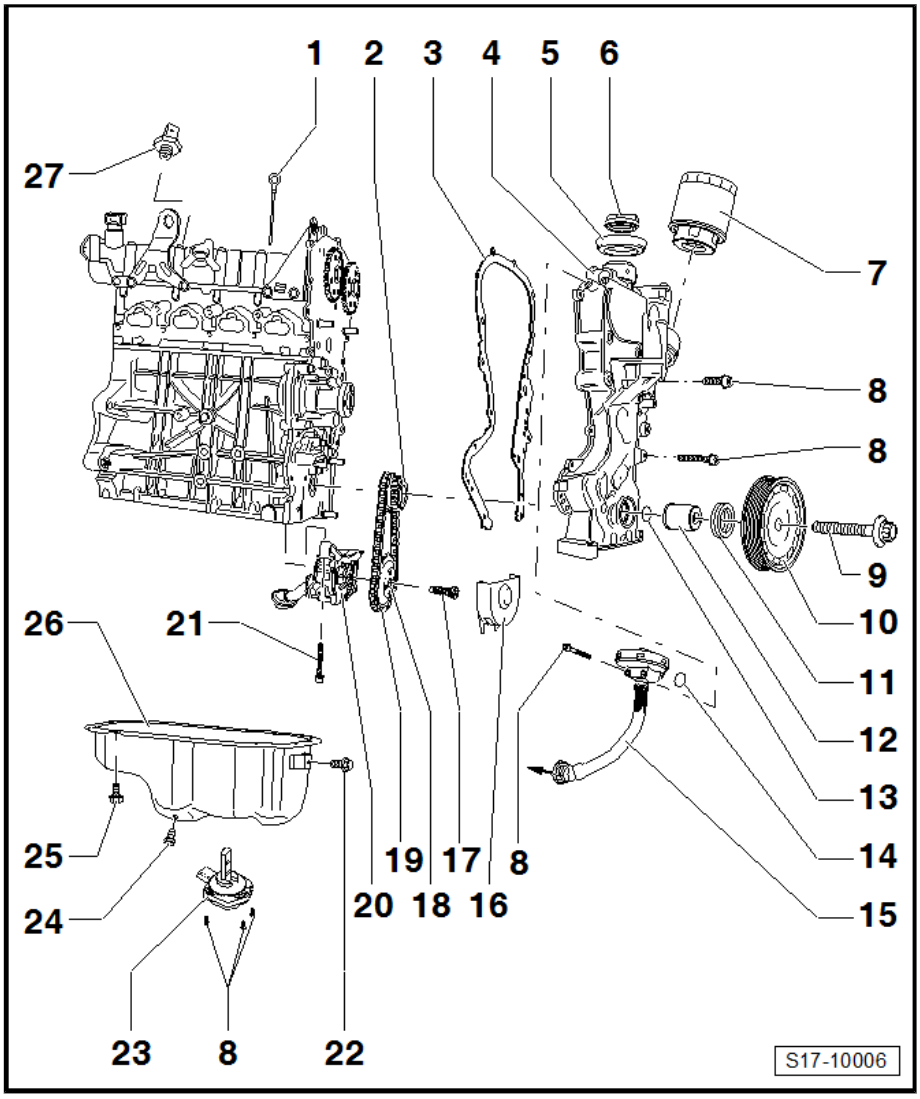
1.2 Lubrication system - Summary of components

For engines with identification characters CFNA, CLSA

Note

- *If considerable quantities of metal swarf or abrasion is found in the engine oil when carrying out engine repairs, it is not sufficient to replace the oil filter. Carefully clean all oil galleries in order to avoid consequential damage.*
- *The oil level must not be above the max. marking - risk of damage to catalytic converter!*

Check the engine oil, amount of oil and oil specification:



1 - Dipstick

- ❑ Oil level must not exceed the max. marking!

2 - Double chain sprocket

- ❑ for timing chain drive and oil pump chain
- ❑ Observe installation position of crankshaft
- ❑ Clamping surfaces must be free of oil and grease.

3 - Gasket

- ❑ replace
- ❑ must be positioned on centering pin

4 - Timing case

- ❑ removing and installing ⇒ page 26
- ❑ to facilitate installation, screw two pin screws M6 x 80 into the camshaft housing and the cylinder block
- ❑ to better guide the timing case, position the oil pan with two screws

5 - Sealing ring

- ❑ replace if damaged

6 - Screw cap

- ❑ replace gasket ring if damaged

7 - Oil filter

- ❑ Pay attention to change intervals:

♦ ⇒ Maintenance ; Booklet Fabia II

♦ ⇒ Maintenance ; Booklet Roomster

♦ ⇒ Maintenance ; Booklet Rapid NH

♦ ⇒ Maintenance ; Booklet Rapid NA

- ❑ tighten by hand
- ❑ 20 Nm
- ❑ pay attention to installation instructions on oil filter

8 - 10 Nm

9 - Fixing screw

- ❑ for crankshaft - belt pulley
- ❑ replace
- ❑ The clamping surface of the fixing screw must be free of grease and oil.
- ❑ insert oiled (thread)
- ❑ tighten ⇒ page 33

10 - Belt pulley

- ❑ The clamping surfaces of the belt pulley must be free of grease and oil.
- ❑ Removing and installing V-ribbed belt ⇒ page 18

11 - Gasket ring for crankshaft in timing case

- ❑ replace
- ❑ replace ⇒ page 32

12 - Spacer sleeve

- ❑ The clamping surfaces of the bushing must be free of grease and oil.
- ❑ install with new O-ring -Position 13-
- ❑ Fitting position ⇒ page 34

13 - O-ring

- ❑ replace
- ❑ in the spacer sleeve -Position 12-

14 - O-ring

- ❑ replace

15 - Oil separator

- ❑ with vacuum regulating valve (PCV valve) and ventilation hose

16 - Cover for chain sprocket

17 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

18 - Sprocket

- ❑ for oil pump
- ❑ when removing and installing counterhold chain sprocket with counterholder - T10172-

19 - Chain

- ❑ for oil pump
- ❑ mark running direction (installed position) before removing

20 - Oil pump

- ❑ must be replaced completely
- ❑ removing and installing ⇒ page 107

21 - 14 Nm + torque a further 90° (1/4 turn)

- ❑ replace

22 - 9 Nm

23 - Oil level and oil temperature sender - G266-

- ❑ replace if damaged
- ❑ check ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

24 - Oil drain plug, 30 Nm

- ❑ with captive seal
- ❑ replace

25 - Screw

- ❑ slacken and tighten only the bolts at the flywheel side with socket insert - T10058- .
- ❑ replace
- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ Tighten to tightening torque for engine with gray cast iron block 8 Nm + 90° (1/4 turns)
- ❑ Tighten to tightening torque for engine with aluminium block 8 Nm + 45° (1/4 turns)

26 - Oil pan

- ❑ removing and installing ⇒ page 105

27 - Oil pressure switch - F1- , 20 Nm

- ❑ Pressure switch 0.05 MPa (0.5 bar)

- ❑ check ⇒ page 109
- ❑ Cut open gasket ring if leaking and replace

1.3 Removing and installing oil pan

Special tools and workshop equipment required

- ♦ Socket insert - T10058-
- ♦ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ♦ Cleaning and degreasing agent , e.g. -D 009 401 04-
- ♦ Protective goggles and gloves
- ♦ Silicone sealant ⇒ ETKA - Electronic catalogue of original parts

Removing

– Remove the noise insulation.

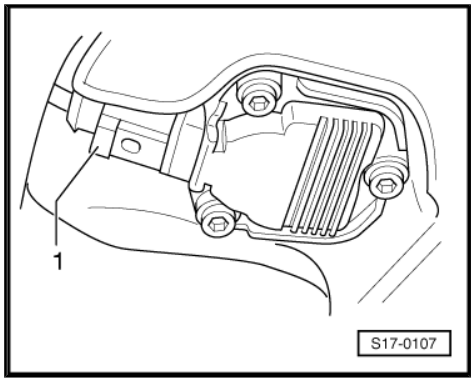
– Remove pre-exhaust pipe:

- ♦ Vehicles with engine identification characters BTS ⇒ page 171 .
- ♦ Vehicles with engine identification characters CFNA ⇒ page 172 .
- ♦ Vehicles with engine identification characters CLSA:

  Fabia II ⇒ page 174 .

  Rapid ⇒ page 175 .

– Disconnect plug from oil level and oil temperature sender - G266- .
– Drain engine oil.
– Unscrew two fixing screws from the gearbox flange and the oil pan.
– Unscrew the sealed oil pan with silicone sealant.
– Remove oil pan, if necessary release by applying slight blows with a rubber-headed hammer.



WARNING

Wear protective gloves when working with sealant and grease remover!

– Clear sealing surface on cylinder block and on the oil pan from gasket residues with chemical sealant remover.
– Degrease the sealing surfaces.

Install

Note

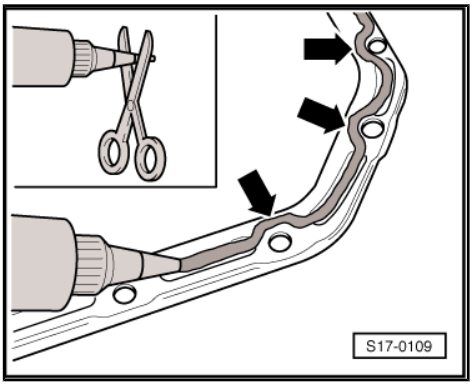
- *Pay attention to the use by date on sealant.*
- *The oil pan must be installed within 5 minutes after applying the silicone sealant.*
- *The oil pan can be better and more securely installed if M6 threaded pins are inserted as guides in two locations on the cylinder block.*

– Cut off nozzle tube at the front marking (∅ of nozzle approx. 3 mm).

– Apply silicone sealant to the clean sealing surface of the oil pan, as shown in the illustration. The sealant bead must be:

♦ be 2...3 mm thick

♦ run past the area around the bolt holes on the inside -arrows-



Note

The sealant bead must not be thicker otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.

– Fit oil pan immediately and lightly tighten all bolts.

– Tighten up the bolts on the oil pan/cylinder block to a torque of 13 Nm.

– Tighten up the bolts on the oil pan/gearbox to a torque of 45 Nm.

Note

After installing the oil pan, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.

1.4 Removing and installing oil pump

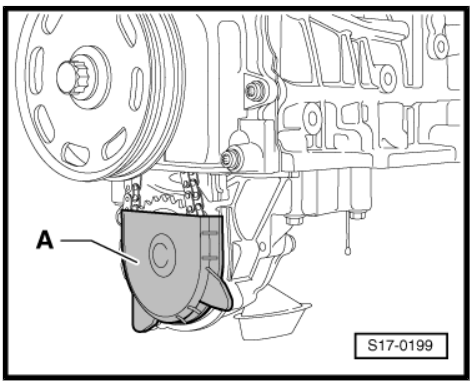
Special tools and workshop equipment required

♦ Counterholder - T10172-

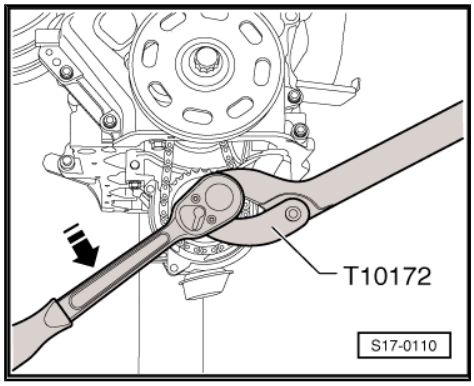
Removing

– Removing the oil pan ⇒ page 105 .

– Unclip the cover for the chain sprocket of the oil pump -A-.



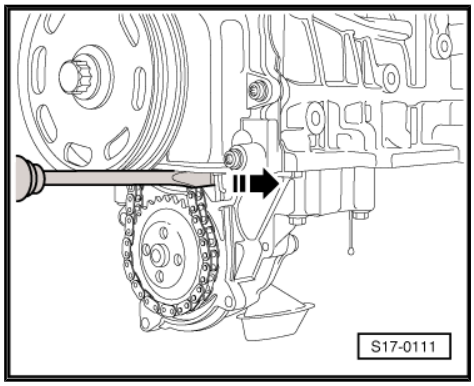
– Hold chain sprocket for oil pump with counterholder - T10172- and slacken fixing screw.



Note

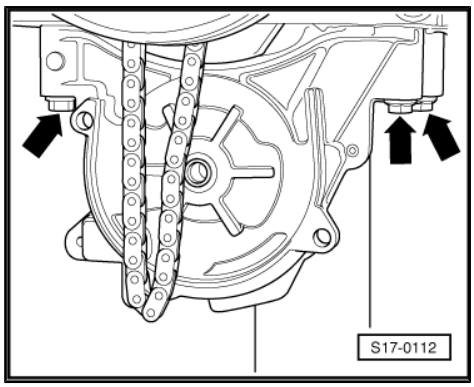
Do not unscrew the bolt yet.

– Press chain tensioner with a screwdriver in -direction of arrow-.
– Release the fixing screw of the chain sprocket.
– Remove the chain sprocket from the shaft of the oil pump and take out of the chain.

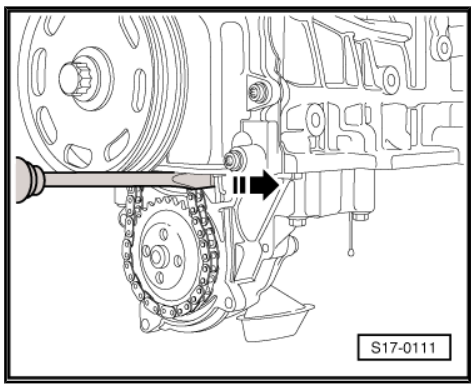


– Loosen fixing bolts of oil pump -arrows- and unscrew.
– Remove the oil pump from the cylinder block.

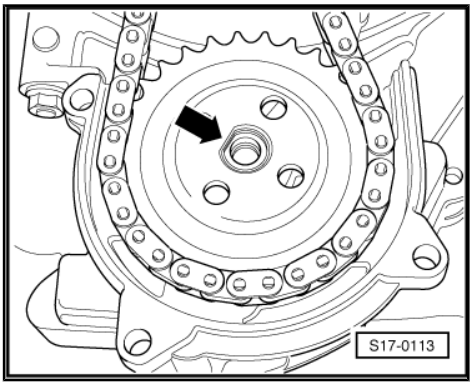
Install



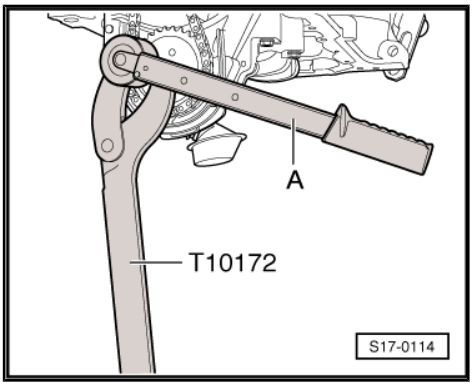
– Press chain tensioner with a screwdriver in -direction of arrow-.
– Insert the chain sprocket into the chain and position on the shaft of the oil pump.



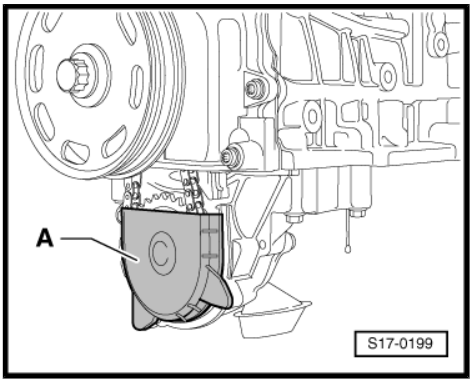
– Pay attention to the seating of the chain sprocket on the shaft of the oil pump -arrow-.
– Screw in the fixing screw of the chain sprocket.



– Counterhold the chain sprocket with the counterholder -T10172- .
– Position the torque wrench -A- as shown in the Fig.
– Tighten fixing bolt to 20 Nm + torque a further 90° ($^1/_4$ turn).



– Install the cover for the chain sprocket of the oil pump -A-.
– Installing the oil pan ⇒ page 105 .



1.5 Testing oil pressure and oil pressure switch - F1-

Special tools and workshop equipment required

- Oil pressure tester , e.g. -V.A.G 1342-
- Voltage tester , e. g. -V.A.G 1527-
- Measuring tool set , e.g. -V.A.G 1594 C-

Vehicles Fabia II

Note

Functional test and repair of the visual and acoustic oil pressure display ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Continued for all vehicles

Test sequence

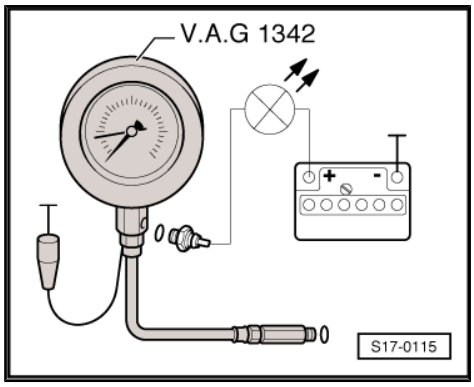
– Remove oil pressure switch - F1- in the front left of the cylinder head.

– Screw oil pressure switch into the test equipment.

– Screw tester in the cylinder head instead of the oil pressure switch.

– Connect brown cable of tester to earth (-).

– Connect voltage tester to battery positive and to oil pressure switch.



If the LED lights up:

– Replace oil pressure switch - F1- .

If the LED does not light up:

– Start engine and slowly increase engine speed.

  Given an oil pressure of 0.03...0.07 MPa (0.3...0.7 bar) the LED must light up, otherwise replace the oil pressure switch.

– Increase engine speed further.

  At an engine speed of 2000 rpm and an oil temperature of 80 °C the oil pressure should be at least 0.2 MPa (2 bar).

At a higher engine speed the oil pressure must not be greater than 0.7 MPa (7 bar).

19 – Cooling

1 Removing and installing parts of the cooling system

WARNING

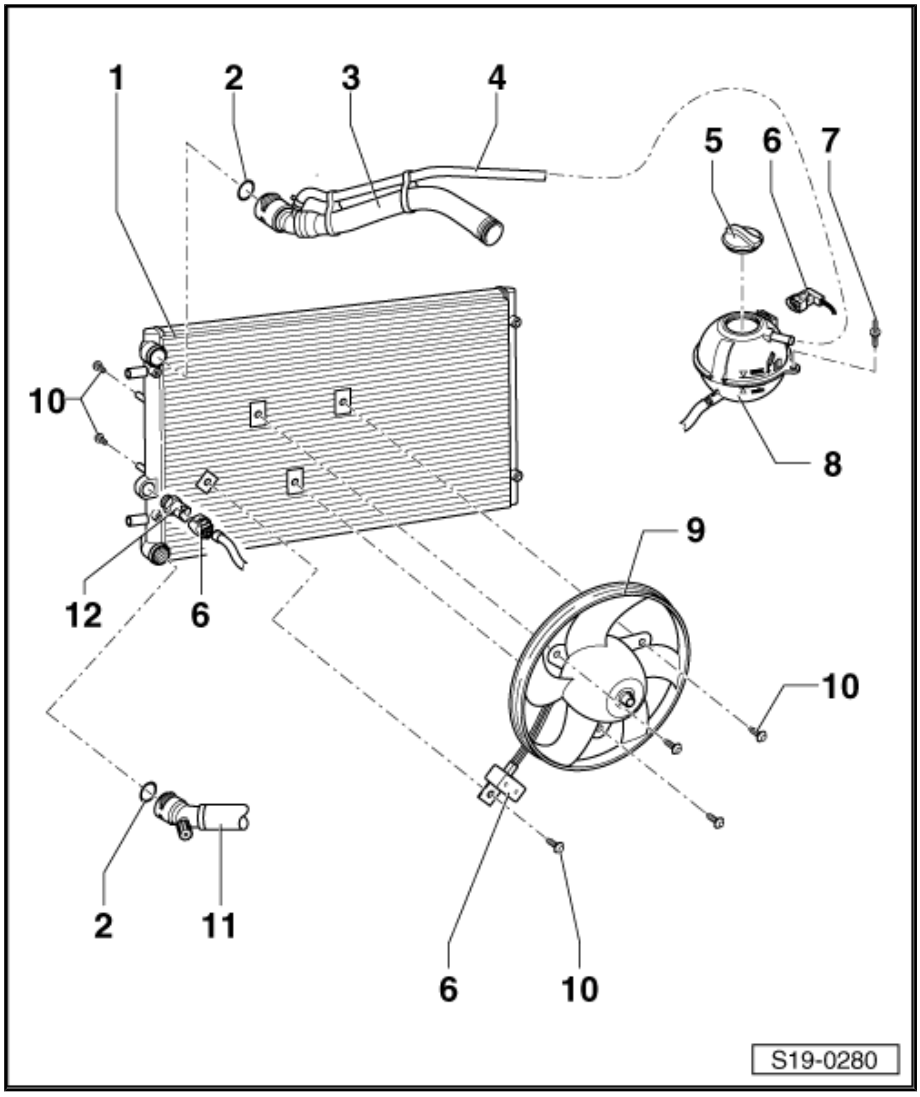
Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

Note

- *When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.*
- *The hose connections are secured with spring-type clips. In the event of repairs only use spring-type clips.*
- *Use pliers for spring strap clips to fit the spring strap clips.*
- *Always replace seals and gasket rings.*
- *When installing fit the coolant hoses free of stress, without them touching any other components (pay attention to the markings on the coolant connections and hoses).*
- *The arrows affixed to the coolant pipes and the coolant hoses must stand opposite one another.*

1.1 Parts of cooling system on the side next to the body - Summary of components

1.1.1 Vehicles without air conditioning



1 - Radiator

- ❑ only complete with radiator fan -Pos. 9-
- ❑ removing and installing ⇒ page 119
- ❑ after replacing fill entire system with fresh coolant ⇒ page 118

2 - O-ring

- ❑ replace

3 - Top coolant hose

- ❑ check tightness
- ❑ connection diagram for coolant hoses ⇒ page 118

4 - Coolant hose

- ❑ for crankcase ventilation preheating at intake manifold

5 - Screw cap

- ❑ with the overpressure valve
- ❑ Test pressure 0.14...0.16 MPa (1.4...1.6 bar)
- ❑ check ⇒ page 120

6 - Connector

7 - Double screw, 2 Nm

8 - Expansion reservoir

- ❑ with coolant shortage warning light sender - G32-
- ❑ Check the cooling system for tightness ⇒ page 120

9 - Radiator fan - V7-

- ❑ screwed onto radiator
- ❑ can be replaced separately

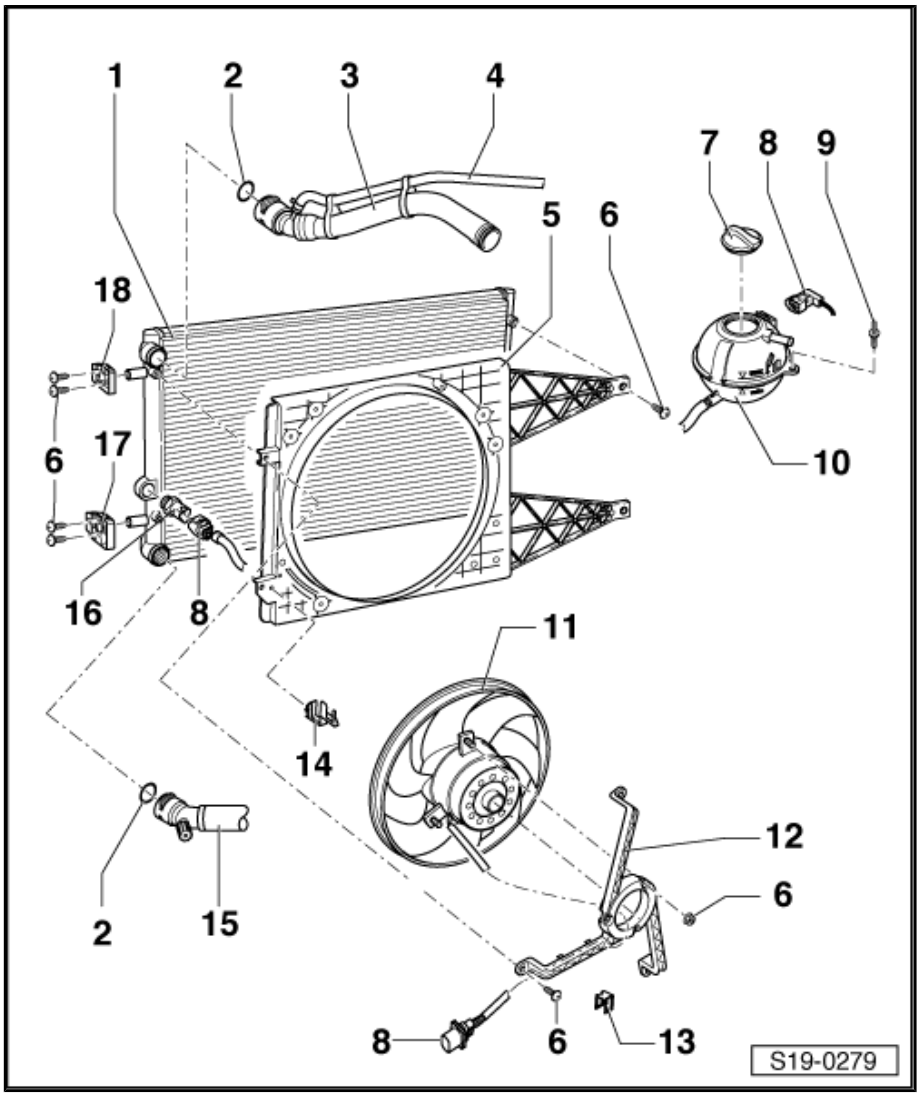
10 - 5 Nm

11 - Bottom coolant hose

- ❑ check tightness
- ❑ connection diagram for coolant hoses ⇒ page 118

12 - Thermo-switch for radiator fan - F18- , 35 Nm

1.1.2 Vehicles with air conditioning system - 1st version



1 - Radiator
- ❑ removing and installing ⇒ page 119
- ❑ after replacing fill entire system with fresh coolant ⇒ page 118

2 - O-ring
- ❑ replace

3 - Top coolant hose
- ❑ check tightness
- ❑ connection diagram for coolant hoses ⇒ page 118

4 - Coolant hose
- ❑ for crankcase ventilation preheating at intake manifold

5 - Fan shroud

6 - 5 Nm

7 - Screw cap
- ❑ with the overpressure valve
- ❑ Test pressure 0.14...0.16 MPa (1.4...1.6 bar)
- ❑ check ⇒ page 120

8 - Connector

9 - Double screw, 2 Nm

10 - Expansion reservoir
- ❑ with coolant shortage warning light sender - G32-
- ❑ Check the cooling system for tightness ⇒ page 120

11 - Radiator fan - V7-

12 - Support
- ❑ for fan

13 - Retaining clip
- ❑ for fan cable

14 - Support
- ❑ for plug of fan

15 - Bottom coolant hose
- ❑ check tightness
- ❑ connection diagram for coolant hoses ⇒ page 118

16 - Thermo-switch for radiator fan - F18- , 35 Nm
- ❑ switching temperatures

1. Stage
♦ on: 92 ... 97 °C

♦ off: 84 ... 91 °C

2. Stage
♦ on: 99 ... 105 °C

♦ off: 91 ... 98 °C

17 - Bottom radiator bearing

❑ black

18 - Top radiator bearing

❑ white

1.1.3 Vehicles with air conditioning system - 2nd version

1 - Coolant hose

❑ connection diagram for coolant hoses ⇒ page 118

2 - Expansion reservoir

❑ Check the cooling system for tightness ⇒ page 120

❑ connection diagram for coolant hoses ⇒ page 118

❑ with coolant shortage warning light sender - G32-

3 - Screw cap

❑ with the overpressure valve

❑ Test pressure 0.14...0.16 MPa (1.4...1.6 bar)

❑ Testing the pressure relief valve in the cap ⇒ page 120

4 - Clamp

5 - Connector

6 - Retaining clip

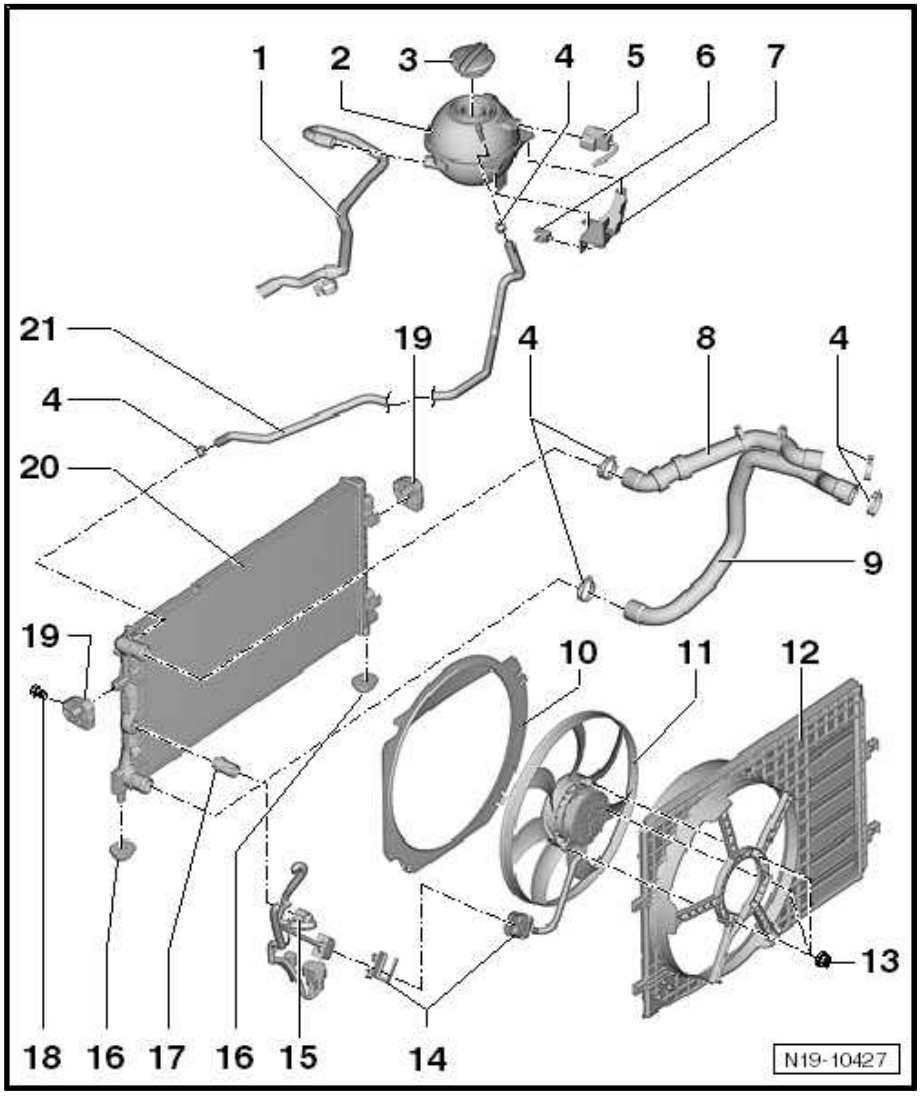
7 - Support

8 - Top coolant hose

❑ connection diagram for coolant hoses ⇒ page 118

9 - Bottom coolant hose

❑ connection diagram for coolant hoses ⇒ page 118



10 - Intermediate plate for fan

11 - Radiator fan - V7-

12 - Fan shroud

13 - 10 Nm

14 - Support

❑ for plug of fan

15 - Connector

- ❑ to thermoswitch for radiator fan - F18-

16 - Bottom radiator bearing

17 - Thermo-switch for radiator fan - F18- , 35 Nm

- ❑ three-pin plug
- ❑ switching temperatures:

1. Stage
- ♦ on: 92 … 97 °C
- ♦ off: 84 … 91 °C

2. Stage
- ♦ on: 99 … 105 °C
- ♦ off: 91 … 98 °C

18 - 10 Nm

19 - Top radiator bearing

20 - Radiator

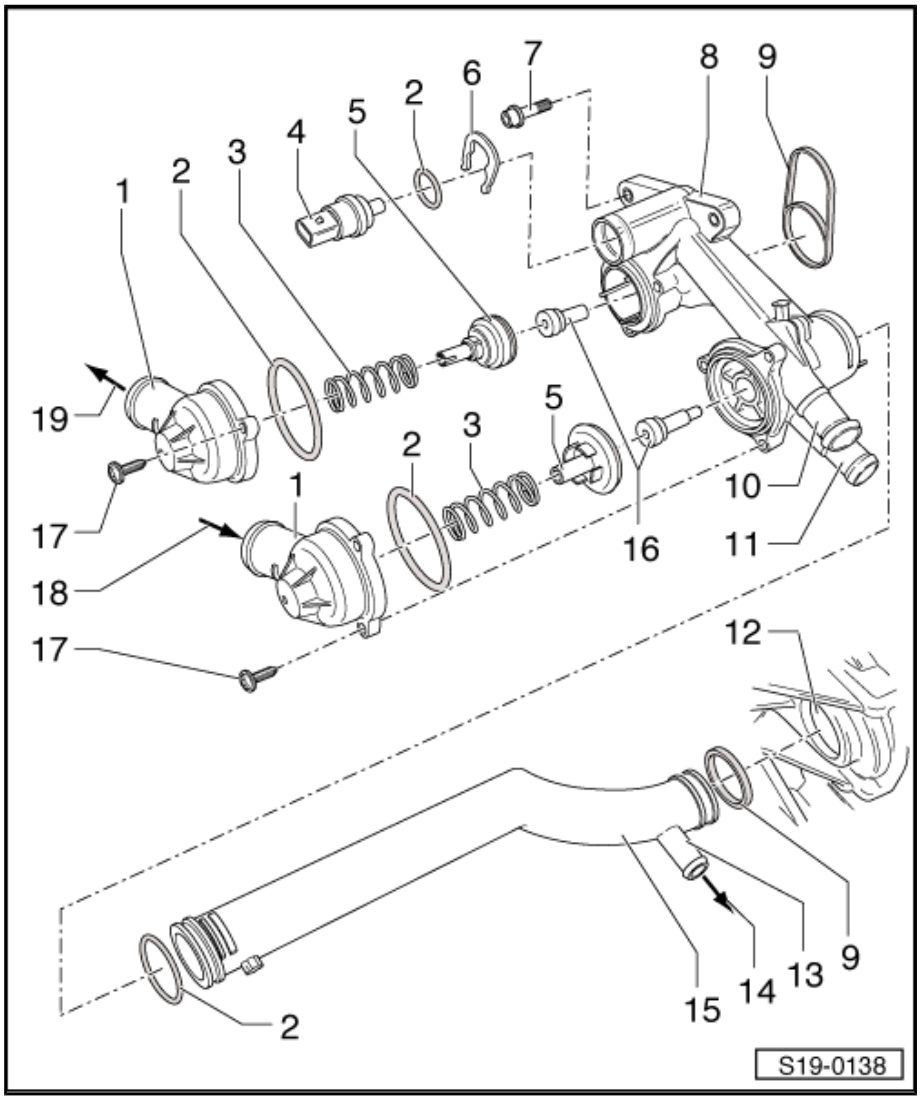
- ❑ removing and installing ⇒ page 119
- ❑ after replacing fill entire system with fresh coolant

21 - Coolant hose

- ❑ to the expansion reservoir

1.2 Cooling system attached to engine - Summary of components

1.2.1 Coolant regulator - Summary of components



1 - Connection fittings

2 - O-ring

- ❑ replace

3 - Pressure spring

4 - Coolant temperature sender - G62-

- ❑ before removing, reduce pressure in cooling system if necessary

5 - Tappet

- ❑ do not mix up when installing

6 - Retaining clip

- ❑ check tightness

7 - 10 Nm

- ❑ replace

8 - Coolant regulator housing

9 - Sealing ring

- ❑ replace

10 - to heat exchanger

- ❑ connection diagram for coolant hoses ⇒ page 118

11 - from heat exchanger

- ❑ connection diagram for coolant hoses ⇒ page 118

12 - Cooling pump housing at cylinder block

13 - Connection fittings

14 - to bottom compensation bottle

- ❑ connection diagram for coolant hoses ⇒ page 118

15 - Coolant pipe

- ❑ connection diagram for coolant hoses ⇒ page 118

16 - Coolant regulator

- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ do not mix up when installing
- ❑ test: Heat up regulator in a water bath
- ❑ Control modes:

♦ Extension wax element 83 °C: 83 … 98 °C

♦ Extension wax element 87 °C: 87 … 102 °C

- ❑ Working stroke: min. 8 mm ... max. 12 mm

17 - 5 Nm

18 - from bottom of radiator

- ❑ connection diagram for coolant hoses ⇒ page 118

19 - towards top radiator

- ❑ connection diagram for coolant hoses ⇒ page 118

1.2.2 Coolant pump - Summary of components

1 - Coolant pump

- ❑ removing and installing ⇒ page 123
- ❑ check smooth operation
- ❑ with integrated gasket ring
- ❑ replace completely if damaged or leaking

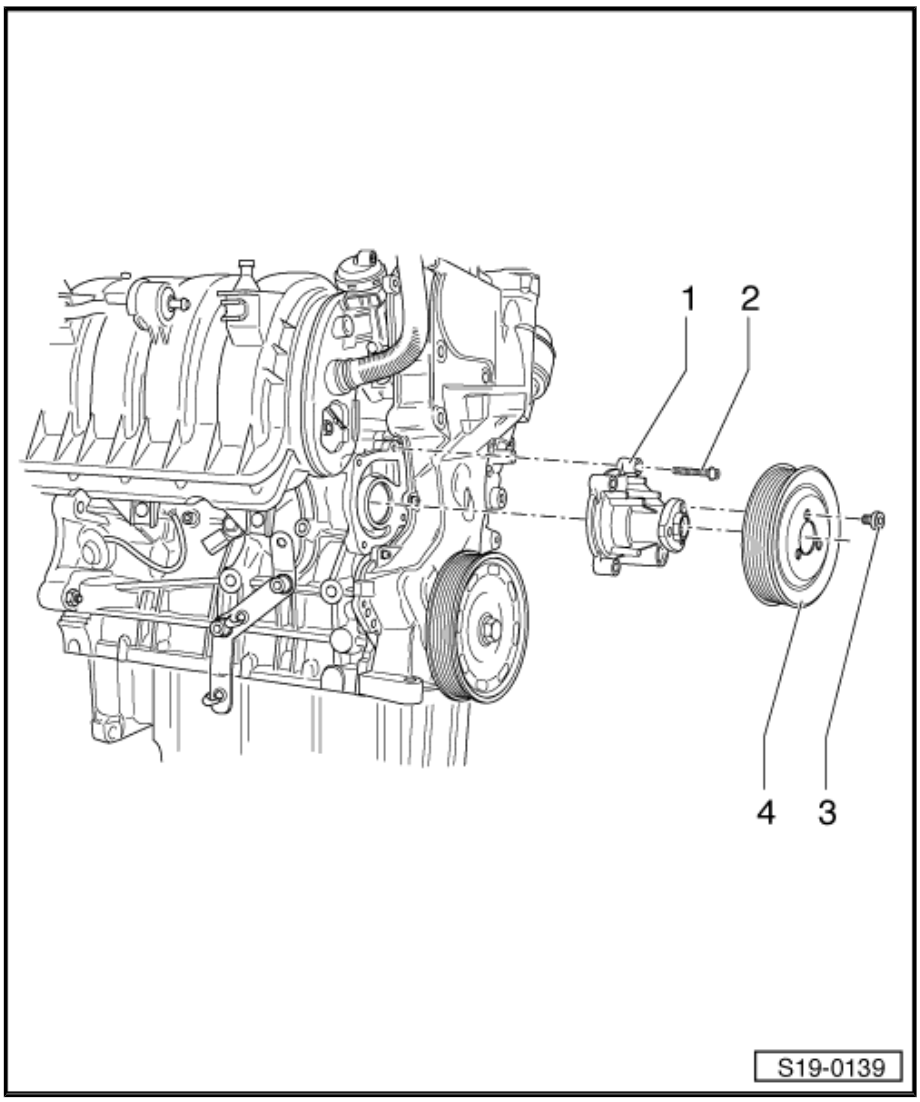
2 - 10 Nm

3 - 20 Nm

- ❑ When loosening and tightening, use the adapted wrench for the water pump and power-assisted steering - MP1-308- ⇒ page 123

4 - Belt pulley

- ❑ When removing and installing, counterhold with adapted wrench for the water pump and power-assisted steering - MP1-308- .
- ❑ Removing and installing ribbed V-belt ⇒ page 18



1.3 Connection diagram for coolant hoses

1 - Expansion reservoir

2 - Coolant hose

- ❑ of crankcase ventilation preheating

3 - Preheating for crankcase ventilation

4 - Heat exchanger for heating

5 - ATF radiator

- ❑ only on vehicles with automatic gearbox

6 - Coolant hose

- ❑ for crankcase ventilation preheating

7 - Coolant regulator housing

8 - Bottom coolant hose

9 - Radiator

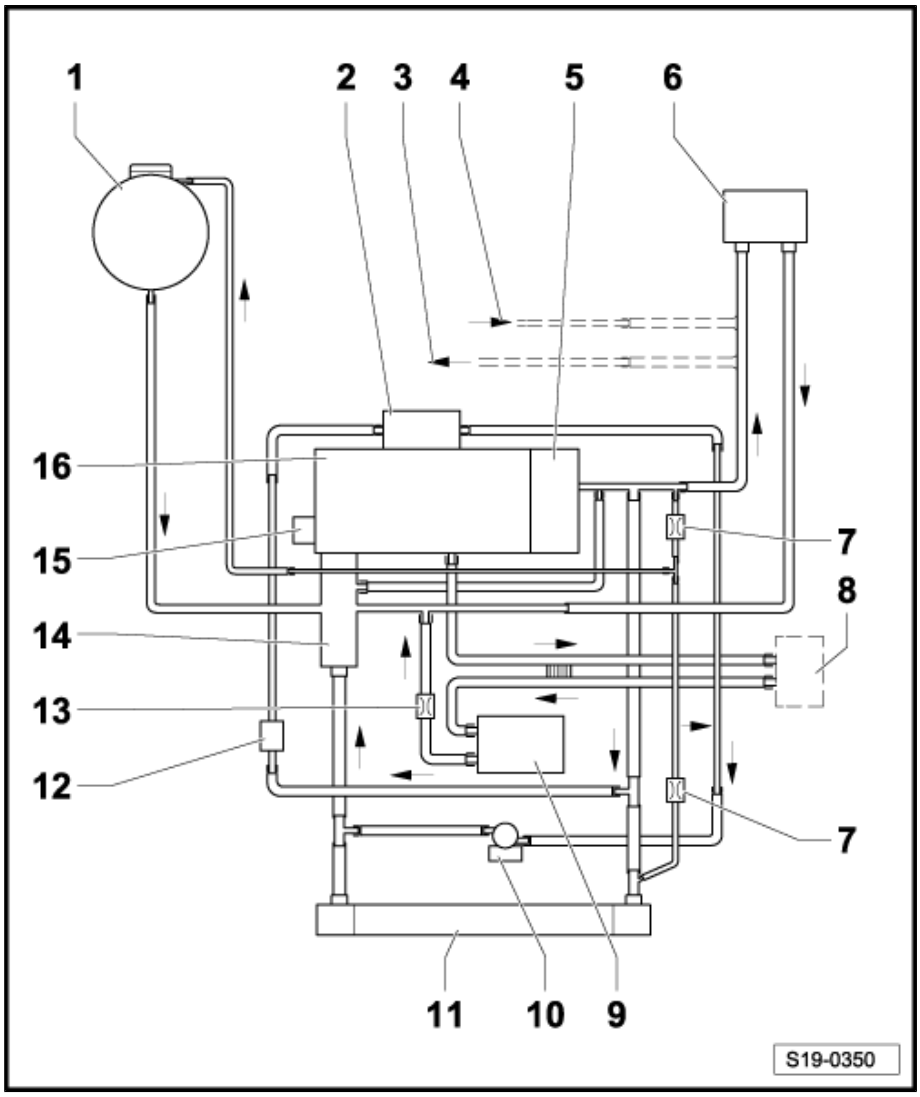
10 - Top coolant hose

11 - Coolant pipe

12 - Cylinder head/cylinder block

13 - Coolant pump

14 - Intake manifold



1.4 Draining and filling up coolant

Special tools and workshop equipment required

- ♦ Catch pan , e.g. -VAS 6208-
- ♦ Pliers for spring strap clamps
- ♦ Refractometer

Draining

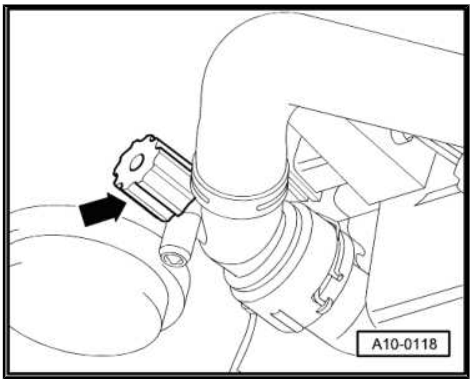
Note

- ♦ *Collect drained coolant in a clean container for reuse or proper disposal.*
- ♦ *Observe the disposal instructions.*

WARNING

Hot steam may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

– Open the cap of the coolant expansion reservoir.
– Remove the sound dampening system ⇒ Body Work; Rep. gr. 50 .
– Position drip tray (e.g. -V.A.S 6208-) under the engine.
– Turn the drain plug -arrow- on the radiator to the left and to the rear; fit auxiliary hose onto connection if necessary.



Filling up

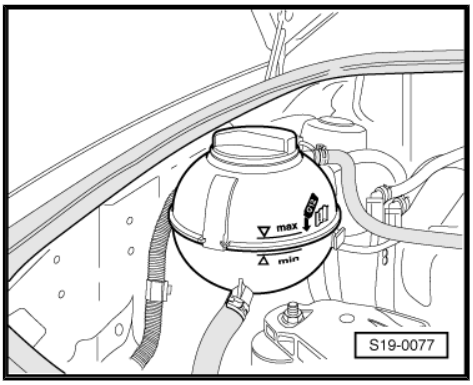
– Close the drain valve at coolant hose below the radiator.
– Install the noise insulation.

Select the appropriate coolant additive from the ⇒ ETKA - Electronic catalogue of original parts .

– In a clean reservoir mix water and coolant additive in the specified mixing ratio:

♦ ⇒ Maintenance ; Booklet Fabia II .
♦ ⇒ Maintenance ; Booklet Roomster .
♦ ⇒ Maintenance ; Booklet Rapid NH .
♦ ⇒ Maintenance ; Booklet Rapid NA .

– Fill up coolant up to Max. marking on the expansion reservoir.
– Seal expansion reservoir.
– Start engine and run engine until the fan starts.



WARNING

Hot steam may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

– Check the level of coolant and top up if necessary. When engine is at operating temperature the coolant level must be at the “max” marking, when engine is cold between the “min” and “max” markings.

1.5 Removing and installing radiator

Special tools and workshop equipment required

♦ Catch pan , e.g. -VAS 6208-
♦ Pliers for spring strap clamps

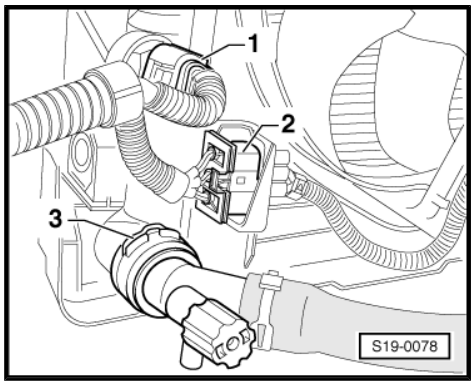
Removing

– Remove front bumper ⇒ Body Work; Rep. gr. 63 .

Note

Collect drained coolant in a clean container for proper disposal or reuse.

– Drain coolant ⇒ page 118 .
– Pull off coolant hose at the top and bottom of the radiator.
– Disconnect plug -1- from thermoswitch for radiator fan - F18- and plug -2- from radiator fan - V7- .



Vehicles with air conditioning

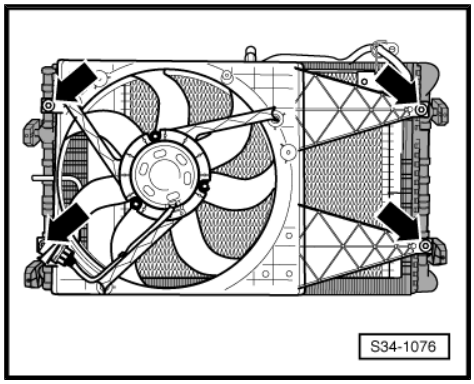
WARNING

Do not open the refrigerant circuit of the air conditioning system.

– Unscrew screws of brackets for the refrigerant lines at the fan shroud and at the radiator.

Continued for all vehicles

– Remove headlights ⇒ Electrical System; Rep. gr. 94 .
– Release screws -arrows- and remove fan shroud with fan.

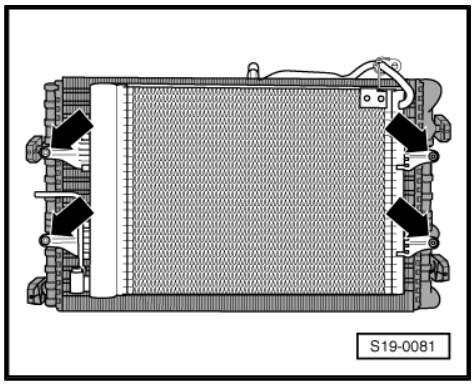


Vehicles with air conditioning

Note

- *To avoid causing damage to the condenser and to the refrigerant lines and hoses make sure the lines and hoses are not over-extended, kinked or bent.*
- *Do not simply suspend AC condenser on the refrigerant lines. Pay attention to a correct suspension or support.*

– Unscrew fixing screws for AC compressor -arrows- and suspend condenser laterally.
– Unscrew fixing screws for radiator bearing on right and left.
– Incline the radiator slightly backwards and pull out upwards.



Vehicles without air conditioning

– Unscrew fixing screws for radiator bearing on front right and left.
– Incline the radiator slightly backwards and pull out upwards.

Install

Installation is carried out in the reverse order. Pay attention to the following:

– Top up coolant ⇒ page 118 .

1.6 Checking the coolant system for leak-tightness

1.6.1 Inspecting coolant system with cooling system testing device - V.A.G 1274- for tightness

Special tools and workshop equipment required

- Cooling system testing device , e.g. -V.A.G 1274-

- Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- Adapter for cooling system testing device , e.g. -V.A.G 1274/9-

Test condition

- Engine is at operating temperature.

Test sequence

WARNING

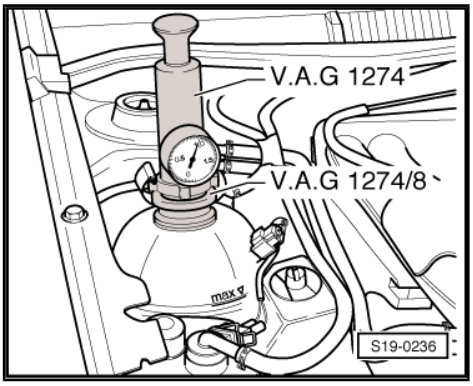
Hot steam may escape when the compensation bottle is opened.

- *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- *Cover the cap with a cloth and open carefully.*

– Open compensation bottle.

– Position the cooling system testing device - V.A.G 1274- with adapter - V.A.G 1274/8- on the coolant expansion reservoir.

– Using the hand pump of the testing device generate an over-pressure of approx. 0.1 MPa (1 bar).



If the pressure drops:

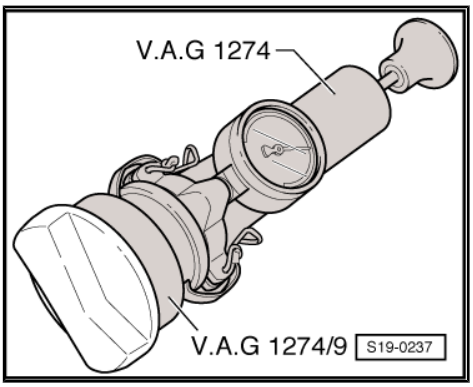
– Search position of the leak and repair fault.

Testing the pressure relief valve in the cap

– Position the cooling system testing device - V.A.G 1274- with adapter - V.A.G 1274/9- on the cap.

– Operate the handpump.

- The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).



If the pressure relief valve opens too early or too late:

– Renew cap.

1.6.2 Inspecting coolant system with cooling system testing device - V.A.G 1274 B- for tightness

Special tools and workshop equipment required

- Cooling system testing device , e.g. -V.A.G 1274 B-
- Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- Adapter for cooling system testing device , e.g. -V.A.G 1274/9-

Test condition

- Engine is at operating temperature.

Test sequence

WARNING

Hot steam may escape when the compensation bottle is opened.

- *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- *Cover the cap with a cloth and open carefully.*

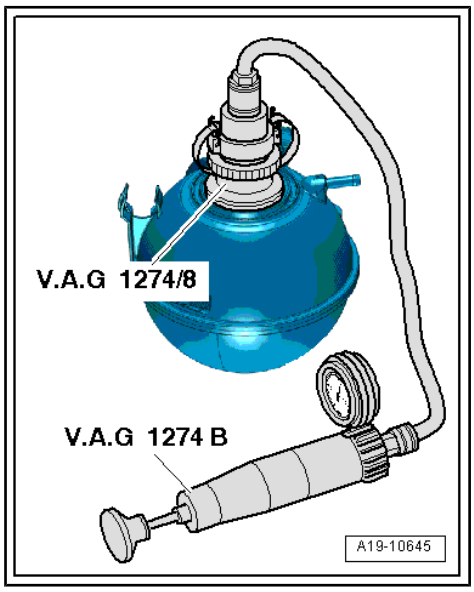
– Open compensation bottle.

– Screw the adapter for cooling system testing device - V.A.G 1274/8- into the coolant expansion bottle.

– Clamp the connecting piece - V.A.G 1274 B/1- in the adapter for cooling system testing device - V.A.G 1274/8- .

– Connect the connecting piece - V.A.G 1274 B/1- via the delivered connecting hose to the cooling system testing device - V.A.G 1274 B- .

– Using the hand pump of the testing device generate an overpressure of approx. 0.1 MPa (1 bar).



WARNING

Risk of scalding!

- *Before the cooling system testing device - V.A.G 1274 B- is separated from the connecting hose or the connecting piece - V.A.G 1274 B/1- , the existing pressure must absolutely be released.*
- *For this step, press the pressure relief valve on the cooling system testing device - V.A.G 1274 B- until the pressure gauge indicates the value »0«.*

If the pressure drops:

– Search position of the leak and repair fault.

Testing the pressure relief valve in the cap

– Screw the screw cap into the adapter for cooling system testing device - V.A.G 1274/9- .

– Clamp the connecting piece - V.A.G 1274 B/1- in the adapter for cooling system testing device - V.A.G 1274/9- .

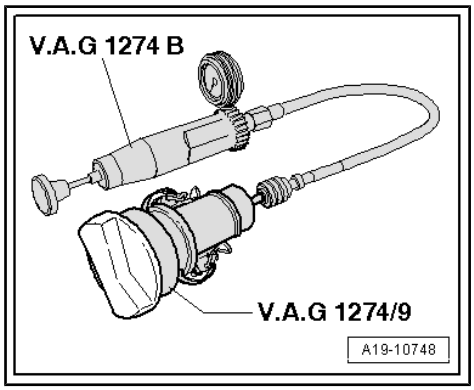
– Connect the connecting piece - V.A.G 1274 B/1- via the delivered connecting hose to the cooling system testing device - V.A.G 1274 B- .

– Operate the handpump.

- The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).

If the pressure relief valve opens too early or too late:

– Renew cap.



1.7 Removing and installing coolant pump

Note

- *The integrated gasket of the coolant pump must not be separated from the pump.*
- *If damage or leak present, replace coolant pump with gasket completely.*

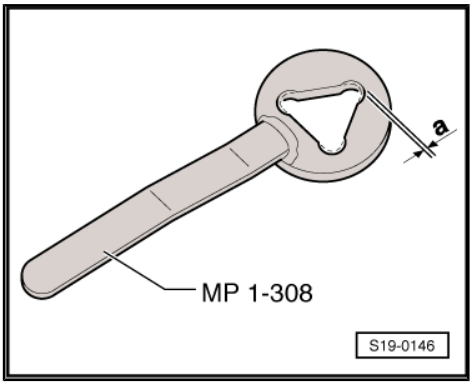
Special tools and workshop equipment required

- The adapted wrench for the water pump and power-assisted steering - MP1-308 (V.A.G 1590)-

Adapt wrench for the water pump and power-assisted steering - MP1-308 (V.A.G 1590)-

Because of modified fixing screws for the belt pulley of the coolant pump, these large curvatures must be filed open:

Dimension -a- at least 1 mm.



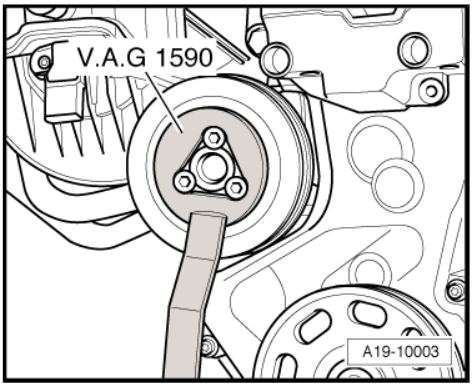
Removing

– Drain coolant ⇒ page 118 .

– Remove the front right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .

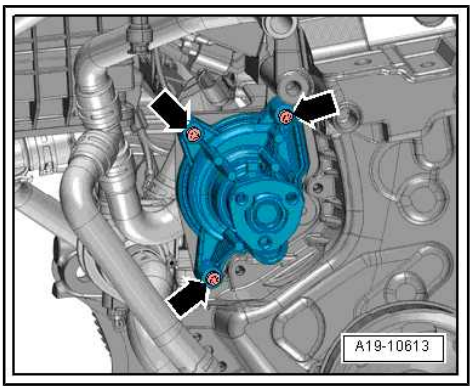
– Remove V-ribbed belt ⇒ page 18 .

– Release the screws for the belt pulley for coolant pump, to do so counterhold with wrench for the water pump and power-assisted steering - V.A.G 1590- .



– Unscrew screws -arrows- of coolant pump.

– Remove the coolant pump from the cylinder block.



Install

Installation is performed in the reverse order, pay attention to the following points:

– Insert coolant pump in the cylinder block.

– Tighten fixing screws of coolant pump to 10 Nm.

– Tighten screws for belt pulley for coolant pump to 20 Nm.

– Install the V-ribbed belt ⇒ page 18 .

– Install the front right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .

– Top up coolant ⇒ page 118 .

20 – Fuel supply system

1 Removing and installing parts of the fuel supply system

Note

- *The fuel lines are connected with quick-release fittings, which are loosened by pressing in the circlip.*
- *Fuel hoses at the engine must only be secured with spring-type clips. The use of clamp-type or screw-type clips is not allowed.*
- *Use pliers for spring strap clips to fit the spring strap clips.*
- *The fuel supply system must be bled after removal of the fuel filter, fuel delivery unit and the fuel strip* ⇒ *page 148* .

Observe safety measures ⇒ page 3 .

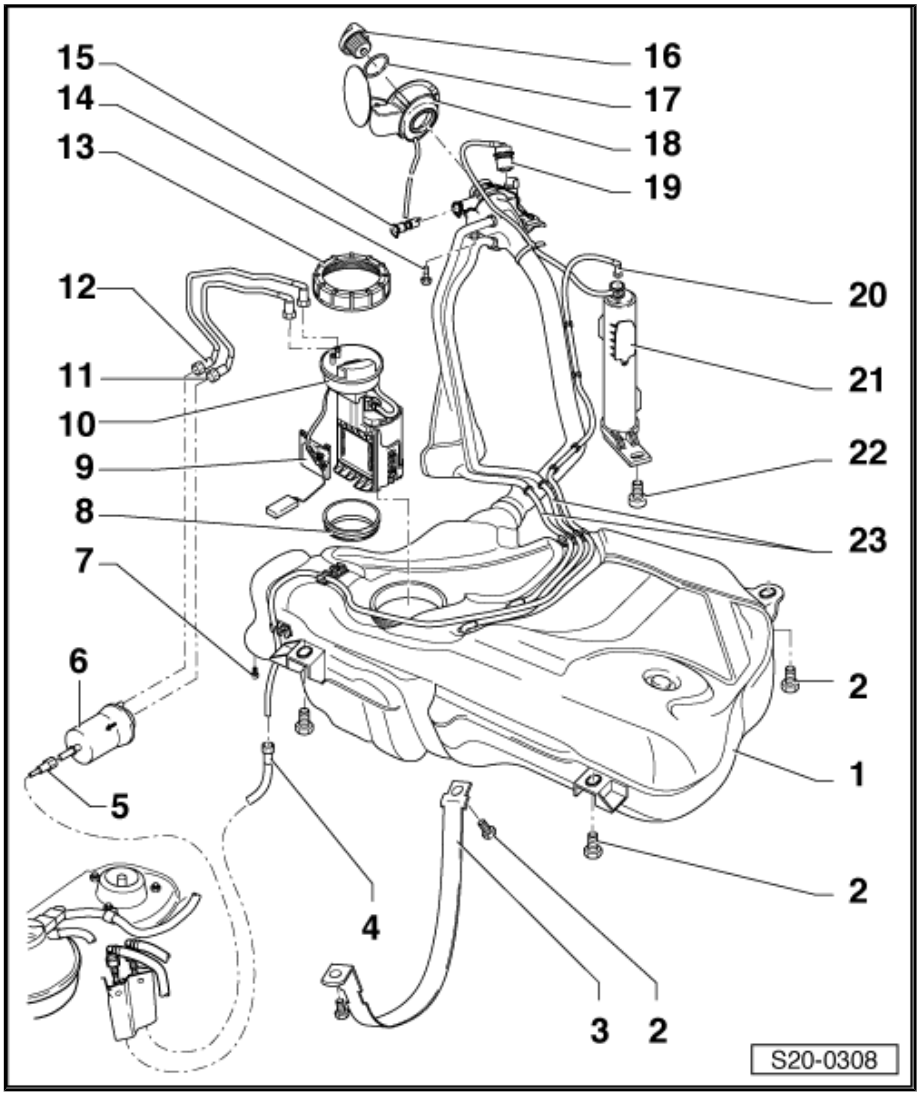
Observe rules for cleanliness ⇒ page 4 .

Accelerator pedal ⇒ page 150 .

Activated charcoal container system ⇒ page 151 .

1.1 Fuel tank with attached parts and fuel filter - Summary of components

Fabia II



1 - Fuel tank

- ❑ support with engine/ gearbox jack - V.A.G 1383 A- when removing
- ❑ removing and installing ⇒ page 135
- ❑ after replacing the fuel tank, bleed ⇒ page 148 the fuel supply with the valve on the fuel strip

2 - 25 Nm

3 - Tensioning strap

4 - Vent line

- ❑ to solenoid valve 1 for activated charcoal filter - N80- in engine compartment

5 - Fuel feed line

- ❑ black
- ❑ to fuel strip at intake manifold

6 - Fuel filter

- ❑ with integrated fuel pressure regulator 0.4 MPa (4 bar)
- ❑ blue return-flow line in the middle and black feed line on the edge
- ❑ after replacing the fuel filter, bleed ⇒ page 148 the fuel supply with the valve on the fuel strip
- ❑ Fitting position: Pin at filter housing must engage in the recess of the guide for the fixing clamp
- ❑ The direction of flow of fuel is marked by arrow

7 - 5 Nm

- ❑ for collar clamp for fuel filter

8 - Sealing ring

- ❑ moisten with fuel before installing

9 - Sender for fuel gauge -G-

- ❑ removing and installing ⇒ page 134

10 - Fuel delivery unit

- ❑ removing and installing ⇒ page 132
- ❑ inspecting fuel pump ⇒ page 143
- ❑ Clean strainer if dirty
- ❑ Fitting position of flange of fuel delivery unit - version 1 ⇒ page 133
- ❑ Fitting position of flange of fuel delivery unit - version 2 ⇒ page 134

11 - Return-flow line

- ❑ from fuel pressure regulator to fuel delivery unit
- ❑ blue

12 - Feed line

- ❑ from the fuel delivery unit to the fuel filter
- ❑ black

13 - Union nut

- ❑ use wrench for union nut - MP1-227 (3217)- for removing and installing ⇒ page 132

14 - 10 Nm

15 - Vent valve

- ❑ to remove, unclip valve at side and take out of filler neck.
- ❑ before installing, unscrew screw cap -Pos. 16-
- ❑ check ⇒ page 126

16 - Screw cap

17 - Sealing ring

- ❑ replace if damaged

18 - Fuel tank lid unit

- ❑ with rubber bowl
- ❑ Removing and installing ⇒ Body Work; Rep. gr. 55

19 - Gravity valve

- ❑ to remove, unclip valve at top and lift out of filler neck
- ❑ inspect valve for blockage:

- ♦ Valve vertical: open
- ♦ Valve tilted 45°: closed

20 - Vent line

- ❑ between activated charcoal filter -Pos. 21- and vent line -Pos. 4-

21 - Activated charcoal filter

- ❑ Assignment ⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ Summary of components of activated charcoal container system ⇒ page 151
- ❑ Checking the fuel tank venting ⇒ page 154

22 - 10 Nm

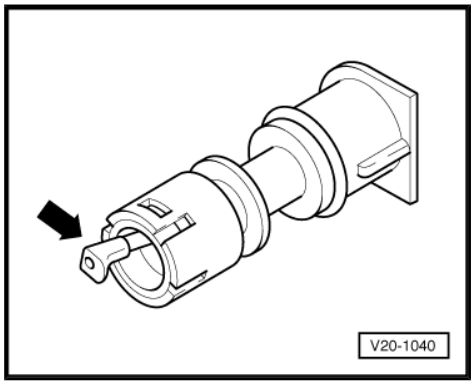
23 - Vent line

- ❑ clipped in place on fuel tank

Inspect vent valve

Lever in zero position: Valve closed.

Lever pressed in direction of the arrow: Valve open.

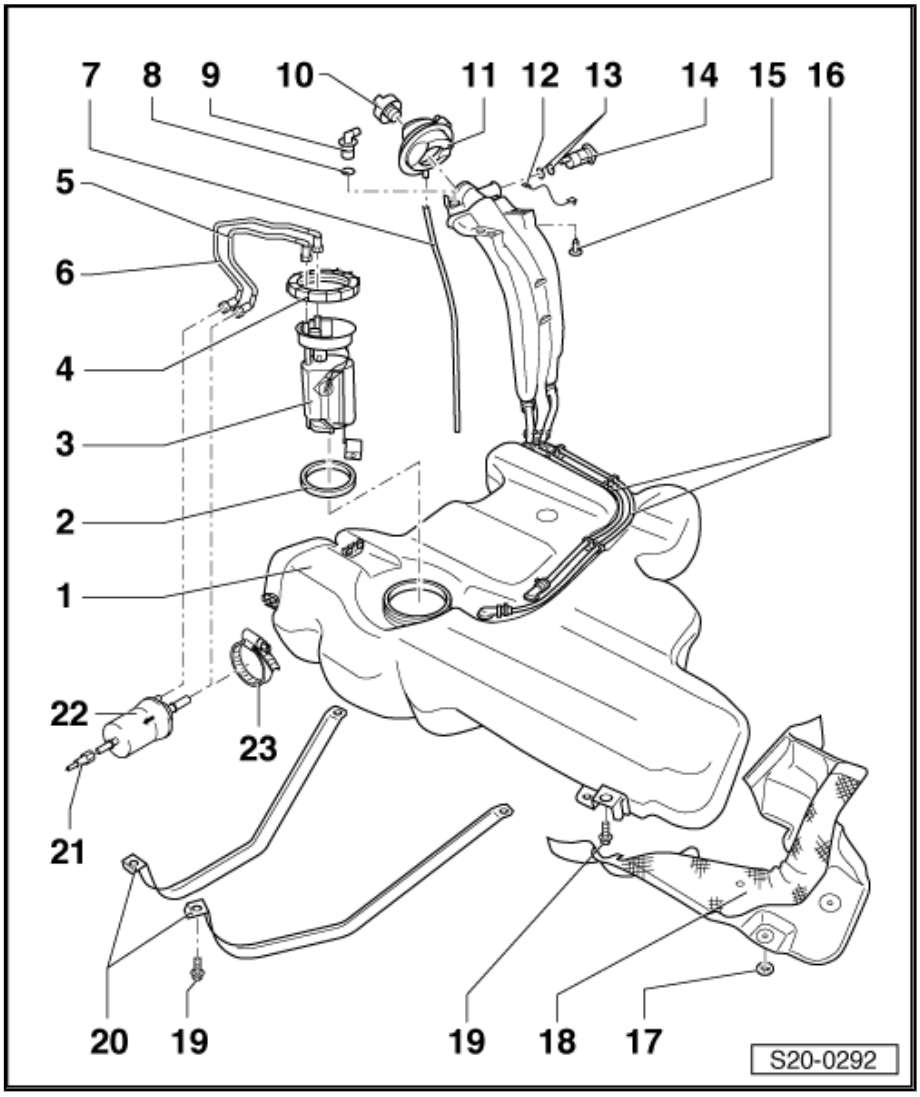


Note

Before installation of the bleeder valve unscrew the cap from the filler neck.

1.2 Fuel tank with attached parts and fuel filter - Summary of components

Roomster with engine identification characters BTS



1 - Fuel tank

- ❑ support with engine/ gearbox jack - V.A.G 1383 A- when removing
- ❑ removing and installing ⇒ page 135
- ❑ after replacing the fuel tank, bleed the fuel supply with the valve on the fuel strip ⇒ page 148

2 - Sealing ring

- ❑ replace if damaged

3 - Fuel delivery unit

- ❑ Fitting position of flange of fuel delivery unit - version 1 ⇒ page 133
- ❑ Fitting position of flange of fuel delivery unit - version 2 ⇒ page 134
- ❑ removing and installing ⇒ page 132
- ❑ inspecting fuel pump ⇒ page 143
- ❑ Clean strainer if dirty

4 - Union nut

- ❑ slacken and tighten with wrench for union nut - MP1-227 (3217)-

5 - Return-flow line

- ❑ from the fuel delivery unit to the fuel filter
- ❑ blue

6 - Feed line

- ❑ from fuel filter to fuel delivery unit
- ❑ black

7 - Overflow hose

8 - O-ring

- ❑ replace

9 - Gravity valve

- ❑ to remove, unclip valve and lift up and out of the filler neck
- ❑ inspect valve for blockage:
- ❑ Valve open vertically
- ❑ Valve tilted 45°: closed

10 - Screw cap

11 - Fuel tank lid unit

12 - Earth connection

13 - O-ring

- ❑ replace

14 - Vent valve

- ❑ check ⇒ page 128

15 - 10 Nm

16 - Vent line

17 - Circlip

18 - Heat shield

- ❑ for fuel tank

19 - 25 Nm

- ❑ replace

20 - Straps

- ❑ pay attention to different lengths

21 - Fuel feed line

- ❑ black
- ❑ from fuel filter to fuel strip at intake manifold

22 - Fuel filter

- ❑ with integrated fuel pressure regulator 0.4 MPa (4 bar)
- ❑ do not interchange connections
- ❑ The direction of flow of fuel is marked by arrow
- ❑ Fitting position: Pin at filter housing must engage in the recess of the guide at the filter holder
- ❑ after replacing the fuel filter, bleed ⇒ page 148 the fuel supply with the valve on the fuel strip

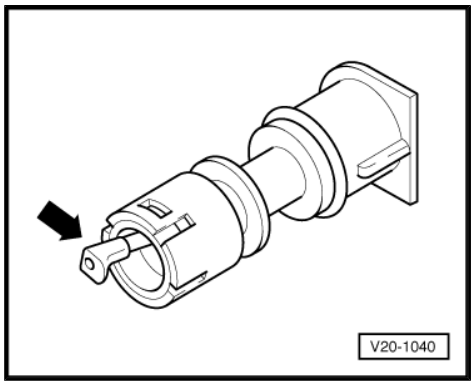
23 - Screw clamp

- ❑ for fuel filter

Inspect vent valve

Lever in zero position: Valve closed.

Lever pressed in direction of the arrow: Valve open.



Note

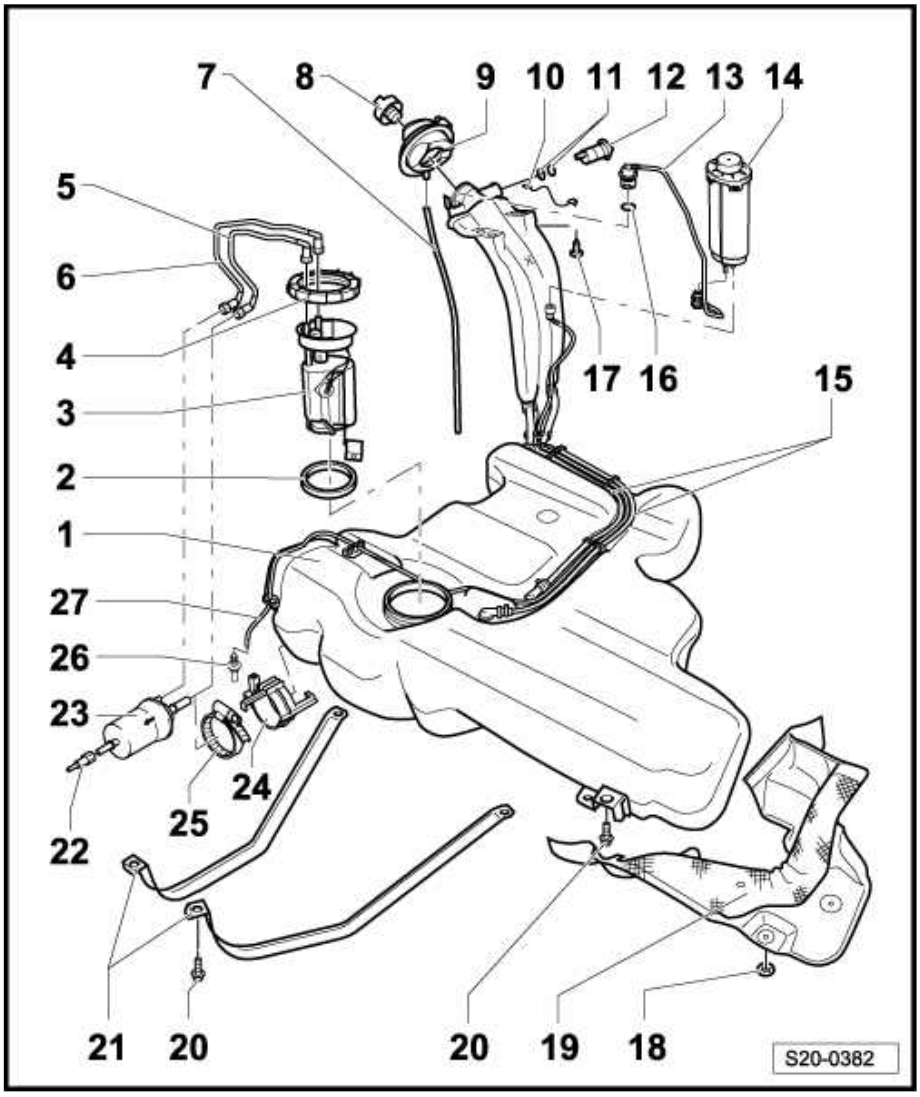
Before installation of the bleeder valve unscrew the cap from the filler neck.

1.3 Fuel tank with attached parts and fuel filter - Summary of components

Roomster with engine identification characters CFNA

Rapid NA with engine identification characters CLSA

Rapid NH, NK with engine identification characters CFNA



1 - Fuel tank

- ❑ support with engine/ gearbox jack - V.A.G 1383 A- when removing
- ❑ removing and installing ⇒ page 135

2 - Sealing ring

- ❑ replace if damaged

3 - Fuel delivery unit

- ❑ Fitting position of flange of fuel delivery unit - version 1 ⇒ page 133
- ❑ Fitting position of flange of fuel delivery unit - version 2 ⇒ page 134
- ❑ removing and installing ⇒ page 132
- ❑ inspecting fuel pump ⇒ page 143
- ❑ Clean strainer if dirty

4 - Union nut

- ❑ slacken and tighten with wrench for union nut - MP1-227 (3217)-

5 - Return-flow line

- ❑ from fuel filter to fuel delivery unit
- ❑ blue

6 - Feed line

- ❑ from the fuel delivery unit to the fuel filter
- ❑ black

7 - Overflow hose

8 - Screw cap

9 - Fuel tank lid unit

- ❑ with rubber bowl
- ❑ Removing and installing ⇒ Body Work; Rep. gr. 55

10 - Earth connection

11 - O-ring

- ❑ replace

12 - Vent valve

- ❑ check ⇒ page 130

13 - Gravity valve

- ❑ to remove, unclip valve and lift up and out of the filler neck
- ❑ inspect valve for blockage:
- ❑ Valve open vertically
- ❑ Valve tilted 45°: closed

14 - Activated charcoal filter

- ❑ Summary of components of activated charcoal container system ⇒ page 151
- ❑ Checking the fuel tank venting ⇒ page 155

15 - Vent line

16 - O-ring

- ❑ replace

17 - 10 Nm

18 - Circlip

19 - Heat shield

- ❑ for fuel tank

20 - 25 Nm

- ❑ replace

21 - Straps

- ❑ pay attention to different lengths

22 - Fuel feed line

- ❑ black
- ❑ from fuel filter to fuel strip at intake manifold

23 - Fuel filter

- ❑ with integrated fuel pressure regulator 0.4 MPa (4 bar)
- ❑ do not interchange connections
- ❑ The direction of flow of fuel is marked by arrow
- ❑ Fitting position: Pin at filter housing must engage in the recess of the guide at the filter holder

24 - Bracket for fuel filter

- ❑ on engines with identification characters CLSA; tightening torque for screw 2 Nm

25 - Screw clamp

- ❑ on engines with identification characters CFNA

26 - Vent line

- ❑ to solenoid valve 1 for activated charcoal filter in engine compartment

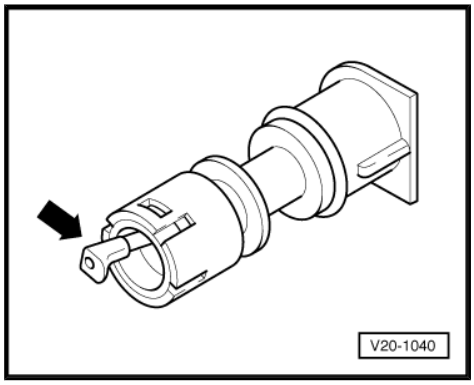
27 - Vent line

- ❑ between activated charcoal filter -Pos. 14- and vent line -Pos. 26-

Inspect vent valve

Lever in zero position: Valve closed.

Lever pressed in direction of the arrow: Valve open.



Note

Before installation of the bleeder valve unscrew the cap from the filler neck.

1.4 Extract fuel from the fuel tank

Special tools and workshop equipment required

- ♦ Hose adapter , e.g. -V.A.G 1318/16-
- ♦ Adapter , e.g. -V.A.G 1318/17-
- ♦ Measuring tool set , e.g. -V.A.G 1594 C-
- ♦ 12 V battery

- Fuel tank

Note

If there are functional problems of the fuel delivery unit suction off fuel with fuel extraction device e.g. -VAS 5190- .

Work procedure

Note

- *Observe safety measures when working on the fuel system ⇒ page 3 .*
- *Observe the regulations concerning cleanliness when working on the fuel supply/injection system ⇒ page 4 .*

– Switch off all electrical components and withdraw key from ignition lock.

Vehicles Fabia II

– Position right rear seat vertically ⇒ Body Work ⇒ Rep. gr. 72 .

Vehicles Roomster

– Fold back the middle and rear seat and position vertically ⇒ Body Work; Rep. gr. 72 .

Vehicles Rapid

– Remove rear seat bench and lay aside floor covering ⇒ Body Work; Rep. gr. 72 .

Continued for all vehicles

– Remove the cover from the fuel delivery unit.

WARNING

The fuel feed line is pressurized! Wear safety goggles and safety clothing, in order to avoid injuries and skin contact. Place cleaning cloths around the connection point before detaching cable connections. Reduce pressure by carefully removing the wiring.

– Detach the fuel feed line by pressing the circlip and catch the fuel which flows out with a cleaning cloth. Unlock the quick coupling and disconnect ⇒ page 138 .

– Connect the adapter -V.A.G 1318/16- and -V.A.G 1318/17- and fit this “drain pipe” onto the feed support of the fuel delivery unit.
– Hold the “drain pipe” in a suitable fuel tank.
– Disconnect connector for fuel pump.
– Using auxiliary cables -A- from the measuring tool set - V.A.G 1594/C- connect up the battery through contacts of the fuel pump as follows:

Battery positive (+) to contact -1- of the fuel pump

For the version with the 4-pin plug

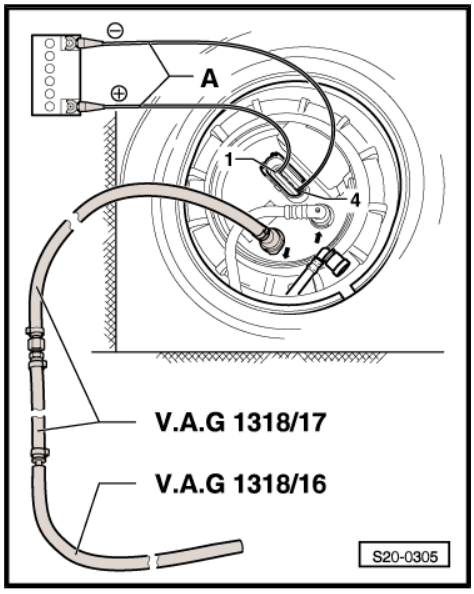
Battery minus (-) to contact -4- of the fuel pump

For the version with the 5-pin plug

Battery minus (-) to contact -5- of the fuel pump

Proceed as follows for both versions

The fuel pump runs and suctions off fuel.



WARNING

In order to avoid fuel overflow due to the fuel tank not being sufficiently large enough, the fuel pump must not run unattended.

1.5 Removing and installing fuel delivery unit

Special tools and workshop equipment required

♦ Wrench for union nut - MP1-227 (3217)-

Condition

- The ignition must be switched off and the ignition key must be withdrawn.
- The fuel tank must not be more than $^1/_2$ full.

Removing

Note

♦ *Observe the safety instructions before starting fitting work* *⇒ page 3* .
♦ *Observe rules for cleanliness* *⇒ page 4* .
♦ *Empty the fuel tank if necessary* *⇒ page 130* *, if there are functional problems of the fuel delivery unit suction off fuel with fuel extraction device e.g. -VAS 5190-* .

Vehicles Fabia II

– Position right rear seat vertically ⇒ Body Work; Rep. gr. 72 .

Vehicles Roomster

– Fold back the middle and rear seat and position vertically ⇒ Body Work; Rep. gr. 72 .

Vehicles Rapid

– Remove rear seat bench and lay aside floor covering ⇒ Body Work; Rep. gr. 72 .

Continued for all vehicles

– Remove the cover from the fuel delivery unit.

– Disconnect the 4-pin plug, the feed and return flow line from the flange of the fuel delivery unit.

Note

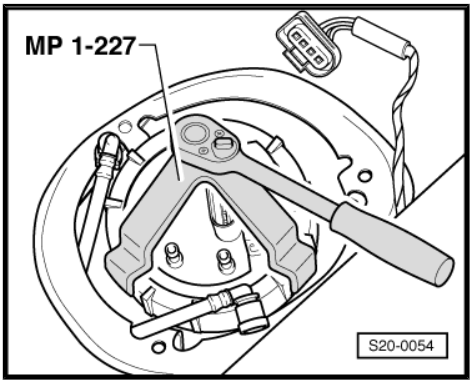
Always press in the securing ring in order to unlock the fuel lines. Unlock the quick coupling and disconnect ⇒ page 138 .

WARNING

The fuel feed line is pressurized! Place a clean cleaning cloth around the connection point before detaching hose connections. Reduce pressure by carefully releasing the connection point.

– Unscrew union nut with wrench for union nut - MP1-227 (3217)- .

– Pull the fuel delivery unit and the gasket ring out of the opening of the fuel tank.



Note

You must empty the old delivery unit before disposing of it if you wish to replace the fuel delivery unit.

Install

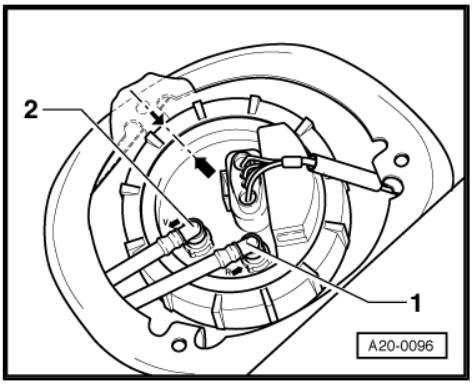
Installation of the fuel delivery unit occurs in reverse order to removal. Pay attention to the following:

Fitting position of flange of fuel delivery unit - version 1

Marking on the flange must be aligned with marking on the fuel tank -arrows-.

Connect blue or blue marked return-flow line -1- to the connection with the marking -R-.

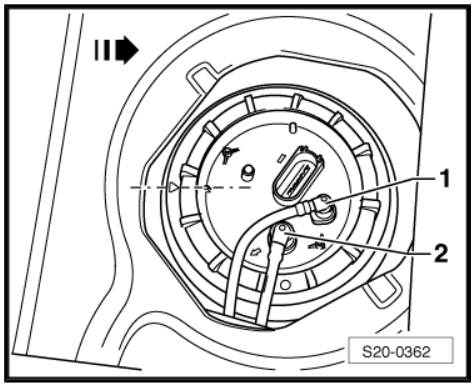
Connect black feed line -2- to connection with marking -V-.



Note

After installing the fuel delivery unit, check whether the feed, return-flow and vent lines are clipped in place on the fuel tank.

Fitting position of flange of fuel delivery unit - version 2



Marking on the flange must be aligned with marking on the fuel tank.

-Arrow- points in direction of travel.

Connect blue or blue marked return-flow line -1- to the connection with the marking -R-.

Connect black feed line -2- to connection with marking -V-.

Note

- *When installing, ensure that the float arm of the sender for fuel gauge display - G- is not bent.*
- *Insert dry gasket ring of the fuel delivery unit into the opening of the fuel tank.*
- *Only moisten gasket ring with fuel before assembly of the fuel delivery unit.*
- *Observe installation position of the fuel delivery unit flange.*
- *Do not interchange feed line and return-flow line.*
- *Make sure the fuel hoses fit tightly.*
- *After installing the fuel delivery unit, check whether the feed, return-flow and vent lines are clipped in place on the fuel tank.*

1.6 Removing and installing the sender for fuel gauge display - G-

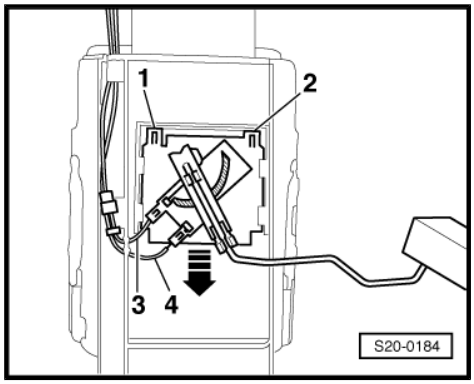
Note

There are two types of senders for the fuel gauge display - G- installed in the vehicles.

Sender for fuel gauge display - G- type 1

Removing

– Remove fuel delivery unit ⇒ page 132 .



– Unlatch and disconnect the plug connection of the lines -3- and -4-.

– Raise catches -1- and -2- with a screwdriver and remove the sender for fuel gauge display - G- from the bottom -arrow-.

Install

– Insert the fuel gauge sender - G- into the guides at the fuel delivery unit and press fully upwards.

– Connect plug of lines and check for correct position of the sender.

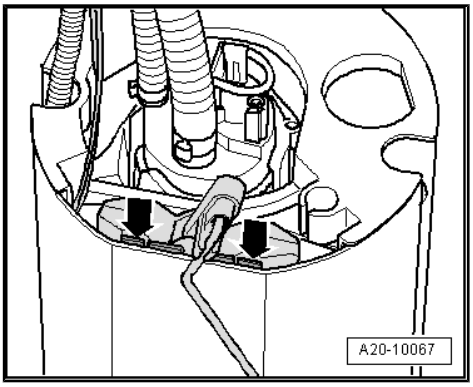
– Install fuel delivery unit ⇒ page 132 .

Sender for fuel gauge display - G- type 2

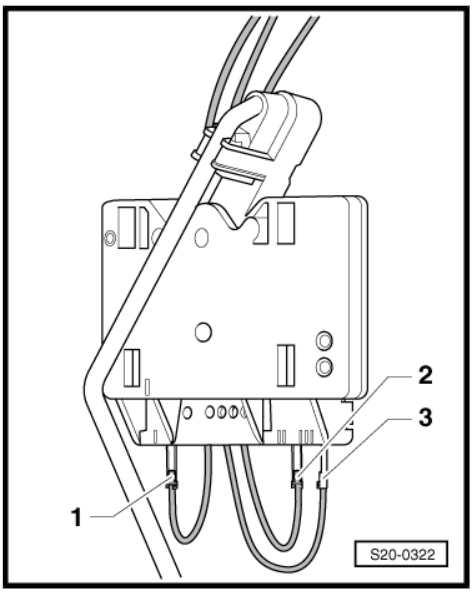
Removing

– Remove fuel delivery unit ⇒ page 132 .

– Unlock the catches -arrows- using a screwdriver and pull out the sender for fuel gauge display - G- towards the top.



– Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue) and -3- (black).



Install

– Connect the lines and check the connector for secure catch.

– Insert the sender for fuel gauge display - G- in the guides at the fuel delivery unit and press downwards until it latches into position.

– Install fuel delivery unit ⇒ page 132 .

1.7 Removing and installing the fuel tank

Special tools and workshop equipment required

♦ Engine/gearbox jack , e.g. -V.A.G 1383 A-

Condition

- The ignition must be switched off and the ignition key must be withdrawn.
- The fuel tank must not be more than $^1/_4$ full. If necessary, extract fuel from the fuel tank ⇒ page 130 .

Note

If there are functional problems of the fuel delivery unit suction off fuel with fuel extraction device e.g. -VAS 5190- .

Removing

Note

♦ *Observe the safety instructions before starting fitting work* *⇒ page 3* .

♦ *Observe rules for cleanliness* *⇒ page 4* .

Vehicles Fabia II

– Position right rear seat vertically ⇒ Body Work; Rep. gr. 72 .

Vehicles Roomster

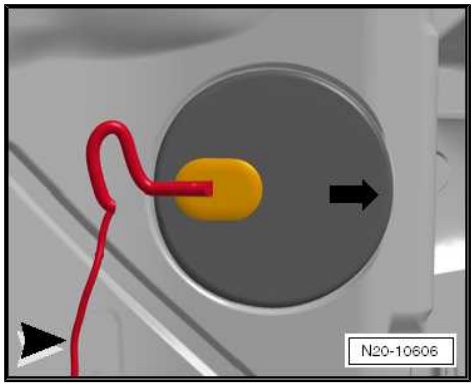
– Fold the rear seat forward and position the middle and rear seat vertically ⇒ Body Work; Rep. gr. 72 .

Vehicles Rapid

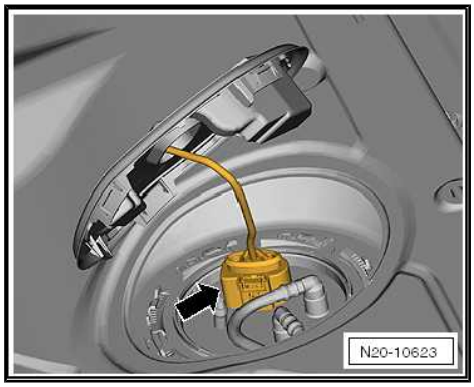
– Remove rear seat bench and lay aside floor covering ⇒ Body Work; Rep. gr. 72 .

Continued for all vehicles

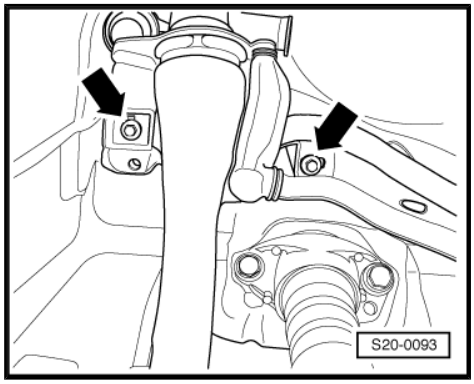
– Remove the cover of the fuel delivery unit under the mat.



– Unplug connector -arrow-.
– Open fuel tank flap and unscrew cap from filler neck.
– Remove the rear right plastic wheelhouse liner ⇒ Body Work; Rep. gr. 66 .



– Unscrew fixing screws at tank filler neck -arrows-.
– Detach both vent lines from the activated charcoal container, if they are installed in the wheelhouse at the rear, by pressing the locking buttons ⇒ page 151 . Unlock the quick coupling and disconnect ⇒ page 138 .
– Removing rear axle ⇒ Chassis; Rep. gr. 42 .

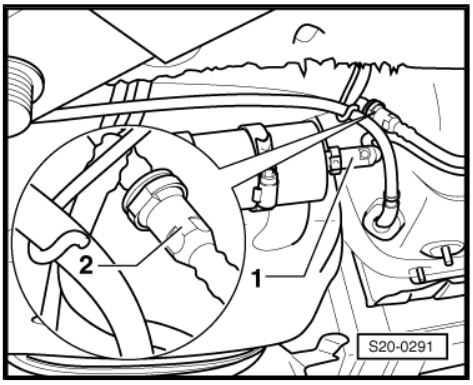


WARNING

The fuel feed line is pressurized! Place a clean cleaning cloth around the connection point before detaching hose connections. Reduce pressure by carefully releasing the connection point.

– Disconnect the fuel feed line -1- and the vent line -2- by pressing the locking buttons. Unlock the quick coupling and disconnect ⇒ page 138 .

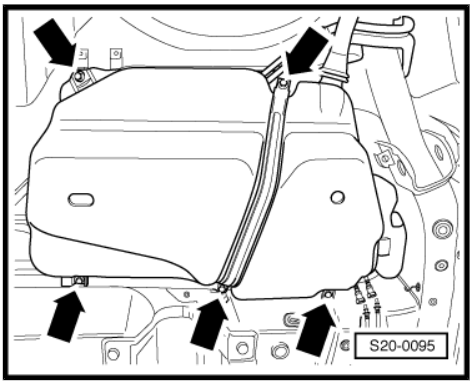
– Support the fuel tank using the engine and gearbox jack - V.A.G 1383 A- .



Vehicles Fabia II

– Unscrew tensioning strap and fixing screws of the fuel tank -arrows-.

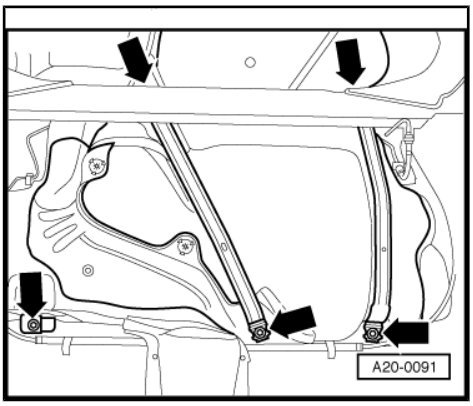
– Slightly lower the lever, pull the filler neck out of the rubber bowl and lower the fuel tank.



Vehicles Roomster and Rapid

– Unscrew tensioning straps and fixing screw of the fuel tank -arrows-.

– Slightly lower the lever, pull the filler neck out of the rubber bowl and lower the fuel tank.

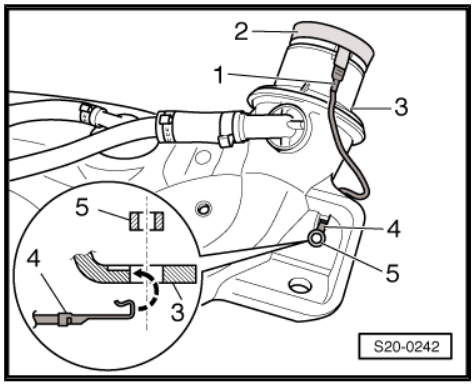


Install

– Check both earth connections for corrosion, if necessary remove corrosion.

– Check fitting position of the earth lead -1-.

- The plug -1- on the metal plate ring -2- must be placed on firmly.
- The contact tab -4- must be hung on the fuel tank -3- and secured with the spacer bush -5-.



Installation is performed in the reverse order; pay attention to the following points:

- Check vent and fuel hoses for damage.
- Do not mix-up the feed, return-flow and vent lines (the return-flow line is blue or has a blue marking, the feed line is black).
- Make sure the caps of the fuel hoses fit tightly.
- After replacing the fuel tank, bleed the fuel supply with the valve on the fuel strip ⇒ page 148

Tightening torques:

- Fabia II ⇒ page 124 .
- Roomster with engine identification characters BTS ⇒ page 126 .
- Roomster with engine identification characters CFNA ⇒ page 128 .
- Rapid NA with engine identification characters CLSA ⇒ page 128 .
- Rapid NH, NK with engine identification characters CFNA ⇒ page 128 .

Note

After installing the fuel tank, check whether the feed, return-flow and vent lines are clipped in place on the fuel tank.

1.8 Separating quick couplings

Special tools and workshop equipment required

- Lever - T10468-

Assign quick couplings

Note

Quick couplings of fuel lines, vacuum lines and ventilation lines are colour marked. Either a colour point on the quick coupling or the release button has the corresponding colour.

Quick coupling	Colour coding on the quick coupling
Fuel feed line	Black
Fuel return-flow line	Blue
Vent line	White, beige
Vacuum line	Green

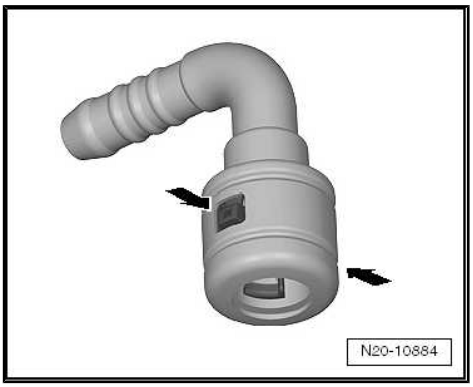
WARNING

The fuel feed line is pressurized! Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel. Place cleaning cloths around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.

Version 1

Quick coupling with release buttons -arrows- on right and left.

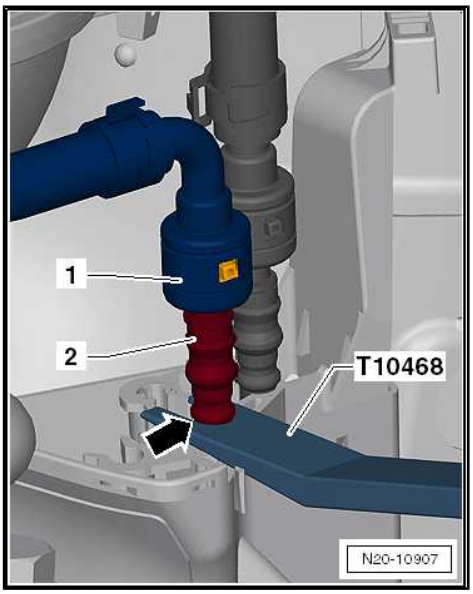
Open



The separation point -1- in the engine compartment must be held.

– Position the lever - T10468- between the heat shield and the stop -arrow- of the fuel feed line -2- and hold it.

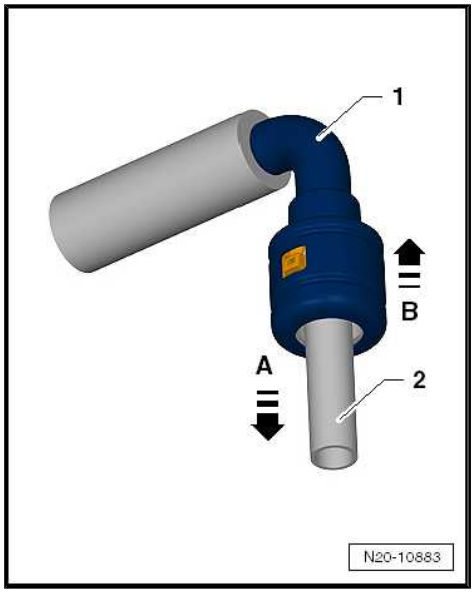
Continued for all separation points



– Press in quick coupling -1- in -direction of arrow A-.
– Press the release buttons and detach the quick coupling -1- in -direction of arrow B- from the fuel line -2-.

Pay attention to the assignment of the colours when installing ⇒ page 138 .

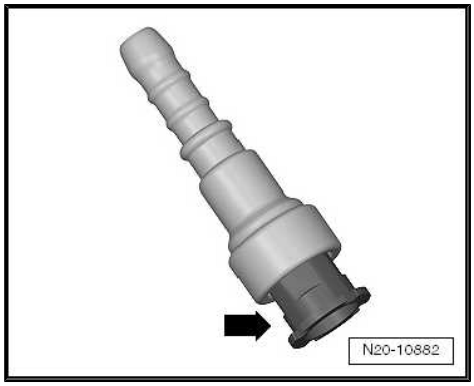
– Check the quick couplings for firm seating by pulling in the opposite direction!



Version 2

Quick coupling with pull release -arrow-.

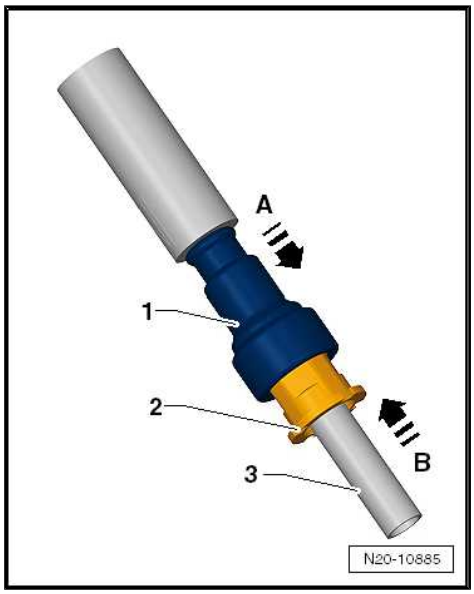
Open



– Press in quick coupling -1- in -direction of arrow A-.
– Pull on the pull release -2- in -irection of arrow B-.
– Detach the quick coupling -1- in -direction of arrow B- from the fuel line -3-.

Pay attention to the assignment of the colours when installing ⇒ page 138 .

– Check the quick couplings for firm seating by pulling in the opposite direction!



Version 3

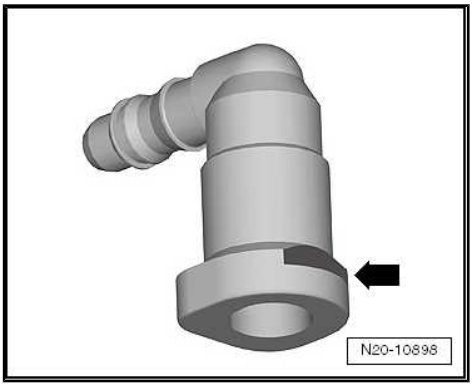
Quick coupling with front button -arrow-.

Open

– Press the release button -arrow- and detach the quick couplings.

Pay attention to the assignment of the colours when installing ⇒ page 138 .

– Check the quick couplings for firm seating by pulling in the opposite direction!



Version 4

Quick coupling with release buttons -arrows- on right and left.

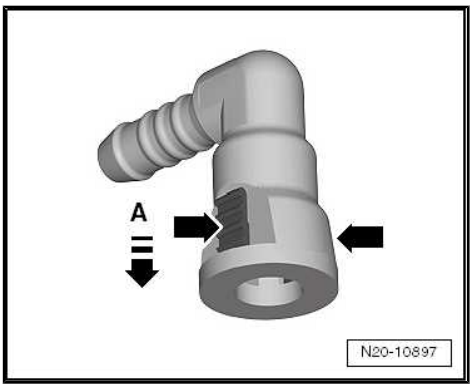
Open

– Press in quick coupling in -direction of arrow A-.

– Press release buttons -arrow- and detach quick coupling.

Pay attention to the assignment of the colours when installing ⇒ page 138 .

– Check the quick couplings for firm seating by pulling in the opposite direction!



Version 5

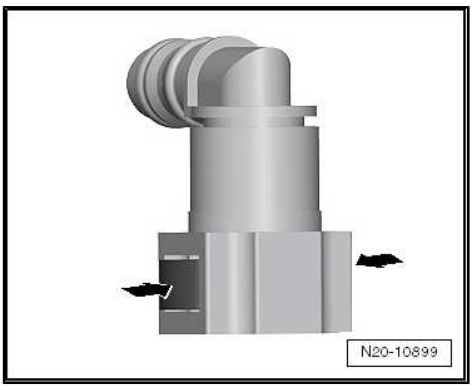
Quick coupling with release buttons -arrows- on right and left.

Open

– Press release buttons -arrow- and detach quick coupling.

Pay attention to the assignment of the colours when installing ⇒ page 138 .

– Check the quick couplings for firm seating by pulling in the opposite direction!



Version 6

Push-on coupling with release buttons -arrows- on right and left.

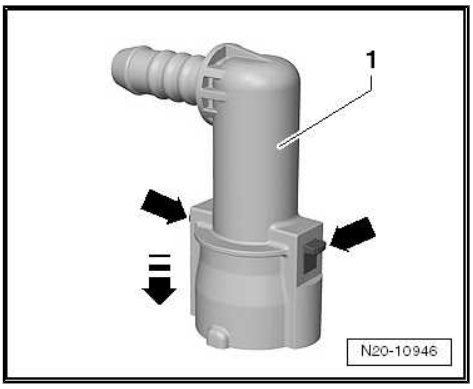
Open

– Press push-on coupling -1- in -direction of arrow- and hold pressed.

– Press release buttons -arrows- and detach quick coupling.

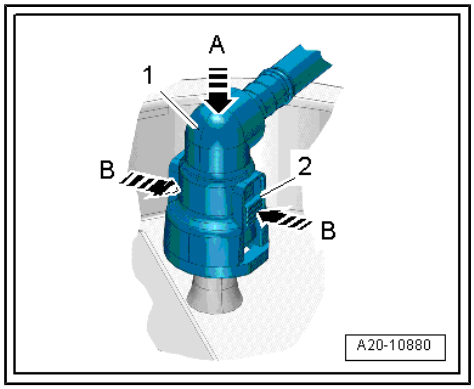
Pay attention to the assignment of the colours when installing ⇒ page 138 .

– Check the quick couplings for firm seating by pulling in the opposite direction!



Version 7

Quick coupling -1- with release buttons -2- right and left.



Open

– Press push-on coupling -1- in -arrow direction A- and hold pressed.
– Press release buttons -2- in -arrow direction B- and remove quick coupling- 1-.

Pay attention to the assignment of the colours when installing ⇒ page 138 .

The quick coupling must be heard to click into place.

– Check the quick couplings for firm seating by pulling in the opposite direction!

2 Testing parts of fuel supply system

2.1 Testing fuel pump

Observe safety measures ⇒ page 3 .

Observe rules for cleanliness ⇒ page 4 .

Special tools and workshop equipment required

- Multimeter , e.g. -V.A.G 1526 A-
- Multimeter with current controlled pliers e. g. -V.A.G 1715-
- Remote control , e.g. -V.A.G 1348/3A-
- Adapter cable set , e.g. -V.A.G 1594 A- or -V.A.G 1594 C-
- Wrench for union nut - MP1-227 (3217)-
- Pressure gauge appliance , e.g. -V.A.G 1318-
- Adapter , e.g. -V.A.G 1318/1-
- Adapter , e.g. -V.A.G 1318/11-
- Adapter , e.g. -V.A.G 1318/17-
- Adapter , e.g. -V.A.G 1318/23-
- Measuring vessel
- Current flow diagram

2.1.1 Inspecting proper operation and power supply

Test conditions

- Battery voltage at least 11.5 volts
- Fuse for protection of injection valves in fuse carrier below the dash panel O.K.

Vehicles Fabia II

– Fold rear seat forwards ⇒ Body Work; Rep. gr. 72 .

Vehicles Roomster

– Fold back the middle and rear seat and position vertically ⇒ Body Work; Rep. gr. 72 .

Vehicles Rapid

– Remove rear seat bench and lay aside floor covering ⇒ Body Work; Rep. gr. 72 .

Continued for all vehicles

– Remove the cover from the fuel delivery unit.

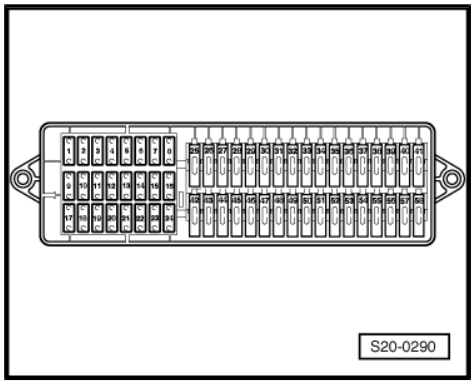
– Switch on ignition. The fuel pump must be heard to start running.

– Switch off ignition.

If the fuel pump does not run:

– Remove cover from the fuse holder.

– Remove fuse for protection of injection valves from the fuse carrier below the dash panel according to current flow diagrams ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



– Connect the remote control -V.A.G 1348/3A- to the corresponding fuse holder and to battery positive (+) with the auxiliary cables from the measuring tool set .
– Activate remote control.

If the fuel pump starts running:

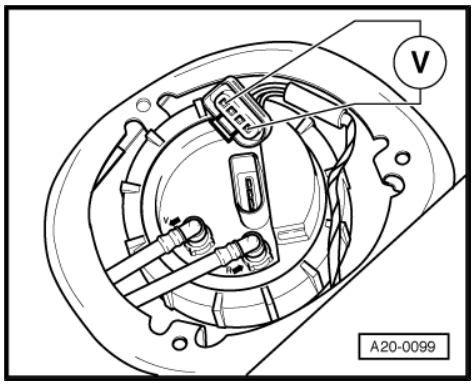
– Testing fuel pump relay - J17- ⇒ Vehicle diagnostic tester.

If the fuel pump does not run:

– Disconnect the plug from the flange at the fuel delivery unit.

For the version with the 4-pin plug

– Connect multimeter for voltage measurement to contacts 1 and 4.



For the version with the 5-pin plug

– Connect multimeter for voltage measurement to contacts 1 and 5.

Proceed as follows for both versions

– Activate remote control.

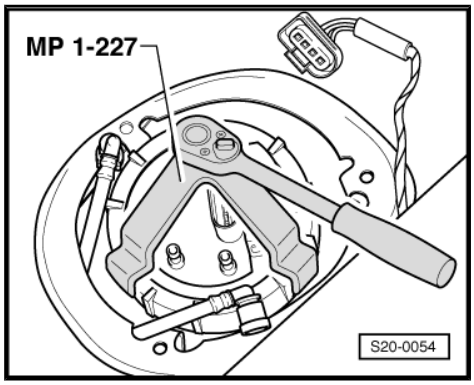
Specified value: approx. battery voltage.

If the nominal voltage is not reached:

– Determine and remove open circuit in the wiring according to the current flow diagram ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

If the nominal voltage is reached:

– Unscrew union nut with wrench for union nut - MP1-227 (3217)- .
– Remove the fuel delivery unit and check whether the electric wiring between the flange and fuel pump is connected.



If no open circuit was detected:

– Replace fuel delivery unit ⇒ page 132 .

2.1.2 Check fuel flow rate

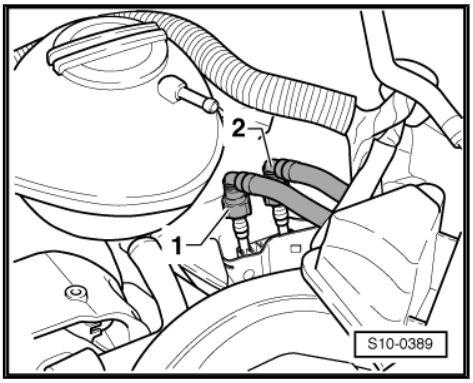
Test conditions

- Supply voltage o.k.
- Remote control -V.A.G 1348/3A- connected.

Test sequence

– Unscrew the cap from the filler neck.

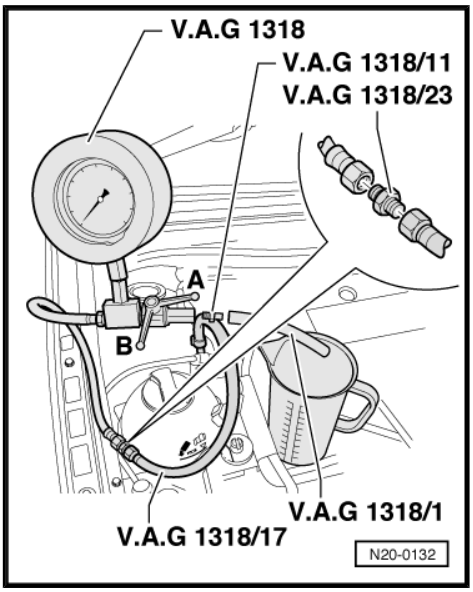
– Pull out the fuel feed line -2- and catch the fuel which flows out with a cleaning cloth. Unlock the quick coupling and disconnect ⇒ page 138 .



WARNING

The fuel feed line is pressurized! Place a clean cleaning cloth around the connection point before detaching hose connections. Reduce pressure by carefully releasing the connection point.

– Connect pressure gauge appliance -V.A.G 1318- with adapter -V.A.G 1318/23- and -V.A.G 1318/17- to the fuel feed line.



– Connect hose -V.A.G 1318/1- to adapter -V.A.G 1318/11- of the pressure gauge appliance and hold in the measuring vessel.

– Open shut-off cock of the pressure measuring device. The lever points in the direction of flow -A-.

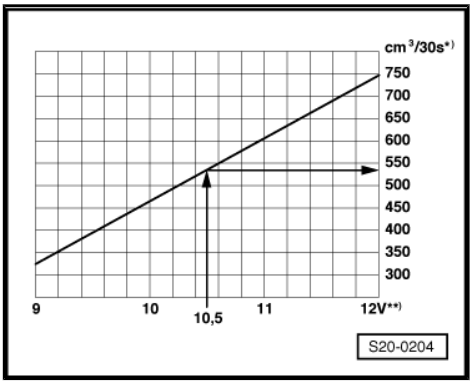
– Activate remote control -V.A.G 1348/3A- . While doing this, slowly close the shut-off cock until the pressure gauge displays 3 bar (0.3 MPa) pressure. Now do not change the position of the shut-off cock.

– Drain the measuring vessel.

– The fuel flow rate of the fuel pump is dependent on the battery voltage. Therefore connect the multimeter with the adapter cable to the vehicle battery.

– Activate remote control for 30 seconds while measuring the battery voltage.

– Compare the fuel rate with the specified value.



*) Minimum flow rate in cm^3/30 s

**) Voltage at fuel delivery unit when engine not running and delivery unit operating (approx. 2 volts less than battery voltage)

Read out examples:

During the test a voltage of 12.5 V was measured on the battery. As the voltage on the fuel delivery unit is approx. 2 V less than the battery voltage, a minimum flow rate of 540 cm^3/30 s is shown in the diagram.

If the minimum flow rate is not reached:

– Check the fuel lines for possible diameter restrictions (kinks) or blocking.

– Disconnect the hose -1- of the feed line from the fuel filter inlet.
– Connect pressure gauge appliance -V.A.G 1318- with adapter -V.A.G 1318/17- to the hose -1-.
– Repeat fuel flow rate test.

If the minimum flow rate is now reached:

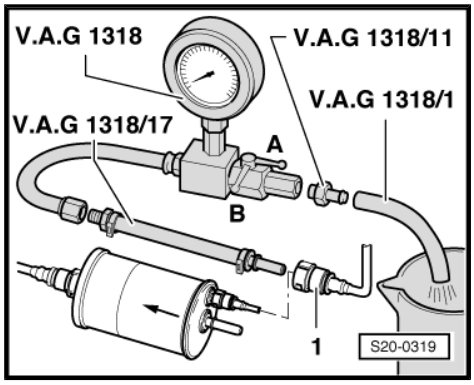
– Replace fuel filter.

If the minimum flow rate is again not reached:

– Remove the fuel delivery unit and check whether the pump strainer is not clogged up.

If no fault was detected until now:

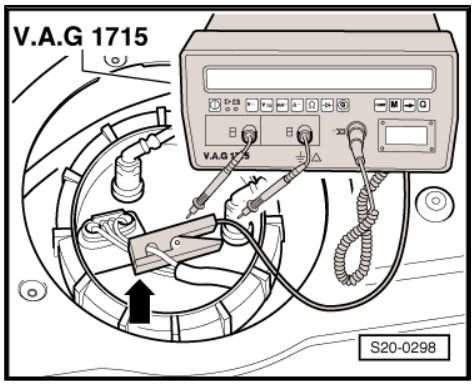
– Replace fuel delivery unit ⇒ page 132 .



The fuel flow rate was reached but a fault in the fuel supply system is suspected (e.g. temporary failure of the fuel supply system):

– Check the power consumption of the fuel delivery unit as follows:
– Connect all released fuel lines.
– Connect multimeter with current probe on the line from contact -1- of the connector of the fuel delivery unit.
– Start engine and run in idle.
– Measure power consumption of the fuel delivery unit.

Specified value: max. 8 A



Note

If the failure in the fuel supply is occasional the test may be performed during a test drive. The assistance of a 2nd mechanic is required.

If the power consumption is exceeded:

– Replace fuel delivery unit ⇒ page 132 .

2.1.3 Inspecting the operating and holding pressure of the fuel, checking the non-return valve of the fuel pump

Checking fuel operating pressure

Note

This test simultaneously checks the leaktightness of the fuel feed line from the fuel delivery unit through to the connecting point of the pressure gauge - V.A.G 1318- .

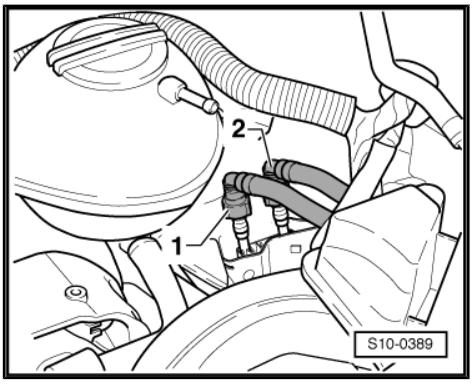
WARNING

The fuel feed line is pressurized! Place a clean cleaning cloth around the connection point before detaching wiring. Reduce pressure by carefully removing the wiring.

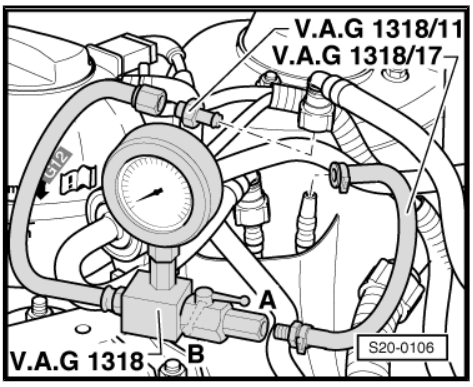
Note

The fuel pressure regulator is a component part of the fuel filter It regulates the fuel pressure in the system to approx 0.4 MPa (4 bar).

– Pull out the fuel feed line -2- and catch the fuel which flows out with a cleaning cloth. Unlock the quick coupling and disconnect ⇒ page 138 .



– Connect the pressure gauge appliance - V.A.G 1318- with adapter -V.A.G 1318/11 - and -V.A.G 1318/17 - to the fuel feed line. The shut-off cock at the device must be in position -A-.
– Start engine and run in idle.
– Measure fuel pressure.



Specified value: 0.39…0.42 MPa (3.9 … 4.2 bar)

If the measured value is higher than 0.42 bar (4.2 bar):

– Check fuel return-flow line between the fuel filter and the fuel pump for continuity or replace fuel pressure regulator.

If the measured value is less than 0.39 bar (3.9 bar):

– Check the fuel lines and the fuel strip for tightness.

Inspecting the holding pressure and the non-return valve of the fuel delivery unit.

Note

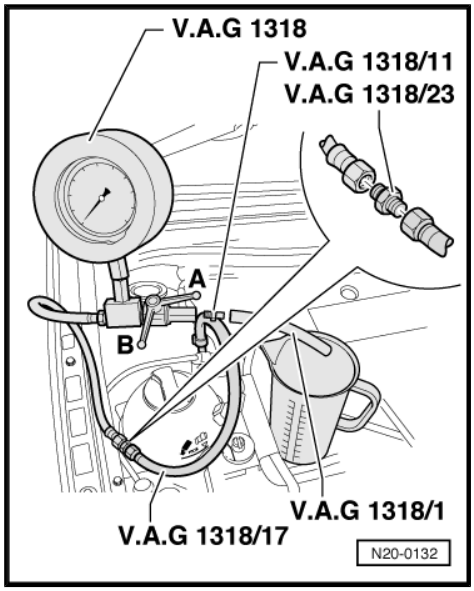
This test simultaneously checks the leaktightness of the fuel feed line from the fuel delivery unit through to the connecting point of the pressure gauge - V.A.G 1318- .

– Connect the pressure gauge - V.A.G 1318- with adapters - V.A.G 1318/23- and - V.A.G 1318/17- to the fuel feed line.
– Close the shut-off cock of the pressure measuring device.

  The lever then points in the position -B-.

– Switch the ignition on and off so often until the fuel pressure on the pressure gauge does no longer rise.
– Read off fuel pressure on the pressure gauge.

  Specified value: at least 0.37 MPa (3.7 bar)



WARNING

Danger of liquid spraying out when opening the shut-off cock; hold the container in front of the free connection to the pressure gauge.

– Lower the pressure to 0.3 MPa (3 bar) by carefully opening the shutoff cock.
– Observe pressure drop at pressure gauge.

  The pressure must not drop below 0.25 MPa (2.5 bar) after 10 minutes.

If the pressure still drops:

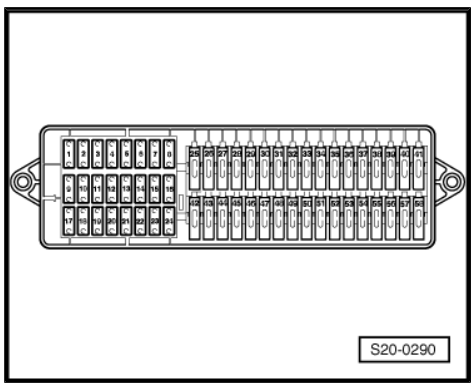
– Check line connections for leaktightness.

If the lines are not found to be faulty, the fuel delivery unit is defective.

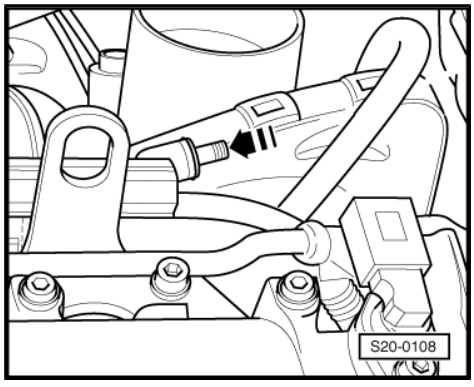
– Replace fuel delivery unit ⇒ page 132 .

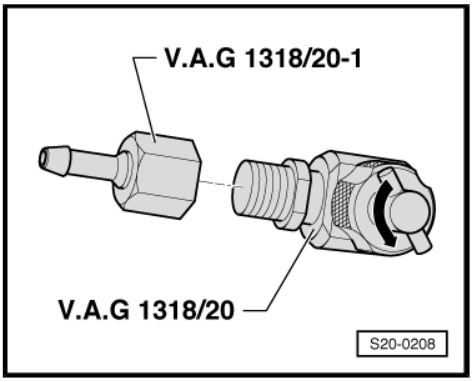
2.2 Venting air from the fuel system

– Remove cover from the fuse holder.
– Remove fuse for protection of injection valves from the fuse carrier below the dash panel according to current flow diagrams ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Connect the remote control -V.A.G 1348/3A- to the corresponding fuse holder and to battery positive (+) with the auxiliary cables from the measuring tool set .
– Remove the air filter housing ⇒ page 161 .



– Unscrew the ventilation valve cap -arrow- on the fuel strip.





- Screw adapter - V.A.G 1318/20-1- onto adapter - V.A.G 1318/20- (T-piece).
- Turn the valve at T-piece anti-clockwise, until it is fully opened.
- Screw adapter - V.A.G 1318/20- fully onto the vent valve on the fuel strip.
- Connect hose with catch pan to adapter - V.A.G 1318/20-1- .
- Screw valve at T-piece clockwise up to the stop into the vent valve.
- Check the adapter and hose connections for leaktightness.
- Activate remote control -V.A.G 1348/3A- .
- As soon as fuel flows out of the hose without bubbles, unscrew valve at T-piece anti-clockwise, until no more fuel escapes.
- Cover ventilation valve with a clean cloth.
- Throttle the bleeder hose and pull off from adapter - V.A.G 1318/20-1- .
- Unscrew adapter - V.A.G 1318/20- (T-piece) from the vent valve on the fuel strip.
- Screw cap onto the vent valve on the fuel strip.
- Install air filter housing ⇒ page 161 .

2.3 Switching off the fuel delivery unit using the crash signal

Operation

The vehicles with airbag are equipped with a crash signal fuel shut-off system. If the airbag units are triggered while driving, the fuel pump relay - J17- opens and the fuel delivery unit is deactivated. This also enhances the starting behaviour of the engine. When the door is opened, the fuel pump is operated for about 2 seconds so that pressure is built up in the fuel system.

- Testing fuel pump relay ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

3 Accelerator pedal

3.1 Accelerator pedal module - Summary of components

1 - Bearing bracket

- ❑ removing and installing ⇒ Chassis; Rep. gr. 46

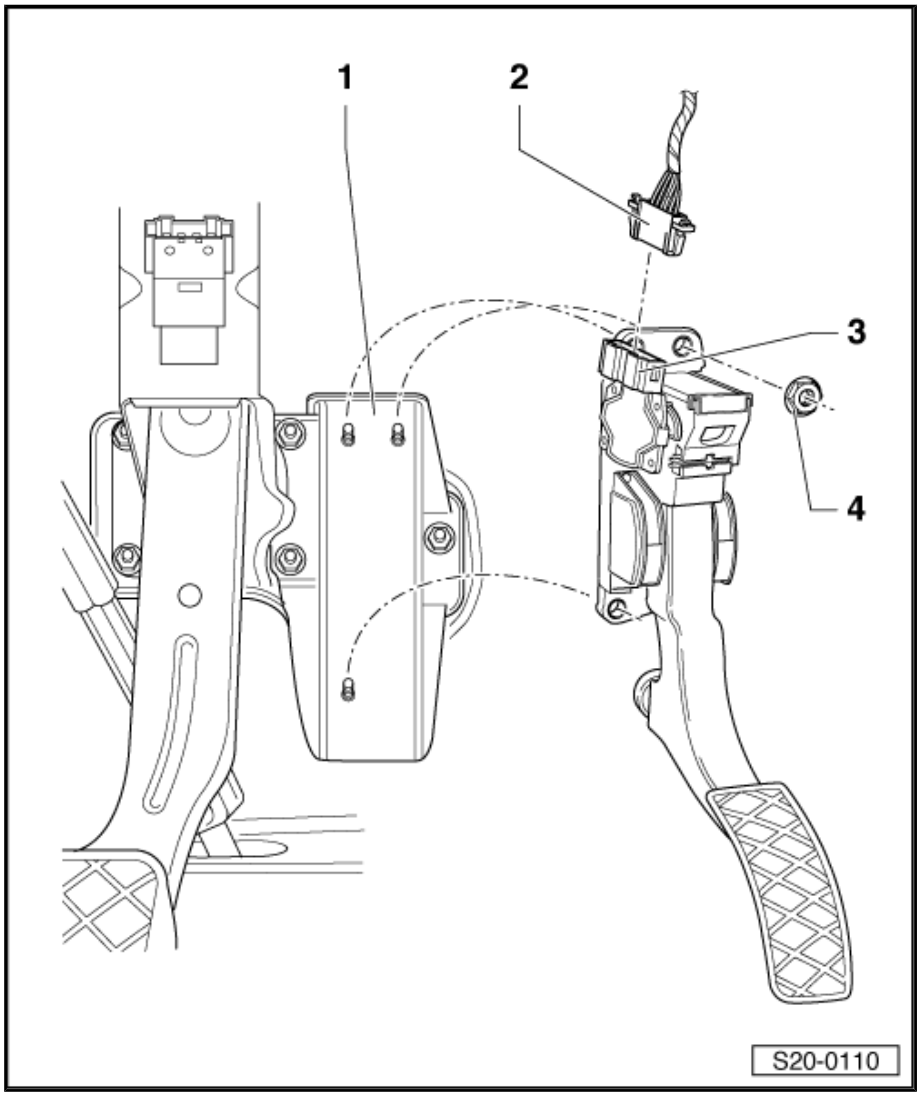
2 - Connector

- ❑ black
- ❑ 6-pin

3 - Accelerator pedal module

- ❑ with accelerator pedal position sender - G79- and accelerator pedal position sender 2 - G185-
- ❑ to remove the sender remove the bottom part of the dash panel on the driver's side
- ❑ After replacing in vehicles with automatic gearbox, adjust the engine and gearbox control unit ⇒ Vehicle diagnostic tester

4 - 10 Nm



4 Activated charcoal container system

4.1 Activated charcoal container system - Summary of components

Fabia II with engine identification characters BTS, CFNA

Note

- *The hose connections are secured with spring-type clips.*
- *Use pliers for spring strap clips to fit the spring strap clips.*
- *Observe safety measures ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 4 .*

1 - Intake manifold

2 - Bleeder hose

3 - Activated charcoal filter solenoid valve 1 - N80-

- ❑ attached with bracket to the intake manifold
- ❑ valve is actuated (pulsed) by engine control unit
- ❑ check ⇒ Vehicle diagnostic tester

4 - Bleeder hose

5 - Vent line

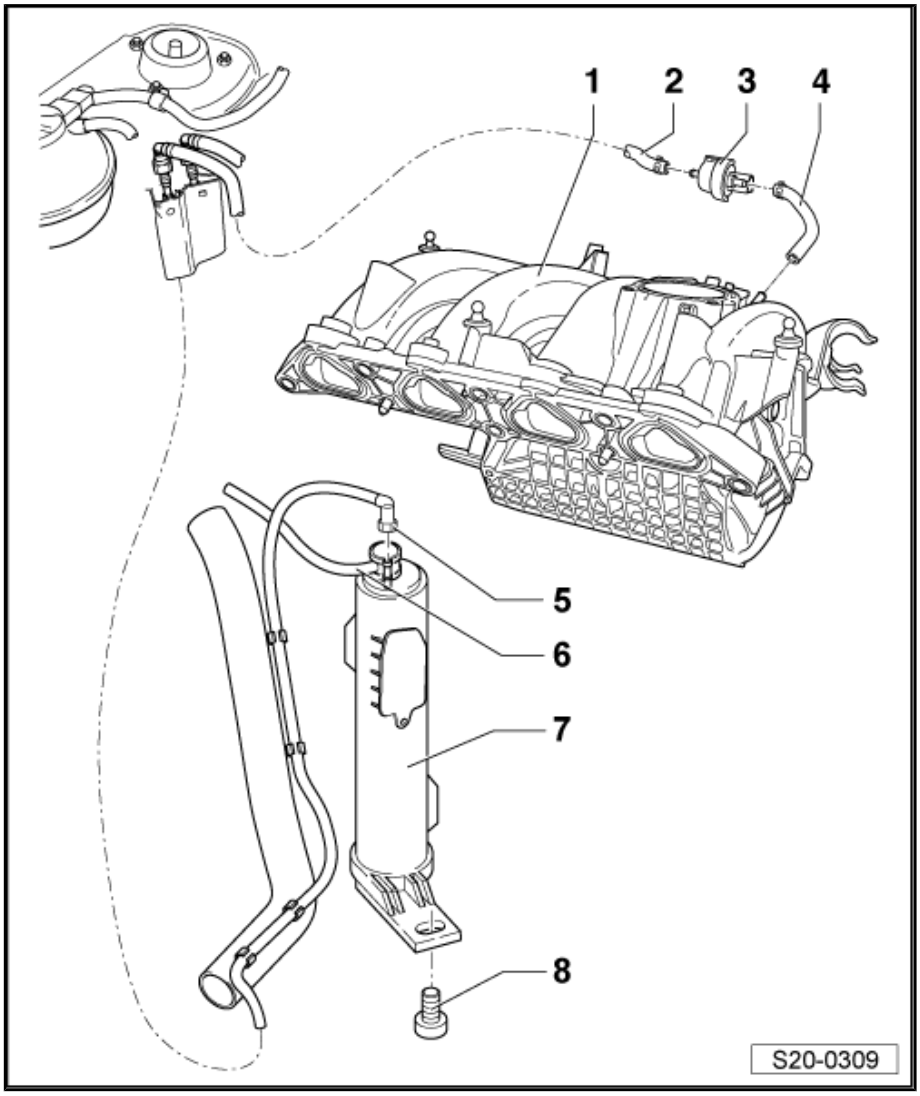
- ❑ from activated charcoal filter system solenoid valve 1 - N80-

6 - Vent line

- ❑ from gravity valve to fuel tank

7 - Activated charcoal filter

- ❑ Assignment ⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ Fitting location: in rear right wheelhouse
- ❑ attached to the vehicle body
- ❑ Checking the fuel tank venting ⇒ page 154
- ❑ removing:



– Removing the rear right wheel.

– Remove plastic wheelhouse liner ⇒ Body Work; Rep. gr. 66 .

– Detach the lines -5- and -6- by pressing the locking buttons. Unlock the quick coupling and disconnect ⇒ page 138 .

– Remove screw -8-.

– Push filter down.

❑ Installing:

– Installation is carried out in the reverse order.

8 - 10 Nm

4.2 Activated charcoal container system - Summary of components

Roomster with engine identification characters BTS

Note

- *The hose connections are secured with spring-type clips.*
- *Always replace clamp-type clips with spring-type clips.*
- *Use pliers for spring strap clips to fit the spring strap clips.*
- *Observe safety measures ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 4 .*

1 - Activated charcoal filter

❑ Fitting location: in right of engine compartment

❑ Checking the fuel tank venting ⇒ page 154

2 - Pressure holding valve with connection hose

3 - Connecting hose

❑ check for firm seating

❑ for fuel tank venting

4 - 10 Nm

5 - Solenoid valve 1 for activated charcoal filter - N80-

❑ When the ignition is switched off, the valve is closed

❑ When the engine has reached its operating temperature, the valve is actuated by the engine control unit (pulsed)

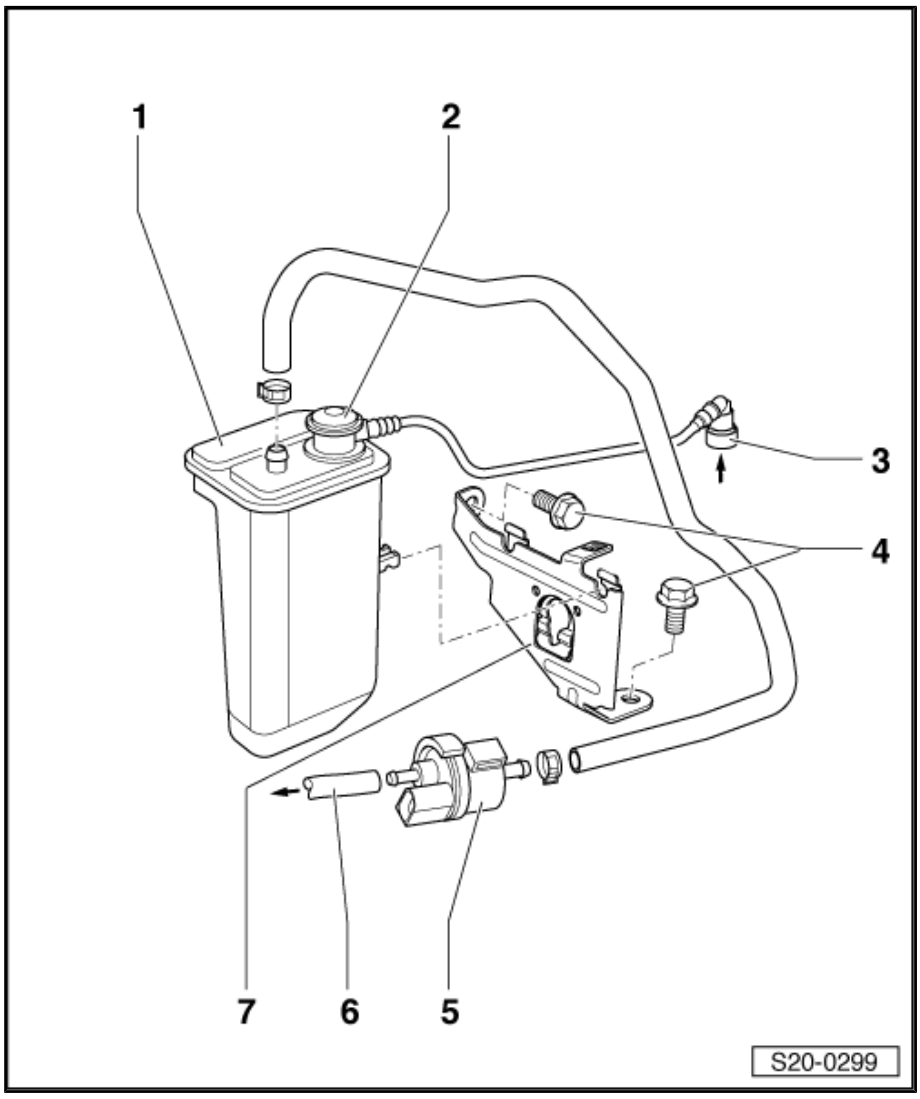
6 - Connecting hose

❑ To intake manifold

❑ check for firm seating

7 - Support

❑ for activated charcoal filter

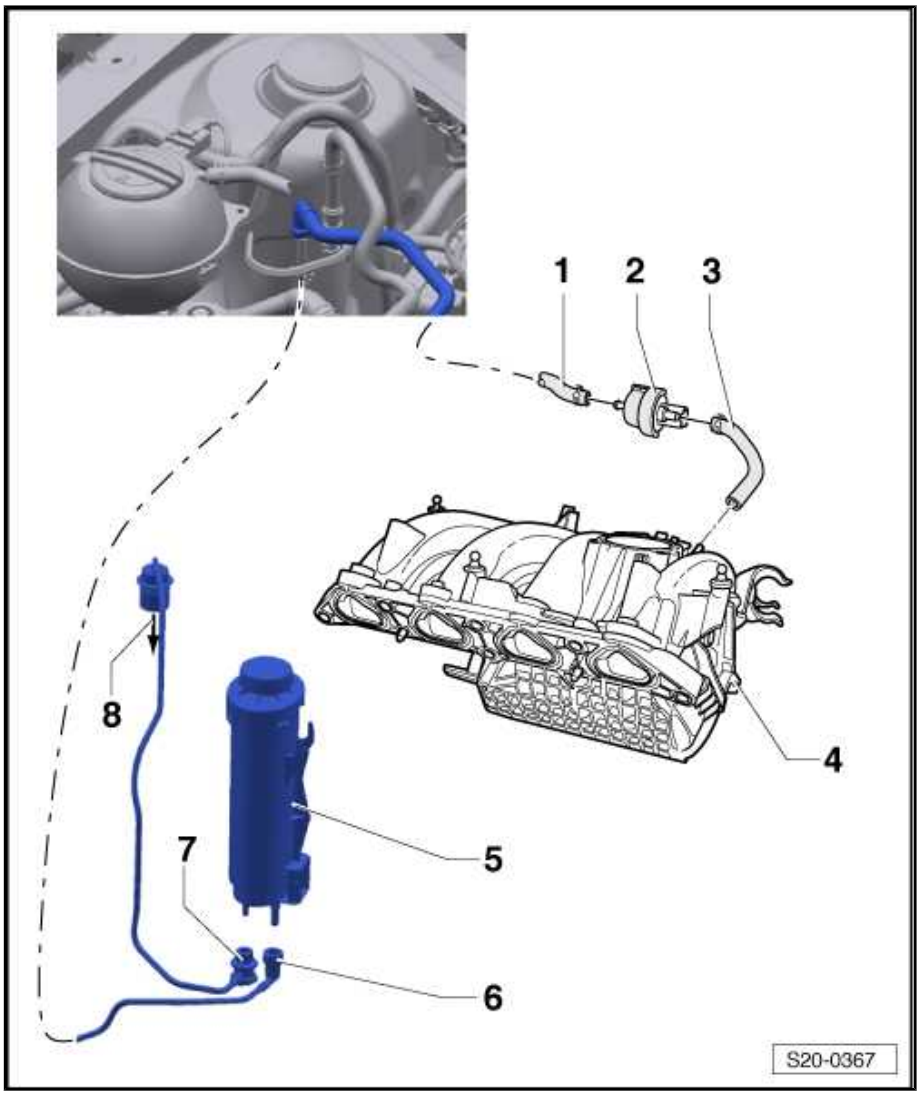


4.3 Activated charcoal container system - Summary of components

Fabia II, Roomster, Rapid - with engine identification characters CFNA, CLSA

Note

- *The hose connections are secured with spring-type clips.*
- *Always replace clamp-type clips with spring-type clips.*
- *Use pliers for spring strap clips to fit the spring strap clips.*
- *Observe safety measures ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 4 .*



1 - Bleeder hose

2 - Solenoid valve 1 for activated charcoal filter - N80-

- ❑ attached with bracket to the intake manifold
- ❑ When the ignition is switched off, the valve is closed
- ❑ When the engine has reached its operating temperature, the valve is actuated by the engine control unit (pulsed)
- ❑ check ⇒ Vehicle diagnostic tester

3 - Bleeder hose

4 - Intake manifold

5 - Activated charcoal filter

- ❑ Fitting location: in rear right wheelhouse
- ❑ attached to the vehicle body
- ❑ Checking the fuel tank venting ⇒ page 155
- ❑ Removing:
- – Removing the rear right wheel.
- – Remove the rear right plastic wheelhouse liner ⇒ Body Work; Rep. gr. 66 .
- – Detach the lines -6- and -7- by pressing the locking buttons. Unlock the quick coupling and disconnect ⇒ page 138 .
- – Remove the activated charcoal filter from the body and push down.
- ❑ Installing:
- – Installation is carried out in the reverse order.

6 - Vent line

7 - Vent line with gravity valve

8 - to the fuel-tank lid unit

4.4 Checking the fuel tank venting

Fabia II with engine identification characters BTS, CFNA

Special tools and workshop equipment required

♦ Hand vacuum pump , e.g. -VAS 6213-

Test condition

- The ignition must be switched off.

– Pull off the vacuum line -1- at the activated charcoal filter solenoid valve 1 - N80- -2-.

– Connect hand vacuum pump - VAS 6213- to vent line -1- as shown.

– Operate the hand vacuum pump several times. No vacuum should build up.

If a vacuum builds up.

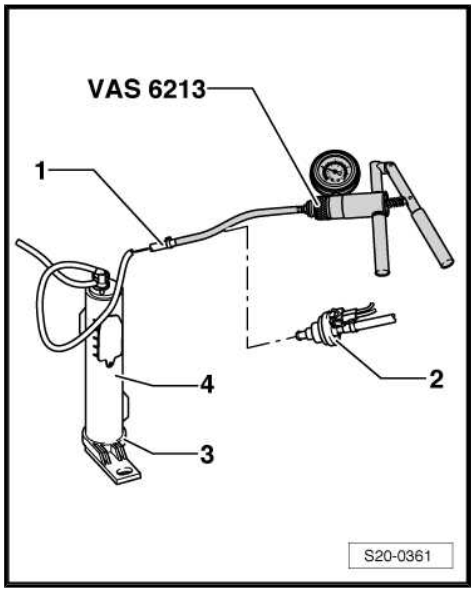
– Check the ventilation opening -3- on the activated charcoal filter -4- for dirt and clean as required.

If no vacuum builds up:

– Shut off ventilation opening -3- on the activated charcoal filter and once again operate the hand vacuum pump several times. A vacuum should build up.

If no vacuum builds up:

– Replace activated charcoal filter.



4.5 Checking the fuel tank venting

Roomster with engine identification characters BTS

Special tools and workshop equipment required

♦ Hand vacuum pump , e.g. -VAS 6213-

Test condition

- The ignition must be switched off.

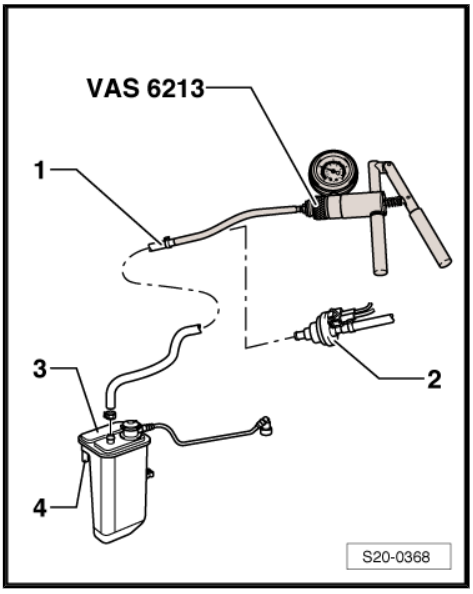
– Remove the ventilation line -1- from the activated charcoal filter on the activated charcoal filter system solenoid valve 1 - N80- -2-.

– Connect hand vacuum pump - VAS 6213- to vent line -1- as shown.
– Operate the hand vacuum pump several times. No vacuum should build up.

If a vacuum builds up.

– Check the ventilation opening -4- on the activated charcoal filter -3- for dirt and clean as required.

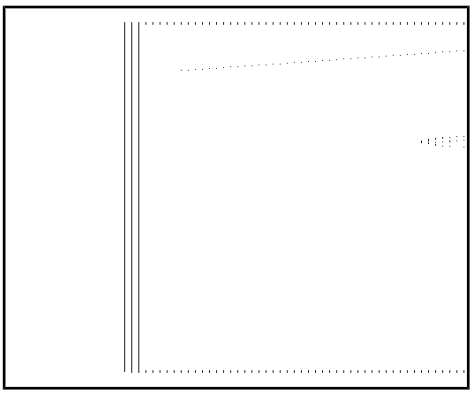
If no vacuum builds up:



– Shut off ventilation opening -arrow- on the activated charcoal filter and once again operate the hand vacuum pump several times. A vacuum should build up.

If no vacuum builds up:

– Replace activated charcoal filter.



4.6 Checking the fuel tank venting

Fabia II, Roomster, Rapid - with engine identification characters CFNA, CLSA

Special tools and workshop equipment required

♦ Hand vacuum pump , e.g. -VAS 6213-

Test condition

• The ignition must be switched off.

– Remove the ventilation line -1- from the activated charcoal filter on the activated charcoal filter system solenoid valve 1 - N80- -2-.

– Connect hand vacuum pump - VAS 6213- to vent line -1- as shown.
– Operate the hand vacuum pump several times. No vacuum should build up.

If a vacuum builds up.

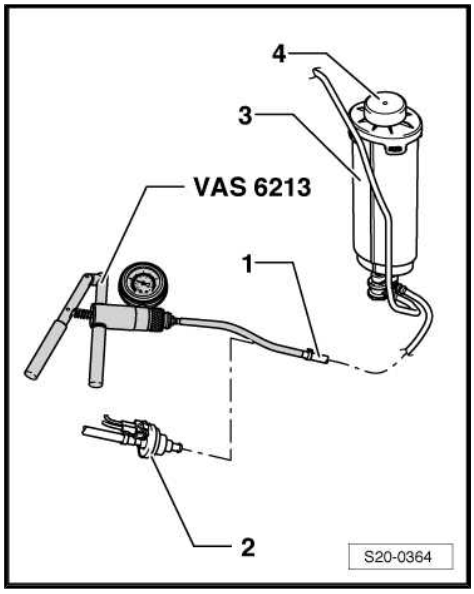
– Check the ventilation opening below the cover -4- on the activated charcoal filter -3- for dirt. Clean as required.

If no vacuum builds up:

– Remove the cover -4- and shut off the ventilation opening on the activated charcoal filter and once again operate the hand vacuum pump several times. A vacuum should build up.

If no vacuum builds up:

– Replace activated charcoal filter.



24 – Mixture preparation - injection

1 Fuel Injection System

General notes on the injection system ⇒ page 5

1.1 Injection and ignition system - Overview of fitting locations

The components marked with A and B are not shown in the fig.

A - Accelerator pedal position sender - G79- and accelerator pedal position sender 2 - G185-

- ❑ in footwell on the accelerator pedal (both senders are located in a housing)

B - lambda probe downstream of catalytic converter - G130-

- ❑ downstream of catalytic converter

1 - The vacuum regulating valve (PCV valve)

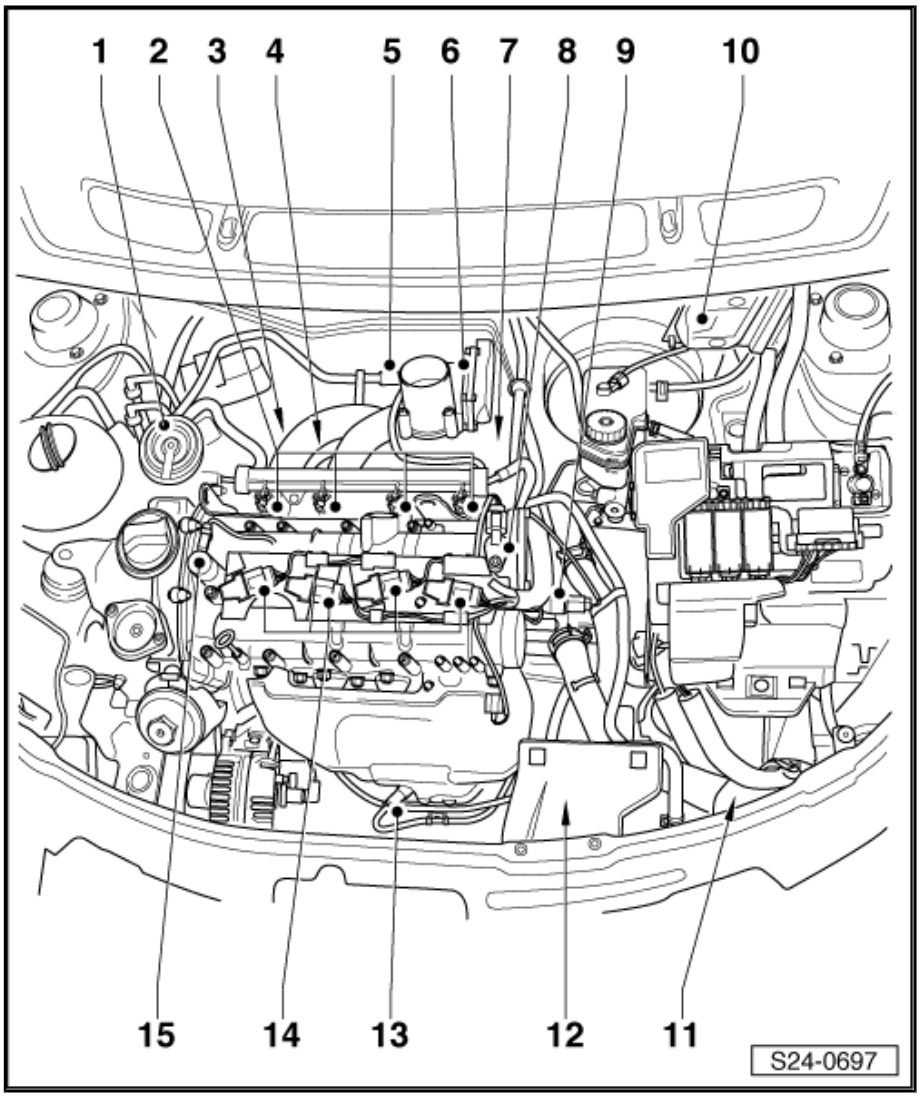
- ❑ at timing case

2 - Injection valves

- ❑ Injection valve for cylinder 1 - N30-
- ❑ Injection valve for cylinder 2 - N31-
- ❑ Injection valve for cylinder 3 - N32-
- ❑ Injection valve for cylinder 4 - N33-
- ❑ to the fuel strip
- ❑ removing and installing ⇒ page 160

3 - Intake manifold pressure sender - G71- with intake air temperature sender - G42-

- ❑ at intake manifold



-Pos. 17- ⇒ page 159

4 - Knock sensor 1 - G61-

- ❑ at rear cylinder block
- ❑ removing and installing ⇒ page 183

5 - Solenoid valve 1 for activated charcoal filter - N80-

- ❑ at intake manifold -Pos. 6- ⇒ page 159

6 - Throttle valve control unit - J338-

- ❑ with throttle valve drive for electronic power control - G186- , angle sensor 1 for throttle valve drive for electronic power control - G187- and angle sensor 2 for throttle valve drive for electronic power control - G188-
- ❑ at intake manifold -Pos. 4- ⇒ page 159

7 - Engine speed sender - G28-

- ❑ at rear crankshaft sealing flange, suction side
- ❑ removing and installing ⇒ page 161

8 - Hall sender - G40-

- ❑ on camshaft housing ⇒ page 52

9 - Coolant temperature sender - G62-

- ❑ in coolant regulator housing ⇒ page 116

10 - Engine control unit - J623-

- ❑ removing and installing ⇒ page 169

11 - Thermoswitch for radiator fan - F18-

- ❑ at bottom left coolant fitting ⇒ page 111

12 - 4-pin plug

- ❑ for lambda probe - G39-
- ❑ at plug holder at starter

13 - Lambda probe - G39-

- ❑ in front of the catalytic converter

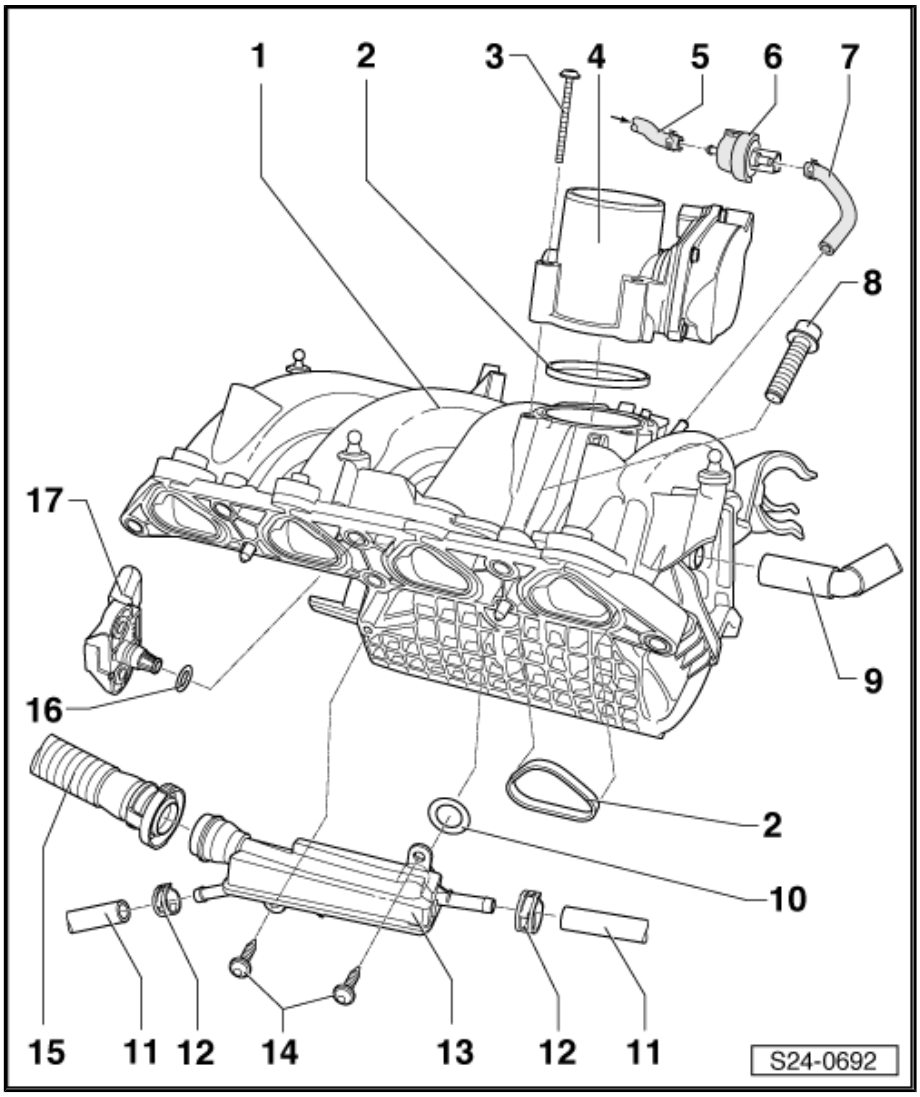
14 - Ignition coils with a power output stage

- ❑ Ignition coil 1 with a power output stage - N70-
- ❑ Ignition coil 2 with a power output stage - N127-
- ❑ Ignition coil 3 with a power output stage - N291-
- ❑ Ignition coil 4 with a power output stage - N292-
- ❑ removing and installing ⇒ page 184

15 - Camshaft adjustment valve 1 - N205-

- ❑ for engine with identification characters BTS

1.2 Intake manifold - Summary of components



1 - Intake manifold

2 - Sealing ring
- ❑ replace

3 - 8 Nm

4 - Throttle valve control unit - J338-
- ❑ when replacing, adapt the engine control unit to the throttle valve control unit ⇒ Vehicle diagnostic tester
- ❑ clean ⇒ page 167

5 - Bleeder hose
- ❑ from the activated charcoal filter system ⇒ page 151

6 - Solenoid valve 1 for activated charcoal filter - N80-
- ❑ attached with bracket to the intake manifold

7 - Bleeder hose

8 - 20 Nm

9 - Vacuum hose
- ❑ To the brake servo unit

10 - O-ring
- ❑ replace if damaged

11 - Coolant hose
- ❑ for crankcase ventilation preheating

12 - Spring strap clamp

13 - Preheating for crankcase ventilation
- ❑ remove intake manifold for removing and installing

14 - 3 Nm

15 - Hose
- ❑ to vacuum regulating valve for crankcase ventilation (for oil separator)

16 - O-ring
- ❑ replace

17 - Intake manifold pressure sender - G71- with intake air temperature sender - G42-

1.3 Fuel strip with injection valves - Summary of components

1 - Fuel intake hose
- ❑ from fuel filter
- ❑ secure with spring strap clamps
- ❑ check for firm seating

2 - 7 Nm

3 - Retaining clip
- ❑ check correct fit

4 - Cable guide
- ❑ clipped in at the fuel strip

5 - Fuel strip

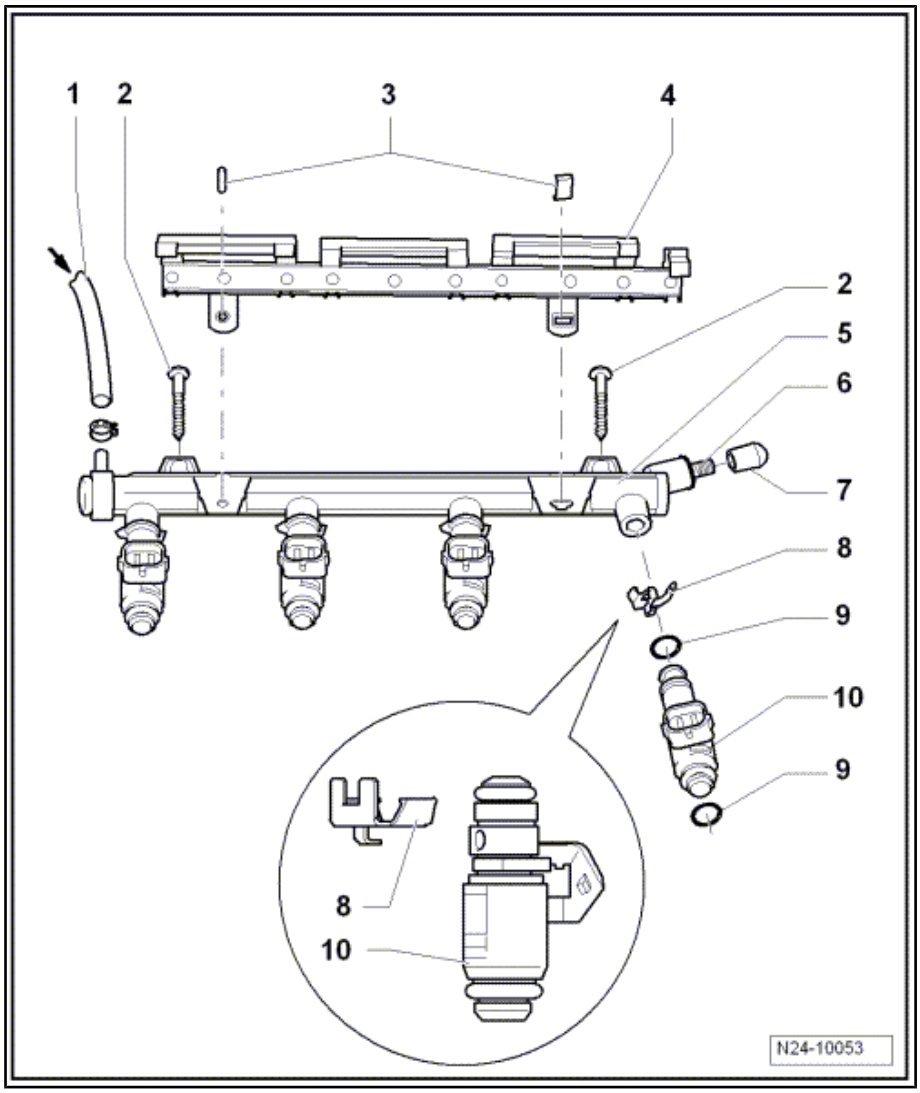
6 - Vent valve
- ❑ for fuel system
- ❑ Vent fuel system ⇒ page 148

7 - Cap
- ❑ for vent valve

8 - Retaining clip
- ❑ check for correct seating on injector

9 - O-ring
- ❑ replace
- ❑ before fitting moisten lightly with clean engine oil

10 - Injection valves - N30 … N33-
- ❑ test tightness ⇒ page 164
- ❑ Check fuel injection rate ⇒ page 165
- ❑ removing and installing ⇒ page 163



1.4 Air filter housing - Summary of components

1 - 3 Nm

2 - Air filter top part

3 - Sealing ring

4 - Non-return valve

5 - Hose

- ❑ to camshaft housing

6 - Air intake hose

7 - Spring strap clamp

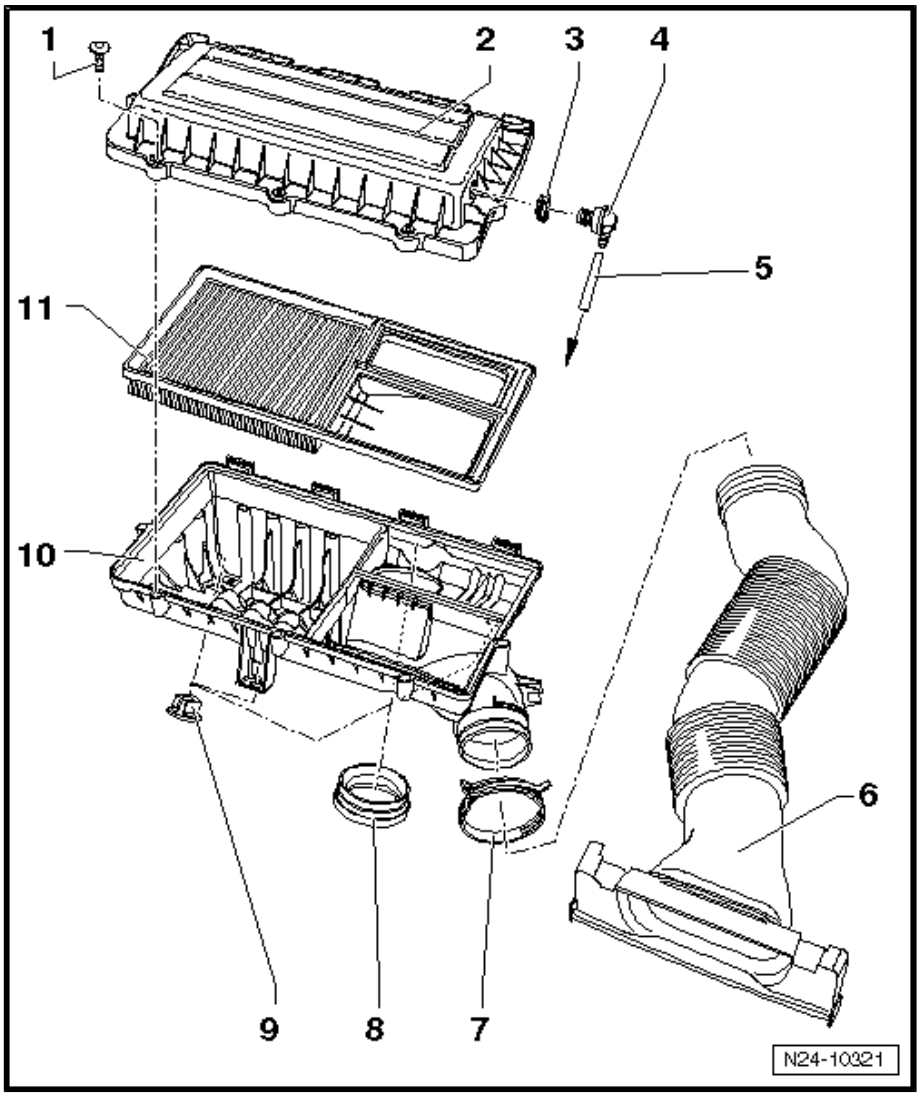
- ❑ to remove and install use pliers for spring strap clips

8 - Sealing ring

9 - Rubber grommet

10 - Air filter bottom part

11 - Air filter element



1.5 Removing and installing engine speed sender - G28-

The engine speed sender - G28- is integrated in the sealing flange on the flywheel side.

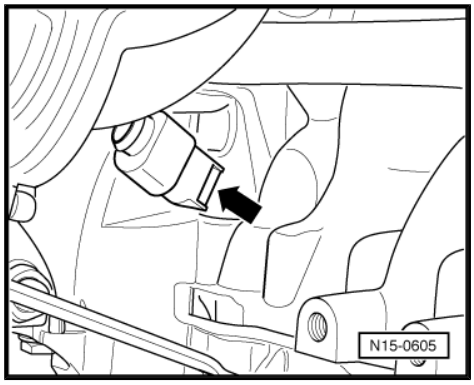
Special tools and workshop equipment required

- ♦ Socket insert 4 mm - T10370-
- ♦ Assembly device - T10118-

Removing

– Remove the noise insulation.

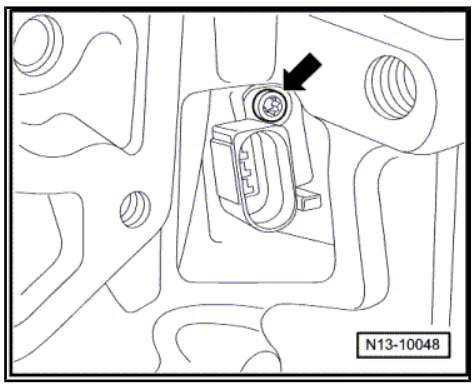
– Disconnect the plug -arrow- for the engine speed sender - G28- using the assembly device - T10118- .



Note

To disconnect the plug without using the assembly device - T10118- , carefully lever off the plug with a suitable screwdriver and at the same time lift up the release button with a thin wire hook.

– Release the fixing screw -arrow- and pull out the engine speed sender - G28- .



Install

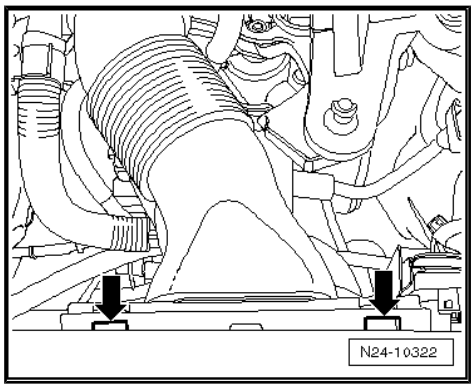
The installation of the engine speed sender - G28- occurs in reverse order, while paying attention to the following:

Tightening torque of holding down bolt: 5 Nm

1.6 Removing and installing air filter housing

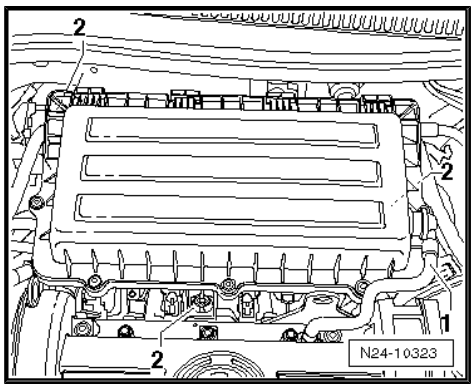
Removing

– Press the catches -arrows- and pull the inlet connection out of the intake air duct.



– Pull off hose -1- from non-return valve.

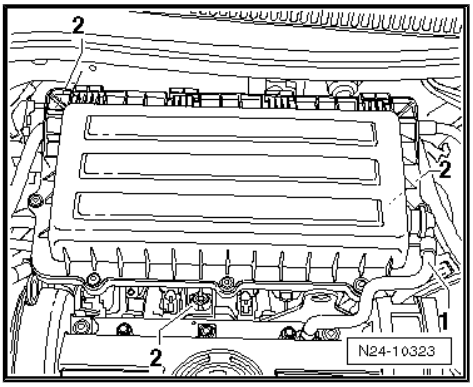
– Detach the air filter housing from the carrier bolts -2- upwards.



Install

– Installation is carried out in the reverse order.

– Press the air filter housing from the top onto the carrier bolts -2-.
– Fit the hose -1- onto the non-return valve.

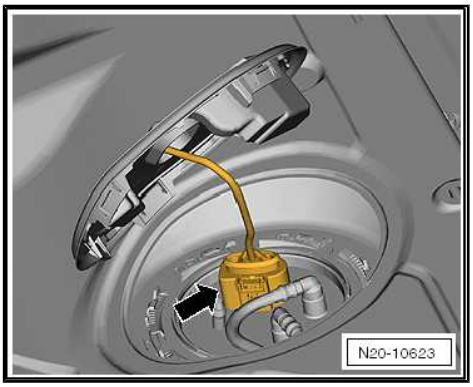


1.7 Removing and installing injection valves

Removing

Note

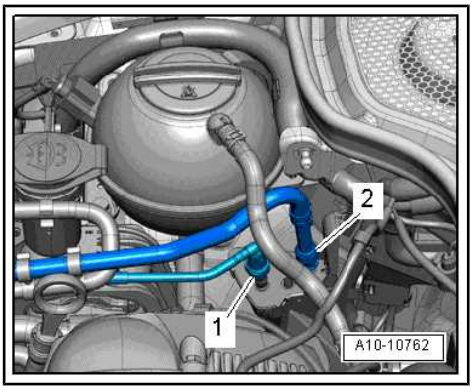
- *The fuel delivery unit is activated by switching on the ignition and the door contact switch of the driver door. For safety reasons, before opening the fuel system and in the event that the battery is not disconnected, the plug -arrow- must be disconnected from the fuel delivery unit or the fuse for the voltage supply of the fuel delivery unit must be pulled out according to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.*
- *Observe the safety instructions before starting fitting work ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 4 .*



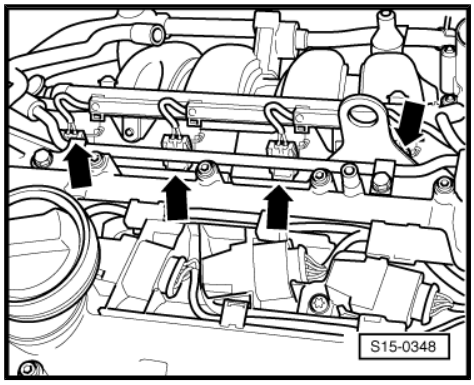
WARNING

The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

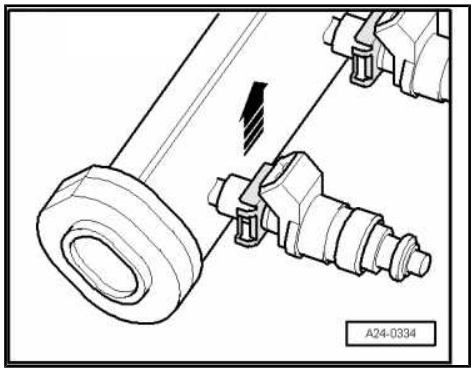
– Pull out the fuel feed line -2- and catch the fuel which flows out with a cleaning cloth. Unlock the quick coupling and disconnect ⇒ page 138 .
– Remove the air filter housing ⇒ page 162



– Disconnect plug -arrows- of all injection valves.
– Release the wiring loom of the injection valves.
– Unscrew the fuel distributor from the intake manifold.
– Remove the fuel distributor with injectors from the inlet manifold. (Hose remains connected).



– Detach clamp -arrow- and remove injection valve.



Install

The installation of the injection valves occurs in reverse order, while doing so pay attention to the following points:

- Replace the O-rings on all the injectors and moisten lightly with clean engine oil.
- Check perfect fit of the clamps.
- Fit the fuel rail with the installed injection valves to the intake manifold and tighten screws uniformly to 7 Nm.

– Venting air from the fuel system ⇒ page 148 .

1.8 Checking the tightness of the injection valves and the fuel injection rate

Special tools and workshop equipment required

- Remote control , e.g. -V.A.G 1348/3 A-
- Adapter cable , e.g. -V.A.G 1348/3-2-
- Hand multimeter , e.g. -V.A.G 1602-
- Measuring tool set , e.g. -V.A.G 1594 C-

1.8.1 Checking the tightness of the injection valves

WARNING

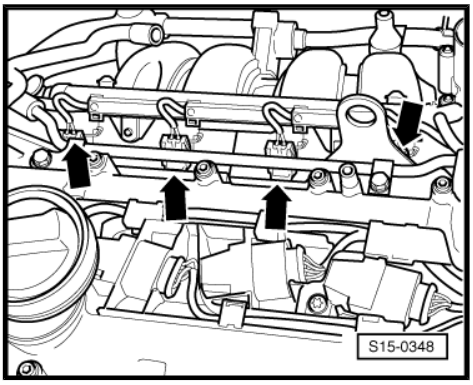
The fuel system is under pressure! Before opening the system lay cleaning cloths around the connection point. Reduce pressure by carefully releasing the connection point.

Test condition

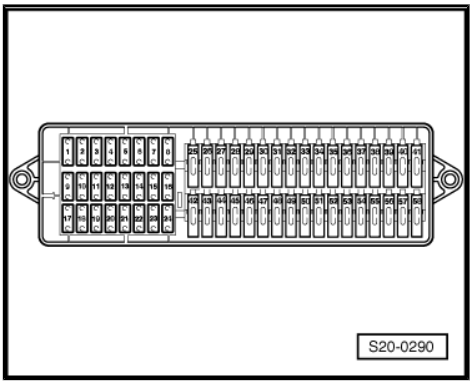
- The fuel pressure must be OK, test ⇒ page 146

– Remove the air filter housing ⇒ page 162 .

– Disconnect plug -arrows- of all injection valves.
– Release the wiring loom of the injection valves.
– Unscrew the fuel strip from the intake manifold.
– Remove the fuel strip with injectors from the intake manifold. (Hose remains connected).



– Remove fuse for protection of fuel pump from the fuse carrier below the dash panel according to current flow diagrams ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Connect the remote control -V.A.G 1348/3A- with the adapter cable combination from the adapter cable set between the relevant fuse sockets (de-energized) and to battery positive (+).



Note

This step is only intended to ensure that the fuel delivery unit runs when the engine is switched off.

– Activate remote control. The fuel pump must run.
– Test the tightness of the injection valves (visual inspection).
• With the fuel delivery unit running, maximum 2 drops may drip out per minute at each valve.

If the fuel loss is greater than this:

– Replace the leaky injector ⇒ page 163 .

Note

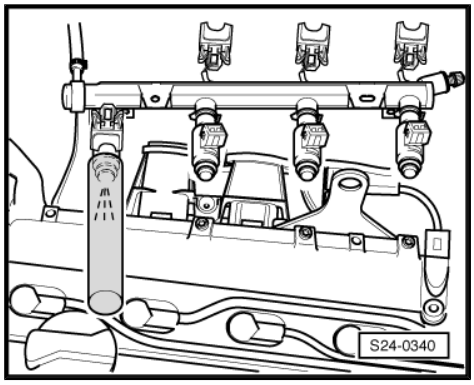
Always fit new seals.

1.8.2 Testing fuel injection rate

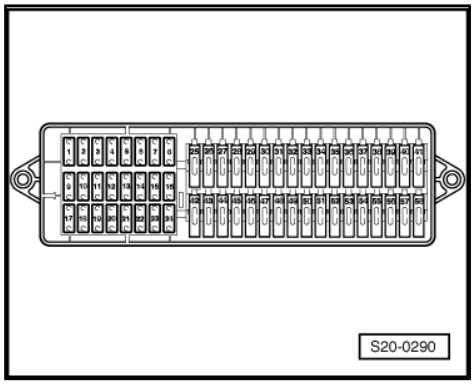
Test conditions

• The fuel pressure must be OK, test ⇒ page 146
• Injection valves must be installed in the fuel strip and the fuel line connected.
• Fuel temperature 15...20°C, fuel must be according to the valid standards.

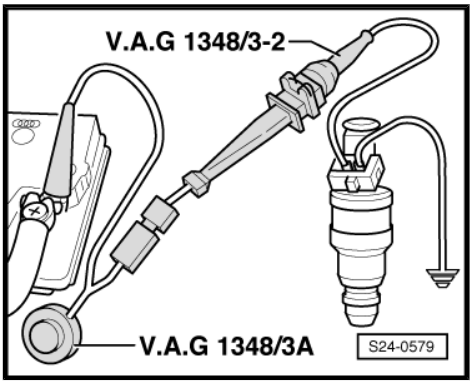
– Insert injector to be tested in a measuring glass , e.g. -V.A.G 1602- .
– Remove cover from the fuse holder.



– Remove fuse for protection of fuel pump from the fuse carrier below the dash panel according to current flow diagrams ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Connect the contact of the relevant fuse socket (de-energized) and the battery positive terminal (+) with cables from the measuring tool set. The fuel pump must run.



– Connect a contact of the injection valve on the engine mass using adapter cables from the mesuring tool set .
– Connect the second contact of the injection valve using an auxiliary cable to the remote control - V.A.G 1348/3 A- with the adapter cable e.g. - V.A.G 1348/3-2- .
– Connect alligator clip to battery positive (+).



Note

When testing the injection rate also check the jet formation.

– Activate the remote control - V.A.G 1348/3 A- for 30 seconds.
– Repeat the test at the other injectors in sequence. To do so always use a new measuring glass.
– After all the injectors have been operated, place the measuring glasses on a flat surface and compare the quantities of fuel injected.

Note

The injection rate must be the same for all injection valves.

Specified value: 84...99.0 ml (per injector).

If the measurement obtained for one or several injectors is below or above the specification:

– Replace the faulty injector ⇒ page 163 .

The injectors are installed in the reverse order for removal. Pay attention to the following:

♦ Replace the O-rings on all the injectors and moisten lightly with clean engine oil.
♦ Fit the fuel rail with the installed injection valves to the intake manifold and tighten screws uniformly to 7 Nm.

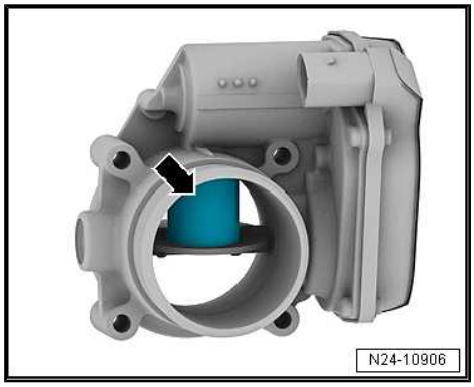
1.9 Clean throttle valve control unit - J338-

Note

♦ *If a new engine control unit - J623- is fitted, the throttle valve control unit - J338- must be adapted. The adaptation must only be carried out with a new or cleaned throttle valve control unit - J338- , because dirt/carbon deposits in the end stop of the throttle valve can lead to incorrect adaptation values.*
♦ *The throttle valve support must not be scratched when cleaning.*

– Remove the air filter housing ⇒ page 161 .
– Remove the throttle valve control unit ⇒ page 159 .

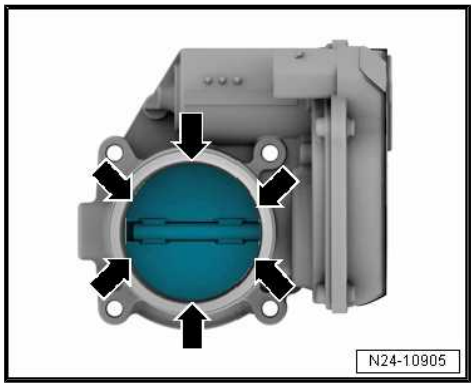
– Open the throttle valve manually and block the throttle valve in the opened position with a suitable object (e.g. plastic or wooden wedge)-arrow-.



WARNING

Acetone is easily inflammable. Please observe the accident prevention regulations and the safety instructions when handling easily inflammable fluids. Do not use compressed air when cleaning the throttle valve. Wear safety goggles and safety clothing, in order to avoid injuries and skin contact.

– Thoroughly clean the throttle valve support, in particular the area of the closed throttle valve -arrows-, with commercially available acetone in accordance with DIN 53247 and a paint brush.
– Wipe the throttle valve support with a non-fluffy cloth.
– Let the acetone dry off completely and re-install the cleaned throttle valve control unit.
– Adapting the engine control unit - J623- to the throttle valve control unit - J338- ⇒ Vehicle diagnostic tester.



2 Engine control unit

2.1 Removing and installing engine control unit - J623-

Note

- *Before replacing the engine control unit -J623- first the control unit identification and hence the coding of the current control unit must be interrogated with ⇒ Vehicle diagnostic tester.*
- *If replacing, the throttle valve unit -J338- must be cleaned before adapting a new control unit* *⇒ page 167* *.*

Removing

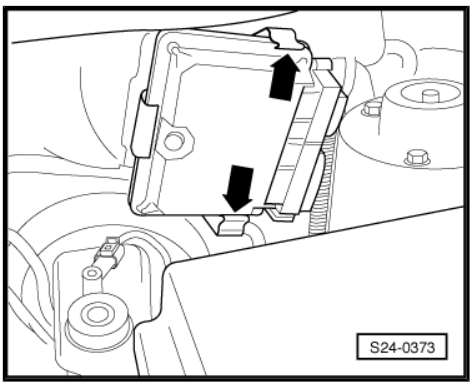
Special tools and workshop equipment required

- Body saw e.g. -V.A.G 1523/A-

Removing

– Switch off ignition.

– Press the bracket -arrows- outwards and pull the engine control unit out sideways.

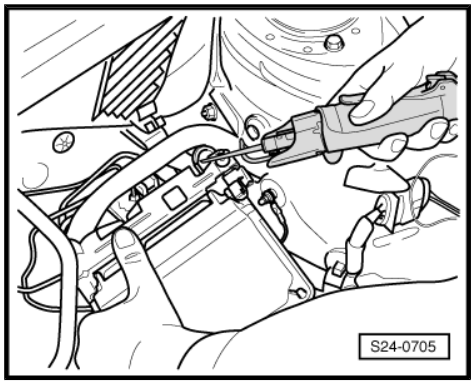


For vehicles with protective cover

– Cut with body saw a slot for the cross-head screwdriver in the heads of the pull-off screws.

Note

It must be sawed twice with the body saw, so that the slot is wide enough, in order to be able to unscrew the screws with a suitable screwdriver.



– Screw out the screws.
– Remove protective cover of control unit.

For all vehicles

– Disconnect plug at engine control unit and unplug.

Install

Connect both plugs and lock.

For vehicles with protective cover

– Insert protective cover and fix with new pull-off screws at engine control unit.

For all vehicles

Insert the control unit into the pressure retaining clips on the body.

– When replacing the control unit, adapt the engine control unit ⇒ Vehicle diagnostic tester.

26 – Exhaust system

1 Removing and installing parts of the exhaust system

Note

- *When performing installation work on the exhaust system, make sure the exhaust system is not mounted under tension and has adequate clearance from the vehicle body. If necessary slacken the clamping sleeves and align the silencer and exhaust pipes so as to create adequate clearance between these components and the vehicle body, and that the weight of the exhaust system is evenly distributed over the hangers.*
- *Always replace self-locking nuts.*

1.1 Exhaust manifold and pre-exhaust pipe - Summary of components

Fabia II, Roomster with engine identification characters BTS

1 - Heat shield

2 - 10 Nm

3 - Lambda probe upstream of catalytic converter - G39- , 50 Nm

- ❑ the thread of new lambda probes must be coated with assembly paste
- ❑ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the paste must not get into the slots of the probe body
- ❑ 4-pin plug in holder at starter

4 - Exhaust manifold

- ❑ with pre-catalytic converter
- ❑ protect against shocks and blows

5 - Gasket

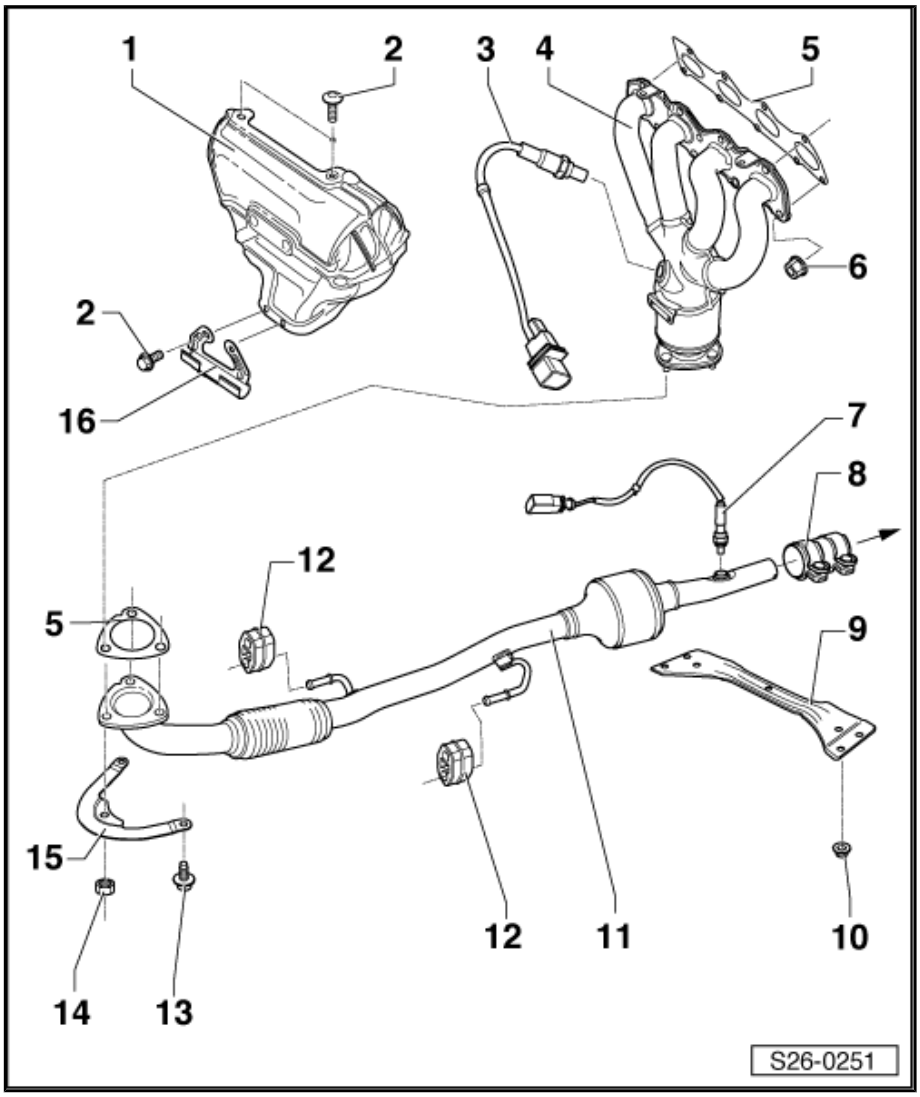
- ❑ replace

6 - 25 Nm

- ❑ Coat stud bolts on the exhaust manifold with hot bolt paste - G 052 112 A3- before installing

7 - Lambda probe downstream of catalytic converter - G130- , 50 Nm

- ❑ the thread of new lamb-



da probes must be coated with assembly paste

- ❑ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the paste must not get into the slots of the probe body
- ❑ 4-pin plug in the cover below the right underfloor trim panel

8 - Clamping sleeve, 23 Nm

- ❑ Before tightening, align the exhaust system in cold condition free of stress ⇒ page 181
- ❑ Tighten screwed connections uniformly

9 - Tunnel bridge (strut)

10 - 20 Nm

11 - Pre-exhaust pipe

- ❑ with catalytic converter
- ❑ do not twist decoupling element more than 10° - risk of damage
- ❑ Secure decoupling element with transport security -T10403-
- ❑ Remove the protection for the decoupling element on the spare part as late as possible
- ❑ Align exhaust system free of stress ⇒ page 181

12 - Retaining strap

- ❑ replace if damaged

13 - 20 Nm

14 - 40 Nm

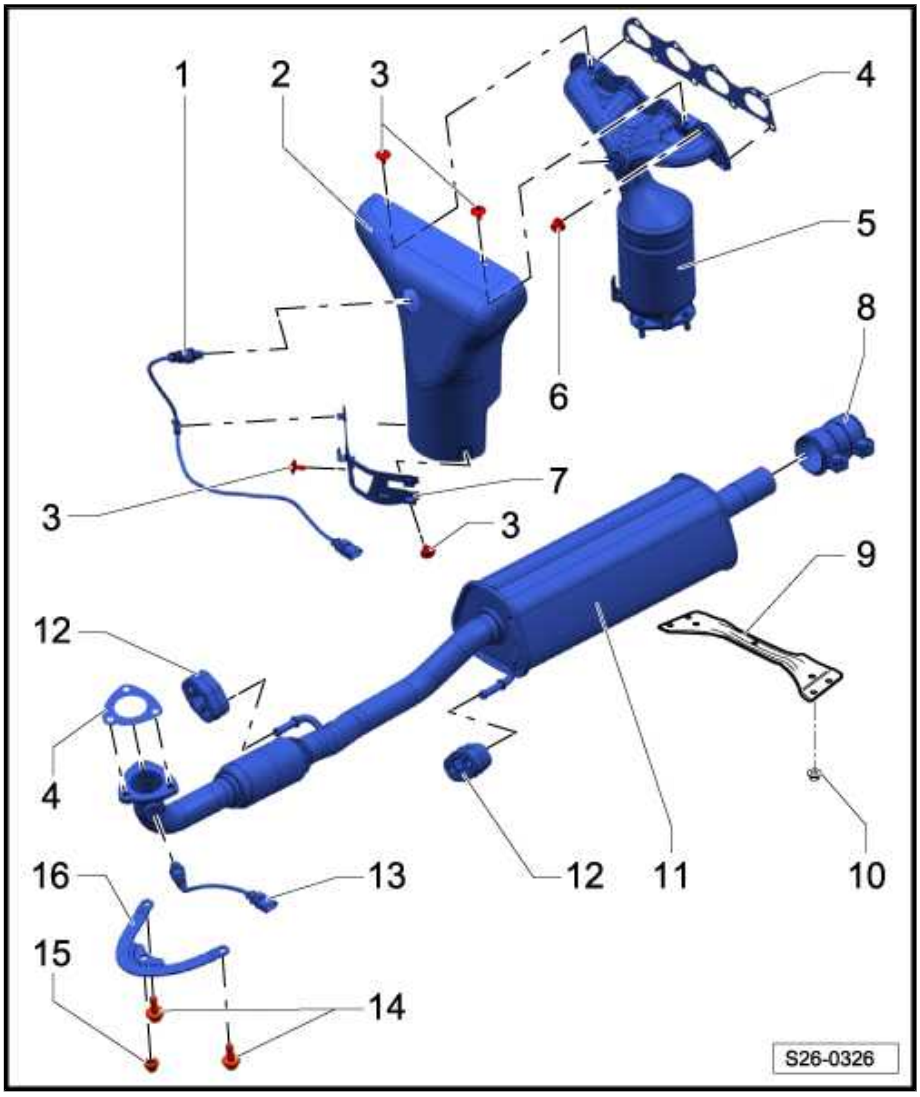
- ❑ replace
- ❑ Coat stud bolts of pre-catalytic converter with hot bolt paste - G 052 112 A3- before installing.

15 - Support

16 - Wiring harness bracket

1.2 Exhaust manifold and pre-exhaust pipe - Summary of components

Fabia II, Roomster with engine identification characters CFNA



1 - Lambda probe upstream of catalytic converter - G39- , 50 Nm

- ❑ the thread of new lambda probes must be coated with assembly paste
- ❑ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the paste must not get into the slots of the probe body
- ❑ 4-pin plug in holder at starter

2 - Heat shield

3 - 10 Nm

4 - Gasket

- ❑ replace

5 - Exhaust manifold

- ❑ with catalytic converter
- ❑ protect against shocks and blows

6 - 25 Nm

- ❑ Coat stud bolts on the exhaust manifold with hot bolt paste - G 052 112 A3- before installing

7 - Wiring harness bracket

8 - Clamping sleeve, 23 Nm

- ❑ Before tightening, align the exhaust system in cold condition free of stress ⇒ page 181
- ❑ Tighten screwed connections uniformly

9 - Tunnel bridge (strut)

10 - 20 Nm

11 - Pre-exhaust pipe

- ❑ Do not damage the wire mesh of the decoupling element.
- ❑ do not twist decoupling element more than 10° - risk of damage
- ❑ Secure decoupling element with transport security -T10403-
- ❑ Remove the protection for the decoupling element on the spare part as late as possible
- ❑ Align exhaust system free of stress ⇒ page 181

12 - Retaining strap

- ❑ replace if damaged

13 - Lambda probe downstream of catalytic converter - G130- , 50 Nm

- ❑ the thread of new lambda probes must be coated with assembly paste
- ❑ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the paste must not get into the slots of the probe body
- ❑ 4-pin plug in the cover below the right underfloor trim panel

14 - 20 Nm

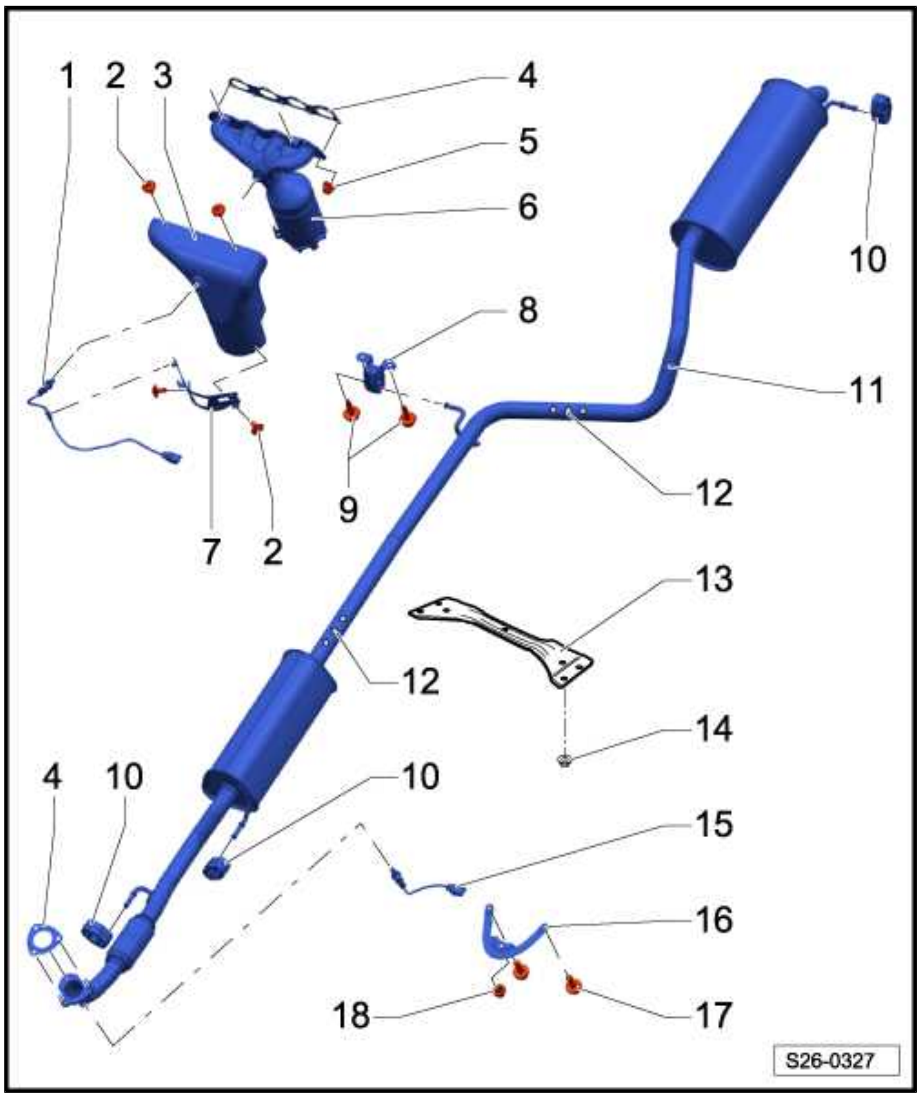
15 - 40 Nm

- ❑ replace
- ❑ Coat stud bolts of pre-catalytic converter with hot bolt paste - G 052 112 A3- before installing.

16 - Support

1.3 Exhaust gas system - Summary of components

Fabia II with engine identification characters CLSA



1 - Lambda probe upstream of catalytic converter - G39- , 50 Nm

- ❑ the thread of new lambda probes must be coated with assembly paste
- ❑ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the paste must not get into the slots of the probe body
- ❑ 4-pin plug in holder at starter

2 - 10 Nm

3 - Heat shield

4 - Gasket

- ❑ replace

5 - 25 Nm

- ❑ Coat stud bolts on the exhaust manifold with hot bolt paste - G 052 112 A3- before installing

6 - Exhaust manifold

- ❑ with catalytic converter
- ❑ protect against shocks and blows

7 - Wiring harness bracket

8 - Retaining strap

- ❑ Pay attention to the part number
- ❑ replace if damaged

9 - 23 Nm

10 - Retaining strap

- ❑ replace if damaged

11 - Exhaust System

- ❑ do not twist decoupling element more than 10° - risk of damage
- ❑ for first equipment a building unit, replace individually when carrying out repairs
- ❑ Secure decoupling element with transport security -T10403-

- ❑ Remove the protection for the decoupling element on the spare part as late as possible
- ❑ Align exhaust system free of stress ⇒ page 181

12 - Separation point

- ❑ for repairs
- ❑ marked with recesses around the circumference

13 - Tunnel bridge (strut)

14 - 20 Nm

15 - Lambda probe downstream of catalytic converter - G130- , 50 Nm

- ❑ the thread of new lambda probes must be coated with assembly paste
- ❑ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the paste must not get into the slots of the probe body
- ❑ 4-pin plug in the cover below the right underfloor trim panel

16 - Support

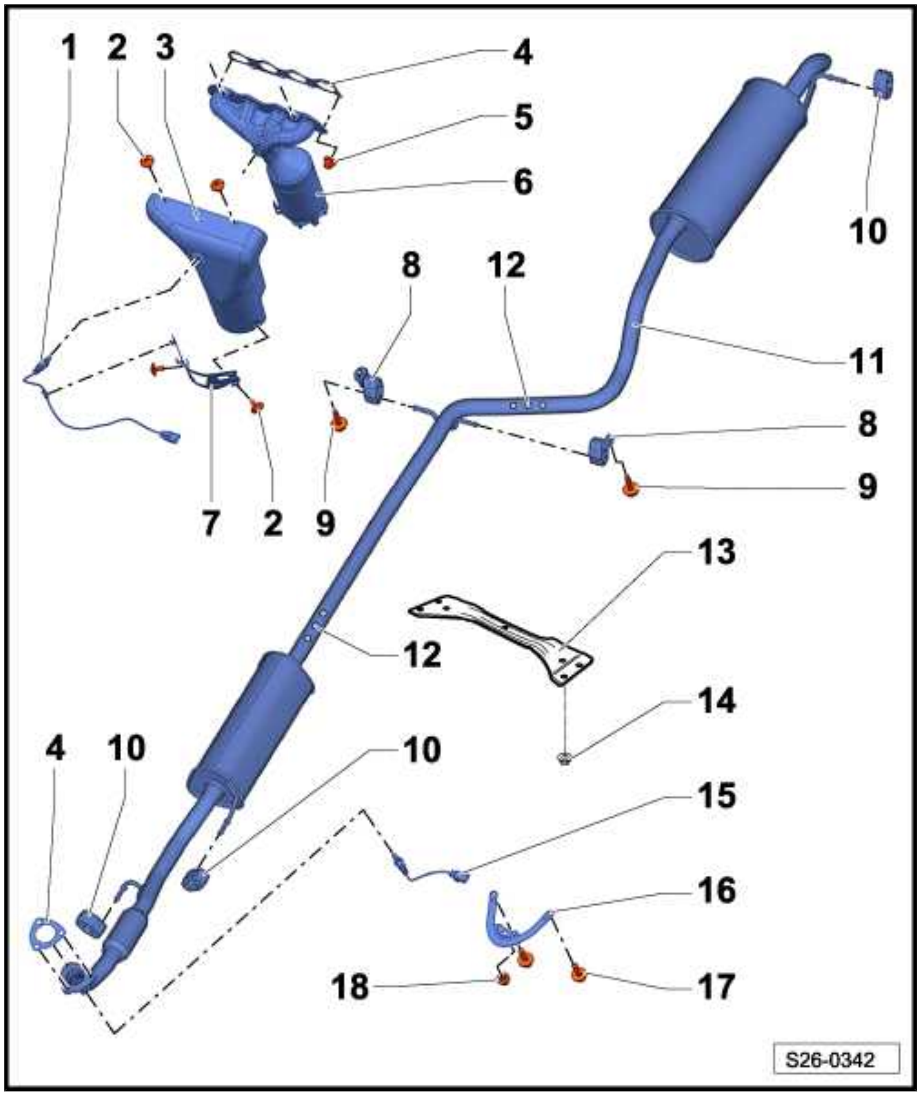
17 - 20 Nm

18 - 40 Nm

- ❑ replace
- ❑ Coat stud bolts of catalytic converter with hot bolt paste - G 052 112 A3- before installing

1.4 Exhaust gas system - Summary of components

Rapid with engine identification characters CLSA, CFNA



1 - Lambda probe upstream of catalytic converter - G39- , 50 Nm

- ❑ the thread of new lambda probes must be coated with assembly paste
- ❑ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the paste must not get into the slots of the probe body
- ❑ 4-pin plug in holder at starter

2 - 10 Nm

3 - Heat shield

4 - Gasket

- ❑ replace

5 - 25 Nm

- ❑ Coat stud bolts on the exhaust manifold with hot bolt paste - G 052 112 A3- before installing

6 - Exhaust manifold

- ❑ with catalytic converter
- ❑ protect against shocks and blows

7 - Wiring harness bracket

8 - Retaining strap

- ❑ Pay attention to the part number
- ❑ replace if damaged

9 - 23 Nm

10 - Retaining strap

- ❑ replace if damaged

11 - Exhaust System

- ❑ for first equipment a building unit, replace individually when carrying out repairs
- ❑ do not twist decoupling element more than 10° - risk of damage
- ❑ Secure decoupling element with transport security -T10403-
- ❑ Remove the protection for the decoupling element on the spare part as late as possible
- ❑ Align exhaust system free of stress ⇒ page 181

12 - Separation point

- ❑ for repairs
- ❑ marked with recesses around the circumference

13 - Tunnel bridge (strut)

14 - 20 Nm

15 - Lambda probe downstream of catalytic converter - G130- , 50 Nm

- ❑ the thread of new lambda probes must be coated with assembly paste
- ❑ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the paste must not get into the slots of the probe body
- ❑ 4-pin plug in the cover below the right underfloor trim panel

16 - Support

17 - 20 Nm

18 - 40 Nm

- ❑ replace
- ❑ Coat stud bolts of pre-catalytic converter with hot bolt paste - G 052 112 A3- before installing.

1.5 Middle and rear silencer - Summary of components

Fabia II with engine identification characters BTS

1 - Middle and rear silencer

- ❑ for first equipment a building unit
- ❑ Replace individually when carrying out repairs
- ❑ Separation point ⇒ page 180
- ❑ Align exhaust system free of stress ⇒ page 181

2 - Separation point

- ❑ for repairs
- ❑ marked with recesses around the circumference

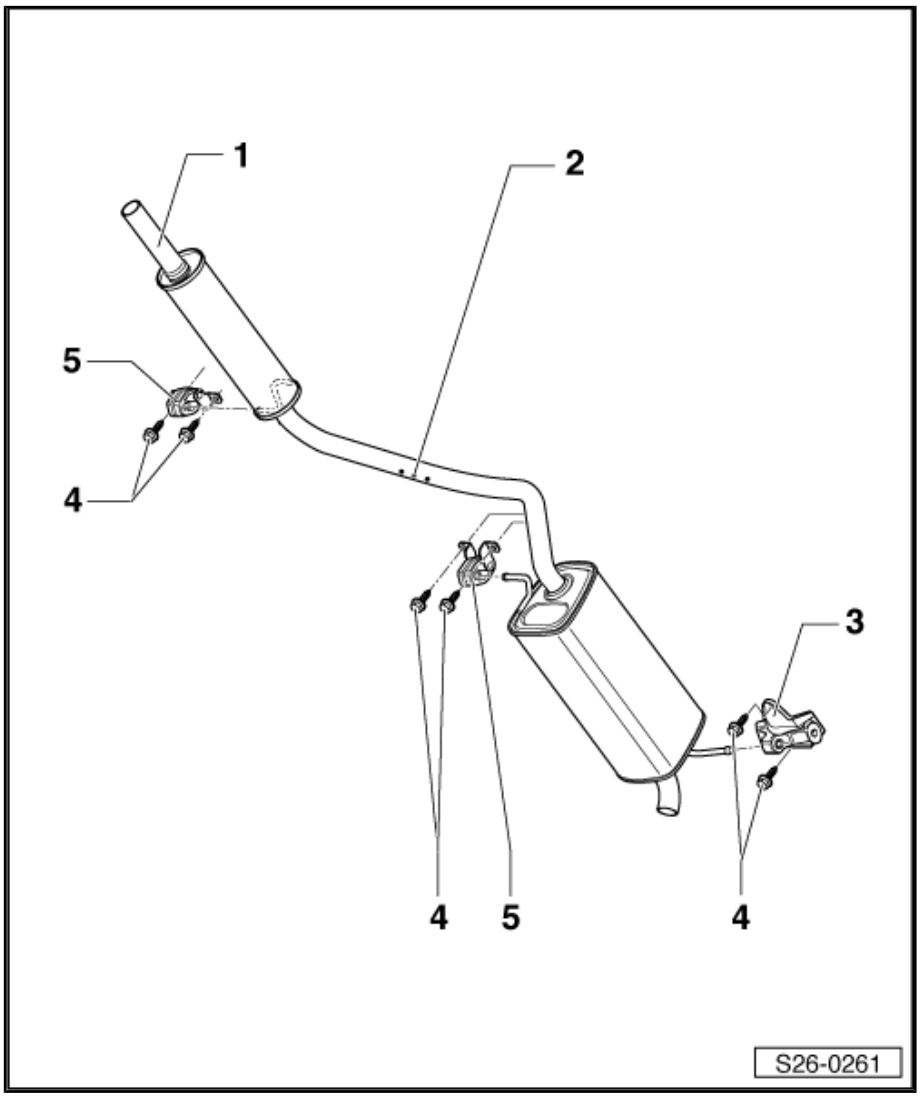
3 - Rear retaining strap

- ❑ Pay attention to the part number
- ❑ replace if damaged

4 - 23 Nm

5 - Retaining strap

- ❑ Pay attention to the part number
- ❑ replace if damaged



1.6 Middle and rear silencer - Summary of components

Roomster with engine identification characters BTS

1 - The middle silencer

- ❑ for first equipment building unit with rear silencer
- ❑ Replace individually when carrying out repairs
- ❑ Separation point ⇒ page 180
- ❑ Align exhaust system free of stress ⇒ page 181

2 - Retaining strap

- ❑ Pay attention to the part number
- ❑ replace if damaged

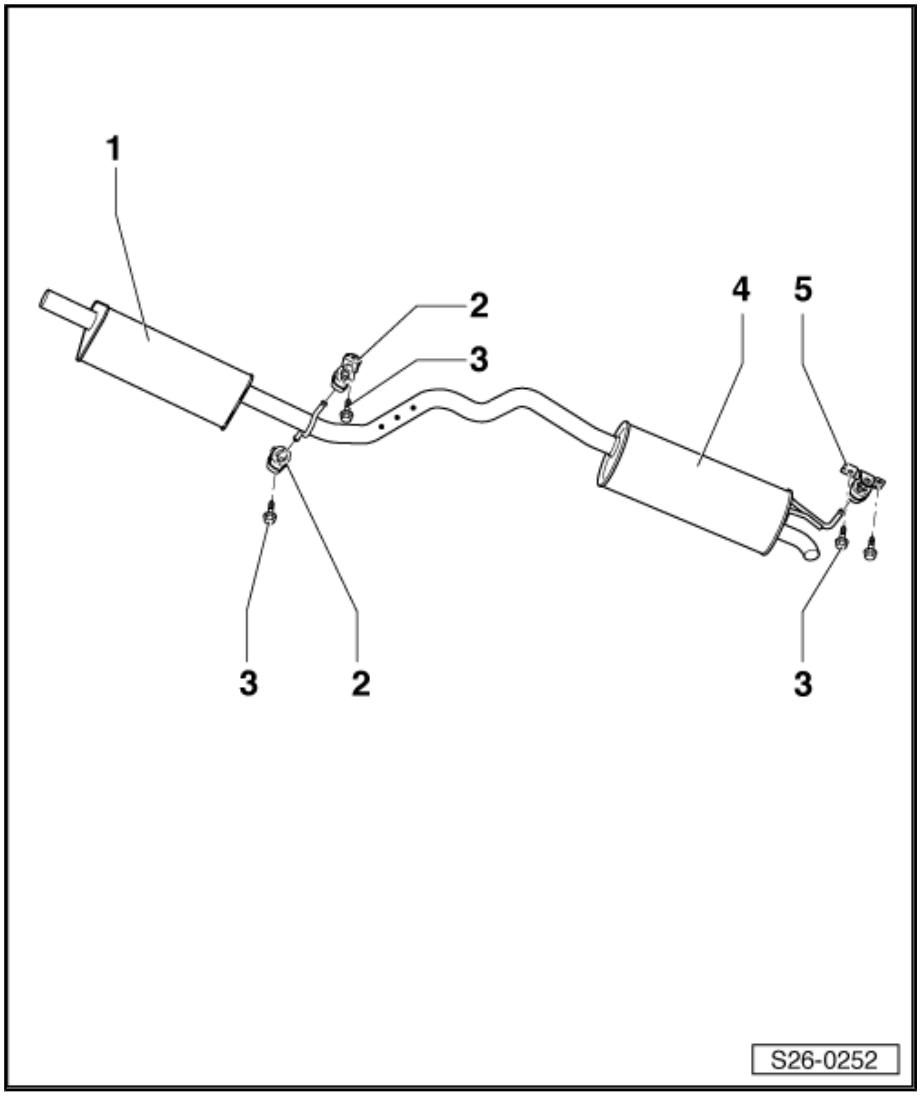
3 - 23 Nm

4 - Rear silencer

- ❑ for first equipment building unit with middle silencer
- ❑ Replace individually when carrying out repairs
- ❑ Separation point ⇒ page 180
- ❑ Align exhaust system free of stress ⇒ page 181

5 - Rear retaining strap

- ❑ Pay attention to the part number
- ❑ replace if damaged



1.7 Middle and rear silencer - Summary of components

Fabia II with engine identification characters CFNA

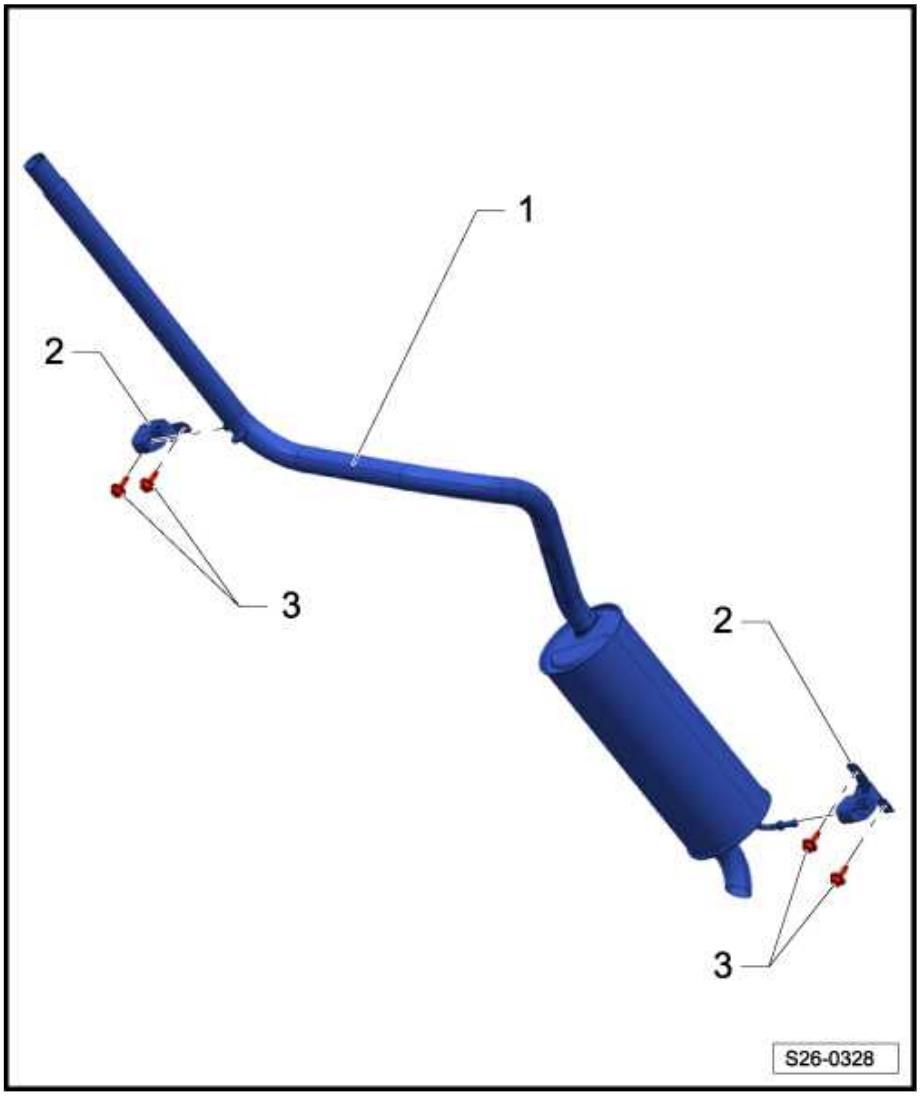
1 - Middle and rear silencer

- ❑ Align exhaust system free of stress
⇒ page 181

2 - Retaining strap

- ❑ Pay attention to the part number
- ❑ replace if damaged

3 - 23 Nm



1.8 Middle and rear silencer - Summary of components

Roomster with engine identification characters CFNA

1 - Middle and rear silencer

- ❑ for first equipment building unit with rear silencer
- ❑ Replace individually when carrying out repairs
- ❑ Separation point ⇒ page 180
- ❑ Align exhaust system free of stress ⇒ page 181

2 - 23 Nm

3 - Retaining strap

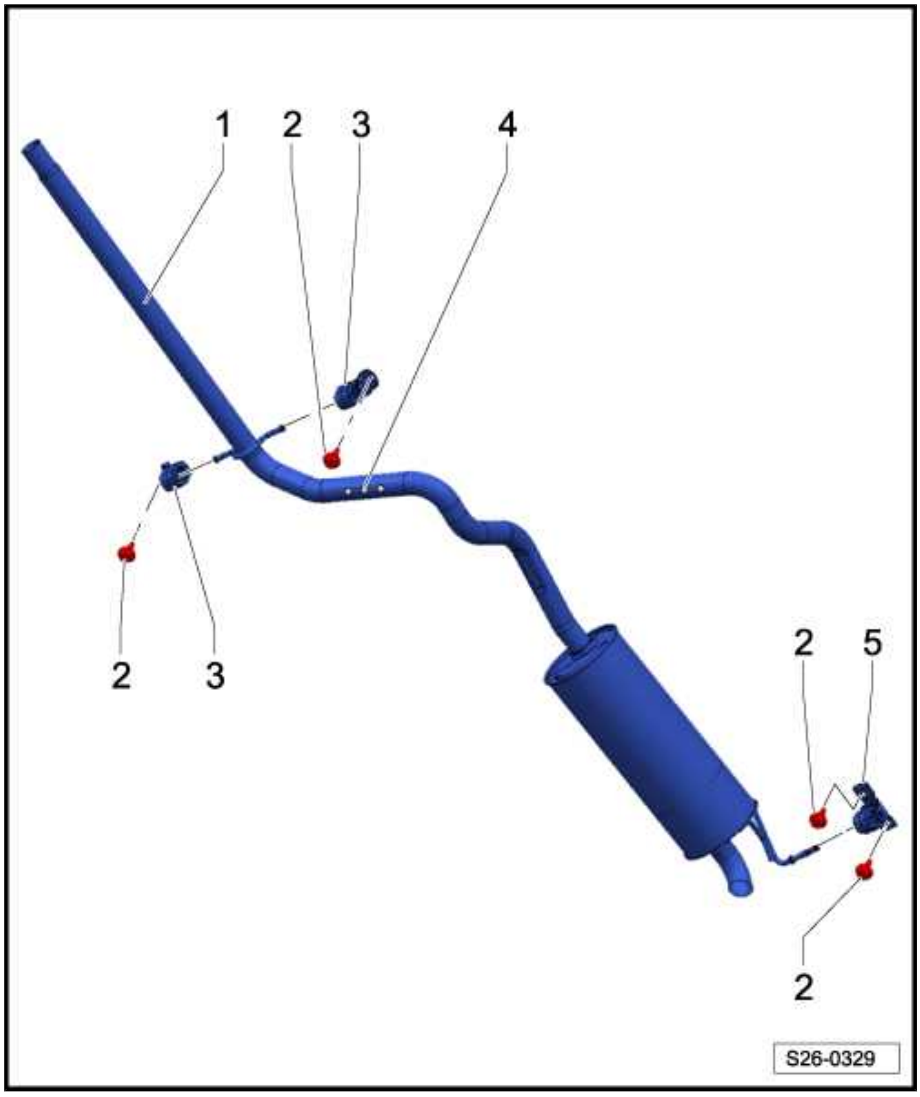
- ❑ Pay attention to the part number
- ❑ replace if damaged

4 - Separation point

- ❑ for repairs
- ❑ marked with recesses around the circumference

5 - Rear retaining strap

- ❑ Pay attention to the part number
- ❑ replace if damaged



1.9 Replacing middle or rear silencer

- A separation point is provided for repair purposes for replacing the front silencer, if necessary the rear silencer.
- The separation point is marked by indentation on the circumference of the exhaust pipe.

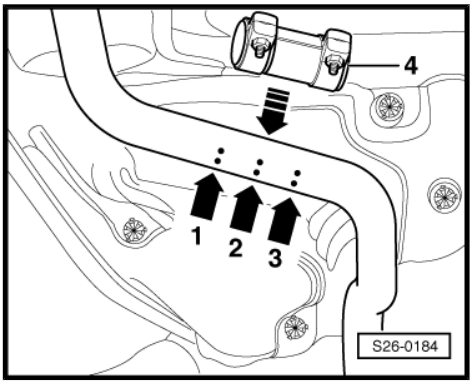
Special tools and workshop equipment required

- Body saw e.g. -V.A.G 1523-
- Protective goggles

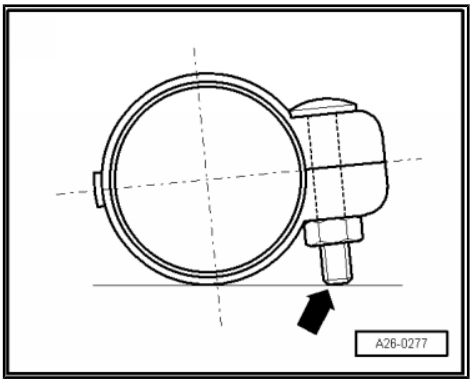
WARNING

Wear safety goggles.

– Separate exhaust pipe at right angles at the separation point -arrow 2-.
– When installing, position clamping sleeve -4- between the side markings -arrow 1- and -arrow 3-.



– Install the clamping sleeve in such a way that the ends of the screws do not protrude beyond the bottom edge of the clamping sleeve -arrow-.
– Align exhaust system in cold condition free of stress ⇒ page 181 .



1.10 Aligning exhaust system free of stress

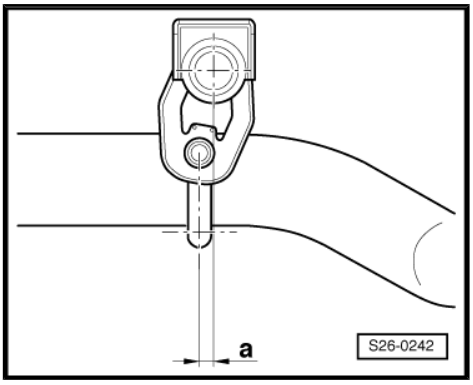
Condition

• The exhaust system is aligned when cold.

– Slacken clamping sleeve between pre-exhaust pipe and middle and rear silencer.

Vehicles Fabia II, Roomster

– Push the middle and rear silencer forward until the dimension -a- = 3 ... 7 mm is obtained on the retaining strap/middle silencer.



Vehicles Rapid

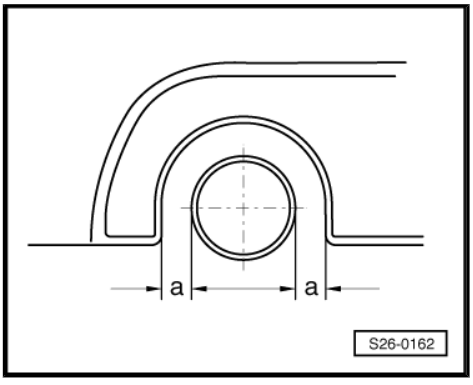
– Push the middle and rear silencer forward until the dimension -a- = 13 ... 17 mm is obtained on the retaining strap/rear silencer.

Continued for all vehicles

– Tighten nuts of clamping sleeve to 23 Nm.

Align exhaust tailpipe

– Align rear silencer in such a way that there is an equal distance -a- right and left between bumper opening and exhaust tailpipe.
– For centering the exhaust tailpipe, if necessary loosen the suspension of the rear silencer.



1.11 Inspecting the exhaust system for leak-tightness

– Start engine and run in idle.

– Seal off exhaust tailpipe for the duration of the leak check (e.g. with cloths or plugs).

– Inspect all the connection points (cylinder head/exhaust manifold/pre-exhaust pipe etc.) for leaktightness by listening and visual inspection.

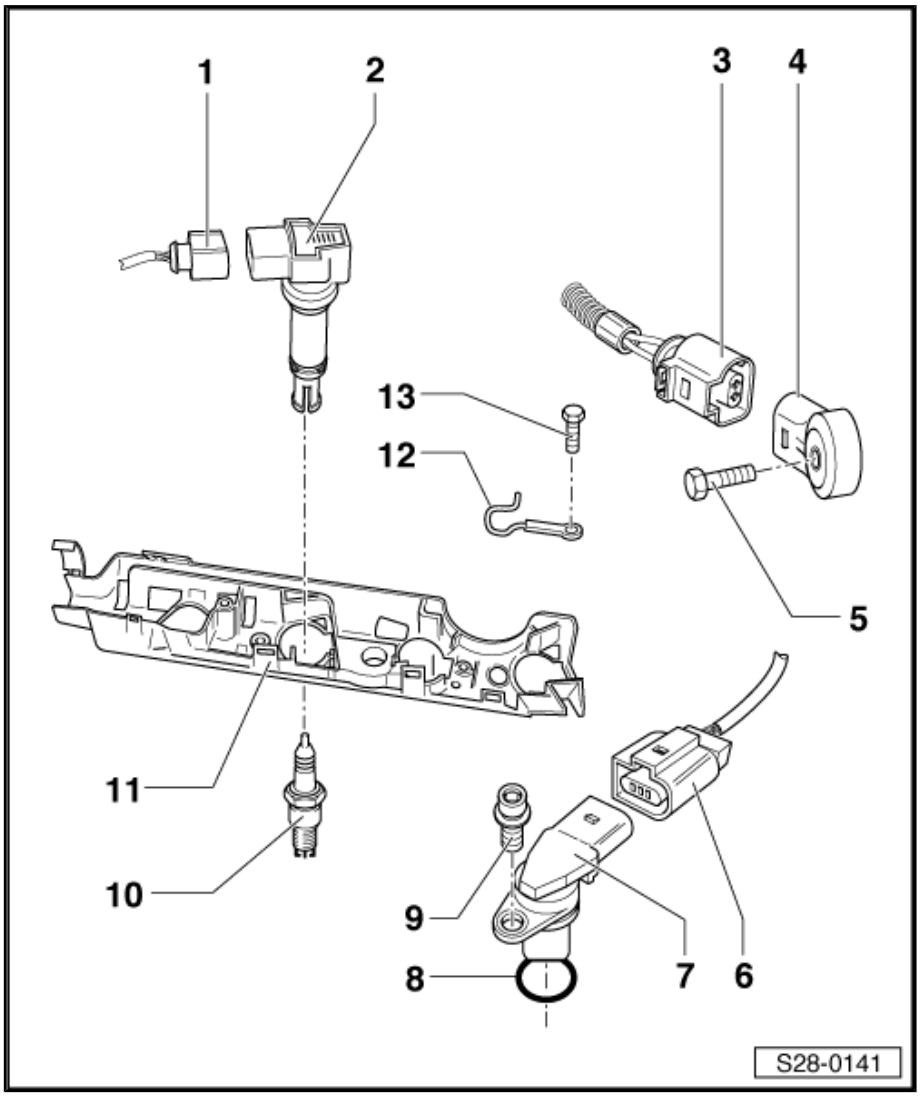
– Eliminate any leak found.

28 – Ignition system

1 Ignition system

General notes on the ignition system ⇒ page 5 .

1.1 Ignition system - Summary of components



1 - Connector

- ❑ black, 4 pin
- ❑ release with assembly device - T10118-

2 - Ignition coils with power output stage -N70- , -N127- , -N291- and -N292-

- ❑ removing and installing ⇒ page 184

3 - Connector

- ❑ black, 2 pin
- ❑ Knock sensor 1 - G61-
- ❑ contacts gold-plated

4 - Knock sensor 1 - G61-

- ❑ Contacts of connector gold-plated

5 - 20 Nm

- ❑ the tightening torque influences the knock sensor function

6 - Connector

- ❑ black, 3 pin
- ❑ for hall sender - G40-

7 - Hall sender - G40-

- ❑ on camshaft housing ⇒ page 52

8 - O-ring

- ❑ replace if damaged

9 - 10 Nm

10 - Spark plug, 30 Nm

- ❑ Pay attention to part number, model and electrode spacing

♦ ⇒ Maintenance ; Booklet Fabia II

♦ ⇒ Maintenance ; Booklet Roomster

♦ ⇒ Maintenance ; Booklet Rapid

- ❑ use spark plug wrench, e.g. - 3122B- for removing and installing

11 - Cable guide

12 - Earth connection

13 - 10 Nm

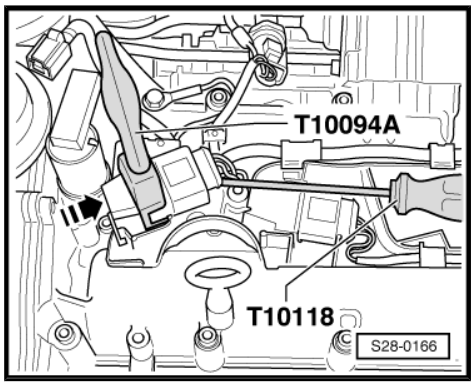
- ❑ only loosen or tighten with the ignition off

1.2 Removing and installing ignition coils with power output stages

Special tools and workshop equipment required

- Assembly device - T10118-
- Extractor - T10094 A-

Removing



– Position extractor - T10094 A- onto the ignition coil with power output stage in the -direction of the arrow-.
– Slightly pull ignition coil with power output stage out of the cylinder head.
– Position the assembly device - T10118- as shown.
– Carefully release the connector catch and unplug the connector.
– Remove the disconnected ignition coil with power output stage from the cylinder head.

Install

– Position extractor - T10094 A- onto the ignition coil with power output stage and insert into the hole on the cylinder head.
– Push connector onto the ignition coil with power output stage until it audibly locks into place.
– Press the ignition coil with power output stage with extractor - T10094 A- onto the spark plug in the cylinder head.