Volkswagen 6 Cylinder Injection Engine Individual
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Workshop Manual

Golf 2004 ➤

6-cylinder injection engine VW Individual									
Engine ID	CBR A								

Edition 10.2009

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

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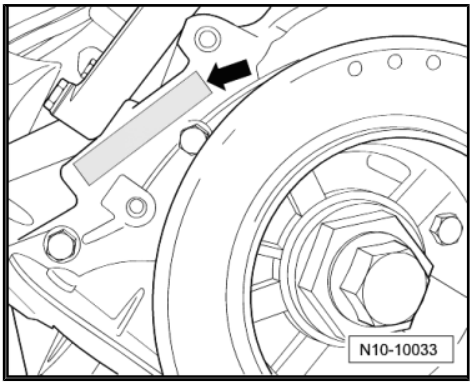
00 – Technical data

1 Engine number

The engine number (“engine code” and “serial number”) is located next to the vibration damper -arrow- on the cylinder block.

The engine number consists of up to nine characters (alphanumeric). The first part (maximum 3 characters) makes up the "engine code", and the second part (6 characters), the "serial number". If more than 999,999 engines with the same engine code are produced, the first of the six characters is replaced with a letter.

Additionally, a sticker with “engine code” and “serial number” is attached to the camshaft cover.



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2 Engine data

Engine code		CBRA
Manufactured		06.07 ▸
Emissions fulfil		LEV2 standard
Cylinder arrangement		VR[1)]
Cylinder angle		15.0°
Capacity	cm^3	3189
Output	kW at rpm	184/6300
Torque	Nm at rpm	320/2500 … 3000
Bore	∅ mm	84.0
Stroke	mm	95.9
Compression ratio		10.85
Valves per cylinder		4
RON	min.	98 unleaded[2)]
Injection, ignition		Motronic ME7.1.1
Firing order		1-5-3-6-2-4
Knock control		2 knock sensors
Lambda control		4 probes
Catalytic converter		yes
Exhaust gas recirculation		no
Turbocharging/supercharging		no
Secondary air system		yes
Electronic power control		yes
Variable intake manifold		yes
Variable valve timing		yes [3)]
Leak diagnosis system		yes

[1)] VR = V-arrangement in compact in-line design.

[2)] In exceptional circumstances min. 95 RON, however with reduced performance.

[3)] Two independently variable camshafts.

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10 – Removing and installing engine

1 Removing and installing engine

Removing engine ⇒ page 4 .

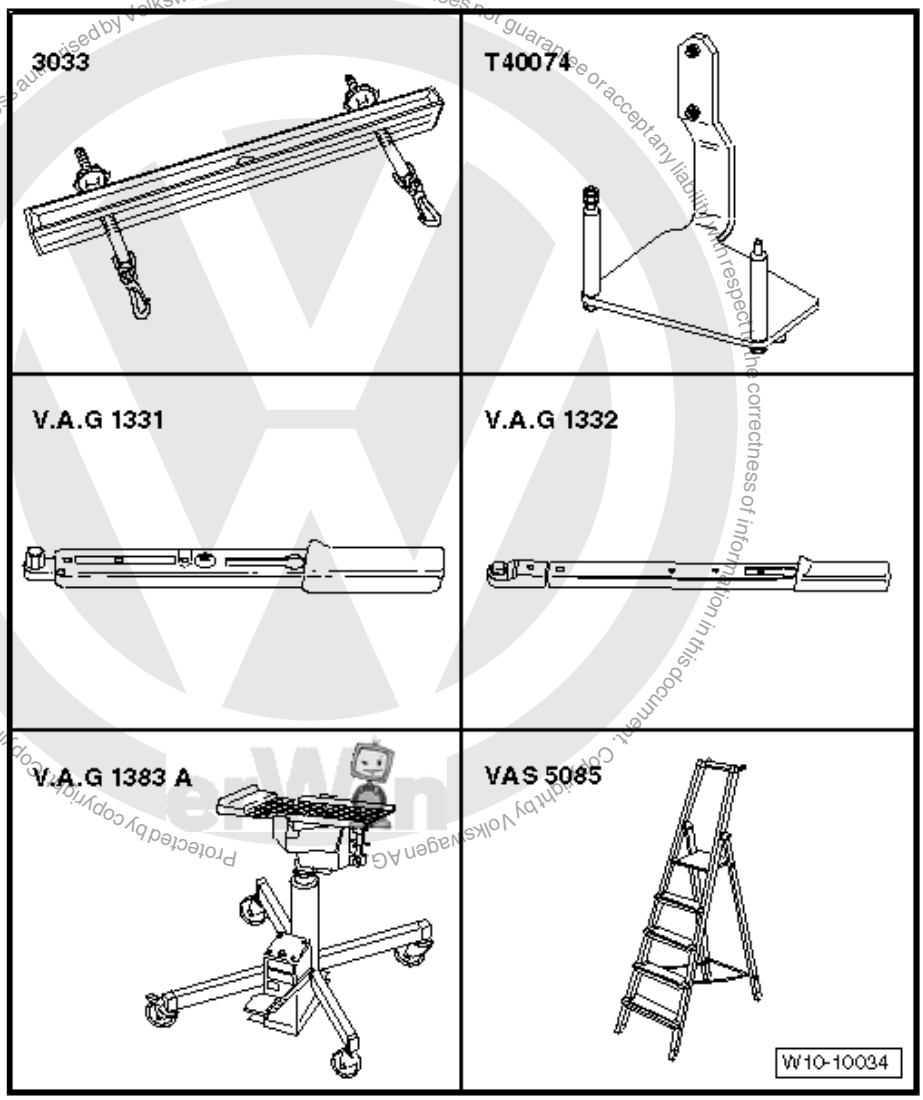
Securing engine to assembly stand ⇒ page 10 .

Installing engine ⇒ page 11 .

Specified torques for assembly mountings ⇒ page 13 .

Special tools and workshop equipment required

- Lifting tackle -3033-
- Engine bracket -T40074-
- Torque wrench -V.A.G 1331-
- Torque wrench -V.A.G 1332-
- Engine and gearbox jack -V.A.G 1383 A-
- Stepladder -VAS 5085-



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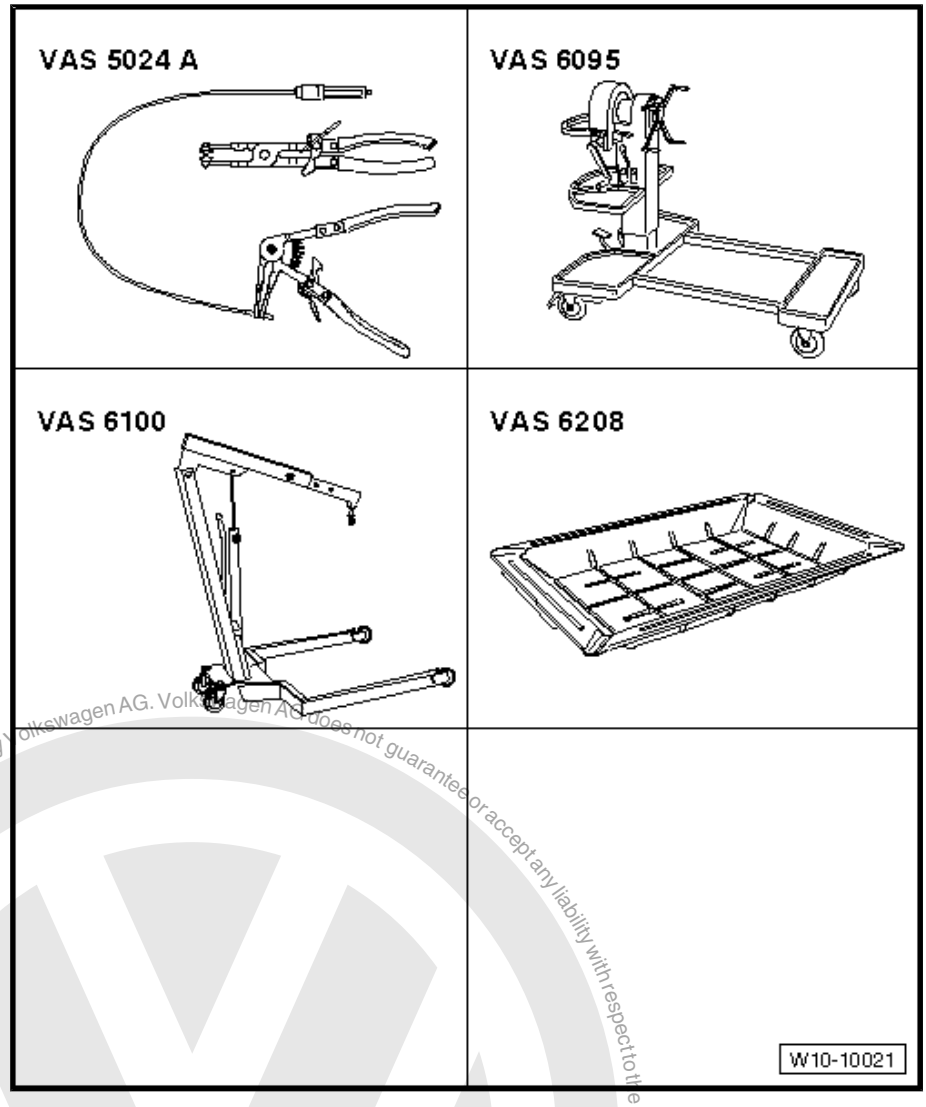
- Spring-type clip pliers -VAS 5024 A-
- Engine and gearbox support -VAS 6095- with engine bracket -3269-
- Workshop crane -VAS 6100-
- Drip tray -V.A.G 1306- or drip tray -VAS 6208-



Not illustrated:

- Container for removed parts -V.A.G 1698-
- Engine bung set -VAS 6122-
- Cable ties
- High-temperature grease -G 052 133 A2-

1.1 Removing engine

The engine is removed downwards with gearbox.

– Before removing, read the fault memories of all control units ⇒ Vehicle diagnosis, testing and information system VAS 5051; “Guided fault finding”.

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Note

- *All cable ties which are opened or cut through when engine is removed must be replaced in the same position when engine is installed.*
- *Leave ignition key in ignition lock to prevent steering lock from engaging.*
- *It is advisable to remove the front wheels before beginning engine removal. The vehicle can then be lowered on hoist until the brake disc splash plates are just above the floor. This provides the most ergonomic working position regarding accessibility of engine compartment components.*
- *Some components cannot be removed, or removed only with difficulty, with the engine installed. Therefore, you should determine all defective components before removing engine and renew them while engine is removed.*
- *To prevent damage to removed components, place them in the container for removed parts -V.A.G 1698- .*

Caution

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- ***Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant and refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.***
- ***To avoid damage to lines/wiring, ensure sufficient clearance to all moving or hot components.***

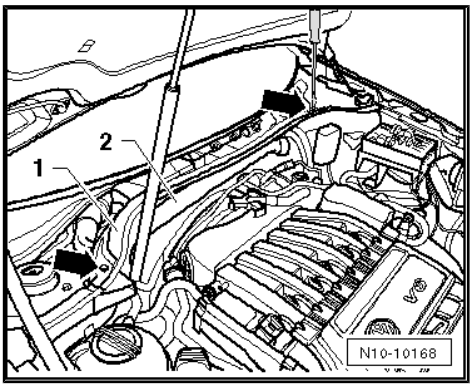
– Disconnect earth strap at battery with ignition switched off ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and reconnecting battery .

– Completely remove air filter together with connecting hose to throttle valve module -J338- ⇒ page 174 .

– Remove bracket from air filter.

– Remove wiper arms, plenum chamber cover and plenum chamber bulkhead: ⇒ Electrical system; Rep. Gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .

– Unscrew securing bolts -arrows- of plenum chamber bulkhead -1- and remove together with resonance air pipe -2-.



Vehicles with anti-theft secured engine control unit

– Remove protective housing from engine control unit ⇒ page 185 .

Continuation for all vehicles

– Pull engine wiring harness connector off engine control unit.

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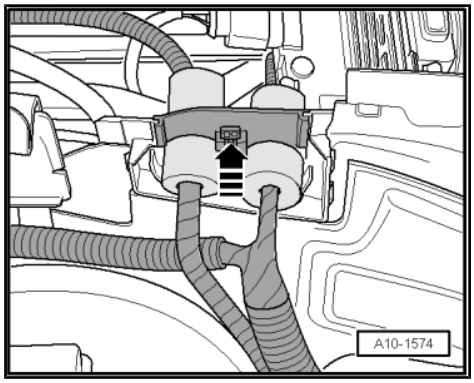
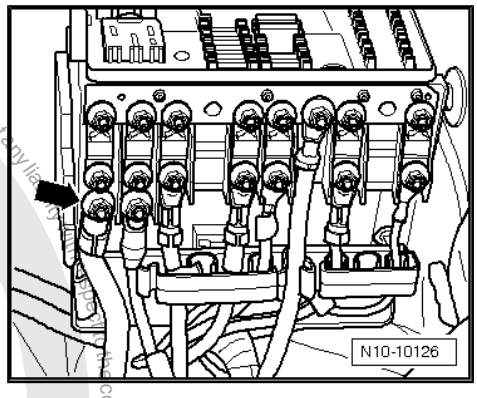
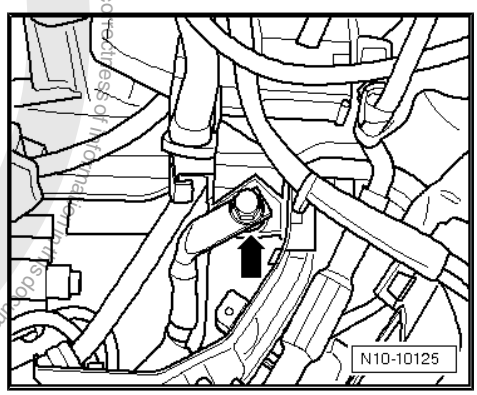
– Release feed-through for engine wiring harness -arrow- and pull off upwards.



– Unscrew cable from alternator at fuse holder -arrow-.

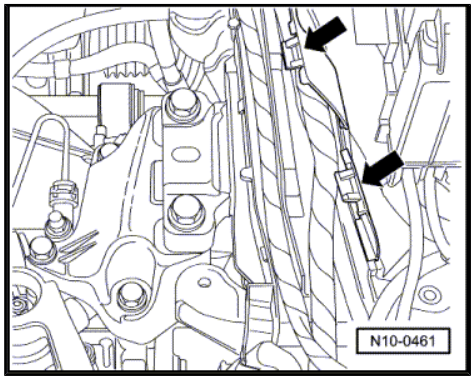


– Unscrew earth cable from longitudinal member -arrow-.



– Open wiring guide catches on longitudinal member -arrows-.

– Separate all connectors between engine wiring harness and body and lay engine wiring harness on engine.



WARNING

Fuel supply line is pressurised. Wear eye protection and protective clothing to avoid possible injury and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

– Observe rules for cleanliness ⇒ page 129 .

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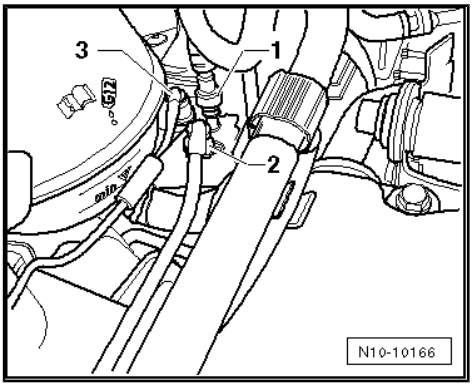
– Separate fuel supply line -1- (black) and catch escaping fuel with a cloth.

– Disconnect breather line -2- (white) and remove activated charcoal filter.

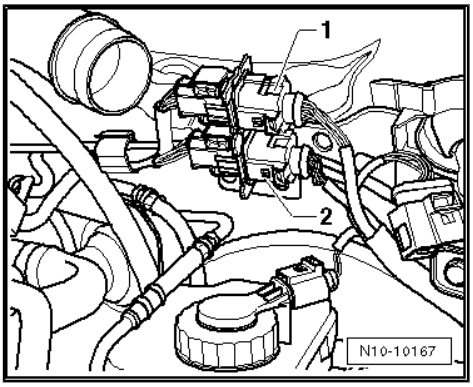


Note

- *Press in securing ring to release fuel lines.*
- *On vehicles with auxiliary heater the fuel line -3- of the metering pump -V54- must also be separated.*

– Seal line so that fuel system is not contaminated by dirt.

– Separate Lambda probe connectors at plenum chamber bulkhead and release cables.



1 - Lambda probe 2 -G108- , 6-pin connector (brown)

2 - Lambda probe -G39- , 6-pin connector (black)

– Pull off/disconnect all electrical connections as necessary from engine/gearbox and lay to one side.

– Pull vacuum line for brake servo off intake manifold.

– Separate all further connection, vacuum and intake hoses from engine.

– Remove selector mechanism from gearbox ⇒ 6-speed dual clutch gearbox 02E; Rep. Gr. 34 ; Selector mechanism .

WARNING

Steam may escape when expansion tank is opened. Wear eye protection and protective clothing to avoid eye injuries and scalding. Cover cap with cloth and open carefully.

– Open and close expansion tank cap to release pressure in cooling system.

– Remove noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

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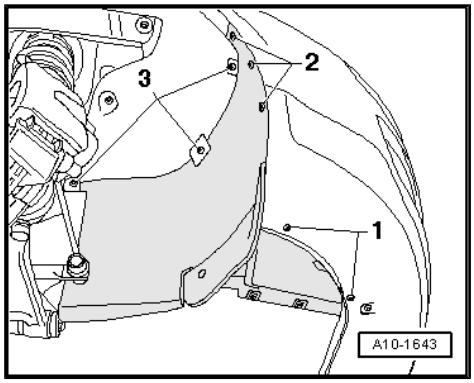
– Remove front parts of wheel housing liners ⇒ General body repairs, exterior; Rep. Gr. 66 ; Removing and installing wheel housing liner .
– Move lock carrier into its service position ⇒ General body repairs, exterior; Rep. Gr. 50 ; Lock carrier, service position .
– Pull connector off oil level and oil temperature sender -G266- .
– Pull wiring retainer for oil level and oil temperature sender -G266- off subframe.
– Remove front exhaust pipe with catalytic converters ⇒ page 195 .



Note

The flexible joint in the front exhaust pipe must not be bent by more than 20° - risk of damage. To remove, ask for the assistance of a second mechanic.

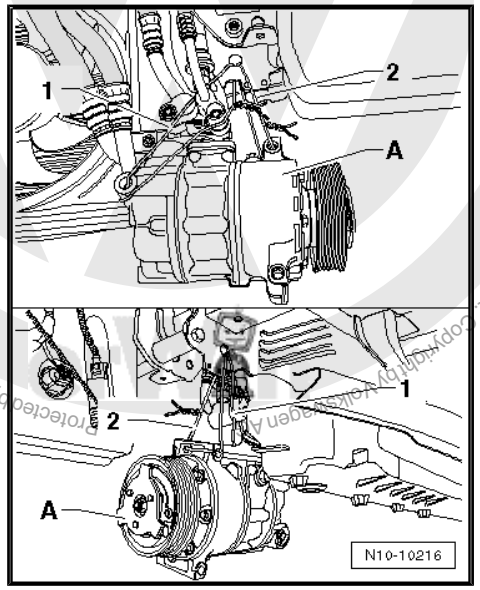
– Remove front propshaft ⇒ Final drive 02D, 0AV; Rep. Gr. 39 ; Assembly overview - repairing propshaft

Note

To prevent damage to condenser or to refrigerant lines/hoses, ensure that the lines and hoses are not stretched, kinked or bent.

To facilitate removing and installing engine without opening refrigerant circuit:

– Remove poly V-belt ⇒ page 20 .
– Open refrigerant line brackets on body.
– Remove air conditioner compressor with connected refrigerant lines from ancillary bracket ⇒ Heating, air conditioning; Rep. Gr. 87 ; Removing and installing compressor bracket .
– Secure air conditioner compressor -A- to lock carrier as illustrated (securing points -1 and 2-.
– Remove drive shaft protection for right drive shaft.
– Remove drive shafts ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Removing and installing drive shafts



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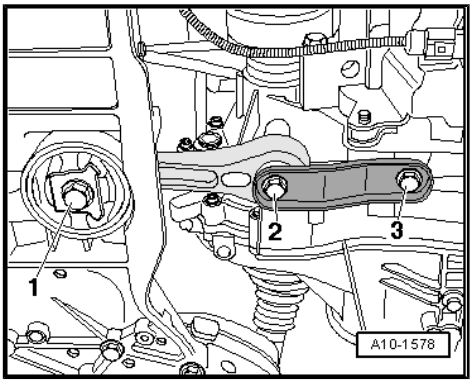
– Unscrew bolts -1…3- and remove pendulum support.



– Drain coolant ⇒ page 110 .
– Pull coolant hose quick-release couplings off heat exchanger and radiator.
– Pull off coolant hoses to expansion tank.

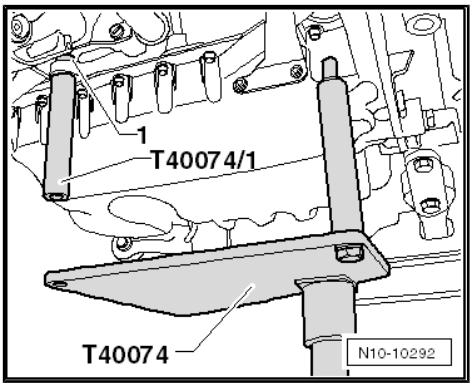
Vehicles with auxiliary heater

– Disconnect coolant hoses to auxiliary heater and to heater coolant shut-off valve -N279- .

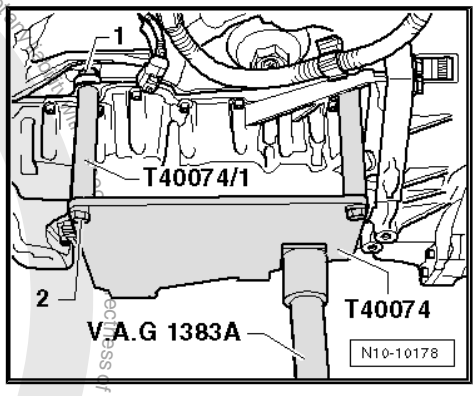
Continuation for all vehicles

– Insert engine bracket -T40074- in engine and gearbox jack -V.A.G 1383 A- .

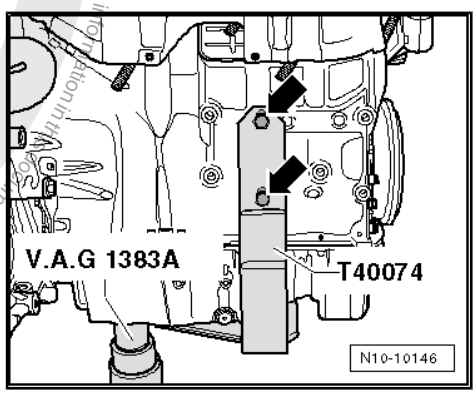
– Remove adapter -T40074/1- from engine support -T40074- and screw with nut -1- onto cylinder block.



– Position engine support -T40074- on engine as shown and retighten adapter -T40074/1- with engine support -T40074- -2-.



– Fit engine support -T40074- with M10x25 bolts on exhaust side as shown and tighten to approx. 20 Nm on cylinder block -arrows-.
– Lift engine and gearbox lightly using engine and gearbox jack -V.A.G 1383 A- .



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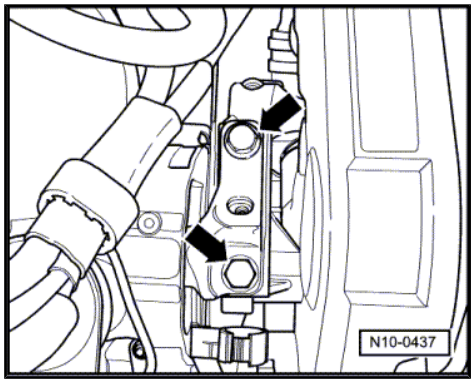
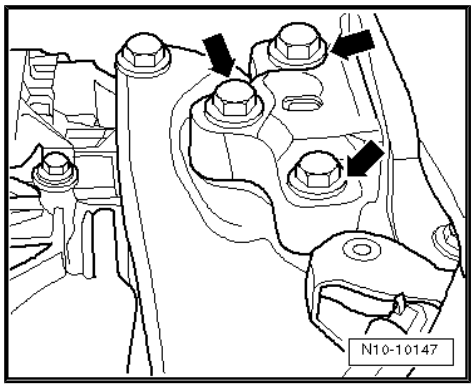
– Unbolt engine side of assembly mounting from engine bracket from above -arrows-.



– Unbolt gearbox side of assembly mounting from gearbox bracket -arrows- from above.



Note

- *To remove securing bolts use stepladder -VAS 5085- .*
- *Engine with gearbox must be guided carefully when lowered to prevent damage to bodywork.*

– Carefully lower engine with gearbox.

1.2 Securing engine on engine and gearbox support -VAS 6095-

Secure engine to engine and gearbox support -VAS 6095- to carry out repairs.

Procedure

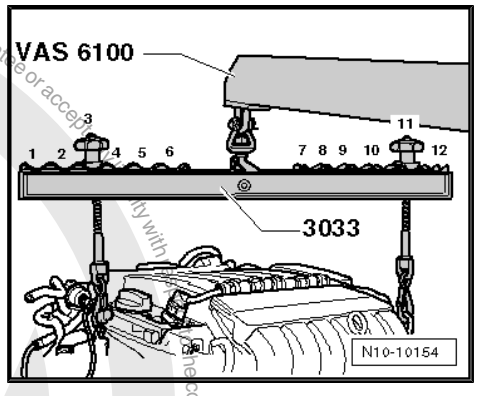
– Unbolt gearbox.

– Attach lifting tackle -3033- as follows and lift engine from engine and gearbox jack -V.A.G 1383 A- using workshop crane -VAS 6100- .

Vibration damper end: position 3.

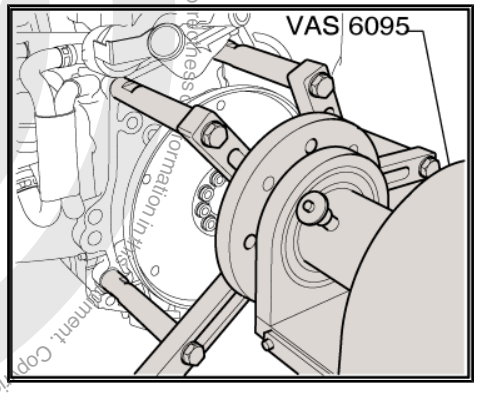
Flywheel end: position 11.

When using engine and gearbox support -VAS 6095- with universal mountings:



– Secure engine to engine and gearbox support -VAS 6095- as shown.

When using engine bracket -3269- :



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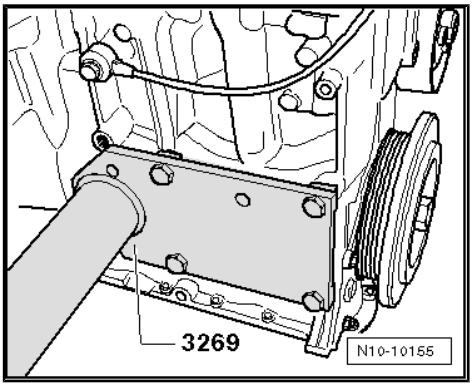
– Bolt engine bracket -3269- to cylinder block as shown.



1.3 Installing engine

Installation is carried out in the reverse order. When installing, note the following:

Caution

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- ***Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant and refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.***
- ***To avoid damage to lines, ensure sufficient clearance to all moving or hot components.***

– A needle bearing must be fitted in the crankshaft on vehicles with DSG®. Install needle bearing where necessary ⇒ page 33 .

– Lightly lubricate used needle bearings with high-temperature grease -G 052 133 A2- .

– Check whether dowel sleeves for centring engine/gearbox have been fitted in cylinder block, insert if necessary.

– When installing engine and gearbox assembly, ensure sufficient clearance to subframe and radiator.

– Align engine mountings as follows:

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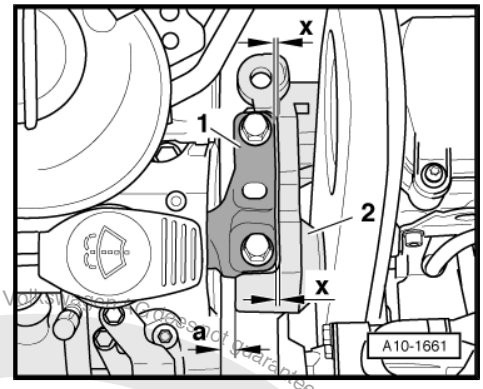

- There must be a distance of -a- at least 10 mm between engine support and longitudinal member (right side).
- The side surface of the engine support -2- should be located parallel to the support arm -1-.

– Install pendulum support ⇒ page 13 .

Note

Specified torques for assembly mountings ⇒ page 13 .

– Install drive shafts ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Removing and installing drive shafts .

– Install front propshaft ⇒ Final drive 02D, 0AV; Rep. Gr. 39 ; Assembly overview - repairing propshaft

– Install front exhaust pipe together with catalytic converters ⇒ page 195 .

Note

Ensure that the exhaust system is installed free of stress ⇒ page 200 .

– If necessary, adjust selector lever cable ⇒ 6-speed dual clutch gearbox 02E; Rep. Gr. 34 ; Selector mechanism; Adjusting selector lever cable .

– Electrical connections and routing ⇒ Electrical system; Rep. Gr. 97 .

– Install air conditioner compressor ⇒ Heating, air conditioning; Rep. Gr. 87 .

– Install poly V-belt ⇒ page 20 .

– Reset service position ⇒ General body repairs, exterior; Rep. Gr. 50 ; Lock carrier, service position .

– Install noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation. .

– Replenish coolant ⇒ page 110 .

– Carry out vehicle system test ⇒ Vehicle diagnosis, testing and information system VAS 5051 “Guided fault finding”.

– Finish the vehicle system test so that any fault entries stored during assembly can be deleted automatically.

– Generate the readiness code in combination with a road test.

Observe applicable safety precautions during road test.

– Carry out road test.

– Then carry out vehicle system test again and rectify any faults which may have occurred.

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Specified torques

Threaded connection		Specified torque
Bolts, nuts	M6	10 Nm
	M7	15 Nm
	M8	25 Nm
	M10	40 Nm
	M12	60 Nm

Note

Specified torques for assembly mountings ⇒ page 13 .

1.4 Specified torques for assembly mounting

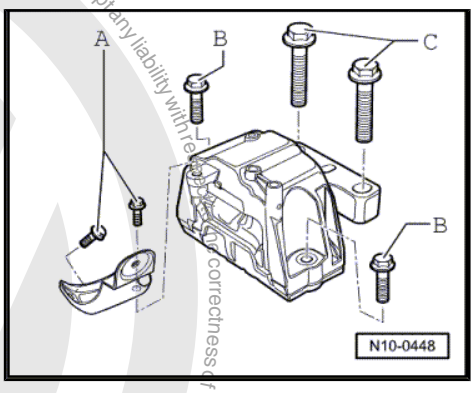
Engine assembly mountings

A = 20 Nm + 90° (1/4 turn) further [1)]

B = 40 Nm + 90° (1/4 turn) further [1)]

C = 60 Nm + 90° (1/4 turn) further [1)]

[1)] Renew.

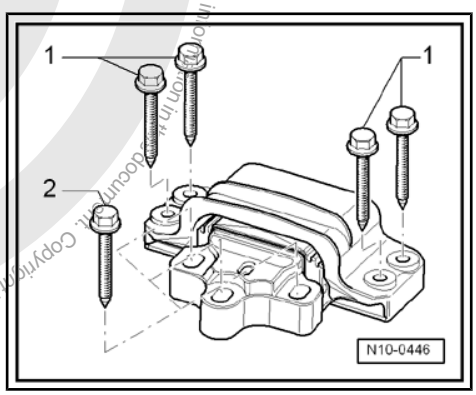


Gearbox assembly mounting

1 = 40 Nm + 90° (1/4 turn) further [1)]

2 = 60 Nm + 90° (1/4 turn) further [1)]

[1)] Renew.



Pendulum support

Note

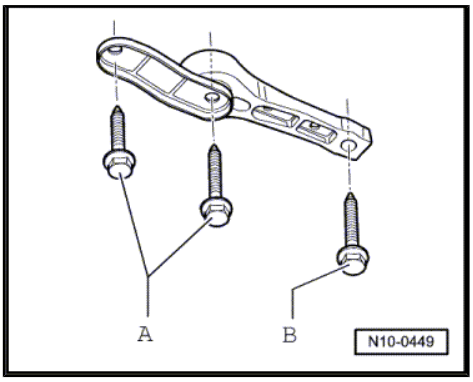
Bolt pendulum support to gearbox and then to subframe.

A - Strength rating 8.8 = 40 Nm + 90° ($^1/_4$ turn) further [1)]

A - Strength rating 10.9 = 50 Nm + 90° ($^1/_4$ turn) further [1)]

B - = 100 Nm + 90° ($^1/_4$ turn) further [1)]

[1)] Renew.



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Volkswagen 6 Cylinder Injection Engine Individual
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13 – Crankshaft group

1 Dismantling and assembling engine

Note

- *Secure engine to engine and gearbox support -VAS 6095- to carry out assembly work* ⇒ *page 10* .
- *Finding metal shavings or a large quantity of small metal particles during engine repair could indicate that the crankshaft bearings or conrod bearings are damaged. To prevent this from causing further damage, perform the following repairs:*
- *Thoroughly clean oil channels.*
- *Renew oil spray jets.*
- *Renew oil cooler.*
- *Renew oil filter.*

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