

Engine, removing and installing

Rules of cleanliness

CAUTION!

Whenever carrying out work on the fuel supply and fuel injection systems, carefully observe the following five rules of cleanliness.

- 1 - Thoroughly clean fuel system line and hose connections and the surrounding area before disconnecting.
- 2 - Place removed components on a clean surface and cover. Use plastic sheeting or paper. Do not use fluffy rags that could leave lint!
- 3 - Carefully cover over or seal any components that have been opened if repairs are not carried out immediately.
- 4 - Install only clean parts:

Do not remove replacement parts from the packaging until immediately before they are to be installed.

Do not use parts that have been stored without packaging (e.g. in toolboxes, etc.).

5 - When the fuel system is opened:

Avoid working with compressed air whenever possible.

Avoid moving the vehicle if possible.

Safety precautions

WARNING!

Be sure the ignition is switched OFF, when:

- ♦ *Disconnecting ignition wires*
- ♦ *Disconnecting fuel injection system wiring*
- ♦ *Connecting or disconnecting test equipment leads*
- ♦ *Disconnecting the battery*
- ♦ *Washing the engine or engine compartment.*

CAUTION!

BEFORE disconnecting the battery:

- ♦ *Stop the engine.*
- ♦ *Be sure the ignition is switched OFF (also applies when connecting the battery). Failure to do so may damage the Engine Control Module (ECM).*

♦ *Be sure of the proper radio code (for vehicles equipped with coded anti-theft radio).*

Removing

The engine is removed from the front, after being separated from the transmission.

CAUTION!

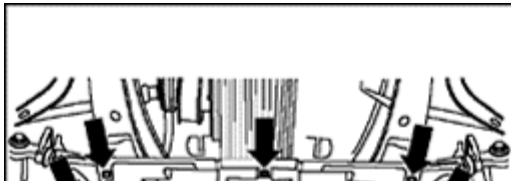
Determine correct radio anti-theft coding before disconnecting the battery.

Note:

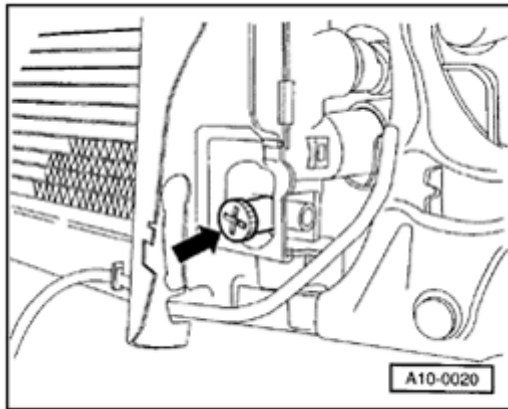
All tie wraps that are loosened or removed in order to remove the engine must be replaced or reinstalled in the same place when the engine is installed.

- Ignition switched off
- Disconnect battery Ground (GND) strap.
- Unbolt bumper by unclipping vent grille at left and right and removing from bumper

⇒ [Repair Manual, Body Exterior, Repair Group 63](#).



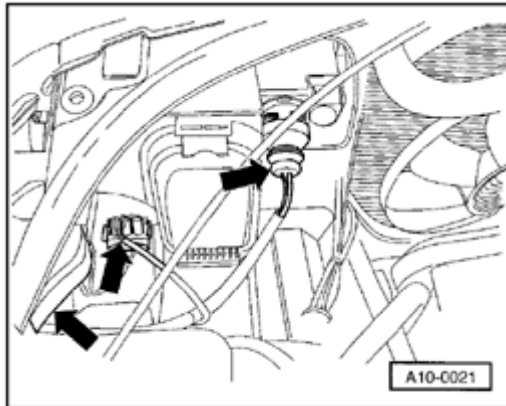
- Remove noise insulation panel.



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- Unbolt cooling coil for power steering fluid at bottom left of radiator.
- Drain coolant at radiator.
- Remove locking element for connection flange of coolant hose at bottom of radiator; pull off connection flange.

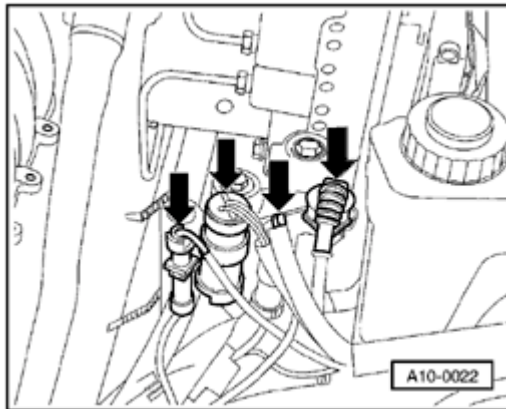
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- Remove intake air duct to air cleaner at air scoop and lift out.

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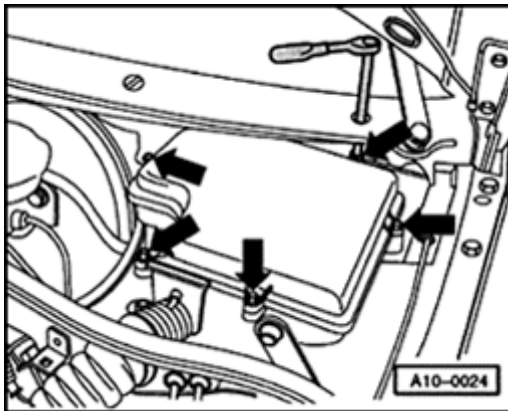
- Disconnect harness connectors for headlights and turn signal lights.
- Disconnect harness connector of engine coolant temperature sensor near bottom coolant hose at left of radiator.



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- Disconnect four harness connectors at ABS hydraulic unit.
- Disconnect harness connectors for anti-theft warning system at upper left of front end.
- Disconnect coolant hose at top left of engine.
- Unclip and disconnect A/C clutch harness connectors at radiator air guide on lower right.
- Disconnect harness connectors at both horns, let cables hang free.
- Remove air scoop.

- Disconnect harness connectors at Mass Air Flow (MAF) sensor and Idle Air Control (IAC) valve, unbolt hose from plenum chamber and unclip.
- Disconnect hose connection at IAC valve.
- Remove air guide between air cleaner and throttle body.
- Remove air cleaner housing.
- Disconnect fuel supply and return lines.
- Remove coolant expansion tank.



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- Remove cover for electronics box.
- Unclip engine control module and disconnect harness connectors.
- Disconnect harness connectors at connector station below engine control module.
- Disconnect ground connection and bracket for harness connectors at plenum chamber.
- Disconnect both coolant lines to heater core between plenum chamber and engine.
- Disconnect accelerator pedal cable and let hang free.

- Disconnect both harness connectors at top of transmission.

- Loosen V-belt for hydraulic pump, viscous fan and generator and secure with special tool 3204.
- Use screwdriver to counter-hold belt pulley for viscous fan and unbolt with open-end wrench 3312.

Tightening torque with torque wrench 1331 and open-end wrench 3312 is 37 Nm (27 ft lb); without open-end wrench 3312 tightening torque is 70 Nm (52 ft lb).

Note:

Refer to table for torque wrenches of a different length; length of torque wrench from socket drive to center of handle.

Length of torque wrench	Tightening torques	
220 mm	33 Nm	(24 ft lb)
280 mm	37 Nm	(27 ft lb)
300 mm	39 Nm	(29 ft lb)
440 mm	45 Nm	(33 ft lb)

- Unbolt hydraulic pump from mounting bracket.

CAUTION!

Hydraulic lines should remain connected.

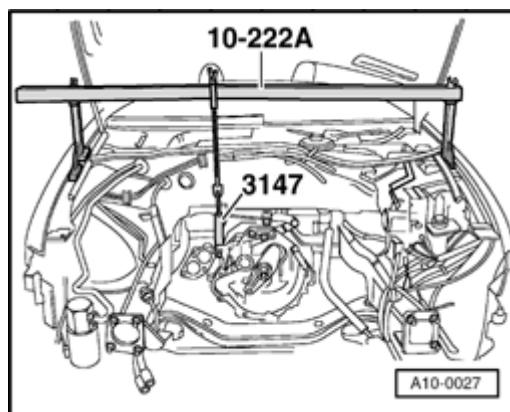
- Unscrew bolts and secure A/C compressor to one side with wire.

CAUTION!

- ♦ ***Disconnect at mounting points only.***
- ♦ ***DO NOT open the air conditioning refrigerant circuit.***
- ♦ ***Set the A/C compressor aside carefully. Refrigerant lines kink easily.***
- ♦ ***The A/C refrigerant circuit must only be opened by specially trained technicians using the proper tools and equipment.***
- Remove bolts securing exhaust manifold and front exhaust pipe at top.
- Disconnect battery positive (B+) cable from starter at right of engine below exhaust manifold.

- Remove starter, take off insulator at starter positive (B+) connection, unbolt fixture at engine block, disconnect ground wire from engine support.
- Unscrew four engine mounting bolts.

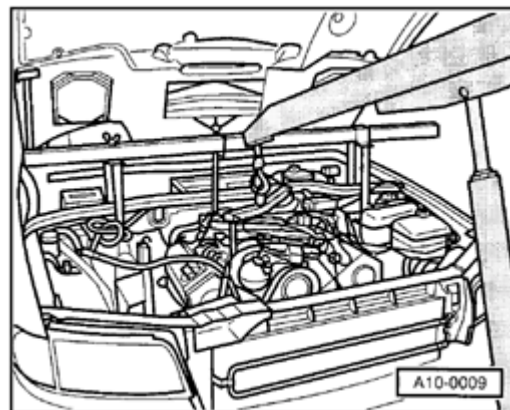
- Support weight of transmission using engine support bridge 10-222A.



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- Attach engine support adapter 3147 to bolt hole of transmission bell housing.

(Adapter installation shown with engine removed)



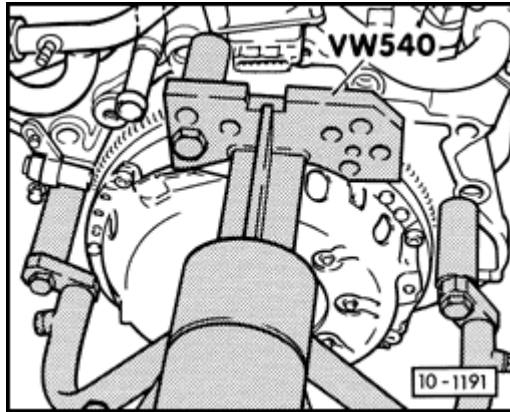
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- Attach engine sling 2024A to engine and workshop crane 1202A.

CAUTION!

The mounting hooks and pins on the lifting device must be secured with locking pins.

Mounting engine cylinder block on assembly stand



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- Mount engine to stand using holding fixture VW 540 along with VW 540/2.

CAUTION!

DO NOT have the cylinder block mounted to the assembly stand while measuring the cylinder bores (Repair Group 13). The cylinder block is deformed by its own weight under these conditions and such stress will result in false measurements that are not accurate after the tension has been relieved.

Installing

The engine is installed in the reverse order of removal, with the addition of the following special conditions and steps:

WARNING!

Do not re-use any fasteners that are worn or deformed in normal use. Many fasteners are designed to be used only once and become unreliable and may fail when used a second time. This includes, but is not limited to, nuts, bolts, washers, self-locking nuts or bolts, circlips and cotter pins. Always follow recommendations given in this publication. Always replace these fasteners with new parts.

- Check that alignment sleeves for centering engine and transmission are properly installed in cylinder block. Install sleeves if necessary.
- Always install new seals and gaskets.
- Check centering of clutch disc, if necessary.
- Check clutch release bearing for wear and replace if necessary.

- Clean transmission input shaft splines. Lightly lubricate clutch release bearing and transmission input shaft splines with G 000 100 grease. Do not grease guide sleeve for release bearing.
- Install engine mounts free of stress. To do so, align engine by shaking before tightening engine mounts.

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- Allow stop of torque support to move down onto rubber block under its own weight; tighten bolts to 45 Nm (33 ft lb).
- Align exhaust system free of stress ⇒ Repair Group 26.
- Adjust accelerator pedal cable ⇒ Repair Group 20.
- Re-fill engine cooling system ⇒ Repair Group 19.
- Drained coolant may only be re-used provided the cylinder block or the cylinder head was not replaced.
- Check oil level before starting engine.
- Short blocks are supplied without bushing in crankshaft. For vehicles with automatic transmission, tap bushing into place before installing drive plate.
- Check reconditioned engines with manual gearbox to determine whether needle bearing is installed in crankshaft; install if necessary.

- Observe tightening torque specifications.

Tightening torques

Notes:

- ◆ *The tightening torques apply only to lightly greased, oiled, plated or specially treated nuts and bolts.*
- ◆ *It is permissible to use additional lubricants such as engine or gear oils, but do not use Molykote and do not use degreased parts.*
- ◆ *Permissible tolerance for tightening torques $\pm 15\%$.*

Bolts, nuts	M6	10 Nm	(7 ft lb)
	M8	20 Nm	(15 ft lb)
	M10	45 Nm	(33 ft lb)
	M12	60 Nm	(44 ft lb)
Exhaust pipe to manifold	M8	25 Nm	(18 ft lb)
AC compressor to bracket	M8	25	(18 ft

		Nm	lb)
Torque converter to drive plate	M8	35 Nm	(26 ft lb)
Engine support to engine mount	M10	45 Nm	
Viscous coupling to bracket	M10	45 Nm	(33 ft lb)
Hydraulic pump to bracket	M8	25 Nm	(18 ft lb)
Generator to mounting bracket	M8	35 Nm	(28 ft lb)