

2.22 Liter 5-Cyl. Turbo Engine Mechanical, Engine Code(s): AAN

00 General, Technical data

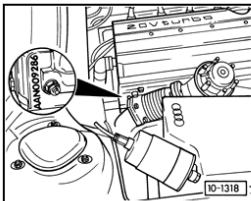
Technical data

[Engine code](#)

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Engine code

- < Engine code and serial number are stamped on the right-hand side at the rear of the cylinder head.



[List of engines](#)

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List of engines

Engine code		AAN
Manufactured	from	07.91
	to	-
No. of cylinders		5
Displacement	liters	2.226
Output	kW @ RPM	169 @ 5900
	Hp @ RPM	227 @ 5900
Torque	Nm @ RPM	350 @ 1950
	lbf @ RPM	258 @ 1950
Bore diameter	mm	81.0

Engine code		AAN
Stroke	mm	86.4
Compression ratio		9.3:1
Valve timing: at 1 mm valve lift and 0 mm valve clearance		
Inlet opens after TDC		3 °
Inlet closes after BDC		25 °
Outlet opens before BDC		42 °
Outlet closes before TDC		9 °
RON	minimum	95
Fuel injection system		Motronic Multiport Fuel Injection
Exhaust Gas Recirculation (EGR)		-
Three Way Catalytic converter (TWC)		Yes (2)
Lambda control		Yes
Exhaust gas turbocharger		Yes
On Board Diagnostic		Yes
Vehicle especially tuned for		Low pollutant exhaust

10 Engine - Assembly

Engine, removing and installing

[Rules of cleanliness](#)

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Rules of cleanliness

CAUTION!

To avoid damage to fuel supply and fuel injection systems, carefully observe the following 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 measures

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Safety measures

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).

Engine, removing

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Engine, removing

- Engine is removed upward without the transmission.
- All tie wraps that are loosened or cut during engine removal must be put back on in the same place when the engine is installed.

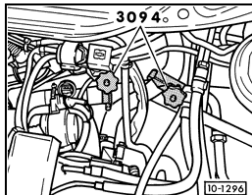
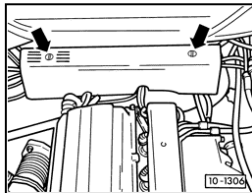
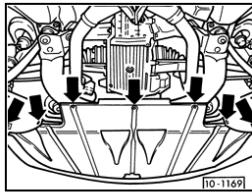
CAUTION!

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

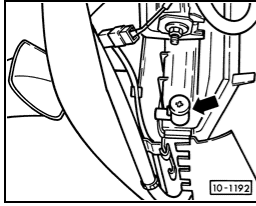
- Disconnect battery Ground (GND) strap with ignition switched off.

Note:

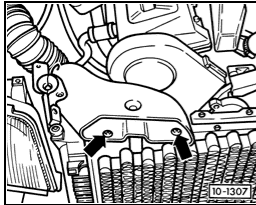
On vehicles without fresh air filter or air conditioner, battery is located in plenum chamber on right. On vehicles with fresh air filter or air conditioner, it is located under rear seat cushion.



- ◀ - Remove noise insulation panel (arrows).
- Disengage additional front retaining clips in center of noise insulation panel.
- Remove front bumper.
=> Repair Manual Body Exterior, Interior, Repair Group 63
- Remove lock carrier (upper radiator support) with attached parts.
=> Repair Manual Body Exterior, Interior, Repair Group 50
- Position oil catch pan VW 1306 under engine compartment.
- Open plug on coolant expansion tank.
- ◀ - Turn quick fasteners (arrows) on connector cover on rear engine compartment bulkhead 90 ° to left and remove cover.
- ◀ - Plug water hoses to heater with special hose clamps 3094.

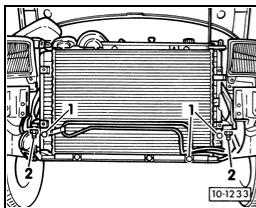


- ◀ - Drain coolant at cooler (arrow), push auxiliary hose onto drain petcock if necessary.



- ◀ - Unscrew right air duct at radiator (arrows) and remove.

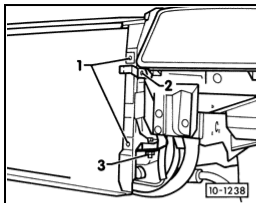
Vehicles without air conditioner



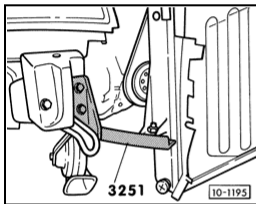
- ◀ - Remove oil cooler for hydraulic oil at radiator -1- and hang up on body (hoses remain connected).
- Disconnect coolant hoses at radiator.
- Remove radiator -2-.

Vehicles with air conditioner

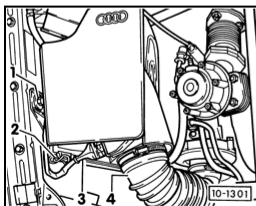
- Radiator remains installed.



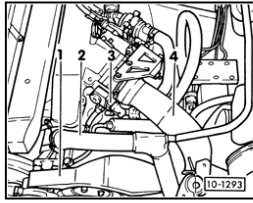
- ◀ - Remove bracket for trim plate -2- on right side of vehicle.
- Remove right and left radiator attachment -3-.
- Remove left air guide from radiator -1-.



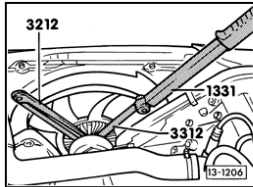
- ◀ - Install support device 3251 to right bumper bracket and swing radiator forward.



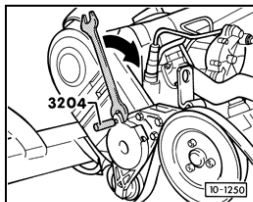
- ◀ - Disconnect air hose between Mass Air Flow (MAF) sensor and turbocharger -4- at MAF sensor.
- Remove connector at MAF sensor -3-.
- Remove retaining bolt -1-.
- Release four spring clips -2-.
- Remove upper section of air cleaner housing and remove air cleaner element.
- Disconnect intake hose and remove lower section of air cleaner housing.



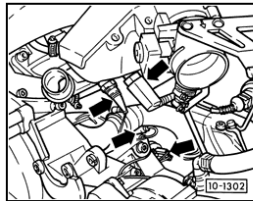
- ◀ - Disconnect upper hose to radiator -2- at radiator and coolant manifold and put aside. T-shaped hose to expansion tank remains connected.
- Remove cover -1- above ribbed belt.
- Remove connector at throttle position sensor -3-.
- Remove air hose -4-.



- ◀ - Remove viscous clutch. Use spanner wrench 3212 to brace with wrench 3312 to remove.
- Lay viscous fan in fan frame.
- If necessary, unclip lower wiring harness from fan frame.
- Loosen bolts on belt pulley of vane pump for power steering.



- ◀ - Relieve tension on poly-ribbed belt by turning tensioner in direction shown (arrow) with open-end wrench and insert pin 3204 into hole.
- Remove ribbed belt.
- Remove belt pulley of vane pump for power steering.
- Remove power steering hose from bracket on left engine mount.
- Remove vane pump for power steering and set aside in engine compartment.
- Hoses remain connected.



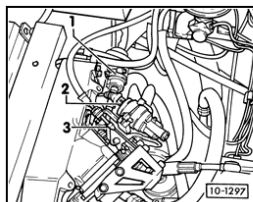
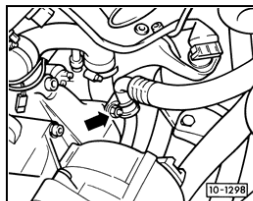
- ◀ - Disconnect harness connectors (arrows):
 - Thermoswitch (2-pin)
 - Thermoswitch (4-pin)
 - Engine oil pressure sensor (white insulation)
 - Engine oil pressure sensor (for gauge)
- Disconnect wires from alternator and loosen cable clip.

Vehicles with air conditioner:

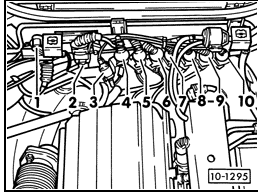
- ◀ - Remove retaining clip for refrigerant and coolant line (arrow).

Vehicles without air conditioner:

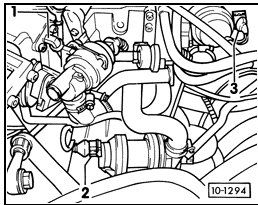
- Remove retaining tab for upper coolant line (arrow).



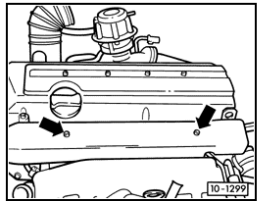
- ◀ - Detach throttle cable -3-.
- Pull off connector at idle air control valve -2-.
- Pull off connector and supply hose at Evaporative Emission (EVAP) canister purge regulator valve -1-.
- Mark connectors on rear engine compartment bulkhead and separate:



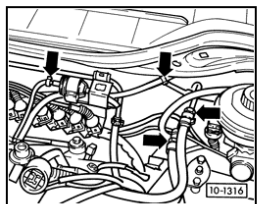
- ⚡ 1 - Black 3-pin connector for ignition coil with power output stage 2 (two pins used in connector)
- 2 - Brown 3-pin connector for power output stage
- 3 - Black single-pin connector (round) for Heated Oxygen Sensor (HO2S)
- 4 - Black 2-pin connector for HO2S
- 5 - White 3-pin connector for ignition coils in cylinder head (lower connector section, three pins connected)
- 6 - White 3-pin connector for ignition coils in cylinder head (lower connector section, two pins connected)
- 7 - Black 3-pin connector for Crankshaft Position (CKP) sensor
- 8 - Grey connector for Engine Speed (RPM) sensor
- 9 - Brown connector for knock sensor 1
- 10 - Blue connector for knock sensor 2



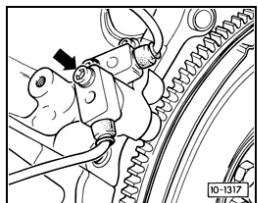
- ⚡ - Unscrew Intake Air Temperature (IAT) sensor -1- on throttle housing.
- Disconnect harness connectors -2- for electric coolant pump and -3- for Camshaft Position (CMP) sensor.
- Pull through wiring harness toward rear and expose.



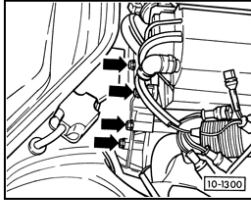
- ⚡ - Unscrew fuel injector cover.
- Disconnect harness connectors from fuel injectors and expose wiring harness.
- Disconnect ground wires.
 - * On upper intake manifold, wiring color brown/red
 - * On rear intake manifold, wiring color brown/white
- Disconnect harness connector from thermostwitch at back side of cylinder head.
- Disconnect coolant hoses to heater on engine.



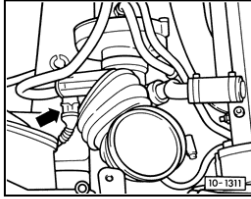
- ⚡ - Separate fuel and vacuum lines (arrows).



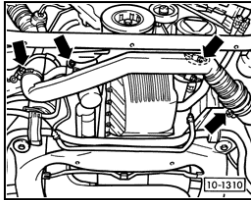
- ⚡ - To avoid damage, remove Engine Speed (RPM) sensor above flywheel (arrow).



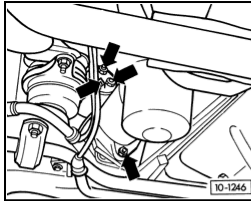
- ◀ - Unscrew bolts on engine/transmission flange accessible from above (arrows).
- One engine/transmission bolt remains screwed in hand-tight.



- ◀ - Disconnect harness connector from wastegate bypass regulator valve (arrow).

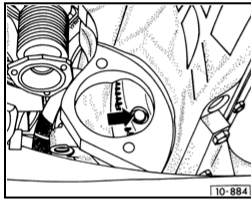


- ◀ - Disconnect pressure line between turbocharger and intercooler (arrows).

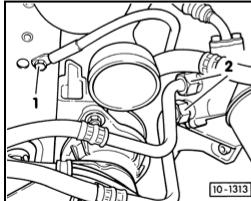


- ◀ - Remove starter (arrows).

Vehicles with automatic transmission:



- ◀ - Remove three bolts of torque converter in opening of removed starter (turn crankshaft 1/3-turn each time).

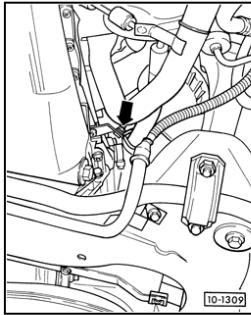


- ◀ - Disconnect ground wire -1- from right longitudinal member.
- Mark oil lines -2- and disconnect from oil filter flange, allowing oil to drip into catch pan.

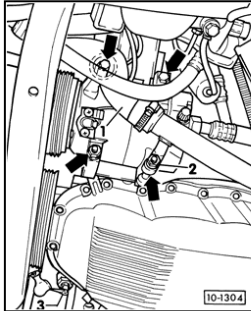
Vehicles with air conditioner:

CAUTION!

- ♦ Disconnect brackets and mounting points only.
- ♦ DO NOT open the air conditioning refrigerant circuit.
- ♦ Refrigerant lines kink easily.



- ◀ - Remove bracket (arrow) for refrigerant hose at oil sump.

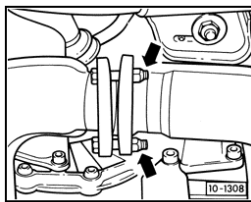


- ◀ - Unscrew and remove coolant line -3-.
- Unscrew A/C compressor (arrows) and hang up on side.

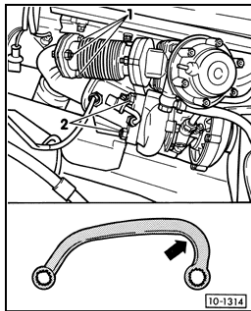
CAUTION!

The A/C refrigerant circuit must only be opened by specially trained technicians using the proper tools and equipment.

- Detach wire -2- from engine oil temperature sensor.
- Remove lower coolant hose -1- to radiator.



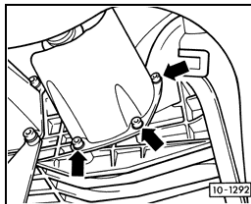
- ◀ - Remove front exhaust manifold.
- Unscrew bolts at bottom left and right (arrows).



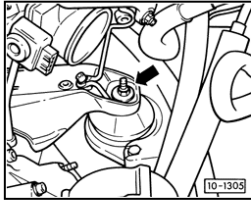
- ◀ - Unscrew three bolts -1- on corrugated pipe.
- Unscrew four nuts -2- on turbocharger/exhaust pipe flange.

Note:

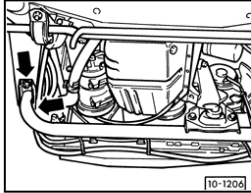
- * To remove lower rear nuts -2- on turbocharger/exhaust pipe flange, 15 mm flat box wrench (bottom) must be bent to fit (arrow).
- * Size of remaining nuts on turbocharger/exhaust pipe flange is 17 mm.
- Remove exhaust pipe downward.



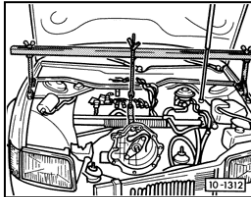
- ◀ - Remove cover for right drive shaft (arrows).



- ◀ - Unscrew nuts of left and right engine mounts (arrow).
- Unscrew bolts on engine/transmission flange accessible from below.



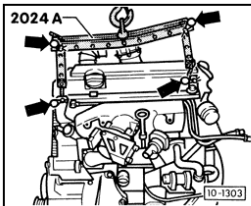
- ◀ - Remove cross-member with torque arm. To do this, remove pressure reservoir bracket from left longitudinal member and torque arm from engine. Unscrew four bolts (arrows) and remove cross-member.



- ◀ - Position transmission support 10-222 A on fender attachment lip.
- Hook transmission mount 3147 into upper right bolt hole of transmission bell housing (shown with engine removed).

Note:

Height of transmission can be adjusted with wing nut of support hook.



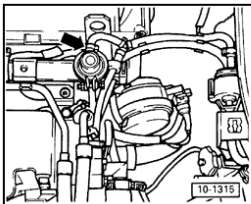
- ◀ - Hook engine support 2024 A to engine and to workshop crane 1202.

Note:

In order to balance the engine's center of gravity, bars for lifting hooks must be connected as shown in diagram.

WARNING!

Hooks and pins of engine support must be secured with safety clips (arrows in diagram).



- ◀ - Ensure sufficient space between engine support and vacuum hose (arrow). Remove hose if necessary.
- Lift engine with workshop crane using pins of engine mountings.
- Retighten wing nut on transmission support 10-222A accordingly.
- Upper engine/transmission flange: Unscrew last bolt.
- Pull engine off transmission and lift upward out of engine compartment.

Note:

Guide engine carefully when lifting out in order to avoid damaging clutch, body and radiator.

Vehicles with automatic transmission:

- After removing engine, secure torque converter in transmission from falling out.

Engine, installing

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Engine, installing

Install the engine in reverse order of removal and observe the following points.

- * Check whether locating sleeves for centering engine/transmission are installed in cylinder block. Install sleeves if necessary.
- * Always replace self-locking nuts.
- * Always replace seals.
- * If necessary, check centering of clutch drive plate.
- * Clean splines of transmission input shaft. Thinly coat splines and clutch release bearing with G 000 100. Do not grease guide sleeve for release bearing.
- * Make sure that support tab of coolant pipe is not pinched between engine and transmission while pushing these together.
- * Install engine mounting torque-free by aligning engine with shaking movements before tightening engine mounting.
- * Install coolant pipe, retaining clip for refrigerant pipe and A/C compressor together.
- * When tightening exhaust down pipe on turbocharger, ensure freedom of movement between exhaust down pipe and subframe.
- * Align exhaust system tension-free.

=> Repair Group 26

- * Adjust throttle cable.

=> Repair Group 20

- * Do not reuse drained coolant. Fill coolant.

=> Repair Group 19

- * Check oil level before starting engine.

Note:

- * Secure all cable ties taken out during removal at same location during installation.
- * Secure wiring exposed during removal tension-free at same location during installation.

Tightening torques

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Tightening torques

Bolts/nuts - general			
M6	10 Nm	(7 ft lb)	
M8	20 Nm	(15 ft lb)	
M10	45 Nm	(33 ft lb)	
M12	60 Nm	(44 ft lb)	

Exceptions:

Exhaust down pipe to turbocharger	30 Nm	(22 ft lb)
Exhaust down pipe to corrugated pipe	25 Nm	(18 ft lb)
Exhaust down pipe to catalyst	25 Nm	(18 ft lb)
Catalyst to transmission support	25 Nm	(18 ft lb)
A/C compressor to bracket	25 Nm	(18 ft lb)
Torque converter to drive plate	60 Nm	(44 ft lb)

Viscous fan to carrier:

* Using torque wrench 1331 and fork wrench 3312	37 Nm	(27 ft lb)
* Without fork wrench 3312	70 Nm	(52 ft lb)

Note:

If other torque wrenches are used, refer to the following chart for proper tightening torques:

Torque wrench length (center of socket to center of handle)		
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)