

19 - ENGINE - COOLING SYSTEM

COOLING SYSTEM COMPONENTS, REMOVING AND INSTALLING

Cooling System Components, Removing and Installing

--> [Coolant Hose Connection Diagram](#)

--> [Cooling System, Draining and Filling](#)

--> [Thermostat, Coolant Pump, Connecting Pieces, Component Overview](#)

--> [Coolant Pump, Removing and Installing](#)

--> [Coolant Thermostat, Removing and Installing](#)

--> [Thermostat, Checking](#)

--> [Coolant Pipes, Component Overview](#)

--> [Engine Coolant Temperature Sensor, Removing and Installing](#)

--> [Front Coolant Line, Removing and Installing](#)

--> [Left Coolant Pipes, Removing and Installing](#)

--> [Radiator, Removing and Installing](#)

--> [Fan Shroud, Removing and Installing](#)

--> [Coolant Fan, Removing and Installing](#)

--> [Cooling System, Checking for Leaks](#)

CAUTION: Steam can be released when the cap is removed from the expansion tank. Cover cap with a cloth and open carefully.

NOTE:

- When the engine is warm the cooling system is under pressure. If necessary release pressure before commencing repair work.
- Always replace gaskets and seals.
- Secure all hose connections with hose clamps appropriate for the model --> .
- Arrows on coolant pipes and coolant hoses must line up across from each other.

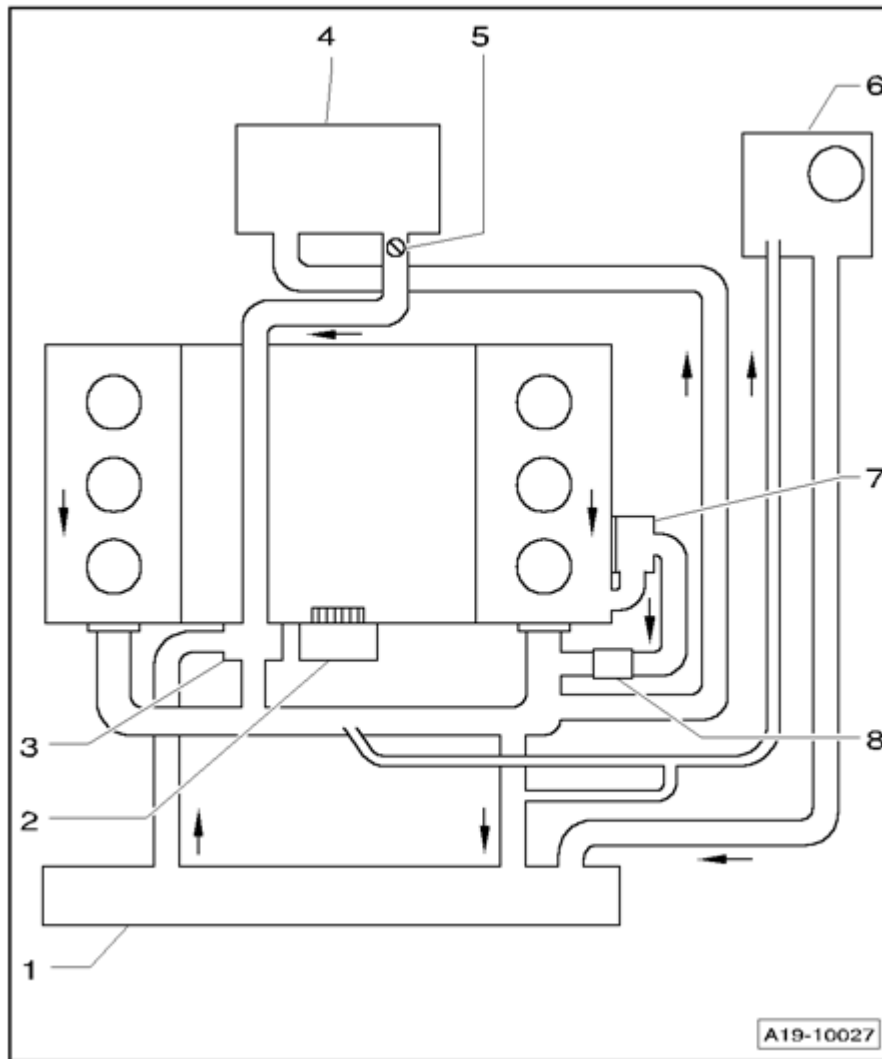
Coolant Hose Connection Diagram**Coolant Hose Connection Diagram**

Fig. 496: Coolant Hose Connection Diagram
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Radiator

- Removing and installing --> **Oil Cooler, Removing and Installing**
- Renew coolant after replacing

2 - Coolant pump

- Removing and installing --> **Coolant Pump, Removing and Installing**

3 - Coolant thermostat

- Removing and installing --> **Coolant Thermostat, Removing and Installing**
- Checking --> **Thermostat, Checking**

4 - Heater core

- Replace coolant after replacing

5 - Bleeder screw

6 - Expansion tank

- With sealing cap
- Pressure relief valve in cap, checking

7 - Oil cooler

- Replace coolant after replacing
- Removing and installing --> **Oil Cooler, Removing and Installing**

8 - After-run coolant pump V51

- Only for vehicles in countries with hot climates

Cooling System, Draining and Filling

Cooling System, Draining and Filling

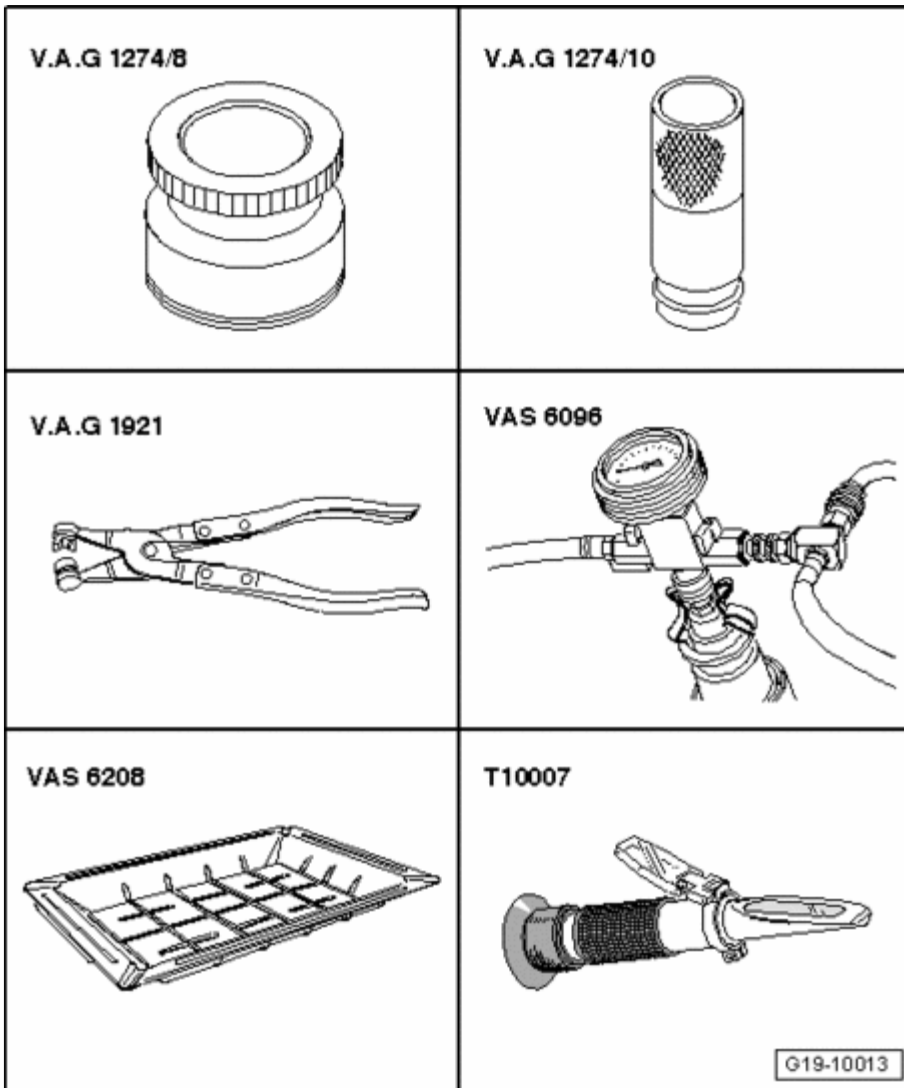


Fig. 497: Identifying Special Tools - Cooling System, Draining And Filling
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Adapter V.A.G 1274/8
- Adapter V.A.G 1274 tester V.A.G 1274/10
- Hose clamp pliers V.A.G 1921
- Cooling system charge unit VAS 6096

- Drip tray for workshop crane VAS 6208
- Refractometer T10007

Draining

NOTE: • Drained coolant must be stored in a clean container for disposal or reuse.

CAUTION: Cover cap of expansion tank with rag and open carefully, as hot steam i.e. hot coolant may escape when opening.

- Open cap of coolant expansion tank.

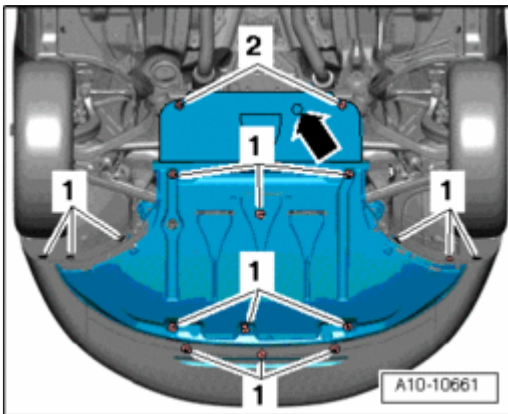


Fig. 498: Identifying Noise Insulation And Mountings
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove noise insulation and mountings - 1, 2 - - **arrow** - where present.
- Place drip tray for workshop crane VAS 6208 under engine.

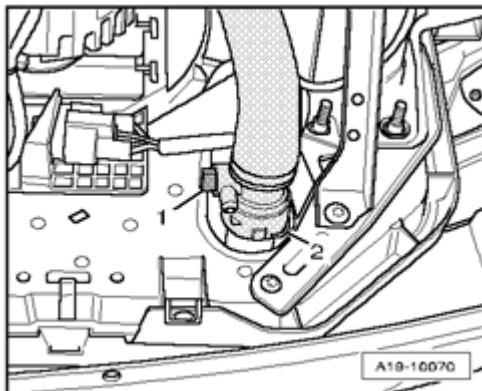


Fig. 499: Identifying Drain Plug & Coolant Hose
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open drain plug - 1 - and allow coolant to drain.

NOTE: • Ignore - 2 -.

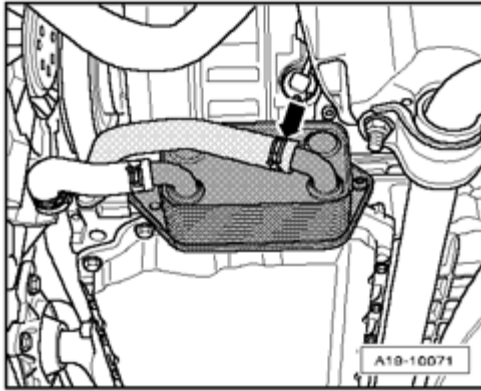


Fig. 500: Disconnecting Coolant Hose From Oil Cooler
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect coolant hose - **arrow** - from oil cooler and drain remaining coolant.

Filling

- Ignition switched off.

NOTE:

- The cooling system is filled all year round with a mixture of frost and corrosion protection additives and water.
- Use only *coolant additive Plus G 012 A8F A1* (short: G12+) "according to TL VW 774 F". Other coolant additives may above all reduce the corrosion protection effect significantly. The damage resulting from this may lead to loss of coolant and consequently to severe engine damage.
- G12+ and coolant additives with the designation "according to TL VW 774 F" reduce frost and corrosion damage as well as lime deposits. They also raise the boiling point. For this reason the system must be filled all year round with frost and corrosion protection additives.
- Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.
- Protection against frost must be assured to about -25 C (in arctic climatic countries to about -35 C).
- The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The coolant additive portion must be at least 40%.
- If for climatic reasons greater frost protection is required, the amount of G12+ can be increased, but only up to 60% (frost protection to about -40 C), otherwise frost protection and cooling effectiveness will be reduced.
- Only clean drinking water may be used for mixing coolant.
- If the radiator, heater core, cylinder head and cylinder head gasket or cylinder block is replaced, completely replace the engine coolant.

- Dirty coolant must not be re-used.
- For coolant G12+ , use refractometer T10007 to test frost protection in cooling system.
- Secure all hose connections with hose clamps appropriate for the model .
- Replace seal.

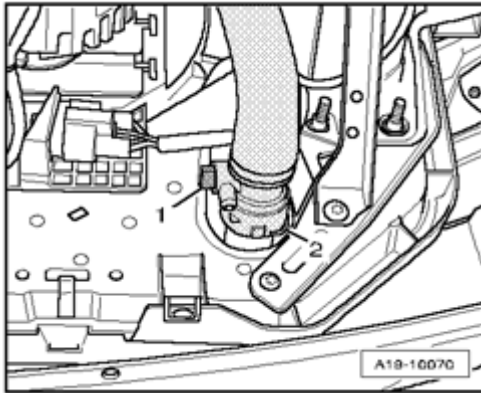


Fig. 501: Identifying Drain Plug & Coolant Hose
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Close drain plug - 1 -.

NOTE:

- Ignore - 2 -.

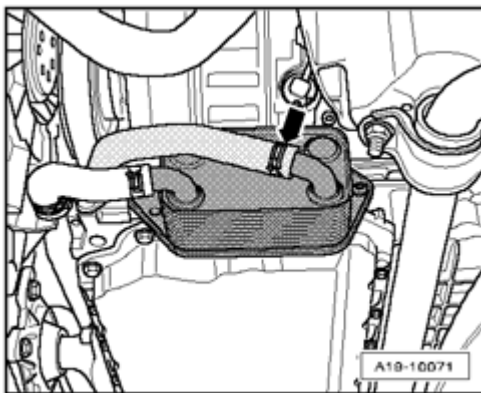


Fig. 502: Disconnecting Coolant Hose From Oil Cooler
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect coolant hose to oil cooler - **arrow** -.

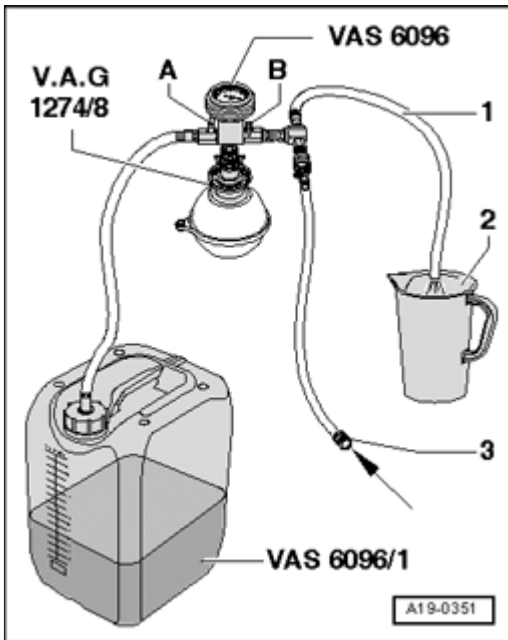


Fig. 503: Filling Reservoir VAS 6096/1 With At Least 12 Liters Of Premixed Coolant
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Fill replacement reservoir VAS 6096/1 with at least 12 liters of pre-mixed coolant with correct mixture ratio:
 - G12+ (40%) and water (60%) for freeze protection down to -25 C
 - G12+ (50%) and water (50%) for freeze protection down to -35 C
 - G12+ (60%) and water (40%) for freeze protection down to -40 C
- Place air outlet hose - **1** - into a small container - **2** -. (A small amount of coolant is drawn off which should be reserved with the discharged air.)
- Close both valves - **A** - and - **B** - by turning lever perpendicular to direction of flow.
- Connect hose - **3** - to pressurized air.
- Pressure: 6 to 10 bar pressure.

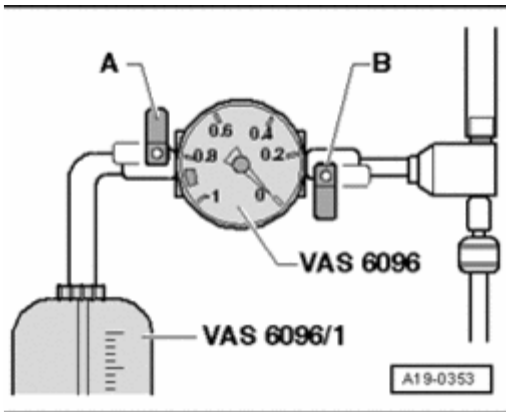


Fig. 504: Cooling System, Draining And Filling
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open valve - **B** -, turn lever in direction of flow to do this.

A vacuum is created in the cooling system by the suction jet pump.

- Needle on the instrument display must travel into the green region.
- Also briefly open valve - **A** -, turn lever in direction of flow to do this, so that hose of the replacement reservoir VAS 6096/1 is filled with coolant.
- Close valve - **A** - again.
- Let valve - **B** - remain open another 2 minutes.
- A further vacuum is created in the cooling system by the suction jet pump.
- Needle on the instrument display must still remain in the green region.
- Close valve - **B** -.
- Needle in display must remain in green region, then vacuum in cooling system is sufficient for subsequent filling.

If needle stands below the green region, repeat procedure.

If the vacuum decreases, cooling system is leaking.

- Disconnect pressurized air hose.
- Open valve - **A** -.

The vacuum in the cooling system has the effect of extracting coolant from coolant reservoir VAS 6096/1 ; cooling system is filled.

- Remove cooling system charge unit VAS 6096 from coolant expansion tank.

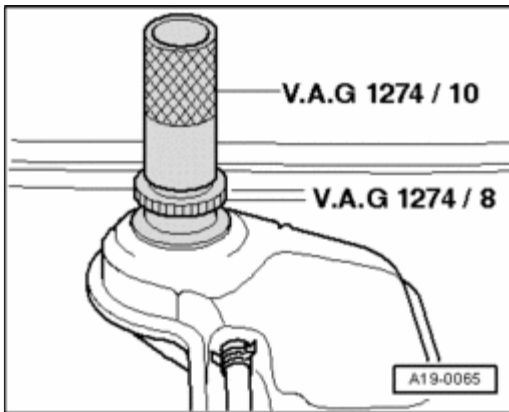


Fig. 505: Connecting Adapter For Cooling System Tester V.A.G 1274/10 To Adapter V.A.G 1274/8
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect adapter for VAG1274 tester V.A.G 1274/10 to adapter V.A.G 1274/8.

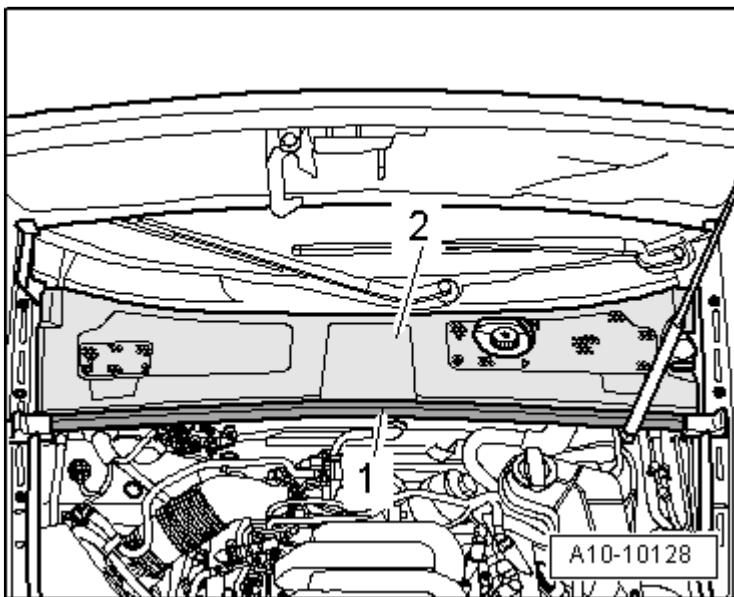


Fig. 506: Removing Rubber Seal For Plenum Chamber Cover & Plenum Chamber Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rubber seal - 1 - for plenum chamber cover.
- Remove plenum chamber cover - 2 -.

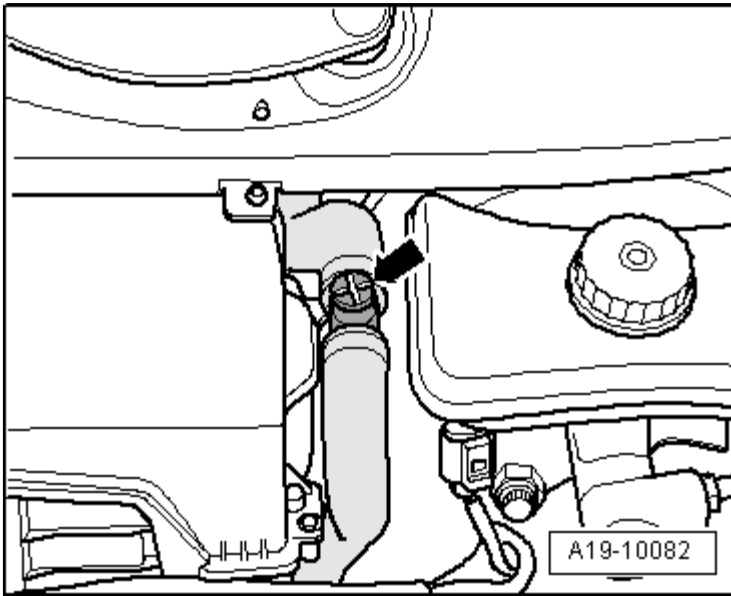


Fig. 507: Opening Bleeder Screw

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open bleeder screw - **arrow** -.
- Fill up coolant until it escapes from the coolant hose bleeder hole.
- Close bleeder screw.
- If present, switch on auxiliary heater for about 30 seconds.

- Twist cap for expansion tank closed.
- Start engine.
- Set heating air conditioning system to "HI" on both sides.
- Let engine run at 2000 RPM for 3 minutes.

- Let engine run at idle long enough until both large coolant hoses on main cooler are warm.
- Let engine run at 2000 RPM for 1 minute.
- Turn off engine and allow it to cool off.

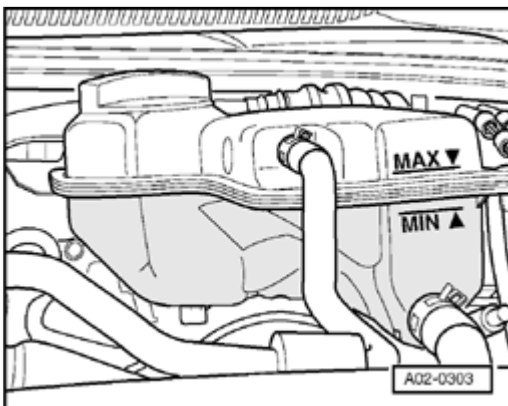


Fig. 508: Checking Coolant Level

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check coolant level.
- With cold engine, coolant level must be at MAX marking.
- Coolant level may be above MAX marking with engine at operating temperature.

Thermostat, Coolant Pump, Connecting Pieces, Component Overview

Thermostat, Coolant Pump, Connecting Pieces, Component Overview

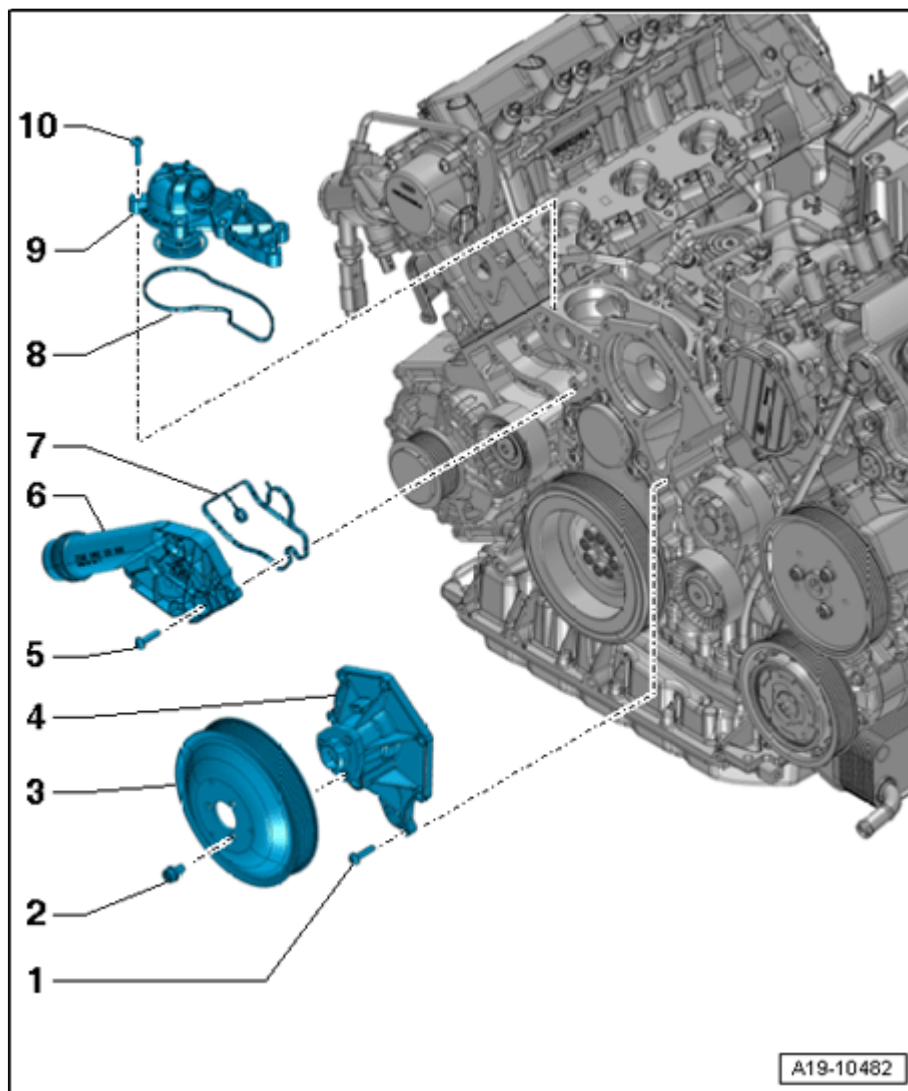


Fig. 509: Thermostat, Coolant Pump, Connecting Pieces, Component Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 9 Nm

2 - 20 Nm

3 - Ribbed belt pulley for coolant pump

4 - Coolant pump

- With gasket
- Removing and installing --> **Coolant Pump, Removing and Installing**

5 - 9 Nm

6 - Connecting piece

- For coolant hose

7 - Gasket

- Replace

8 - Gasket

- Different versions
- Replace

9 - Coolant thermostat

- Removing and installing --> **Coolant Thermostat, Removing and Installing**
- Checking --> **Thermostat, Checking**

10 - 9 Nm

Coolant Pump, Removing and Installing

Coolant Pump, Removing and Installing

Special tools, testers and auxiliary items required

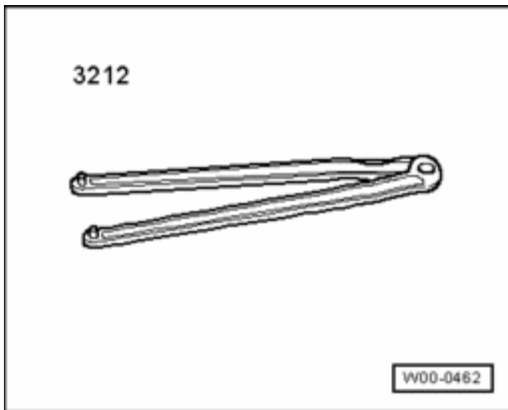


Fig. 510: Spanner Wrench 3212

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spanner Wrench 3212

Removing

- Drain coolant --> Cooling System, Draining and Filling.

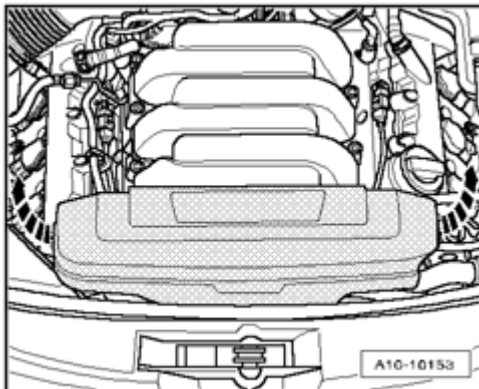


Fig. 511: Identifying Front Engine Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front engine cover - **arrows** -.

NOTE:

- Before removing ribbed belt, mark the turning direction on it with chalk or a felt tip pen. A reversed turning direction can cause damage to the belt under operating conditions.

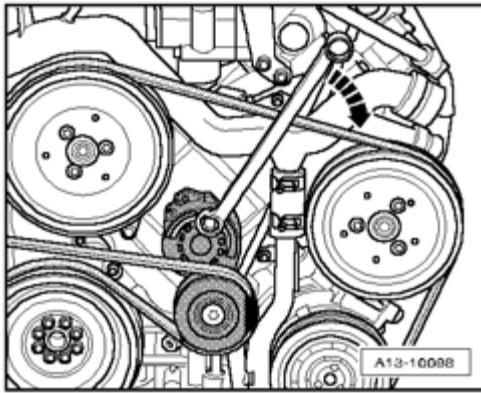


Fig. 512: Pivoting Tensioning Device To Relieve Tension On Ribbed Belt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pivot tensioning device in direction of - **arrow** - to relieve tension on ribbed belt.
- Remove ribbed belt from coolant pump.
- Release tensioner unit

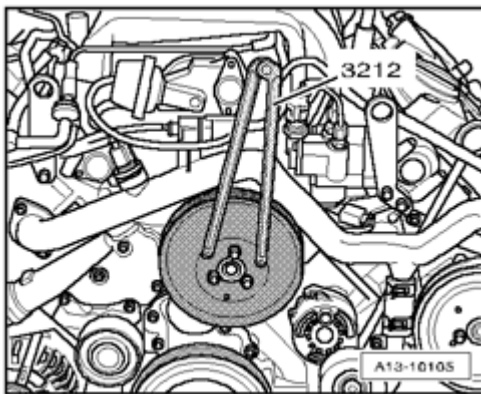


Fig. 513: Loosening Bolts Use Spanner Wrench 3212 To Counter-Hold
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ribbed belt pulley from coolant pump.
- When loosening bolts use spanner wrench 3212 to counter-hold.
- Pry off cover cap.

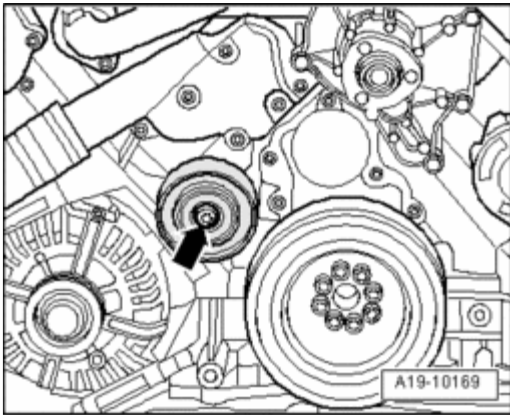


Fig. 514: Removing Bolt And Disconnecting Idler Roller
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **arrows** - and disconnect idler roller.

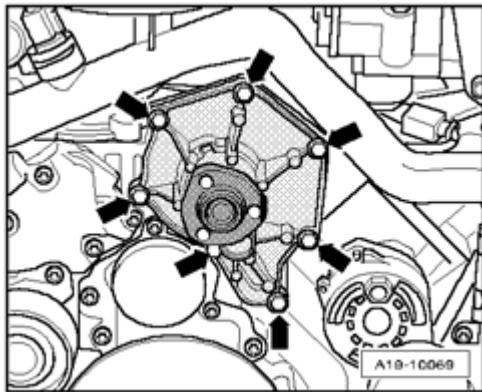


Fig. 515: Removing Bolts For Coolant Pump And Coolant Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** - for coolant pump and remove coolant pump.

Installing

Installation is in reverse order of removal, noting the following:

- Clean sealing surfaces so they are completely free of any oil or grease.

NOTE:

- If the previously used coolant pump is reinstalled, apply a 1.5 mm thick sealant bead to the cleaned sealing surface in addition to the seal that has been vulcanized on.

- Install ribbed belt --> **Ribbed Belt, Removing and Installing** .
- Fill with coolant -->**Cooling System, Draining and Filling** .

Tightening Specifications

Component	Nm
Coolant pump to cylinder block	9
Ribbed belt pulley to coolant pump	20
Idler roller to cylinder block	40

Coolant Thermostat, Removing and Installing

Coolant Thermostat, Removing and Installing

Removing

- Drain coolant --> **Cooling System, Draining and Filling.**
- Remove upper part of intake manifold --> **24 - FUEL INJECTION SYSTEM .**
- Remove front coolant pipe --> **Front Coolant Line, Removing and Installing.**

NOTE:

- Place a rag beneath to catch escaping coolant.

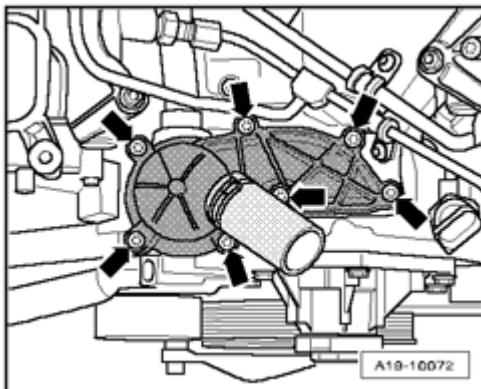


Fig. 516: Remove Bolts & Thermostat

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -.
- Remove thermostat with connecting piece.

Installing

Installation is in reverse order of removal, noting the following:

NOTE:

- Replace seals.

- Install front coolant pipe --> **Front Coolant Line, Removing and Installing.**

- Install intake manifold upper-part --> **24 - FUEL INJECTION SYSTEM** .
- Fill with coolant --> **Cooling System, Draining and Filling** .

Tightening specifications

Component	Nm
Thermostat with connecting piece to cylinder block	9

Thermostat, Checking

Thermostat, Checking

- Heat up removed thermostat in water.

Opening begins	Opening ends	Opening lift
approximately 87° C	approximately 102° C 1)	min. 8 mm
1) Cannot be tested.		

Coolant Pipes, Component Overview

Coolant Pipes, Component Overview

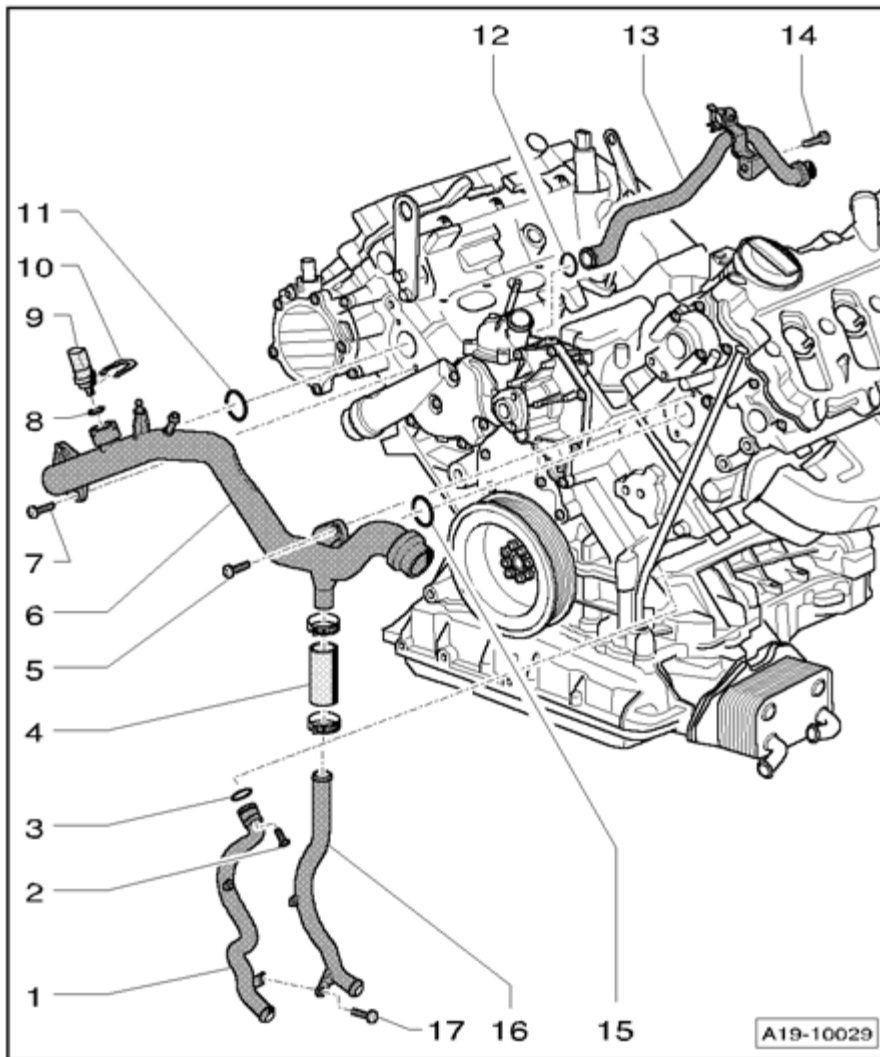


Fig. 517: Coolant Pipes, Component Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Left coolant line
- 2 - 9 Nm
- 3 - O-ring
 - Replace
- 4 - Connecting hose
- 5 - 9 Nm
- 6 - Front coolant line

- Removing and installing --> **Front Coolant Line, Removing and Installing**

7 - 9 Nm

8 - O-ring

- Replace

9 - Engine Coolant Temperature (ECT) Sensor G62

- Removing and installing --> **Engine Coolant Temperature Sensor, Removing and Installing**

10 - Retaining clip

11 - Seal

- Replace

12 - O-ring

- Replace

13 - Upper coolant line

- Removing and installing

14 - 9 Nm

15 - Seal

- Replace

16 - Left coolant line

17 - 9 Nm

Engine Coolant Temperature Sensor, Removing and Installing

Engine Coolant Temperature Sensor, Removing and Installing

Removing

- Drain coolant --> **Cooling System, Draining and Filling.**

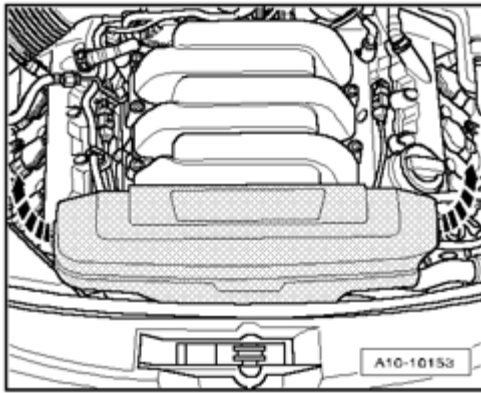


Fig. 518: Identifying Front Engine Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front engine cover - **arrows** -.

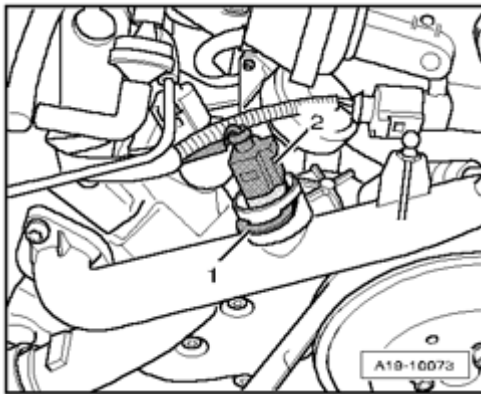


Fig. 519: Disconnecting Engine Coolant Temperature (ECT) Sensor G62 electrical connector & retaining clip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical connector - **2** - on Engine Coolant Temperature (ECT) Sensor G62.
- Remove retaining clip - **1** - and Engine Coolant Temperature (ECT) Sensor G62.

Installing

Installation is in reverse order of removal, noting the following:

NOTE:

- **Replace O-ring.**

- Fill with coolant -->**Cooling System, Draining and Filling** .

Front Coolant Line, Removing and Installing

Front Coolant Line, Removing and Installing

Special tools, testers and auxiliary items required

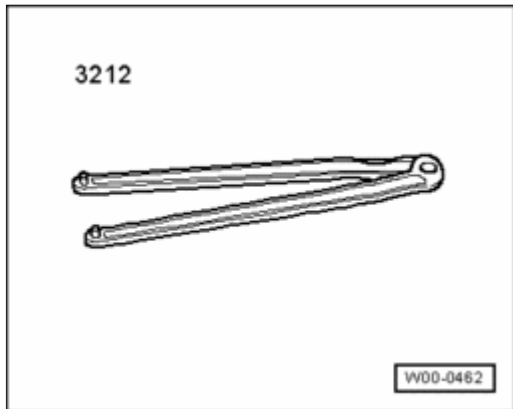


Fig. 520: Spanner Wrench 3212

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spanner Wrench 3212

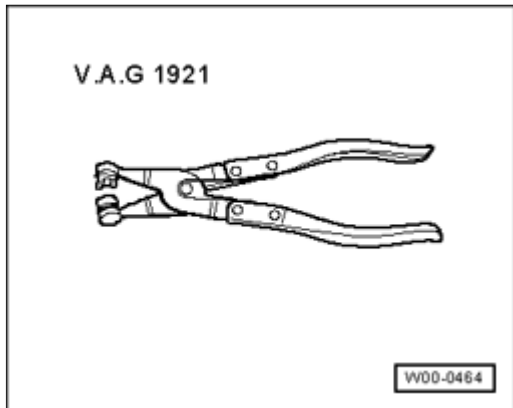


Fig. 521: Hose Clamp Pliers V.A.G 1921

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hose clamp pliers V.A.G 1921

Removing

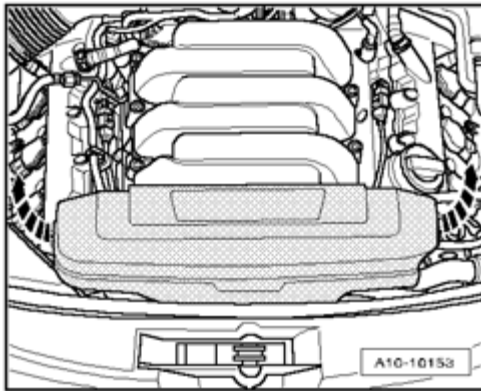


Fig. 522: Identifying Front Engine Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front engine cover - **arrows** -.

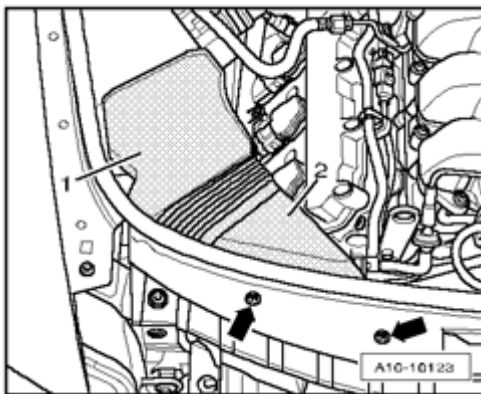


Fig. 523: Removing Air Duct Screws & Air Ducts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -.
- Remove air duct - **1** - and - **2** -.

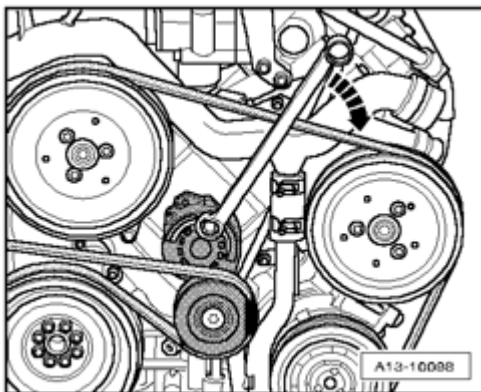


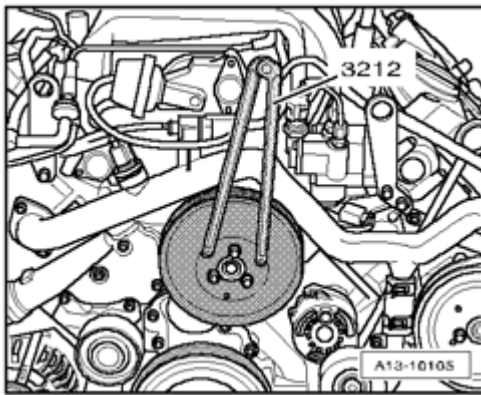
Fig. 524: Pivoting Tensioning Device To Relieve Tension On Ribbed Belt

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

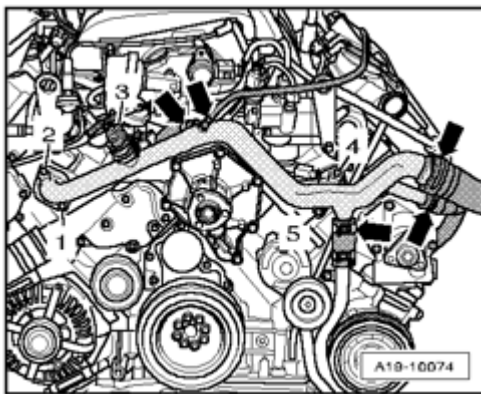
- Before removing ribbed belt, mark the turning direction on it with chalk or a felt tip pen. A reversed turning direction can cause damage to the belt under operating conditions.

- Pivot tensioning device in direction of - **arrow** - to relieve tension on ribbed belt.
- Remove ribbed belt from coolant pump.
- Release tensioner unit

**Fig. 525: Loosening Bolts Use Spanner Wrench 3212 To Counter-Hold**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ribbed belt pulley from coolant pump.
- When loosening bolts use spanner wrench 3212 to counter-hold.

**Fig. 526: Disconnecting Coolant Hoses From Front Coolant Pipe**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical connector - **3** -.
- Disconnect coolant hoses - **arrows** - from front coolant pipe.

- Remove bolts - 1 - , - 2 - , - 4 - and - 5 - and remove front coolant pipe.

Installing

Installation is in reverse order of removal, noting the following:

NOTE:

- **Replace seals and O-rings.**
- **Secure all hose connections with hose clamps appropriate for the model .**

- Clean and/or smooth O-ring sealing surface before installing.
- Moisten new O-ring with G12+ and push onto coolant pipe.
- Install ribbed belt --> **Ribbed Belt, Removing and Installing** .
- Fill with coolant -->**Cooling System, Draining and Filling** .

Tightening Specifications

Component	Nm
Front coolant pipe to engine	9
Ribbed belt pulley to coolant pump	20

Left Coolant Pipes, Removing and Installing

Left Coolant Pipes, Removing and Installing

Special tools, testers and auxiliary items required

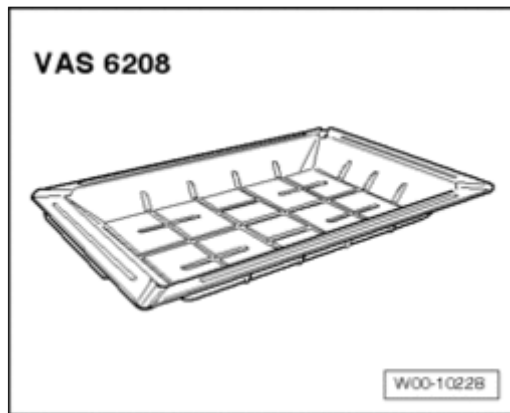


Fig. 527: Drip Tray For Workshop Crane VAS 6208
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drip tray for workshop crane VAS 6208

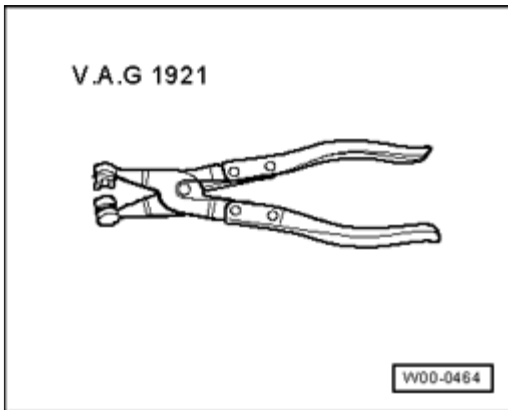


Fig. 528: Hose Clamp Pliers V.A.G 1921
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hose clamp pliers V.A.G 1921

Removing

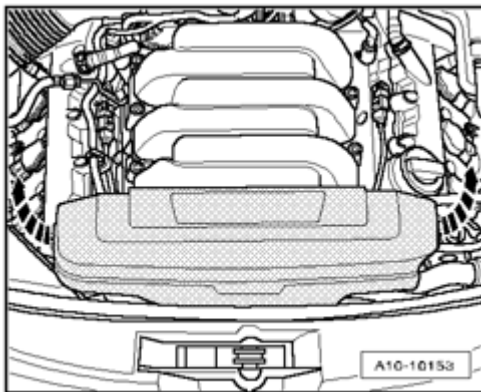


Fig. 529: Identifying Front Engine Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front engine cover - **arrows** -.

NOTE:

- Before removing ribbed belt, mark the turning direction on it with chalk or a felt tip pen. A reversed turning direction can cause damage to the belt under operating conditions.

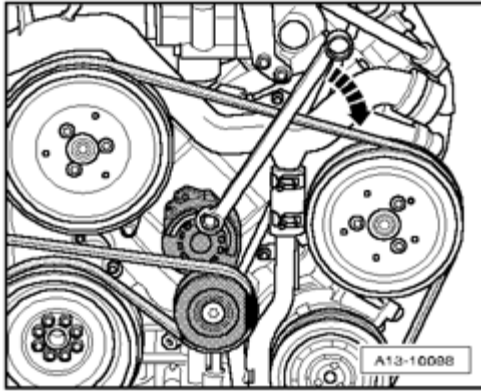


Fig. 530: Pivoting Tensioning Device To Relieve Tension On Ribbed Belt
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pivot tensioning device in direction of - **arrow** - to relieve tension on ribbed belt.
- Remove ribbed belt from coolant pump.
- Release tensioner unit

CAUTION: Cover cap of expansion tank with rag and open carefully, as hot steam i.e. hot coolant may escape when opening.

- Open cap of coolant expansion tank.

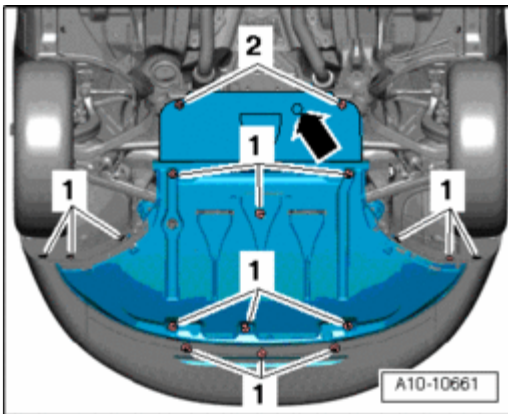


Fig. 531: Identifying Noise Insulation And Mountings
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove noise insulation and mountings - **1, 2** - - **arrow** - where present.
- Place drip tray for workshop crane VAS 6208 under engine.

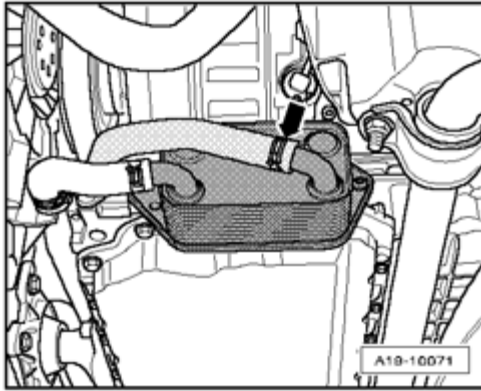


Fig. 532: Disconnecting Coolant Hose From Oil Cooler
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect coolant hose - **arrow** - from oil cooler and drain coolant.

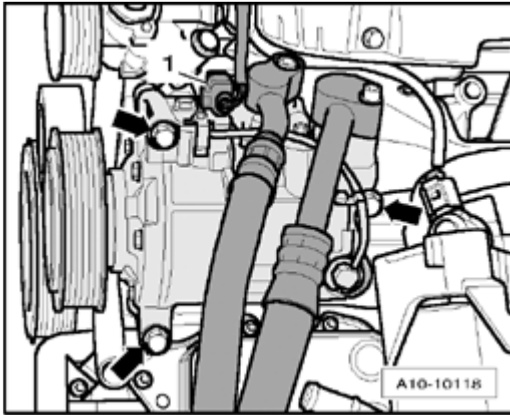


Fig. 533: Disconnecting Connector For Wiring To Air Conditioning Compressor Clutch Solenoid
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate connector - **1** - for wiring to air conditioning compressor clutch solenoid.

CAUTION: The air conditioning refrigerant circuit must not be opened.

- Remove air conditioning compressor from bracket - **arrows** -.

NOTE:

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

- Hang up the air conditioning compressor with attached lines on left side of vehicle.

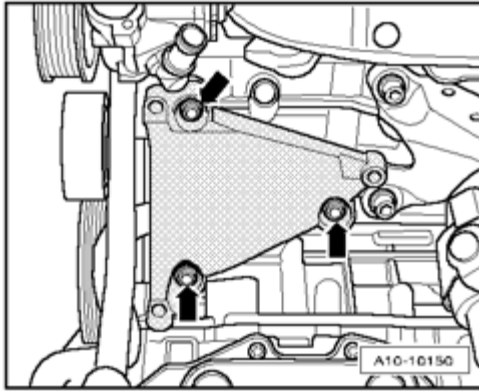


Fig. 534: Removing Bolts And Air Conditioning Compressor Bracket
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** - and remove air conditioning compressor bracket.

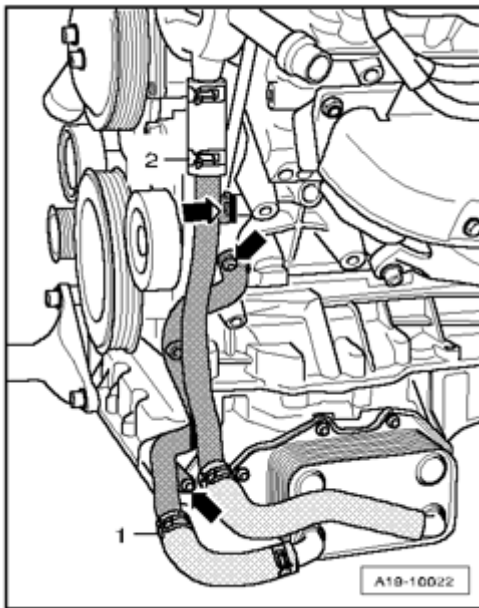


Fig. 535: Removing Bolts And Coolant Pipe From Engine
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -.
- Disconnect coolant pipes from coolant hoses - **1** - and - **2** -.

NOTE: ● **To improve clarity, the power steering pump is shown removed.**

Installing

Installation is in reverse order of removal, noting the following:

2008 Audi A6 Quattro

ENGINE 3.2 V6 4V Engine Mechanical, Engine Code(s): BKH

NOTE:

- **Replace O-rings.**
- **Secure all hose connections with hose clamps appropriate for the model .**

- Clean and/or smooth O-ring sealing surface before installing.
- Moisten new O-ring with G12+ and push onto coolant pipe.
- Install A/C compressor --> **87 - AIR CONDITIONING** .
- Install ribbed belt --> **Ribbed Belt, Removing and Installing** .

- Fill with coolant -->**Cooling System, Draining and Filling** .

Tightening specifications

Component	Nm
Coolant pipes to engine	9

Radiator, Removing and Installing

Radiator, Removing and Installing

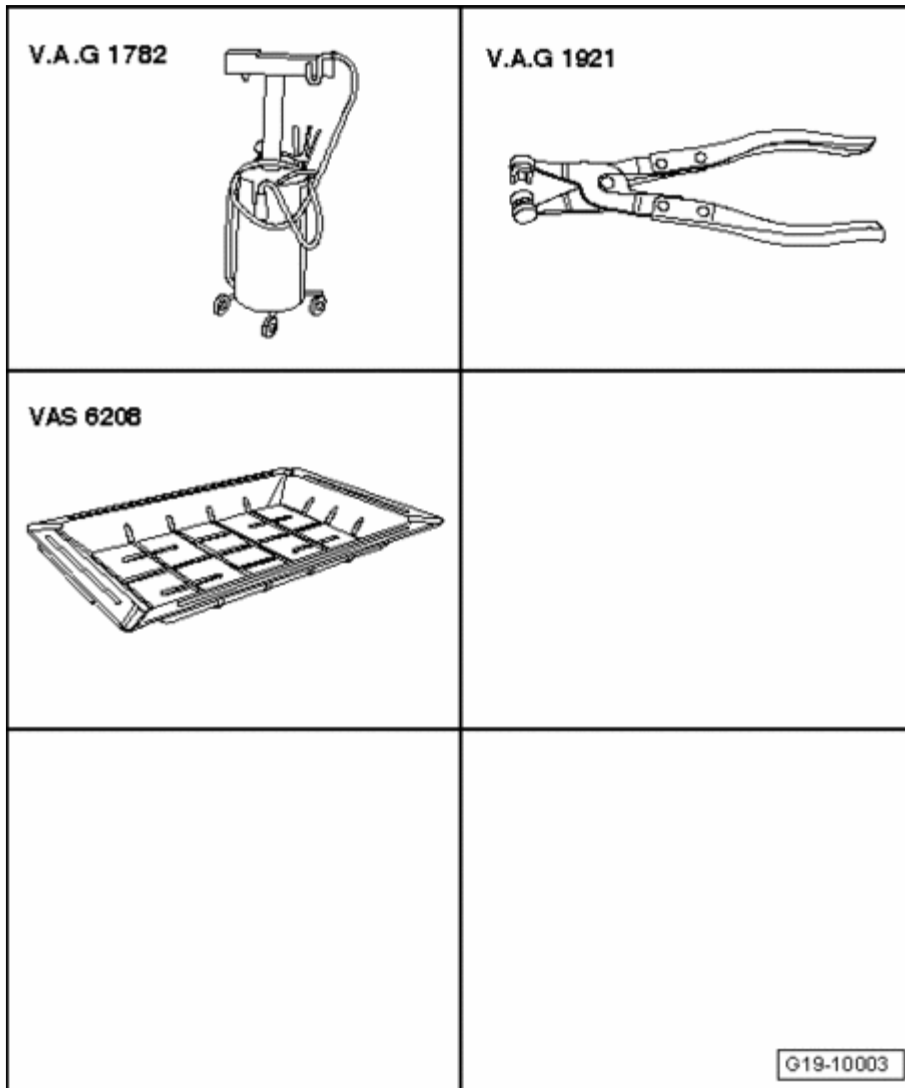


Fig. 536: Identifying Special Tools - Radiator, Removing And Installing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Old oil collecting and extracting device V.A.G 1782
- Hose clamp pliers V.A.G 1921
- Drip tray for workshop crane VAS 6208

Removing

NOTE:

- When assembled correctly, radiator and condenser can show slight impressions on fins. This is not damage. Radiators or condensers should not be replaced because of slight impressions like these.

CAUTION: Cover cap of expansion tank with rag and open carefully, as hot steam i.e. hot coolant may escape when opening.

- Open cap of coolant expansion tank.

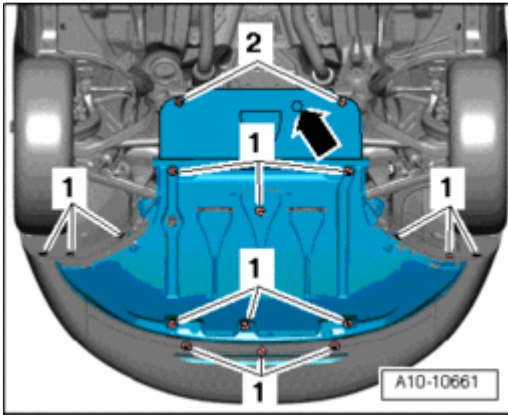


Fig. 537: Identifying Noise Insulation And Mountings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove noise insulation and mountings - **1, 2** - - **arrow** - where present.
- Remove left and right front wheel housing liners --> **66 - EXTERIOR EQUIPMENT** .
- Remove front bumper cover --> **63 - BUMPERS** .

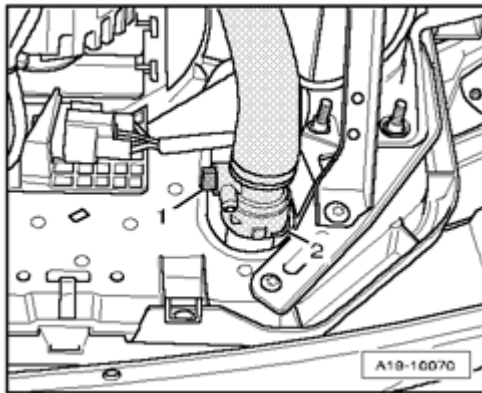


Fig. 538: Identifying Drain Plug & Coolant Hose
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place drip tray for workshop crane VAS 6208 under engine.
- Open drain plug - **1** - and allow coolant to drain.
- Then disconnect coolant hose - **2** - from radiator.

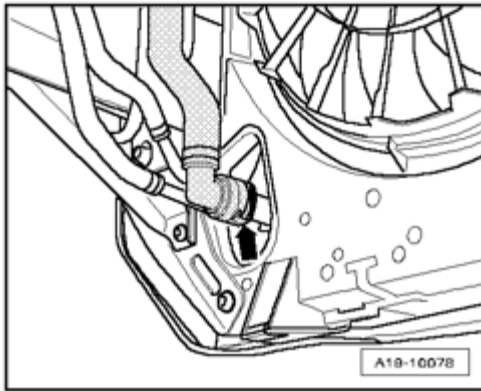


Fig. 539: Disconnecting Coolant Hose From Lower Left Of Radiator
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect coolant hose - **arrow** - from radiator at bottom left.

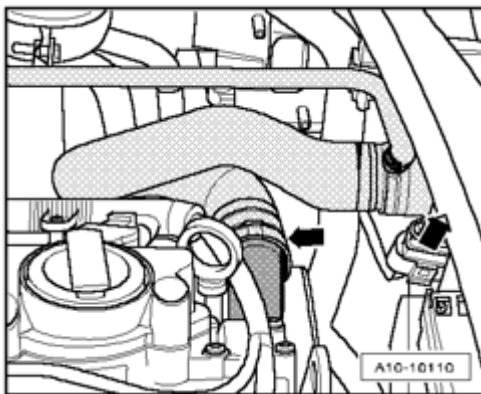


Fig. 540: Removing Left Front Coolant Hose In Engine Compartment
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect top coolant hose - **right arrow** - from radiator.

NOTE:

- **Ignore - left arrow -.**

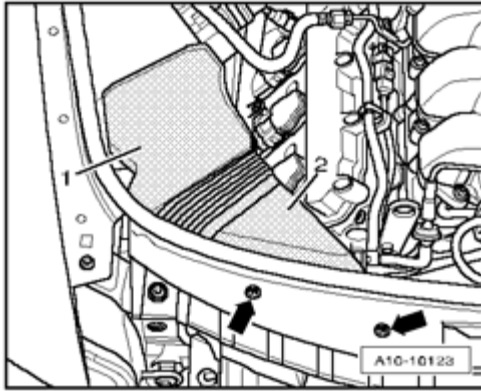


Fig. 541: Removing Air Duct Screws & Air Ducts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles with Multitronic transmission or automatic transmission 09L:

- Remove bolts - **arrows** -.
- Remove air duct - **1** - and - **2** -.

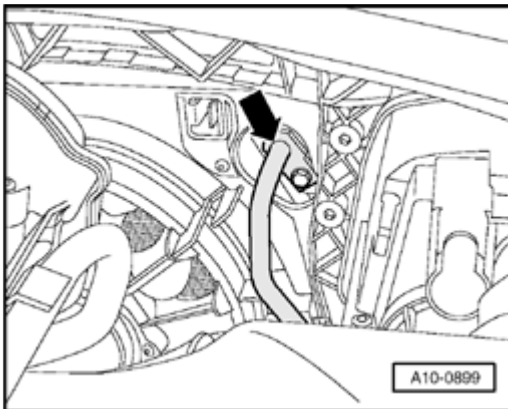


Fig. 542: Disconnecting ATF-Lines At Top And Bottom Of Radiator
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Observe the rules of cleanliness for working on automatic transmissions -- > 00 TECHNICAL DATA .**

- Place old oil collecting and extracting device V.A.G 1782 under engine.
- Remove upper and lower ATF lines - **arrow** - on cooler --> **37 CONTROLS, HOUSING** .
- Tie ATF lines up to longitudinal member to prevent fluid from escaping.

All:

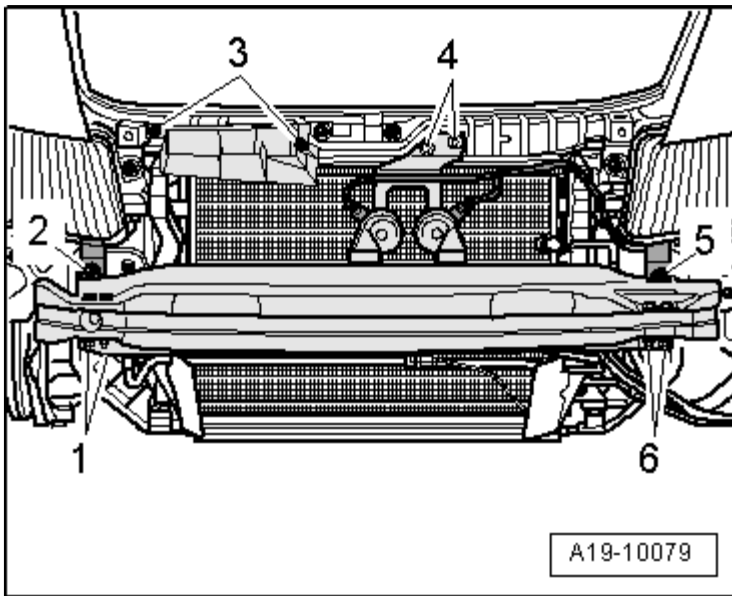


Fig. 543: Identifying Bolts, Brackets, Bumper & Air Duct
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **3** - and remove air duct.
- Remove bolts - **4** - and remove bracket for horns; leave electrical connections intact.
- Unfasten bracket - **2** - and - **5** - for headlight.
- Remove nuts - **1** - and - **6** - and remove bumper.

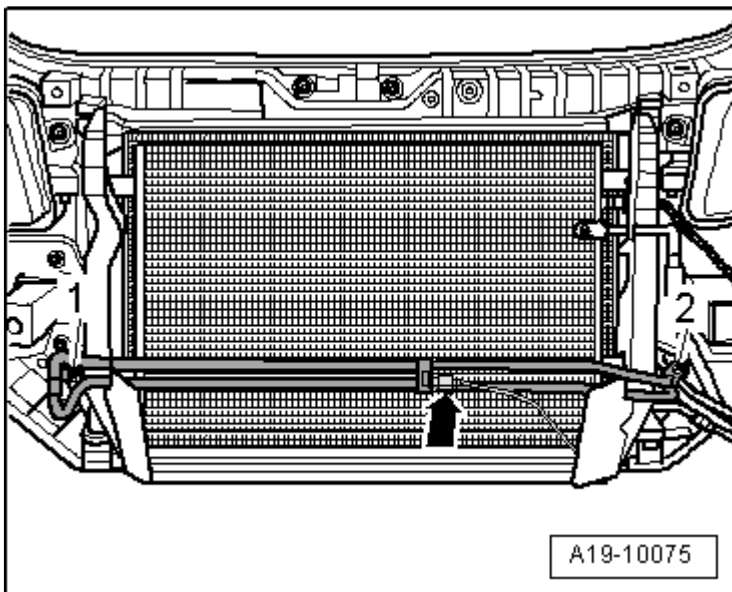


Fig. 544: Unclipping Outside Air Temperature Sensor G17 From Bracket & Removing Power Steering Cooling Coil Bolts
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip Outside Air Temperature Sensor G17 - **arrow** - from the bracket.

- Remove power steering cooling coil bolts - **1** - and - **2** - hydraulic hoses remain connected.
- Remove air guides at left and right of radiator.

CAUTION: The air conditioning refrigerant circuit must not be opened.

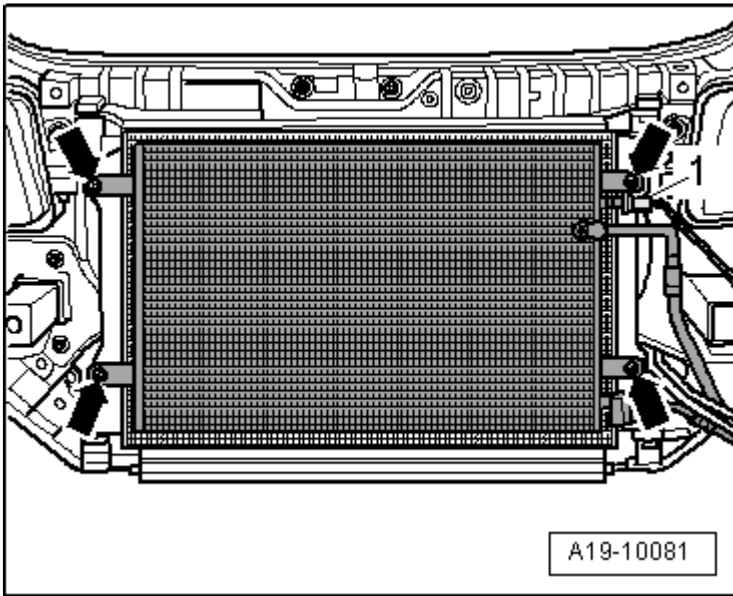


Fig. 545: Separating Electrical Connector & Removing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate electrical connector - **1** -.
- Remove bolts - **arrows** -.

NOTE:

- Do not bend or stretch lines or hoses as A/C compressor and/or refrigerant lines/hoses may be damaged.

- Pivot condenser downward with lines connected.

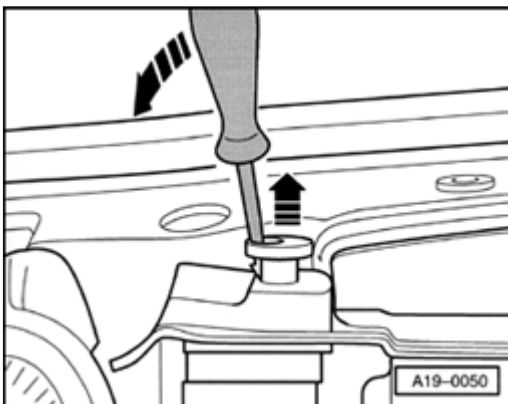


Fig. 546: Releasing Both Radiator Retaining Pins And Removing By Pulling Upward
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release both radiator retaining pins and remove by pulling upward - **arrows** -.
- Pivot radiator forward, pull up and remove.

Installing

Installation is in reverse order of removal, noting the following:

NOTE: • **Secure all hose connections with hose clamps appropriate for the model .**

- Install ATF lines --> **37 CONTROLS, HOUSING** .
- Install front bumper cover --> **63 - BUMPERS** .
- Install left and right front wheel housing liners --> **66 - EXTERIOR EQUIPMENT** .
- Fill with coolant -->**Cooling System, Draining and Filling** .

NOTE: • **Complete coolant must be replaced if the radiator was replaced.**

- Check ATF level --> **37 CONTROLS, HOUSING** .

Tightening Specifications

Component	Nm
Condenser to lock carrier	6
Cooling coil for power steering to condenser	9
Bracket for horns to lock carrier	8

Fan Shroud, Removing and Installing

Fan Shroud, Removing and Installing

Removing

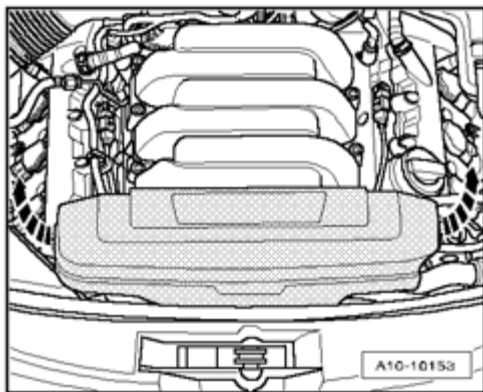


Fig. 547: Identifying Front Engine Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front engine cover - **arrows** -.

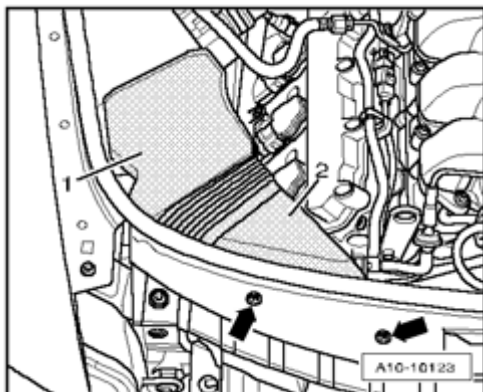


Fig. 548: Removing Air Duct Screws & Air Ducts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -.
- Remove air duct - **1** - and - **2** -.

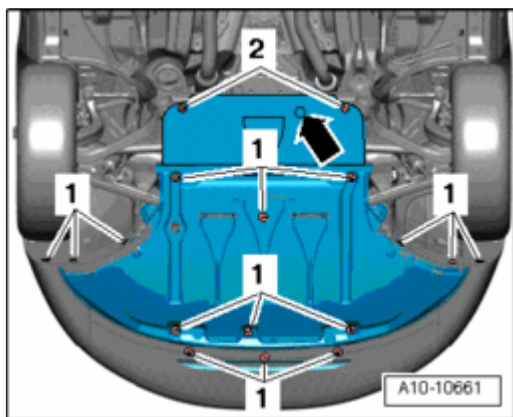


Fig. 549: Identifying Noise Insulation And Mountings
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front noise insulation by loosening mounting parts - **1** -.

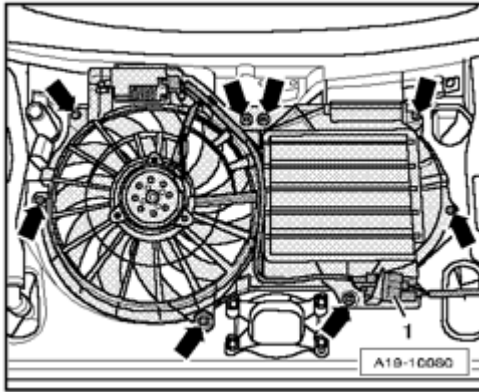


Fig. 550: Removing Bolts And Fan Shroud Upward/Out
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical harness connector - **1** - for coolant fan.
- Remove bolts - **arrows** - and remove fan shroud upward and out.

Installing

Installation is in reverse order.

Tightening Specifications

Component		Nm
Fan shroud to	M6	11
Lock carrier	Metal screw	2

Coolant Fan, Removing and Installing

Coolant Fan, Removing and Installing

Removing

- Remove fan shroud --> **Fan Shroud, Removing and Installing.**
- Free up electrical wiring.

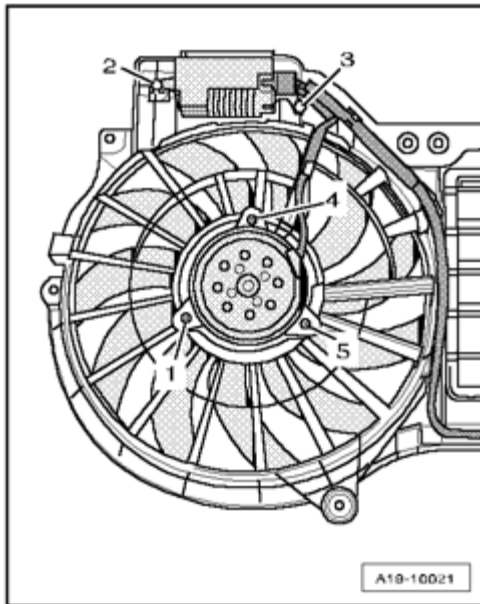


Fig. 551: Removing Bolts & Coolant Fan With Control Module
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1 to 5** -.
- Remove coolant fan with control module.

Installing

Installation is in reverse order of removal, noting the following:

- Install fan shroud --> **Fan Shroud, Removing and Installing.**

Tightening specifications

Component		Nm
Coolant fan	Single stage fan	3
To fan shroud	Double fan	4,5

Cooling System, Checking for Leaks

Cooling System, Checking for Leaks

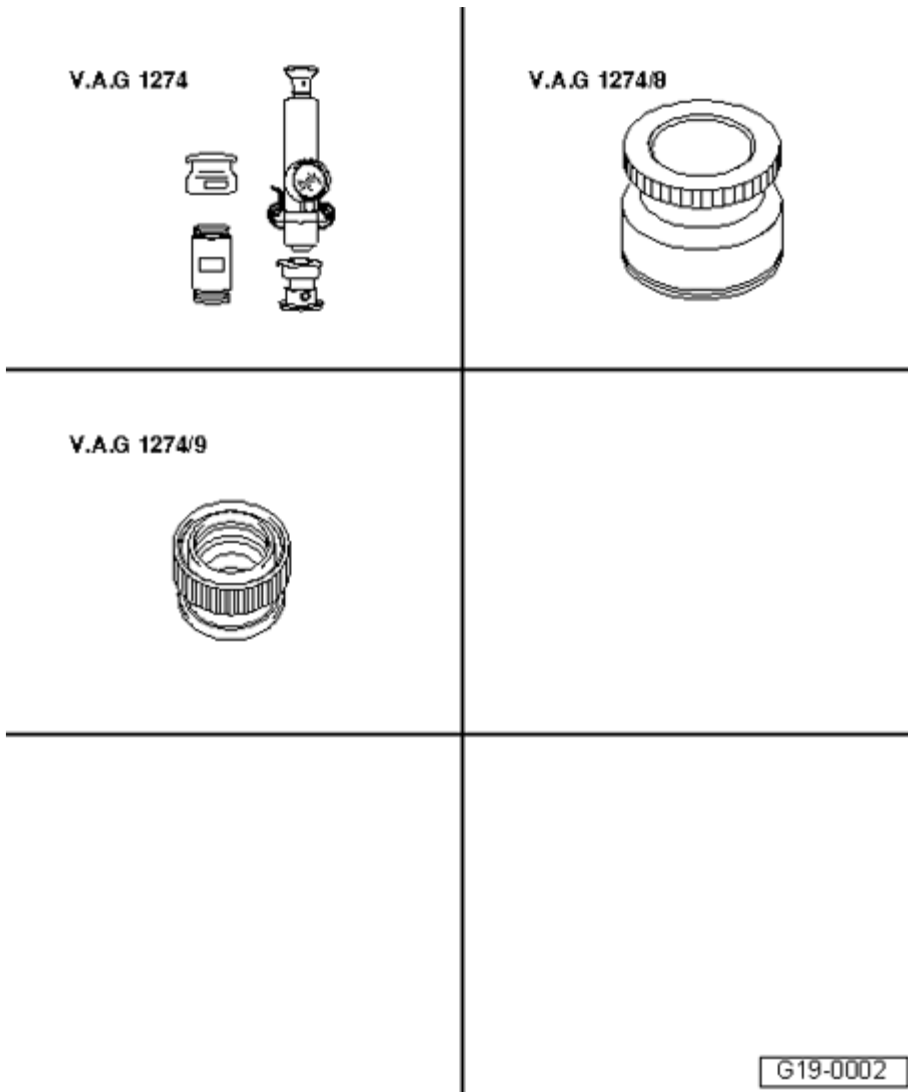


Fig. 552: Identifying Special Tools - Cooling System, Checking For Leaks
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Cooling system tester V.A.G 1274
- Adapter V.A.G 1274/8
- Adapter V.A.G 1274/9

Procedure

- Engine at operating temperature.

CAUTION: Cover cap of expansion tank with rag and open carefully, as hot steam i.e. hot coolant may escape when opening.

- Open cap of coolant expansion tank.

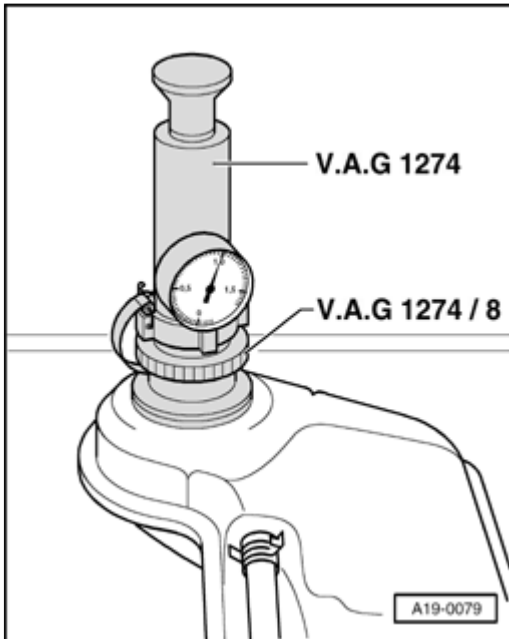


Fig. 553: Positioning Cooling System Tester V.A.G 1274 With Adapter V.A.G 1274/8 On Expansion Tank
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position cooling system tester V.A.G 1274 with adapter V.A.G 1274/8 on expansion tank.
- Generate a positive pressure of approximately 1.0 bar using hand pump of cooling system tester.

If pressure drops:

- Search for leaking areas and repair the malfunction.

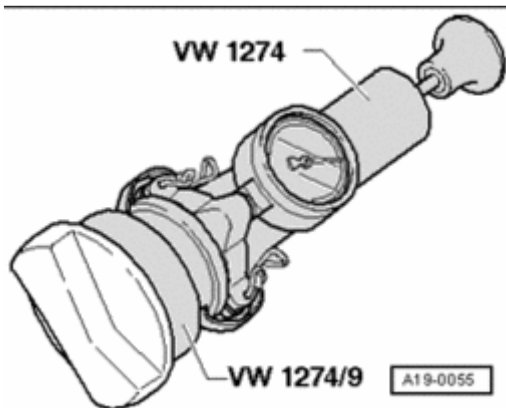


Fig. 554: Pressure Relief Valve In Cap, Checking
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressure relief valve in cap, checking

- Position cooling system tester V.A.G 1274 with adapter V.A.G 1274/9 on cap.
- Generate a positive pressure using hand pump of cooling system tester.
- Pressure release valve must open at a positive pressure of 1.4 to 1.6 bar.

If check-valve does not open as indicated:

- Replace cap.