

27 - STARTER, GENERATOR, CRUISE CONTROL

BATTERY

Battery

The battery is one of the most important electrical components in the vehicle. Trouble-free operation of the battery contributes substantially to customer satisfaction. To ensure a long service life, the battery must be checked, serviced, and cared for according to the explanations in this information.

In addition to its function of starting the vehicle, the battery performs other tasks as a buffer and a source of electrical energy for the vehicles entire electrical system.

Safety precautions

Before beginning work, the technicians must be acquainted with the possible risks when handling batteries.

Warnings and safety measures for lead-acid batteries

When servicing batteries, technicians must be aware of, and observe warnings and safety measures specified in this repair information.

Explanation of WARNING symbols on batteries

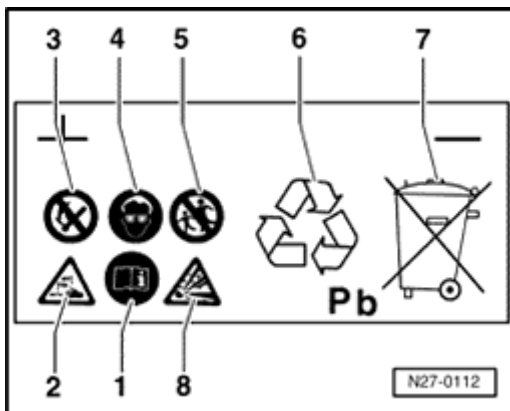


Fig. 1: Warning Symbols On Batteries

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Explanation of WARNING symbols on batteries

CAUTION: 1 - Read and follow all instructions on battery, contained in Repair Information, Electrical Equipment, and in Owners Manual!

2 - Battery acid can cause severe burns!

- When working with electrolyte always wear eye protection, rubber

gloves and a suitable apron. If electrolyte is spilled on eyes, skin, clothing (or painted surfaces), flush at once with large quantities of water.

- Never tip a battery on edge. Electrolyte can spill from the ventilation openings.

3 - Keep open flames and sparks away and DO NOT smoke near batteries! .

- Avoid sparks when working with cables and electrical units.
- Always reinstall battery positive (B+) or negative (-) terminal covers if removed during servicing

4 - Always wear eye protection when working with electrolyte!

- If electrolyte gets into eyes, flush with large quantities of water. Seek medical attention immediately!

5 - Keep children away from batteries!

6 - Dispose of batteries properly!

- Waste batteries must only be disposed of in appropriate waste disposal sites. Refer to local regulations pertaining to battery disposal.

7 - Never dispose of batteries in household waste! Batteries contain lead (Pb), which is toxic.

8 - Danger of explosion!

- Batteries produce explosive gasses while being charged.
- Keep open flames and sparks away and DO NOT smoke near batteries.
- The battery charger **MUST** be turned off when connecting or disconnecting the cables at the battery.
- Battery cell caps must **NOT** be removed while charging.
- Ensure that battery is charged in a well ventilated area.
- Avoid short circuits. Always reinstall battery positive (B+) or negative (-) terminal covers if removed during servicing.

Electrolyte:

- Unprotected contact with electrolyte will severely burn skin, eyes and mucous membrane.
- Electrolyte gasses will burn breathing passages.
- Ingestion of electrolyte will burn digestive system.
- **FIRST AID:** If electrolyte is spilled on eyes or skin, flush at once with large quantities of water. Remove any clothing affected and also flush with water.
- Never tip a battery on edge. Electrolyte can spill from ventilation openings.
- Should electrolyte be spilled on painted surfaces in vehicle or on floor, remove with absorbent material (dispose of absorbent material properly). Neutralize any remaining electrolyte with mixture of baking soda and water.
- Do not touch electrolyte with bare hands. Avoid skin contact.
- After servicing batteries, do not touch mouth, nose or eyes. Thoroughly wash hands prior to breaks and upon completion of battery servicing.
- Keep area where batteries are serviced free from food and drink.

CAUTION: Keep open flames and sparks away and **DO NOT** smoke near batteries.

- Smoking and open flames are prohibited while working near batteries.
- Avoid sparks when working with wiring, connectors, electrical components, as well as tools and equipment used for servicing.
- Always reinstall battery positive (B+) or negative (-) terminal covers if removed during servicing.

Eye protection and protective clothing:

- CAUTION:**
- When working with electrolyte always wear eye protection, rubber gloves and a suitable apron.

Danger of explosion:

- CAUTION:**
- Batteries produce explosive gasses while being charged.
 - Keep open flames and sparks away and **DO NOT** smoke near batteries.
 - Spray battery with antistatic spray prior to handling.
 - Battery cell caps must **NOT** be removed while charging.

- Battery charger **MUST** be turned off when connecting or disconnecting cables at battery.
- Ensure that battery is charged in a well ventilated area and, after charging is complete, is left to sit for a period of time in that area.
- Batteries should be transported only in conductive metal containers.
- Materials capable of generating and conducting electrostatic charges must not be used in area of battery while being charged.
- Avoid short circuits. Always reinstall battery positive (B+) or negative (-) terminal covers if removed during servicing.

Battery handling instructions

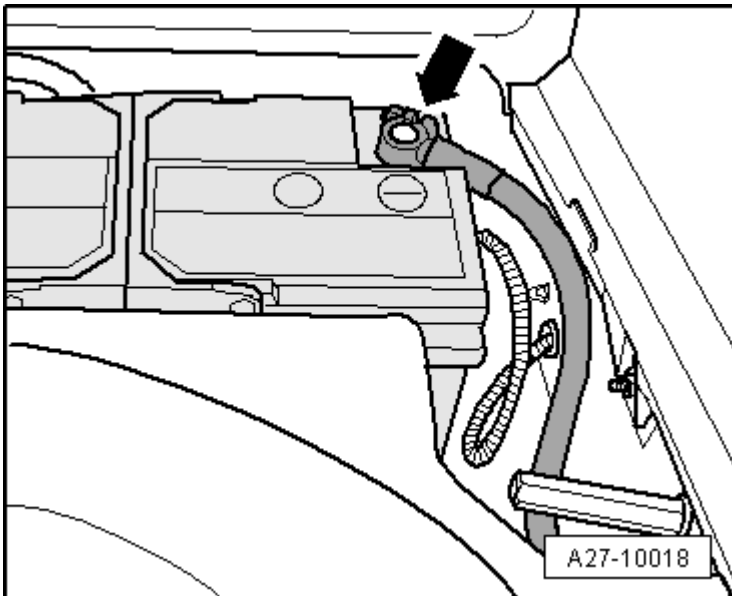


Fig. 2: Disconnecting Ground (GND) Cable At Battery
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- Do not grease battery terminals.
- Put the battery terminal clamps on only by hand, without forcing them, to avoid damaging the battery casing.
- The tightening torque for the cable clamps - arrow - is 7.5 Nm.
- The tightening torque of the additional clamps on the battery terminal clamps is 7.5 Nm.

Valve-regulated lead-acid battery or AGM battery

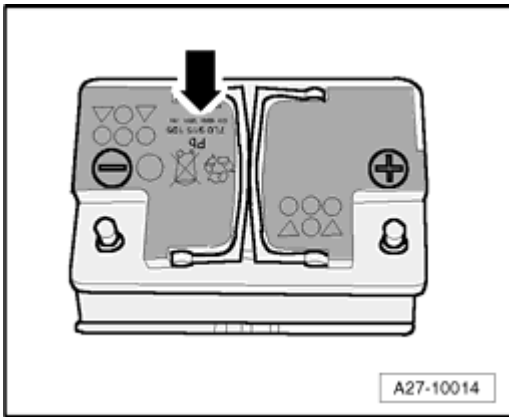


Fig. 3: Locating Number Of Ampere On Battery
Courtesy of VOLKSWAGEN UNITED STATES, INC.

CAUTION: Depending on the equipment, either a valve-regulated lead-acid battery or an AGM battery can be installed, identifiable by the number of ampere hours - arrow -.

- Number of ampere hours: 68 Ah 380 A
- Number of ampere hours: 75 Ah 420 A

Valve-regulated lead-acid batteries and AGM batteries must be protected from overvoltage.

The acid level cannot be checked on valve-regulated lead-acid batteries and AGM batteries. The battery cannot and must not be opened.

Battery, disconnecting and reconnecting notes

Should service procedures in this Repair Information specify disconnecting and reconnecting battery, please observe following **CAUTIONS**:

CAUTION: Before beginning repairs on electrical system:

- Obtain anti-theft radio security code (where applicable).
- Switch off all electrical components.
- Switch ignition off and remove ignition key.
- Disconnect negative (-) battery terminal.
- After reconnecting vehicle battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Information and/or Owners Manual.

Battery, disconnecting and connecting

Work procedure

- Switch ignition off and remove ignition key.

Sedan:

- Lift and secure luggage compartment floor mat.

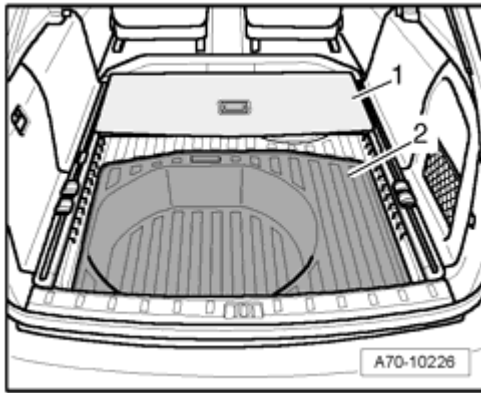


Fig. 4: Identifying Luggage Compartment Cargo Floor And Spare Wheel Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Avant:

- Remove luggage compartment storage area floor - 1 - and cover for spare wheel - 2 -.

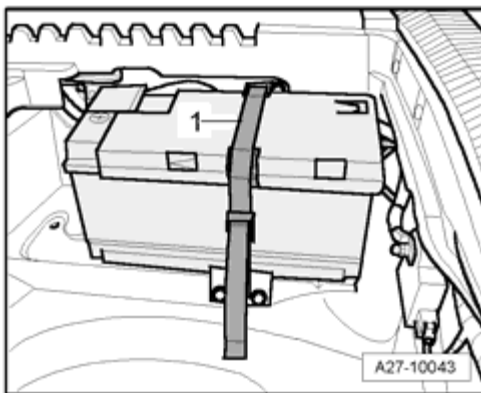


Fig. 5: Identifying Battery Retaining Band
Courtesy of VOLKSWAGEN UNITED STATES, INC.

All:

- Release battery strap - 1 - if present.

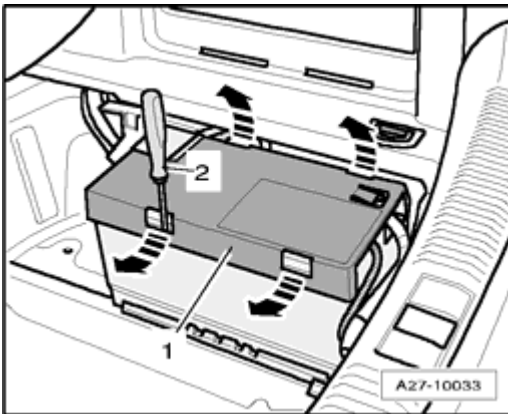


Fig. 6: Releasing Retaining Clips With A Screwdriver And Removing Battery Ground Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release retaining clips - **arrows** - using a screwdriver - **2** - and remove ground (GND) terminal cap - **1** -.

NOTE:

- Illustration shows molded insert removed.

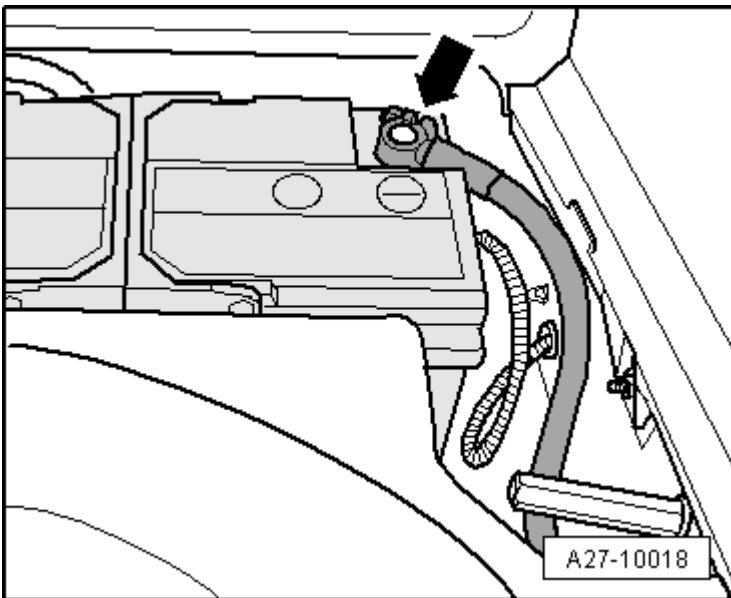


Fig. 7: Disconnecting Ground (GND) Cable At Battery
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect Ground (GND) wire - **arrow** - at battery.
- To connect, connect terminal clamp of Ground (GND) wire by hand to battery minus pole "-" and tighten nut.

If the battery is re-connected again, the following steps must be performed:

- Activate automatic run-up and run-down of electric window regulators Owners manual.

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

- Synchronize secondary and additional keys to ensure remote control operation. To do so, insert key into ignition lock, switch the ignition on and off again and remove key.
- Check DTC memories of all control modules and erase DTCs "Undervoltage" if necessary.

NOTE:

- **After re-connecting voltage supply, ESP indicator lamp can only go out after driving several meters.**

Tightening torque

Component	Nm
Battery terminal to battery post	7.5

Battery, removing and installing

Removing

- Switch ignition off and remove ignition key.

Sedan:

- Lift and secure luggage compartment floor mat.

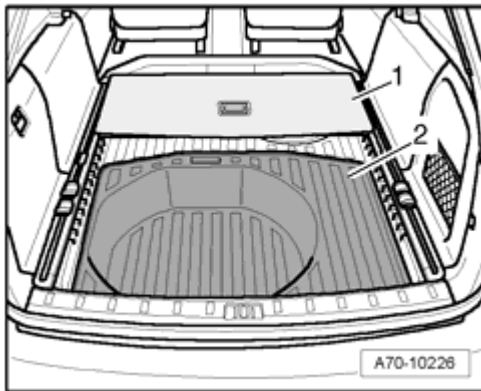


Fig. 8: Identifying Luggage Compartment Cargo Floor And Spare Wheel Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Avant:

- Remove luggage compartment storage area floor - 1 - and cover for spare wheel - 2 -.

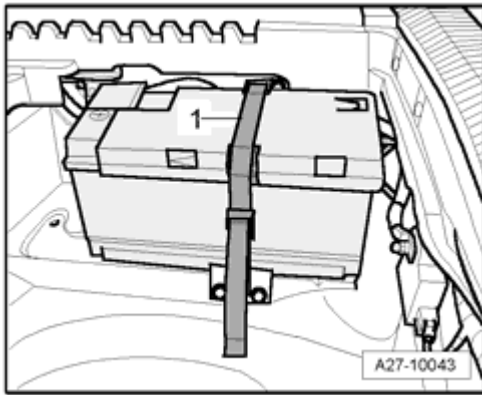


Fig. 9: Identifying Battery Retaining Band

Courtesy of VOLKSWAGEN UNITED STATES, INC.

All:

- Release battery strap - 1 - if present.

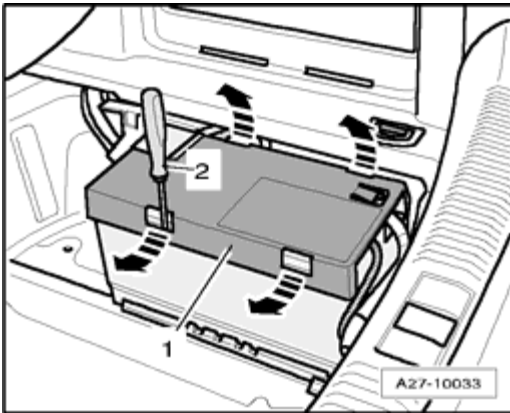


Fig. 10: Releasing Retaining Clips With A Screwdriver And Removing Battery Ground Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release retaining clips - **arrows** - using a screwdriver - **2** - and remove ground (GND) terminal cap - **1** -.

NOTE:

- Illustration shows molded insert removed.
- Connect the battery charger for battery assistance mode --> Battery assistance mode using battery charger VAS 5095A , VAS 5900 or VAS 5903.

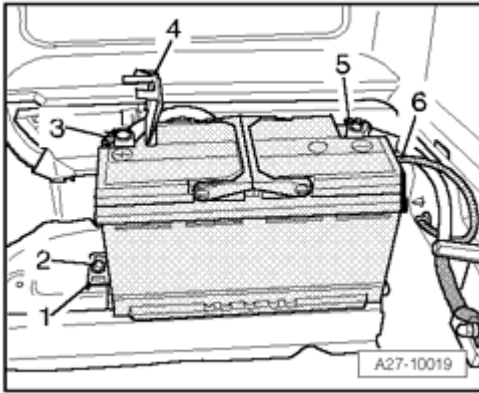


Fig. 11: Identifying Cover, Ground Wire, B+ Wire, Central Venting System, Bolt, And Battery Retaining Bracket

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove cover - 4 - above battery positive terminal.
- Disconnect ground (GND) wire - 5 - and B+ wire - 3 - from battery.
- Remove hose of central venting system - 6 -.
- Remove bolt - 2 - at battery retaining bracket - 1 -.
- Lift battery out of right luggage compartment.

CAUTION: When disposing of batteries, disposal regulations for batteries and for sulfuric acid must always be observed.

Installing

NOTE:

- For optimum operation of Energy Management Control Module J644 , the use of the battery indicated in the Parts Catalog is recommended.
- Only cycle-proof and leak-proof valve-regulated lead-acid batteries or AGM batteries according to standards "TL82506" (from December 1997) and "VW75073" (from August 2001) must be installed.
- Batteries from the Audi Parts Program have a bottom strip-adapter for adapting to different grip channels. Whether and how bottom strip-adapter is used, refer to operating instructions for battery.

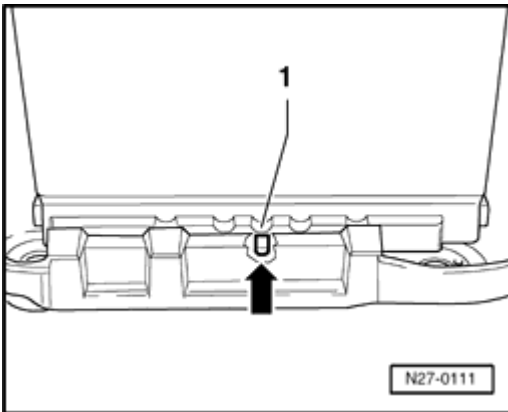


Fig. 12: Battery Foot Strip Cut-Out

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert battery into battery holder so that tab of rear battery holder - **arrow** - engages into cutout for battery clamping strip - **1** -.
- Battery must no longer be movable.

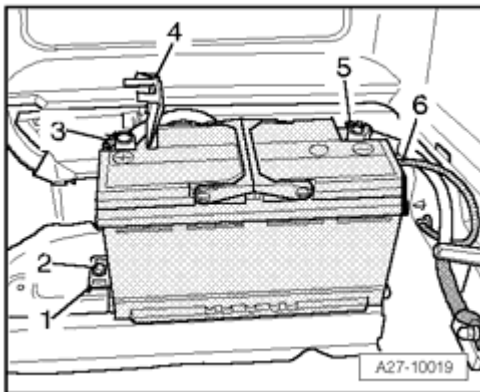


Fig. 13: Identifying Cover, Ground Wire, B+ Wire, Central Venting System, Bolt, And Battery Retaining Bracket

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten battery retaining bracket - **1** - using bolt - **2** -.

NOTE:

- **The tab at the battery retaining bracket must engage in the recess at the battery clamping strip.**

With ignition switched off and electrical components switched off, connect battery in the following sequence:

- First, connect terminal clamp - **3** - of positive wire to battery positive terminal "+" by hand and tighten nut.
- Connect terminal clamp - **5** - of ground (GND) wire to battery negative terminal "-" by hand and tighten

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

- Connect hose - **6** - for central venting system, heed notes --> **Batteries with central gas venting.**
- Close cover - **4** - above battery positive terminal.
- Check battery for proper seating after installation --> **Check battery for secure seating.**
- Stop battery assistance mode at battery charger.

If the battery was not removed and installed in assistance mode, the following steps must be performed after reconnecting the battery:

- Activate automatic run-up and run-down of electric window regulators Owners manual.
- Synchronize secondary and additional keys to ensure remote control operation. To do so, insert key into ignition lock, switch the ignition on and off again and remove key.
- Check DTC memories of all control modules and erase DTCs "Undervoltage" if necessary.

NOTE:

- **After re-connecting voltage supply, ESP indicator lamp can only go out after driving several meters.**

If the battery was replaced, Energy Management Control Module J644 must be coded anew.

Tightening torques

Component	Nm
Bolt at retaining bracket	24
Battery terminal to battery post	7.5

Check battery for secure seating

- Try to wiggle battery back and forth to check for proper installation.

If battery is not securely seated, the following dangers exist:

- Shortened service life due to damage caused by shaking.
- If the battery is not secured properly normal shock and vibration can damage the battery plates, which results in premature battery failure.
- The battery casing can be damaged by the fastening clip (this might possibly allow acid to escape from the battery, which would have severe consequences).
- Poor crash safety.

Batteries with central gas venting

NOTE:

- **Make sure that venting hose is always connected to the battery.**
- **For batteries with hose/tube for central venting system, make sure the hose is not kinked. Only in this case can the battery be vented freely.**

- The latest generation of batteries has a central venting system and a flashback protector in the form of a so-called "frit". Function: Gas produced when charging leaves the battery through a central opening on the top part of the side covering. A flashback protector is also integrated at the same place to prevent the combustible gas in the battery from igniting. The frit consists of a small round fiberglass mat about 15 mm in diameter and 2 mm thick. It works similarly to a valve, i.e. it allows gas produced in the battery to flow out.
- Do not lubricate battery terminals.
- Put the battery terminal clamps on only by hand, without forcing them, to avoid damaging the battery casing.

Battery with "Magic Eye"

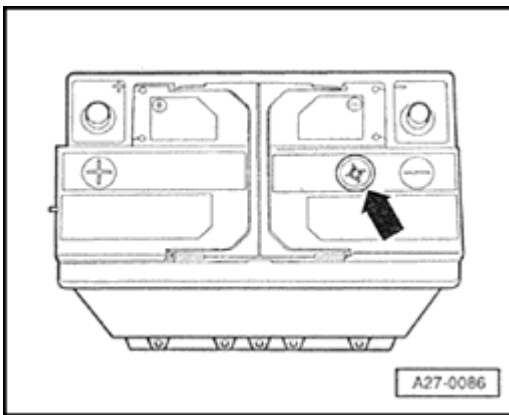


Fig. 14: Locating Magic Eye

Courtesy of VOLKSWAGEN UNITED STATES, INC.

The "magic eye" - **arrow** - gives information regarding the acid level and the charge level of the battery. Three different color indications are possible:

Color indication	Battery charge condition
Green	• Battery is sufficiently charged.
Black	• No charge or charge too low.
Colorless or yellow	• Critical acid level reached, battery must be recharged or replaced.

NOTE:

- If the battery is older than 5 years and the color indication of the magic eye is transparent, the battery should be replaced with a new one.

Work procedure

NOTE:

- When recharging the battery (but also while driving), air bubbles can form

below the "magic eye". These corrupt the color indication of the "magic eye".

- If batteries are equipped with sealing plugs due to manufacturing conditions, they are covered with a plastic foil.
- Before performing a visual check, lightly and carefully tap onto "magic eye" using a screwdriver handle; as a result the air bubbles will disappear.
- Read color indication of the "magic eye" --> Battery with "Magic Eye".

Visual check of battery

A visual check of the battery should be performed before executing measurements such as open-circuit voltage, electrolyte density or battery load check.

- Check the following:
 - Is the battery housing damaged? Damage to the casing can allow acid to escape from the battery.
 - Are the battery terminals (battery connections) damaged? Because of a damaged battery terminal, contact of the wiring connections is not ensured. This can cause a cable fire and interfere with the function of the electrical system.
 - Are the original battery sealing plugs installed? The sealing plugs must be equipped with an O-ring seal. In case of loss or damage, only original sealing plugs of the same type may be used.

Battery check using diagnostic systems VAS 5051 , VAS 5052 and VAS 5053

Special tools, testers and auxiliary items required

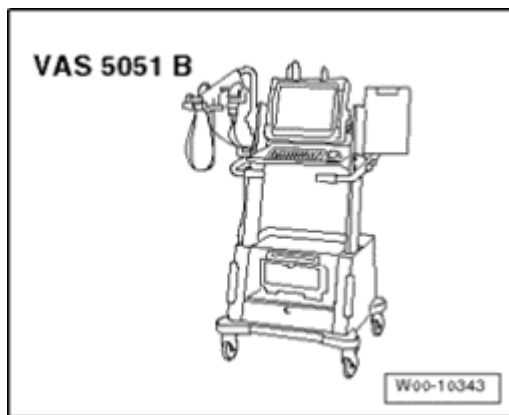


Fig. 15: Identifying Vehicle Diagnosis, Testing And Information System VAS 5051B
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Vehicle Diagnostic, Testing and Information System VAS 5051B with diagnostic cable VAS 5051/5A

Work procedure

- No charging unit must be connected when checking the battery and the engine must not be running

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

- Battery temperature must be at least -10 ° C.
- Diagnostic system temperature must be +5 45 ° C.
- With ignition switched on, connect Diagnostic Operation System VAS 5051B with diagnostic cable VAS 5051/5A.

NOTE:

- If a malfunction indication is displayed Operating instructions of VAS 5051B.

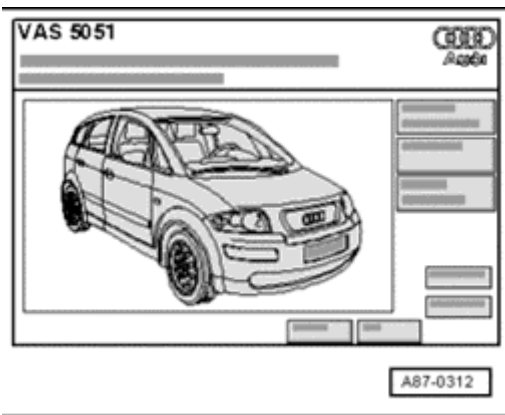


Fig. 16: Diagnostic System VAS 5051: Display
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Display on VAS 5051B :

- Touch Guided Functions button.

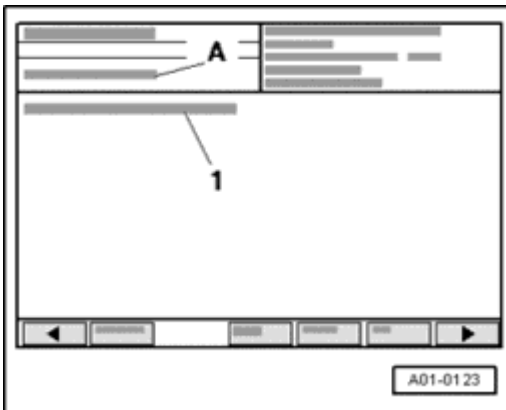


Fig. 17: Display On VAS 5051 - (1st Control Element In Test & Evaporative Emission (EVAP) Canister Purge Regulator Valve-N80-)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Display on VAS 5051B :

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

Vehicle Diagnostic, Testing and Information System VAS 5051B will then switch to the next selection level.

Selection request	Text line to be selected
Select car manufacturer	"Audi"
Select model	"Audi A6 2005 > "
Select model year (example)	"2006 (06)"
Select car type (example)	"Sedan"
Select engine code (example)	"BGS 5.2l FSI / 309 kW"
If vehicle identification was performed correctly, press --> button as confirmation.	
Select vehicle system or function (example)	61 - Battery regulation
Select vehicle system or function	A - Battery, checking, <u>Battery</u>

○ Follow further instructions on display of VAS 5051B , the following can be displayed:

- Battery is OK.
- Charge battery.
- Replace battery.

After battery check :

- Touch Go To button.
- Select function "Exit".

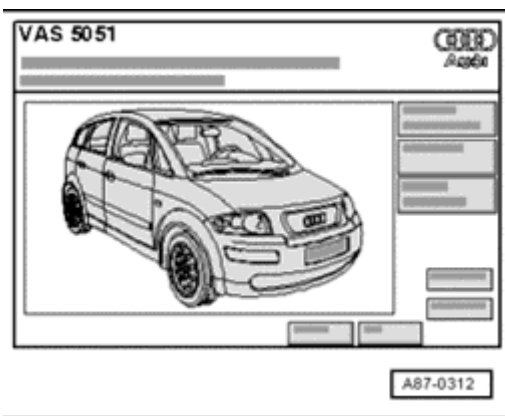


Fig. 18: Diagnostic System VAS 5051: Display
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Display on VAS 5051B :

- Switch off ignition and disconnect diagnostic connector after this indication is displayed.
- If necessary, charge battery according to --> **Charge battery** , or replace battery --> **Battery, removing**

No load voltage, checking**NOTE:**

- **Measurement of open-circuit voltage for evaluation of battery charge condition should only be considered if battery check cannot be executed using VAS 5051 , VAS 5052 or VAS 5053.**

Special tools, testers and auxiliary items required

Fig. 19: Portable Multimeter V.A.G 1526C

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Portable multimeter V.A.G 1526C

Work procedure

- Make sure the following is observed, since a proper measurement can otherwise not be ensured.
- Battery remains installed in vehicle, battery ground (GND) strap must not be disconnected.
- Open rear lid and adjust lid lock at position "Closed" so that the luggage compartment lamp is not switched on.
- Lock vehicle with remote control.
- Battery must not be loaded by electrical components within the next 2 hours before measurement.
- Battery must not be charged within the next 12 hours before measurement.
- Battery temperature must be at least -10 ° C.

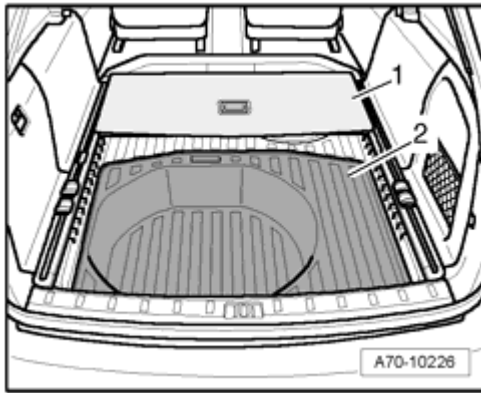


Fig. 20: Identifying Luggage Compartment Cargo Floor And Spare Wheel Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles with ground (GND) pin in luggage compartment

Sedan:

- Lift and secure luggage compartment floor mat.

Avant:

- Remove luggage compartment storage area floor - 1 - and cover for spare wheel - 2 -.

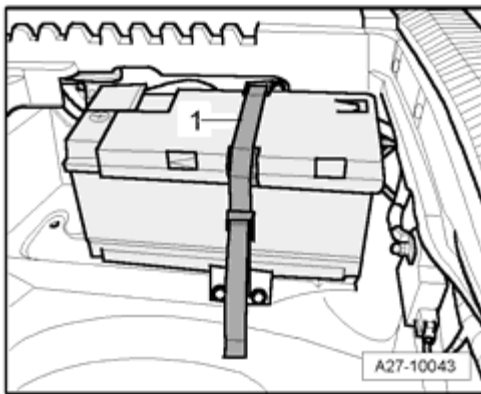


Fig. 21: Identifying Battery Retaining Band
Courtesy of VOLKSWAGEN UNITED STATES, INC.

All:

- Release battery strap - 1 - if present.

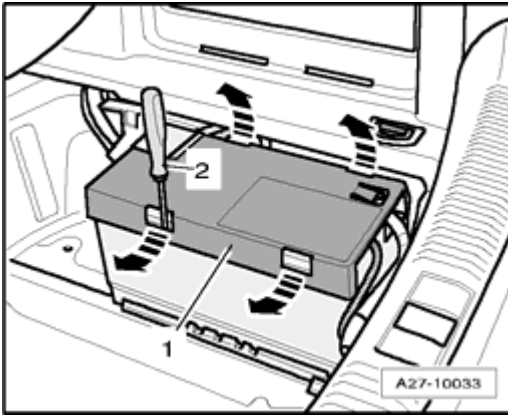


Fig. 22: Releasing Retaining Clips With A Screwdriver And Removing Battery Ground Cover
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release retaining clips - **arrows** - using a screwdriver - **2** - and remove ground (GND) terminal cap - **1** -.

NOTE:

- **Illustration shows molded insert removed.**
- **Remove cover above battery positive terminal.**

Vehicles with ground (GND) pin in luggage compartment

- Open cover - **arrow** - above battery positive terminal.
- Connect multimeter V.A.G 1526C to positive terminal "+" and negative terminal "".

Continuation of open-circuit voltage measurement

After a holding time of at least 2 hours:

- Measure voltage between the battery terminals.
- If meter indicates 12.5 volts or more, battery is in good condition.
- If battery open-circuit voltage is less than 12.5 volts, battery must be recharged --> **Charge battery**.
- After recharging, a battery check must be performed --> **Battery check using diagnostic systems VAS 5051 , VAS 5052 and VAS 5053**.

Battery, rapid-charging

CAUTION:

- **Battery must not be connected to vehicle electrical system when performing rapid charging. Disconnect ground and positive cables --> Battery, removing and installing.**
- **Do NOT attempt to rapid-charge completely discharged batteries.**

- Battery sealing plugs must always be firmly screwed in during charging, voltage measurement and load measurement.
- Ensure good ventilation.
- Smoking or open flames are not allowed in rooms in which batteries are being charged. The reason for this is that inflammable gasses are formed during battery charging process.
- Observe safety regulations of charger and battery manufacturers.

NOTE:

- Battery temperature must be at least 10 ° C.
- Rapid charging of batteries should only be performed in exceptional circumstances (e.g. boost starting) as rapid charging may cause damage.

Checking electrolyte level - batteries with "magic eye"

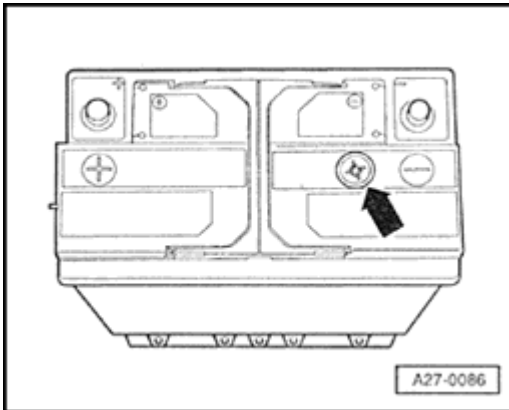


Fig. 23: Locating Magic Eye

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- For batteries with "magic eye" - **arrow** - , the electrolyte level can be read out via color indication. Three different color indications are possible:

Color indication	Battery charge condition
Green	• Battery is sufficiently charged.
Black	• No charge or charge too low.
Colorless or yellow	• Critical acid level reached, battery must be recharged or replaced.

Checking electrolyte level - batteries with sealing plug

CAUTION:

- Observe accident prevention directions when handling battery acid Electrolyte.
- Appropriate safety clothing is required Eye protection and protective clothing.

- **Illuminate the inner part of the battery housing only by using a flashlight.**
- **Never illuminate the interior of the battery housing using a naked flame.**
- **Never handle a naked flame or a burning cigarette close to batteries.**

Maintaining the correct electrolyte level in the battery is an important factor affecting the length of the battery's service life.

- Batteries with visible minimum and maximum marks require only visual inspection from the outside of the battery to check the electrolyte level.
- The electrolyte level must be above the min marking but may extend only as far as the max marking.

CAUTION:

- **To ensure proper sealing of the different battery plug systems, it is necessary that the original battery plugs are threaded into the battery openings. In case of loss or damage, only original sealing plugs of the same type may be used.**
- **The plugs must be equipped with an O-ring seal.**
- Unthread the sealing plugs on batteries which do not have clearly visible min and max markings or have an opaque housing so that the electrolyte level cannot be checked.
- Check electrolyte level by visually checking the inside of the battery.
- The electrolyte level must stop at the inside electrolyte level mark (plastic peg). This corresponds to the exterior max. marking.

If the electrolyte level is too low, a loss of battery capacity (power) occurs due to cell plates drying out. If the cell plates are not surrounded by electrolyte (sulfuric acid-water mixture), the plates, plate straps, and cell connectors will corrode. The corrosion damages battery operation, the battery can no longer be used.

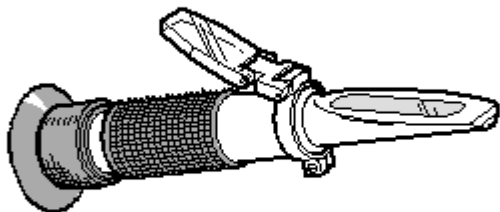
If the electrolyte level in the battery cells is too low, the battery must be replaced.

- Replacing battery --> **Battery, removing and installing.**

Electrolyte specific gravity, measuring - batteries with sealing plugs

Special tools, testers and auxiliary items required

T1 0007

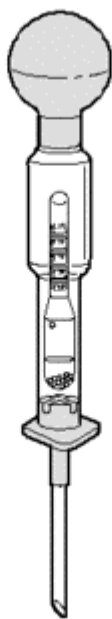


W00-0689

Fig. 24: Refractometer T10007

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Refractometer T10007 or



N27-0094

Fig. 25: Identifying Commercially Available Hydrometer

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Commercially available hydrometer

CAUTION:

- Observe accident prevention directions when handling battery acid

- Appropriate safety clothing is required Eye protection and protective clothing.
- Maintenance-free batteries must not be opened for checking the acid density, otherwise warranty expires.
- When disposing of batteries, disposal regulations for batteries and for sulfuric acid must always be observed.

NOTE:

- The electrolyte density test, in combination with the battery load test, provides information about the condition of the battery.
- The temperature of the battery acid must be at least 10 ° C.
- The electrolyte density can be checked directly after the battery is charged.

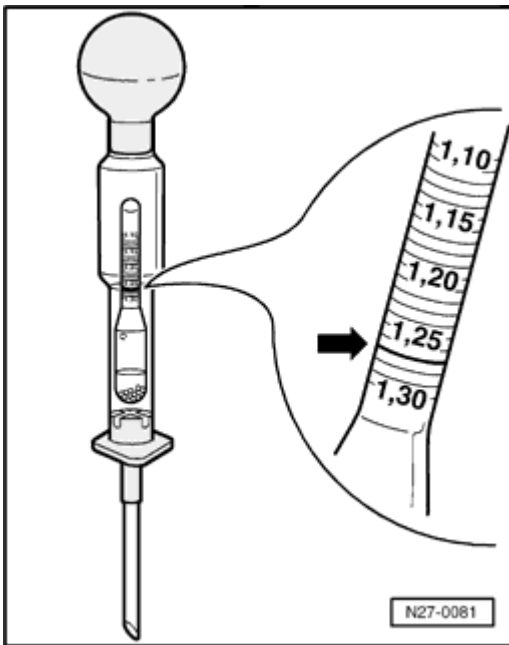


Fig. 26: Hydrometer Specific Gravity Reading

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Work procedure

- Remove all sealing plugs of battery cells.
- Dip hydrometer into battery cell and siphon off enough electrolyte until float floats freely in electrolyte.
- The larger the specified weight of the siphoned battery acid, the higher the float will float.
- The acid density of the electrolyte can be read off in kg/dm^3 on the hydrometer scale (specified density of the battery acid).
- Read off measured value at hydrometer and compare to indicated values in the table.

2005 Audi A6 Quattro**ELECTRICAL Electrical Equipment**

Charge condition in normal climates	Electrolyte density in kg/dm ³
Discharged	1.12
Half-charged	1.20
Good charge	1.28

Charge condition in tropical climates	Electrolyte density in kg/dm ³
Discharged	1.08
Half-charged	1.16
Good charge	1.23

Specified acid density must be at least 1.24 kg/dm³ in moderate climate zones. If the acid density in all battery cells is too low:

- Charge battery and repeat acid density test.

Example 1

Battery cell	1	2	3	4	5	6
Electrolyte density per cell in kg/dm ³	1.24	1.25	1.25	1.10 ¹⁾	1.24	1.25
• ¹⁾ Acid density in cell 4 is too low (deviation greater than 0.03 kg/dm ³).						

Example 2

Battery cell	1	2	3	4	5	6
Electrolyte density per cell in kg/dm ³	1.26	1.26	1.25	1.14 ¹⁾	1.18 ¹⁾	1.24
• ¹⁾ Acid density in cells 4 and 5 too low (deviation greater than 0.03 kg/dm ³).						

If specified values are not obtained:

- Replace battery.

NOTE:

- The measured values for the acid density for individual battery cells may not deviate more than 0.03 kg/dm³ from each other, otherwise replace battery.

If specified values are obtained:

- Thread in sealing plugs of battery cells.

CAUTION:

- To ensure proper sealing of the different battery cover systems, the

original battery plugs must be threaded into the battery openings. In case of loss or damage, only original sealing plugs of the same type may be used.

- The plugs must be equipped with an O-ring seal.

Charge battery

Special tools, testers and auxiliary items required

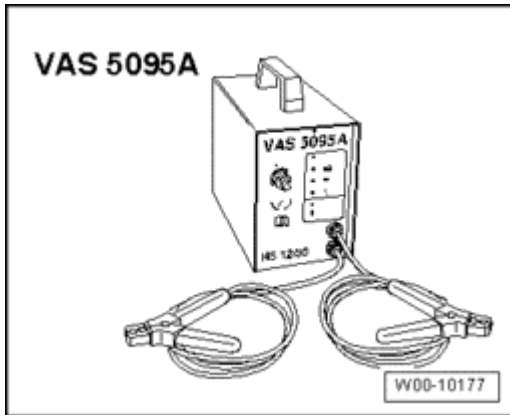


Fig. 27: Battery Charging Unit VAS 5095 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Battery charger VAS 5095A or

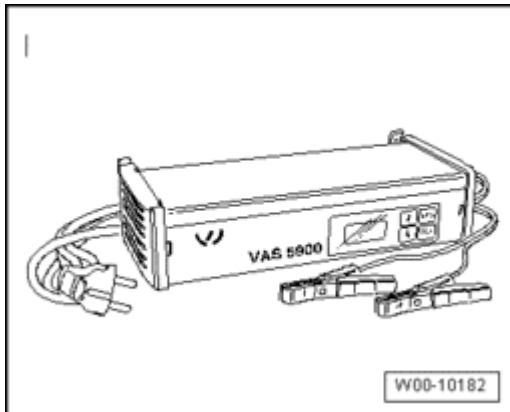


Fig. 28: Battery Charging Unit VAS 5900
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Battery charger VAS 5900 or

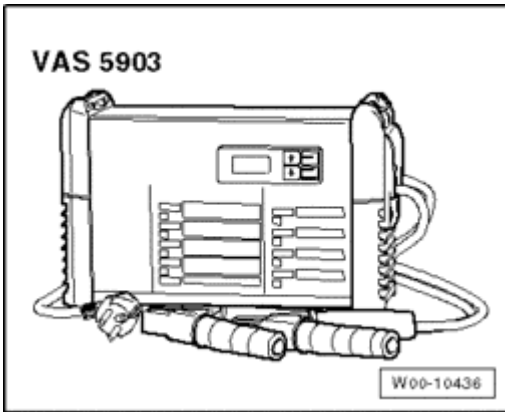


Fig. 29: Battery Charging Unit VAS 5903

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Battery charging unit VAS 5903

CAUTION: Valve-regulated lead-acid batteries and AGM batteries must be protected from overvoltage.

NOTE:

- Battery chargers VAS 5095A , VAS 5900 and VAS 5903 charge without current and voltage peaks. Batteries can therefore also be charged when installed. When doing this, heed the safety instructions. The devices provide an assistance mode in which they provide supply for the circuits.
- When working on the electrical equipment with components temporarily switched on, and for "Guided Fault Finding" , the battery must be charged with a battery charger with assistance mode to prevent damage to the battery.

CAUTION:

- It is recommended that the battery is charged when installed and connected. Only in this way it is guaranteed that the charge current is included in the capacity of the Energy Management Control Module J644.
- Battery plugs must always be threaded in so they seal properly for charging, voltage measurement and load measurement.
- Battery must not be quick-charged.

CAUTION:

- Provide sufficient ventilation.
- There should be no open lights or smoking in rooms where batteries are being charged. The reason for this is that gas builds up during the battery charging process, which can easily ignite.
- Heed the safety regulations of the battery and battery charger manufacturers.

Work procedure

- Switch off battery charger.
- Switch off ignition.

Sedan:

- Lift and secure luggage compartment floor mat.

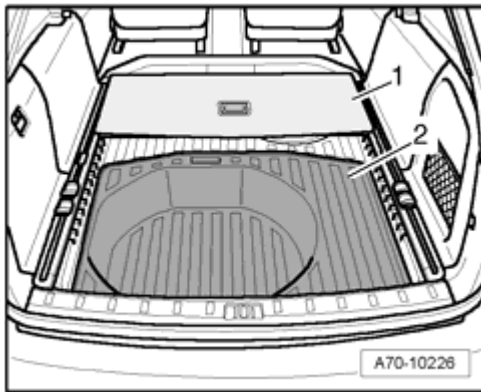


Fig. 30: Identifying Luggage Compartment Cargo Floor And Spare Wheel Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Avant:

- Remove luggage compartment storage area floor - 1 - and cover for spare wheel - 2 -.

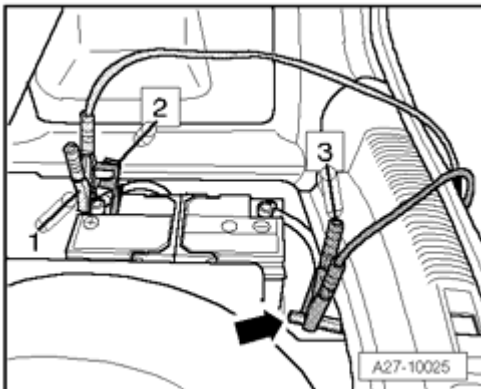


Fig. 31: Identifying Cover, Ground Pin, Battery Charger Pliers, And Ground Wire Pliers
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles with ground (GND) pin in luggage compartment:

- Remove cover - 2 - above battery positive terminal.

- Clamp ground (GND) wire pliers - **3** - of battery charger to ground pin - **arrow** - of Energy Management Control Module J644.

Vehicles with ground (GND) pin in engine compartment:

- Open cover - **arrow** - above battery positive terminal.
- Clamp positive wire clamp of battery charger to B+ terminal tap, and clamp ground (GND) wire pliers of battery charger to negative terminal tap.

All:

- Adjust charge current at battery charger according to battery capacity. It should amount to approx. 10 % of the battery capacity. For a 60 Ah-battery, approx. 6 A.
- Switch on battery charger.
- Keep lid open while charging.
- Perform battery test after charging process --> **Charge battery**..

Severely discharged batteries

- Batteries which have not been used in driving operation for a long time, for example in stored vehicles, discharge themselves.
- A battery is severely discharged, when the resting voltage has dropped below 11.6 volts. With voltage between 12.2 and 11.6 V, the battery is pre-damaged. Measuring open-circuit voltage --> **No load voltage, checking**.
- In severely discharged batteries the electrolyte (a mixture of sulfuric acid and water) consists almost entirely of water, since the proportion of sulfuric acid is strongly reduced. At minus temperatures, the battery can freeze and the casing can crack.
- Severely discharged batteries can sulfatize, i.e. the complete plate-surfaces of the batteries can harden. The battery acid is not clear, it has a slightly white color.
- If severely discharged batteries are recharged again shortly after having been severely discharged, the sulfation forms again.
- If these batteries are not recharged, the plates continue to harden and the charge-retention ability becomes limited. The consequence is reduced battery performance.

Procedure for charging severely discharged batteries, which are sulfatized

Severely discharged batteries which are sulfatized must be charged with a small charge-current as follows:

- Adjust charging current to approx. 5 % of the battery capacity, i.e. for a 60 Ah battery, the charging current is then to approx. 3 Ampere.
- Charge battery --> **Charge battery**. The charge voltage (U max) may only amount to a max. of 14.4 V (volt).

NOTE:

- Severely discharged batteries should never be charged quickly.

Battery assistance mode using battery charger VAS 5095A , VAS 5900 or VAS 5903

- The battery assistance mode is used, e.g. for battery replacement in the workshop when troubleshooting.
- In the following, the battery assistance mode is described acting for battery charger VAS 5900.

Special tools, testers and auxiliary items required

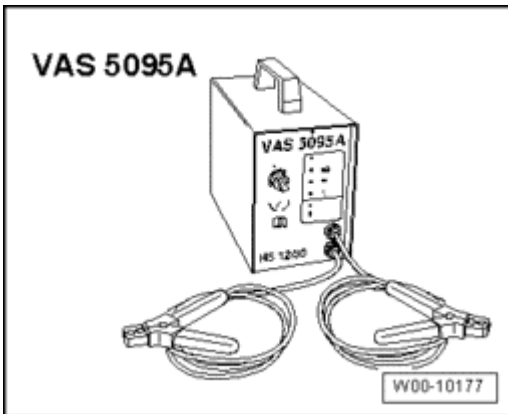


Fig. 32: Battery Charging Unit VAS 5095 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Battery charger VAS 5095A or

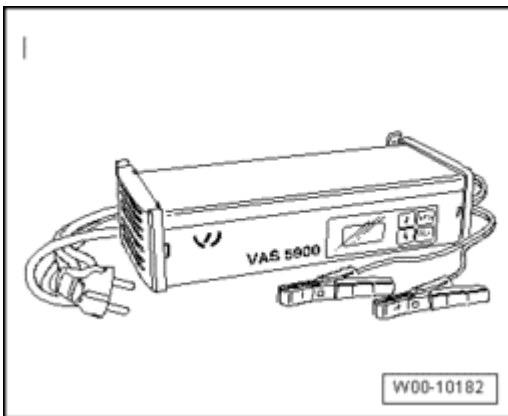


Fig. 33: Battery Charging Unit VAS 5900
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Battery charger VAS 5900 or

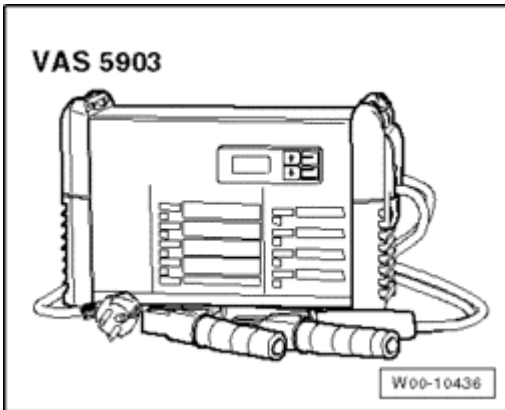


Fig. 34: Battery Charging Unit VAS 5903

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Battery charging unit VAS 5903

Work procedure

- Switch ignition off and remove ignition key.
- Switch off all electrical components.
- Connect power plug of battery charger VAS 5900.
- The last selected operating mode appears on the display.
- Press Start/Stop button for approx. 5 seconds.
- Menu item "charging of severely discharged batteries / assistance mode" is activated.
- Press button ? or ? in order to adjust the vehicle electrical system.

NOTE:

- If no button is pressed within 5 seconds, the battery charger VAS 5900 switches back to the main menu.
- Select the battery voltage by pressing the Start/Stop button.

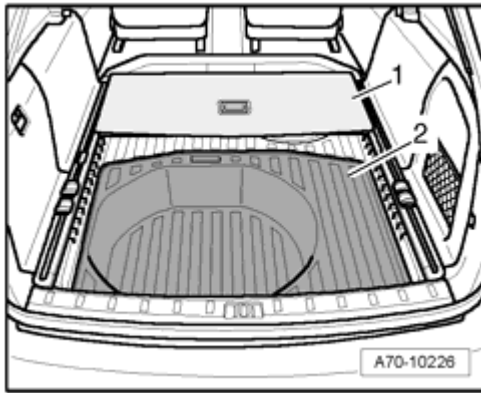


Fig. 35: Identifying Luggage Compartment Cargo Floor And Spare Wheel Cover
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles with ground (GND) pin in luggage compartment

Sedan:

- Lift and secure luggage compartment floor mat.

Avant:

- Remove luggage compartment storage area floor - 1 - and cover for spare wheel - 2 -.

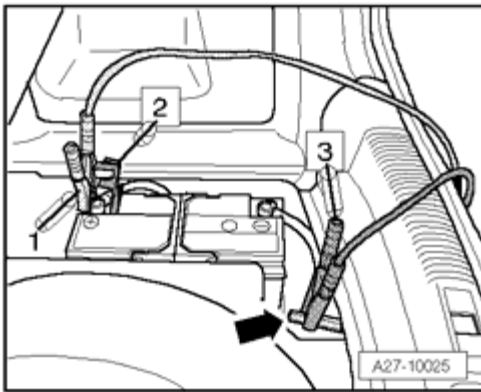


Fig. 36: Identifying Cover, Ground Pin, Battery Charger Pliers, And Ground Wire Pliers
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove cover - 2 - above battery positive terminal.
- Clamp battery charger pliers - 1 - of positive wire to battery's B+ terminal "+".
- Clamp ground (GND) wire pliers - 3 - of battery charger to ground pin - **arrow** - of Energy Management Control Module J644.

Vehicles with ground (GND) pin in luggage compartment

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

- Open cover - **arrow** - above battery positive terminal.
- Clamp positive wire clamp of battery charger to B+ terminal tap "+" , and clamp ground (GND) wire pliers of battery charger to negative terminal tap "".

All:

- The charging clips are checked for connection to correct poles.

CAUTION: The Start/Stop button must not be operated when the charging clips are not connected correctly, otherwise battery charger VAS 5900 or vehicle electronics are damaged.

- Confirm charging clips are connected to correct poles via Start/Stop.
- The battery charger VAS 5900 starts the assistance mode.

The battery can now be removed.

- Press Start/Stop button to end assistance mode only after replacing the battery.
- Disconnect power plug.

Battery Switch-Off Relay J655 , removing and installing - vehicles up to approx. 06.2004

If Battery Switch-Off Relay J655 is malfunctioning or was triggered, it must be replaced.

- Replace Battery Switch-Off Relay J655 --> **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS** .

Battery Interrupt Igniter N253 , removing and installing - vehicles as of approx. 07.2004

If Battery Interrupt Igniter N253 is malfunctioning or was triggered, it must be replaced.

- Replace Battery Interrupt Igniter N253 --> **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS** .

Retainer for Battery Switch-Off Relay J655 or Battery Interrupt Igniter N253 , removing and installing

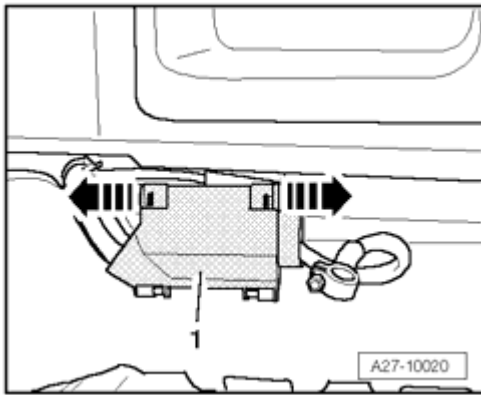


Fig. 37: Releasing Clasps And Opening Flap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

NOTE:

- All cable ties opened or cut during engine removal must be reinstalled at the same locations during installation.
- Remove battery --> Battery, removing and installing.
- Release clasps - arrows - and open flap - 1 -.

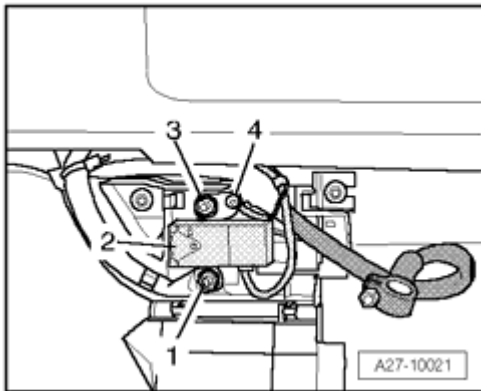


Fig. 38: Removing Nuts From B+ Wires And Battery Switch-Off Relay J655 From Retainer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles up to approx. 06.2004:

- Remove nuts - 1 - and - 3 - from B+ wires.
- Remove Battery Switch-Off Relay J655 - 2 - from retainer.

NOTE:

- Disregard - 4 -.

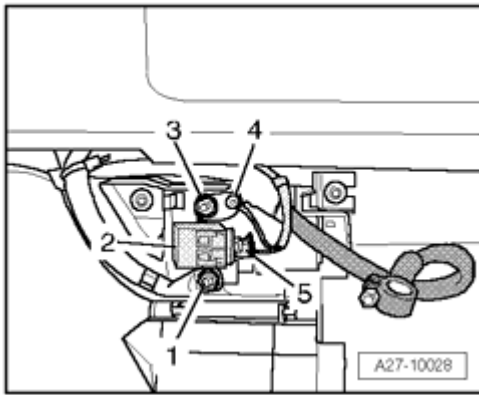


Fig. 39: Removing Nuts From B+ Wires And Battery Interrupt Igniter N253 From Retainer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles as of 07.2004:

- Remove nuts - 1 - and - 3 - from B+ wires.
- Remove Battery Interrupt Igniter N253 - 2 - from retainer.

NOTE:

- Disregard - 4 - and - 5 -.

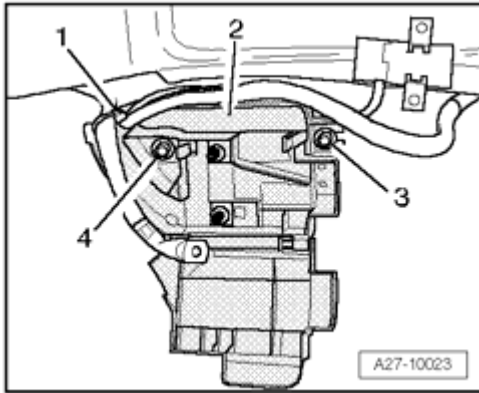


Fig. 40: Identifying Nuts, Cable Tie, And Retainer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

All:

- Remove nuts - 3 - and - 4 -.
- Cut cable tie - 1 - and remove retainer - 2 - from body.

Installing

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

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

NOTE:

- During installation, re-install all cable ties at the same locations.
- Install battery Installing.

Tightening torques

Component	Nm
Retainer to body	3
Positive wires on Battery Switch-Off Relay J655 or Battery Interrupt Igniter N253	20

Energy Management Control Module J644 , removing and installing

Removing

NOTE:

- While removing and installing, no charger must be connected.
- If control module is replaced, select "Guided Functions" of respective control module in.
- With ignition switched off, disconnect battery Ground (GND) wire --> Battery, disconnecting and connecting.

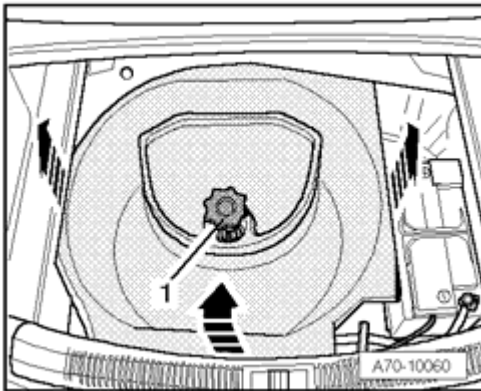


Fig. 41: Removing Mounting Bolt And Molded Insert From Spare Wheel Well
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Vehicles with molded insert:

- If present, remove mounting bolt - **1** -.
- Remove molded insert from spare wheel well - **arrows** -.

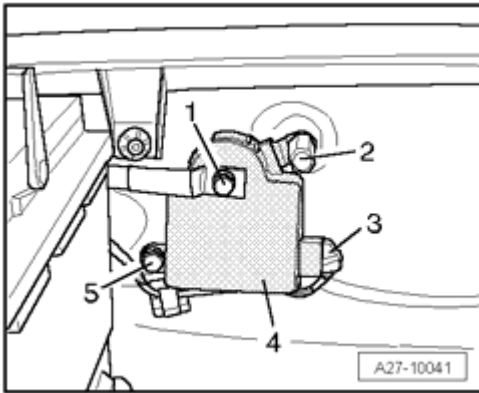


Fig. 42: Identifying Ground Pin, Cap Nut, Ground Wire, Harness Connector And Energy Management Control Module J644

Courtesy of VOLKSWAGEN UNITED STATES, INC.

All:

- Remove ground pin - 2 - and cap nut - 5 -.
- Remove Energy Management Control Module J644 - 4 -.
- Unscrew ground (GND) wire - 1 - to battery from Energy Management Control Module J644.
- Disconnect electrical harness connector - 3 -.

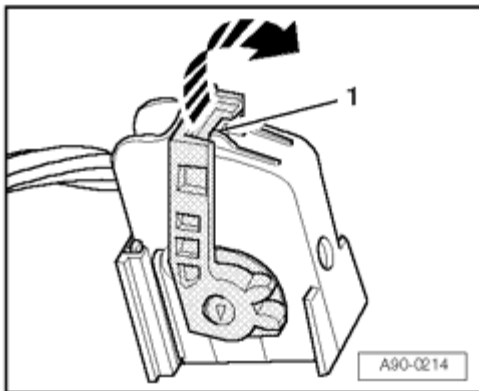


Fig. 43: Pressing Catch And Rotating Retaining Bracket

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press catch - 1 - and rotate retaining bracket in - **direction of arrow** - to do so.

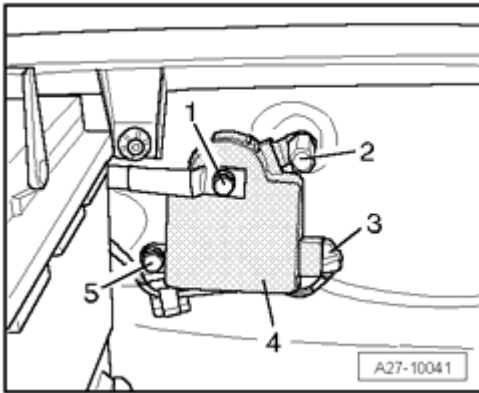


Fig. 44: Identifying Ground Pin, Cap Nut, Ground Wire, Harness Connector And Energy Management Control Module J644

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing

When installing, always heed the following sequence, otherwise proper function of Energy Management Control Module J644 cannot be guaranteed.

1. Install ground (GND) wire 1 to battery on Energy Management Control Module J644.
2. Screw Energy Management Control Module J644 4 on to body, tighten ground (GND) pin 2 and cap nut 5 to do so.
3. Connect ground (GND) wire to battery.
4. Connect electrical harness connector 3 to Energy Management Control Module J644.
5. Perform necessary steps after connecting battery.

If Energy Management Control Module J644 was replaced, it must be coded.

Tightening torques

Component		Nm
Control module	Ground (GND) pin	20
to chassis	Nut	20
Ground (GND) wire to control module		9

GENERATOR, REMOVING AND INSTALLING

Vehicles with 3.2l FSI engines

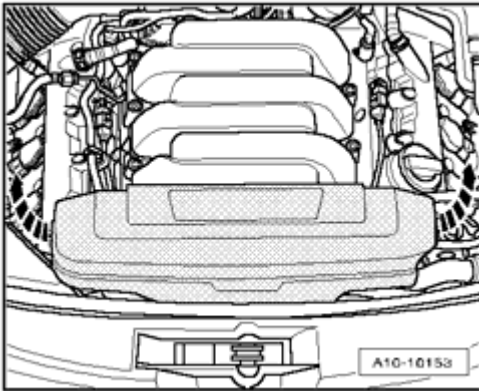


Fig. 45: Identifying Front Engine Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- With ignition switched off, disconnect battery Ground (GND) wire --> **Battery, disconnecting and connecting.**
- Remove front engine cover - **arrows** -.

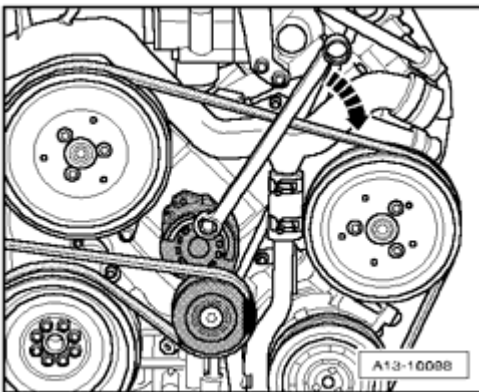


Fig. 46: Pivoting Tensioning Device To Relieve Tension On Ribbed Belt

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- Mark direction of rotation of ribbed belt using chalk or felt-tip marker before removing. Reversing the direction of rotation of a run-in ribbed belt can destroy the belt.
- Pivot tensioner in - direction of arrow - to release tension on ribbed belt.
- Remove ribbed belt from generator pulley.
- Release tensioner.

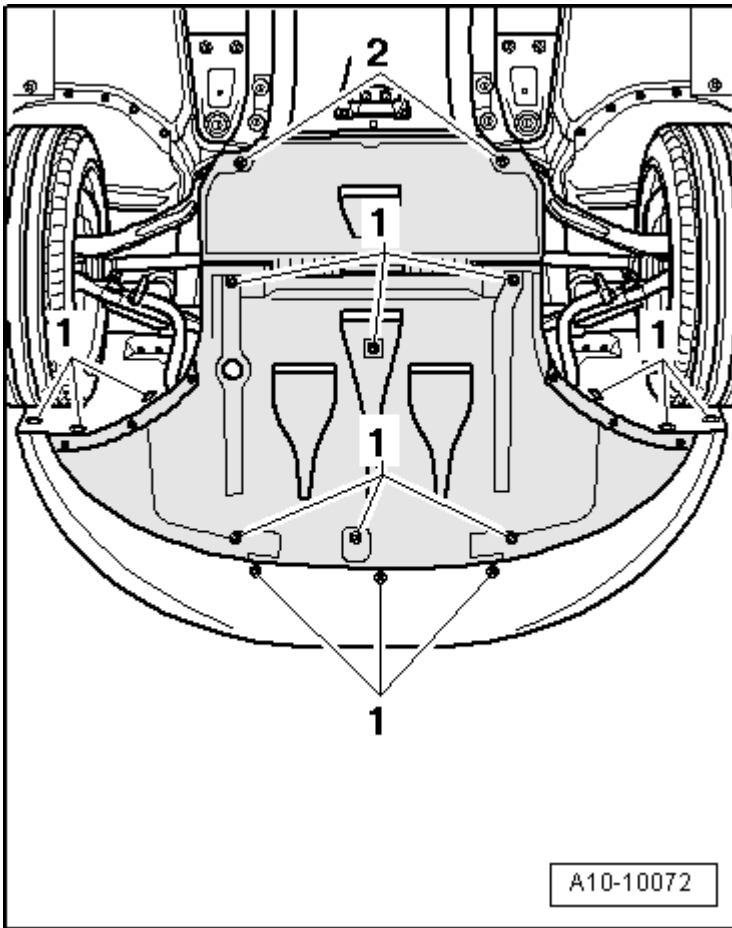


Fig. 47: Identifying Quick-Release Screws And Front Noise Insulation
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove quick-release screws - 1 - and - 2 - and remove front noise insulation.

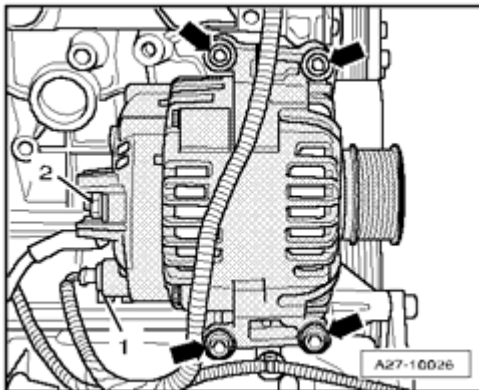


Fig. 48: Identifying Bolts, Electrical Connections, And Generator
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical wires - 1 - and - 2 - from generator.

- Unscrew bolts - **arrows** - and remove generator.

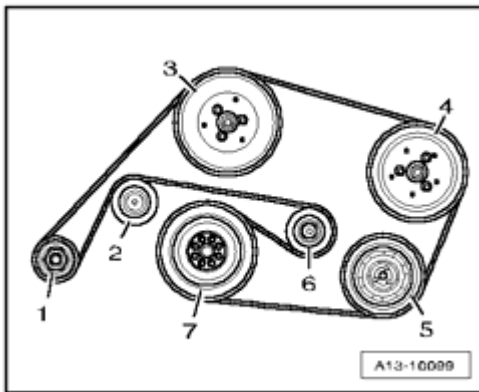


Fig. 49: Placing Ribbed Belt Over Belt Pulley

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing

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

- Place ribbed belt over belt pulley in the specified sequence.

1. Generator
2. Relay pulley
3. Coolant pump
4. Power-steering pump
5. A/C compressor
6. Ribbed belt tensioner
7. Crankshaft

NOTE:

- When installing ribbed belt, be sure that it is seated correctly on belt pulleys.
- Connect battery. Required actions Battery, disconnecting and connecting.
- Start engine and check path of belt.

Tightening torques

Component	Nm
Generator to engine	22
Terminal 30/B+ to generator	16

Vehicles with 4.2I MPI engine

Removing

- With ignition switched off, disconnect battery Ground (GND) wire --> **Battery, disconnecting and connecting.**
- Drain engine coolant --> 4.2 Liter V8 5V Engine Mechanical, Engine Code(s): BNK - **19 - ENGINE - COOLING SYSTEM** .
- Bring lock carrier into service position --> **50 - BODY - FRONT** .

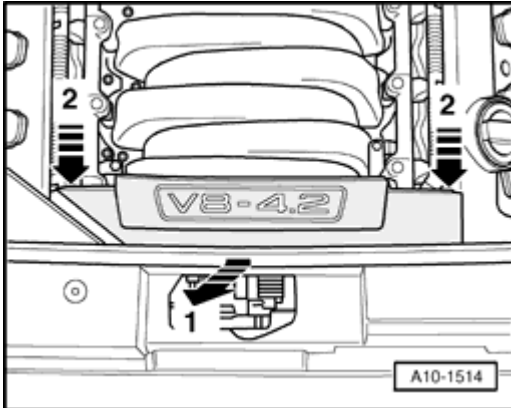


Fig. 50: Removing Front Engine Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front engine cover - **arrow 1** - and - **arrows 2** -.

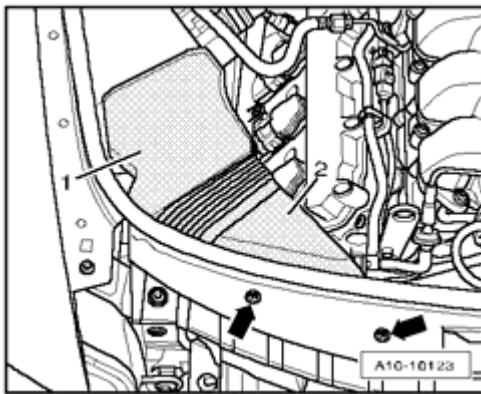


Fig. 51: Removing Air Duct Screws & Air Ducts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

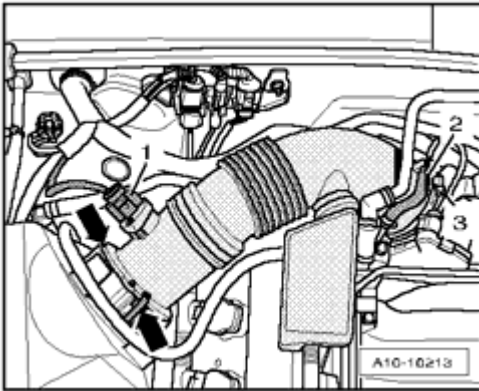


Fig. 52: Identifying Vacuum Line, Electrical Harness Connector, Hose Clamp, And Clips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect vacuum line - **2** -.
- Disconnect electrical harness connector - **1** - at Mass Air Flow (MAF) Sensor G70.
- Remove air guide hose, release hose clamp - **3** - and open clips - **arrows** - to do so.

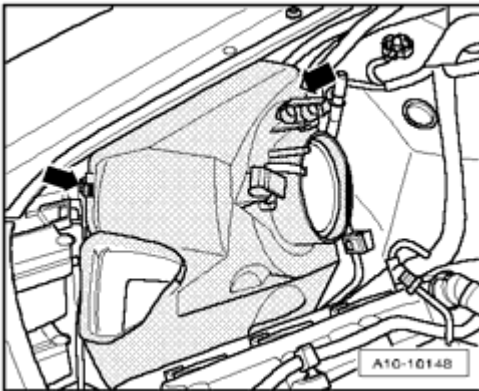


Fig. 53: Opening Clips And Removing Upper Part Of Air Filter Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open clips - **arrows** - and remove upper air filter housing.

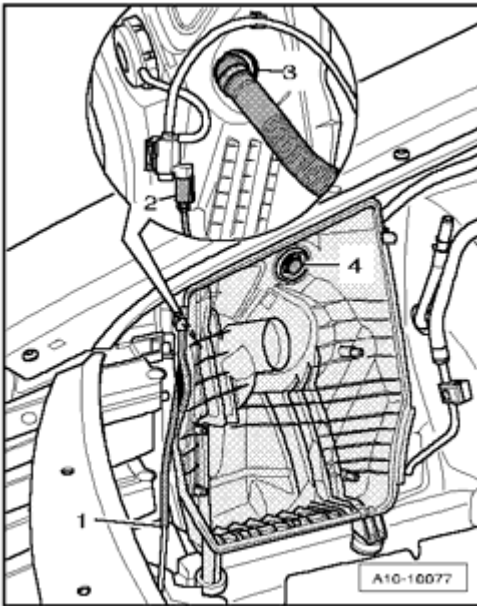


Fig. 54: Identifying Vacuum Line, Expanding Clip, Hose, And Electrical Harness Connector
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect vacuum line - 1 -.
- Remove pin of expanding clip - 4 -.
- Remove lower air filter housing and disconnect electrical harness connector - 2 - at rear from Intake Air Switch-Over valve N335.
- Disconnect hose - 3 - to Secondary Air Injection (AIR) pump.
- Remove lower air filter housing.

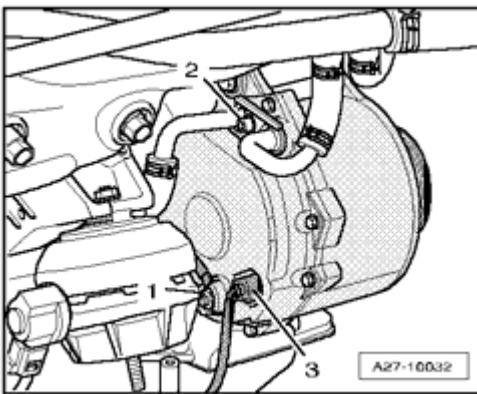


Fig. 55: Identifying Electrical Wires, And Bolt
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - 2 - and remove bracket.
- Pull water pipes out of generator.

- Disconnect electrical wires - 1 - and - 3 - from generator.

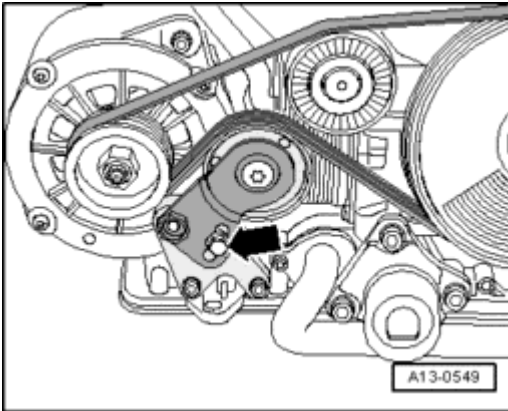


Fig. 56: Loosening Tensioning Bolt And Ribbed Belt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- Mark direction of rotation of ribbed belt using chalk or felt-tip marker before removing. Reversing the direction of rotation of a run-in ribbed belt can destroy the belt.
- Loosen tensioning bolt - arrow - and remove ribbed belt.

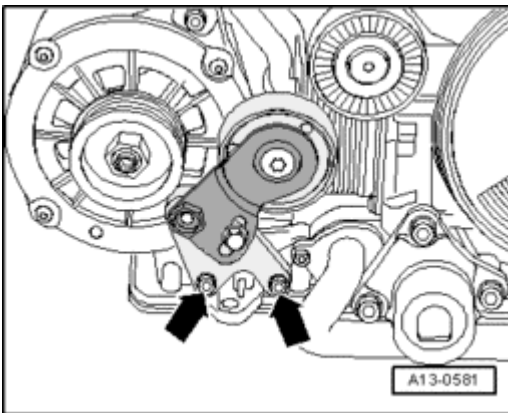


Fig. 57: Removing Tensioning Roller
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** - and remove tensioner roller.

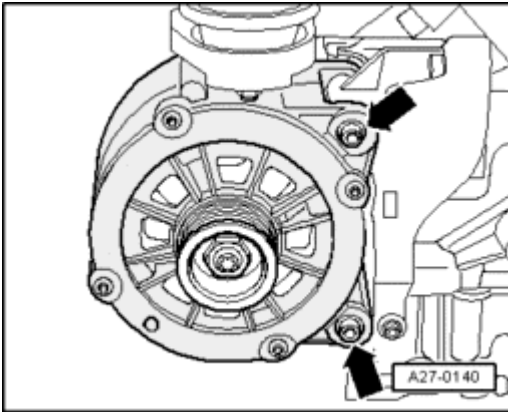


Fig. 58: Removing Generator Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - arrows -.

NOTE:

- If generator is stuck in its bracket, screw in mounting bolts again except 2 rotations.
- Carefully strike on bolt heads using flat side of hammer - doing this loosens sleeves of generator mount.
- Remove generator.

Installing

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

NOTE:

- Secure all hose connections using hose clamps appropriate for the model type Parts Catalog
- Replace O-rings.
- Slightly drive back sleeves for retaining bolts in order for easier installation of generator.

NOTE:

- Tight sleeves for generator mount must be made smooth-running, otherwise clamping force of sleeve is too little despite correct torque.

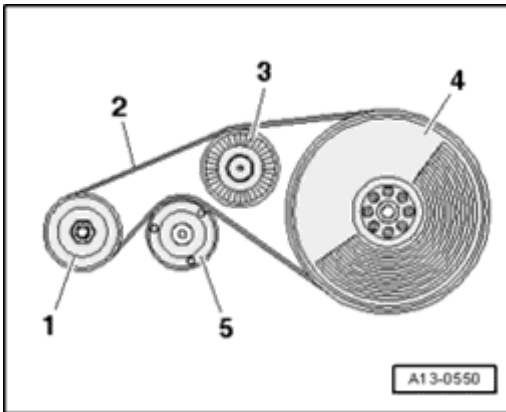


Fig. 59: Placing Ribbed Belt Over Belt Pulley In Specified Sequence
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place ribbed belt - 2 - over belt pulleys in the specified sequence.

1 - Generator

3 - Relay pulley

4 - Harmonic balancer

5 - Tensioner roller

NOTE:

- When installing ribbed belt, be sure that it is seated correctly on belt pulleys.
- Install lock carrier with attachments --> **50 - BODY - FRONT** .
- Connect battery. Required actions **Battery, disconnecting and connecting**.
- Fill with coolant --> **4.2 Liter V8 5V Engine Mechanical, Engine Code(s): BNK - 19 - ENGINE - COOLING SYSTEM** .
- Start engine and check path of belt.

Tightening torques

Component	Nm
Alternator to bracket	22
Tensioner roller to bracket	22
Terminal 30/B+ to generator	16
Bracket for coolant lines to generator	9

Vehicles with 4.2 FSI engines

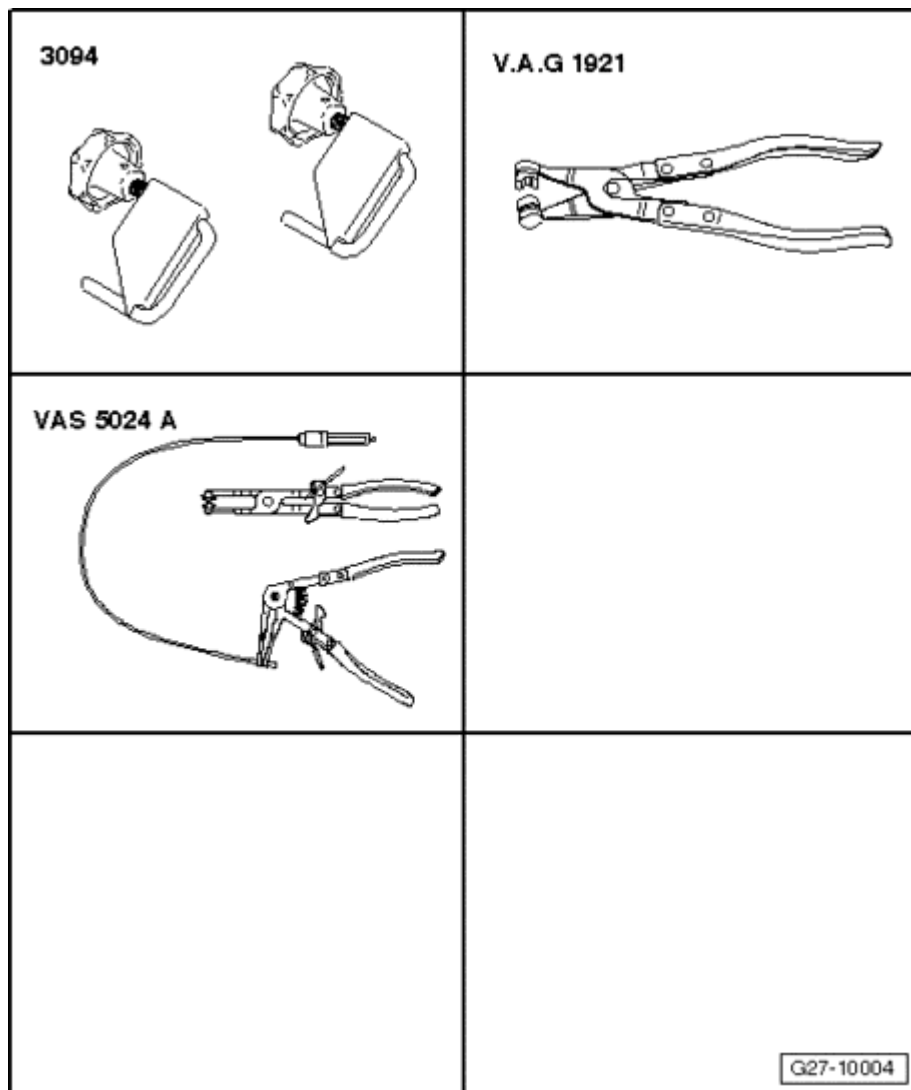


Fig. 60: Hose Clamps Up To 25mm 3094, Hose Clamp Pliers V.A.G 1921, And Pliers For Spring-Type Clamps VAS 5024 A

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Hose clamps up to 25mm 3094
- Hose clamp pliers V.A.G 1921
- Pliers for spring-type clamps VAS 5024 A

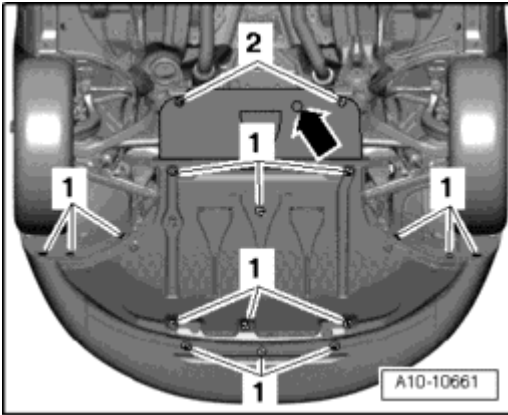


Fig. 61: Identifying Noise Insulation And Mountings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- With ignition switched off, disconnect battery Ground (GND) wire --> **Battery, disconnecting and connecting.**
- Remove quick-release screws - **1** - and - **2** -.
- Remove pin of expanding clip - **arrow** - and remove noise insulations.

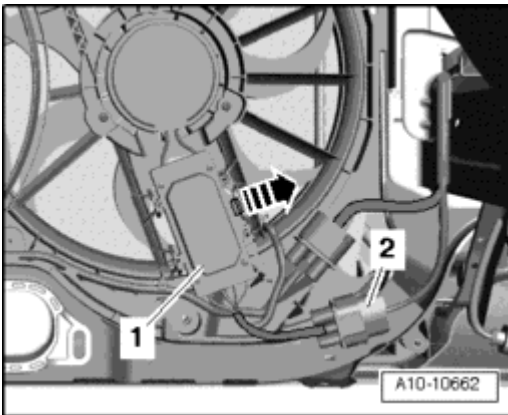


Fig. 62: Identifying Clip, Coolant Fan Control (FC) Control Module J293, And Electrical Harness Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove electrical harness connector - **2** - from bracket and disconnect it.
- Release clip - **arrow** - and lay Coolant Fan Control (FC) Control Module J293 - **1** - aside.

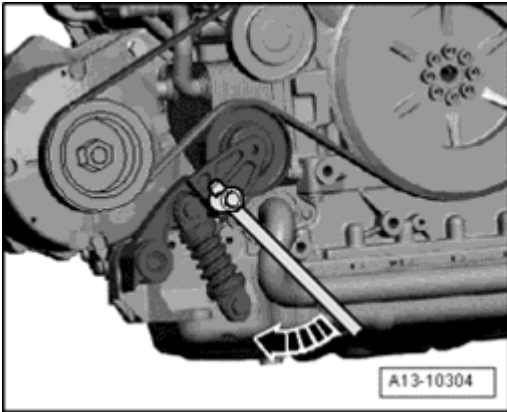


Fig. 63: Releasing Ribbed Belt Tension

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- Mark direction of rotation of ribbed belt using chalk or felt-tip marker before removing. Reversing the direction of rotation of a run-in ribbed belt can destroy the belt.
- Pivot tensioner in - direction of arrow - to release tension on ribbed belt.
- Remove ribbed belt and release tensioner.

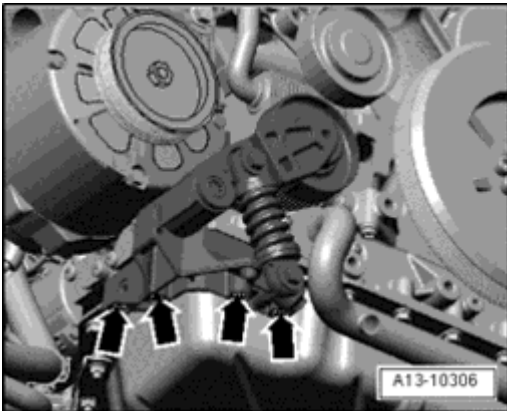


Fig. 64: Removing Bolts & Ribbed Belt Tensioner At Upper Part Of Oil Pan

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -.
- Remove tensioner for ribbed belt from upper part of oil pan.

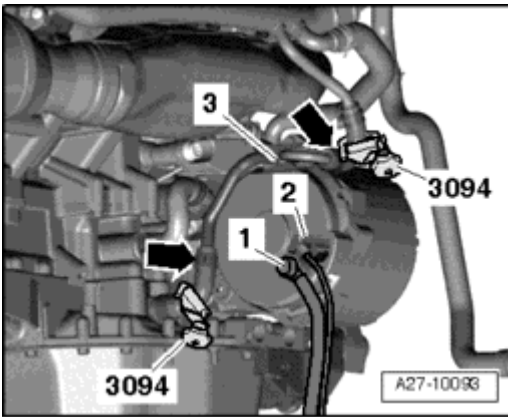


Fig. 65: Identifying Coolant Hoses And Coolant Pipes
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp coolant hoses - 2 - and - 3 - using hose clamps 3094.

NOTE:

- Place a rag under separating point to catch escaping coolant.
- Disconnect coolant hoses - arrows - from coolant pipes.
- Disconnect electrical harness connector - 3 - at generator.
- Remove terminal 30/B+ - 1 -.

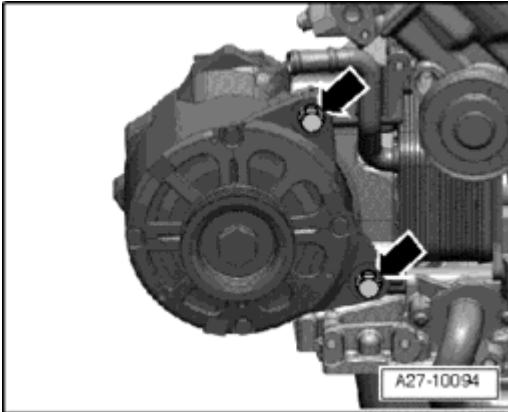


Fig. 66: Identifying Bolts For Generator
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew bolts - arrows - and remove generator.

NOTE:

- If generator is stuck in its bracket, screw in mounting bolts again except 2 rotations.
- Carefully strike on bolt heads using flat side of hammer - doing this loosens sleeves of generator mount.

Installing

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

NOTE:

- Secure all hose connections using hose clamps appropriate for the model type Parts Catalog
- Slightly drive back sleeves for retaining bolts in order for easier installation of generator.

NOTE:

- Tight sleeves for generator mount must be made smooth-running, otherwise clamping force of sleeve is too little despite correct torque.

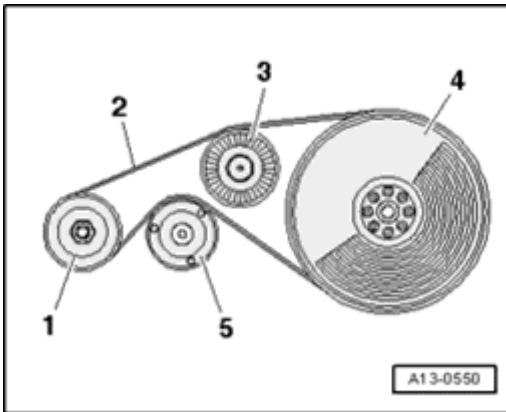


Fig. 67: Placing Ribbed Belt Over Belt Pulley In Specified Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place ribbed belt - 2 - over belt pulleys in the specified sequence.

1 - Generator

3 - Relay pulley

4 - Harmonic balancer

5 - Tensioner roller

NOTE:

- When installing ribbed belt, be sure that it is seated correctly on belt pulleys.
- Install ribbed belt --> 4.2 Liter V8 5V Engine Mechanical, Engine Code(s): BVJ - 13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK .
- Connect battery. Required actions Battery, disconnecting and connecting.
- Fill with coolant --> 4.2 Liter V8 5V Engine Mechanical, Engine Code(s): BVJ - 19 - ENGINE - COOLING SYSTEM .
- Start engine and check path of belt.

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

Tightening torques

Component	Nm
Bracket for coolant lines to generator	9
Generator to engine	23
Terminal 30/B+ to generator	16
Tensioner for ribbed belt to upper part of oil pan	22

Vehicles with 5.2l FSI engines

Removing

- With ignition switched off, disconnect battery Ground (GND) wire --> **Battery, disconnecting and connecting.**
- Drain engine coolant --> 5.2 Liter 10-Cyl. 4V Engine Mechanical, Engine Code(s): BXA - **19 - ENGINE - COOLING SYSTEM** .
- Remove radiator --> 5.2 Liter 10-Cyl. 4V Engine Mechanical, Engine Code(s): BXA - **19 - ENGINE - COOLING SYSTEM** .

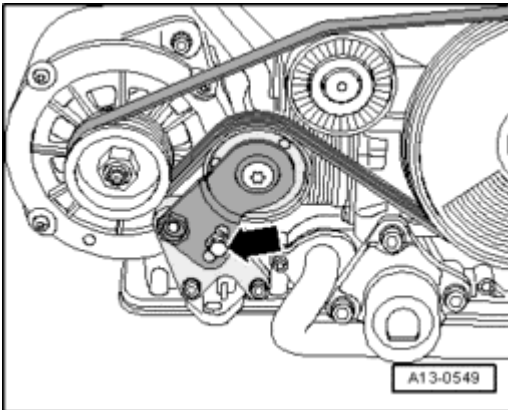


Fig. 68: Loosening Tensioning Bolt And Ribbed Belt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- Mark direction of rotation of ribbed belt using chalk or felt-tip marker before removing. Reversing the direction of rotation of a run-in ribbed belt can destroy the belt.
- Loosen tensioning bolt - arrow - and remove ribbed belt.

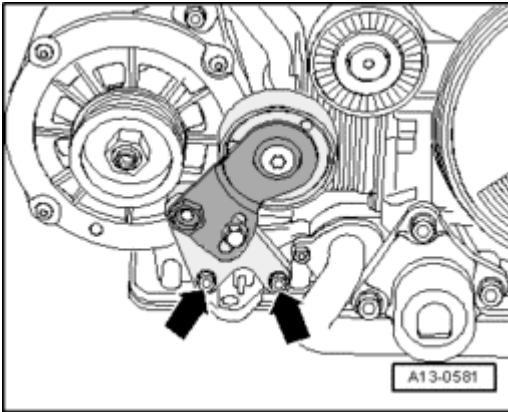


Fig. 69: Removing Tensioning Roller

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -.
- Remove tensioner for ribbed belt from upper part of oil pan.

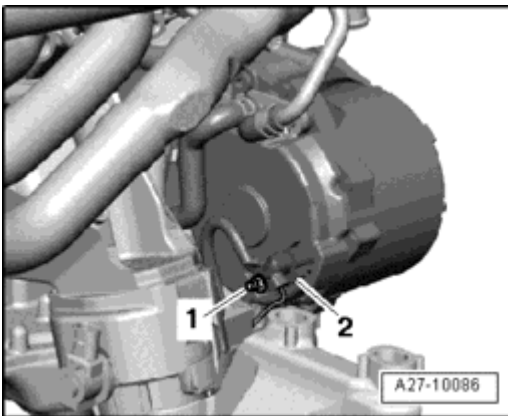


Fig. 70: Identifying Electrical Harness Connector And Terminal 30/B+

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical harness connector - **3** - at generator.
- Remove terminal 30/B+ - **1** -.

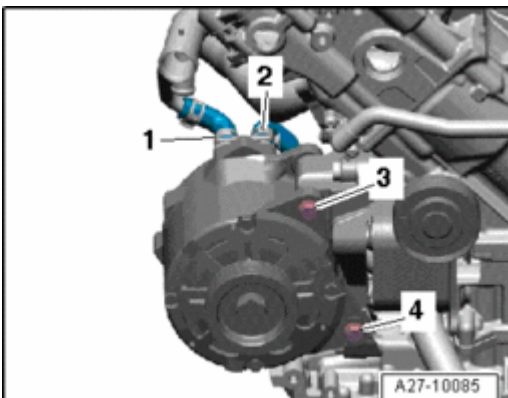


Fig. 71: Identifying Coolant Hoses And Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - 3 - and - 4 -.

NOTE:

- If generator is stuck in its bracket, screw in mounting bolts again except 2 rotations.
- Carefully strike on bolt heads using flat side of hammer - doing this loosens threaded sleeves of generator mount.
- Remove generator.
- Disconnect coolant hoses - 1 - and - 2 - at generator.

Installing

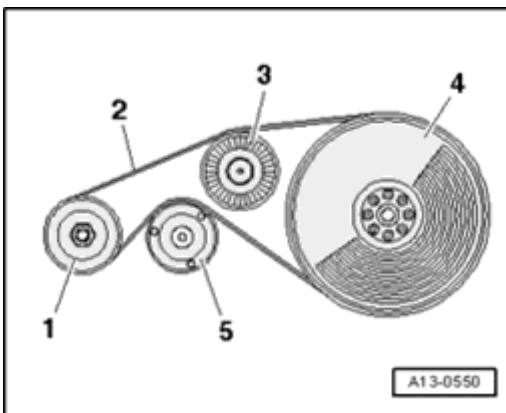
Installation is performed in reverse order of removal, noting the following:

NOTE:

- Secure all hose connections using hose clamps appropriate for the model type Parts Catalog
- Slightly drive back sleeves for retaining bolts in order for easier installation of generator.

NOTE:

- Tight sleeves for generator mount must be made smooth-running, otherwise clamping force of sleeve is too little despite correct torque.

**Fig. 72: Placing Ribbed Belt Over Belt Pulley In Specified Sequence**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place ribbed belt - 2 - over belt pulleys in the specified sequence.

1 - Generator

3 - Relay pulley

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

4 - Harmonic balancer

5 - Tensioner roller

NOTE:

- When installing ribbed belt, be sure that it is seated correctly on belt pulleys.
- Install radiator --> 5.2 Liter 10-Cyl. 4V Engine Mechanical, Engine Code(s): **BXA - 19 - ENGINE - COOLING SYSTEM** .
- Connect battery. Required actions **Battery, disconnecting and connecting**.
- Fill with coolant --> 5.2 Liter 10-Cyl. 4V Engine Mechanical, Engine Code (s): **BXA - 19 - ENGINE - COOLING SYSTEM** .
- Start engine and check path of belt.

Tightening torques

Component	Nm
Generator to bracket	22
Tensioner for ribbed belt to upper part of oil pan	22
Terminal 30/B+ to generator	16

GENERATOR, SERVICING

Bosch generator - component overview

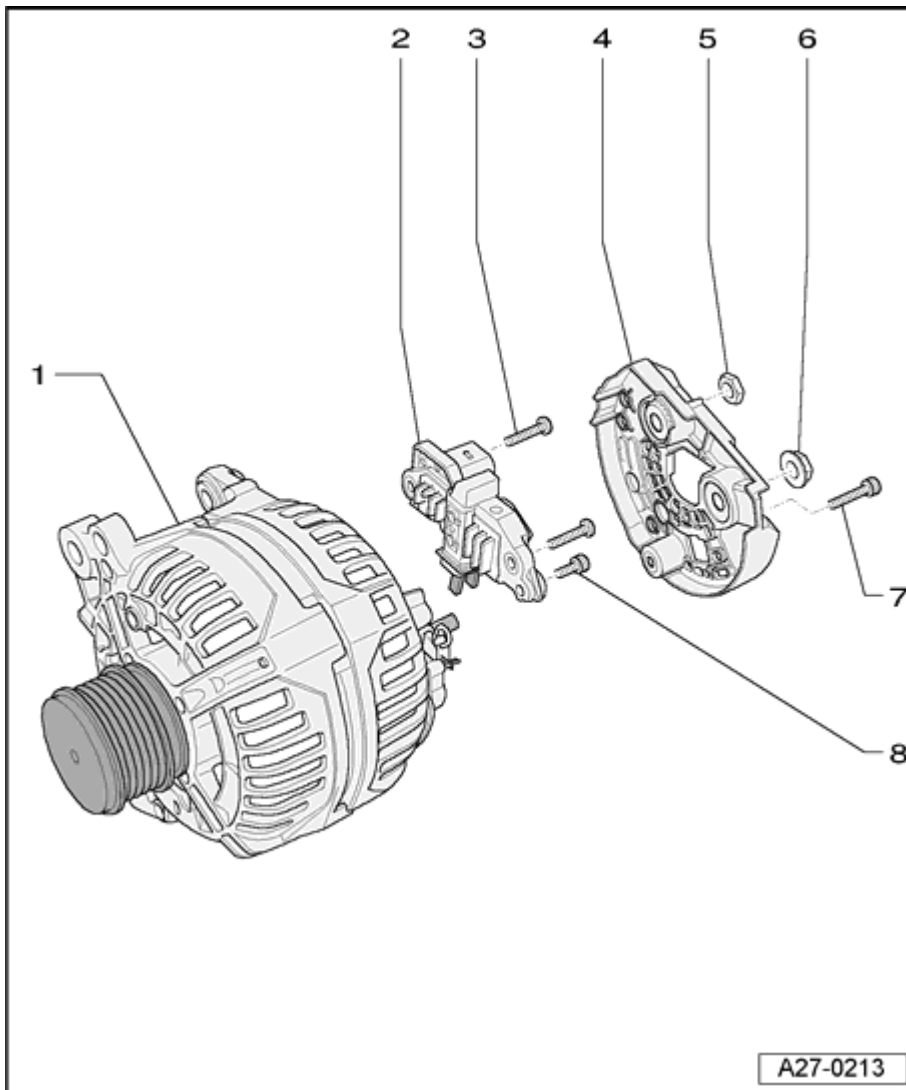


Fig. 73: Bosch Generator, From MY 2001, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Generator

2 - Voltage regulator

- Removing and installing --> **Voltage regulator, removing and installing - Bosch generator**
- Checking carbon brushes --> **Carbon brushes, checking - Bosch generator**

3 - 2.5 Nm

4 - Cover

5 - Nut (12 Nm)

6 - Ribbed nut (30 Nm)

7 - 3 Nm

8 - 1.5 Nm

Voltage regulator, removing and installing - Bosch generator

Removing

- Remove generator:
 - 3.2l FSI engines --> Vehicles with 3.2l FSI engines.
 - 4.2l MPI engine --> Vehicles with 4.2l MPI engine.
 - 4.2l FSI engine --> Vehicles with 4.2l FSI engines.
 - 5.2l FSI engine --> Vehicles with 5.2l FSI engines.

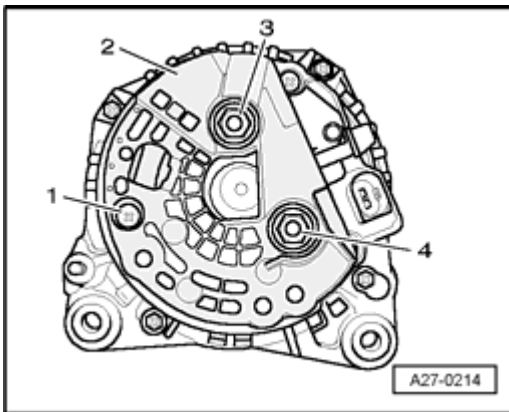


Fig. 74: Generator Cover And Screws

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - 1 - and nuts - 3 - and - 4 -.
- Remove cover - 2 - at rear side of generator.

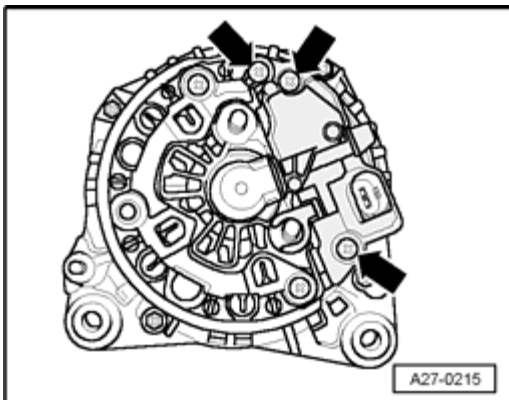


Fig. 75: Voltage Regulator Screws

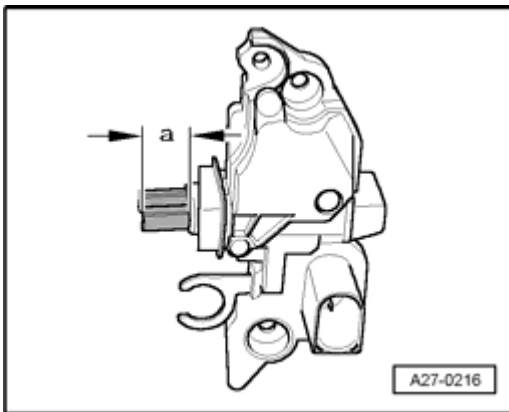
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -.
- Remove voltage regulator.

Installing

- When installing the voltage regulator, make sure the carbon brushes rest properly on the slip rings.

Rest of installation is performed in the reverse order of removal. Tightening torques --> **Bosch generator - component overview**.

Carbon brushes, checking - Bosch generator**Fig. 76: Carbon Brushes Wear Limit**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Work procedure

- Remove voltage regulator --> **Voltage regulator, removing and installing - Bosch generator**.
- Check carbon brushes for length - **a** -.
- Wear limit: - **a** - = 5 mm.

Valeo generator - component overview

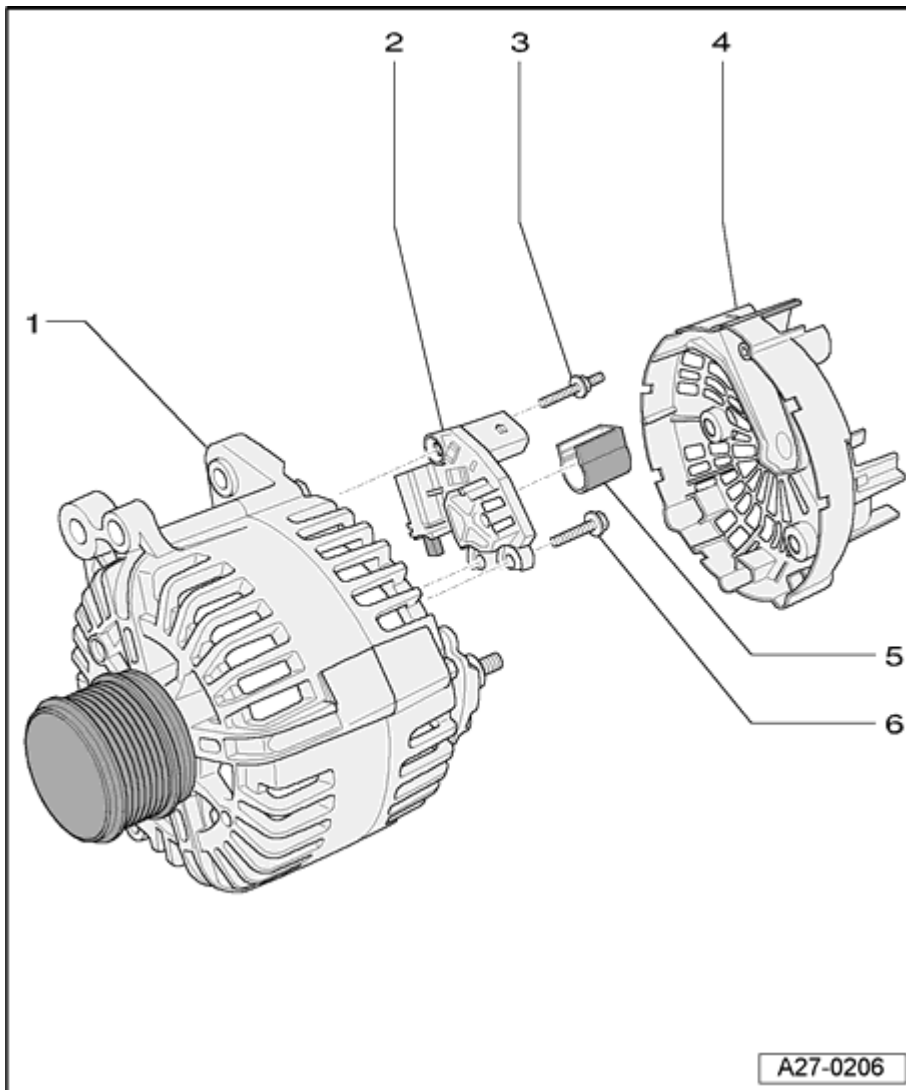


Fig. 77: Valeo Generator, From MY 2001, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Generator

2 - Voltage regulator

- Removing and installing --> **Voltage regulator, removing and installing - Valeo generator**
- Checking carbon brushes --> **Carbon brushes, checking - Valeo generator**

3 - Double bolt (2 Nm)

4 - Cover

5 - Protective cap

6 - Hex bolt, (2 Nm)

Voltage regulator, removing and installing - Valeo generator

Removing

- Remove generator:
 - 3.2l FSI engines --> Vehicles with 3.2l FSI engines.
 - 4.2l MPI engine --> Vehicles with 4.2l MPI engine.
 - 4.2l FSI engine --> Vehicles with 4.2l FSI engines.
 - 5.2l FSI engine --> Vehicles with 5.2l FSI engines.

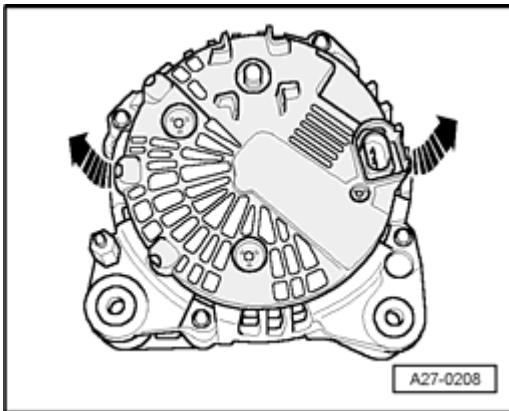


Fig. 78: Identifying Cover And Threaded Pins At Rear Side Of Generator
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press out cover from threaded pins at rear side of generator - **arrows** -.

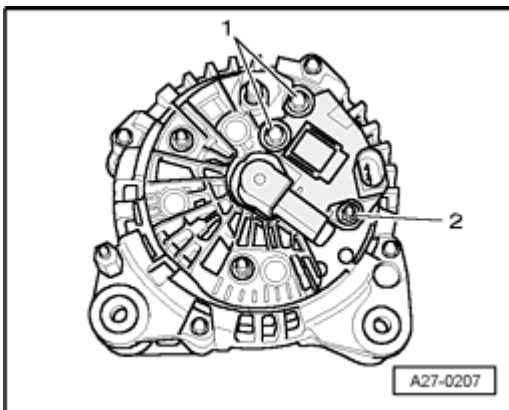


Fig. 79: Generator Bolts And Combination Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1** - and double bolt - **2** -.

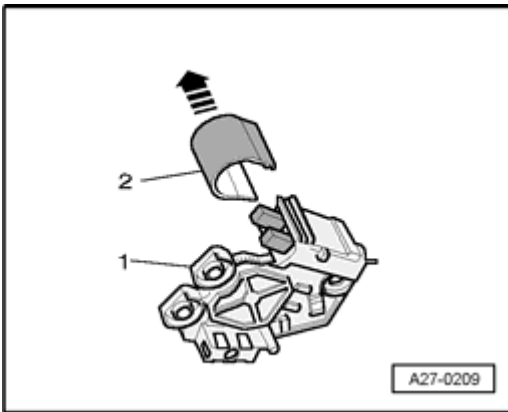


Fig. 80: Voltage Regulator And Protective Cap

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing

- Press off protective cap - 2 - from voltage regulator - 1 - in - **direction of arrow** -.
- When installing the voltage regulator, make sure the carbon brushes rest properly on the slip rings.
- Attach protective cap with voltage regulator installed.

Rest of installation is performed in the reverse order of removal.

Tightening torque

Component	Nm
Voltage regulator to generator	2

Carbon brushes, checking - Valeo generator

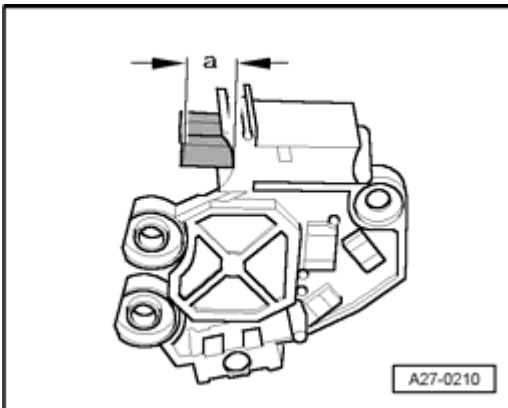


Fig. 81: Carbon Brushes, Valeo Generator From MY 2001, Checking

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Work procedure

- Remove voltage regulator --> **Voltage regulator, removing and installing - Valeo generator.**
- Check carbon brushes for length - **a** -.
- Wear limit: - **a** - = 5 mm.

Ribbed belt pulley without overrunning clutch, removing and installing

Special tools, testers and auxiliary items required

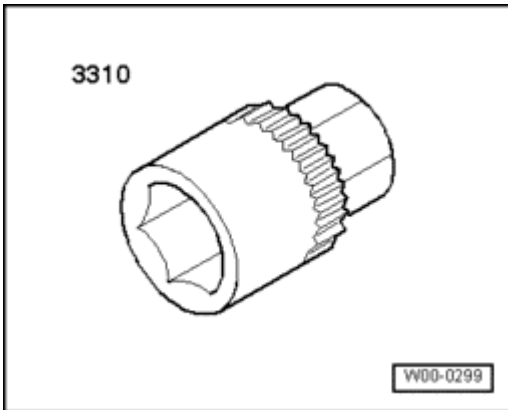


Fig. 82: 3310 Socket

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Socket 3310
- Torx T 50 socket

Removing

- Remove generator:
 - 3.2l FSI engines --> **Vehicles with 3.2l FSI engines.**
 - 4.2l MPI engine --> **Vehicles with 4.2l MPI engine.**
 - 4.2l FSI engine --> **Vehicles with 4.2l FSI engines.**
 - 5.2l FSI engine --> **Vehicles with 5.2l FSI engines.**

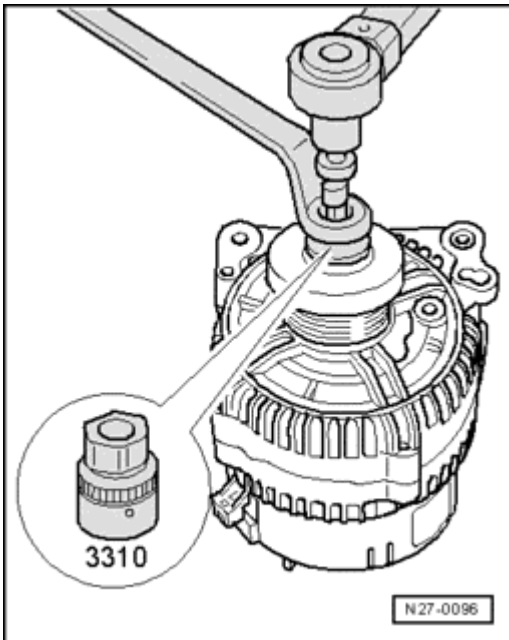


Fig. 83: Loosen/Tighten Nut At Pulley With Wrench And Adapter 3310
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press off protective cap from generator pulley.
- Counterhold mounting nut using socket 3310 and rotate generator shaft clockwise to loosen it.
- Remove ribbed belt pulley.

Installing

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

- To tighten, rotate generator shaft clockwise.
- Clip protective cap onto generator pulley.

Tightening torque

Component	Nm
Ribbed belt pullet to generator	65

Ribbed belt pulley with overrunning clutch, removing and installing

Special tools, testers and auxiliary items required

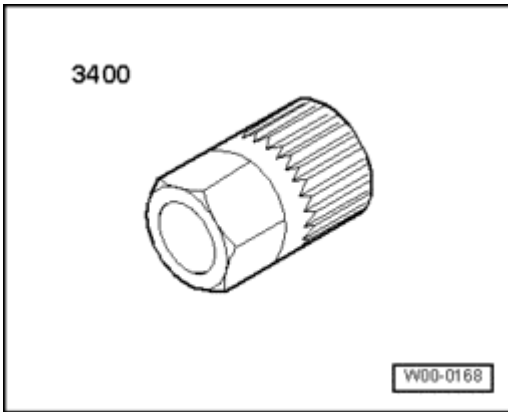


Fig. 84: 3400 Multi-Tooth Adapter

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Multi-point adapter 3400
- Torx T 50 socket

Removing

- Remove generator:
 - 3.2l FSI engines --> Vehicles with 3.2l FSI engines.
 - 4.2l MPI engine --> Vehicles with 4.2l MPI engine.
 - 4.2l FSI engine --> Vehicles with 4.2l FSI engines.
 - 5.2l FSI engine --> Vehicles with 5.2l FSI engines.

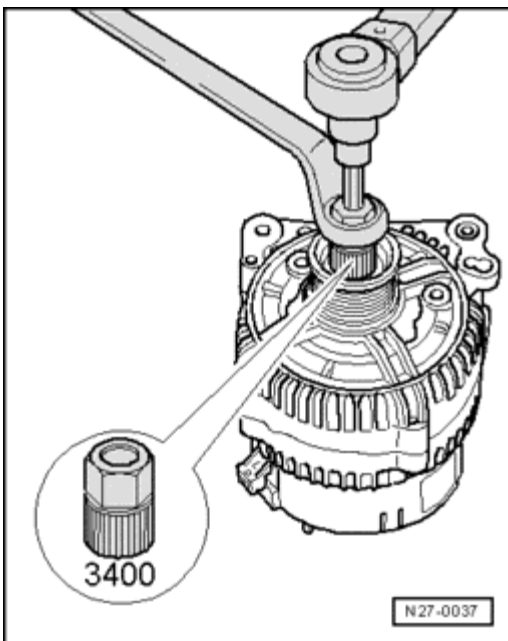


Fig. 85: Identifying Adapter 3400 Installed In Generator Shaft

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press off protective cap from generator pulley.
- Counterhold pulley using multi-tooth adapter 3400 and rotate generator shaft clockwise to loosen it.

Installing

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

- To tighten, rotate generator shaft clockwise.
- Clip protective cap onto generator pulley.

Tightening torque

Component	Nm
Ribbed belt pulley with freewheel to generator	80

STARTER, REMOVING AND INSTALLING

Vehicles with 3.2l FSI engines

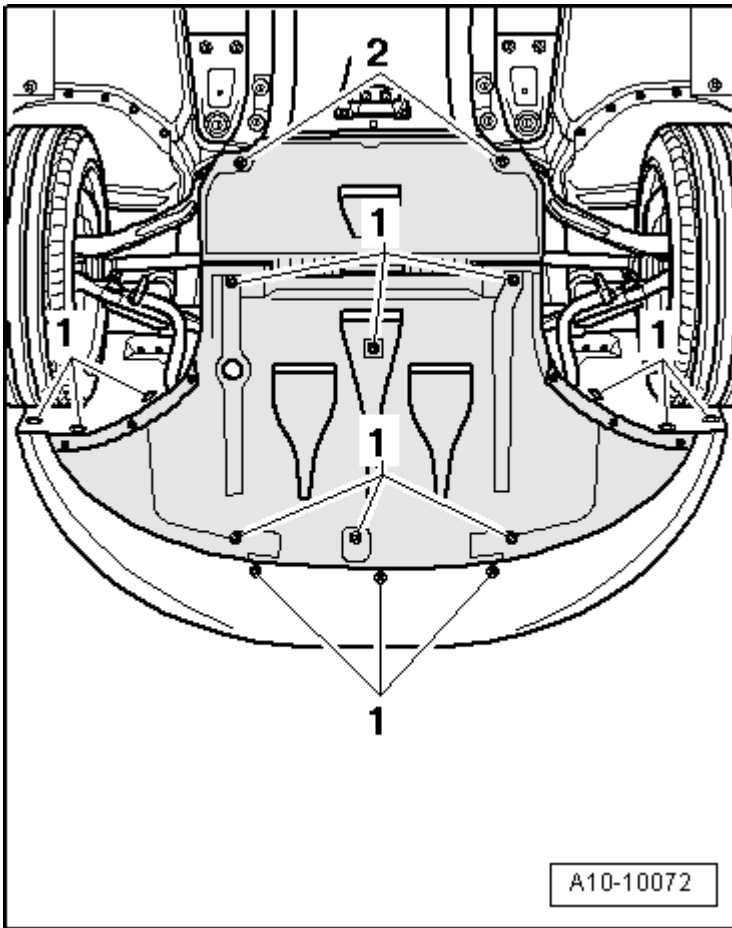


Fig. 86: Identifying Quick-Release Screws And Front Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- With ignition switched off, disconnect battery Ground (GND) wire --> **Battery, disconnecting and connecting.**
- Remove right front wheel.

NOTE:

- Secure brake disc using a wheel bolt.
- Remove quick-release screws - 1 - and - 2 - and remove front noise insulation.

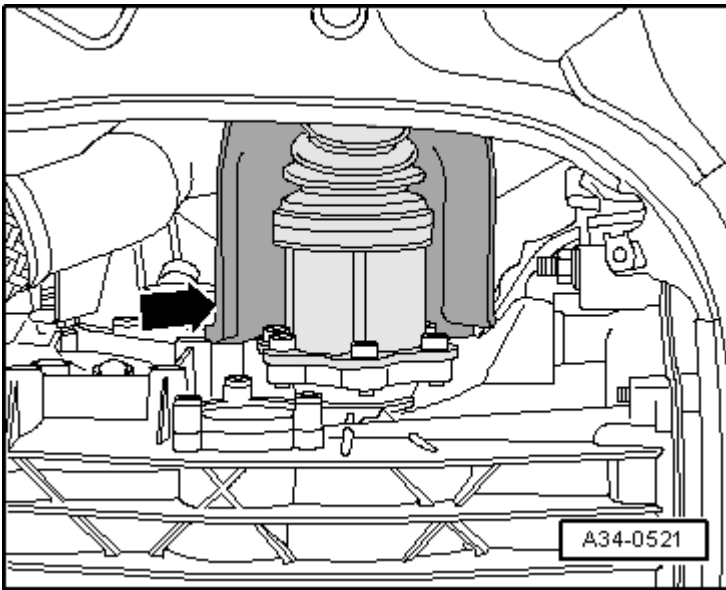


Fig. 87: Drive Axle Heat Shield

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove heat shield - **arrow** - for right drive axle.

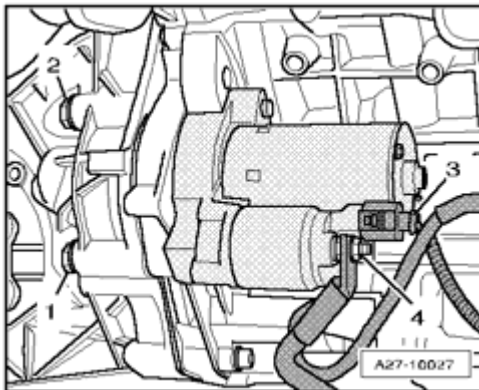


Fig. 88: Identifying Bolts And Electrical Wires

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical wires - **3** - and - **4** - on starter.
- Remove bolts - **1** - and - **2** - and remove starter.

NOTE:

- For clarity, the figure depicts engine support as removed.

Installing

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

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

NOTE:

- Replace self-locking nuts.
- Connect battery. Required actions Battery, disconnecting and connecting.

Tightening torques

Component	Nm
Starter to transmission	65
Terminal B+ to starter	16
Heat shield for driveshaft to transmission	23

Vehicles with 4.2I MPI engine

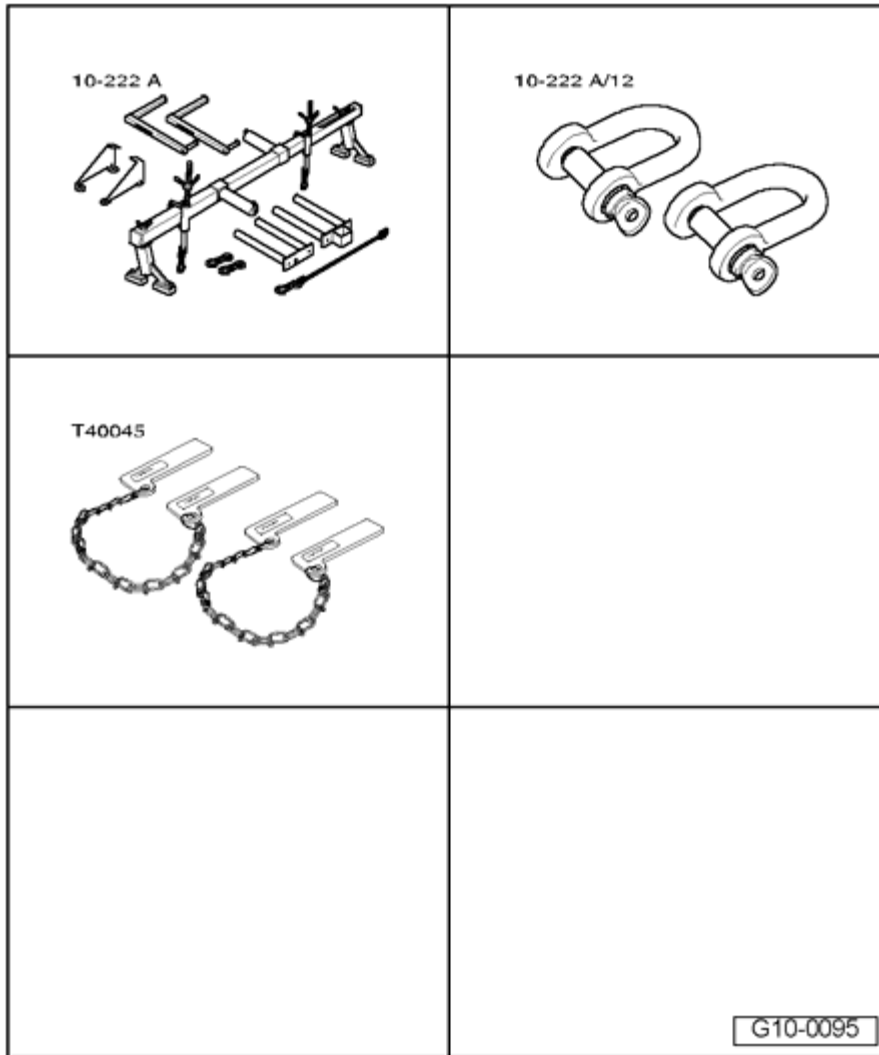
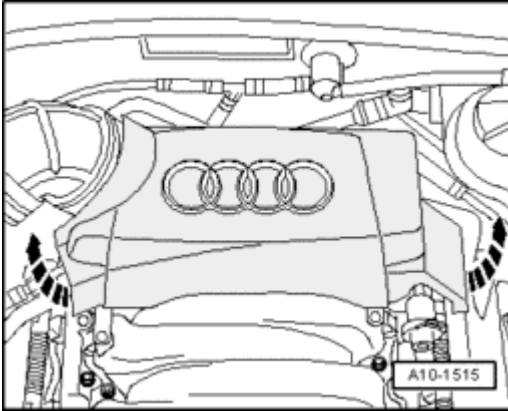


Fig. 89: Engine Support Bridge 10 - 222 A, Shackle 10 - 222 A /12, And Insert Pad For Front Fender T40045

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

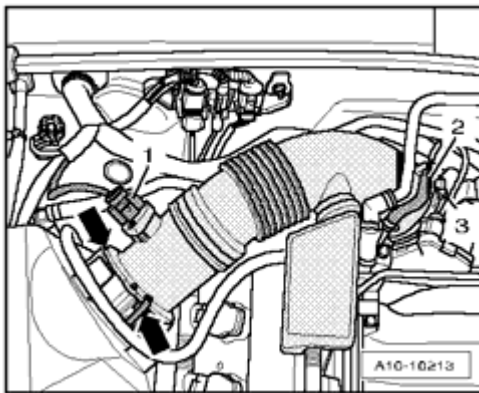
- Engine support bridge 10 - 222 A
- Shackle 10 - 222 A /12
- Insert pad for front fender T40045

**Fig. 90: Removing Rear Engine Cover**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- With ignition switched off, disconnect battery Ground (GND) wire --> **Battery, disconnecting and connecting.**
- Remove rear engine cover - **arrows** -.

**Fig. 91: Identifying Vacuum Line, Electrical Harness Connector, Hose Clamp, And Clips**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect vacuum line - **2** -.
- Disconnect electrical harness connector - **1** - at Mass Air Flow (MAF) Sensor G70.
- Remove air guide hose, release hose clamp - **3** - and open clips - **arrows** - to do so.

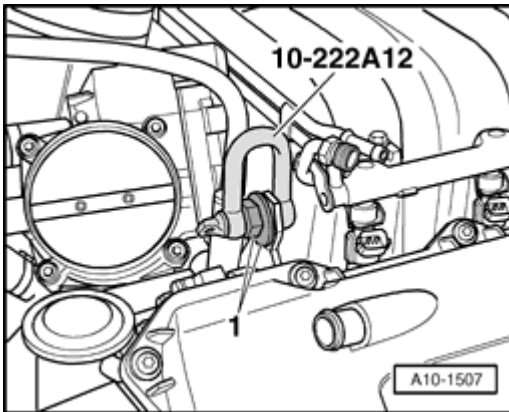


Fig. 92: Securing Shackle 10-222 A/12 To Right Rear Engine Lifting Eyelet
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure shackle 10 - 222 A /12 to right rear engine lifting eyelet.

NOTE:

- Disregard - 1 -.

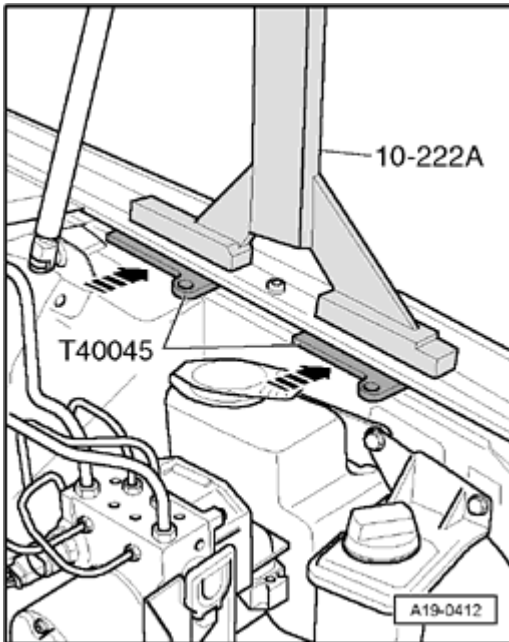


Fig. 93: Placing Insert Pad For Front Fender T40045 On Both Sides Between Fender Attachment Edge And Web Plate Lying Beneath

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull off sealing rubber at bolted flanges of fender.
- To avoid damage to the fender edges when using engine support bridge, insert pad for front fender T40045 on both sides between fender bolt edge and web plate lying beneath - **arrows** -.

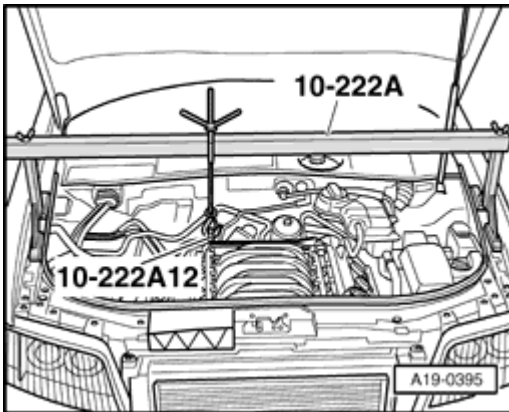


Fig. 94: Engaging Shackle 10-222 A/12 On Spindle Of Engine Support Bridge 10-222 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install engine support bridge 10 - 222 A onto fender bolting edge. Spindle must point toward front.
- Hook shackle 10 - 222 A /12 into spindle of engine support bridge 10 - 222 A.
- Carefully attach spindle of engine support bridge.

CAUTION: Spindles of engine support bridge 10 - 222 A must not be pretensioned, otherwise fenders could be damaged.

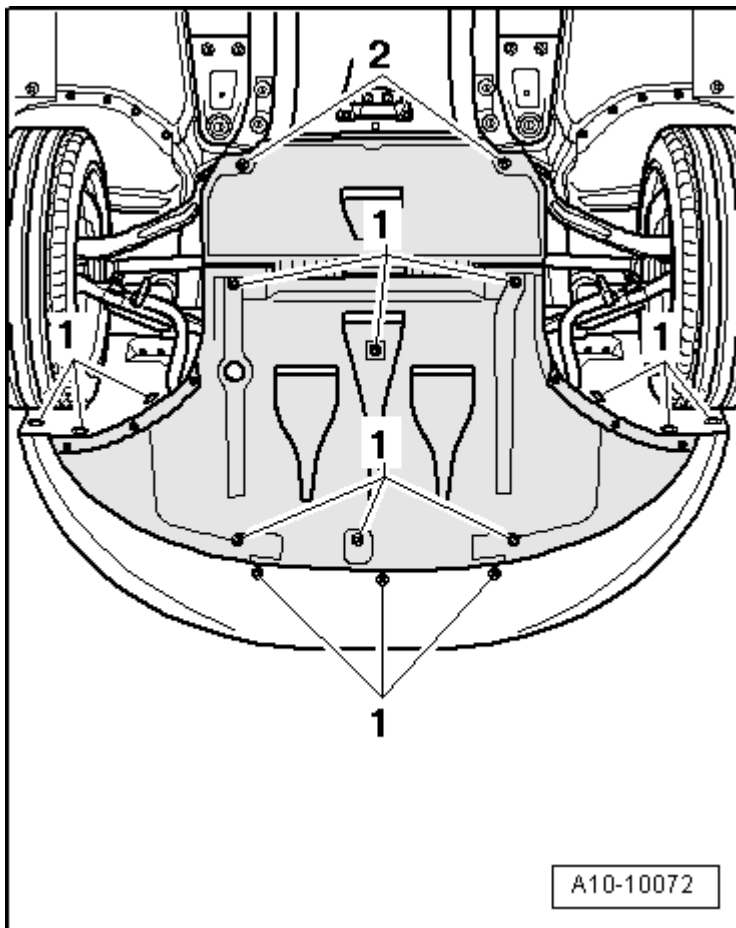


Fig. 95: Identifying Quick-Release Screws And Front Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove right front wheel.

NOTE:

- Secure brake disc using a wheel bolt.
- Remove quick-release screws - 1 - and - 2 - and remove front noise insulation.

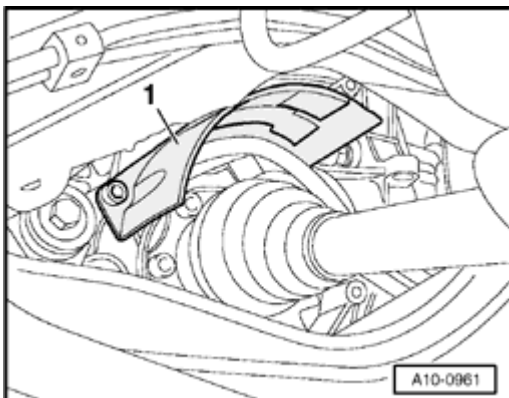


Fig. 96: Removing Left/Right Heat Shields For Drive Axles
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove heat shield - 1 - for right drive axle.

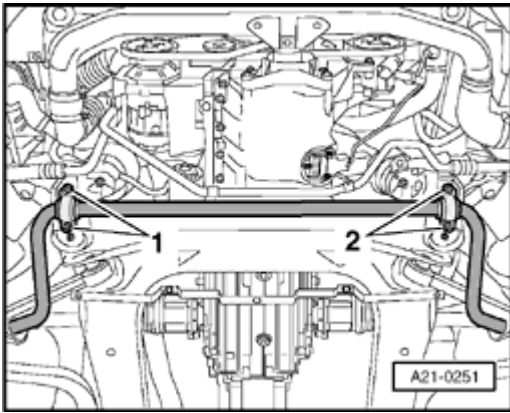


Fig. 97: Removing Stabilizer Bar Mountings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - 1 - and - 2 - at stabilizer mounts.

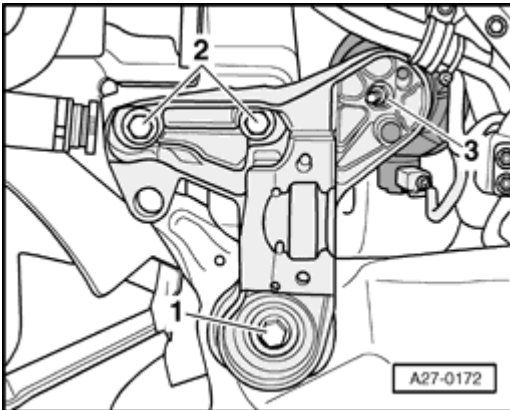


Fig. 98: Identifying Nuts, Bolts, And Right Side Engine Mount Carrier
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nut - 3 -.
- Remove bolts - 1 - and - 2 - and remove right engine console.

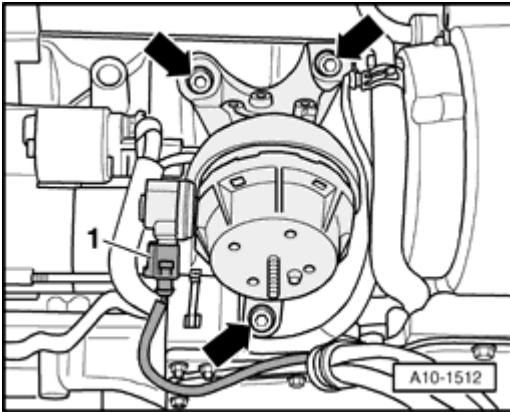


Fig. 99: Disconnecting Electrical Harness Connector At Right Engine Mount
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical harness connector - **1** -.
- Remove bolts - **arrows** -.
- Remove right engine support with engine mount.

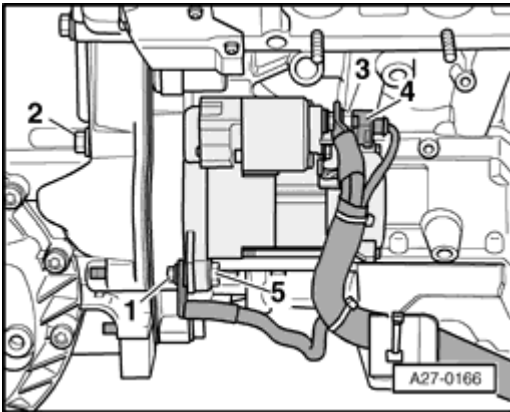


Fig. 100: Identifying Ground (GND) Wire, Starter Electrical Wires, Bolts & Starter
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew Ground (GND) wire - **1** -.
- Disconnect electrical wires - **3** - and - **4** -.
- Unscrew bolts - **2** - and - **5** - and remove starter.

Installing

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

- Install engine console and tighten subframe --> **40 - FRONT SUSPENSION**
- Install stabilizer --> **40 - FRONT SUSPENSION** .
- Connect battery. Required actions **Battery, disconnecting and connecting.**

2005 Audi A6 Quattro

ELECTRICAL Electrical Equipment

Tightening torques

Component	Nm
Starter to transmission	65
Terminal B+ to starter	16
Ground (GND) wire to starter	22
Engine support to cylinder block	42 ¹⁾
Heat shield for driveshaft to transmission	23
¹⁾ Insert with locking compound; locking compound Parts Catalog.	

Vehicles with 4.2l FSI engines

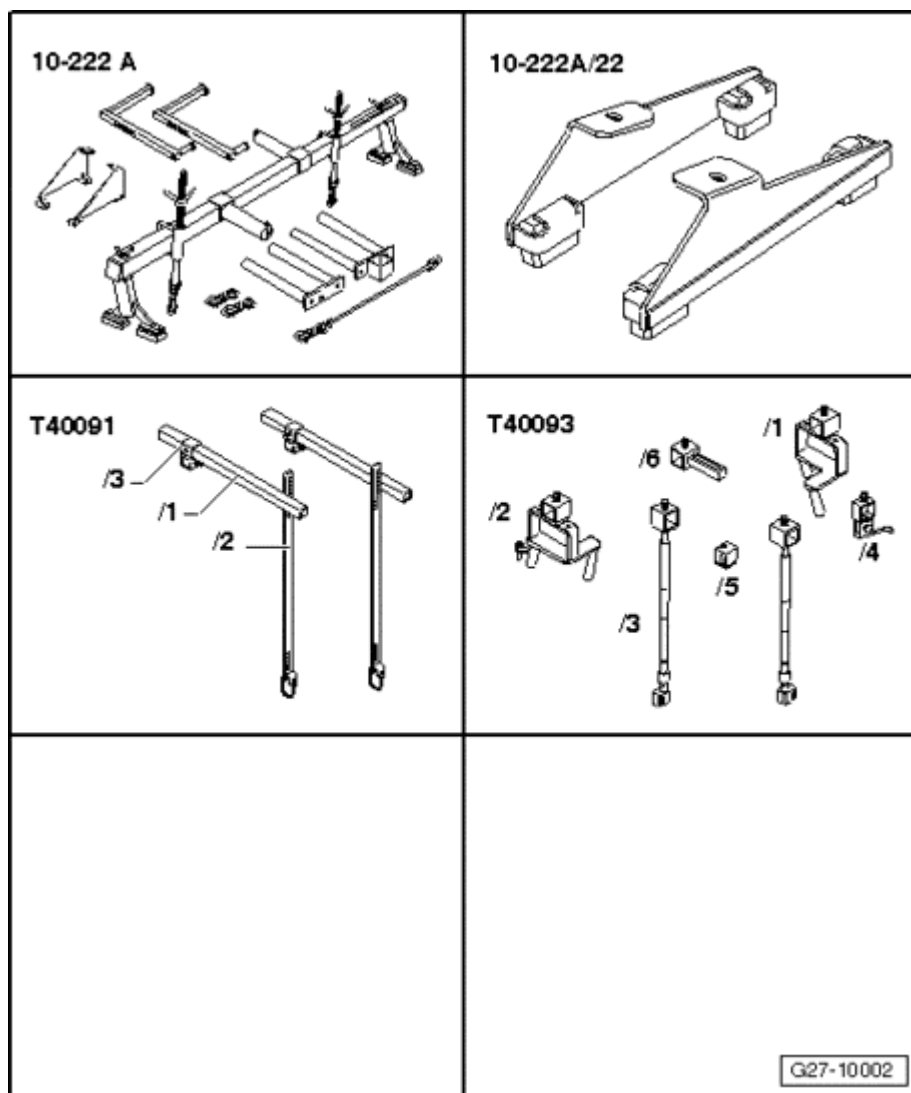


Fig. 101: Engine Support Bridge 10 - 222 A, Adapter 10 - 222 A /22, Engine Support Basic Set T40091, And Engine Support Supplement Set T40093

Special tools, testers and auxiliary items required

- Engine support bridge 10 - 222 A
- Adapter 10 - 222 A /22
- Engine Support Basic Set T40091
- Engine Support Supplement Set T40093

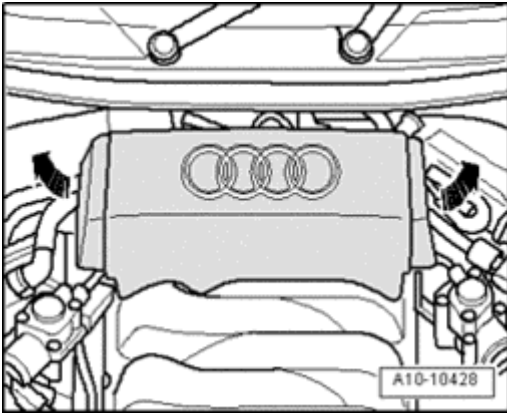


Fig. 102: Removing Rear Engine Cover

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

NOTE:

- All cable ties opened or cut during engine removal must be reinstalled at the same locations during installation.
- With ignition switched off, disconnect battery Ground (GND) wire --> Battery, disconnecting and connecting.
- Remove rear engine cover - arrows -.

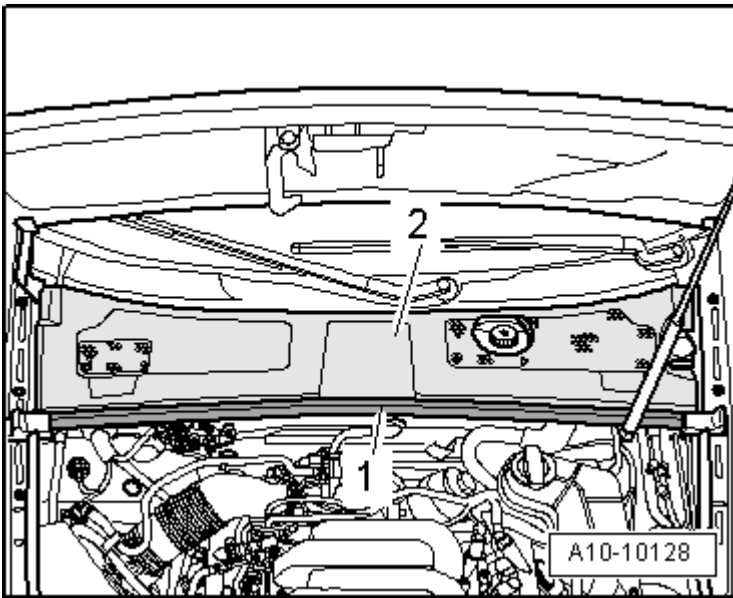


Fig. 103: Removing Rubber Seal For Plenum Chamber Cover & Plenum Chamber Cover
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rubber seal - 1 - and remove plenum chamber cover - 2 -.

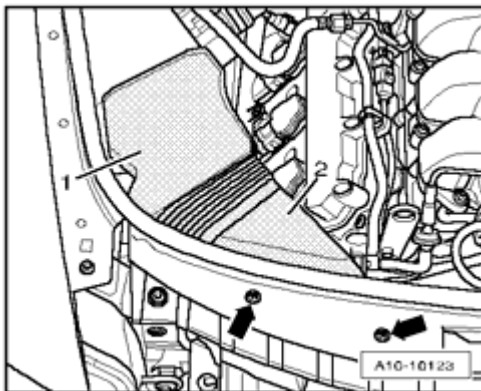


Fig. 104: Removing Air Duct Screws & Air Ducts
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

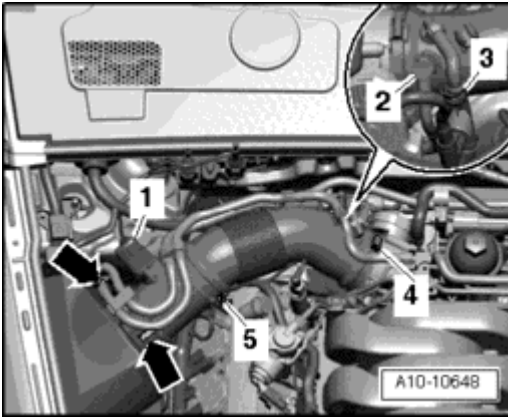


Fig. 105: Identifying Electrical Harness Connector, Clips, And Hose Clamp
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lay aside fuel line and line to EVAP canister at air filter housing and air guide pipe.
- Disconnect electrical harness connector - **1** - at Mass Air Flow (MAF) Sensor G70.
- Remove air guide pipe from air filter housing, release hose clamp - **5** - and open clips - **arrows** - to do so.

NOTE:

- Disregard - **2, 3 and 4** -.

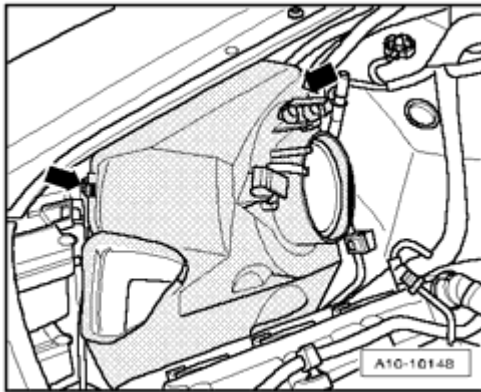


Fig. 106: Opening Clips And Removing Upper Part Of Air Filter Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open clips - **arrows** - and remove upper air filter housing.

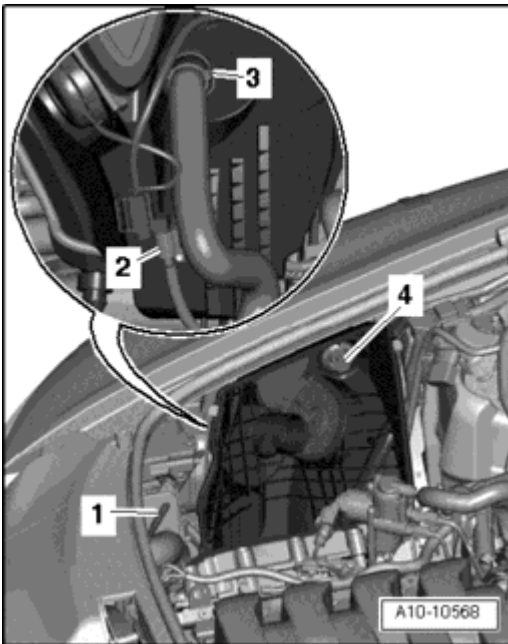


Fig. 107: Identifying Vacuum Line, Expanding Clip, Electrical Harness Connector, And Air Guide Hose
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect vacuum line - 1 -.
- Remove pin of expanding clip - 4 -.
- Remove lower air filter housing and disconnect electrical harness connector - 2 - at rear from Exhaust Gas Recirculation (EGR) Cooler Switch-Over Valve N345.
- Remove air guide hose - 3 - for Secondary Air Injection (AIR) pump, press release buttons to do so.

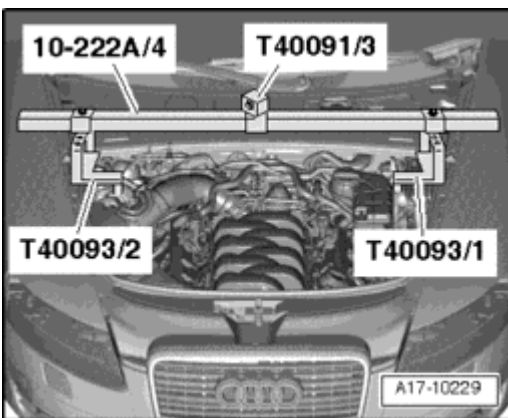


Fig. 108: Securing Adapter 10 - 222 A /4 Using Binder T40091/3 As Well As Supports T40093/1 And T40093/2 At Suspension Strut Domes

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure adapter 10 - 222 A /4 using binder T40091/3 as well as supports T40093/1 and T40093/2 at suspension strut domes.

- Supports T40093/1 are marked for left and right sides of vehicle.

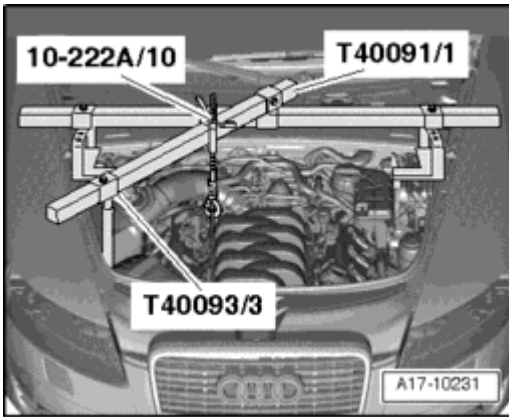


Fig. 109: Assembling Other Components Of Engine Support Bridge 10 - 222 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Assemble other components of engine support bridge 10 - 222 A as depicted in illustration. Set supports T40093/3 on to seams of longitudinal members.
- Engage hook 10 - 222 A /10 in engine lifting eye.
- Pre-tension engine slightly using spindles of engine support bridge 10 - 222 A.

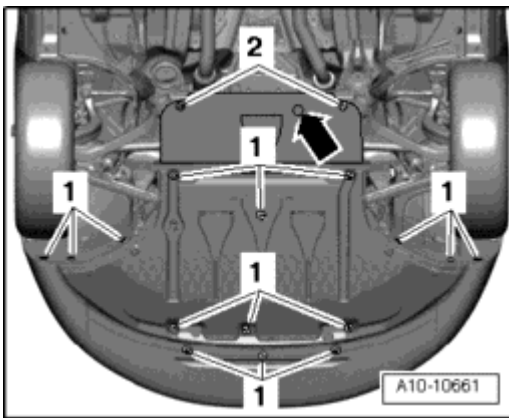


Fig. 110: Identifying Noise Insulation And Mountings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove right front wheel.
- Remove noise insulations, loosen mounting parts - 1, 2, arrow - to do so.

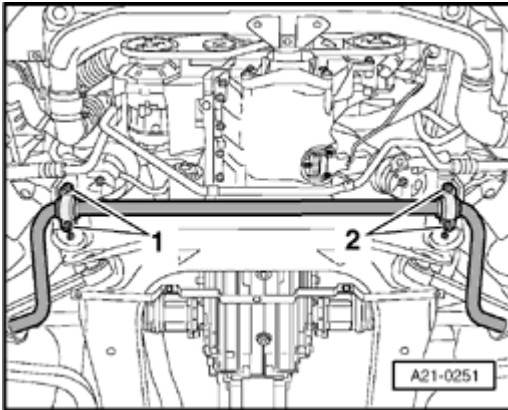


Fig. 111: Removing Stabilizer Bar Mountings

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - 1 - and - 2 - for left and right stabilizer mounts.

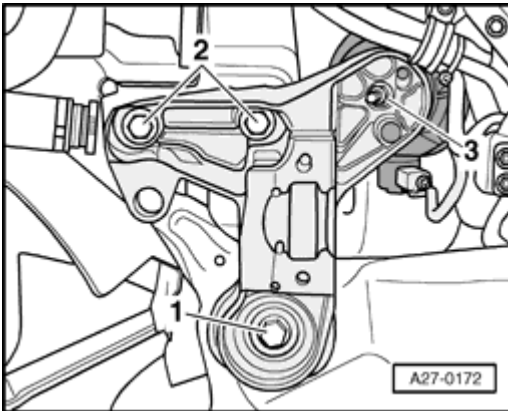


Fig. 112: Identifying Nuts, Bolts, And Right Side Engine Mount Carrier

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Expose electrical wires at engine mount console.
- Remove nut - 3 -.
- Remove bolts - 1 - and - 2 - and remove right engine mount console.

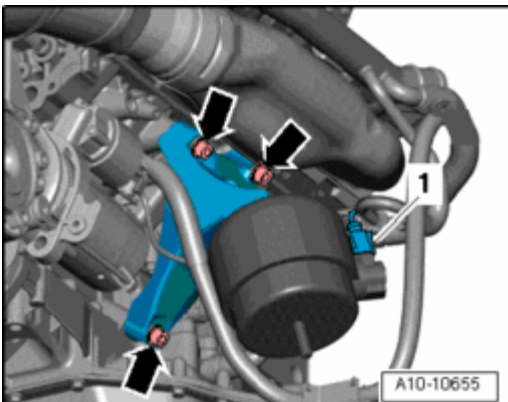


Fig. 113: Identifying Electrical Harness Connector And Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical harness connector - 1 - at right engine mount.
- Remove bolts - **arrows** -.
- Remove right engine support with engine mount.

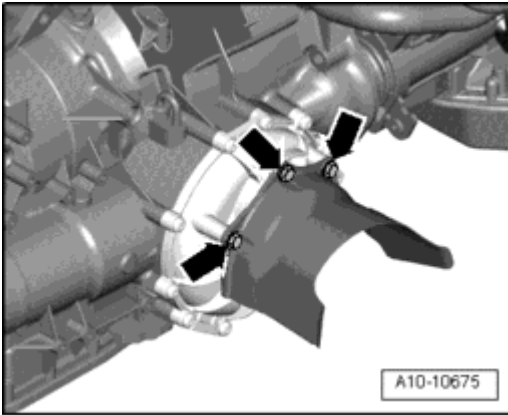


Fig. 114: Identifying Bolts And Heat Shields

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -.
- Remove heat shields - 1 - and - 2 -.

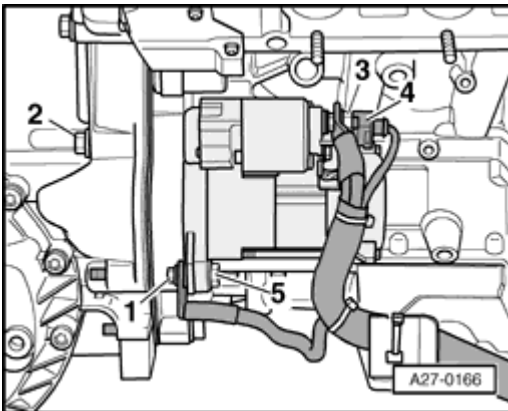


Fig. 115: Identifying Ground (GND) Wire, Starter Electrical Wires, Bolts & Starter

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- B+ wire can only be removed after disconnecting electrical harness connector of terminal 50.
- Unscrew Ground (GND) wire - 1 -.
- Disconnect electrical wires - 3 - and - 4 -.
- Unscrew bolts - 2 - and - 5 - and remove starter.

Installing

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

NOTE:

- During installation, re-install all cable ties at the same locations.
- Install right engine mount console --> **40 - FRONT SUSPENSION** .
- Install stabilizer --> **40 - FRONT SUSPENSION** .
- Connect battery. Required actions Battery, disconnecting and connecting.

Tightening torques

Component		Nm
B+ wire to starter		16
Starter to transmission	M10 ¹⁾	65
	M12	65
• ¹⁾ Screw property class 10.9.		

Vehicles with 5.2l FSI engines

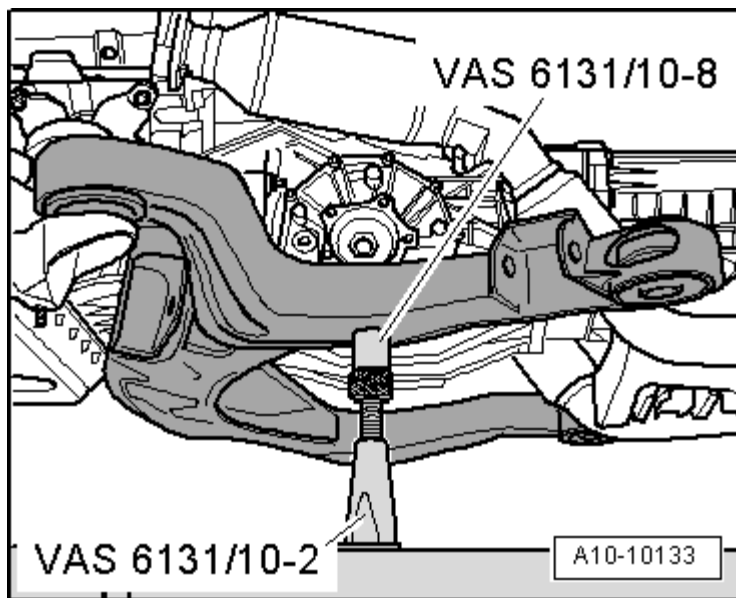


Fig. 116: Positioning Support Elements From VAS 6131/10 At Left/Right On Subframe
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- Remove engine --> **10 - ENGINE - ASSEMBLY** .
- Leave engine with transmission installed on the scissor lift platform VAS 6131.

- Remove both base plates of attachments for subframe from scissor lift table VAS 6131.
- Remove attachments.
- Remove subframe to the side.

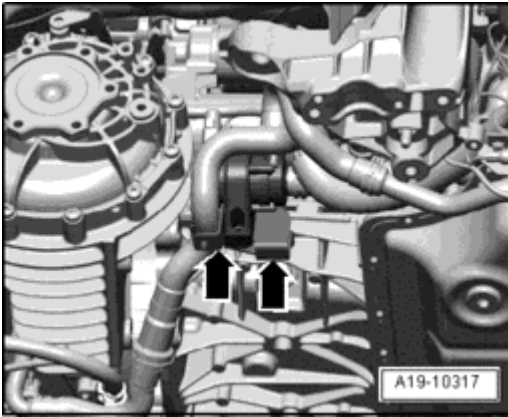


Fig. 117: Removing Bolts From After-Run Coolant Pump V51
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** - from After-Run Coolant Pump V51.

NOTE:

- The coolant hoses and electrical harness connectors remain connected.

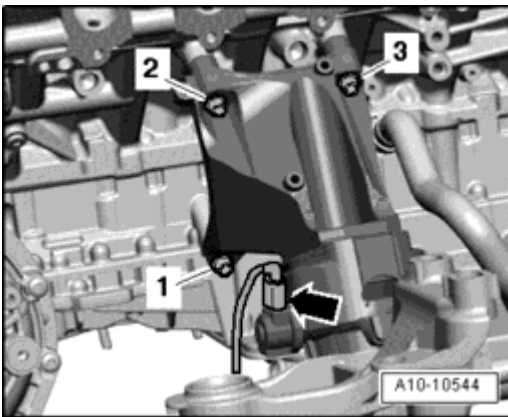


Fig. 118: Identifying Electrical Harness Connector And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical harness connector - **arrow** - at right engine mount.
- Remove bolts - **1 3** -.
- Remove engine support with engine mount.

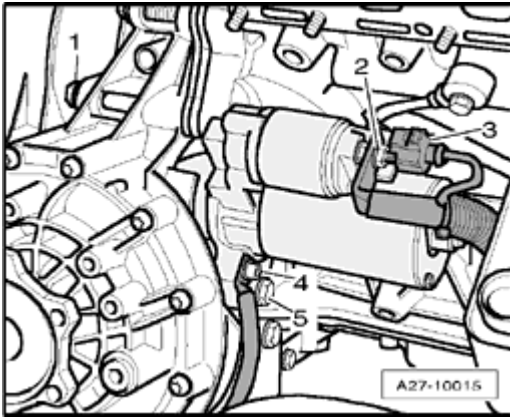


Fig. 119: Identifying Ground Wire, Electrical Wires, Bolts, And Starter
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ground (GND) wire - **4** - from starter.
- Disconnect electrical wires - **2** - and - **3** - from starter.
- Unscrew bolts - **1** - and - **5** - and remove starter.

Installing

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

- Install engine --> **10 - ENGINE - ASSEMBLY** .

Tightening torques

Component		Nm
Starter to transmission	M10x40	45
	M10x135 ¹⁾	65
Terminal B+ to starter		16
Ground (GND) wire to starter		22
Engine support to cylinder block		40
After-Run Coolant Pump V51 to bracket		8
• ¹⁾ Screw property class 10.9.		