

STARTER - BOSCH

Article Text

1991 Volkswagen Passat

For Volkswagen Technical Site

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Wednesday, August 25, 1999 09:03PM

ARTICLE BEGINNING

1990-92 ELECTRICAL

Starters - Bosch

1990-92 Passat

1991-92 Cabriolet, Corrado, Fox, Golf GL, GTI, Jetta, Vanagon

DESCRIPTION

Starter is a brush type, series-wound electric motor with an overrunning clutch. Field frame is enclosed by commutator end frame and drive bushing and carries pole shoes and field coils. A splined armature shaft drive end carries drive assembly.

TROUBLE SHOOTING

CHARGING SYSTEM TROUBLE SHOOTING TABLE

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PROBLEM

Possible Cause Action

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NO START CONDITION

Dead Battery	Check/Replace Battery
Bad Cable Connections	Clean/Replace Cables
Ignition Switch/Circuit Fault	Check Switch/Circuit

CHARGING SYSTEM WARNING LIGHT STAYS ON

Loose/Worn Alternator Belt	Tighten/Replace Belt
Loose Alternator Connections	Check/Repair Connections
Warning Light Wiring	Check/Repair Wiring
Faulty Stator/Diodes	Test/Repair Alternator
Faulty Voltage Regulator	Test/Repair Regulator

WARNING LIGHT OFF WITH IGNITION SWITCH ON

Blown Fuse	Check/Replace Fuse
Faulty Alternator	Test Alternator
Bad Warning Light Bulb	Test/Replace Bulb

WARNING LIGHT ON WITH IGNITION SWITCH OFF

Alternator Wiring Short	Check/Repair Wiring
Faulty Rectifier Bridge	Test/Repair Alternator

AMMETER INDICATES DISCHARGE

Loose/Worn Alternator Belt	Tighten/Replace Belt
Loose Alternator Connections	Check/Repair Connections

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Faulty Ammeter Test/Replace Ammeter
NOISY Defective Battery Replace Battery
Defective Alternator Test/Repair Alternator
Defective Regulator Test/Repair Regulator
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ON-VEHICLE TESTING

STARTER DOES NOT CRANK ENGINE

1) Ensure battery is fully charged. Make sure electrical and ground connections are clean and tight. With ignition switch in START position, measure voltage at spade terminal of starter solenoid. Reading should be at least 8 volts (9.5 volts on Fox). If so, check engine for mechanical problems. If voltage is not as specified, go to next step.

2) Measure voltage at ignition switch. If reading is at least 8 volts (9.5 volts on Fox), check wiring between ignition switch and starter solenoid. If voltage is not as specified, replace ignition switch.

3) Measure voltage at field (starter) terminal of starter solenoid. If reading is 8 volts or more, repair or replace starter. If reading is less than 8 volts, replace starter solenoid.

NOTE: On vehicles with automatic transmission, also check park/neutral switch.

STARTER CRANKS TOO SLOWLY

Ensure engine crankcase is filled with recommended viscosity oil. Check charging system to ensure battery is fully charged. Make sure electrical and ground connections are clean and tight. If starter still turns slowly, repair or replace starter.

VOLTAGE DROP TEST

Starter Main Terminal

Connect a voltmeter between starter main terminal and starter body. Disconnect ignition coil positive terminal and operate starter. Voltage reading should not be more than 1.0 volt less than battery voltage. If a larger voltage drop is indicated, circuit between battery and starter terminal may be defective.

Main Starter Case

Connect a voltmeter between positive battery terminal and starter motor "M" terminal. With ignition off, operate starter for 2-3 seconds. Battery voltage should be present, then drop to less than one volt. If voltage is greater than specification, high resistance may be present in circuit. Go to ACROSS SOLENOID SWITCH test.

Across Solenoid Switch

Connect a voltmeter between 2 starter solenoid terminal stud

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connections. With ignition disconnected, operate starter for 2-3 seconds and note meter reading. Initially, battery voltage should be present, then voltage should drop to less than .5 volts. If voltage is not as specified, check for damaged switch or loose or dirty connections. If high resistance is present, terminal may be loose or corroded.

Connect a voltmeter between battery ground terminal and starter main housing. With ignition off, operate starter for 2-3 seconds. If ground is okay, voltage reading should be less than .5 volt. If reading is .6 volt or more, high resistance is present in ground return side of circuit.

- 1) Remove bridge strap connecting solenoid to motor. Check windings by connecting a 12-volt battery operated test light between solenoid main terminal STA and solenoid body. If light illuminates, both windings are satisfactory.
- 2) Ensure that contacts open and close satisfactorily by connecting 12-volt battery and a high wattage test light between main solenoid terminals. Test light should not illuminate.
- 3) Close switch by energizing solenoid windings. Solenoid should be heard to operate and closing of solenoid contacts will be indicated by test light illuminating to full brilliance. On opening switch, test light should go out.

Removal & Installation

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1) Disconnect battery ground strap. Before raising vehicle, remove upper starter mounting bolt. Release handbrake (to allow axle rotation) and raise vehicle on hoist.

2) Disconnect right rear axle from transmission and wire aside. Cover exposed CV joint with plastic bag to prevent entry of dirt or other foreign material.

3) Loosen clamp securing cooling hoses to chassis. Wire hoses aside. Remove bolt "A" from differential lock servo. Loosen bolt "B" and withdraw as far as possible. Lack of clearance prevents complete removal of bolt "B". See Fig. 1.

NOTE: Nuts are welded to bracket. DO NOT attempt to loosen.

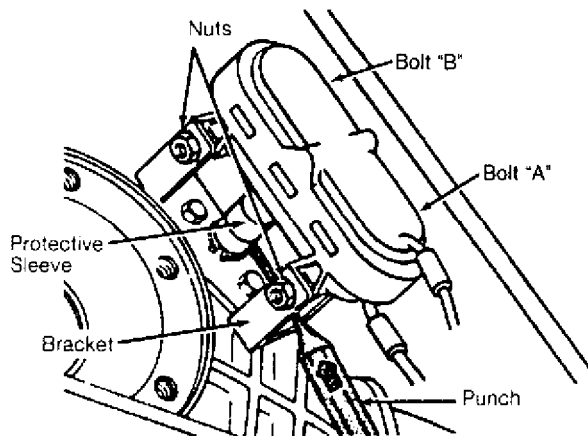


Fig. 1: Removing Differential Lock Servo (Vanagon)
Courtesy of Volkswagen United States, Inc.

4) Push back protective sleeve and drive out spring pin. With bolt "B" withdrawn as far as possible, give servo a slight upward twist and remove from bracket. See Fig. 1.

5) Remove circlip, bracket securing bolts and bracket. See Fig. 2.

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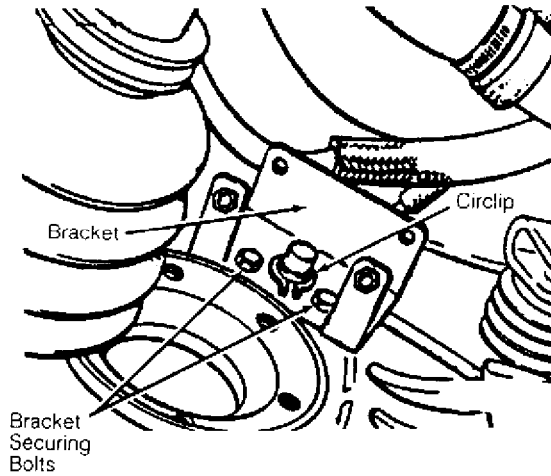


Fig. 2: Removing Differential Lock Servo Bracket (Vanagon)
Courtesy of Volkswagen United States, Inc.

6) Disconnect wires from starter solenoid. Remove lower mounting nut, push up slightly on starter and remove. See Fig. 3. To install, reverse removal procedure.

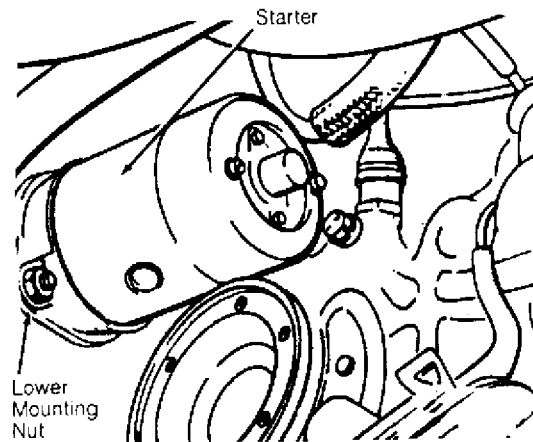


Fig. 3: Removing Starter (Vanagon)
Courtesy of Volkswagen United States, Inc.

ALL MODELS EXCEPT VANAGON R & I

Removal & Installation

Disconnect negative battery cable. Support engine/transmission assembly with Support Beam (VW 10-222). On all models except Fox, add a Leg Set (VW 10-2224/1) to support beam. On all models, remove engine mount bolts, nut, and clamp screw (next to exhaust manifold flange). Remove engine mount. Disconnect wiring and

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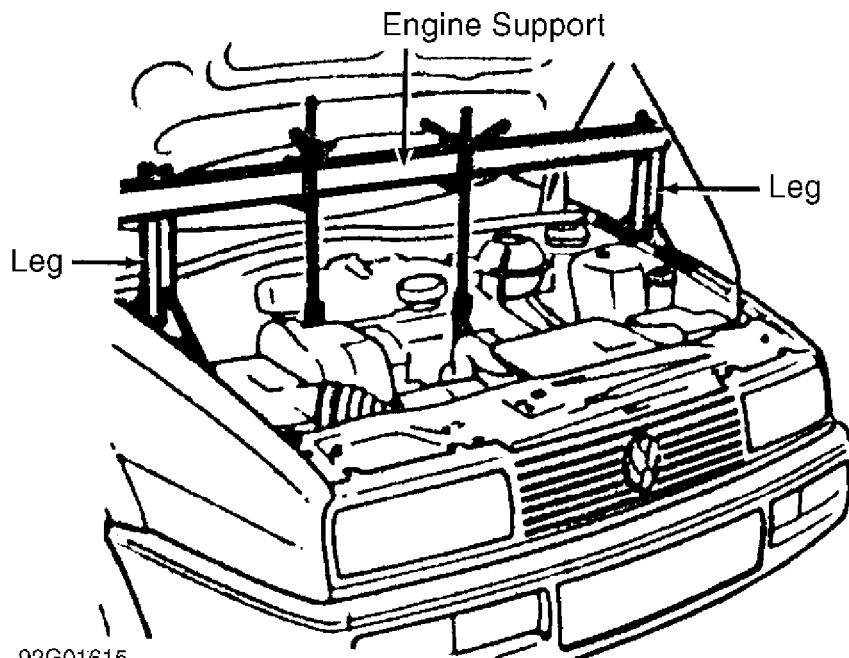
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remove starter. To install, reverse removal procedure. See Fig. 4.



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Fig. 4: Removing Starter (Except Vanagon)
Courtesy of Volkswagen United States, Inc.

OVERHAUL

For overhaul, see exploded view of typical Bosch starter. See Fig. 5.

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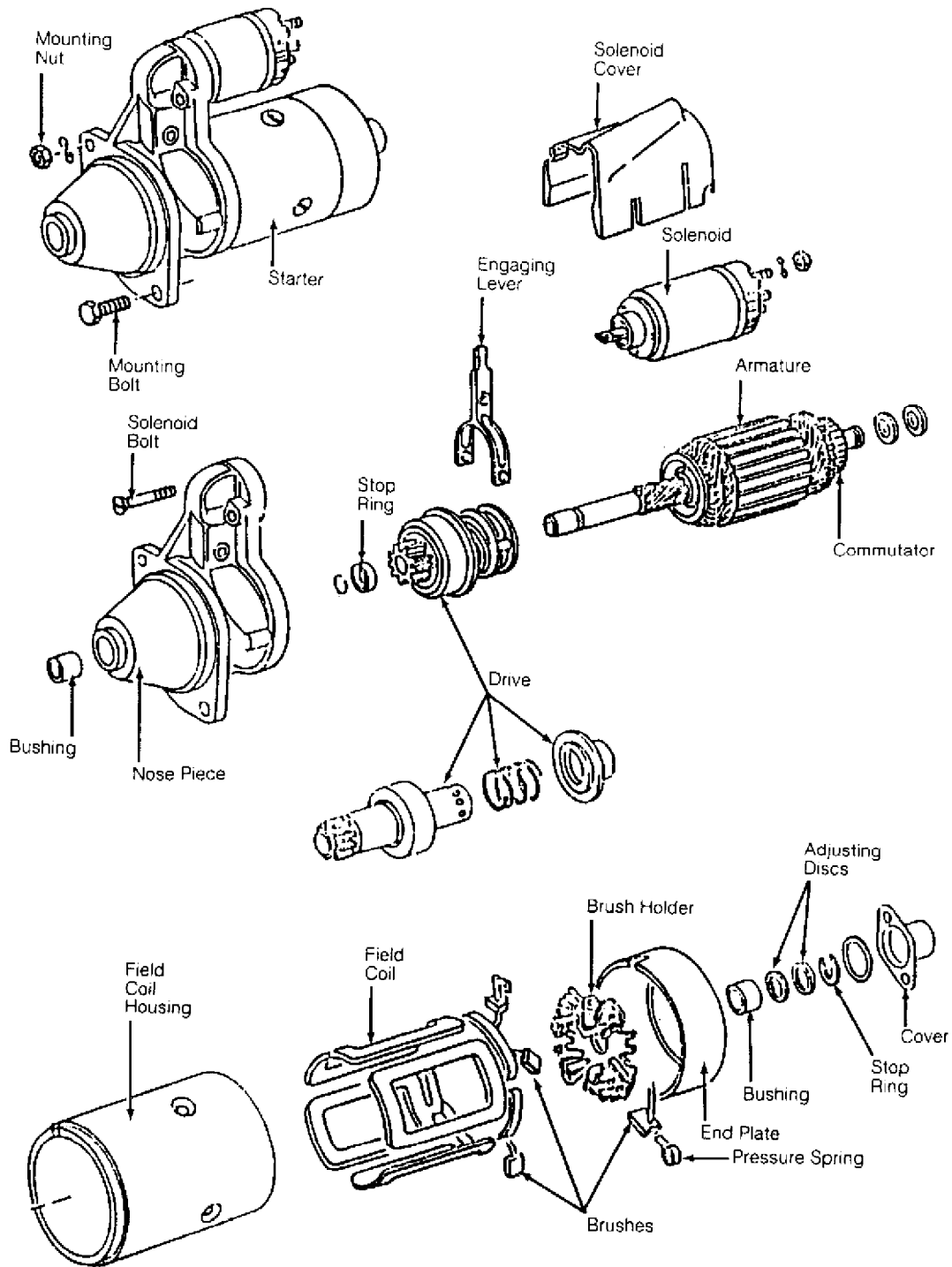


Fig. 5: Exploded View of Bosch Starter (Typical)
Courtesy of Volkswagen United States, Inc.

STARTER SPECIFICATIONS

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STARTER SPECIFICATIONS

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Application	Specification
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Armature

Runout002" (.05mm)
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End Play002" (.05mm)
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Cold Cranking

Test Voltage	12
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Minimum Voltage	9
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Amps	90
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Minimum RPM	1500
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Solenoid Hold-In

Winding Voltage	4 Volts (Min.)
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Solenoid Pull-In

Winding Voltage	7
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Commutator Runout0004" (.01mm)
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Cranking Voltage	9 Volts Min.
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Starter Current Draw	170 Amps Max.
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TORQUE SPECIFICATIONS

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Application	Ft. Lbs. (N.m)
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Starter-To-Block Bolts

All Except Vanagon	32.5-44.3 (44-60)
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Vanagon	21 (28)
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Starter-To-Block Bolts (1992)

Cabriolet, Golf, GTI & Jetta

A/T	14 (19)
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M/T	43 (58)
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Corrado, Fox & Passat	44 (60)
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INCH LBS. (N.m)

Solenoid Bolts	96 (10.8)
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Through Bolts	54 (6.1)
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END OF ARTICLE