

**STARTER - BOSCH**  
**Article Text**  
1991 Volkswagen Vanagon  
For Volkswagen Technical Site  
Copyright © 1998 Mitchell Repair Information Company, LLC  
Saturday, March 18, 2000 09:46PM

**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

AA

PROBLEM

Possible Cause	Action
----------------	--------

AA

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

**STARTER - BOSCH**  
**Article Text (p. 2)**  
1991 Volkswagen Vanagon  
For Volkswagen Technical Site  
Copyright © 1998 Mitchell Repair Information Company, LLC  
Saturday, March 18, 2000 09:46PM

Faulty Ammeter .....	Test/Replace Ammeter
NOISY Defective Battery .....	Replace Battery
Defective Alternator .....	Test/Repair Alternator
Defective Regulator .....	Test/Repair Regulator

AA

**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

Saturday, March 18, 2000 09:46PM

1) Disconnect battery ground strap. Before raising vehicle,

## STARTER - BOSCH

### Article Text (p. 4)

1991 Volkswagen Vanagon

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Saturday, March 18, 2000 09:46PM

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.

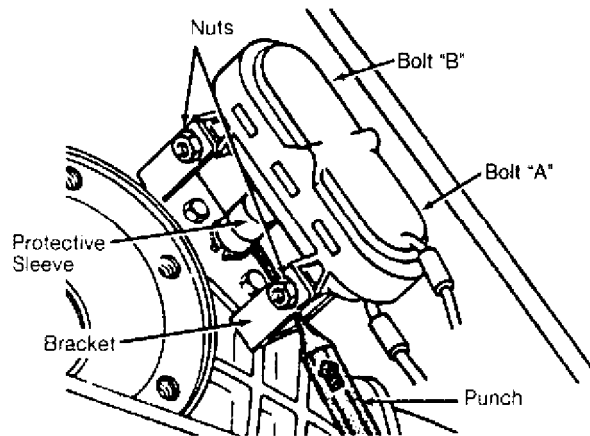


Fig. 1: Removing Differential Lock Servo (Vanagon)  
Courtesy of Volkswagen United States, Inc.

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.

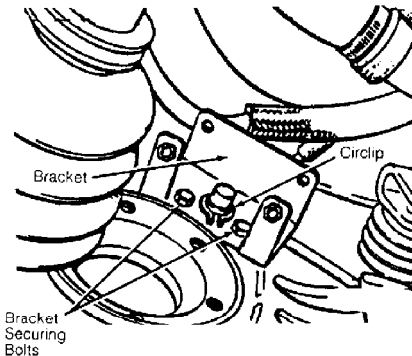


Fig. 2: Removing Differential Lock Servo Bracket (Vanagon)  
Courtesy of Volkswagen United States, Inc.

**STARTER - BOSCH**  
**Article Text (p. 5)**  
1991 Volkswagen Vanagon  
For Volkswagen Technical Site  
Copyright © 1998 Mitchell Repair Information Company, LLC  
Saturday, March 18, 2000 09:46PM

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.

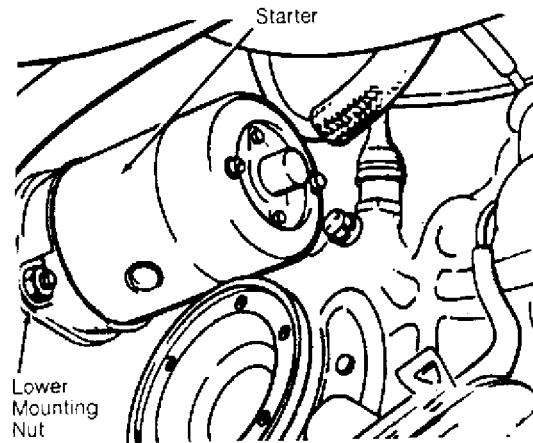
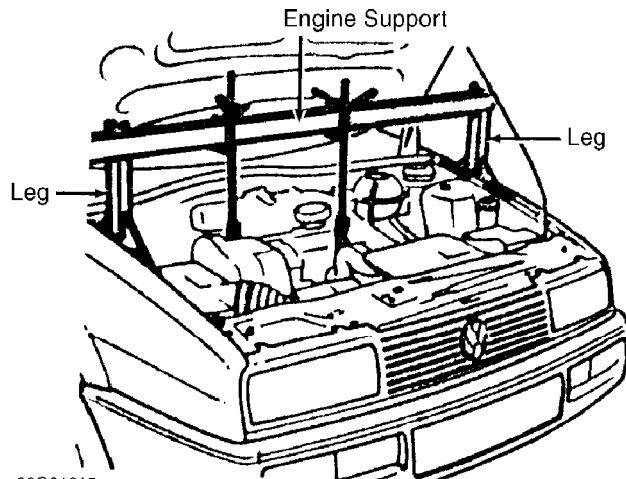


Fig. 3: Removing Starter (Vanagon)  
Courtesy of Volkswagen United States, Inc.

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



92G01615

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.

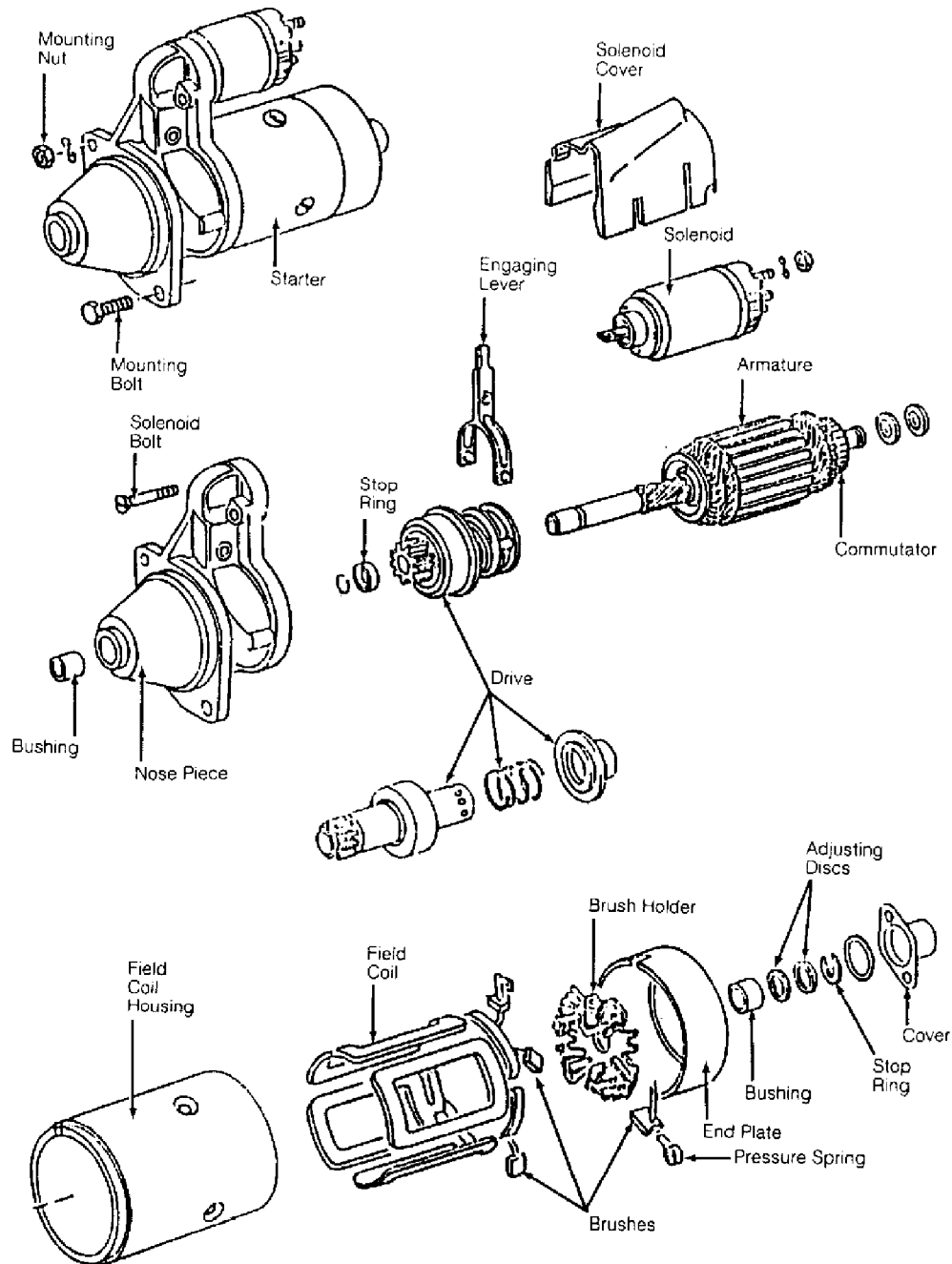


Fig. 5: Exploded View of Bosch Starter (Typical)  
Courtesy of Volkswagen United States, Inc.

**STARTER - BOSCH**  
**Article Text (p. 7)**  
1991 Volkswagen Vanagon  
For Volkswagen Technical Site  
Copyright © 1998 Mitchell Repair Information Company, LLC  
Saturday, March 18, 2000 09:46PM

**STARTER SPECIFICATIONS**

STARTER SPECIFICATIONS

AA

Application	Specification
-------------	---------------

Armature

Runout .....	.002" (.05mm)
End Play .....	.002" (.05mm)

Cold Cranking

Test Voltage .....	12
Minimum Voltage .....	9
Amps .....	90
Minimum RPM .....	1500
Solenoid Hold-In	
Winding Voltage .....	4 Volts (Min.)
Solenoid Pull-In	
Winding Voltage .....	7

Commutator Runout .....	.0004" (.01mm)
-------------------------	----------------

Cranking Voltage .....	9 Volts Min.
------------------------	--------------

Starter Current Draw .....	170 Amps Max.
----------------------------	---------------

AA

**TORQUE SPECIFICATIONS**

TORQUE SPECIFICATIONS

AA

Application	Ft. Lbs. (N.m)
-------------	----------------

Starter-To-Block Bolts

All Except Vanagon .....	32.5-44.3 (44-60)
Vanagon .....	21 (28)

Starter-To-Block Bolts (1992)

Cabriolet, Golf, GTI & Jetta	
A/T .....	14 (19)
M/T .....	43 (58)
Corrado, Fox & Passat .....	44 (60)

INCH LBS. (N.m)

Solenoid Bolts .....	96 (10.8)
----------------------	-----------

Through Bolts .....	54 (6.1)
---------------------	----------

AA

**END OF ARTICLE**