

## **STARTER**

### **Article Text**

1993 Volkswagen Passat

For Volkswagen Technical Site: <http://vw.belcom.ru>

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Wednesday, March 22, 2000 10:22PM

## **ARTICLE BEGINNING**

1993 ELECTRICAL

Volkswagen Starters - Bosch

Volkswagen; Corrado SLC, Passat

## **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**

NOTE: See TROUBLE SHOOTING - BASIC PROCEDURES article in GENERAL INFORMATION.

## **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. If voltage is as specified, 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, 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.

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Voltage reading should not be more than one 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 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 volt. 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.

#### **Ground Return Line**

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.

## **BENCH TESTING**

### **STARTER SOLENOID**

1) Remove bridge strap connecting solenoid to motor. Check windings by connecting a 12-volt self-powered 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 a 12-volt self-powered test light between starter solenoid main terminals. Test light should not illuminate.

NOTE: Step 3) uses a non-powered (standard) test light.

3) Connect a test light to STARTER terminal of solenoid and ground. Apply voltage to STA and BAT terminals of solenoid. Solenoid should be heard to operate as contacts close and test light should illuminate. When voltage is removed from STA terminal of solenoid, test light should go out.

### **STARTER LOAD (LOCK) TEST**

With starter on test bench, lock starter drive pinion. Voltmeter should read 4.5 volts and ammeter should read 700-800 amps.

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**STARTER NO-LOAD TEST**

With starter on test bench, operate starter and check ammeter, voltage, and RPM. Readings should be within specification. See STARTER NO-LOAD TEST SPECIFICATIONS table.

STARTER NO-LOAD TEST SPECIFICATIONS TABLE		
AA		
Volts	Amps	RPM
11.5	65-95	6500
AA		

**REMOVAL & INSTALLATION**

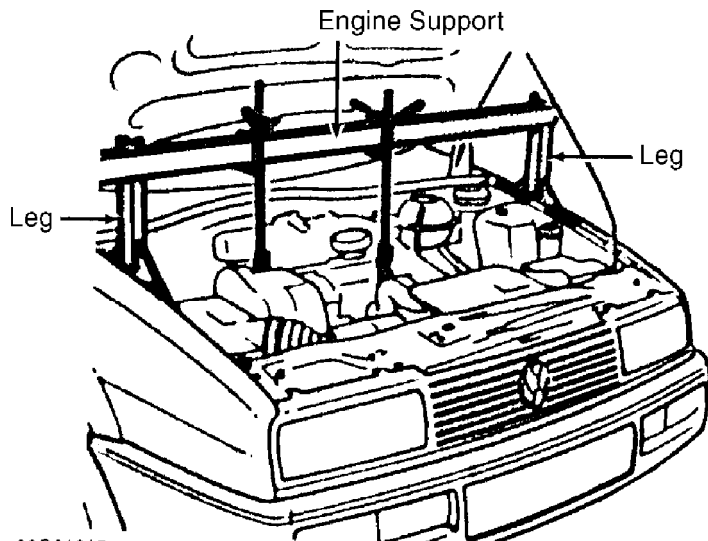
**CORRADO SLC & PASSAT**

**CAUTION:** Failure to use Support Beam (VW 10-222A) and Leg Set (VW 10-222A/1) may result in misalignment of engine/transmission assembly.

Removal & Installation

1) Disconnect negative battery cable. Support engine/transmission assembly with Support Beam (VW 10-222A) and Leg Set (VW 10-222A/1). See Fig. 1. Remove engine mount bolts. Remove rubber engine mount lower nut and clamp screw. Remove engine mount.

2) On Passat, cut and remove starter and alternator wiring harness tie straps. On all models, disconnect wiring and remove starter. To install, reverse removal procedure. Tighten starter mounting bolts/nuts to specification. See TORQUE SPECIFICATIONS table at end of article.



92G01615  
Fig. 1: Removing Starter (Corrado SLC, Passat)  
Courtesy of Volkswagen United States, Inc.

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## OVERHAUL

For overhaul, see exploded view of typical Bosch starter. See Fig. 2.

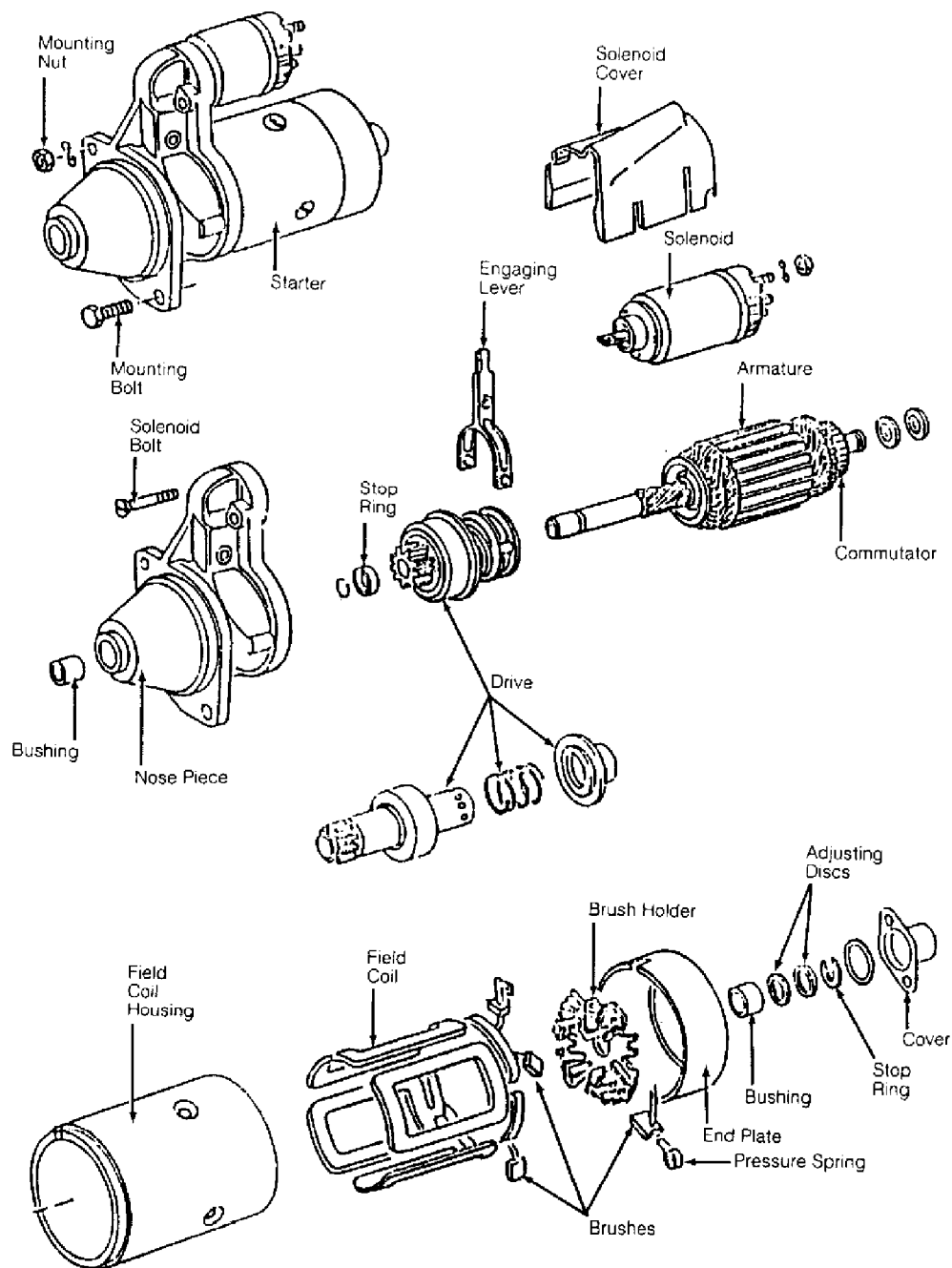


Fig. 2: Exploded View of Bosch Starter (Typical)  
Courtesy of Volkswagen United States, Inc.

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## STARTER SPECIFICATIONS

### STARTER SPECIFICATIONS TABLE

AA

Application	Specification
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#### Armature

Runout .....	.002" (.05 mm)
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End Play .....	.002" (.05 mm)
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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 Minimum
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Solenoid Pull-In Winding Voltage .....	7 Volts
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Commutator Runout .....	.0004" (.01 mm)
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Cranking Voltage .....	9 Volts Minimum
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Starter Current Draw .....	170 Amps Maximum
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AA

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS TABLE

AA

Application	Ft. Lbs. (N.m)
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#### Starter-To-Block Bolt/Nut

Corrado SLC, Passat .....	44 (60)
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INCH Lbs. (N.m)

Solenoid Bolts .....	96 (11)
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Through Bolts .....	54 (6)
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AA

END OF ARTICLE