

14 ELECTRICAL SYSTEM

5.5 Starter Bench Tests

A battery, or several batteries wired in parallel, with a rated capacity of 135 ampere hours should be available for bench test. This will ensure that decreasing battery power does not influence the test readings. Automotive electrical shops that have starter motor test stands will find the data in **Table d** and **Table e** useful to determine how closely starters conform to factory specifications. Testing should be carried out in the following sequence:

1. No load test—starter motor running freely.
2. Load test—test stand flywheel braked to limit starter to the rpm given in **Table d**. This test must last no longer than 10 seconds.
3. Stall torque test—test stand flywheel braked to stop the starter under load. This test must last no longer than 5 seconds.
4. Solenoid pull-in voltage under load—starter switched on and off under light load and the pinion checked for proper engagement.

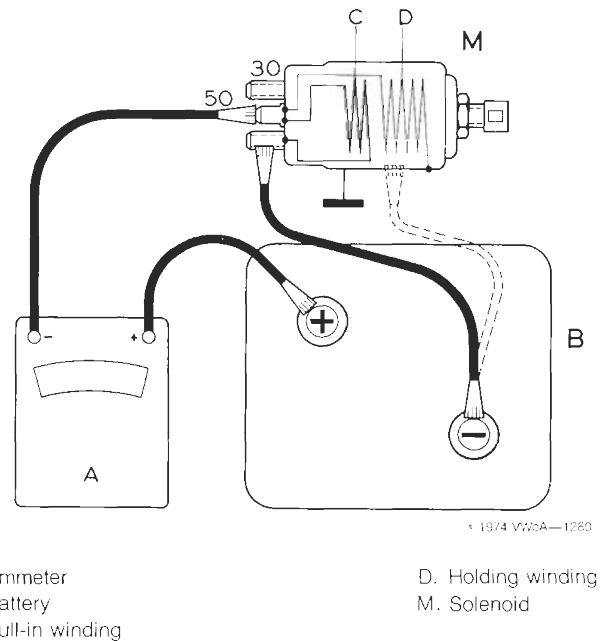


Fig. 5-11. Solenoid winding tests. Move negative connection to position shown by dotted lines to check current draw in holding winding. Bosch unit is shown, but VW solenoid uses a similar hook-up.

Table d. Starter Data

Starter Type	No-load Test			Load Test			Stall Torque Test		
	Current (amps)	Voltage	Speed (rpm)	Current (amps)	Voltage	Speed (rpm)	Current (amps)	Voltage	Solenoid pull-in voltage
311 911 023B	35-45	12	7400-9100	170-205	9	900-1300	220-260	6	7
111 911 023A	25-40	12	6200-7800	170-195	9	1050-1350	270-290	6	8
003 911 023A	35-50	12	6400-7900	160-200	9	1100-1400	250-300	6	8

Table e lists the normal current draw for the two windings of a solenoid that is in good condition. The pull-in winding is tested as shown in Fig. 5-11 and the holding winding as shown by the dotted lines in the same illustration. Faulty windings cannot be repaired. If readings vary from those listed in **Table e**, the solenoid must be replaced.

Table e. Solenoid Switch Test Data

	Current draw (amps)	
	Bosch	VW
Pull-in winding, max.	35	30
Holding winding, max.	11	12

6. CHARGING SYSTEM

Table f lists the generators installed in 1968 through 1971 Type 2 vehicles. In addition to the direct current generators listed in **Table f**, an alternator has been installed on Type 2 vehicles beginning with the 1972 models. The alternator is manufactured by Bosch.

Table f. Generator Types

Generator	From chassis No.	Through chassis No.
211 903 031 A	218 000 001	218 163 485
113 903 031 G	218 163 486	218 202 251
211 903 031 D	219 000 001	211 2276 560