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Submitted for recognition as an American National Standard

(R) ELECTRIC STARTING MOTOR TEST PROCEDURE

Foreword—Prior to 1981, SAE J544 addressed both starting motor and generator performance curves. Review of this technical report for improvement indicated that a recommended test procedure for development of the performance curves was needed and that starting motors and generators should be addressed in separate SAE technical reports. The generator performance curve information is now contained in SAE J56. The SAE J544 identity has been retained for testing the output performance and plotting the performance curves of starting motors.

1. **Scope**—This SAE Recommended Practice provides a standard procedure for testing the output performance and plotting the performance curve of electric starting motors, and a graphical method of determining engine cranking speed.

2. **References**

2.1 **Applicable Publications**—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J56—Electrical Generating System (Alternator Type) Performance Curve and Test Procedure
SAE J1253—Low Temperature Cranking Load Requirements of an Engine

3. **Testing Procedure**—The motor shall be mounted in a test stand as shown in Figure 1. For larger starting motors, the torque may be measured directly at the motor axis with a special test end frame because of torque limitation of test equipment. The torque measurement may be recorded and should be identified on the performance curve as either a frame reaction at the motor axis or at the torque loading point shown in Figure 1.

NOTE— If the latter test method is used, the effect of inertia should be taken into account.

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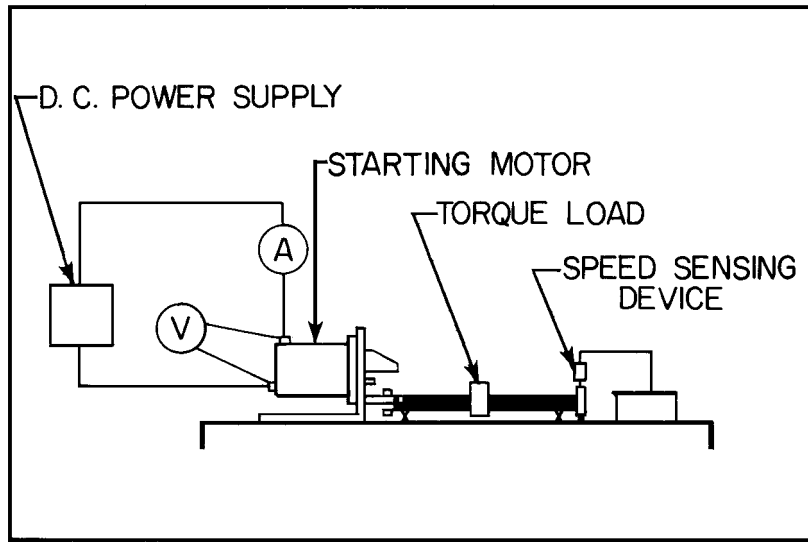


FIGURE 1—TYPICAL TEST SET-UP FOR STARTING MOTORS

Performance curves are established by running the starting motor in one of two methods. Method A is plotting a curve from discrete points while Method B is achieved by operating the motor in a continuous mode while the output is automatically recorded and/or plotted. Deviations from either of these two methods shall be noted on the performance curve. When a solenoid is used for meshing the starting motor pinion gear with the flywheel ring gear, the applied voltage and total current draw shall include the solenoid and be noted on the performance curve.

- 3.1 Test Method A**—Run the starting motor at various discrete torque loads and record the voltage, torque, current, and speed. The terminal voltage is preferably adjusted to a voltage curve selected from Table 1. The voltage curve selected shall not exceed the recommendation of the motor manufacturer. Enough points shall be recorded to develop a curve. The points shall be plotted and the curves developed as shown in Figure 2.

Cooling intervals between each test point shall be made to insure that the effects of temperature changes are negligible. Ambient test temperature shall be noted on the performance curve.

TABLE 1—RECOMMENDED TERMINAL VOLTAGE CURVES FOR STARTING MOTOR TESTS

Curve Name	Curve Data ⁽¹⁾	
	Volts at Open Circuit	Volts at Amperes
24V Heavy-Duty	24	16 at 1000
24V Standard-Duty	24	12 at 600
12V High Output	12	10 at 1000
12V Extra Heavy-Duty	12	8 at 1000
12V Heavy-Duty	12	6 at 1000
12V Medium-Duty	12	6 at 600
12V Standard-Duty	12	6 at 400
6V Standard-Duty	6	2 at 800

1. The terminal voltage curve is a straight line defined by the data points