SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J277

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Maintenance of Design Voltage—Snowmobile Electrical Systems

Foreword—This SAE Recommended Practice is intended as a guide toward standard practice, but may be subject to frequent change to keep pace with experience and technical advances. Hence, its use where flexibility of revision is impractical is not recommended.

1. ***Scope***—This SAE Recommended Practice provides test methods and requirements for maintenance of design voltage in snowmobile electrical systems. It pertains to both battery-equipped and batteryless systems.

2. ***References***—There are no referenced publications specified herein.

3. ***Samples for Test***—Samples submitted for laboratory test shall be representative of the systems as regularly manufactured and marketed. Each sample shall include not only the electrical system, but also accessory equipment necessary to operate it in the normal manner.

4. ***Test Apparatus***

4.1 Voltmeter—Alternating current (AC) or direct current (DC), as required, capable of ±2% accuracy of the measured reading. For AC measurements, either a true RMS voltmeter is required or the AC and DC components of the AC waveform must be measured separately and added algebraically as follows in Equation 1:

$$V_{\text{True RMS}} = V_{DC}^2 + V_{AC}^2 \qquad \text{(Eq. 1)}$$

For AC measurements, the voltmeter must have a minimum crest factor of 3.

4.2 Ammeter—DC, capable of ±2% accuracy of the measured reading.

4.3 Tachometer—Means of measuring engine rpm within ±3%.

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5. Test Procedure

5.1 Preliminary Instruction

5.1.1 If snowmobile is battery equipped, install a fully charged original equipment battery.

5.1.2 If snowmobile is battery equipped, install the ammeter in series with the battery such that it indicates negative current for discharge and positive current for charge conditions. Do not install the ammeter in series with the electric starter motor.

5.1.3 VOLTMETER INSTALLATION

5.1.3.1 Install the voltmeter(s) between the lamp terminals and the system ground. For the purpose of this document, the terminal voltages are designated as follows:

a. V_1—Headlamp low beam terminal to ground
b. V_2—Headlamp high beam terminal to ground
c. V_3—Tail lamp terminal to ground
d. V_4—Stop lamp terminal to ground

5.1.3.2 Take the required voltage readings simultaneously. If this is not possible, record the average of three consecutive readings that are within 1 V of each other.

5.1.4 ENGINE RPM

5.1.4.1 Do not use a tachometer operating from the alternator signal unless: it is standard equipment in the system being tested, or it affects the system's output voltage less than 0.5%.

5.1.5 SYSTEM OPERATION—Verify proper operation of all lamps, switches, and associated equipment both before and after the test is completed.

5.1.6 DATA SHEET—Prepare data sheet to record the voltage measurements indicated in Table 1 and the rpm recorded in 5.2.2.2.

TABLE 1—SWITCH POSITION FOR VOLTAGE MEASUREMENT

Engine RPM	Switch Positions Headlamp Low V_1	Switch Positions Headlamp High V_2	Switch Positions Tail Lamp V_3	Switch Positions Stop Lamp V_4
1. Idle	O	X	X	O
2. Idle	X	O	X	O
3. Clutch Engagement	X	O	X	O
4. Clutch Engagement	O	X	X	O
5. Rated	O	X	X	O
6. Rated	O	X	X	X
7. Rated	X	O	X	O
8. Rated	X	O	X	X
9. Rated	O	O	O	X

NOTE:

X = Switch in "ON" position and measure voltage
O = Switch in "OFF" position, no voltage measurement

5.2 Data Recording

5.2.1 Record the voltage measurements for the various switch positions and rpms as indicated in Table 1.

5.2.1.1 Idle rpm equals manufacturer's recommended idle rpm.

5.2.1.2 Clutch engagement rpm equals the rpm of initial clutch engagement (for systems not using a centrifugal clutch, run the engine at an rpm equivalent to 40% of top speed in top gear).

5.2.1.3 Rated rpm equals the engine rpm at maximum bhp, as installed in the snowmobile.

5.2.2 RPM FOR "0" AMMETER READING—For battery-equipped systems only.

5.2.2.1 Switch headlamp to upper beam.

5.2.2.2 Record the engine rpm at which the ammeter reads "0".

5.2.3 SYSTEMS WITH TWO OR MORE HEADLAMPS

5.2.3.1 Simulate a field lamp failure.

5.2.3.2 Repeat 5.2.1.

6. Test Limits

6.1 Except as provided in 6.1.1, record all measurements in 5.2.1 and 5.2.3.2 between 80 and 120% of the rated lamp design voltage.

6.1.1 At idle rpm, the lamp voltages (V_1, V_2, and V_3) are to be between 40 and 120% of the rated lamp design voltage.

6.2 Do not use or record the rpm of 5.2.2.2 if it is greater than the manufacturer's clutch engagement rpm.

7. Test Conditions—Condition the snowmobile before testing. Snowmobile conditioning consists of either running the snowmobile at the manufacturer's recommended idle rpm for 5 min, or soaking the snowmobile for 2 h at a temperature of no less than 10 °C.

PREPARED BY THE SAE SNOWMOBILE COMMITTEE