SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

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Superseding J277 NOV2004

Maintenance of Design Voltage—Snowmobile Electrical Systems

RATIONALE

An additional column has been added (V5) to Table 1 to address the effects of extra load on the machine electrical system due to added electrical accessories.

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:

$$\text{Vtrue rms} = \text{square root}(Vdc^2 + Vac^2) \quad \text{(Eq. 1)}$$

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

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4.2 Ammeter

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

4.3 Tachometer

Means of measuring engine rpm within ±3%.

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) across the lamp terminals. For the purpose of this document, the terminal voltages are designated as follows:

a. V1—Headlamp low beam terminals.

b. V2—Headlamp high beam terminals.

c. V3—Tail lamp terminals.

d. V4—Stop lamp terminals.

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 Optional Accessories Definition

Optional accessories are all electrical loads that come standard with the vehicle that can be switched off and can usually be turned on for more than 1 min, including but not limited to the front and rear heated grips, heated lever, heated seat, and cooling fan.

Head lamp, tail lamp, stop lamp, and manufacturer's separately sold accessories are excluded. All other factory installed loads that are presently connected to the vehicle are not considered as accessory and must be connected at all times.

5.1.7 Data Sheet

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

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TABLE 1 - SWITCH POSITION FOR VOLTAGE MEASUREMENT

Engine RPM	Switch Positions Headlamp Low V1	Switch Positions Headlamp High V2	Switch Positions Tail Lamp V3	Switch Positions Stop Lamp V4	Switch Positions Powered Accessory V5
1. Idle	O	X	X	O	X
2. Idle	X	O	X	O	X
3. clutch Engagement	O	O	X	O	O
4. Clutch Engagement	O	X	X	O	O
5. Clutch Engagement	X	O	X	O	X
6. Clutch Engagement	O	X	X	O	X
7. Rated	O	X	X	O	O
8. Rated	O	X	X	X	O
9. Rated	O	X	X	X	X
10. Rated	X	O	X	O	O
11. Rated	X	O	X	X	O
12. Rated	X	O	X	X	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 rpm 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

NOTE: If the battery is not in the charging state at idle, the test as described in 5.2.2 must be performed.

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.

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