SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J92 AUG2010

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Snowmobile Throttle Control Systems

RATIONALE

The changes and revisions included are designed to accommodate existing and potential new technology throttle systems design, specifically electronic control “Throttle by wire” or remote control systems.

1. SCOPE

This SAE Recommended Practice is intended to provide the minimum acceptable criteria for snowmobile hand throttle control systems. This recommendation is not intended to cover competition vehicles nor is it intended to limit development of new and/or improved technology in controls. Although these recommendations are primarily addressed to hand control systems using an outer flexible conduit with a multiple strand inner cable, the basic requirements of freedom of movement, strength, material, etc., will apply to any system.

2. REFERENCE

2.1 Applicable Document

The following publication forms 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 Publication

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J33 Snowmobile Definitions and Nomenclature—General

3. DEFINITIONS

3.1 SNOWMOBILE

As defined in SAE J33.

3.2 THROTTLE CONTROL

A hand-controlled device mounted on the steering control; either a lever type (squeeze grip) or a twist grip type. (See Figure 1.)

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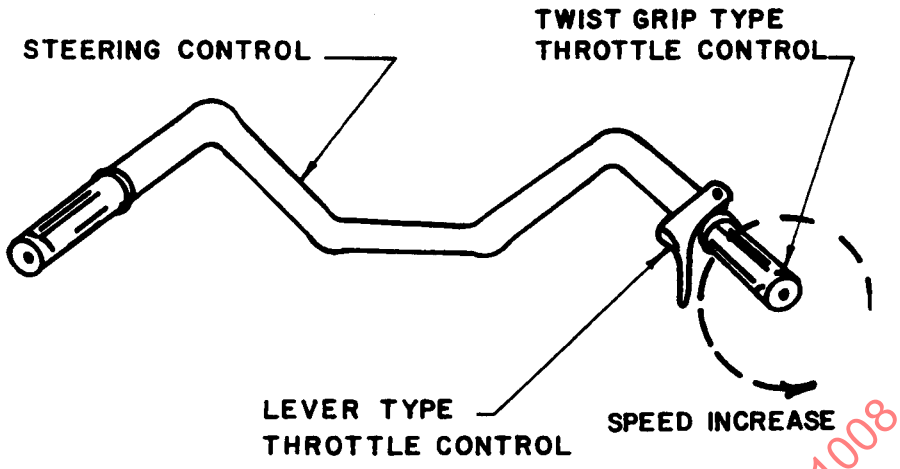

FIGURE 1 - THROTTLE CONTROL

3.3 SPEED CONTROLLER

A device such as a carburetor(s), fuel injection valves, sensors,electronic control device, etc., used to control the supply of energy (fuel) to the prime mover (engine–motor).

3.4 CONTROL TRANSFER

A means of transmitting mechanical motion or electronic command (throttle by wire) between two or more points.

3.4.1 Control Cable Assembly

A linkage consisting of a flexible assembly with an outer housing or conduit and an inner cable, usually multiple stranded; capable of transmitting motion between two points. This assembly is provided with connection means on both ends of housing and cable.

3.4.2 Electronic Control

A control interface by means of direct electronic connection or remote control.

3.5 THROTTLE CONTROL SYSTEM

A complete system used to control engine(s) speed. This includes the throttle control, control linkage, sensors, electronic controller, speed controller, input linkage, springs, brackets. etc., necessary for operation of the system. Any attachment to the system that affects its operation such as a warning light switch, safety switch, etc., shall be considered as part of the system.

3.6 RIGHT-RIGHT HAND, LEFT-LEFT HAND

Designation refers to orientation of the vehicle when the operator is seated in the operator's position, facing forward.

3.7 SHALL

The word shall is to be understood as mandatory.

3.8 SHOULD

The word should is to be understood as advisory.

3.9 IDLE

The position of the throttle control system at which engine will not propel the vehicle, when the control linkage movement is restricted by a mechanical stop on the speed controller and engine rpm is within the idle range specified by the engine manufacturer.

4. REQUIREMENTS AND RECOMMENDATIONS

4.1 Requirements

The throttle control system shall meet the following minimum performance criteria when tested in accord with Section 5, or to design requirements by visual inspection.

4.1.1 The throttle control(s) shall be on the right side of the steering control adjacent to, or at, the right-hand position.

4.1.1.1 Lever type throttle controls shall be positioned so that pivoting the lever toward the steering control shall move the speed controller to a higher speed position.

4.1.1.2 Twist grip type throttle controls shall move the speed controller to a higher speed position when rotation of the control about its axis is in a counterclockwise direction when viewed from the right end or downward end. See Figure 1.

4.1.2 The throttle control system shall operate freely without hesitation or binding, and when released from any partial or full-speed position shall automatically return to its idle position within 1 s.

4.1.3 The throttle control system's performance shall not be adversely affected by climatic conditions during vehicle operation.

4.1.4 The throttle control system shall be protected from areas which would cause the system's temperature to exceed the temperature limit of the material used.

4.1.5 The throttle control system shall be protected so that with all guards and shrouds in place, it cannot be pulled or snagged in a manner that would accelerate the vehicle.

4.1.6 Motion of any part of the vehicle, such as the steering control, shall not cause activation, prevent activation, or jam the throttle control system.

4.2 Recommendations

The following design recommendations should improve the performance and safety of a throttle control system.

4.2.1 Throttle control(s) should be designed with an abutment or stop independent of the control linkage that will limit rotation of the control near the idle and at the full-speed positions.

4.2.2 Adjustments

For normal operation, the linkage should be adjusted in such a way that a full-speed position is obtained when the control is in contact with the high speed stop of 4.2.1.

4.2.3 The control system should be routed to avoid entrapment of moisture.

4.2.4 Control cable assembly, when used, should be routed with bend radii as large as practical. Where small radii are necessary, adequate strain relief protection should be provided to insure that the conduit will not kink.

4.2.5 The adequacy of the throttle control system should be verified by field testing.

5. TESTS

5.1 General Requirements

5.1.1 A minimum of two samples of each type of throttle control system are to be tested.

5.1.2 The throttle control system used throughout the following testing shall be identical to those to be used in vehicle production.

5.1.3 All throttle control system tests shall be conducted on a vehicle with production routing or on a suitable fixture that duplicates the location of components and routing.

5.1.4 Room temperature is defined as being in the range of 15 to 27 °C (60 to 80 °F).

5.1.5 The engine does not have to operate unless otherwise noted.

5.1.6 Components may be lubricated at time of initial assembly if specified on production assembly specification. After tests have started, lubrication of any component of the throttle control system, other than components which receive lubrication during normal operations or which are specified in vehicle service instructions, shall not be allowed.

5.1.7 Tests shall be run in the following sequence.

5.2 System High-Temperature Test

5.2.1 Scope

To determine the effect of elevated temperature and wear on operation of the throttle control system.

5.2.2 Test Procedure

5.2.2.1 Conduct the test at a temperature of 49 °C (120 °F) minimum. If, however, a portion of the throttle control system is exposed to a higher temperature in service, then at least this portion of the throttle control system shall be tested at this higher temperature. (Refer to 5.2.2.2.)

5.2.2.2 Determine the maximum temperature to which the throttle control system is exposed when the snowmobile has operated for a minimum of 30 min under load at an ambient temperature of at least 10 °C (50 °F), and use this temperature to conduct test 5.2.2.3. If a minimum ambient of 10 °C (50 °F) cannot be obtained, subtract the ambient temperature from 10 °C (50 °F), and add this difference to the maximum under hood temperature to which the throttle control system is exposed. Use this temperature to conduct test 5.2.2.3.

5.2.2.3 Subject to 5.2.3; cycle the throttle control system through design operating range (idle to full speed) at a rate not to exceed 60 cycles per min for 300 000 cycles minimum.

5.2.2.4 Subject to 5.2.3; the throttle control system shall be subjected to strength test 5.4 while remaining at temperature, per 5.2.2.1 or 5.2.2.2.

5.2.3 Test Acceptance

The throttle control system, when released from any position, shall return to idle position within 1 s.