SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

SAE J297

Issued 1973-05
Reaffirmed 1985-06

Submitted for recognition as an American National Standard

OPERATOR CONTROLS ON INDUSTRIAL EQUIPMENT

1. PURPOSE AND SCOPE:

This standard is intended to improve operator efficiency and convenience by providing guidelines for the uniformity of location and direction of motion of operator controls used on industrial wheeled equipment. The controls covered are those centrally located at the operator's normal position.

2. GENERAL:

2.1 These guidelines are based on the principle that a given direction of movement of any control produces a consistent and expected effect.

2.2 Where confusion may result from the motion of the control, the effect from movement of the control shall be clearly and permanently identified.

3. DEFINITIONS:

3.1 INDUSTRIAL WHEELED EQUIPMENT: That class of tractors and associated equipment used in operations such as landscaping, construction services, loading, digging, grounds keeping, and highway maintenance.

3.2 PROPELLING MACHINES: Tractors or self-propelled units.
ed.

3.3 TOWED, SEMI-MOUNTED AND MOUNTED EQUIPMENT: Equipment used in conjunction
ed. with propelling machines defined in 3.2.

3.4 RIGHT-HAND, LEFT-HAND, AND FORWARD DESIGNATIONS: Those related to the operator when sitting in the operating position.

4. BRAKE CONTROL:

4.1 The brake pedal(s) shall be actuated by the operator's right foot with the direction of motion forward and/or downward for engagement. When traction control is not foot actuated, brakes may be operated by either foot.

4.2 When separate brake pedals are provided for the independent right-hand and left-hand brake control, it shall be possible to obtain combined and/or equalized control.

4.3 The parking brake or parking device control shall be located convenient to the operator.

5. CLUTCH CONTROL:

5.1 Traction Control:

5.1.1 When a foot pedal control is provided, it shall be actuated by the operator's left foot with the direction of motion forward and/or downward for disengagement.

5.1.2 When a hand-operated control is provided, it shall be moved toward the operator (generally rearward) for disengagement.

5.2 Combination Clutch and Brake Control: When a foot-operated combination tractor clutch and brake control is used, it shall be left-foot operated with the direction of motion to be forward and/or downward to cause clutch disengagement and brake engagement.

5.3 Power Take-Off Control:

5.3.1 When a hand-operated clutch control is provided, its movement shall be generally rearward and/or downward for disengagement.

5.3.2 The combination tractor clutch and constant running or transmission-driven power take-off clutch controls are governed by 5.1.1 and/or 5.1.2.

5.4 Master Implement, Header, or Gathering Unit Clutch: (for self-propelled implements)

5.4.1 When a hand-operated clutch control is provided, its movement shall be generally rearward and/or downward for disengagement.

5.4.2 When a foot-pedal clutch control is provided, it shall be governed by 5.1.1.

6. ENGINE SPEED CONTROL:

6.1 The engine speed control shall be convenient to the operator.

6.2 When the direction of motion of the engine speed hand control is in a plane parallel to the longitudinal axis of the propelling machine, the direction of motion shall be generally forward or upward to increase engine speed. (Reaffirmed)

6.3 When a foot-operated engine speed control is provided, it shall be right-foot operated with the direction of motion forward and/or downward to increase engine speed.

7. GROUND SPEED AND DIRECTION CONTROL:

7.1 The transmission speed selector lever(s) shall be conveniently located, and the shifting pattern(s) shall be clearly and permanently identified.

7.2 When a hand-operated forward-reverse directional control level (non-variable speed) is provided, it shall be moved forward for forward machine motion, and be moved generally rearward for rearward machine motion. If a neutral position is provided, provisions shall be made to prevent accidental movement of the control. (Reaffirmed)

7.3 When a hand-operated variable speed control is provided, it shall be moved generally forward and/or upward to increase speed.

7.4 Hand-operated combination direction and variable speed ratio control lever(s) shall be operated in one of the following patterns:

7.4.1 The lever shall be moved forward or away from the operator from the neutral position, for forward travel and increasing forward speed. It shall be moved generally rearward or toward the operator, from the neutral position, for rearward travel and increasing rearward speed. Provision shall be made for secondary motion when passing through neutral. A positive neutral position shall be provided.

7.4.2 The lever shall be moved generally forward and away from the operator, from a neutral position, for forward speed. For rearward travel, the lever shall be moved laterally through a neutral position, and then forward and/or away from the operator for increased rearward speed. A positive neutral position shall be provided.

7.5 If foot-operated directional and variable speed control(s) is provided, forward and/or downward motion on the outer or rear element of the control(s) shall produce reverse motion and forward and/or downward motion on the inner or forward element of the control(s) shall produce forward motion. Forward and/or downward motion of either element shall increase speed. All direction and variable speed control(s) shall be clearly and permanently identified to indicate their function. A positive neutral position or control shall be provided.

7.6 An interlock shall be provided which prevents the engine from being started unless (a) the transmission selector level is in a neutral position, (b) the transmission clutch is disengaged, or (c) the combination direction and speed control is in a neutral position.

7.7 When a differential lock control is provided, it shall be moved forward or downward for engagement.

8. LIFT CONTROL LEVERS FOR EQUIPMENT:

Lift control lever(s) intended for movement from the operator's station shall be convenient to the operator and shall be clearly and permanently identified. The control(s) should be located on the right-hand side of the operator.

8.1 When a hand control is provided, the direction of motion shall be generally forward or downward to lower and rearward or upward to raise the equipment.

8.2 When a heel and toe foot control pedal is provided, the direction of motion of the forward part of the pedal shall be generally downward to lower and upward to raise.

9. STEERING CONTROL:

9.1 When a steering wheel control is provided, a clockwise rotation shall effect a right turn and counterclockwise rotation shall effect a left turn.

9.2 When a single lever other than tiller type is used for steering, a lateral motion of the lever to the right shall effect a right turn and a lateral motion to the left shall effect a left turn.

9.2.1 If the single lever also controls the speed and direction of travel, it shall be governed by 7.4.1.

9.3 When a single tiller type lever is used for steering, a lateral motion of the lever to the right shall effect a left turn and a lateral motion to the left shall effect a right turn.

9.4 When two levers are provided for steering by controlling the speed and direction of the driving elements, the right-hand lever shall control the right-hand element and the left-hand lever shall control the left-hand element. The levers shall be moved forward or away from the neutral position, for forward travel and increasing forward speed. They shall be moved generally rearward or toward the operator, from the neutral position, for rearward travel and increasing rearward speed.