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

# SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1177

REAF. JUN88

Issued 1978-04
Reaffirmed 1988-06

Superseding J1177 OCT80

Submitted for recognition as an American National Standard

## HYDRAULIC EXCAVATOR OPERATOR CONTROLS

***Foreword*—**This Reaffirmed Document has not changed other than to put it into the new SAE Technical Standards Board Format.

***1.*** ***Scope*—**This recommended practice covers mobile hydraulic excavator controls and the specific arrangement and direction of motion for the primary controls.

This recommended practice applies to mobile hydraulic excavators. (A mobile hydraulic excavator is defined as a self-propelled machine with an upperstructure capable of continuous rotation and which digs, elevates, swings, and dumps material by action of the boom and arm or telescoping boom with bucket.)

**1.1** **Purpose—**This SAE Recommended Practice is intended as a guide for designing uniform two lever type operating controls for mobile hydraulic excavators, either wheel mounted or crawler mounted on independently reversible tracks.

It is not intended to limit new design innovation or to force a change on existing machines.

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

***3.*** ***Definitions***

**3.1** **Working Equipment Controls—**Those controls that actuate the functions that dig, elevate, swing, and dump material.

3.1.1 PRIMARY CONTROLS—Those controls that actuate the following basic functions common to all hydraulic excavators: boom, arm or telescoping boom, swing, and bucket or clam.

3.1.2 SECONDARY CONTROLS—Those controls that actuate other equipment functions (if provided) such as bucket tilt, bucket rotate, extendible arm, adjustable boom, combination bucket, etc.

**3.2** **Machine Travel Controls—**Those controls that actuate any functions that influence machine movement or travel.

3.2.1 WHEEL MOUNTED MACHINE

*3.2.1.1* *Primary Controls*—Those controls that actuate the following basic travel functions: speed, steering, travel direction, service brake, and clutch (if provided).





**QUESTIONS REGARDING THIS DOCUMENT: (724) 772-8512 FAX: (724) 776-0243**
**TO PLACE A DOCUMENT ORDER; (724) 776-4970 FAX: (724) 776-0790**
**SAE WEB ADDRESS http://www.sae.org**

*3.2.1.2* *Secondary Controls*—Those controls that actuate other travel functions (if provided) such as transmission selector, emergency brake, parking brake, turn signal, etc.

3.2.2 CRAWLER MOUNTED MACHINE

*3.2.2.1* *Primary Controls*—Those controls that actuate the following basic travel functions: speed, steering, and travel direction.

*3.2.2.2* *Secondary Controls*—Those controls that actuate other travel functions (if provided) such as transmission selector, parking brake, etc.

**3.3** **Auxiliary Controls—**Those controls that actuate all other functions that pertain to overall machine performance such as outriggers, engine speed, engine start and stop, swing brakes, horn, digging brakes, and steering selector.

## *4. General*

**4.1** The function of all controls (except as noted in 4.1.1) shall be clearly identified on permanently affixed labels or diagrams (Ref. SAE J298). Primary and secondary control movement shall additionally be identified such that the operator can determine equipment movement without trial and error or reference to a manual.

4.1.1 The function of controls obviously self-defined by standard practice such as steering wheel, turn signal, and horn or by mounting location such as heater switch or door handle when located on the unit are exempt. Movement of foot operated controls need not be identified if they operate with a push motion.

**4.2** All primary working equipment and machine travel controls (except steering wheel, travel direction, and clutch controls) shall return to their neutral position automatically when released and the power for movement shall disengage.

**4.3** The type and style of control levers, buttons, or pedals are left to the option of the manufacturer.

**4.4** Where possible, the movement of all controls from their neutral position shall be in the same general direction as the movement of the functions that they control.

## *5. Recommendations*

**5.1** The control arrangements shown in Figures 1, 2, and 3 are for the primary controls only, and shall be located within the optimum zones as set forth in SAE J898.

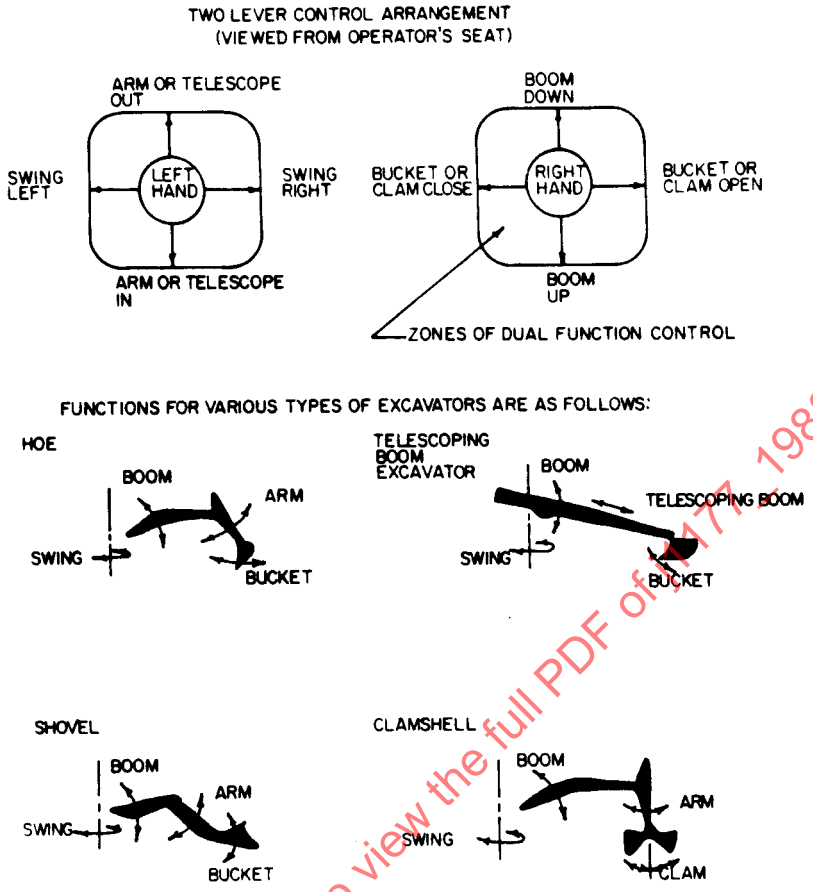
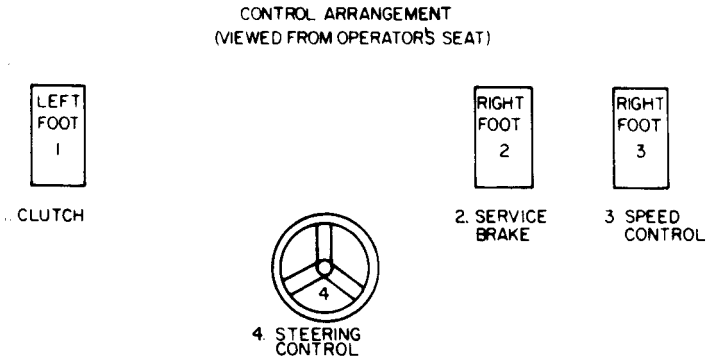



FIGURE 1—PRIMARY WORKING EQUIPMENT CONTROLS AND FUNCTIONS




| CONTROL | OPERATION |
|---|---|
| 1. CLUTCH | PUSH TO DISENGAGE |
| 2. SERVICE BRAKE | PUSH TO ENGAGE |
| 3. SPEED CONTROL | PUSH TO INCREASE SPEED |
| 4. STEERING CONTROL | COUNTERCLOCKWISE TO TURN LEFT; CLOCKWISE TO TURN RIGHT |
| 5. TRAVEL DIRECTION CONTROL | AT THE DISCRETION OF THE MANUFACTURER |

FIGURE 2—PRIMARY MACHINE TRAVEL CONTROLS (WHEEL MOUNTED)

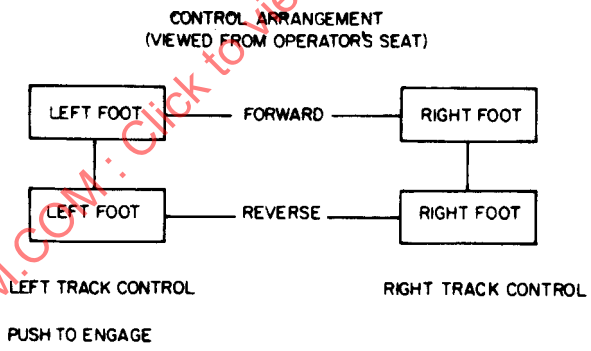



FIGURE 3—PRIMARY MACHINE TRAVEL CONTROLS (CRAWLER MOUNTED)



**5.2** The location and direction of movement of the Primary Working Equipment Controls and their functions are illustrated in Figure 1. The direction of movement of the functions that are controlled (right, left, etc.) are relative to the operator when he is sitting in the operator position.

**5.3** The location and direction of movement of the Primary Machine Travel Controls for Wheel Mounted Machines and Crawler Mounted Machines are illustrated and described in Figures 2 and 3 respectively. The direction of movement of functions that are controlled (forward, reverse, etc.) are relative to the machine in its normal travel mode as specified by the manufacturer.