SAE International™

SURFACE VEHICLE STANDARD

SAE J1179

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Superseded by ISO 6015

Hydraulic Excavator and Backhoe Digging Forces

Foreword—SAE J1057 has been superseded by SAE J/ISO 6165.

1. Scope—This document applies to all hydraulic excavators and backhoes that are either crawler mounted or rubber tire mounted, with or without outrigger members, identified in SAE J1116 as earthmoving machines and defined in SAE J/ISO 6165.

1.1 Purpose—This document is to provide a uniform method of determining digging forces for hydraulic excavators and backhoes.

1.2 Rationale—This document is being superseded by ISO 6015.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1116—Categories of Off-Road Work Machines
SAE J/ISO 6165—Earthmoving Machinery—Basic Types—Vocabulary

3. Definitions

3.1 Working Circuit Pressure—That nominal pressure applied to the specific circuit by the pump(s).

3.2 Holding Circuit Pressure—The maximum static pressure in a specific circuit, limited by a relief valve at a flow no greater than 10% of the circuit rated flow.

3.3 Maximum Digging Forces—The maximum digging forces are the digging forces that can be exerted at the outermost cutting point. These forces are calculated by applying working circuit pressure to the cylinder(s) providing the digging force without exceeding holding circuit pressure in any other circuit. Weight of components and friction are to be excluded from these force calculations.

3.3.1 MAXIMUM BUCKET TANGENTIAL FORCE—The maximum bucket tangential force, “V”, Figure 1, is the digging force generated by the bucket cylinder(s) and tangent to the arc of radius “C”, Figure 1. The bucket shall be positioned to obtain the maximum output moment from the bucket cylinder(s) and connecting linkage.

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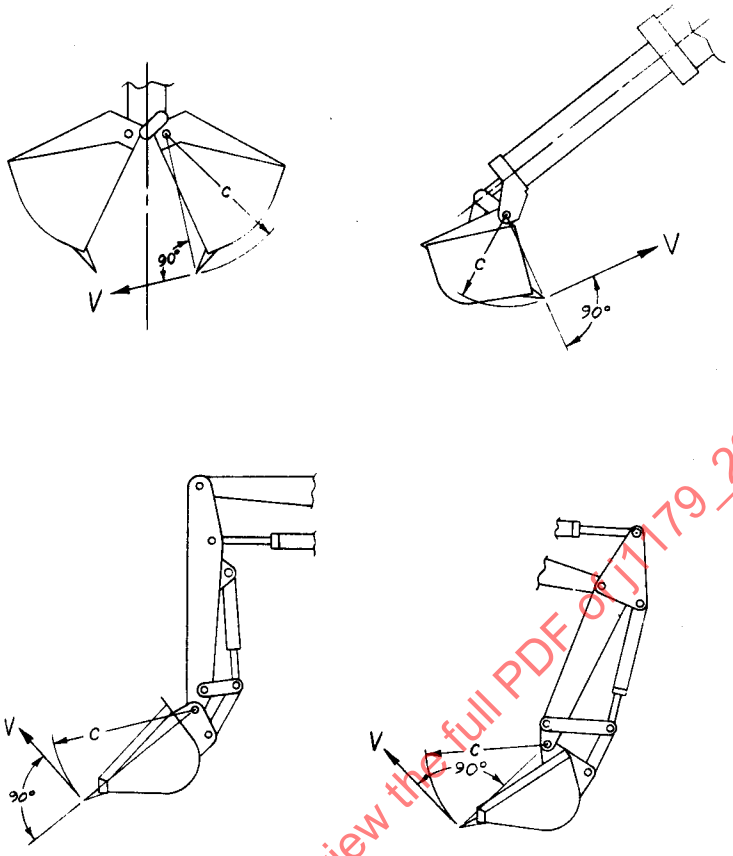

FIGURE 1—MAXIMUM BUCKET TANGENTIAL FORCE

3.3.2 MAXIMUM ARM/DIPPERSTICK FORCE—The maximum arm/dipperstick force, "W", Figure 2 is the digging force generated by the arm/dipperstick cylinder(s) and tangent to the arc of the radius "B", Figure 2. The arm/dipperstick shall be positioned to obtain the maximum output moment from the arm/dipperstick cylinder(s) and the bucket positioned as in 3.3.1.

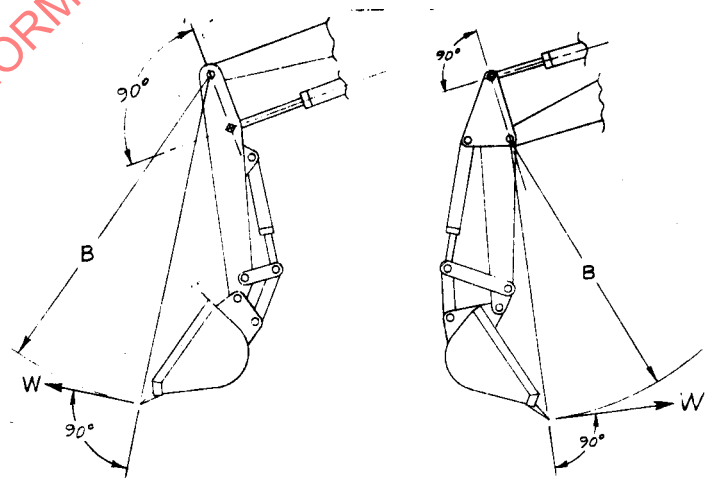

FIGURE 2—MAXIMUM ARM/DIPPERSTICK FORCE