Front-End Agricultural Loader Ratings

Developed by the ASAE Farm Loader Subcommittee; approved by the ASAE Power and Machinery Division Technical Committee; adopted by ASAE as a Standard December 1966; revised editorially December 1969; reconfirmed December 1974; revised December 1975; reconfirmed December 1980; revised March 1982; reconfirmed December 1986, December 1991; revised January 1996; revised editorially March 1997.

1 Purpose

1.1 The purpose of this Standard is to provide a uniform method of rating front-end agricultural loaders. Any specification published that is not in accordance with criteria of this Standard should be defined.

2 Normative references

The following standard contains provisions which, through reference in this text, constitutes provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below. Standards organizations maintain registers of currently valid standards.

SAE J742 FEB85, *Capacity Rating—Loader Bucket*

SAE J1150 OCT92, *Terminology for Agricultural Equipment*

3 Description of equipment rated

3.1 Loader model: Specify manufacturer and model number.

3.1.1 Bucket: Specify size of material handling attachment.

3.1.1.1 Width: Overall outside width of bucket, in millimeters (inches).

3.1.1.2 Depth (L): Horizontal distance, in millimeters (inches), from tip of cutting edge to rearmost vertical inner face of bucket.

3.1.1.3 Height (M): Overall vertical height, in millimeters (inches), from bottom of bucket to top edge of bucket.

3.1.1.4 Length (N): Horizontal distance in millimeters (inches), from the tip of the cutting edge to the bucket pivot pin centerline.

3.1.1.5 Bucket weight: Specify mass of bucket in kilograms (pounds).

3.1.1.6 Capacity: Specify struck and rated capacities per SAE Standard J742.

3.1.2 Bucket control: Specify type of bucket leveling system, if equipped.

3.2 Tractor model: Specify manufacturer, model number, and other information necessary to define tractor.

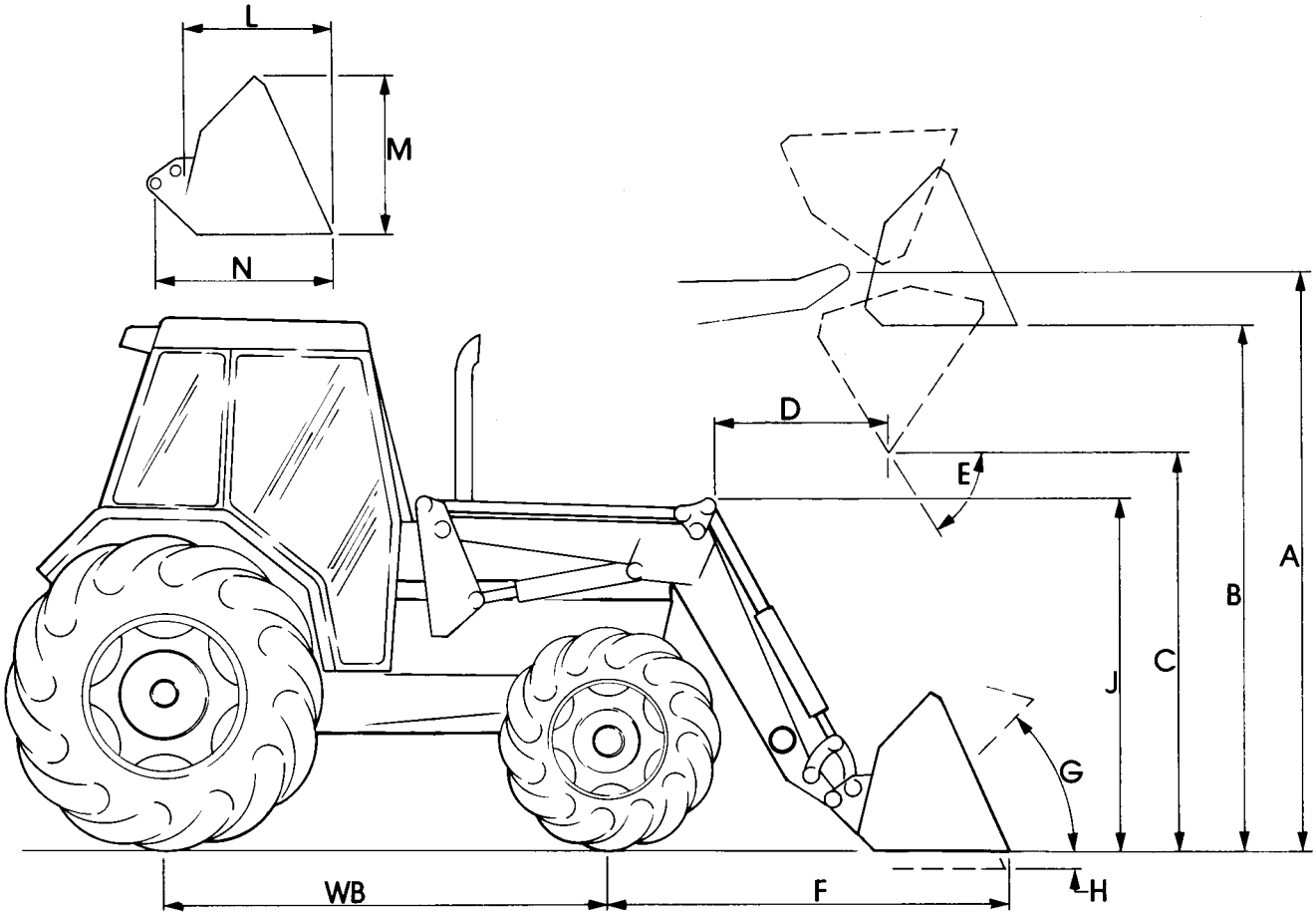

Figure 1 – Dimensional specifications

3.2.1 Tires: Specify front and rear tire sizes and tire type nomenclature (code number).

3.2.2 Wheelbase (WB): Specify wheelbase in millimeters (inches).

3.3 Hydraulic system: Specify whether tractor or independent system.

3.3.1 Rated flow: Specification for maximum hydraulic flow at rated engine speed (RPM) in liters per minute (gallons per minute). Specify RPM.

3.3.2 Maximum pressure: Specify pressure setting governing loader operation in kilopascals (pounds per square inch).

4 Specifications, dimensional (figure 1)

4.1 Dimensional specifications are to be determined under the following conditions.

(a) Bucket empty.
(b) Machine at operating mass and equipment as specified. Any provisions made to add counterweight to machine are to be specified (e.g., wheel weights, tires loaded with calcium, three-point hitch ballast).

4.1.1 Maximum lift height to pivot pin (A): The vertical distance in millimeters (inches), from ground line to the bucket pivot pin centerline with the loader fully raised.

4.1.2 Maximum lift height under level bucket (B): The vertical distance, in millimeters (inches), from ground line to the lowest point on the bottom side of a level (horizontal) bucket with the loader fully raised.

4.1.3 Clearance with bucket dumped (C): Vertical distance, in millimeters (inches), from ground line to the lowest point of the cutting edge when the bucket is dumped 45 deg and the loader is fully raised. (If maximum dump angle is less than 45 deg, specify angle.)

4.1.4 Reach at maximum lift height (D): Horizontal distance, in millimeters (inches), from tip of bucket cutting edge to the foremost part of the tractor (specify whether tires or tractor) or loader frame with the loader fully raised and bucket dumped at 45 deg. (If maximum dump angle is less than 45 deg, specify angle.)

4.1.5 Maximum dump angle (E): The angle, in degrees, that the bucket will rotate below horizontal with loader fully raised. E

4.1.6 Reach with bucket on ground (F): The distance, in millimeters (inches), from center line of tractor front wheels to tip of the bucket cutting edge when bucket is level on ground (ground line).

4.1.7 Maximum rollback angle (G): The angle, in degrees, that the bucket will rotate above horizontal starting with the bucket at ground line. E

4.1.8 Digging depth (H): The vertical distance in millimeters (inches) from the ground line to the bottom of the bucket cutting edge with the loader at its lowest position and bucket cutting edge horizontal.

4.1.9 Overall height in carry position (J): Vertical distance in millimeters (inches), from ground line to the highest point on the loader with the bucket fully rolled back and loader raised, to provide 305 mm (12 in.) of ground clearance.

5 Specifications, operational (figures 2 and 3)

For compact utility tractor loaders reference point shall be 500 mm (19.7 in.) in place of 800 mm (31.5 in.). Refer to SAE J1150 for classification of tractor.

5.1 Operational specifications shall be determined under the following conditions:

(a) Maximum pressure (3.3.2) for lift capacity and breakout force. E
(b) Rated flow (3.3.1) for cycle times. E
(c) Machine not tied down.
(d) Machine at operating mass and equipment as specified. Any provisions made to add counterweight to machine are to be specified (e.g., wheel weights, tires loaded with calcium, three-point hitch ballast.)

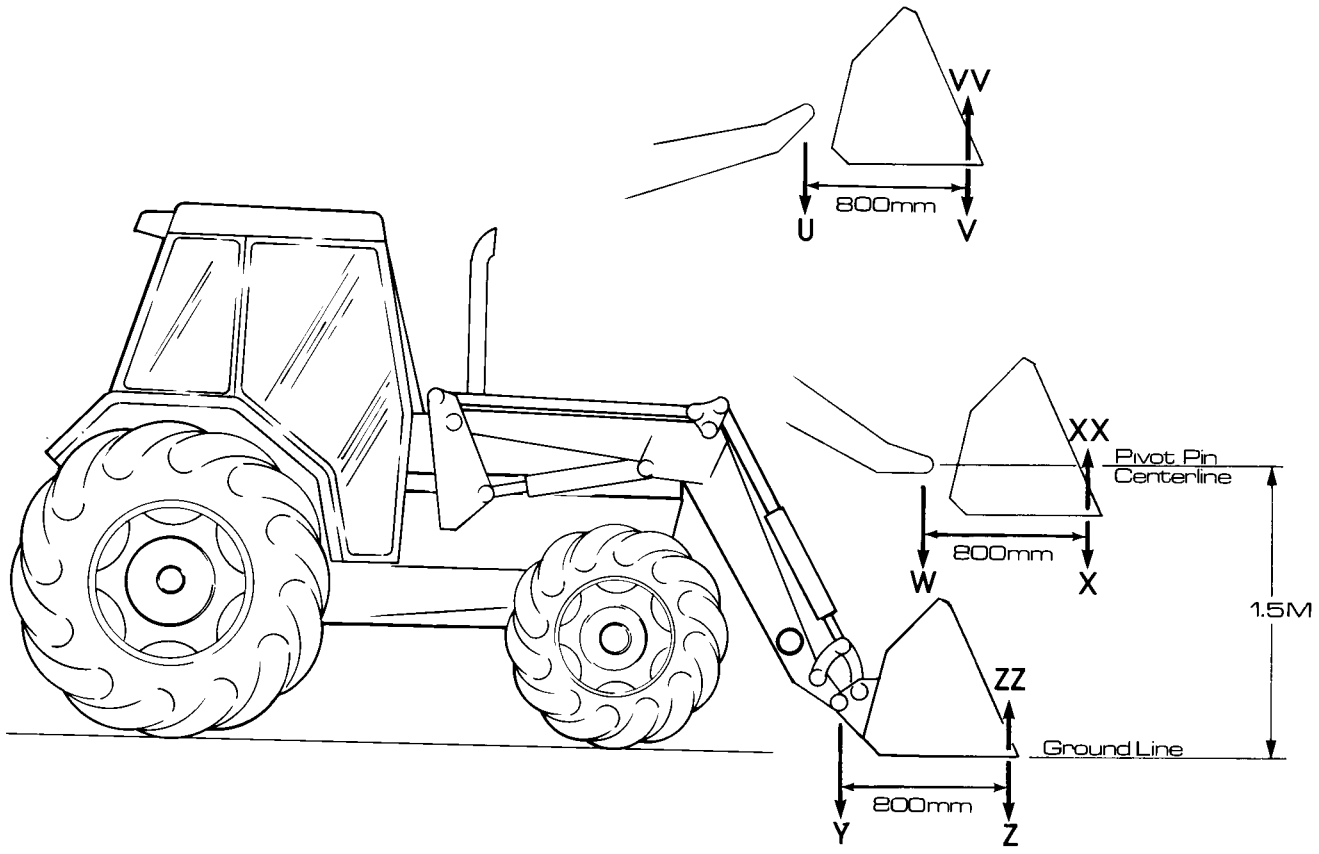

Figure 2 – Operational specifications

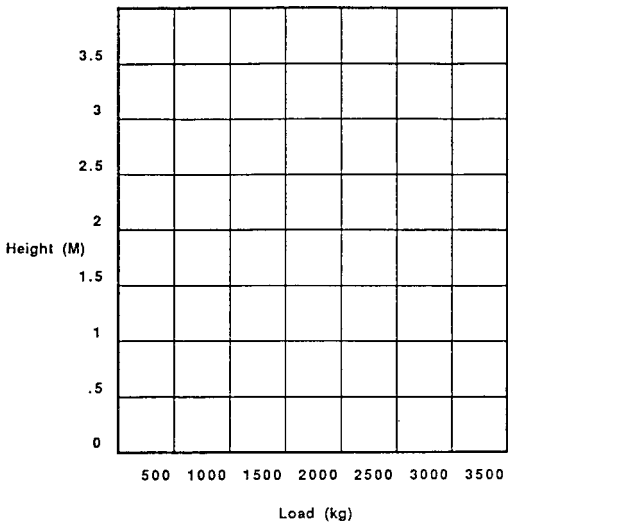

Figure 3 – Lift capacity chart

5.1.1 Lift capacity to maximum height—at pivot pin (U): The net vertical load in kilograms (pounds), measured at the bucket pivot pin centerline that the loader will lift to maximum height using the lift cylinders.

5.1.2 Lift capacity to maximum height (V): The net load, in kilograms (pounds), located 800 mm (31.5 in.), forward of the bucket pivot pin centerline that the loader will lift to maximum height using the lift cylinders with bucket horizontal.

5.1.3 Lift capacity to 1.5 m (59 in.) height—at pivot pin (W): The vertical load, in kilograms (pounds), the loader will lift at the bucket pivot pin centerline with the pin centerline located 1.5 m (59 in.) above the ground line with bucket horizontal using lift cylinders.

5.1.4 Lift capacity to 1.5 m (59 in.) height (X): The vertical load, in kilograms (pounds), the loader will lift at a point 800 mm (31.5 in), forward of the bucket pivot pin centerline with the pivot pin centerline located 1.5 m (59 in.) above the ground line with bucket horizontal using lift cylinders.

5.1.5 Breakout force—at pivot pin (Y): Vertical lifting force, in newtons (pounds), the loader will exert at the bucket pivot pin centerline using the lift cylinders only, with the bucket horizontal at ground line.

5.1.6 Breakout force (Z): Vertical lifting force, in newtons (pounds), the loader will exert located 800 mm (31.5 in.) forward of the bucket pivot pin centerline using the lift cylinders only, with the bucket horizontal at ground line.

5.1.7 Bucket rollback force at maximum height (VV): Vertical lifting force, in newtons (pounds), the bucket will exert, located 800 mm (31.5 in.) forward of the bucket pivot pin centerline, using the bucket cylinders only, with loader at maximum height and bucket horizontal.

5.1.8 Bucket rollback force at 1.5 m (59 in.) lift height (XX): Vertical lifting force, in newtons (pounds), the bucket will exert located 800 mm (31.5 in.) forward of the bucket pivot pin centerline using the bucket cylinders only, with the loader positioned to locate the bucket pivot pin centerline at 1.5 m (59 in.) above ground line and bucket horizontal.

5.1.9 Bucket rollback force at ground line (ZZ): Vertical lifting force, in newtons (pounds), the bucket will exert located 800 mm (31.5 in.) forward of the bucket pivot pin centerline using the bucket cylinders only, with the loader positioned to locate the bottom of the bucket cutting edge horizontal at ground line.

5.1.10 Raising time: Time, in seconds, required to raise empty bucket from ground line to maximum lift height at rated flow.

5.1.11 Lowering time: Time, in seconds, required to lower empty bucket from full height to ground line at rated flow.

5.1.12 Bucket dumping time: Time, in seconds, required to rotate empty bucket from full rollback to full dump position at rated flow.

5.1.13 Bucket rollback time: Time, in seconds, required to rotate empty bucket from full dump to full rollback position at rated flow.