

SAE-J715

ADOPTION NOTICE

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TABLE 2—DIMENSIONS ASSOCIATED WITH IMPLEMENT (SEE FIGURE 3)

Dimensions designated in Figure 2 (A, B, etc.)	Category I	Category I	Category II	Category II	Category III ⁴	Category III ⁴	Category IV ⁴	Category IV ⁴
	mm Min	mm Max	mm Min	mm Max	mm Min	mm Max	mm Min	mm Max
A ₁ Lwr hitch pin or adapt. outs. dia ¹	36.33	36.58	36.33	36.58	36.33	36.58	49.7	50.8
B ₁ Lwr hitch pin inner shldr. spread ¹	681.0	684.3	822.5	825.5	963.7	966.7	1162	1165
C ₁ Lwr hitch pin outer shldr. spread ¹	750.83	753.88	970.28	973.33	1111.50	1114.55	1358	1361
D ₁ Lwr hitch pin in & out shldr. dia ¹	50.55	63.75	50.55	63.75	50.55	63.75	63	101.6
E ₁ Coupler mast pin diameter	31.50	31.75	31.50	31.75	31.50	31.75	44.2	45
F ₁ Coupler mast pin vertical spacing	379.48	382.53	379.48	382.53	481.08	484.13	684.5	687.5
G ₁ Coupler mast pin horizontal spacing ²	-	38.1	-	38.1	-	38.1	-	50.8
H ₁ Lower socket clearance ³								
J ₁ Upper hook clearance ³								
K ₁ Lower hitch pin or adapt. alignment	To be in line within 0.015 mm per 1 mm of pin length							

¹ For implements with cantilever mounted lower hitch pins, special quick coupler hitch pins must be supplied to Dimensions A₁, B₁, C₁, and D₁. Adapter bushings may be supplied which convert existing three-point hitch pins to Dimensions A₁, B₁, C₁, and D₁ in lieu of special quick coupler hitch pins.

For three-point hitch implements on which the lower hitch points consist of straddle mounted pins, no additional thrust surfaces are required, providing the pin diameter and support dimensions conform to Dimensions A₁, B₁, C₁, and G₁.

The method used and dimensions related to attaching the pins or adapter bushings to the implement shall be at the discretion of the implement manufacturer.

² The lower implement attaching point on the quick-attaching coupler shall be located in the vertical position such that the lift range, power range, and leveling adjustment, as specified in Table 2 of SAE J715, are fulfilled.

Implement components, other than the hitch pins, that are in alignment with the Lower Socket Width (Dimension B, See Figure 2 and Table 1) shall not extend forward of the centerline of the lower socket for a distance of 203 mm above the lower socket.

Components above this height and extending laterally more than 381 mm from the coupler centerline shall not extend more than 25 mm forward of the vertical centerline through the upper hook opening.

³ The implement must provide clearance when attached to the coupler to permit lowering all elements of the coupler 120.9 mm for Category I, II, and III and 146 mm for Category IV-N and IV minimum for satisfactory attachment and detachment of the implement from the coupler.

The upper hook on the quick coupler shall be on center of the lower sockets within 3.0 mm.

Provision shall be made for adequate upper hook clearance on those implements which require landing or leveling.

⁴ See Section 4 for Category IV-N or III-N, narrow hitch, dimensions.

THREE-POINT FREE-LINK HITCH ATTACHMENT OF IMPLEMENTS TO AGRICULTURAL WHEELED TRACTORS—SAE J715 JUN93 SAE Standard

Report of the Tractor Technical Committee, approved April 1959, revised by the Agricultural Tractor Technical Committee September 1983, reaffirmed October 1988, and revised June 1993. Rationale statement available.

Foreword—This SAE Standard is functionally equivalent to ISO 730. However, there are dimensional differences between this Standard and ISO 730. Most are minor with the exception of mast height where ISO 730 uses the larger European mast height, and the minimum height above ground for lower link rear ball where ISO 730 specifies 230 mm vs. 203 mm for this Standard.

(R) **1. Scope**—This SAE Standard sets forth requirements for the attachment of three-point hitch implements or equipment to the rear of agricultural wheeled tractors by means of a three-point free-link in association with a power lift.

In order to assure proper performance of certain implements, standard dimensions for mast height, mast pitch adjustment, and implement leveling adjustment are included. Location of link attachment points is not restricted and is, therefore, left to the discretion of the tractor designer.

If draft links are used for trailing power take-off implements, a means shall be included for locking the draft links in a fixed position, and a drawbar hitch point shall be positioned in conformance with power take-off standards.

Dimensions comprising the standard specification are divided into four categories as shown in Table 1:

TABLE 1—DIMENSIONS

Category	Maximum Drawbar Power, kW ^{1,3}
I	15 to 35
II	30 to 75
III and III-N ²	60 to 168
IV and IV-N ²	135 to 300

¹ Based on SAE J708 and J2708, paragraph 2.5.

² Refer to Special Hitch Categories, Section 3.

³ Reference SAE J1548, paragraph 2.1.

2. References

- (R) 2.1 Applicable Documents—The following publications form a part of this specification to the extent specified herein. The latest version of SAE publications shall apply.
- (R) 2.1.1 ASAE/SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.
 - ASAE S209/SAE J708—Agricultural Tractor Test Code
 - ASAE S209/SAE J2708—Agricultural Tractor Test Code (OECD)
 - ASAE S220/SAE J711—Tire Selection Tables for Agricultural Tractors of Future Designs
 - ASAE S349.1/SAE J283—Test Procedure for Measuring Hydraulic Lift Capacity on Agricultural Tractors Equipped with Three-Point Hitch
 - ASAE S278.6/SAE J909—Three Point Hitch, Implement Quick Coupler, Agricultural Tractors
 - SAE J1548—Drawbars—Agricultural Wheel Tractors

2.2 Definition of Terms—(See Figures 1 to 3.)

- 2.2.1 LINKAGE—The combination of one upper link and two lower links, each articulated to the tractor and the implement at opposite ends in order to connect the implement to the tractor.
- 2.2.2 UPPER LINK, LOWER LINK—Element in the linkage.
- 2.2.3 HITCH POINT—The articulated connection between a link and the implement. For geometrical analysis, the hitch point is established as the center of the articulated connection between a link and the implement.
- 2.2.4 LINK POINT—The articulated connection between a link and the tractor. For geometrical analysis, the link point is established as the center of the articulated connection between a link and the tractor.
- 2.2.5 UPPER HITCH POINT—The articulated connection between the upper link and the implement.
- 2.2.6 UPPER LINK POINT—The articulated connection between the upper link and the tractor.
- 2.2.7 LOWER HITCH POINT—The articulated connection between a lower link and the implement.

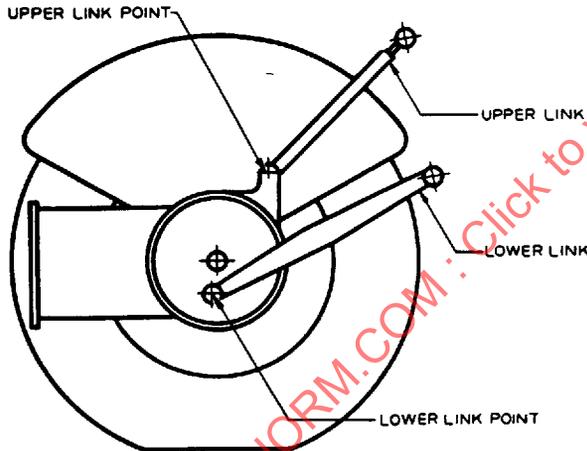


FIGURE 1—TRACTOR LINKAGE

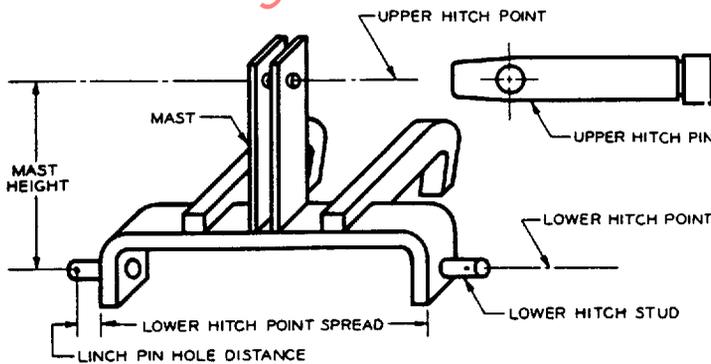


FIGURE 2—DIMENSIONS ASSOCIATED WITH IMPLEMENT

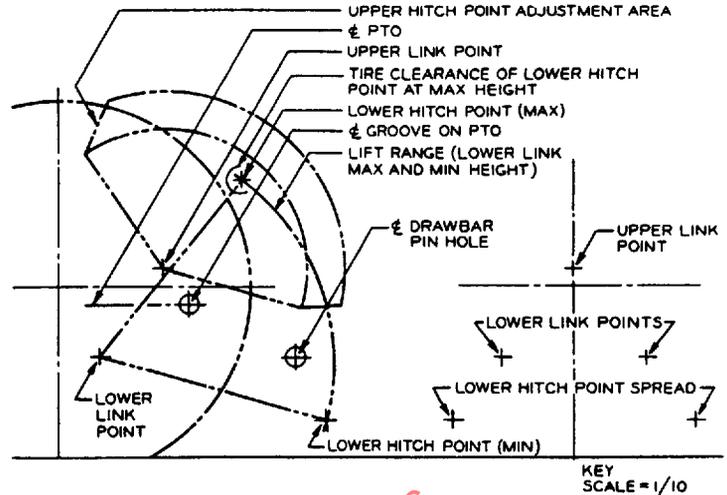


FIGURE 3—DIMENSIONS ASSOCIATED WITH TRACTOR

- 2.2.8 LOWER LINK POINT—The articulated connection between a lower link and the tractor.
- 2.2.9 UPPER HITCH PIN—The pin that connects the upper link to the implement.
- 2.2.10 UPPER LINK PIN—The pin that connects the upper link to the tractor.
- 2.2.11 LOWER HITCH STUD OR PIN—The stud or pin, attached to the implement, on which a lower link is secured.
- 2.2.12 LINCHPIN—The retaining pin used in the hitch pins or studs.
- 2.2.13 MAST—The member that provides attachment of the upper link to the implement.
- 2.2.14 MAST HEIGHT—The perpendicular distance between the upper hitch point and common axis of the lower hitch points.
- (R) 2.2.15 MAST ADJUSTMENT—The usable range of movements of the mast in a vertical plane. It is measured as the maximum and minimum heights of the lower hitch points above the ground between which a mast of standard height can be adjusted to any inclination between 5 degrees toward the rear from vertical and 5 degrees toward the front from vertical.
 - Adjustment of the mast controls the pitch of the implement. Specifying the mast adjustment to be provided enables the tractor designer to determine the minimum acceptable adjustment of the length of the top link in relation to the point of attachment of the linkage; it also permits the implement designer to determine the range of operating depths of the implement over which pitch adjustment can be obtained.
- 2.2.16 LEVELING ADJUSTMENT—The adjustment of the lower links so that one lower hitch point may be moved vertically with respect to the other lower hitch point to provide an inclination of the implement.
- 2.2.17 LOWER HITCH POINT SPREAD—The distance between lower hitch points measured at the base of the lower hitch stud, or the distance between the innermost restraining means provided on the implement.
- 2.2.18 LINCHPIN HOLE DISTANCE—The distance between the linchpin hole centerline and the lower link stud base.
- 2.2.19 LIFT LINKAGE—The connecting linkage that transmits force to the lower links for raising and lowering.
- 2.2.20 LIFT RANGE—The range of movement of the lower hitch points utilizing the extent of manual adjustment provided in the lift linkage in conjunction with the power range, expressed as the maximum and minimum possible heights of the lower hitch points above ground level, the lower hitch point axis being maintained horizontal to the ground.
- 2.2.21 POWER RANGE—The total vertical movement of the lower hitch point excluding any adjustment in the linkage or lift linkage.
- 2.2.22 LOWER HITCH POINT TIRE CLEARANCE—Clearance expressed as a radial dimension from the lower hitch point to the outside diameter of the tire with the implement in raised position and all side sway removed from the links.
- 2.2.23 LOWER HITCH POINT TRACTOR CLEARANCE—The horizontal dimension between the rearmost parts of the tractor in the area between the two draft links and the horizontal line through the two lower hitch points throughout the range of vertical movement of the hitch points. See Figure 4. The power take-off master shield may be removed, if necessary, to meet this dimension.

3. *Special Hitch Categories*—Certain farming operations require dual rear wheels and narrow spacing. Experience has shown that some large implements used in these circumstances require a special Category Narrow Hitch.

(R) 3.1 *Special Category III Narrow Hitch (III-N)*—This special hitch differs from the Category III Hitch in only one dimension; namely, the "Lower Hitch Point Spread" is 822.5 mm/825.5 mm (same as Category II). All other dimensions for the Category III-N Three Point Free-Link are the same as Category III in Tables 2 and 3.

(R) 3.2 *Special Category IV Narrow Hitch (IV-N)*—This special hitch differs from the Category IV hitch in the following dimensions; "Lower Hitch Point Spread" is 919 mm/922 mm. "Leveling Adjustment" is the same as Category III. All other dimensions for the Category IV-N Three-Point Free-Link Hitch are the same as Category IV in Tables 2 and 3.

4. *Tractor Lift Force Capacity*

4.1 Tractors shall have the following minimum lift force available throughout the power range, at a distance of 610 mm to the rear of the lower hitch points, when tested in accordance with J283.

4.1.1 Through 65 kW Maximum Drawbar Power—310 N/kW drawbar power.

4.1.2 Above 65 kW Maximum Drawbar Power—20.15 kN plus 155 N/kW drawbar power above 65 kW drawbar power.

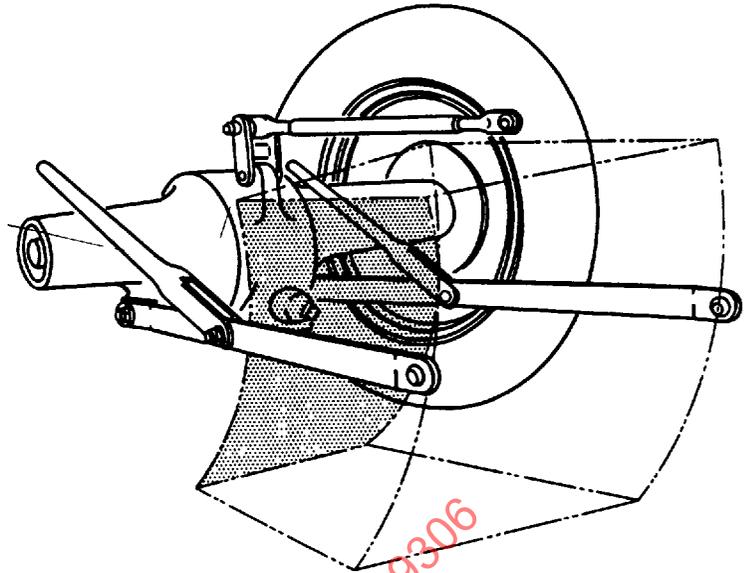


FIGURE 4—LOWER HITCH POINT TRACTOR CLEARANCE

(R) TABLE 2—DIMENSIONS ASSOCIATED WITH IMPLEMENT

	Category I mm Min	Category I mm Max	Category II mm Min	Category II mm Max	Category III ⁵ mm Min	Category III ⁵ mm Max	Category IV ⁵ mm Min	Category IV ⁵ mm Max
Upper Hitch Point								
Width inside	44.5	--	52.3	--	53.3	--	65	--
Width outside	--	85.9	--	95.3	--	95.3	--	132
Clearance radius for upper link ^{1,2}	57.2	--	57.2	--	57.2	--	76.2	--
Hitch pin hole diameter	19.3	19.56	26.65	25.91	32.0	32.26	45.2	45.5
Lower Hitch Point								
Stud diameter	21.84	22.10	28.19	28.45	36.32	36.58	49.7	50.8
Linchpin hole distance ^{1,2}	38.86	--	48.52	--	48.52	--	68	--
Linchpin hole diameter	11.68	12.19	11.68	12.19	11.68	12.19	17.5	18
Lower hitch point spread	681.0	684.3	822.5	825.5	963.7	966.7	1165	1168
Clearance radius for lower link ^{1,2}	63.5	--	73.2	--	82.6	--	82.6	--
Implement encroachment in front of lower hitch point if implement extends laterally behind tire	--	12.7	--	12.7	--	12.7	--	12.7
Implement Mast Height ^{3,4}	457	457	483	483	559	559	686	686

¹ Some tractors with quick-attachable connectors require 140 mm space for clearance above the upper hitch point and below the lower hitch points.

² Refer to standard for attachment of implements to agricultural wheeled tractors equipped with quick-attaching coupler for three-point free-link hitch.

Tractor equipped with a standard category quick-attaching coupler for the three-point free-link hitch requires an auxiliary attaching pin on the implement mast located 76 mm for Categories I and III, and 101.6 mm for Category II, below the standard upper hitch point. To facilitate attachment and detachment of the implement, a clearance zone must be maintained 76 mm rearward from and extending 104 mm above and 215 mm below this pin. In addition, a clearance zone must be maintained 94 mm rearward from and extending 25 mm above and 211 mm below each lower hitch point. To facilitate the attachment and detachment of the implement with tractors equipped with a standard Category IV-N or IV quick-attaching coupler for the three-point free-link hitch, a clearance zone must be maintained 85 mm rearward from and extending 120 mm above and 252 mm below the standard upper hitch point on the implement mast. In addition, a clearance zone must be maintained 94 mm rearward from and extending 32 mm above and 272 mm below each lower hitch point. (The above dimension addition is relative to the H dimension in Table 1 of SAE J909b.)

³ The mast height is not necessarily a mechanical dimension on the implement itself. It is a figure used in design and if properly used for design of both implement and tractor, a well-performing interchangeable implement and tractor combination will be achieved. This standard makes it possible to produce tractors and implements that will give good performance in any combination; therefore, consideration to hitch geometry is essential. This makes it desirable to establish a standard mast height and a standard mast adjustment within a working range, because these items influence the position of hitch points that are common to both the implement and the tractor.

Mast height is one of the essential factors in establishing the virtual hitch point of the free-link system, draft signal for the draft-responsive system, loads on the linkage and hitch points, changes in implement pitch corresponding to changes in working depth, implement pitch when the implement is in transport position, clearance of the implement with the tractor, especially in transport position and clearance of the hitch links with the implement or with the tractor, especially in the transport position.

When an implement mast height is made different than standard to accomplish some specific performance feature, care should be exercised to insure that the desired performance is secured with tractors likely to operate the implement.

Continued