

Submitted for recognition as an American National Standard

(R) Trailer Axle Alignment

1. **Scope**—The scope of this SAE Recommended Practice, trailer axle alignment, is to identify the dimensional limits of, and a method to, establish a perpendicular relationship between the king pin centerline and the axle centerline at its midpoint. Various types of equipment are commercially available which can be used for this measurement which provides varying degrees of accuracy, but none can be endorsed by SAE.

The most fundamental methods of measurement will be described here, but other equipment is available if a greater degree of accuracy is desired.

2. **References**

- 2.1 **Related Publications**—The following publications are provided for information purposes only and are not a required part of this document. Unless otherwise stated, the latest version of SAE publications shall apply.

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

SAE J875 JUN85—Trailer Axle Alignment

2.1.2 TRUCK MANUFACTURER PUBLICATIONS—Available from The Maintenance Council, American Trucking Associations, 2200 Mill Road, Alexandria, VA 22314-5388.

TMC Recommended Practice RP-708; 1997 Rev.
TMC Recommended Practice RP-71-90

2.1.3 DANA CORPORATION PUBLICATION—Available from Dana Corporation, P.O. Box 974, 4500 Dorr Street, Toledo, OH 43615.

Spicer Trailer Products

2.1.4 WABASH NATIONAL PUBLICATION—Available from Wabash National, P.O. Box 6129, 1000 Sagamore Parkway, S., Lafayette, IN 47905.

Trailer Alignment Procedure

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3. Procedure

- 3.1 Prior to any alignment efforts, the suspensions, axles, subframes, and attaching parts should be inspected for proper installation and absence of looseness or wear. If any looseness, wear, or installation abnormalities are observed, they must be corrected prior to alignment to ensure long-term satisfactory performance.
- 3.2 To ensure the best possible tire wear, it is advisable to check the toe-in of each axle. A fundamental toe-in check can be made by using the procedure outlined in the section titled Toe-In, or more accurate measurement can be obtained using available laser-measuring devices.
- 3.3 For trailers that are designed to operate with a slope and have suspensions with different design heights to accommodate that slope, the alignment procedure should be done with the trailer at the designed slope.
- 3.4 For trailers that operate with a slope, but all the suspensions have the same recommended design height; perform the alignment with the trailer level.
- 3.5 For trailers that operate level and all of the suspensions have the same recommended design height, perform the axle alignment with the trailer level.
- 3.6 For trailers with sliding subframes, the sliding subframe should be located at the rear-most location of the slide mechanism. The lock pins must be positioned to the rear of the holes in the lock rails, the same as they would be during normal vehicle operation. To assure this rearward location, it is recommended that a tensioning device be temporarily attached between the rear of the slider and the rear of the trailer. When tension is applied to the device, it will assure that the slider is in its rearward position with the lock pins properly engaged. In addition to its rearward position, the slider should be located so that the clearance between the four corners of the slider frame and the inside of the lock rails is equal. If the clearances are not equal, it may be necessary to install temporary shims to make the corner clearances equal.

4. Toe-In—The following procedure described is a basic method to check trailer axle toe-in.

- 4.1 Check that the wheel bearings are in working order, have the proper clearance, and are lubricated.
- 4.2 If the axle is cambered, assure that the camber marks are properly orientated, usually on the top.
- 4.3 Load the vehicle and locate it on a flat level surface.
- 4.4 Scribe a fine vertical line approximately $\frac{1}{2}$ inch long on the middle of the tread of one tire in each wheel set, on the rear side of the tire, at the same height as the centerline of the axle is above the floor. Repeat this on each axle.
- 4.5 Measure each axle for the distance (x_1) between the scribed lines on opposite sides of the vehicle on the same axle as shown in Figure 1. Record the dimensions.
- 4.6 Move the trailer forward until the scribed lines are on the rear side of the axle and at the same vertical height from the floor as they were when located at the front.
- 4.7 Measure the distance (x_2) between the same scribed lines and record the dimensions.
- 4.8 The difference between the dimensions on an individual axle must be $\frac{1}{4}$ in or less for toe-in and a maximum of $\frac{1}{16}$ in for toe-out. (Toe-in has smaller dimension at front, toe-out has larger dimension at front).

- 4.9 If the toe-in/toe-out measurements exceed those listed previously, or if the vehicle has been exposed to unusual loadings, which might have bent the axle, it may be necessary to utilize more accurate measuring devices, such as lasers, to determine the precise condition of the axle. It is possible to have an axle which has correct toe-in characteristics when measured as previous, yet when aligned by the enclosed procedure, be incorrectly aligned and create excessive tire wear. If during any toe-in measurement an axle is found to be out of specification, consult the axle manufacturer for remedial options.

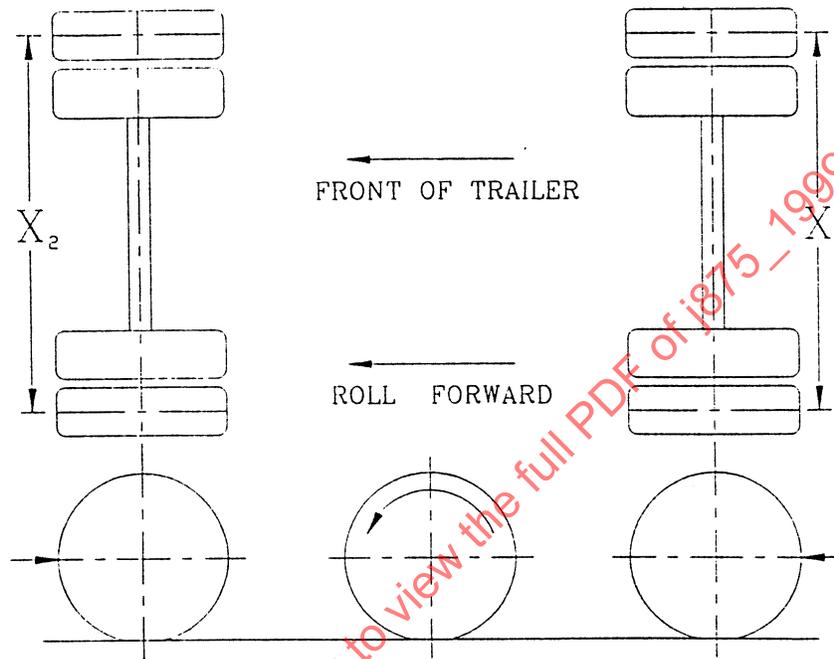


FIGURE 1—TOE-IN MEASUREMENT LOCATION

5. Axle Alignment

- 5.1 Before taking alignment measurements, make sure the trailer is unloaded and located on a flat, level surface. To free the suspension from any binding, move the trailer rearward and forward several times, without using the trailer brakes, with the last movement being forward. The trailer must be level from front to rear, and side to side, except as noted earlier for sloped trailers. During the measurement procedure, both parking and service brakes must be off. Chock at least one wheel set loosely for safety.
- 5.2 Stabilize the front of the trailer with a sturdy support at each corner. Remove the outer tires and rim or wheels, depending on the type of wheel equipment. Verify that the axles are centered under the trailer laterally. The midpoint of the axle along its length must be within $\frac{1}{4}$ in of the longitudinal centerline of the trailer. Attach a steel tape, or some other non-stretch device such as a small diameter cable to a connecting device, which attaches to, or around the king pin. To assure consistent measurements, use a tension gage on the non-stretch device each time a measurement is taken. Remove any items under the chassis which would interfere with the steel tape or other measuring device when it is stretched between the king pin and the axle end. A tape measure is not required, just a means to compare the difference between two measurements. Identify a location on the end of the axle that is identical on both ends of the axle.
- 5.3 Measure dimensions A and B, Figure 2. The difference must be 3.2 mm (1/8 in) or less. For additional axles, the alignment is in relation to the front axle. Measure C and D, C_1 and D_1 , etc. The difference between the matched C and D distances must be 1.6 mm, 1/16 in or less.

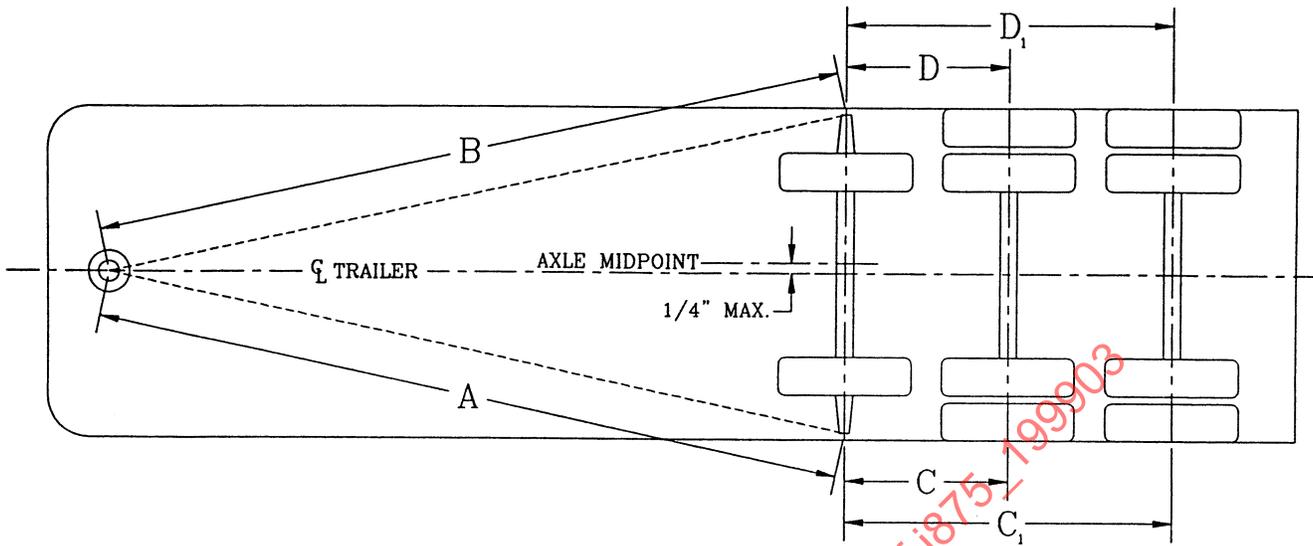


FIGURE 2—AXLE ALIGNMENT MEASUREMENT LOCATIONS

6. Notes

- 6.1 **Marginal Indicia**—The change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

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