

Alignment Overview

This procedure is intended to assist in correctly addressing tire wear issues suspected to be related to axle alignment. Actual misalignment issues related to a defect in the axle are extremely rare. If a defect in the axle is at fault, the repair is generally covered under our warranty terms. However, if the misalignment is due to impact or improper axle installation, we will refer the repair to the responsible parties.

The good news is that these issues can usually be evaluated and resolved by careful inspection and measurement with commonly available tools. Only a limited number of automotive alignment shops can handle trailers due to their axle width, and the fact that their axles are close together. Consequently, proper diagnosis of the underlying cause is critical to avoid multiple attempts at repair. A thorough initial inspection of the trailer and methodical approach to troubleshooting is key to a fast and effective resolution. For this reason, we appreciate the up-front time taken to gather the information below, and are available at 931-967-5101x16, warrantytn@ufpnet.com to answer any questions.

- General Inspection:
 1. Ensure all tires on trailer are “ST” rated for trailer service. Their DOT load carrying capacity should be equal to or greater than the axle capacity. Ensure all tires are and have been fully inflated to the DOT pressure. Note tire brand, size, and whether bias or radial.
 2. Determine if wear problem has been since new or has recently occurred. Recent occurrence indicates collision damage or a mechanical problem.
 3. On tandem or triple axle trailers, determine if customer’s trailer/tow vehicle hitch combination allows towing with the trailer frame level. Towing tongue low will overload the front axle and tires, or tongue high will overload the rear axle and tires, particularly on tandem or triple torsion trailers. Proper towing level can be evaluated with a 4 foot level on the longitudinal trailer frame.
 4. Check for apparent collision damage on axle beam or trailer frame. Look for tie down strap or chain marks in paint on axle beam. On leaf spring trailers with straight axles, check beam straightness with a 4 foot level on top of beam and front or rear of beam. See Figure 3 and below. Gap between straightedge and beam indicates overload or bend.

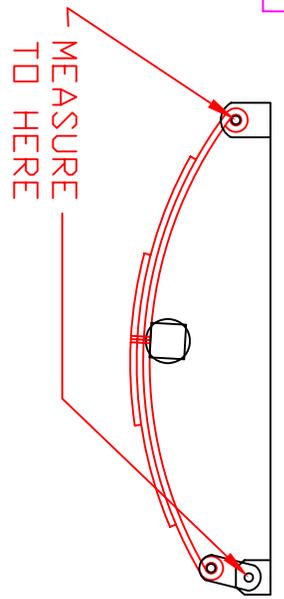
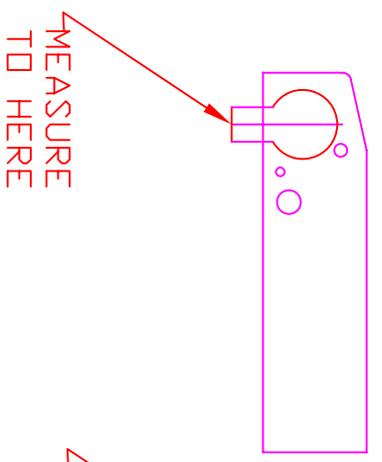


5. Check bearing end play at each tire by jacking them up individually so that they clear the ground. Attempt to rock the wheel back and forth at the 12 and 6 o'clock orientation, and again at 3 and 9 o'clock orientation. If the tire moves more than 1/8", bearings, lug nuts, or other suspension parts are too loose.
6. Wear Patterns:
 - If all tires on a multi axle trailer are wearing OK except for one, try the straightedge on a leaf spring axle beam shown previously and/or the toe check (Figure 2) on that hub first as this is probably overload or impact damage related. Pay particular attention to the right front, as it is most likely subject to impact damage.
 - If there is tire wear consistently on the inside or consistently on the outside of the tires, have the boat/trailer combination weighed at a public scale with full fuel tanks and owner's normal gear in it. If a wakeboard boat, determine whether permanent ballast has been added to the boat, or it is towed with ballast tanks full. Trailers that are overweight or significantly underweight will affect camber.
 - Rare: If a multi-axle torsion and accelerated wear is on one tire that looks like, but is not underinflation, that one tire may be overloaded. Jack up trailer so all tires hang freely. Check tire clearance to fender or angles of the torsion trailing arms and see if they are similar. Torsion tire unloaded clearance differences greater than .75 inches, or 6 degrees on the trailing arms will cause tires to be unevenly loaded and should be corrected, contact UFP for directions.
 - If more than one tire is wearing, start with measuring alignment of the axles to the frame or the toe check on all hubs. If the axle is misaligned to the frame, one side of the axle would be found toed in and the other side toed out about the same amount.

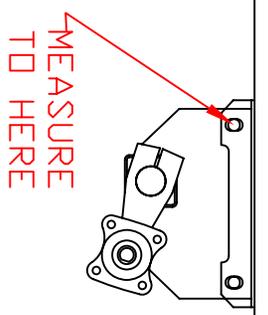
- Axle Alignment in Frame Check

Occasionally, axles will be installed in a trailer frame such that they are misaligned to the operating centerline of the trailer. Cross checking installation measurements is an effective method for checking axle alignment to the trailer frame. The method below offers practical field measurements. Measurement to the tow ball develops the practical centerline of the trailer. However, if this is absolutely not possible due to obstruction, or if there is a lot of movement in a swing tongue, measuring to the corners of the most rear crossmember is a fair substitute, as many trailer manufacturers square the trailer from this point.

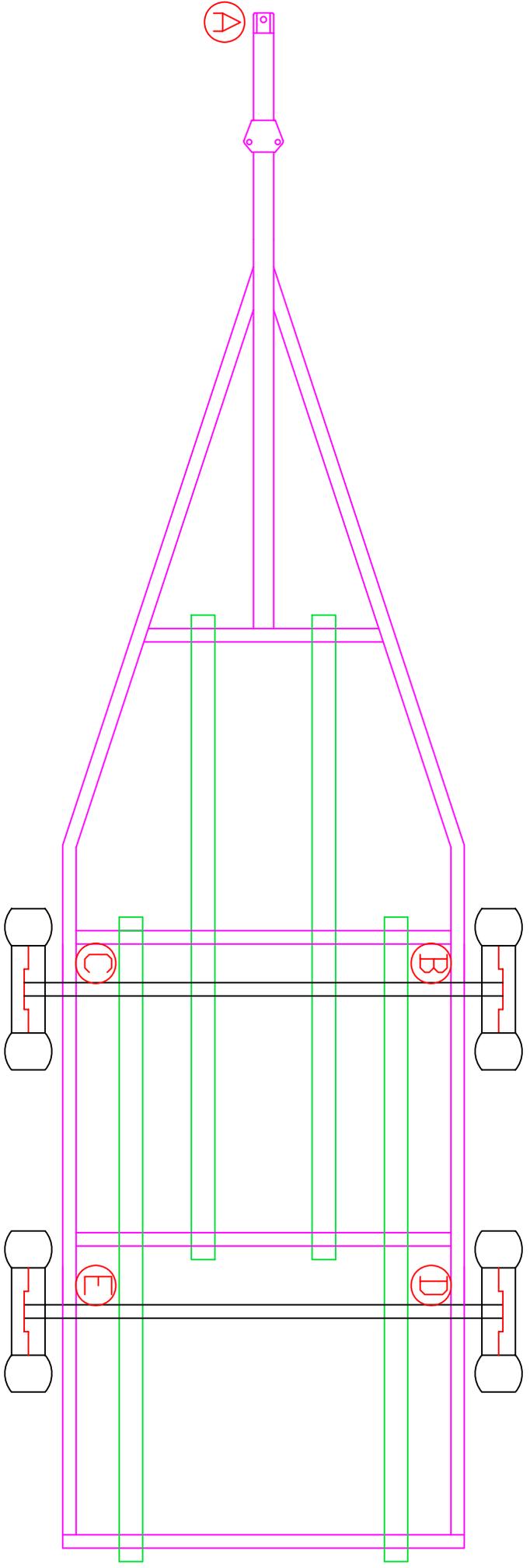
1. For accurate measurements, use a steel tape measure with increments of 1/16 or 1/10 inch minimum. Measure carefully to 1/16"-1/10" or the most accurate increment available. You may get best accuracy by starting at the one foot mark on the tape versus the manufactured tape end. Double-check measurements, as we have seen trailers manufactured exactly one inch out of square due to jig layout error.
2. For an accurate tow ball center measurement, attach the trailer to the tow vehicle. Make a centerline dot on the bottom of the tow ball shank with a Sharpie or other permanent marker.
3. For an accurate center of axle fastener measurement make a centerline dot on the fastener head.
4. If a single axle leaf spring trailer, the measurement point can be either the center of the spring hanger bolts, or the center of the spring leaf tie bolts. If a multi-axle leaf spring trailer, diagonal measurements should be taken between the centers of all six spring hanger bolts.
5. If a single or multi axle torsion trailer, measurements can be taken to the centers of the torsion frame mount bolts.
6. See Figure 1 for the suggested measurement layout.



SPRING



TORSION



ALIGNMENT CHECK
FIGURE 1

- Axle Toe Check

Prior to making any measurements of toe, jack the trailer up and support the frame so the frame is perfectly level using a carpenter's level or equivalent and the axles hang freely. If you are working on a straight leaf spring axle, sometimes a bent axle problem is found quickly by checking the beam first with a straightedge as listed above in the general inspection paragraph Step 4.

It is possible to take toe measurements directly to the hub mounting face or rotor surfaces with a precise tape measure. Better, a 24" carpenter's level, or other straightedge can be exactly centered on the hub face for accurate measurement or to allow clearance of suspension components. Measurement accuracy needs to be to the 1/16 inch.

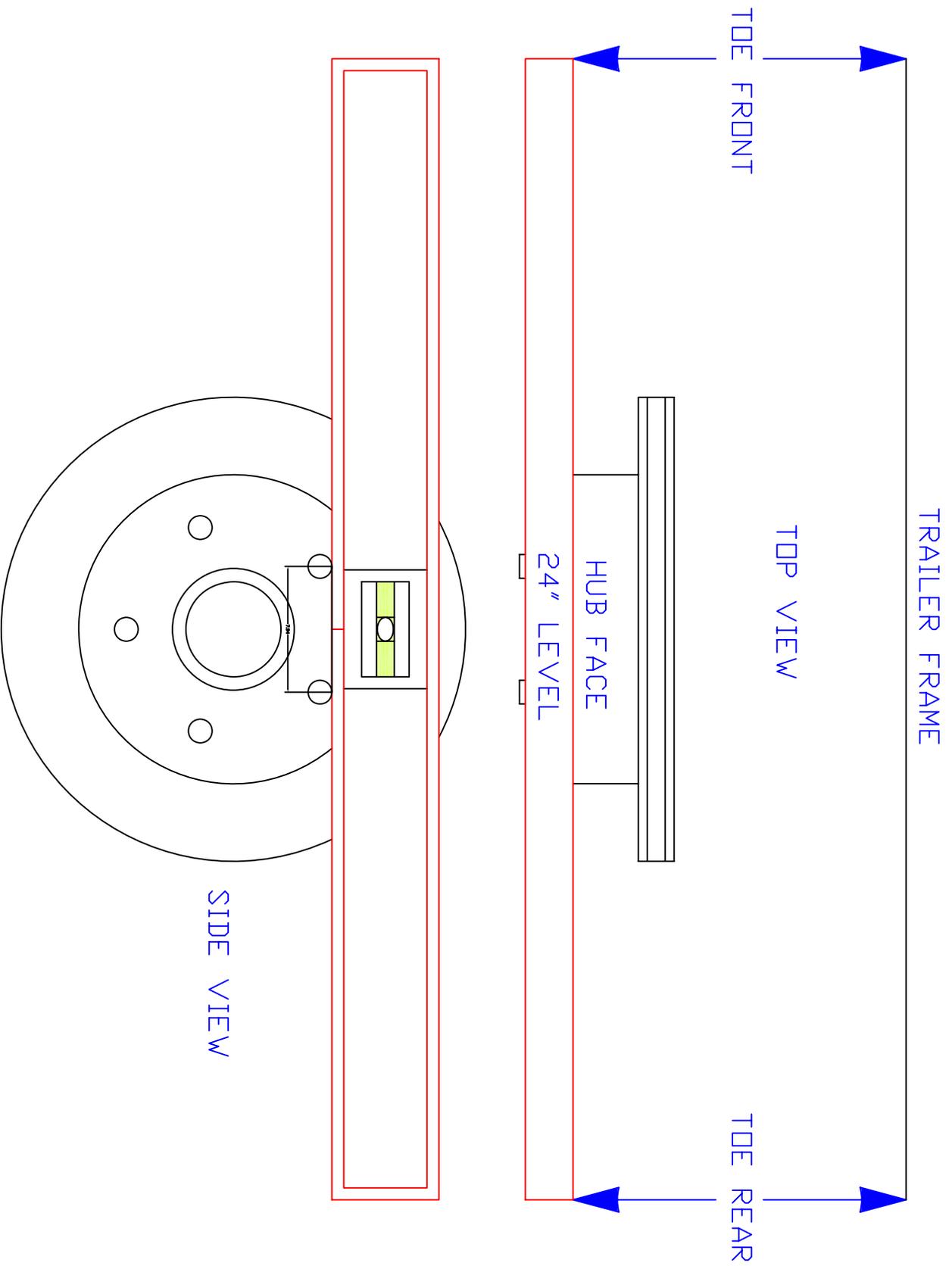
Axle toe is checked at the 3 and 9 o'clock position on the hub or rotor. Axle camber is checked at the 12 o'clock and 6 o'clock position. If, because of obstructions, you can only get three of the four measurements, we can usually work with them. See Figure 2 for toe. Ignore camber to start, an axle with a camber problem will probably have toe issues too. If toe checks out, we will check camber separately.

Checking Toe:

The best toe measurement is directly to the hub or rotor (at 3 and 9 o'clock positions). To do this, remove the wheels. Get a 24" carpenter's level and mark the exact centerline on the bottom level surface. You will then measure out and mark two stud alignment marks on either side of the centerline at the following distance:

- 5 Lug axle 1-5/16" or 1.31"
- 6 Lug axle 1-3/8" or 1.38"
- 8 Lug axle 1-1/4" or 1.25"

Place the 24" level on top of the top two studs and slide back so the back level edge is in good contact with the hub face surface and the two marks made above are exactly centered on top of the studs. Level the level and make sure it remains centered on top of the studs. See Figure 2. Take a very accurate measurement from the inside of the level surface to the trailer frame. You probably will want to have a helper and use an accurate carpenter's or machinists square to be sure your measurements are accurate. The front and back toe measurements should be equal or at least within 1/8" on a 24" straightedge.



LEFT WHEEL TOE EXAMPLE
FIGURE 2

ALIGNMENT MEASUREMENT DATA SHEET

GENERAL INSPECTION INFO:

Trailer VIN#:

Trailer GWVR:

Number of Axles:

Axle Rating:

Tire Size, Weight Rating, and Brand:

Measured Weight of Loaded Boat and Trailer:

Witness marks or other impact evidence:

Other General Inspection Findings:

ALIGNMENT CHECK, FIGURE 1:

A-B Measurement:

A-C Measurement:

A-D Measurement:

A-E Measurement:

B-E Measurement:

C-D Measurement:

Other Relevant Measurements for Tandem or Triple Trailers:

UNLOADED TOE CHECK, FIGURE 2:

Zero Bearing End Play Found:

Length of Straightedge/level if used:

Front Axle Left Hand Toe Front Measurement (3 o'clock):

Front Axle Left hand Toe Rear Measurement (9 o'clock):

Front Axle Right Hand Toe Front Measurement (3 o'clock):

Front Axle Right Hand Toe Rear Measurement (9 o'clock):

Rear Axle Left Hand Toe Front Measurement (3 o'clock):

Rear Axle Left hand Toe Rear Measurement (9 o'clock):

Rear Axle Right Hand Toe Front Measurement (3 o'clock):

Rear Axle Right Hand Toe Rear Measurement (9 o'clock):