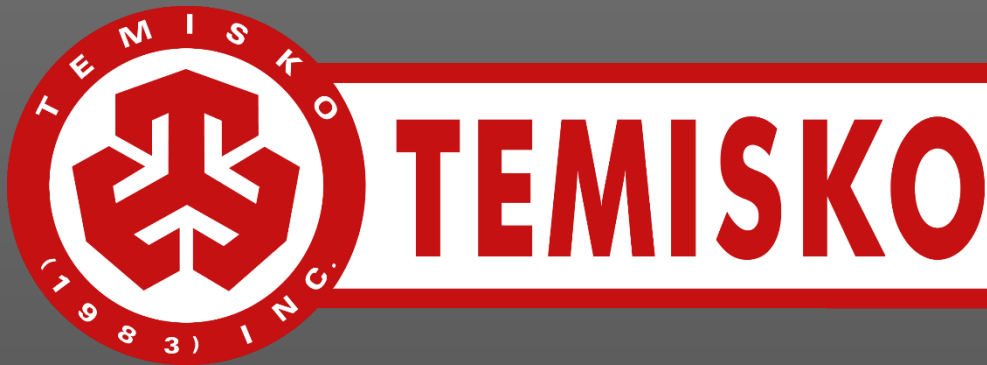


2021



Shimming Procedure

SHIMMING LOW BEDS

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1	Contents	
2	Intended Purpose	2
3	Why shim?	2
4	Special Cases.....	3
5	Basic Principle of Shimming.....	3
6	Loading Effects	4
7	Common shim points.....	6
8	Shimming an Axle Group	7
9	Shimming sequence	8
10	Troubleshooting Guide.....	9

2 Intended Purpose

To equalise all the loadings onto the axles equally is the responsibility of the operator. This in-depth guide will show step by step to equalise the load onto the trailer. The guide will also show the effect of different loadings and their effects on the main deck. The trailer in this tutorial was deliberately chosen for its complexity. If the trailer that you are shimming has less parts, then the procedure will be shorter.

Applies to trailer models:

- All low beds (examples below)
 - Tandem
 - 2+1
 - 2+2
 - 3+1
 - 4
 - 3+2
 - 3+3
 - Other configurations
- Jeeps
- Boosters (Nitro stingers)
 - 1 axle
 - Tandem
 - Tridem
 - Trunnion style
 - All other configurations
- Mechanical spread bars

3 Why shim?

Shimming refers to adding or removing metal pieces in the structure. Heavy haul units may have many points where shims can be added or removed. These points are there to increase or decrease the arch in the trailer.

Shimming is performed to level the axle groups as to spread the load evenly on them all. They must be level because the suspension only has a set amount of travel. For example, if a group is not shimmed enough (going downhill), the front suspension may be at its lowest level and the last axle may be at its highest point. This means that if the trailer travels over a bump in the road, the front suspension may bottom out and try to hold the whole loading.

Another reason is that the air bags have a working curve. This curve is specific to every air bag model. What is important to retain is that all air bags push the same amount of force when they are at the same height. When the air bags are not at the same height, they will push differently. Shimming will re-position the suspension so that all the air bags are at the same height.

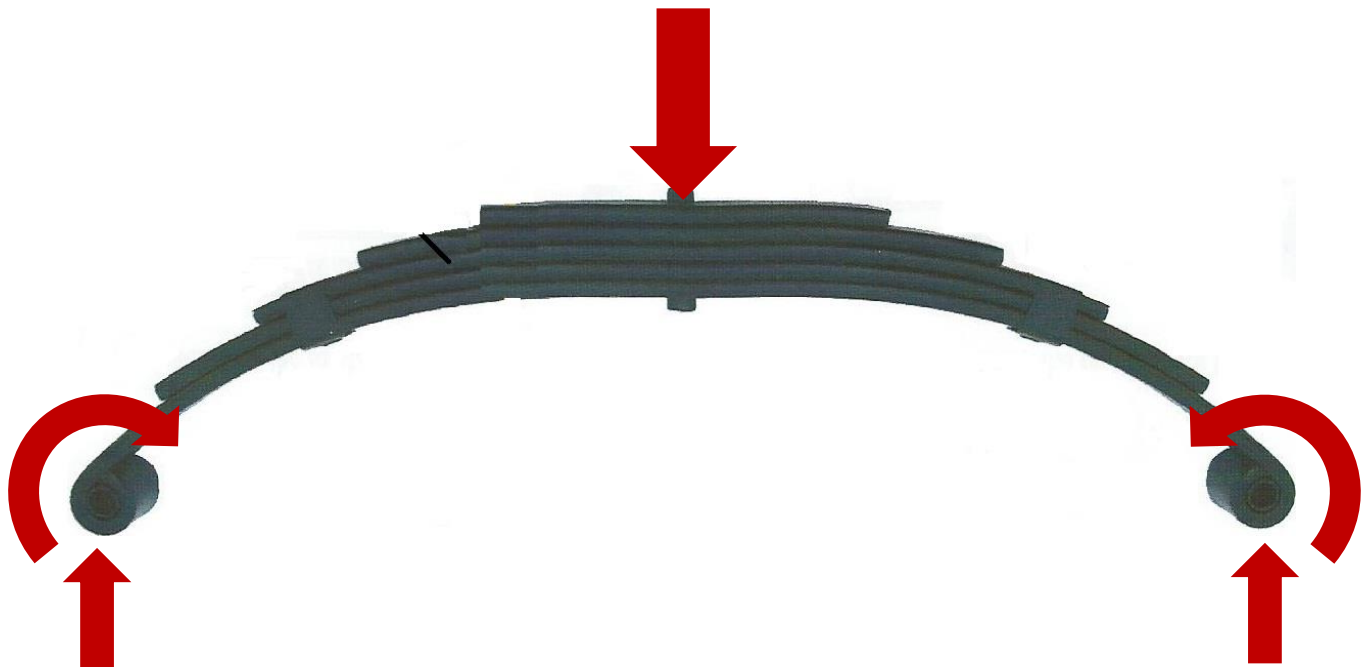
4 Special Cases

This procedure is written for low beds that have air ride suspensions with shim points. This manual is still valid as it may serve as a trouble shooting guide for a trailer that does not have any shim points. For trailers that have spring suspensions, great care must be taken to ensure that the loading is equalised on all axles. In the absence of a leveling valve, the operator must rely on the axles that are mid group to establish the baseline measurement.

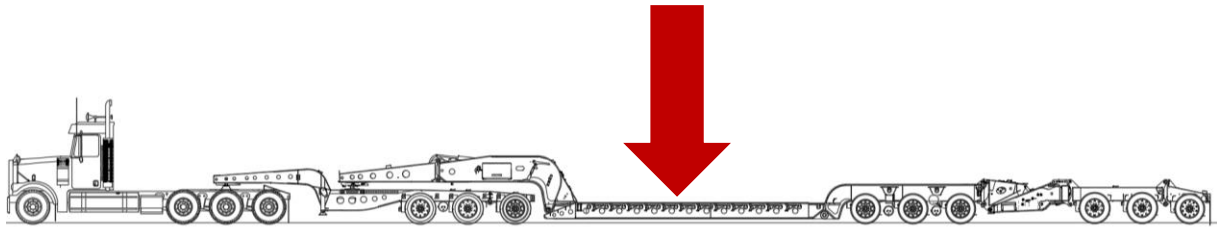
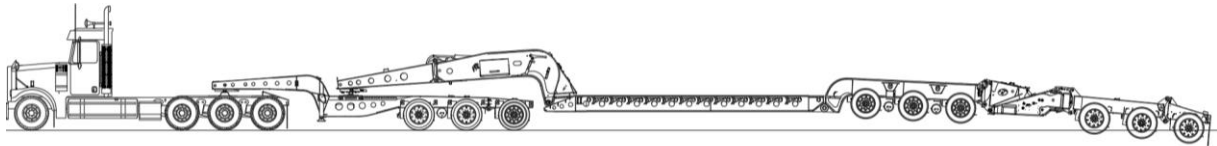
5 Basic Principle of Shimming

Shimming refers to adding or removing shims between the articulation points. This procedure is still valid for trailers that do not have any shim points as this may serve as a troubleshooting guide.

Every trailer can be simplified to a leaf spring. This spring will deflect when a load is applied to the center. The more force is applied to the center, the more the leaf spring will bend. When the leaf spring is compressed it flattens and the ends rotate.



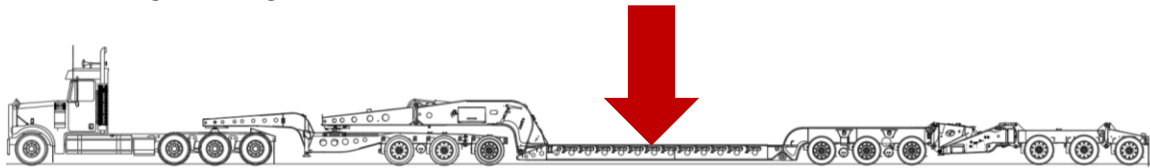
Below is an exaggerated depiction of a low bed before and after loading.



The trailer Will always deflect downwards. This is why when you shim the trailer, it will always be arched up before loading.

6 Loading Effects

The same low bed will react differently to the same load if it is applied differently. Consider the following 3 loading scenarios:



Concentrated loading



Distributed loading



Point loading at ends of deck

For the same given weight, the 3 loading scenarios will need to be shimmed differently. The main cause of deflection in a trailer is related to how far the weight is away from the wheels. This distance is like a prybar. The longer the distance between the load and the wheels, the longer the prybar acts on the trailer.



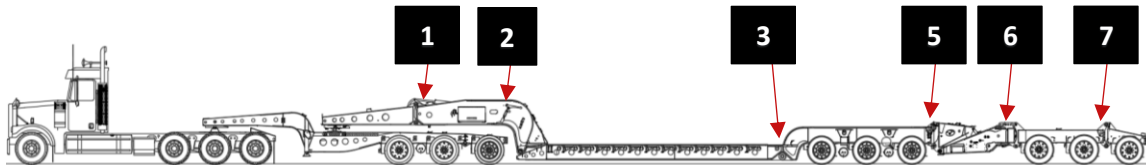
Load type	Shimming amount	Examples
Concentrated Loading	High	Coil of wire
Distributed loading	Medium	Transformer Tracked machine
Point loading at ends of deck	Low	Self supporting structure Wheeled machine

If the load that is being hauled with the trailer is a combination of 2 or three of these types, then the shimming will be a mixture of the 2.

7 Common shim points

Trailer shim points and style vary from model to model but they all perform the same function. Typically shim points double as connection points.

1. Gooseneck extension
2. Gooseneck pawl settings
3. Connection between deck section and tail section
4. Deck to deck sections
5. Tail section to booster connection
6. Booster mechanism to bogey
7. Bogey axles to pin on axle (flip axle)



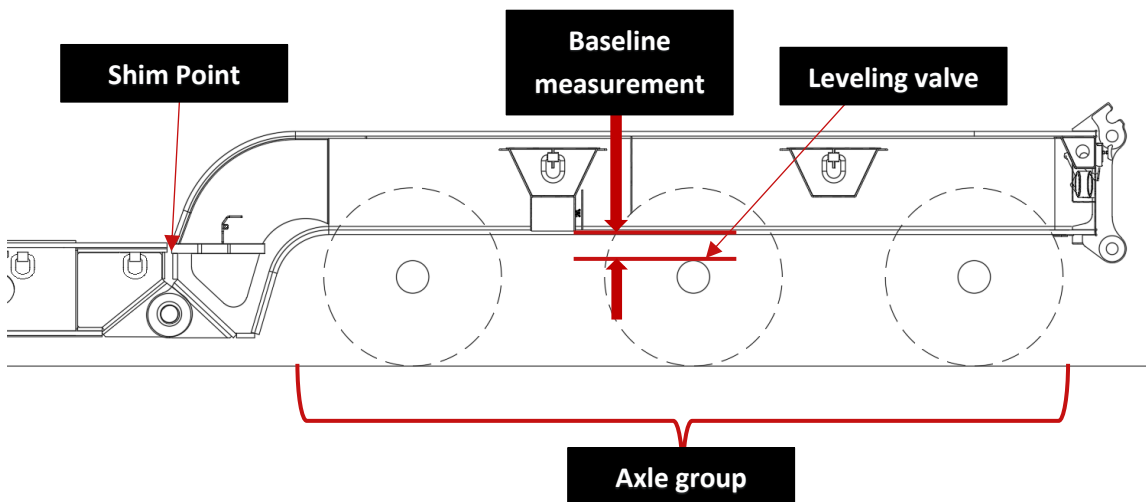
It is important to note that not all trailers have these shim points. What is important is to locate them and to use them properly.

8 Shimming an Axle Group

Shimming the whole trailer is done one group at a time. The first step is to locate the axle that has the leveling valve. On tridem axles the leveling valve is typically located onto the second axle. The valve's location is important as it will be the baseline measurement for the group. This baseline measurement will be used to compare with the other axles.

Reminder:

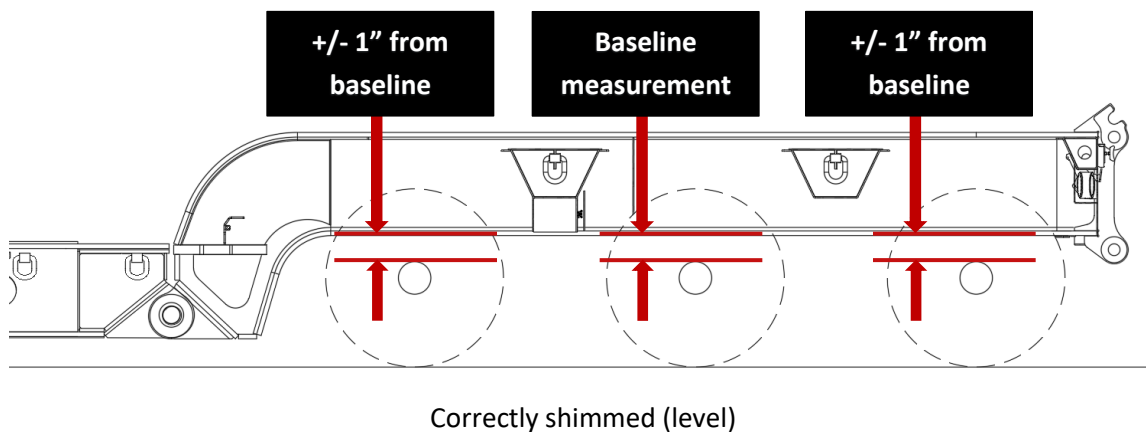
The leveling valve will always bring the axle to its level position. (unless axle is overloaded or insufficient air pressure).

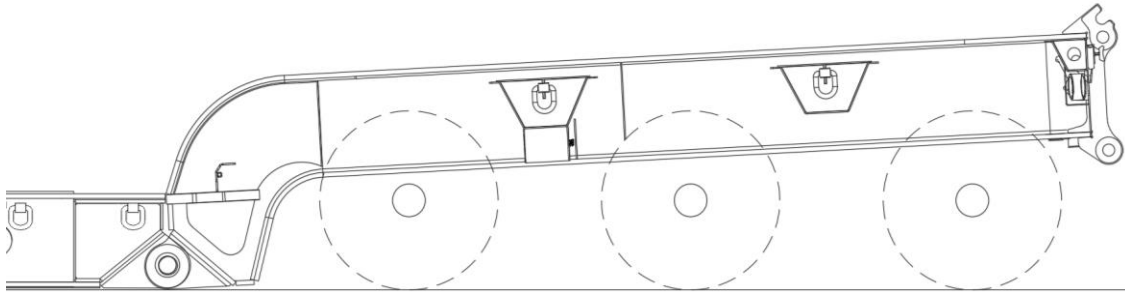


The baseline measurement is obtained through the following steps:

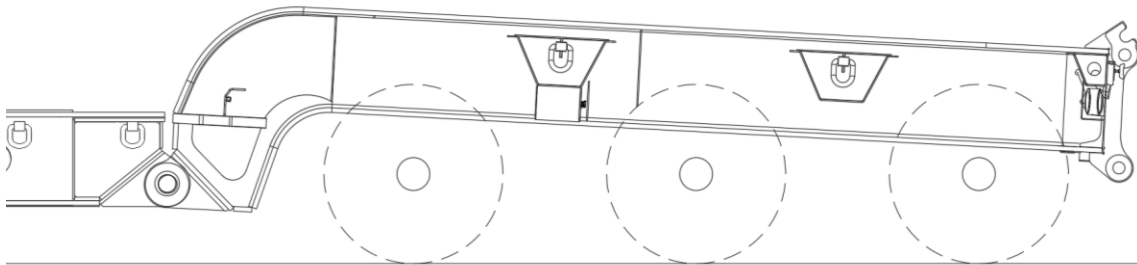
- Fill the trailer with air (90-120 psi)
- Allow the trailer to level
- Measure from the bottom of the frame to the top of the axle

Below are the 3 scenarios that





Not enough shims (going downhill)



Too Many shims (going uphill)

The baseline measurement and shimming principle is the same if there are 2,3 or more axles.

1. Locate leveling valve
2. Acquire baseline measurements
3. Measure all other axles heights (must all be within +/- 1" from baseline)

9 Shimming sequence

The sequence for shimming a trailer is important as if it is not followed, it will take much longer to achieve the desired results. The sequence below is for a complex trailer. If the trailer that is being shimmed has less points, then stop at the section that only pertains to your trailer.

Trailer configuration:



1. Load the trailer
2. Raise the gooseneck
3. Connect the air lines and allow the air ride to level.
4. Measure tridem group to see if axle heights are within +/- 1"
5. If not
 - a. Lower gooseneck
 - b. add shims to the Connection between deck section and tail section

- c. return to step 2
- 6. Load up the booster's hydraulics
- 7. Allow air ride system to stabilise
- 8. Check air ride pressures to ensure that tail and booster are loaded equally
- 9. If not,
 - a. Return to step 6
- 10. Measure tridem group of the tail section to see if axle heights are within +/- 1"
- 11. If not, return to step 5
- 12. Measure tridem group of the booster section to see if axle heights are within +/- 1"
- 13. If not,
 - a. Unload booster's hydraulics
 - b. Shim up the booster mechanism to bogey connection
 - c. Return to step 6
- 14. Adjust gooseneck ride height to the desired height
- 15. Measure tridem group of the tail section and booster sections to see if axle heights are within +/- 1"
- 16. If not,
 - a. Return to step 5

This procedure may take some time to perform as it is an iterative process. Once a baseline shim setting is found, it is then possible to dramatically shorten the shimming time. After some time working with the equipment it will become second nature to know how much pre-camber to give the trailer prior to loading. This "feel" for the equipment is developed over time and is biased on the understanding of the equipment's structural response to loading.

10 Troubleshooting Guide

Below is a list of common problems with remedies that has occurred in the past.

Problem	Cause	Remedy
The front axle is too low and the back of the group is too high	Trailer was not shimmed properly	Add more shims to a shim point
The front axle is too low and the back of the group is too high	The trailer has bent during an extreme loading or event	Add more shims OR the trailer may need to be re-arched with a heat process
Tail section and booster are shimmed correctly but weight distribution is not correct (common air only)	Mismatch air bags or suspension type on booster	Replace air bags if it can be done. If not then new booster with correct suspension needs to be employed
Tail section and booster are shimmed correctly but weight distribution is not correct	Ride Height is too low or too high to work within its acceptable range	Re-adjust the leveling valve height so that the suspension is in the middle of its stroke