

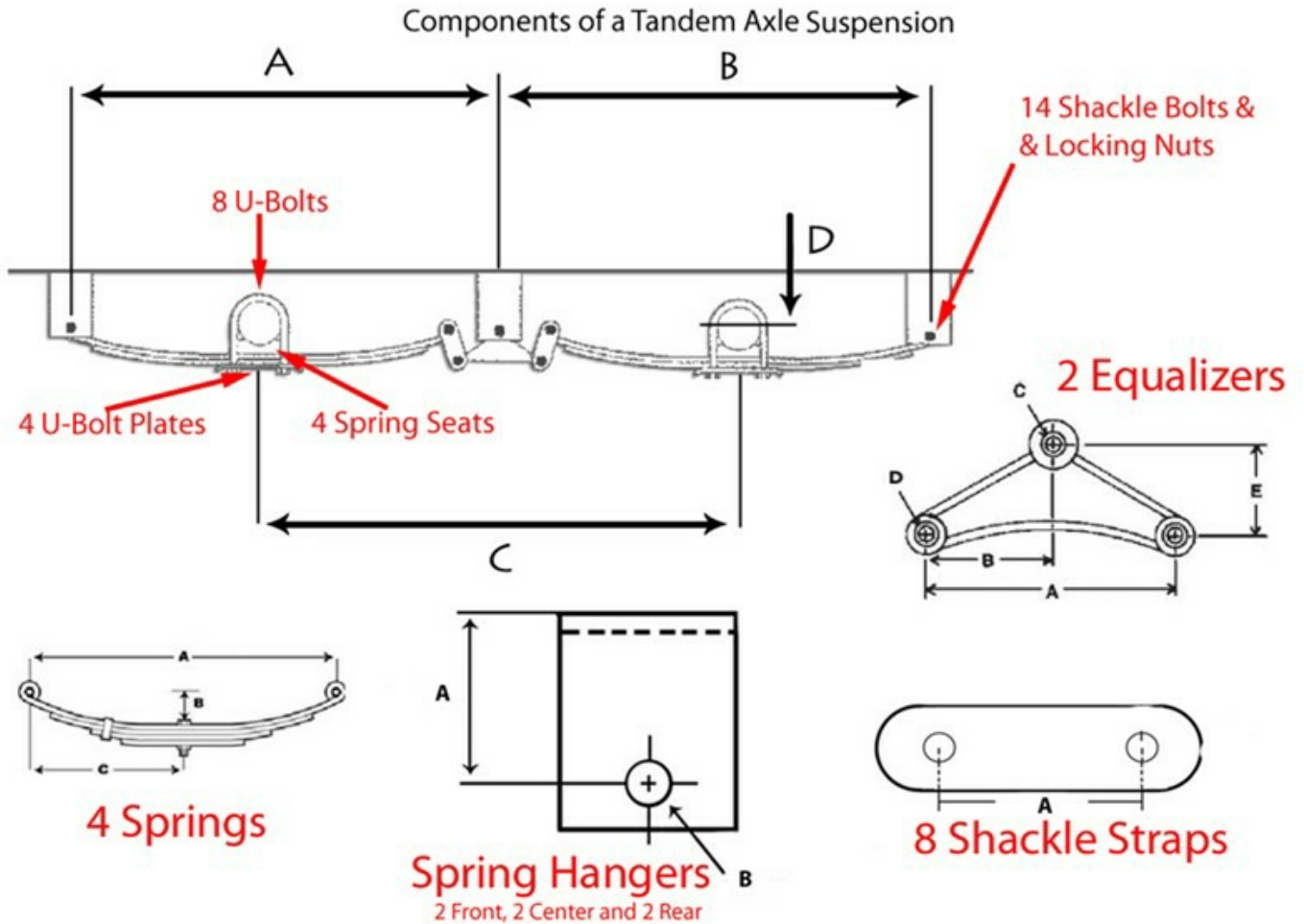
# Tandem Axle Suspension System Information

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Parts Of The Tandem Suspension System, Parts List, Identification & Function

First I want to say that you can use what ever type of axles and suspension you wish with our trailer plans. We have included this file to help people who are not real familiar with trailer suspension systems, therefore we chose the most commonly used suspension systems on tandem axle trailers today which is the leaf spring suspension system.

This file is to help familiarize you with the different parts, where they are placed and how they work.



## Hangers



**Hangers are the system's point of attachment to the trailer.**

- Hangers are welded to the frame
- Hangers are used to suspend:
  - Leaf springs
  - Equalizers
- Note: There are always 2 more hangers than springs in a suspension system. For example, if there are 4 springs in a kit, you will have 6 hangers.

## Types of Hangers

- Front - always suspends front of leaf spring (closest to tow vehicle)
- Center - suspends equalizers
- Rear - suspends leaf springs directly or via shackle straps

## Hanger Dimensions

- Width:
  - 1-3/4"
- Height
  - Distance from the center of the bolt hole to the top of the hanger
  - Different heights provide varying levels of clearance for the trailer
  - Hangers for a single system do not have to be of equal height
- Bolt hole diameter
  - Most hangers for double-eye springs require 9/16" diameter x 3" long bolts



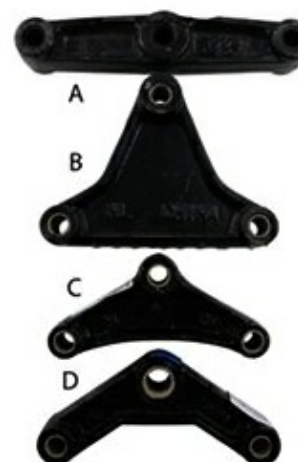
## Equalizers



Used for multi-axle systems, equalizers are designed to transfer from one axle to another the additional load resulting from bumps. The transfer of load serves to equalize the weight being carried by all axles at the time of impact. Without an equalizer, going over a bump would cause one axle to have a disproportional amount of weight on it. Also, the equalizer allows for a smooth transfer of the impact through the suspension system under the trailer.

## Features

- Suspended from a middle hanger and serve as a link between the leaf springs
  - Shackle straps are used to connect the springs to the equalizer
- Swing front to back, allowing the axles to adjust to bumps
- Note: There is always 1 equalizer between 2 connecting springs in a system
- Types
  - (A) Flat - generally used for horse trailers
  - (B) Tall - designed to allow a trailer to ride low in RV applications
  - (C) Curved - most popular; often found on utility trailers and car haulers
  - (D) Short curved - commonly used with short springs on which front and rear hangers are close together





## Shackle Straps

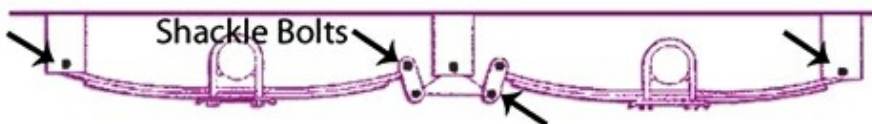


**Shackle straps are used to link components of a suspension system and to allow small movement in the suspension system.**

- Link between springs and hangers (single-axle system) and springs and equalizers (multi-axle system)
- All shackles in a system should be of equal length
- All shackles have 9/16" diameter bolt holes
- 3 Sizes (length is from center of one bolt hole to center of other bolt hole)
  - 3-1/8" Long shackle straps - typically used on single-axle systems
  - 2-5/8" Long shackle straps - typically used on dual-axle systems and all triple-axle systems; most popular
  - 2-1/4" Long shackle straps - typically used in 1 dual-axle kit
- Note: There are usually 2 shackle straps per spring in single-axle systems and 4 per equalizer in multi-axle systems



## Suspension Bolts



### Features

Suspension bolts hold together the various moving components of a trailer suspension system, serving as the pivot points in the system.

- Bolt together:
  - Springs and hangers
  - Springs and equalizers via shackle straps
  - Equalizers and hangers

### Types

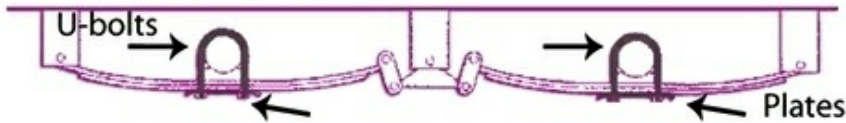
- Suspension bolts
  - (A) Regular shackle bolts - for use between springs and hangers and between slippers and hangers
  - (B) Wet shackle bolts - have zerk fittings that allow grease to be injected, which assists movement and halts corrosion
    - Can be used anywhere in the suspension system as long as the bolt is of appropriate size; eyes with bushing often do not need wet bolts
  - (C) Equalizer bolts - designed to suspend equalizers
- Nuts
  - (D) Regular nut - normal nut; reusable
  - (E) Lock nut - has mismatched threads to ensure that the nut cannot twist off the bolt; one-time use
  - (F) Castle nut - looks like a castle wall; includes a cotter pin, which threads through the small hole at the threaded end of the bolt to ensure that the nut cannot come off the bolt
    - Most often used on the equalizer of systems with high weight capacities



### Dimensions

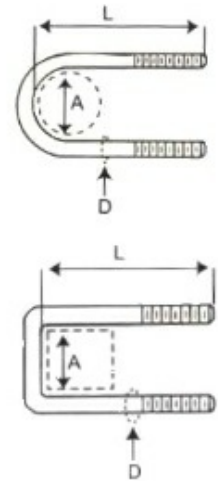
- Diameter should match the bushing or the bolt hole inner diameter
  - Equalizers can have bolt holes of varying diameters, so be sure that you have properly sized bolts for each hole
- Length is 3" (all double-eye leaf springs are the same width)
  - Length measurement provided is the usable length from the bottom of the head to the end of the bolt

## U-Bolts and U-Bolt Plates



### U-bolts are designed to secure the leaf springs to the axle of the trailer.

- The U or square part of the bolt attaches directly to the axle, and the ends will extend over the spring seats and springs
- U-bolt ends go through U-bolt plate and nuts to secure springs to axle
  - 2 U-bolts per spring - 1 for each side of the spring
  - 4 U-bolts per axle
- Types of U-bolts
  - Round U-bolts for round axles
  - Square U-bolts for square axles
- Bolt dimensions (depend on axle type and capacity)
  - (A) Width - matches axle diameter
  - (L) Length - varies depending on axle diameter and the number of leaves on the springs
    - Needs to clear axle, spring seat and spring so that U-bolt plate can be attached
  - (D) Diameter - the larger the diameter, the greater the U-bolt weight rating
- Torque ratings
  - 1/2" bolts: 45 ft/lbs - 70 ft/lbs
  - 9/16" bolts: 65 ft/lbs - 95 ft/lbs
  - 5/8" bolts: 100 ft/lbs - 120 ft/lbs



### U-Bolt Plates

- Used to attach leaf spring to axle
- Dimensions vary depending on:
  - U-bolt width and diameters
  - Must match up so that bolts fit securely
- Should be replaced if:
  - Rusted
  - Stretched
  - Bent
  - Show any other significant signs of wear
- Look for stress cracks and worn spots when performing routine checks on your suspension system

### Typical Axle Diameters Based on Axle Capacity

- 1,000-lb - 2,000-lb Axles: 1-1/2" - 1-3/4" diameter
- 3,500-lb Axles: 2-3/8" diameter
  - Can have a 3-1/2" diameter, but rarely
- 6,000-lb - 7,200-lb Axles: 3" diameter
- 8,000-lb Axles: 3-1/2" diameter
- 9,000-lb Axles: 4" diameter
- 10,000-lb Or more axles: 5" diameter



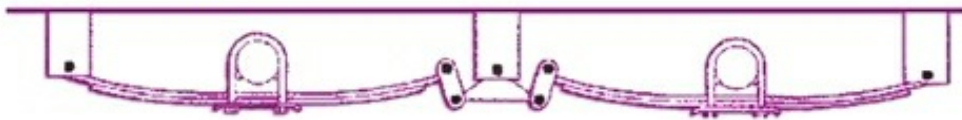
## Spring Seats



- Welded to the axle
- Sit between axle and springs
- Provide a flat surface on which the springs rest
- A nub on the spring sits in the hole in the spring seat, lining up the springs to the spring seat and preventing rotation of the U-bolt assembly
  - Helps to keep the spring from shifting
  - The U-bolts and plates hold together everything in the system
- Dimensions
  - Arch width - designed to fit around axle diameter
    - This is the only relevant dimension
  - You also need to know whether the spring seat is made for a round or square axle

## Parts List

### Dual-Axle Suspension



Quantity	Part
4	Double-eye springs
2	Front hangers
2	Center hangers
2	Rear hangers
2	Equalizers
8	Shackle straps
14	Shackle bolts
4	Spring seats (if needed)
4	U-bolt sets (8 U-bolts)
4	U-bolt plates

In our trailer plans we show you where the centerline is as well as show you how to figure out the centerline on any trailer. One question we are often asked is “How do I know where exactly to place the springs and axles?”

Well it will all be laid out for you once you have the centerline marked on the frame. When you get ready to mount the spring hangers, the equalizer hanger (center hanger) will be mounted directly on the centerline. And once you have that information, the rest will fall into place by the spacing of the hangers. The information for the spacing of the hangers will come with the parts and is set by the manufacturer of the system you purchased.