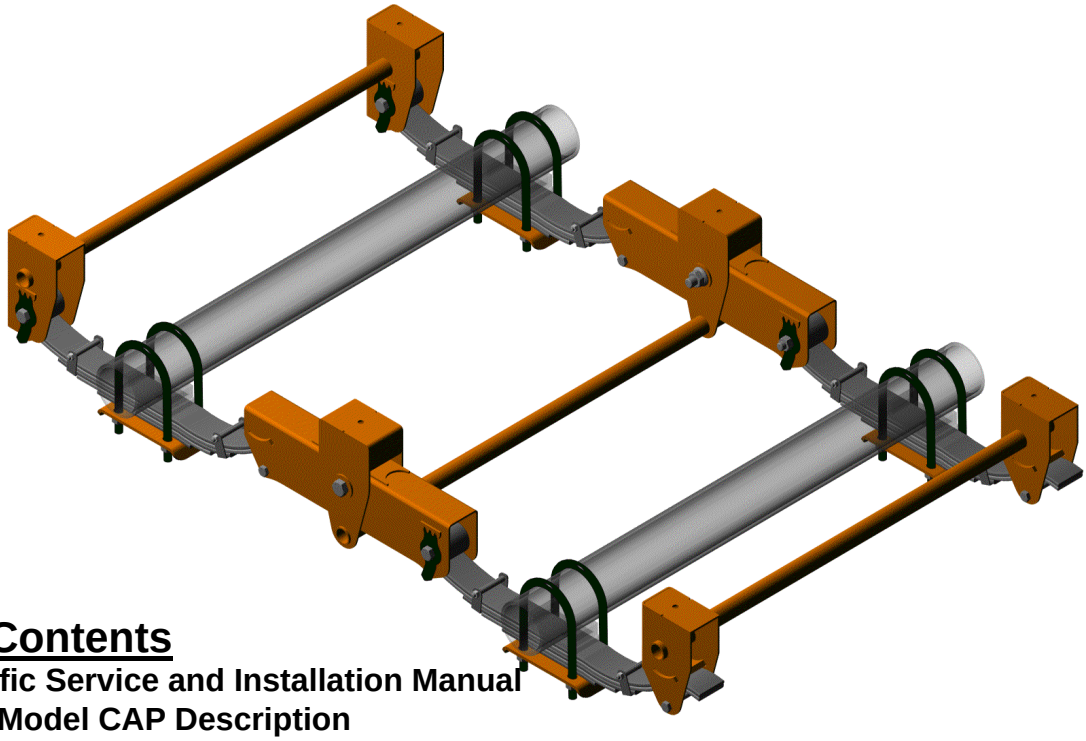
# CUSH CORP

Mechanical Suspension Model CAP:
Single, Tandem, & Tri-axle
Suspensions & Product Service



## Table of Contents

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Giving the World a Better Ride!



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# Model "CAP" Description

The Cush model "CAP" is designed to work with industry standard 3" wide slipper springs for 10,000 lbs to 15,000 lbs units. The Cush model is designed to have several advantage features over the Dexter HAP model unit in that: it allows you to get axles without the adjustment on the axle, has heavier duty hanger and rocker components, uses the same busing as the Dexter HAP, more common replacement bolts, taller hangers for frame and tire clearance, self-locating thru hole for pipe cross-member, full front plated hangers, integrated street side axle alignment.

The"CAP" suspension is available in single, tandem, tri-axle, or multiple axle configurations in order for you to:

- Provide protection and stability to the trailer
- Dampen and reduce the effects of road imperfections
- Securely attach the running gear to the trailer

## Inspection Schedule

The following inspection schedule is a guide to help with the preventative maintenance of your suspension system. Your air suspension will provide many trouble free miles of service by using the information in this publication.

### "CAP" Original Inspection

When reviewing the suspensions on your trailer for the first time, check the following:

- The axles have been aligned properly.
- The suspension frame bracketry have been properly supported.
- Trailer is level
- All welds are of good and acceptable quality
- All fasteners are in place and securely torqued
- No component interferences are visible
- There should be 1" minimum clearance between top of tire and bottom of trailer structure when axle is at full jounce.
- There should be 2" minimum clearance between inside of tire and trailer frame structure for lateral movement.
- There should be ample fore and aft clearances.

### Daily Inspection

A quick visual inspection before operating the trailer will often detect obvious problems such as broken or loose parts.

### "CAP" 30-day Inspection

Check clearances around all moving suspension parts such as springs, tires, and equalizer for any signs of wear or component interferences.

Check each of the following:

- Fasteners – Not loose, broken or missing
- Pivot Bushings – Not protruding, off-center, torn or worn
- Frame Hangers – Not worn, cracked, bent, or damaged
- Equalizer – Not worn, cracked, bent, or broken

- Axle Beam – Not cracked, bent, or broken
- Tires – No tire wear that might indicate an alignment problem.
- Axle Alignment – No pivot gear movement or inappropriate wear, axles tracking properly
- Trailer – Trailer not leaning, trailer frame suspension attachment structurally sound, no cracked or missing welds at suspension frame attachment.

**"CAP" 90-day Inspection and at every brake lining change**

Thoroughly check all items checked at the 30-day inspection. Also check:

- All welded connections for signs of deterioration
- All frame attachment joints and pivoting or clamping joints for problems
- All spring eye bushings
- For any sagging or broken leaf springs

**"CAP" Axle Alignment Inspection**

Check the "Cush-Align" connection for change of position at 30-day, 90-day, and every brake lining change. Re-align if necessary.

**Axle Inspection** (general notes, see axle manufacture's service manual for details). Visually inspect the all axle components, seals, and hub caps for leaks and oil level every 6,000 miles (if oil bath type). Repair if necessary.

At 100,000 miles or 12 months, visually inspect seal and hub cap for contaminants, oil level, or leaks. Check the wheel bearing adjustment. Repair if necessary.

## Suspension Maintenance Items

The Cush trailer air suspension system is designed to minimize service issues. With proper maintenance the life of your suspension system can be extended.

**Caution Notes**

- Trailer walk can occur due to loading, unloading, or damaged parts
- For safe loading and unloading, leave trailer attached to vehicle.
- Do not tow or pull on vehicle by suspension components.
- Fasteners should never be reused, over-torqued, or lubricated.

Do not operate vehicle suspension with:

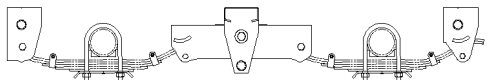
- Broken welds or metal parts
- Loose, broken, or missing fasteners or suspension components
- Loss of air pressure in brake system

## Torque Specifications

It is the customer's responsibility to check and tighten fasteners to specified torque at installation, after the suspension has been in operation for 3000 miles, and at suspension inspection cycles. Failure to do so can result in loss of warranty.

- Torque values given are specified for the fasteners in the condition supplied by Cush Corporation.
- DO NOT APPLY ANY ADDITIONAL LUBRICANTS.
- **!CAUTION:** Fasteners should never be reused if removed or loss of clamp load occurs. For proper joint clamping contact Cush for replacement fasteners or use fasteners of equal strength.
- **!CAUTION:** Over-torquing fasteners could result in material failure.

Common Torque Specifications (See Cush Safety and Inspection Sticker on your trailer)

| | | | | (Ft*Lbs) | | (Nm) | |
|---|---|---|---|---|---|---|---|
| **Fastener Torque Specs** | **Size** | **Thread** | **Grade** | **Min.** | **Max.** | *Min* | *Max.* |
| Spring Retainer Bolt & Nut | 1/2 | 13-UNC | 5/B | **65** | **75** | *88* | *102* |
| (10K) U-Bolt & Nut | 5/8 | 11-UNC | 8/C | **180** | **210** | *244* | *285* |
| Jam Nut | 3/4 | 10-UNC | A/B | **80** | **100** | *108* | *136* |
| Spring Pivot Bolt & Nut | 3/4 | 10-UNC | 8/C | **330** | **380** | *447* | *515* |
| (15K) U-Bolt & Nut | 3/4 | 10-UNC | 8/C | **330** | **380** | *447* | *515* |
| Equalizer Pivot Bolt & Nut | 7/8 | 14-UNF | 8/C | **550** | **600** | *746* | *813* |

**10K to 15K Rubber Bushed Spring Suspension Warnings**

**Alignment:** Support vehicle to unload suspension, block equalizers level, loosen spring eye pivots and spring keeper bolts, align vehicle, re-torque fasteners.

**Torque:** Check torque after "Break-In" period of approximately 1000 miles (1600 km). All bolts and nuts should be checked to insure recommended torque values per inspection schedule. This is required to comply with the CUSH warranty guidelines. It is important that these settings be maintained at all times to insure trouble-free performance.

## Customer Welding Notes:

- It is the responsibility of the suspension installer and vehicle designer to provide adequate vehicle frame design, gusset support in the area of suspension attachment, and proper securing method for the suspension system. The suspension installer has the responsibility to determine the proper welding parameters for the materials being used. For specifications of suspension component materials, contact Cush.
- Required cross member locations may be shown. Actual size and shape may vary per trailer design. It is the responsibility of the suspension installer to ensure structural adequacy of the trailer frame and related cross members.
- No welding of any of the suspension components is permitted, except where specified by Cush.
- Any alteration of the suspension components or installation deviations must be approved, in writing, by Cush Corporation.

### Recommended Steel Welding Procedures, If Required:

- WARNING: If these procedures and specifications are not followed, damage to the axle or suspension could result. The resulting axle or suspension damage could cause an accident, property damage, and/or serious injury.
- A welder qualified in 2G positions per ANSI/AWS D1.1-94 Section 5 Part C "Welder Qualification" must perform the welding.
- The specification shown below is for horizontal (2F) positioning.
- Suspension components and their mating parts must be at a minimum temperature of 60°F(15.5°C) and free from moisture, dirt, scale, paint, grease, and other contaminates.
- All welds must be performed in a flat, or horizontal, position.

Achieve spray arc transfer with the following welding parameters:

- Standard Electrode: AWS E-7018(Oven Dried), 0.125"DIA., 120-140 AMPS D.C., Electrode positive.
- Standard Wire: AWS ER-70S-6 or AWS ER-70S-3, 0.045"DIA
- Volts: 26-30 DCRP
- Current: 275-325 AMPS
- Wire Feed Speed: 380-420 Inches per Minute
- Electrode Extension: 0.75" to 1"
- Gas: 86%AR 14%CO2 at 30 to 35 CFH

Any deviation from these welding parameters must be of equal strength or approved by Cush Corporation in writing.

### Warranty Note

If after review of the Cush Corp Warranty it is determined that there is a warranty issue and Cush Corp has been notified, then a **W**arranty **L**abor **A**llowance may be needed. The **WLA** for the following service items are shown with each itemized description. The service item descriptions include the obvious parts involved, other parts may be involved to complete the warranty repair. Shop per-hour labor rate allowances will not exceed standard industry averages for the work done. Warranty claims should be filed per the Cush Corp Warranty (publication P0202-01) with an itemized list of charges and copies of all available receipts.

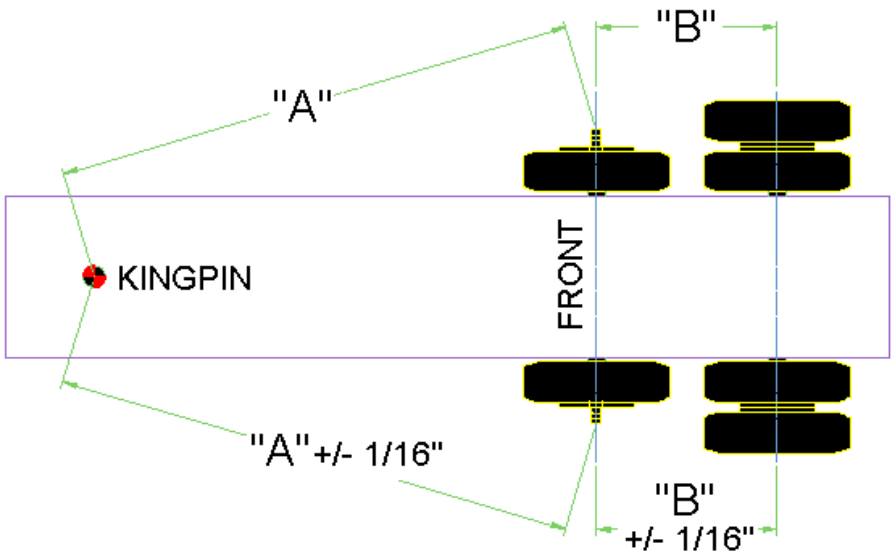
# Suspension Service Items

## Axle Alignment

Cush has several different alignment means available for different applications. Listed here are some general alignment guidelines and alignment procedures for the styles of Cush  Alignment.

CAUTION: DO NOT APPLY undercoating to the "Cush-Align" area until after alignment and torque of the suspension pivot bolts.

- Check that the tire inflation pressure is correct on all tires.
- Alignment should be performed with the vehicle empty and the brakes released.
- On a level floor move the vehicle forward and back to straighten, make sure last movement is forward.
- Remove the outer tires and any other parts from under the chassis that obstruct the measuring distances between the kingpin and the axle ends. If you use a commercially available kingpin and axle spindle extenders or the edge of the wheel rim, you will not need to remove this equipment.
- Measuring from the trailer's kingpin, determine the alignment of the forward axle.
- After achieving proper alignment of the forward axle, torque the Cush Pivot fasteners per Cush torque specifications on the Cush installation drawing.
- Align, to within 0.063" tolerance, any additional axles to the forward axle per the proper alignment method. Use a commercially available alignment gauge or trammel bar if available (see Figure 2).



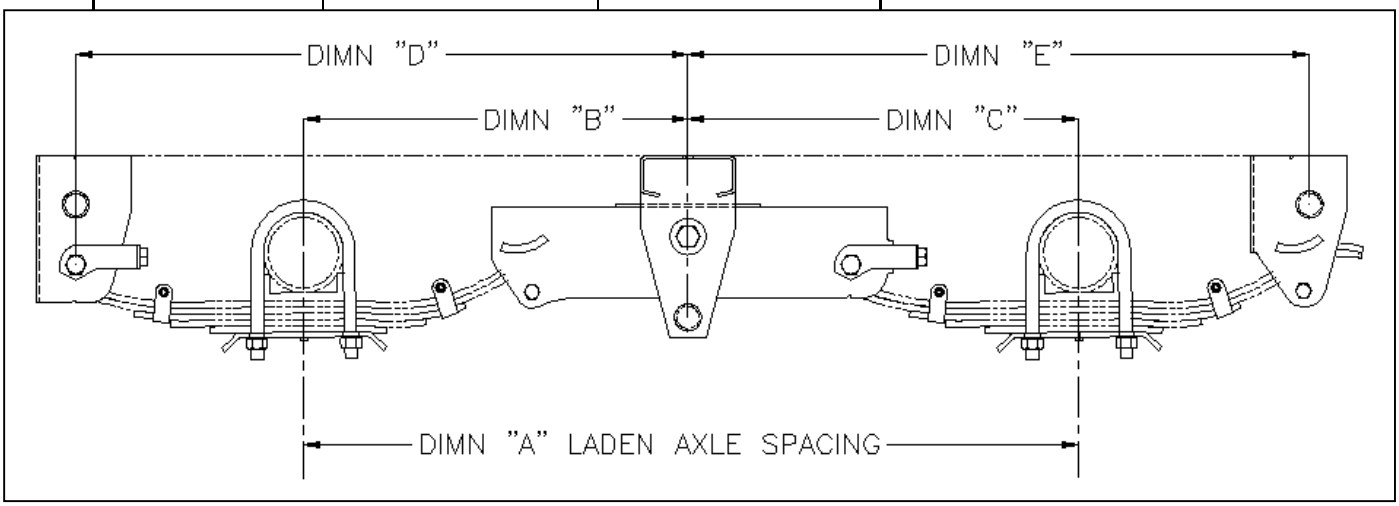

(Figure 2)

NOTE: Failure to follow the procedure for your axle alignment application and/or properly torque the pivot fasteners can result in a failed pivot connection and a loss of warranty coverage!

## Axle Spacing

Cush has several different axle spacing's available for different applications. Listed here are some general dimensions that change with the optional equalizer lengths.

| Axle Spacing Based on Equalizer Length | | |
|---|---|---|
| Dimensions | Short Equalizer L.H.& R.H. Items 24 & 25 | Long Equalizer L.H. & R.H. Items 5 & 6 |
| "A" | 42 1/4" | 48 1/2" |
| "B" | 21 1/8" | 24 1/16" |
| "C" | 21 1/2" | 24 7/16" |
| "D" | 35 3/16" | 38 1/2" |
| "E" | 36" | 38 11/16" |



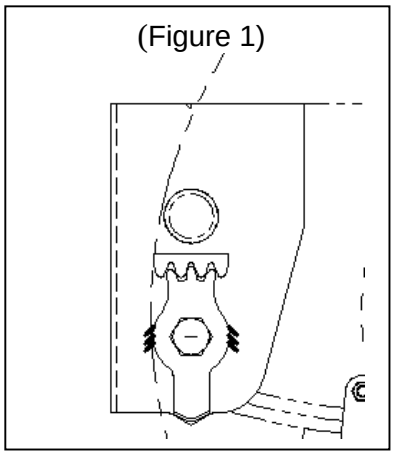
Cush Alignment Style “Obsolete”

**“Cush-Align” Original (On CAP Models from 2005 to 2006 only)**

The “Cush-Align" pivot joint features outside gear tooth washers that cover the alignment slot and mate with a grounded rack plate. At the inside of the hanger

- If realigning, and the gear washer is welded to the side of the hanger, grind the welds loose without gouging the side of the hanger. Remove the gear washers and clean away weld material.
- Snug the bolts of the "Cush-Align" to be tight enough to hold the joint together but loose enough to permit use of the alignment gear.
- Set the alignment gear indicator tab at 6 o'clock, the neutral position. This gives you pivot movement fore and aft. Be sure that there is one tooth of the gear washer outside of the hanger rack, both sides, to be at the middle of the hanger slot (see Figure 1).

(Figure 1)

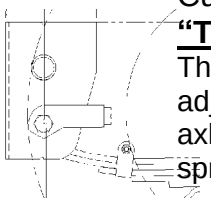


- To align the axle, rotate the alignment gear of one side of the suspension to get the axle aligned. If needed, go to the other side of the suspension and rotate the alignment gear in the opposite direction to fully align the axle.

WARNING: After alignment, clamp the joint per Cush bolt/nut torque specifications. After alignment, the suspension installer can weld the gear washer to the hanger side with 1/2" welds both sides of washer to prevent tampering & for off-road applications, we recommend for abusive applications.

- Use gear outside of the hanger to set the alignment and the inside gear for fine-tuning of the alignment.

WARNING: After alignment, clamp the joint per Cush bolt/nut torque specifications. After alignment, the suspension installer can weld the gear washer to the hanger side with 1/2" welds both sides of washer to prevent tampering & for off-road applications, we recommend for abusive applications.



Cush Alignment Style 4

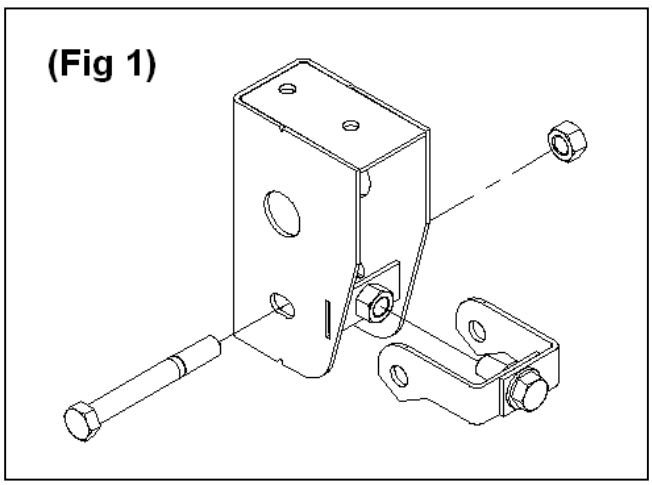
**“T-Align” (3/8” alignment on street side / for Spring Suspensions)**

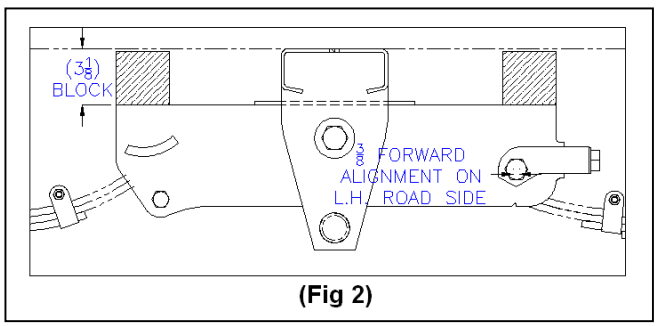
The “T-Align" was designed to give our customers that use a leaf spring suspension axle adjustability at the frame hanger rather than having to loosen u-bolts and adjust at the axle seat. The “T-Align" is a positive adjustment that works with springs to eliminate springs affecting the alignment process.

Overview; The "T-Align" pivot joint features a yoke assembly that covers the alignment slot. After alignment, clamp the joint per Cush torque specifications. No weld is required to secure the slip joint after proper tightening.

- Remove load from trailer (empty). Jack the trailer up on a level surface and place appropriate jack stands of sufficient strength/capacity to support the load under the axle near the spring seat areas.
- Tighten all fasteners on the R.H. Curb Side of trailer suspension.
- Check that the **keeper bolts** are not clamping the sides of the springs causing them to be “locked” by the rear hangers or equalizer.
- With ratchet, turn the alignment bolt on the yoke assembly (L.H. ROAD SIDE) so that the pivot bolt is at the "CENTER OF THE SLOT" on the front hanger & equalizer. DO NOT USE AN IMPACT GUN. (Fig 1)
- Hand tighten (snug) the pivot nuts of the "T-Align" to be tight enough to hold the joint together but loose enough to permit forward movement of the alignment yoke (able to loosen by hand).
- Block the top side of each equalizer between the frame with 2 blocks (3-1/8" tall) per side, to keep level. (Fig 2)
- Measure from the trailer's kingpin to determine the alignment required on the front axle (L.H. ROAD SIDE) to within 1/16".
- After achieving proper alignment of the forward axle, torque pivot fasteners per Cush installation drawing
- Align additional rearward axles to within 1/16" tolerance of the forward axle per the "T-Align" method.

**(Fig 1)**






**(Fig 2)**

## U-BOLT INSPECTION & INSTALLATION NOTES

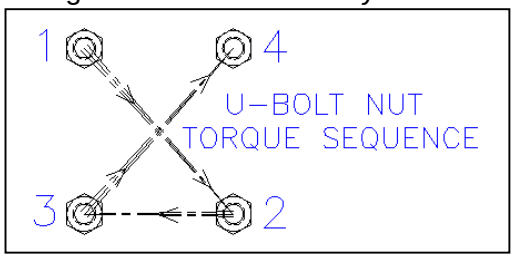
**CAUTION!** Do not apply any lubricants to the u-bolts, improper clamp loading can occur causing failure

### Inspection

- Check each U-bolt threaded area for damage or burrs.
- After installation, an equal amount of thread should be visible beyond the head of the nut on each side of the U-bolt.

### Installation

- U-Bolts should only be installed and torqued after completion of any axle welding. Allow sufficient axle cooling time before applying torque to u-bolts.
- Check that U-bolts fit properly in area, if U-bolt is to tight tap on top of U-bolt to hard surface to open up. Be careful that U-bolt installation does not damage threads.
- Snug all U-bolts evenly before applying clamping torque with hand wrench. Check that u-bolts are parallel and square to axle.
- Torque U-bolts in a three-step process to avoid an improperly clamped axle and resulting damage. Torque the u-bolts in an "**X**" pattern with each torque step (1-2-3-4). This allows the U-bolt to stretch and relax for the clamp to hold torque. Proper tightening will allow equal amount of tread above each nut.
- Use a calibrated torque wrench to get the proper setting for the size of U-bolt you are using:
  - **First Step-1/3 of Final torque**
  - **Second Step-2/3 of Final torque**
  - **Third Step-Final torque**




## Pivot Components

The pivot of an equalizer on a mechanical suspension is the main link to connect the suspension to your trailer. This link provides a resilient connection that allows an axle to walk without excessive flexing. Re-bushing of a suspension requires the use of a bushing press and bushing kit, containing the required components for re-bushing. Contact Cush for information regarding any special tooling and the proper kit for your suspension and review any instructions on your suspension drawing.

Disassembling Pivot Connection:

- On level ground, securely chock the tires and apply trailer parking brakes
- Support the trailer in a safe manner at a working height
- Loosen and remove pivot nut
- Remove Pivot bolt
- Disassemble any other parts that interfere with lowering the spring assembly out of the suspension hangers

- Using a hydraulic jack or other lifting device, lower pivot end of spring from inside hanger.

Bushing Replacement :

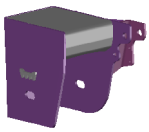
- Use Cush bushing replacement kit shown on parts explosion for your suspension, or contact Cush Corp for cross-reference.
- Some models, remove the flanged inserts from the inner diameter of the bushing tube
- Remove old bushing using bushing tool
- Clean inside surface of trailing arm bushing sleeve
- Lubricate outside of new Cush Dual-Rate bushing and inside of trailing arm bushing sleeve with proper rubber lubricant (P-80 or Ru-glyde)
- Orient voids in bushing within 5 degrees, (plus or minus) of “vertical” position when suspension is in operation.
- Center inner metal bushing in sleeve with the outer metal bushing housing with tool, it may be necessary to push bushing thru a little and pull back to center rubber and inner metal sleeve.

Reassembling pivot connection (Frame Hanger style):

- Position wear washers over the outside diameter of the bushing tube
- *Some models*, Install the flanged inserts in the inner diameter of the bushing tube
- Place the pivot bolt through the partial assembly
- Hand tighten a non-locking nut to hold the position of all loose items
- Using a hydraulic jack or other lifting device, raise pivot end of trailing arm until flanges of flanged inserts enter the inside of the hanger
- Holding this raised position, remove pivot bolt and standard hex nut continue to raise pivot end of trailing arm until hole in bushing lines up with slots in hanger
- Place adjustment gear on pivot bolt per suspension drawing (Always use new fastener hardware)
- Re-insert pivot bolt through side of hanger or yoke beam engaging all teeth of the alignment gear as shown in Figure 1 (Note: one gear tooth outside of alignment rack, both sides for neutral position).
- Place adjustment gear on end of pivot bolt against inner face of hanger, engaging all teeth of the alignment gear as shown in Figure 1 (Note: one gear tooth outside of hanger rack, both sides for neutral position).
- Place pivot nut on end of pivot bolt and tighten until “snug” to hold tooth engagement of alignment gears
- Using a wrench, move alignment gear pointers to nominal position
- Align axle with relation to the kingpin as shown in Figure 2 (see Axle Alignment)
- Reinstall shock absorbers and chain restraints
- Torque all the fasteners to specification

## Cush Corp Suspension Fabricated Components

Some issues are discussed here but if other deficiencies occur contact your trailer manufacturer or Cush Corp for information.



### Suspension Frame Hanger

Cush manufactures various hangers for different applications; because of this it would be best for you to contact Cush for an installation drawing per your application. On these drawings we show recommended cross-member and support locations. Failure to have the proper support in place can cause a reoccurring failure mode. If for some reason it is required to replace a frame hanger, please follow the guidelines below as a minimum safety procedure when repairing these items.

To replace welded frame hanger:

- Contact your trailer manufacturer or Cush Corp for replacement parts
- On level ground, securely chock the tires and apply trailer parking brakes
- Support the trailer in a safe manner at a working height prior to exhausting the air
- Exhaust all air from the air suspension system
- Disassemble the pivot connection and any other parts that interfere with lowering the axle/beam assembly out of the suspension hangers
- Lower the axle beam assembly, check for any damaged beam wear
- Check that the wear washers are in usable condition
- Check that the bushing inserts are in usable condition
- Mark the hanger position on the frame side for reference
- Cut away the frame hanger and clean up the frame with grinder, do not gouge frame
- Put new hanger component on beam/bushing and reassemble the pivot connection, use new pivot bolts & nuts
- Move the alignment gears to the nominal notch position and snug up hanger bolt
- Raise the axle/beam/hanger assembly to the frame and clamp hanger to frame squarely
- Weld hanger to frame per Cush Corp installation drawing
- Reassemble any other parts that were disassembled to lower axle/beam assembly
- Align axle with relation to the kingpin as shown in Figure 2 (see Axle Alignment)
- Torque all the fasteners to specification