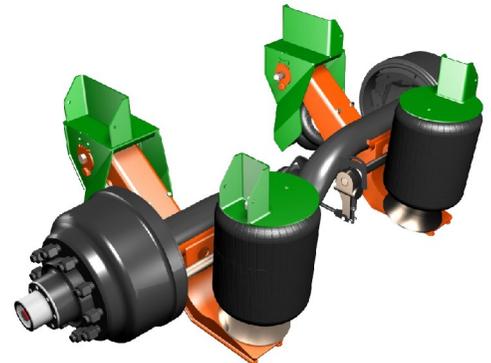
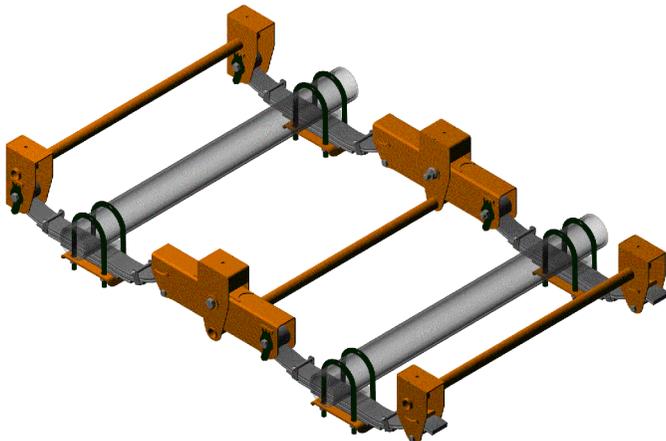
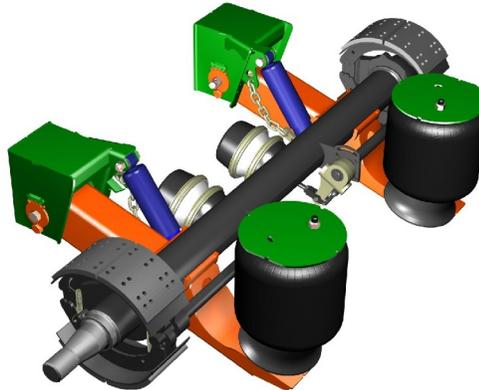
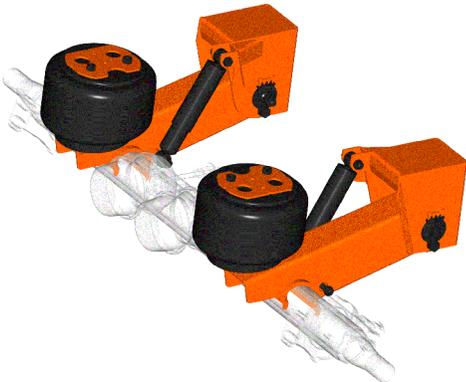
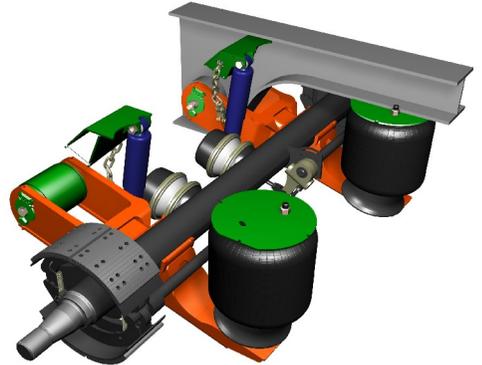
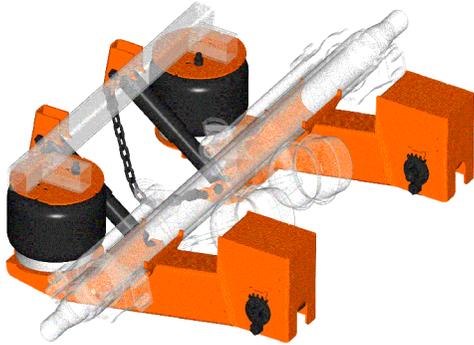


CUSH CORP

Suspensions & Product Service



Company Name: _____

Catalog Date: _____

CUSH Suspension Systems

Service Manual

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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.

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 and air spring plate mountings have been properly supported.
- The suspension ride height is set properly.
- Trailer is level
- All welds are of good and acceptable quality
- All fasteners are in place and securely torqued
- No component interferences are visible
- No air spring, air-lines, or shock absorber leaks are visible
- There should be 0.75" minimum clearance must be maintained around air spring when it is at maximum diameter.
- 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.

30-day Inspection

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

Check each of the following:

- Fasteners – Not loose, broken or missing
- Pivot Bushing – Not protruding, off-center, torn or worn
- Pivot Washer – Not worn through or torn
- Chain Restraint – Not elongated or broke
- Shock Absorber - Not leaking or damaged
- Air Spring - Not leaking, worn, or damaged
- Air Control – Trailer maintains ride height; no leaking or damaged valves, fittings, or piping
- Frame Hanger – Not worn, cracked, bent, or damaged
- Suspension Beam – Not worn, cracked, bent, or broken
- Beam/Axle – 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



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- Trailer – Trailer not leaning, trailer frame suspension attachment structurally sound, no cracked or missing welds at suspension frame attachment.

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

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 seal and hub cap for leaks and oil level every 7,500 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.

Post Inspection Notes

If issues arise from any inspection, review troubleshooting guide (Appendix A of this service manual). If the issue can’t be resolved from the troubleshooting guide or for warranty information, contact your trailer manufacture. If the problem is not related to installation, the trailer manufacturer or suspension installer should contact Cush to resolve the issue or file the warranty claim.

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 loss of air spring pressure.
- For safe loading and unloading, dump air spring pressure to lower 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 air springs or brake system

Trailer “Lean” or “Dog Tracking”

If your trailer is having problems with “Lean” or “Dog Tracking” please refer to the Troubleshooting guide in Appendix A of this manual.



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)

AIR SPRING PROVIDED MOUNTINGS		MAX. (ft*lbs.)
SIZE	Threaded Studs	
3/8"	24-UNF STUD	20
3/8"	16-UNC BLIND NUT	25
1/2"	13-UNC STUD	25
1/2"	13-UNC BLIND NUT	50
3/4"	16-UNF COMBO STUD	50
Air Ports		
1/4"	18-NPTF AIR FITTING	11
1/2"	14-NPTF AIR FITTING	23

General Fastener Torque Specs	Size	Thread	Grade	(Ft*Lbs)		(Nm)	
				Min.	Max.	Min	Max.
Spring Keeper Bolt & Nut	1/2	13-UNC	5/B	65	75	88	102
TRAC-ALIGN Rack Lock Bolt	1/2	13-UNC	5/B	25	35	34	47
(10K) U-Bolt Nut	5/8	11-UNC	8/C	180	210	244	285
Brake Chamber Mounting Nut	5/8	11-UNC	5/B	100	110	136	149
Nyloc Jam Nut	3/4	10-UNC	A/B	80	100	108	136
Shock Mount Nut/Bolt	3/4	10-UNC	5/B	210	235	285	319
CAP 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
(25K) U-Bolt Nut	7/8	14-UNF	8/C	475	525	644	712
Pivot Nut (SecureLok/Securex)	7/8	14-UNF	8/C	550	600	746	813



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 are 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 contaminants.
- 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 **Warranty Labor Allowance** 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.



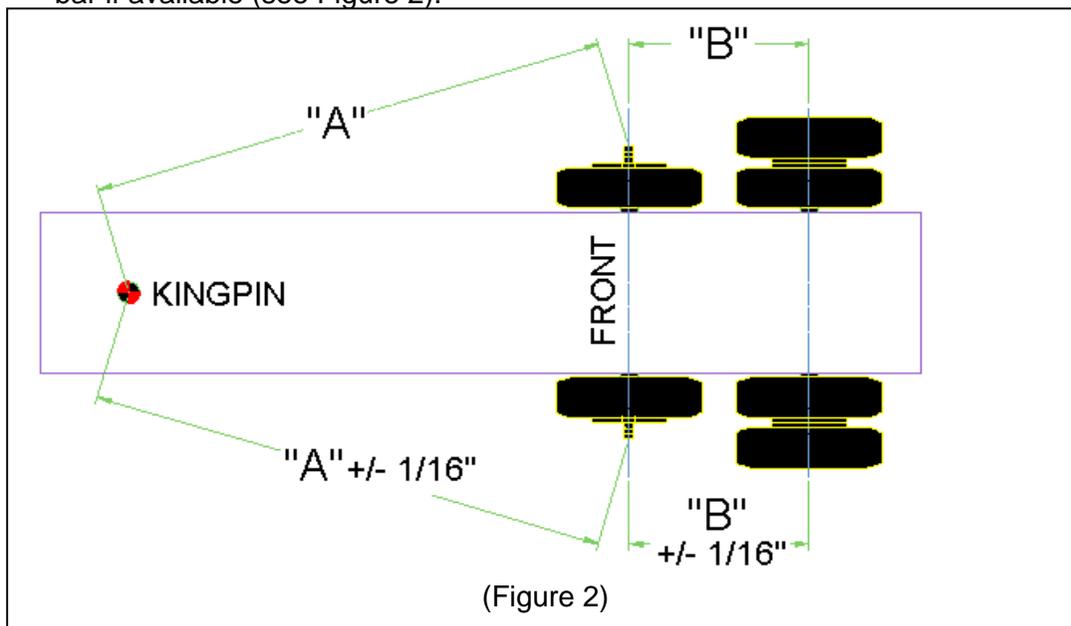
Suspension Service Items

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 "Cush-Align" method. Use a commercially available alignment gauge or trammel bar if available (see Figure 2).



Std Warranty Labor Allowance__0.5 (hours/axle)

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!



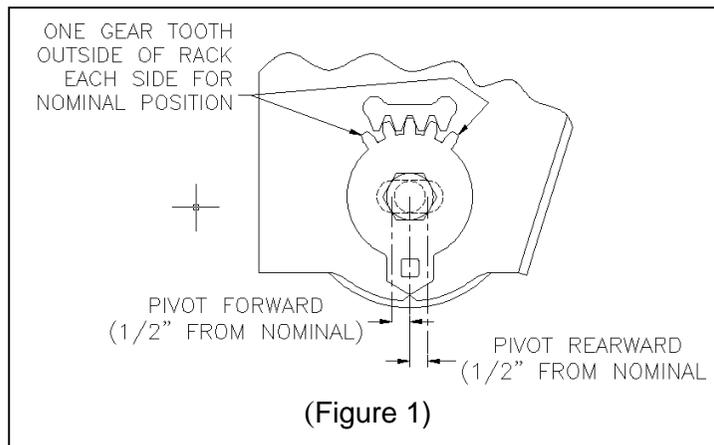
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Cush Alignment Style 1

“Cush-Align” Original (1” alignment / inner flanged collars / 1/4” thk gears)

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, collars guide the bushing and cover the alignment slot.

- 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).



- 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. As standard, there are two alignment gears per hanger. Use the gear on the outside of the hanger to set the alignment and the inside gear for fine-tuning of the alignment.

NOTE: Before tightening the pivot connection fasteners, be sure that the spacer collars are against the bushing inner metal and hanger side. Failure to follow these procedures and/or properly torque the pivot fasteners at this time can result in a failed pivot connection and a loss of warranty coverage!

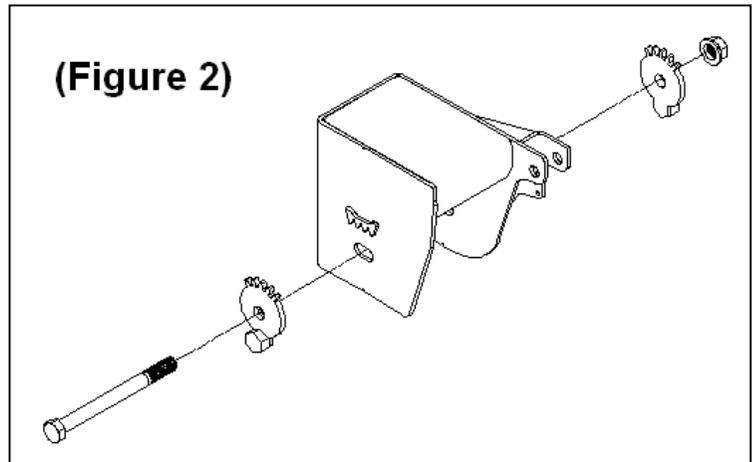
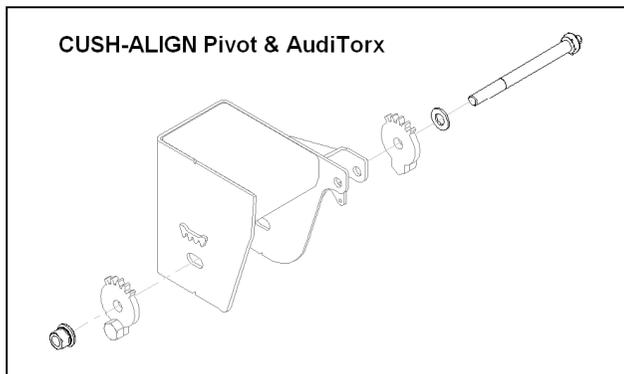
WARNING: After alignment, clamp the joint per Cush bolt/nut torque specifications. After alignment, the suspension installer can weld the gear washer to the hanger side with 1/2" welds both sides of washer to prevent tampering & for off-road applications, we recommend for abusive applications.

Cush Alignment Style 2

“Cush-Align II” Econo (3/4” alignment / 1/2” thk gears)

The “Cush-Align II” pivot joint features outside gear tooth washers that cover the alignment slot and mate with a grounded rack plate. After alignment, clamp the joint per Cush 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.

- *If realigning, the gear washer may be 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.



- 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. As standard, there are two alignment gears per hanger. Use the gear on the 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.

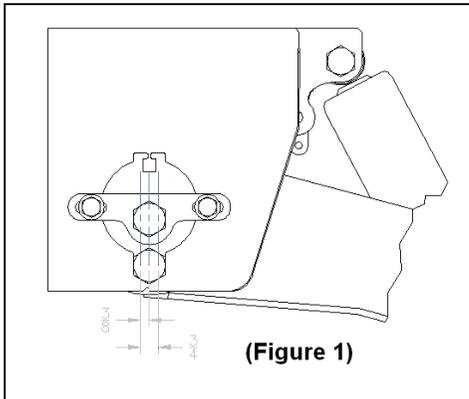
Cush Alignment Style 3

“Trac-Align” (3/4” alignment / 1/2” thk eccentric / optional locking rack)

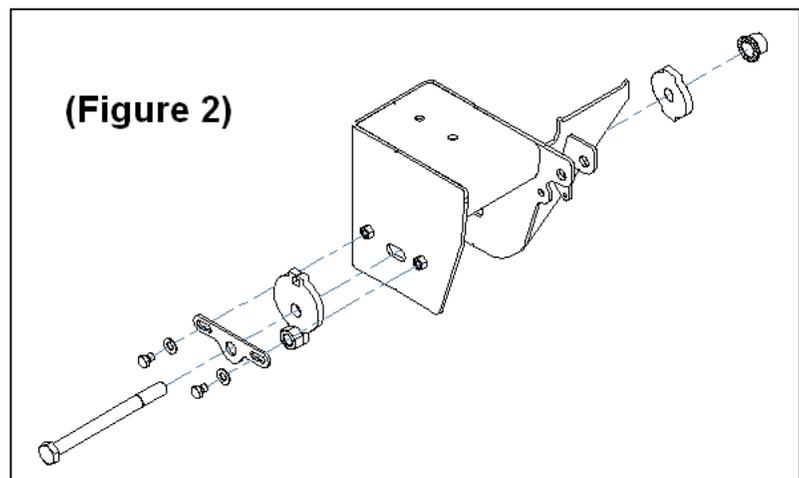
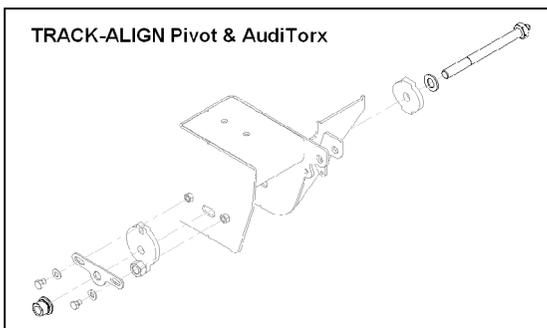
The “Trac-Align” was designed to give our customers extra pivot integrity with the addition of the **optional** locking rack and a more familiar alignment means with the use of an eccentric cam adjustment. The “Trac-Align” also has bearing washer with tabs for use with a Cush axle-welding stand to have a more precise fixturing of the suspension and axle at factory or customer integration.

*Please note that the tabs on the inner bearing washer can be in any position after installation, as they do not indicate pivot alignment.

After alignment, clamp the joint per Cush torque specifications. After alignment, the suspension installer can weld the outside washer to the hanger side with 1/2" welds to prevent tampering & for off-road applications.



- If realigning, loosen the rack lock bolts to allow eccentric cam movement.
- The eccentric cam gear should always have the 1/2” square hole to the top.
- Set the alignment gear indicator tab at 6 o'clock, the neutral position. Snug the rack lock bolts and pivot bolts of the “Trac-Align” to be tight enough to hold the joint together but loose enough to permit use of the eccentric cam adjustment. Be sure that the eccentric cam plate is clamped down flush against the hanger side and is not riding up the grounding nuts/bars.
- For adjustment use a breaker bar in the 1/2” square hole or use a box wrench on the lower eccentric cam gear nut.
- The “Trac-Align” gives you 3/8” pivot movement fore and aft per hanger side. (see 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 pivot bolt per Cush torque specifications. Torque the 1/2” rack lock bolts to 25 ft*lbs, loosen the rack lock bolts to realign pivot.

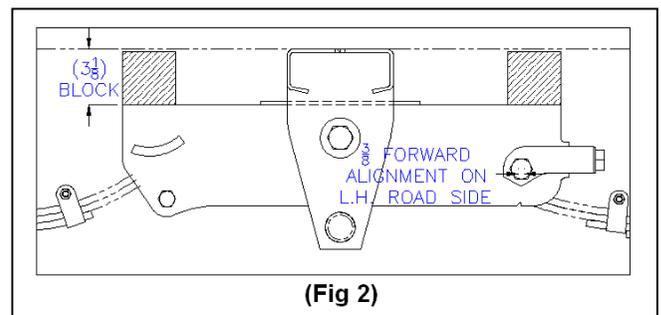
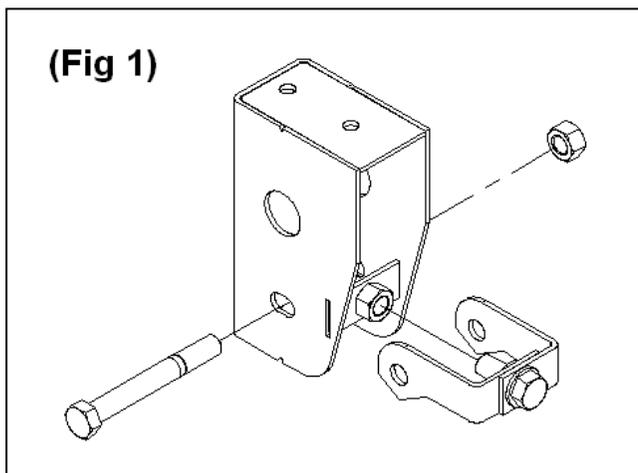
Cush Alignment Style 4

"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.





Shock Absorber

The shock absorber is used to dampen the bouncing of an air spring suspension. Without shocks in place damage can occur to the suspension or trailer. Shocks are a replaceable item of an air suspension and when maintained can extend the life of your air suspension and trailer. Some things can indicate it is time to replace shocks: Uneven tire wear, poor ride characteristics, broken or torn air springs.

Inspection:

- Broken upper or lower shock eye mounting at the welds
- Worn out upper or lower shock eye bushings
- Broken dust tube cover
- Bent or dented lower shock body tube
- Bent shock rod
- Shock leaking streams of oil

To replace a shock absorber:

- Contact your trailer manufacture or Cush Corp for replacement parts or cross-reference
- Remove the shock end mounting hardware
- Check the mounting surface for wear problems
- Insert the new shock absorber and appropriate mounting hardware
- Torque the fasteners to specification

Warranty Labor Allowance__0.3 (hours each)

(See the troubleshooting guide for more information on shock absorber issues)



Air Spring

The air spring is used to carry and cushion the load of an air spring suspension. Without an air spring in place damage can occur to the suspension or trailer. If damaged, air springs are a replaceable item and when maintained can extend the life of your air suspension and trailer. Air Springs can also be used to lift the suspension, observe the same safety precautions below when changing lift springs.

To replace an air spring:

- Contact your trailer manufacturer or Cush Corp for replacement parts or cross-reference
- Support the trailer in a safe manner at a working height prior to exhausting the air
- Exhaust all air from the air suspension system
- Disconnect the air fittings from the air spring
- Remove the mounting hardware from the air spring and remove the air spring
- Check the mounting surface for wear problems
- Insert the new air spring and appropriate mounting hardware
- Torque the fasteners to specification
- Reconnect the air fittings and air lines to the air spring
- Lower the trailer
- Supply air to the suspension system
- Check for air leaks

Warranty Labor Allowance__0.3 (hours each)

(See the troubleshooting guide for more information on air spring issues)



Chain Restraint

The chain restraint is a feature used to protect the shock absorber and air spring of your trailer suspension from overextension. Without the chain restraint in place the suspension will function but damage can occur to the shock absorber. Chain restraints are a replaceable item of an air suspension and can extend the life of your shock absorbers and air springs.

To replace a chain restraint:

- Contact your trailer manufacturer or Cush Corp for replacement parts or cross-reference
- Support the trailer in a safe manner prior to exhausting the air
- Exhaust all air from the air suspension system
- Remove the old chain restraint and attachment link
- Check the mounting surfaces for wear problems
- Check that the new chain restraint is the proper size and length to your old restraint
- Insert the new chain restraint
- Reconnect the attachment link, checking that the chain is not bound up
- Supply air to the suspension system
- Visibly check for any clearance issues with your new chain restraint

Warranty Labor Allowance__0.1 (hours each)

(See the troubleshooting guide for more information on chain restraint issues)

U-BOLT INSPECTION & INSTALLATION NOTES



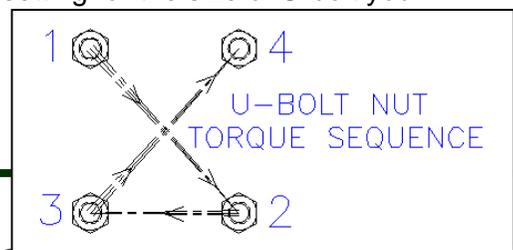
CAUTION! Do not apply any lubricants to the u-bolts, improper clamp loading can occur causing failure

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**



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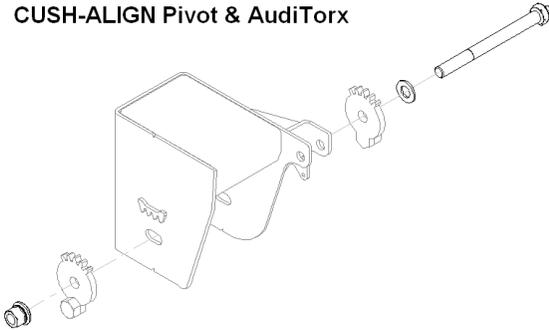


Shear-type Pivot Fastener

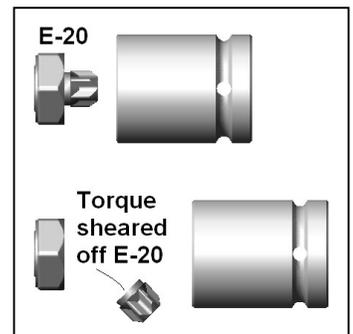
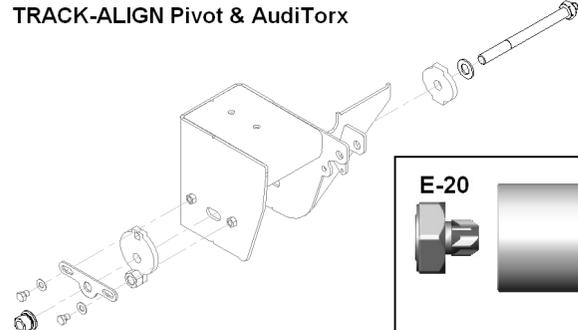
Some Cush suspension models may offer a Shear-type pivot fastener. This Shear-type bolt is well known in the heavy-duty suspension market as being a fast and convenient way to apply the proper torque. The same installation tooling can be used with the Cush units (Torx E-20) as provided by: Hendrickson, Camcar, Strong Tools, & Apex. If a Torx E-20 socket is not available, torque bolt nut per 7/8" Grade 8 spec (550-600ft*lbs).

The AudiTorx Shear-type bolt gives automatic torque clamping and consistent repeatability because the Shear-type Torx E-20 drive head is designed with a cut groove to shear off at a pre-determined torque level when applied with an air impact. After shearing off the Torx drive head a 36mm hex head is left for later service with a socket or wrench.

CUSH-ALIGN Pivot & AudiTorx



TRACK-ALIGN Pivot & AudiTorx



****AudiTorx Installation & Inspection Notes:***

- Required Materials: E-20 Torx socket, 1-5/16" nut wrench, Air Impact wrench capable of 600 ft*lbs (813 N*m) Minimum, alignment tools.
- *If a Torx E-20 socket is not available, torque bolt nut per 7/8" Grade 8 spec (550-600ft*lbs)*
- DO NOT APPLY undercoating to the suspension hanger area until after axle alignment and pivot bolt torque has been applied.
- Cush does not recommend reuse of pivot fastener hardware once the pivot connection is disassembled, use a new bolt and nut.
- Check for proper tire clearance with fastener hardware. The AudiTorx bolt should be installed from the inboard side of the frame hanger to allow access with an air impact when tires are on, if tire clearance is an issue with fastener hardware, then the shear-type bolt head should be installed from the outboard side.
- NOTE: Check for any flashing or obstructions to cause the bearing washers to be raised and not allow flush mounting against the hanger sides (gear or eccentric type).
- Check proper axle alignment, see installation manual for instructions on alignment.
- Snug the pivot fasteners so that the alignment washers do not move while applying initial torque, recheck alignment.
- Torque the shear-type pivot bolt with the E-20 Torx drive socket tool until the bolt's Torx head shears off.
- The E-20 Torx drive socket should fully engage the Torx shear head before and while applying torque.
- Apply paint to the sheared away Torx area as a rust preventative.

Warning!

It is the responsibility of the assembler (OEM, Dealer, Repair Facility, etc.) to inspect and insure proper installation of the Shear-type bolt. If improperly torqued, the pivot clamp force can fail resulting in unreliable axle alignment, vehicle instability, personal injury, and/or property damage.

Socket Description	Drive Size	Cush	Hendrickson	Camcar	Apex
E-20 Torx Socket	3/4" Square	V-24303	A-24303	TX-7120	
E-20 Torx Socket Heavy Duty	1" Square	V-24536	A-24536	TX-8120	E-20
E-20 Torx Socket Heavy Duty w/Sleeve	1" Square	V-25119	A-25119		





Pivot Components

The pivot of a trailing arm air ride 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 removal/installation tool and bushing kit, containing the required components for re-bushing. Contact Cush for information regarding the tool 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 prior to exhausting the air
- Exhaust all air from the air suspension system
- Loosen and remove shock connection and chain restraint
- Loosen and remove any jam nut
- Loosen and remove pivot nut
- Remove Pivot bolt and alignment gears
- Disassemble any other parts that interfere with lowering the trailing arm/axle assembly out of the suspension hangers
- Using a hydraulic jack or other lifting device, lower pivot end of trailing arm/axle from inside hanger. (Yoke suspensions will need to be pulled out from trailer frame)

Bushing Replacement (Frame Hanger style):



- 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

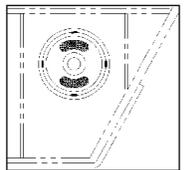
Warranty Labor Allowance 5.0 (hours/axle)

(See the troubleshooting guide for more information on pivot connection issues)

Bushing Replacement (Frame Yoke style):



- After removing the yoke style trailing arm/axle from the bushing frame area, record how much offset each bushing side is to the trailer frame outer bushing metal sleeve
- The Yoke style bushing can be replaced with the bushing tool but it is usually easier to replace the inner bushing and metal sleeve housing by removing the small welds that connect the inner bushing housing to the frame sleeve housing suspension drawing.
- Grind or torch the welds of the inner to outer housing without damaging the outer frame housing tube. Remove old bushing and metal housing from trailer frame and clean the outer frame housing tube for reuse.
- Inspect trailer frame flange for damage.
- Use Cush bushing replacement kit shown on parts explosion for your suspension, or contact Cush Corp for cross-reference.



Reassembling pivot connection (Frame Yoke style):

- Insert new bushing with metal sleeve and orient voids in bushing within 5 degrees, (plus or minus) of “vertical” position compared to the trailer frame.
- See and mark bushing housing for vertical inspection, once washers cover voids orientation can not be seen. (*Cush marks bushing front with notch*)
- Position wear washers over the outside diameter of the bushing inner tube
- Install the flanged insert spacers in the inner diameter of the bushing inner tube, both sides
- Place a pivot bolt through the partial assembly
- Hand tighten a non-locking nut to hold the position of all loose items
- Adjust the new bushing with sleeve in trailer frame sleeve per recorded information so you can get the yoke beams and axle assembly started onto the bushings flanged spacers. (*Do not weld until after axle assembly is centered*)
- Using a hydraulic jack or other lifting device, raise pivot end of yoke trailing arm until flanges of flanged inserts enter the inside of the yoke suspension beam
- 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 yoke beam

- Place adjustment gear on pivot bolt per suspension drawing (Always use new fastener hardware)
- Re-insert pivot bolt through side of 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 yoke beam, engaging all teeth of the alignment gear as shown in Figure 1 (Note: one gear tooth outside of 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 and snug nut/bolt assembly.
- Axle assembly with yoke beams need to be centered on trailer frame and aligned with other trailer tires outside position.
- Once axle has been positioned side to side on trailer frame, recheck that bushing voids are in vertical position and weld bushing inner metal sleeve to trailer frame bushing housing sleeve with ½” min welds 4 places around both sides of sleeve each.
- Do not worry about minor melting of plastic wear washer, do not catch washer or bushing on fire.
- Stagger the sequence of welding as to allow adequate cooling between welds to prevent excessive heating of the bushing.
- Align axle with relation to the kingpin as shown in Figure 2 (see Axle Alignment)
- Reinstall any shock absorbers and chain restraints
- Torque all the fasteners to Cush specification

Warranty Labor Allowance__5.0 (hours/axle)

(See the troubleshooting guide for more information on pivot connection issues)

Pivot Wear Washer



The pivot wear washer is used to prevent metal-to-metal contact of the suspension beam and the inside of the hanger. These wear washers can cup and misshape and still function. At the point the wear washer is worn thru, they should be replaced to prolong the life of the suspension.

To replace wear washers:

- Contact your trailer manufacturer or Cush Corp for replacement parts or cross-reference
- 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 damaging hanger wear
- Remove the flanged inserts from the inner diameter of the bushing tube
- Remove the old wear washers
- Check for any damaging beam, hanger, or insert wear
- Insert the new wear washers and appropriate flanged inserts
- Place a pivot bolt through the partial assembly

- Hand tighten a standard hex nut to hold the position of all loose items
- Raise the axle/beam assembly and reassemble the pivot connection, use new pivot bolts & nuts
- 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

Warranty Labor Allowance__2.0 (hours/axle)

(See the troubleshooting guide for more information on wear washer issues)

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 (Welded type)

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

Warranty Labor Allowance__4.0 (hours each or 6.0 hours/axle)

(See the troubleshooting guide for more information on frame hanger issues)



Suspension Frame Hanger (Bolt-on type)

To replace a bolted 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
- Unbolt the frame hanger and discard the used fasteners
- Inspect trailer frame for damage
- Use new mounting hardware, grade 8, and torque bolts to trailer mfg specification
- Mount new hanger component to trailer frame
- Raise the axle/beam assembly to the hanger and reinstall beam
- Bolt hanger to frame per Cush Corp installation drawing
- Reassemble any other parts that were disassembled to lower axle/beam assembly
- Move the alignment gears to the nominal notch position and snug up hanger bolt
- Align axle with relation to the kingpin as shown in Figure 2 (see Axle Alignment)
- Torque all the fasteners to specification

Warranty Labor Allowance__3.0 (hours each or 5.0 hours/axle)

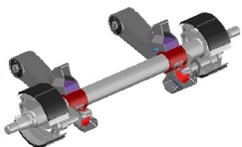
(See the troubleshooting guide for more information on frame hanger issues)

Suspension Trailing Arms & Axle (H-Beam)

Cush manufactures various trailing arms 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. Contact Cush to see if it is required to replace the trailing arm or the H-Beam of the suspension, please follow the guidelines below as a minimum safety procedure when repairing these items.

Suspension H-Beam

To replace the suspension H-Beam (Beam-only axle replacement with a pair of trailing arms):



- Contact your trailer manufacture or Cush Corp for replacement parts and installation drawings
- 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
- Remove the Brake chambers, leave the air lines attached
- Remove the Slack adjusters and mounting hardware, shims and pins
- Remove the ABS valves and sensor wiring from the H-Beam
- Remove the air spring connections to the H-beam
- Remove the shocks and mounting hardware from H-Beam
- Remove the Height control valve connection to the H-Beam

- Disassemble the pivot connection and any other parts that interfere with removing the H-Beam assembly from the suspension hangers and from the trailer frame
- Lower the axle beam assembly or lift the trailer to drop the H-Beam
- Check for any damaged hanger wear
- Remove the axle assembly from under the trailer
- Remove the tires, wheels and proceed to strip axle
- Remove the wheel nuts, drums, spindle nut, and hubs from the axle
- Remove bearings and seals from the axle
- Remove the brake lining shoes and springs from the axle
- Remove the bushing inserts and wear washers from bushing, reuse if necessary
- Install the new H-Beam assembly from Cush Corp
- Reinstall the axle components and then roll the axle assembly under the trailer
- Raise the H-Beam, lower the trailer to working height, and reassemble the pivot connection
- Hook up all air lines and check for leaks
- Reassemble any other parts that were disassembled to lower axle/beam assembly
- Move the alignment gears to the nominal notch position and snug up hanger bolt
- Align axle with relation to the kingpin as shown in Figure 2 (see Axle Alignment)
- Torque all the fasteners to specification
- Package the damaged H-Beam assembly for shipment to Cush Corp, contact Cush for pick up

Warranty Labor Allowance__8.0 (hours/H-Beam)



Original Equipment Manufacturer's Warranty Reference WLA

Warranty for the following non-exclusive list of parts, (if supplied by Cush), will default to the Manufacturer's Warranty, and no labor to repair or replace these parts unless allowed. If damage to these parts is caused by a defect from a Cush Corp product then use these WLA as a guide when filing an approved warranty claim.

Ride Height Control Valve



The ride height control valve (HCV) is used to carry and cushion the load of an air spring suspension. Without an HCV in place damage can occur to the suspension or trailer. If damaged, HCV are a replaceable item and when maintained can extend the life of your air suspension and trailer. The HCV should maintain equal air spring heights for a set of grouped suspensions that are the same to maintain equal load carrying. When the suspension is lowered from loading the HCV lever arm moves up and adds air to the suspension air springs. When the suspension is raised from unloading the HCV lever arm moves down and removes air from the suspension air springs in order to bring the arm back to neutral position. The HCV is covered under the original OEM of the valve and this procedure is given as a guide only.

To replace a Height Control Valve:

- Contact your trailer manufacturer or Cush Corp for replacement parts or cross-reference
 - Support the trailer in a safe manner at a working height prior to exhausting the air
 - Exhaust all air from the air suspension system
 - Disconnect the air fittings from the HCV
 - Remove the mounting hardware from the HCV and remove the HCV
 - Insert the new HVC and appropriate mounting hardware
 - Torque the fasteners to specification
 - Reconnect the air fittings and air lines to the HCV
 - Supply air to the suspension system
 - Check for air leaks with soapy water
 - Set the trailer at ride height by adjusting the HCV to allow air in or out
 - Pin the HCV handle (horizontal arm) thru the hole to the HCV and adjust the vertical linkage
 - Mount the vertical linkage bottom pin in place to the closest hole when using a fixed vertical link
 - Mount the vertical linkage bottom pin in place and adjust the link in the p-grommet and clamp the grommet collar in place when set with the handle pinned to the HCV center position
 - Caution – Remove HCV centering pin otherwise damage to HCV could occur
- Reference Warranty Labor Allowance__1.0 (hours each-Contact Original Manufacturer)



(Barksdale Height Control Valve Installation)

Physical Description

The Barksdale Height Control Valve (HCV) is a three-mode valve used to control the height of a vehicle by directing air to the air spring suspension. The main physical features of the valve are the following; (2) delivery ports*, (1) Exhaust port, (1) inlet/supply port, (1) Height Control Handle, and (2) ¼" Mounting Studs.

(* All ports are ¼" NPT, the (2) delivery ports are clearly marked, "C1" and "C2" on the back of the valve.)

Modes of Operation

The three modes of operation of the HCV are as follows;

1. Fill Mode
2. Exhaust Mode
3. Dead Band Mode

When the vehicle suspension is at the factory set ride height, the valve will be in Dead Band Mode. In Dead Band Mode, the Valve will not allow air to flow in or out of the air bags. As the vehicle becomes laden, the suspension will settle, causing the handle of the valve to rotate upwards. The valve will now enter Fill Mode, allowing air to enter the air bags, causing the vehicle to rise. As the vehicle approaches factory set ride height, the valve will once again enter Dead Band Mode. Similarly, if the bus is unloaded, the suspension will rise causing the control handle of the valve to rotate downward. When the handle rotates downward, the valve enters exhaust mode, thereby letting air out of the air bags, causing the vehicle to lower until Dead Band Mode is reached again at the factory set ride height.

Installation

Attach all fittings to valve before mounting to vehicle. Thread sealant must be applied to all fittings, which are tightened by hand until firm, at which point a wrench should be used to tighten additional 1- 1 ½ turns.

Recommended proper orientation for the valve handle for installation is when the valve handle is in line with the "C1" port.

Mount the Valve to a bracket using the ¼" studs. Do not fully tighten nuts at this time, to allow fine-tune adjustment of ride height. Attach Air Supply line to the port at the top of the valve. Attach the air bag air lines to the "C1" and "C2" ports.

Set-Up

1. Adjust approximate ride height by turning the valve handle up toward the air supply line to add air to the bags to raise the vehicle above the ride height, down to exhaust air from the air bags to adjust to approximate ride height. Then put the handle in the horizontal position.
2. Install wood Centering Pin in hole provided in valve handle.
3. Connect linkage from suspension mount to valve handle and tighten linkage.
4. Adjust to final factory recommended ride height by rotating the valve assembly on the bracket.
5. Tighten nuts to 45 Inch pounds torque.
6. Remove the centering pin.



Warranty Labor Allowances (hours each)

Air reservoir__1.0

Brake chamber__0.8

Brake hose (relay valve to brake chamber)__0.5

Quick release valve__1.0

Height control valve__1.0

Includes:

- Removal and installation of height control valve and the linkage
- Ride height adjustment at linkage

Height control valve linkage__0.5

Solenoid valve__1.0

Air pilot valve__1.0

Brake protection valve__1.0

Flipper valve__1.0

Hand control valve__1.0

Manual exhaust valve__1.0

ABS wheel sensor (one)__1.0 *

Includes:

- Removal and installation of:
 - Tire and wheel assembly
 - Brake drum

Adjust ABS wheel sensors (up to four)__0.5 *

ABS relay valve__1.0 *

ABS modulator valve__1.1 *

ABS electronic control unit (ECU)__1.1 *

Slack adjuster__0.7

Brake camshaft

(Does not require hub removal)__1.2

Includes:

- Removal and installation of:
 - Tire/wheel assembly
 - Slack adjuster
- Brake adjustment

Brake cam tube assembly

(Does not require wheel, drum, or hub removal)__1.0

Includes:

- Removal and installation of:
 - Cam tube weld/re-weld
 - Slack adjuster
- Brake adjustment



Wheel end (tire and wheel removal and installation)

Inner wheel seal__1.0

Hub__1.4

Wheel studs (up to three)__1.7

Hub cap/gasket__0.5

* Includes troubleshooting

Troubleshooting Guide

P1203-01 Appendix A (Contact Cush): Use this guide to review possible suspension maintenance and service issues, possible causes of issues, and possible solutions. Contact Cush Corp before cutting or welding on any suspension components that could void your warranty.

Service Parts Cross-reference Guide

P1203-01 Appendix B (Contact Cush): Use this guide to review possible Cush suspension service parts cross-referenced to competitive part numbers that might be more readily available to you.

Specific Service Bulletin Literature

P1203-01 Appendix C (Contact Cush): If deemed necessary by Cush Corp we will publish a service bulletin specific to a certain suspension application issue. Contact Cush Corp to see if there is a service bulletin that might help with your specific service situation.

Cush Suspension Parts Explosion Drawings

Drawings may vary per your application (Contact Cush for drawings)



P1203-01 Appendix I1

Cush Suspension to Axle Welding Procedures

RECOMMENDED STEEL WELDING PROCEDURES:

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.

NOTE: A welder qualified in 2G position per ANSI/AWS D1.1-94 Section 5 Part C "Welder Qualification" must perform the welding.

NOTE: The specification shown below is for horizontal (2F) positioning.

1) 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 contaminants. (Pre-heat per axle manufacturer)

2) All welds must be performed in a flat, or horizontal, position. Clean welds between each pass.

Standard Wire: AWS ER-70S-6, 0.045"DIA

Volts: 26-30 DCRP

Current: 275-325 AMPS

Gas: 90%AR 10%CO2 at 30 to 35 CFH

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.

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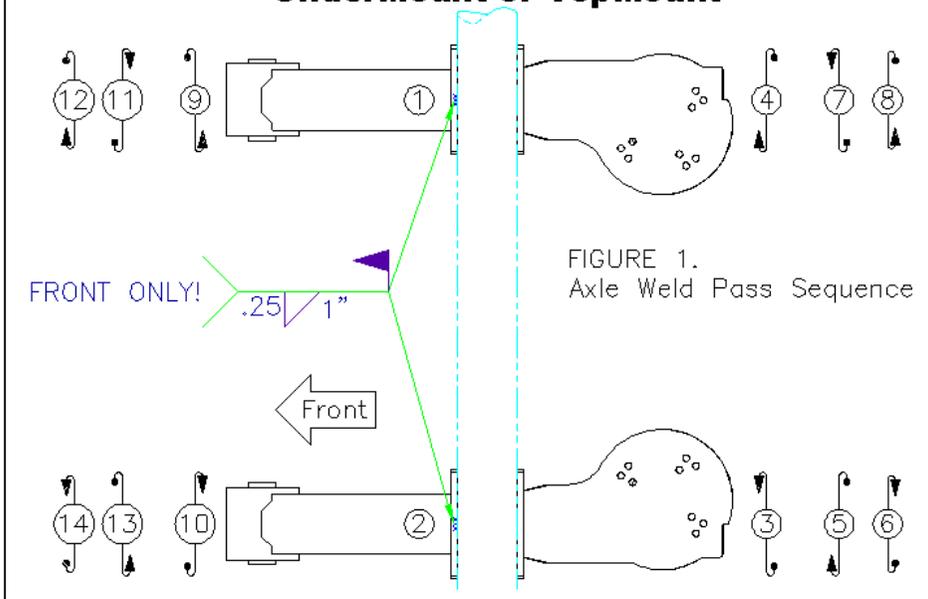
Note: Brake camshaft to be located according to axle manufacturer specifications & suspension/trailer model.

Use locating fixture or flat surface to space suspension beams and center axle. Check that suspension beams are: parallel, square to axle, and perpendicular to axle.

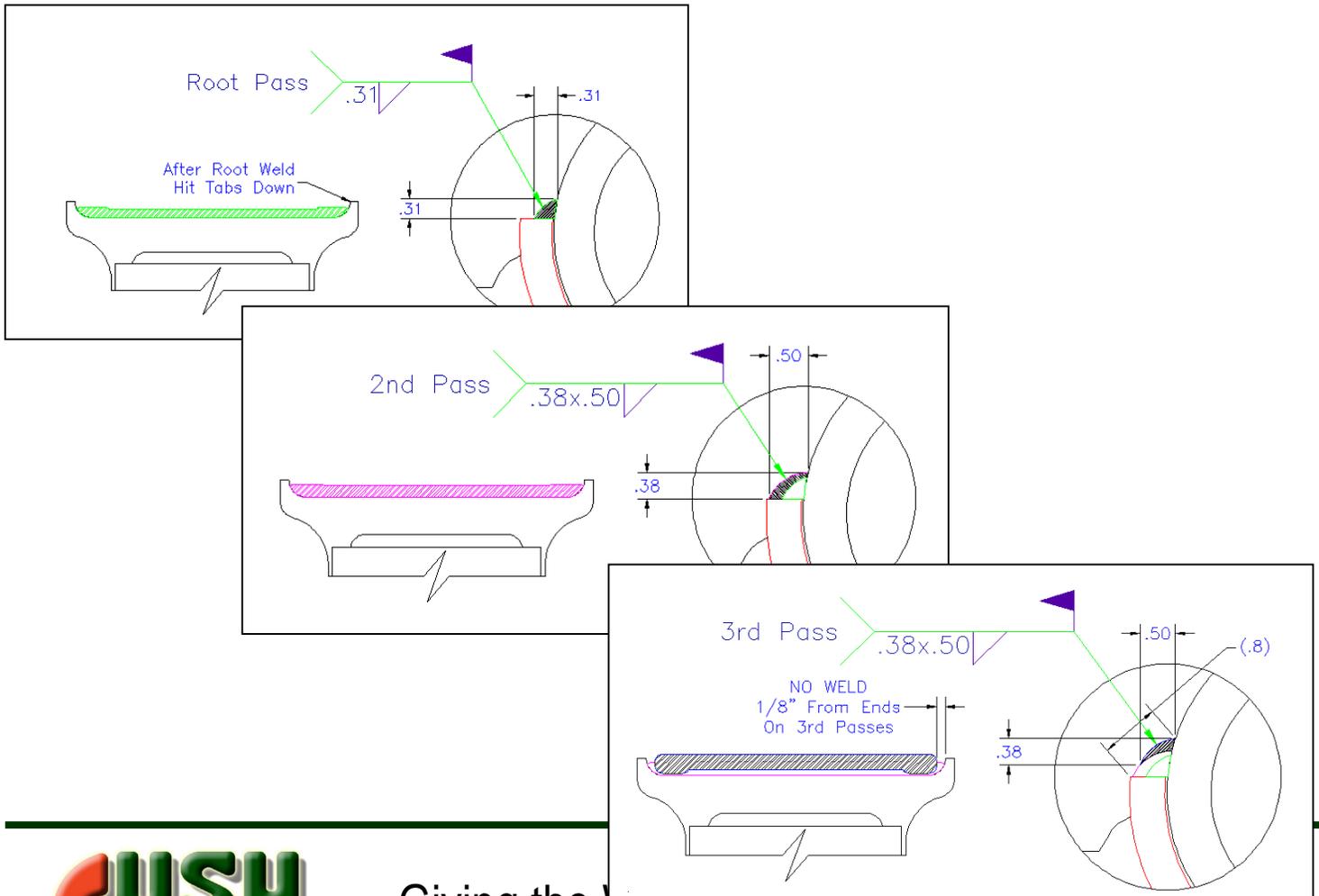
- The suspension axle seat must be tight against the axle with no more that .063" gap at bottom.
- Weld sequence, size, and weld direction should be followed for proper installation.
- Back-weld .75" over the start/ends of all welds
- Fill all craters, avoid cold laps, and undercuts.
- Place 1" tack welds in the center forward of both suspension beams (1-2).
- Position and weld rear root pass (3-4)
- After root weld, hit tabs down for better 2nd pass
- Do not wrap welds over axle seat tabs, no weld .13" from ends on 3rd passes
- Weld rear 2nd & 3rd cover pass (5/6-7/8)
- Position & weld front root pass (9-10)
- Weld front 2nd & 3rd cover pass (11/12-13/14)
- Optional, extra durability can be achieved by Hammer Peenning after welding, use a 1/8" hardened ball end on weld and area.



**Cush Suspension to Axle
3 Pass Weld Sequence
UnderMount or TopMount**

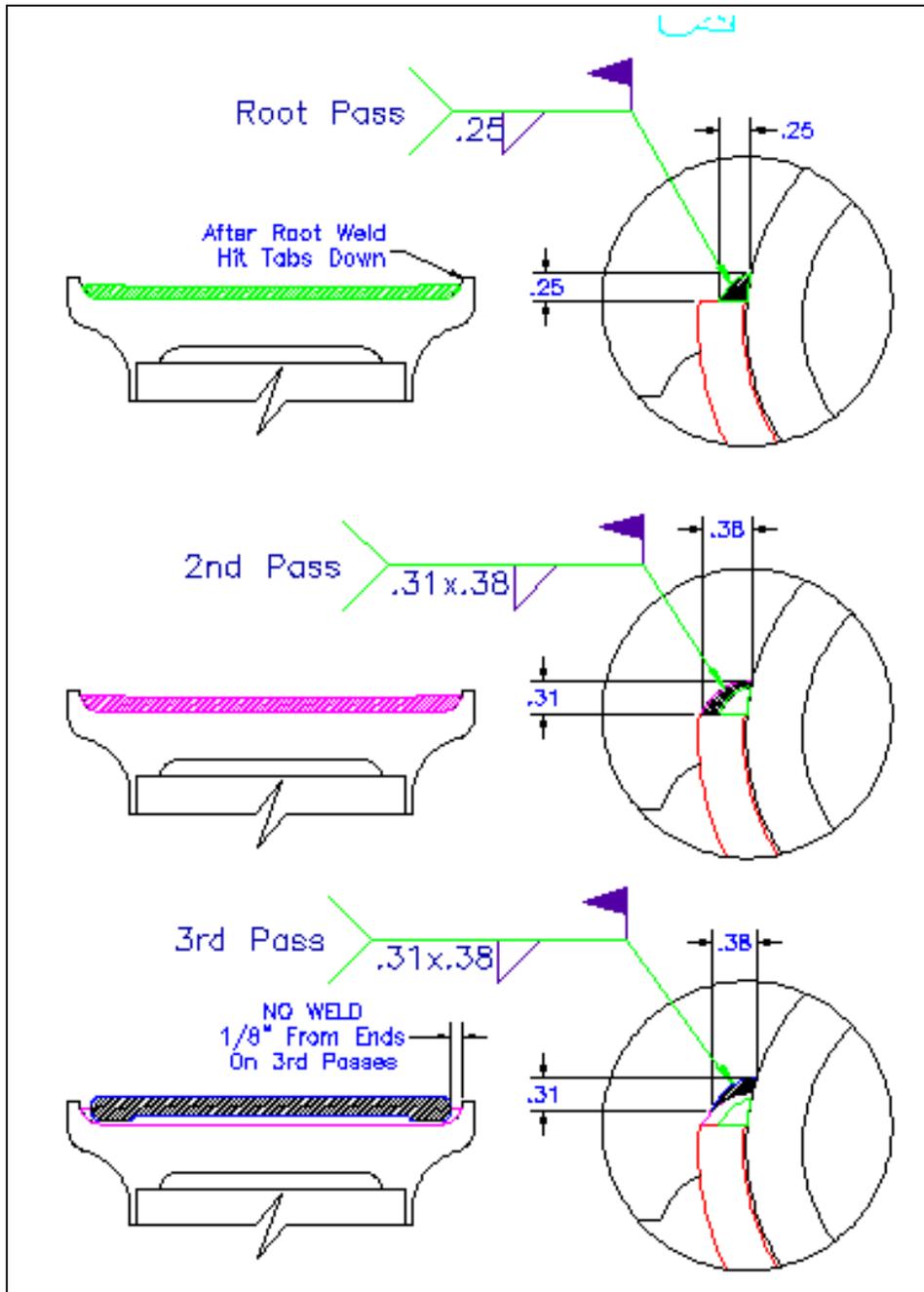


**Axle Welding Procedure A0001-2 (1/2" Weld Seat)
For 10,000# to 30,000# Axle Capacities**



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Axle Welding Procedure A0003-1 (3/8" Weld)
For 6000# to 10,000# Axle Capacities



CUSH SUSPENSIONS SYSTEMS – SERVICE MANUAL

Aftermarket Parts Cross-Reference Guide (P1203-1 Appendix B)						
Updated: 3/2/2007						
Cross-Reference Per Vendor	Cush	Vendor	Alt Vendor #1	Alt Vendor #2	Hendrickson	Ridewell Corp
Shock Absorbers						
	C0062	Monroe(STD): 65416	Monroe(HD): 70720	Gabriel: 85000	B-23566 (STD) / A-20002	1270563B000 (STD)
	C0078	Monroe(HD): OE11494, 65493	Monroe(HD): 65493, 70720	C0062	B-24023(HD) / B-24125 (ExtServ)	1270563B003 (HD)
	C0088	Monroe: 65421	Gabriel: 85030			
	C0226	Monroe:	Gabriel: 85064		B-23649 (STD)	
	C0127	Monroe: 65427	Gabriel: 85903			
	C0227	Monroe: 66886	Gabriel: 85014		A-2160	
	C0228	Monroe: 65110	Gabriel: 85005		A-4084	
Air Springs		Goodyear Air Spring	Conti Air Spring			
	C0060	Goodyear: 1R12-467	Conti: 9-10-19.5 A801	Firestone: W01-358-9580 (*M)	S20127 (*M)	1000001
	C0079	Goodyear: 1R12-494	Conti: 9-10-17.5 A 802	Firestone: n/a		1000003
	C0096	Goodyear: 1R12-256				
	C0097	Goodyear: 1R12-580				
	C0064	Goodyear: 1R14-171	Conti: 11 10.5A-16 P523	Firestone: W01-358-8091	S-21784 (C-20901)	1000156
	C0216	Goodyear: 1R14-151				1000006
	C0073	Goodyear: 2B12-440	Conti: (*M) FD-331-26 480	Firestone: W01-358-7550		
	C0080	Goodyear: 2B9-251	Conti: FD 200-25 429	Firestone: W01-358-6948		1003586948C
	C0083	Goodyear: 2B14-365	Conti: FD 530-35-545	Firestone: W01-358-6801	S-2734 (Replaces #7136, S-1080)	1003586801C
	C0164	Goodyear: 2B14-366	Conti: FD 530-30-449			



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