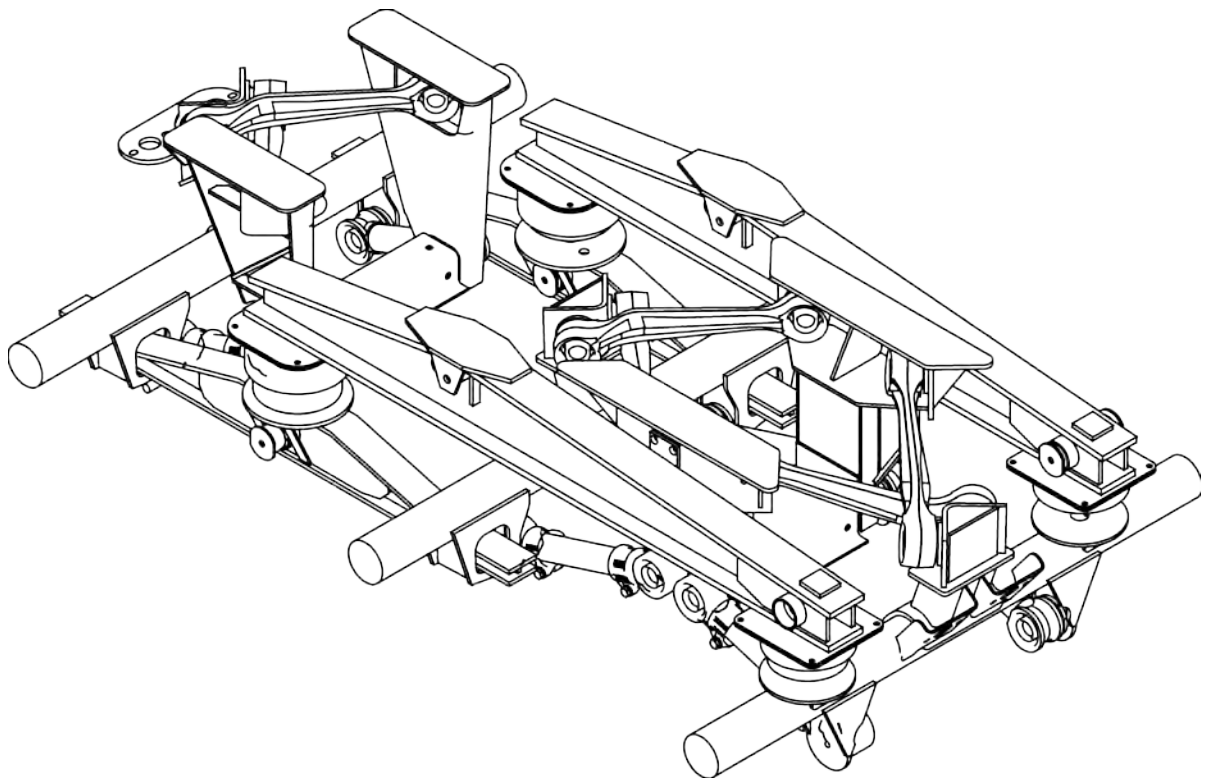




# 1100 Series Trailer Tri-Axle Suspension Service Manual





# Contents

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	<b>Page No.</b>
<b>1.0 GENERAL INFORMATION</b>	<b>1</b>
<b>2.0 INTRODUCTION TO THE SUSPENSION</b>	<b>2</b>
2.1 SUSPENSION PART NAMES	3
<b>3.0 SERVICE – INSPECTION REQUIREMENTS</b>	<b>4</b>
<b>4.0 INSPECTION /REPLACEMENT OF SERVICE PARTS.</b>	<b>5</b>
4.1 FASTENERS.	6
4.2 TORQUE ROD BUSHING INSPECTION	7
4.3 TORQUE ROD BUSHING REPLACEMENT	8
4.4 RESTRICTOR CAN INSPECTION	11
4.5 RESTRICTOR CAN & SPRING REPLACEMENT	12
4.6 SPIGOT CAP INSPECTION	15
4.7 SPIGOT CAP REPLACEMENT	15
4.8 TANDEM BEAM INSPECTION.	16
4.9 TANDEM BEAM REPAIR/REPLACEMENT	17
4.10 RUBBER SPRING INSPECTION	18
4.11 EQUALIZER BEAM REMOVAL	19
<b>5.0 AXLE ALIGNMENT.</b>	<b>22</b>
5.1 AXLE MEASUREMENT	22
5.2 AXLE ALIGNMENT ADJUSTMENTS	24
<b>6.0 TROUBLE SHOOTING.</b>	<b>25</b>
APPENDIX “A” TSB 20170817 WEAR PLATE INSTALLATION	27
APPENDIX “B” Technical Service Bulletin #8905	30



## 1.0 GENERAL INFORMATION

This manual is to be used for the service of a Chalmers 1100 Series Tri-axle Suspension and is intended to give guidance and recommendation for the care, maintenance, inspection and safe operation of the above suspension. It is not a replacement for existing or future specific Pre-Delivery Inspection (P.D.I.) & Preventative Maintenance Programs.

Before proceeding with any work on or with the suspension, please read this manual completely to familiarize yourself with the maintenance and operation of the Chalmers Suspension.

TAKE SPECIAL NOTICE of procedures 1.1 through 1.6 that must be followed without exception when working on any procedures described in this manual.

- 1.1 ALL CHALMERS FASTENERS must be torqued to the specific values shown in Table 2 and to the specific period shown on the Service Inspection Requirements Section 3.0.

**\*\*IMPORTANT** Failure to check torque, may lead to fastener failure and consequent loss of trailer control and void warranty.

- 1.2 DO NOT USE ANY mineral based oils, greases, jellies, or solvent soaps as a lubricant to aid in the assembly of the rubber bushed torque rods. Use only quality rubber lubricants. Failure to do so will void warranty.
- 1.3 DO NOT AT ANY TIME WORK AROUND OR UNDER A VEHICLE SUPPORTED ONLY ON LIFTING DEVICES. THE VEHICLE MUST BE SECURELY CHOCKED AND SUPPORTED ON RIGID STANDS BEFORE WORK MAY COMMENCE.
- 1.4 ALL RELEVANT, MACHINERY, TOOL AND WORK PLACE SAFETY procedures and instructions must be followed without exception when working on any procedures described in this manual.

**FAILURE TO ADHERE TO ANY SAFETY PROCEDURES OR INSTRUCTIONS, MAY LEAD TO PERSONAL INJURY.**

- 1.5 USE ONLY CHALMERS APPROVED REPLACEMENT PARTS. Tests have shown alternate parts, particularly torque rod bushings & springs, do not meet the performance expectations or engineering criteria established for the original products. This has created extreme hard part wear or hardware failures with consequent loss of warranty and more important loss of trailer control.
- 1.6 DO NOT operate the trailer with the suspension in an over loaded condition. Operating at a gross rear axle weight (GRAW), which exceeds the rated suspension capacity will lead to a suspension failure with consequent loss of trailer control and void warranty.



## 2.0 INTRODUCTION TO THE SUSPENSION

The Chalmers 1100 Series Rear Suspension is a walking beam-type tri- suspension that uses hollow rubber springs instead of leaf springs or air bags. Each hollow rubber spring is mounted between the equalizing beam and the centre of the steel tandem beam on the 1<sup>st</sup> & 2<sup>nd</sup> axle and on the 3<sup>rd</sup> axle. Hanger bracket assemblies are attached to the frame and provide mounting points for the lower torque rods that tie the axles to the frame. The upper torque rods are fastened to the hanger brackets and to tower assemblies that are welded to the top of the axle. See Fig. 1.

The 1100 Series Rear Suspension allows a high degree of both parallel and diagonal articulation, while maintaining wheel load equalization.

The Chalmers suspension design separates the rear suspension's responsibility for supporting/cushioning the load from that of locating/guiding the axles. The suspension is very light, relative to its load carrying capacity and requires very little maintenance. In fact, there are no lubrication fittings since grease and oil are never needed.

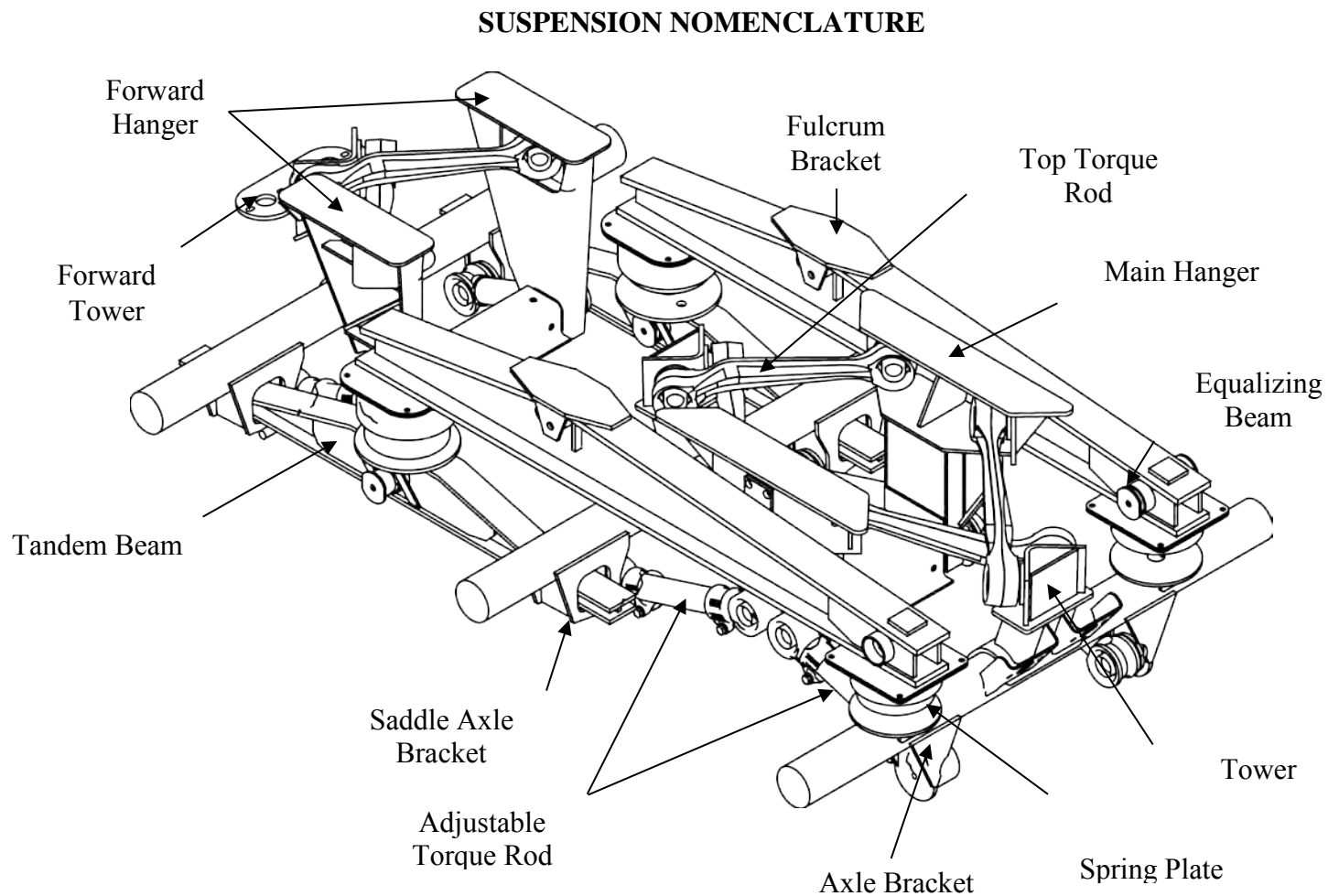
The rear suspension may be precision-aligned by adjusting the length of the lower torque rods. These rods have both left and right hand threads cut on the same tube so rotating the tube changes the effective length of the torque rod.



## 2.1 SUSPENSION PART NAMES

Fig.1 shows an exploded view of a typical 1100 Series Suspension.

Throughout this manual, parts will be referred to by the names shown on this figure.



**FIGURE 1**



### 3.0 SERVICE – INSPECTION REQUIREMENTS

The Chalmers 1100 Series Suspension was designed to require minimum general maintenance. The recommendations shown on the following chart are precautionary and are aimed at avoiding future problems.

PART	ACTION	P.D.I.	1000 Mile 1600 KM	DLY	MTH	YRLY
All Hardware	Check torque to values shown on Table 2.	☺	☺			☺
	On the daily walk around Visually inspect for looseness.			☺		
Torque Rod Bushing	Wear check. Visually inspect for tears or cracks.				☺	
	Visually inspect for correct installation.	☺	☺			
Restrictor Can	Visually inspect for wear or cracking. Replace as required.	☺			☺	
	Visually inspect for missing cans, and cans not centered on spring.	☺			☺	
Spigot Cap	On the daily walk around visually inspect for missing, cracked, broken or loose caps. Replace as required or re-torque.	☺	☺	☺		
Tandem Beam	Inspect for wear and cracks.	☺	☺			☺
	Inspect Beam bearing points					☺
Axle Bracket, Frame Hangers	Visually inspect for road damage or cracks. Replace any damaged parts as required. Contact Chalmers for guidelines.		☺			☺
Rubber Spring	Visually inspect for chemical damage, deep tears and deformed springs. Replace as required.				☺	

#### NOTICE:

The above chart was developed from Chalmers experience on parts subject to wear in normal service. The wear rate is dependent on a number of factors such a load carried, speed travelled, roadbed conditions, traffic density and number of stops.

#### NOTE:

IF THE OPERATOR OF THE VEHICLE IS IN ANY DOUBT ABOUT THE SAFETY OF THE SUSPENSION, HE SHOULD NOT OPERATE THE VEHICLE AND SHOULD IMMEDIATELY SEEK QUALIFIED ADVICE.



#### **4.0 GUIDELINES TO THE INSPECTION AND REPLACEMENT OF SERVICE PARTS**

Recommended tools needed to carry out the work covered in Section 4.

##### **TOOL LIST**

Open End Wrench: 9/16", 3/4", 15/16", 1-1/8", 1-5/16"

Box Wrench (Offset Preferred): 9/16", 3/4", 15/16", 1-1/8", 1-5/16".

Standard Socket (1/2" Drive): 9/16", 3/4", 15/16", 1-1/8", 1-5/16".

Extra Deep Socket (1/2" Drive): 15/16".

Impact Socket (1/2" Drive): 9/16", 3/4", 15/16", 1-1/8", 1-5/16".

Extra Deep Impact Socket (1/2" Drive): 15/16".

Torque Wrench (1/2" Drive): 25 – 250 Ft. Lbs. (CALIBRATED)

##### **GENERAL TOOLS**

Socket Drive Ratchet (1/2" Drive)

Heavy Mallet (Rubber, Copper or Hide)

2 lbs. Copper/Hide Hammer

Large (12" Long Min.) Square Blade Screwdriver

Pinch or Wrecking Bar (3/4" size)

Tape Measure (16 ft.)

Vernier Caliper (6.0" Reading .001")

Impact Wrench (1/2" Drive)

Bottle Jack (5 ton)

Wheel Chocks

Various Wooden Blocks

##### **LUBRICANTS**

Rubber Lubricant: Rimslip or equivalent - **Important – Do not use oil or grease.**



#### 4.1 FASTENERS

This guideline is to be used for the inspection or replacement of Chalmers supplied fasteners **ONLY**. The fastener systems used in a Chalmers suspension are the key to the care and safe operation of the suspension.

These systems comprise of an SAE GR.8 flanged head bolt and SAE GR.G flanged head “Stover” locknut. The sizes of these systems have been specifically engineered for each of their positions and functions within the suspension. See the following Table 1 for size and function.

**TABLE 1**

SIZE	FUNCTIONS
5/8” Dia.	ALL Torque Rod Joints, Torque Rod Eye Pinch Bolts Rebound Chain Hardware
1/2" Dia.	Restrictor Cans

For the safety and proper operation of the suspensions **ALL FASTENERS MUST**, using a calibrated torque wrench, be initially torqued and retorqued at 1000 miles/1600 km of service, to the specific values shown on Table 2.

**TABLE 2 Torque Specifications**  
**For Bolts and Locknuts provided by Chalmers**

BOLT SIZE	ASSEMBLY TORQUE FT. LBS.
3/8”	35-40
1/2"	65-75
5/8”	135-145
3/4”	175-200
1”	445-495

The above torques are recommended for Chalmers-supplied hardware only, and are **NOT** intended for hardware supplied by others.

**NOTE:** Re-torque must be done to both original and replacement fasteners.

**IMPORTANT:** For fastener replacement use **ONLY NEW CHALMERS** approved fasteners. **DO NOT RE-USE or use other fasteners.** To do so may lead to fastener failure and consequent loss of trailer control.

**IMPORTANT:** **FAILURE TO CHECK TORQUE MAY LEAD TO FASTENER FAILURE AND CONSEQUENT LOSS OF VEHICLE CONTROL.**





## 4.2 TORQUE ROD BUSHING INSPECTION.

All 1100 Series Suspensions incorporate rubber bushed torque rod joints that isolate the trailer from axle braking and driving shocks. Bushings absorb axle shock by compression. This compression may give a false impression of a worn bushing. To reduce the chances of prematurely replacing a good bushing, the following steps should be used when inspecting all Chalmers bushings:

**STEP 1** If possible power wash the torque rod ends. As a minimum, the ends should be brushed with a hard bristle brush to remove road dirt accumulations so that the rubber bushing may be seen.

**STEP 2** Chock the front tires to prevent the trailer from moving. Remove all axle brake or wind up loads by placing transmission in neutral, releasing spring brakes, or driveline brake.

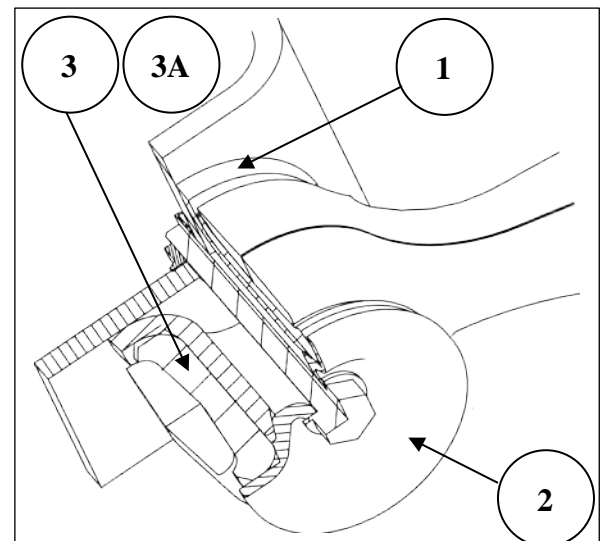
**STEP 3 USING HANDS ONLY** attempt to move the torque rod ends, checking for **FREE** play. If free play is felt, the bushing should be replaced. (If in doubt contact Chalmers)

**NOTE: DO NOT USE A PRY BAR OR LEVER** to check for free play. To do so may lead to premature bushing replacement.

### SPIGOT JOINT

Item	Part No.	Description
1	800021	Spigot Base #2 Joint
2	800055	Spigot Cap #2 Joint
3	800010	T/Rod Bushing #2 Joint
* 3A	800009	T/Rod Bushing-Oversize #2 Joint

\* Service Bushing



**FIGURE 2**  
NUMBER "2" JOINT ASSEMBLY



### 4.3 TORQUE ROD BUSHING REPLACEMENT

Replacement of Chalmers Torque Rod Bushings may be achieved easily and quickly in any shop without the use of a press or special tools, using the following steps as a guide.

STEP 1 If possible power wash the torque rod ends, as a minimum, the ends should be brushed with a hard bristle brush to remove road dirt accumulations.

STEP 2 Chock the front tires to prevent the trailer from moving. Remove all axle brake or wind up loads by placing transmission in neutral and releasing the spring or driveline brakes.

STEP 3 Lift the rear of the trailer. Support the frame on stands so all weight is just taken off the suspension.

NOTE: All stands and lifting devices **MUST** be of sufficient strength and rigidity to safely support the trailer. **DO NOT WORK AROUND OR UNDER THE VEHICLE WHEN SUPPORTED ON LIFTING DEVICES.**

STEP 4 Work on only one torque rod at a time. Remove the 5/8" NC joint fasteners and spigot caps. Discard the fasteners, keep the spigot caps for inspection and cleaning. Remove the torque rod from the spigots by prying at each end until it comes free of the spigots.

NOTE: By completely removing and re-fitting only one torque rod at a time the chance of torque rod mix-up, which could lead to re-alignment of the suspension, will be eliminated.

STEP 5 Place the torque rod on a bench or the floor with the bushing end facing up. Remove the bushings by inserting the tip of a large screwdriver down between the bushing and the torque rod eye and prying out. Discard the bushing.

STEP 6 Using a wire brush and/or scraper clean all rust, scale and rubber accumulations from the spigots, torque rod eyes and spigot cap, taking particular care to clean the inside taper of the spigots.

STEP 7 Inspect the torque rod eyes, spigots and spigot caps for visual cracks and wear.

Should any of the following parts show visual cracks, the part **MUST** be discarded and replaced:

Torque Rod and Eye  
Spigot Cap

Should the spigot show visual cracks, contact Chalmers for guidelines.

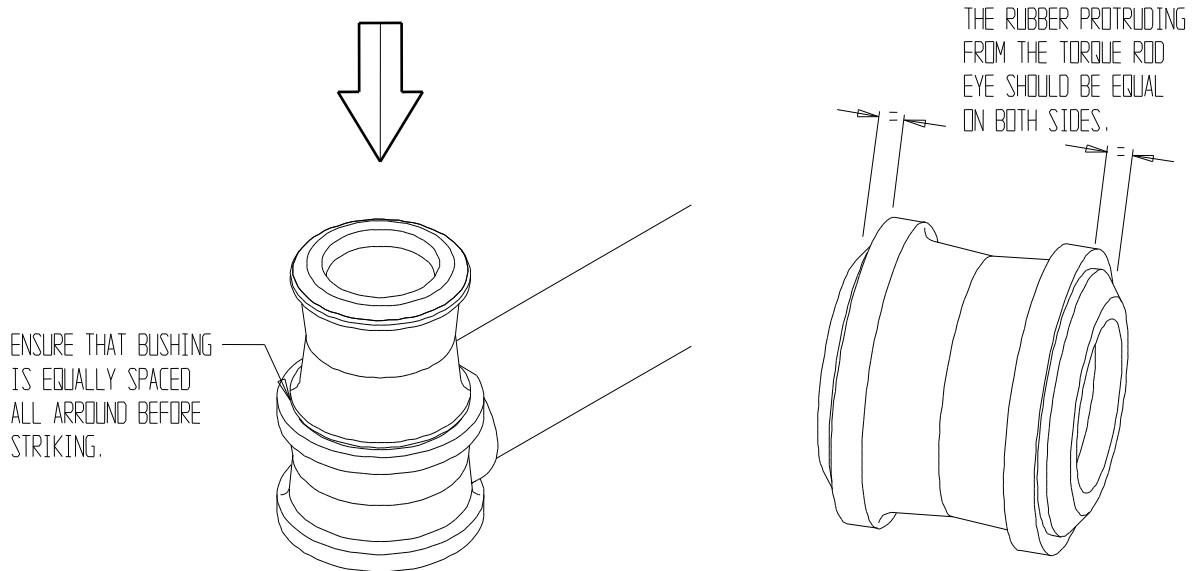
For wear limits, refer to Table 6. Chalmers allows for wear in its design by providing oversize replacement bushings. Refer to Table 6 for when to use.

STEP 8 Liberally lubricate the inside diameter of the torque rod eye, and the outside diameter of the replacement rubber bushing with a quality rubber lubricant such as Rimslip or equivalent.



**IMPORTANT:** Never use any mineral based oils, greases, jellies or solvent soaps as a lubricant. To do so will lead to the premature failure of the bushing.

Place the torque rod on a solid level floor with the open eye end up. Place a rubber bushing onto the eye so as the outside tapered end of the bushing just enters the eye. Try to make sure the bushing is as even as possible to the eye. With a heavy, soft-faced mallet, quickly strike the bushing to drive it down into the eye. See Fig. 3.



**FIGURE 3**

**NOTE:** Repeat the above procedure for the 2<sup>nd</sup> bushing. Then, flip the torque rod over 180 degrees. Tap with a mallet to drive the bushings completely through the eyes until they are positioned evenly in the eyes. See Fig. 3.

**STEP 9** Liberally lubricate the torque rod rubber bushings and the relevant spigots with a quality rubber lubricant.

**IMPORTANT:** Never use any mineral based oils, greases, jellies or solvent soaps as a lubricant to aid in the assembly of the rubber bushed torque rods. To do so will lead to the premature failure of the bushing.

**STEP 10** Push each end of the torque rod onto its relevant spigot. Using a heavy soft-faced mallet, drive the torque rod onto the spigots. For best results, alternate end to end driving so as the torque rod bushings travel evenly over the spigots. Continue driving until the bushing contacts the spigot bottom face.

**STEP 11** Press the spigot caps into the ends of the torque rod bushings, secure the ends in place using new 5/8" NC fasteners.

**Torque the 5/8" NC fasteners to 135 ft. lbs. See Table 2.**



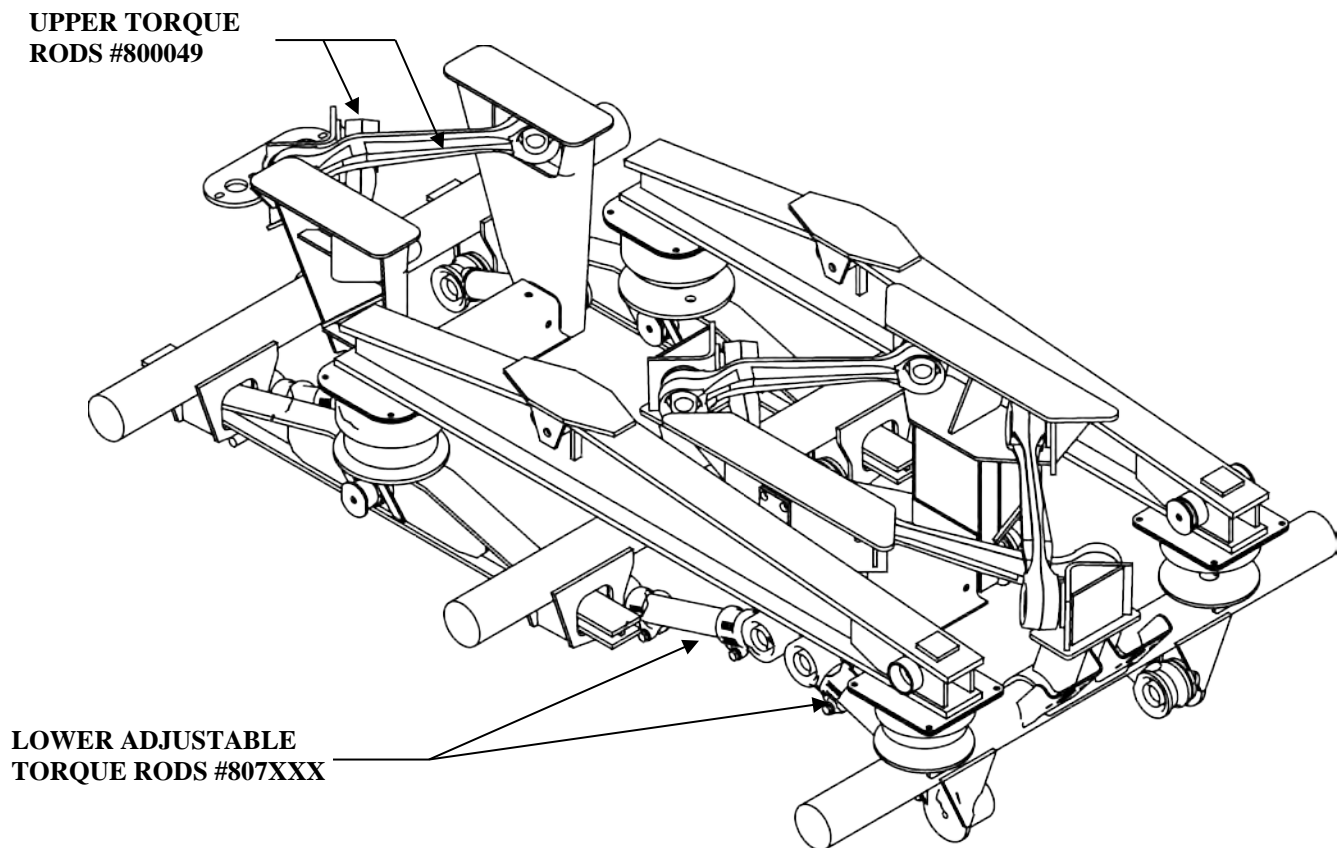
**\*\* IMPORTANT:** Failure to check torque may lead to fastener failure and consequent loss of trailer control and void warranty.

Repeat Steps 1 through 11 for each torque rod to complete the suspension re-bushing.

**IMPORTANT:** USE ONLY NEW CHALMERS approved 5/8" NC fasteners for the joints.  
DO NOT RE-USE or use other fasteners. To do so may lead to fastener failure and consequent loss of trailer control and void warranty.

When finished re-bushing, check to see if the torque rods have been replaced as per Fig. 4.

### TORQUE ROD INSTALLATION



**FIGURE 4**

**90,000 LBS  
CAPACITY  
SUSPENSION**



#### 4.4 RESTRICTOR CAN INSPECTION

The Chalmers spring system comprises of a rubber spring and an enclosing metal restrictor can. The purpose of the restrictor can is to provide specific ride, road handling characteristics and protection to the spring.

The restrictor can will wear or corrode over a period of time and will require replacement. Carefully inspect the restrictor can for cracks or severe corrosion, using the following steps as a guideline:

**STEP 1** If possible, power wash the restrictor can spring area. As a minimum, brush the area with a hard bristle brush to remove road dirt accumulations.

**STEP 2** Chock the tires to prevent the trailer from moving. Lift the trailer, support the frame on stands so that all weight is just taken off the suspension.

**NOTE:** All stands and lifting devices, **MUST** be of sufficient strength and rigidity to safely support the trailer. **DO NOT WORK AROUND OR UNDER THE VEHICLE WHEN SUPPORTED ON LIFTING DEVICES.**

**STEP 3** Remove the bolts holding the restrictor can to the equalizing beam. Rotate the restrictor can completely around, looking at the top and sides for visual cracks and signs of severe corrosion or distortion. If any of these are present, or the restrictor can is missing, it should be replaced. It is recommended that all restrictor cans be replaced to assure evenness of ride and handling.

**NOTE:** Should a cracked or missing restrictor can be found during trailer operation, it may be driven **SLOWLY** to the nearest maintenance shop for replacement.

**ALL CRACKED OR MISSING restrictor cans MUST be replaced.** Failure to do so may lead to loss of trailer control and consequent personal injury.



#### 4.5 A RESTRICTOR CAN & RUBBER SPRING REPLACEMENT (Tandem Beam)

Replacement of Chalmers restrictor cans may be achieved easily and quickly in any shop without the use of special tools, using the following steps as a guide.

**STEP 1** If possible, power wash the restrictor can spring area. As a minimum, brush the area with a hard bristle brush to remove road dirt accumulations.

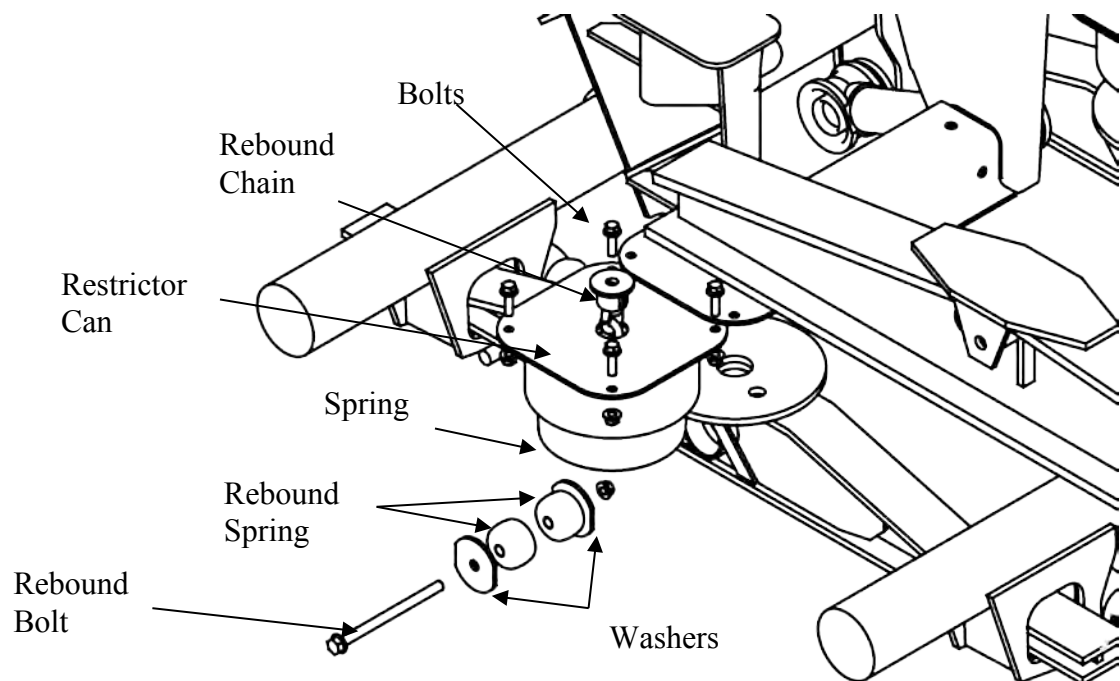
**STEP 2** Chock the tires to prevent the trailer from moving. Lift up the trailer, support the frame on stands so as all weight is just taken off the suspension.

**NOTE:** All stands and lifting devices **MUST** be of sufficient strength and rigidity to safely support the trailer. **DO NOT WORK AROUND OR UNDER THE VEHICLE WHEN SUPPORTED ON LIFTING DEVICES.**

**STEP 3** Remove the four 1/2" NC fasteners holding the restrictor can to the equalizing beam. Discard the fasteners. Remove the 5/8" NC fastener holding the rebound chain/spring.

**NOTE:** It may be necessary to remove tires to allow spring assembly removal.

**STEP 4** Pull the spring, restrictor can & rebound chain as one assembly outward off the beam. See Fig. 5A.



**FIGURE 5A**

**STEP 5** Separate the restrictor can, spring and rebound chain. Discard the restrictor can. Using a wire brush or scraper, remove rust and road accumulations from the rebound chain.



Clean out the centre vent holes in the beam. See Fig. 5A. Inspect the rebound chain for visual cracks. If cracked, replace. Contact Chalmers for details.

STEP 6 If reusing the spring, Turn the spring upside down so as the old top is now down. Place in the new restrictor. Insert the rebound chain. See Fig. 5A.

STEP 7 Lift and place as one assembly, the rebound chain, spring and restrictor can onto the beam. Line up the rebound chain to line up with the 5/8" fastener and rebound springs.

STEP 8 Install and tighten the new 1/2" NC restrictor can fasteners. **Torque to 65 ft. lbs.** See Table 2.

STEP 9 Tighten the 5/8" rebound fasteners allowing only 4 – 5 threads to be exposed. Do not over tighten.

STEP 10 Before removing trailer from stands, check both restrictor cans for an even gap around the spring. Adjust if required.

#### **4.5 B RESTRICTOR CAN & RUBBER SPRING REPLACEMENT (Rear Axle)**

Replacement of Chalmers restrictor cans may be achieved easily and quickly in any shop without the use of special tools, using the following steps as a guide.

STEP 1 If possible, power wash the restrictor can spring area. As a minimum, brush the area with a hard bristle brush to remove road dirt accumulations.

STEP 2 Chock the tires to prevent the trailer from moving. Lift up the trailer, support the frame on stands so as all weight is just taken off the suspension.

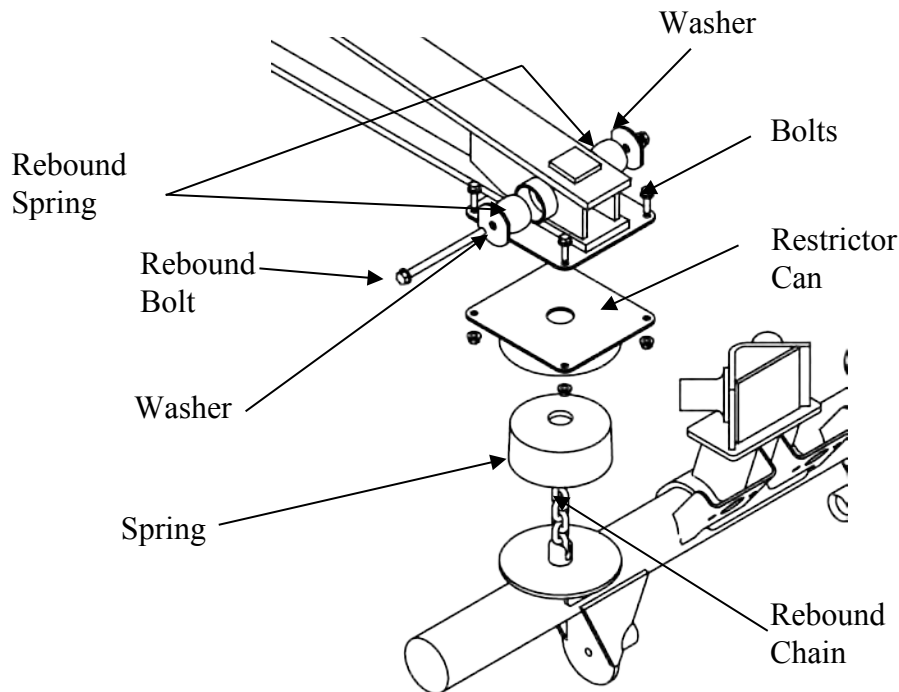
NOTE: All stands and lifting devices **MUST** be of sufficient strength and rigidity to safely support the trailer. **DO NOT WORK AROUND OR UNDER THE VEHICLE WHEN SUPPORTED ON LIFTING DEVICES.**

STEP 3 Remove the four 1/2" NC fasteners holding the restrictor can to the equalizing beam. Discard the fasteners. Remove the 5/8" NC fastener holding the rebound chain/spring.

NOTE: It may be necessary to remove tires to allow spring assembly removal.

STEP 4 Pull the spring & restrictor can outward off the beam. Allow the rebound chain to slip out. See Fig. 5B.



**FIGURE 5B**

- STEP 5 Separate the restrictor can and spring. Discard the restrictor can. Using a wire brush or scraper, remove rust and road accumulations from the rebound chain. Clean out the centre vent holes in the beam. See Fig. 5B. Inspect the rebound chain for visual cracks. If cracked, replace. Contact Chalmers for details.
- STEP 6 Turn the spring upside down so as the old top is now down. Place in the new restrictor can. See Fig. 5B.
- STEP 7 Attach a length of light rope to the end of the rebound chain. Feed the rope through hole on the bottom side of the spring. Feed it up through the restrictor can and into the equalizing beam.
- STEP 8 Lift and place as one assembly, the spring and restrictor can onto the axle. Use the rope to feed the end of the rebound chain up into equalizing beam. Insert the rebound bolt into 1 washer and rebound spring. Insert into the rebound chain. Complete the assembly by inserting the remaining washer, rebound spring and nut. Tighten the 5/8" rebound fasteners allowing only 4 – 5 threads to be exposed. Do not over tighten.
- STEP 9 Install and tighten the new 1/2" NC restrictor can fasteners. **Torque to 65 ft. lbs.** See Table 2.
- STEP 10 Before removing trailer from stands, check both restrictor cans for an even gap around the spring. Adjust if required.





#### 4.6 SPIGOT CAP INSPECTION

The spigot caps are part of the Chalmers torque rod joint system and play a key part in this system by placing a small amount of end compression to the rubber bushing and providing end retention to the joint.

Visual inspection of the spigot caps should be done on a daily basis. See Section 3.0 Service Inspection Requirements.

**IMPORTANT:** If a missing, cracked or broken spigot cap is detected, it **MUST** be replaced immediately. **DO NOT** operate the trailer. To do so may lead to consequent loss of trailer control and personal injury.

**IMPORTANT:** If a loose spigot cap is found, retorque the 5/8" NC fasteners to 135 ft. lbs. See Table 2. Should persistent loosening occur, replace the 5/8" NC fastener as hard part wear is affecting the bolt seat. See Table 2.

#### 4.7 SPIGOT CAP REPLACEMENT

Replacement of the spigot caps may be achieved easily and quickly with no requirements to remove major parts from the trailer or use special tools, using the following steps as a guide.

STEP 1 If possible power wash the torque rod ends. As a minimum, the ends should be brushed with a hard bristle brush to remove road dirt accumulations.

STEP 2 Chock the front tires to prevent the trailer from moving.

STEP 3 Remove the 5/8" NC fasteners and pry off the spigot cap, discard both.

STEP 4 Press the replacement spigot cap into the ends of the torque rod bushings.

STEP 5 Install and tighten new 5/8" NC torque rod joint fasteners. **Torque to 135 ft. lbs.** See Table 2.

**IMPORTANT:** Failure to check torque may lead to fastener failure and consequent loss of trailer control and void warranty.



## 4.8 TANDEM BEAM INSPECTION

The Chalmers 1100 Series Walking Beam is a key part of the load support and equalization system of the suspension. It not only acts as a lower support and anchor point for the spring system, but also provides the means to equally share the trailer load to the axles.

To allow the high articulation that the 1100 Series Suspension provides, the tandem beams **MUST** be free to move fore and aft side to side when the trailer is on level ground and loaded.

The tandem beams have two wear points, at the contact between the beam-ends and axle saddles. The rate of wear at these points will vary depending on the operating conditions, axle loading, and distance travelled.

Chalmers recommends inspecting the beams for end wear and cracks at the intervals shown in Section 3.0 Service Inspection Requirements.

Inspect the beam-ends carefully, looking for cracks and lower flange wear. Cracks along welds may be repairable while cracks in or across the beam flanges require tandem beam replacement. See Fig. 1 Appendix "B" Engineering Bulletin 8905. Lower flange wear requires the accurate measurement of lower beam flange thickness. Measurements taken at the flange edges are not an accurate indication of beam wear, see Fig. 8, and may lead to unnecessary beam repair/replacement. Inspection of the beam-ends may be done without removing any major parts using the following steps as a guideline.

**STEP 1** If possible, power wash the beam end. As a minimum brush the area with a hard bristle brush to remove road dirt accumulations.

**STEP 2** Chock the front tires to prevent the trailer from moving. Lift the rear of the trailer, support the frame on stands so as all the weight is just taken off the suspension, and the beam-ends are off the saddles.

**NOTE:** All stands and lifting devices **MUST** be of sufficient strength and rigidity to safely support the trailer. **DO NOT WORK AROUND OR UNDER THE VEHICLE WHEN SUPPORTED ON LIFTING DEVICES.**

**STEP 3** Manoeuvre the beam so as the wear area thickness on the bottom face, may be determined using either a micrometer or a Vernier calliper. Measure the thickness at the wear area, and a non-worn area. See Fig. 8. The wear allowance is the difference between thicknesses and **MUST** not be any greater than .062" (1.5 mm).

**NOTE:** All measurements should be taken as a minimum of ½" from the beam flange edges to eliminate any edge wear that may have occurred.

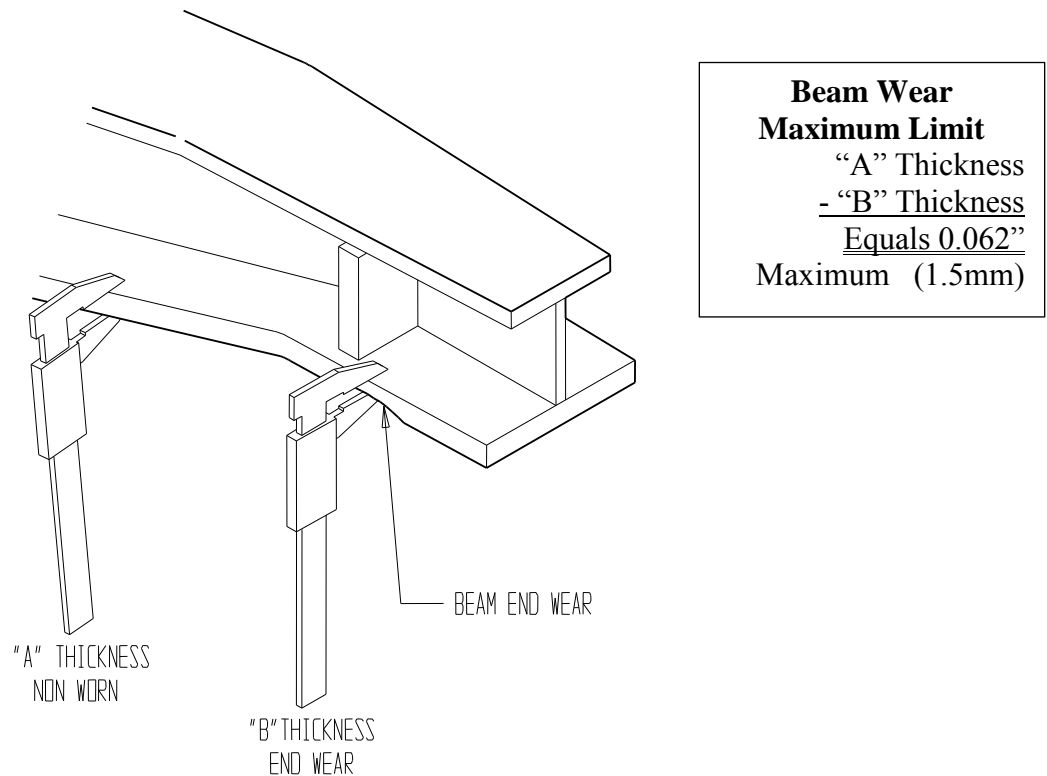
If the beams show wear greater than the .062" (1.5 mm) allowable, a Chalmers supplied wear plate **MUST** be installed. Contact Chalmers for details.

**NOTICE:** Should excessive wear or cracks be found during trailer operations, it may be **SLOWLY** driven to the nearest repair shop. Failure to repair or replace



excessively worn or cracked tandem beams will lead to failure of the beam ends and consequent loss of trailer control.

### BEAM WEAR MEASUREMENT



**FIGURE 8**

## 4.9 TANDEM BEAM REPAIR/REPLACEMENT

Repair of the tandem beam entails the use of electric arc welding and **MUST** be performed by a qualified shop. See Appendix "A" TSB 20170817 and Appendix "B" Eng. Bulletin 8905 for repair installation instructions and guidelines.

Replacement of the tandem beams may be done in any shop without the use of special tools using the following steps as a guide:

- STEP 1 If possible, power wash the tandem beam. As a minimum, the beam should be brushed with a hard bristle brush to remove road dirt accumulation.
- STEP 2 Chock the front tires to prevent the trailer from moving. Remove all axle brake or wind up loads by placing transmission in neutral and releasing the spring or driveline brakes.
- STEP 3 Lift the rear of the trailer. Support the frame on stands so all weight is just taken off the suspension.



NOTE: All stands and lifting devices **MUST** be of sufficient strength and rigidity to safely support the trailer. **DO NOT WORK AROUND OR UNDER THE VEHICLE WHEN SUPPORTED ON LIFTING DEVICES.**

STEP 4 Remove the rebound chain, spring and restrictor can following Steps 3 and 4 in Section 4.5A.

STEP 5 Remove the upper, and if necessary, the lower torque rods from the forward axle following Step 4 outlined in Section 4.3.

NOTE: Tag or mark each torque rod so as each rod may be replaced in the exact position it came off.

STEP 6 Roll the forward axle so as the beam end is free of the saddle. Lower free end and slide the beam forward to remove from suspension.

STEP 7 Install the replacement or repaired beams by sliding the beam-ends into the respective saddles on the middle axle. See Fig. 1. Roll the forward axle and at the same time, slide the forward beam-ends into their respective saddles.

STEP 8 Replace the rear axle upper and lower torque rods following Step 9 through 11 in Section 4.3.

STEP 9 Replace the rebound chain, spring and restrictor can following Step 6 – 10 in Section 4.5A.

STEP 10 Torque all fasteners to values shown in Table 2.

**\*\*IMPORTANT: FAILURE TO CHECK TORQUE MAY LEAD TO FASTENER FAILURE AND CONSEQUENT LOSS OF VEHICLE CONTROL AND VOID WARRANTY.**

#### **4.10 RUBBER SPRING INSPECTION**

The Chalmers patented rubber springs used in the 1100 Series Suspensions are manufactured to very exacting standards from a high quality natural rubber compound, and in the vast majority of cases will last the life of the trailer.

Under normal operation, the Chalmers rubber springs do not require periodic maintenance or replacement. Minor scrubbing from the restrictor can and attachment fasteners is normal. The springs also lose a little in overall height due to compression set. This reduction in height occurs in the first few loads, making an in-service spring shorter than a new spring.

To reduce the chances of prematurely replacing a good spring, the following steps should be used when inspecting all Chalmers rubber springs.

STEP 1 If possible, power wash the restrictor can spring area. As a minimum, brush the area with a hard bristle brush to remove road dirt accumulations.



STEP 2 Chock tires to prevent the trailer from moving. Lift the rear of the trailer, support the frame on stands so all the weight is just taken off the suspension.

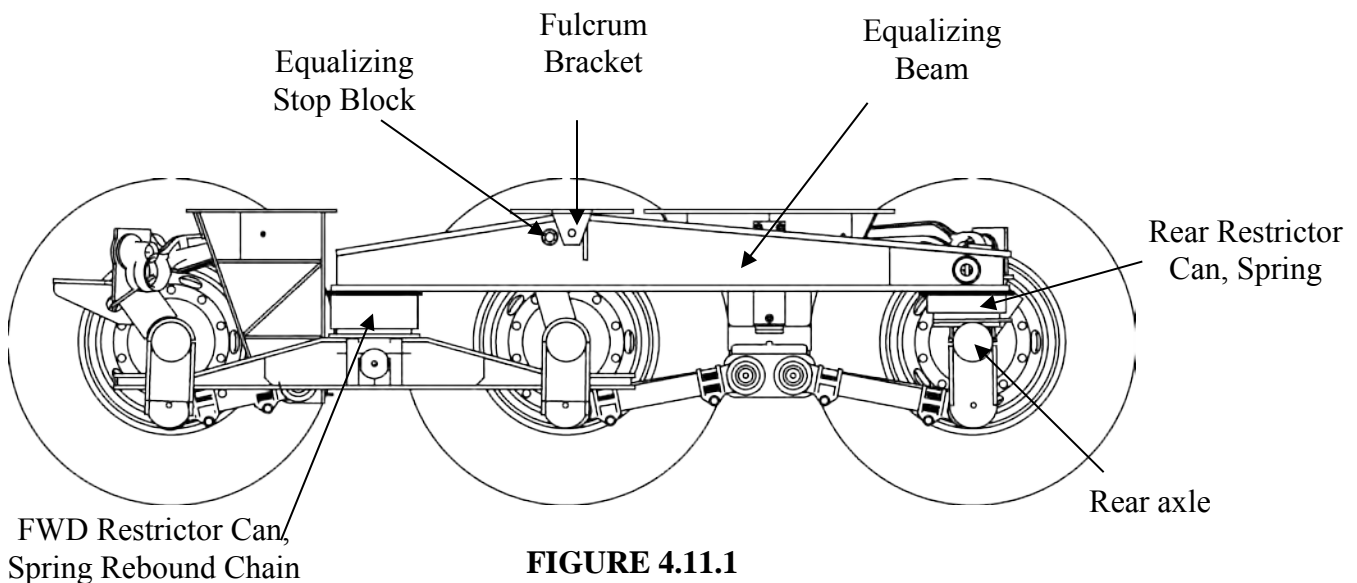
NOTE: All stands and lifting devices **MUST** be of sufficient strength and rigidity to safely support the trailer. **DO NOT WORK AROUND OR UNDER THE VEHICLE WHEN SUPPORTED ON LIFTING DEVICES.**

STEP 3 Rotate the spring completely around, looking at the rubber spring below the restrictor can for deep cuts, severe distortion, and signs of chemical attack leaving the surface sticky or dry cracked.

If severe distortion is noticed, contact Chalmers for details.

NOTICE: Should a damaged spring be found during trailer operation, it may be driven **SLOWLY** to its maintenance shop for spring replacement. Springs may be replaced in ones; they do not require replacing in sets. Failure to replace a damaged spring may lead to a hard ride or trailer control problems with consequent trailer damage.

#### 4.11 EQUALIZING BEAM REMOVAL



**FIGURE 4.11.1**

Replacement of Chalmers equalizing beams may be achieved easily and quickly in any shop without the use of special tools, using the following steps as a guide.

STEP 1 If possible, power wash the suspension area. As a minimum, brush the area with a hard bristle brush to remove road dirt accumulations.

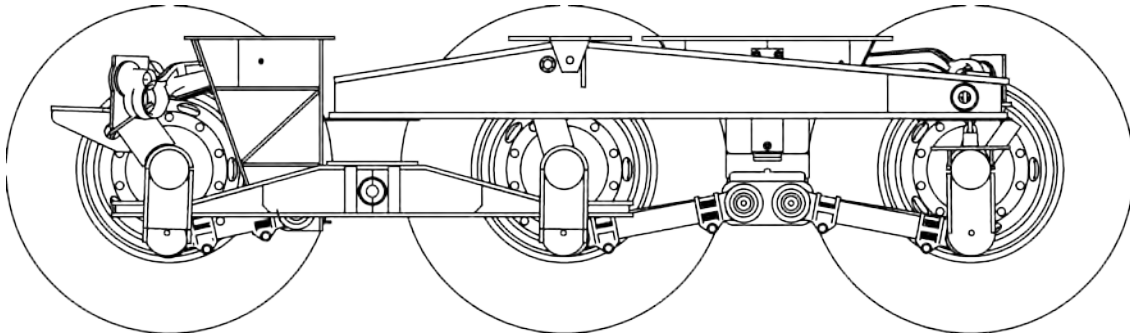
STEP 2 Chock the tires to prevent the trailer from moving. Lift up the trailer; support the frame on stands so as all weight is just taken off the suspension.



**NOTE:** All stands and lifting devices **MUST** be of sufficient strength and rigidity to safely support the trailer. **DO NOT WORK AROUND OR UNDER THE VEHICLE WHEN SUPPORTED ON LIFTING DEVICES.**

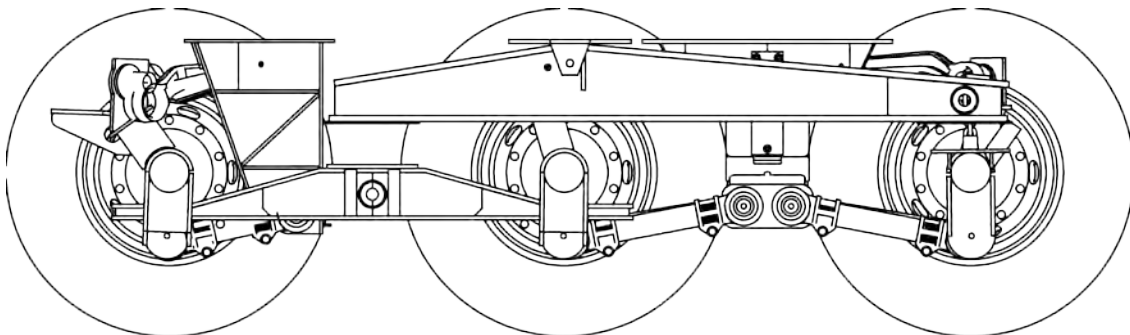
**STEP 3** Remove both the forward & rear restrictor cans, springs & rebound chains as per sections 4.5A & 4.5B. See Fig. 4.11.2

**NOTE:** It may be necessary to remove tires to allow access.



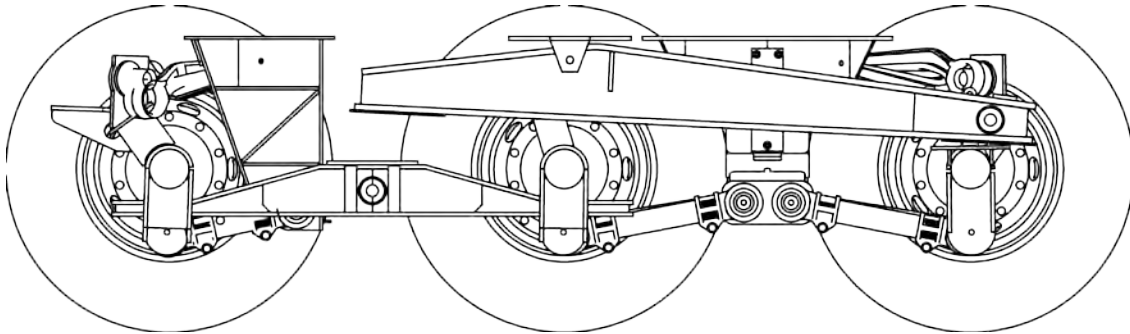
**FIGURE 4.11.2**

**STEP 4** Remove the equalizing beam stop blocks. See Fig. 4.11.3



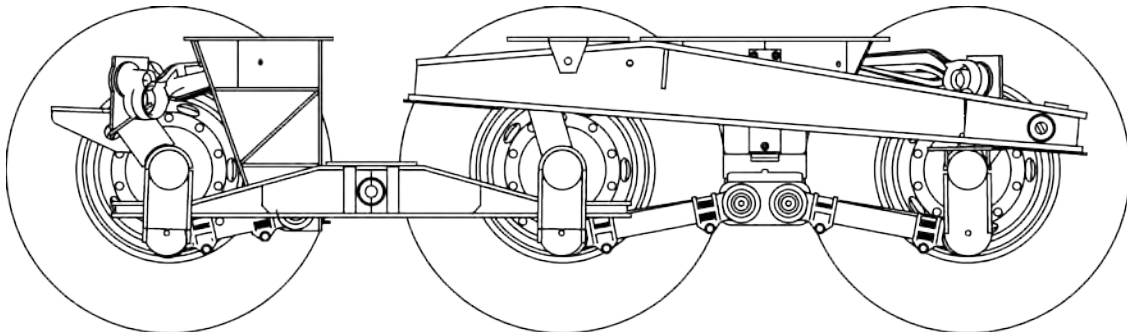
**FIGURE 4.11.3**

**STEP 5** Slide the equalizing beam back. Lower the rear end of the beam as you go. See Fig. 4.11.4

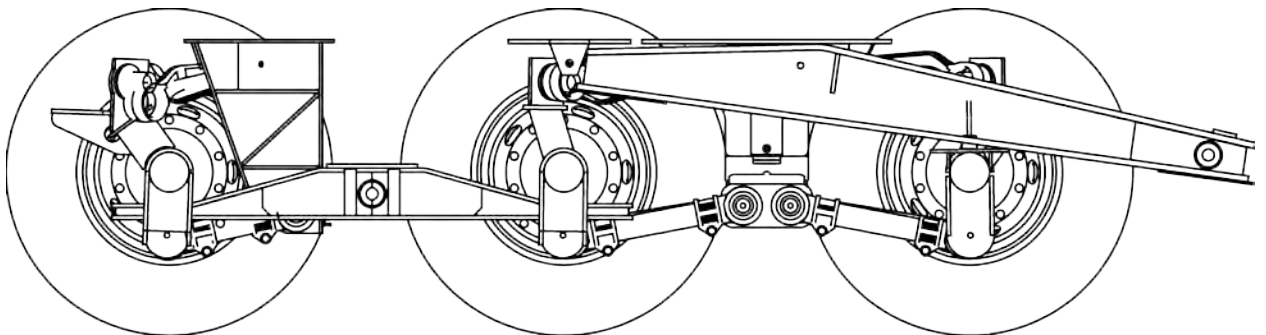


**FIGURE 4.11.4**

STEP 6 Continue sliding the beam until it clears the fulcrum bracket. See Fig. 4.11.5 & 4.11.6



**FIGURE 4.11.5**



**FIGURE 4.11.6**





## 5.0 AXLE ALIGNMENT

The 1100 Series Tri-axle Suspension uses four torque rods for each axle. These torque rods are the ONLY parts in the suspension that affect the location or alignment of each axle.

The Six (2 per axle) top vee torque rods, set the axle spread, side to side centre. They are factory set and play NO part in the alignment process. See Fig. 4.

The Six (2 per axle) bottom torque rods set the axle spread, and axle alignment. These rods are the ONLY means of making periodic adjustments for axle alignments. See Fig. 4.

The Chalmers 1100 Series Suspension allows for the precision alignment of each axle by the use of fine threads cut into the bottom torque rod tubes. These rods incorporate left and right hand cut threads on the same tube, thus by rotating the tube, the rod length may be increased or decreased (within the limit of the rod) to achieve the desired alignment.

## 5.1 AXLE MEASUREMENT

Measurement and alignment of a trailer fitted with a Chalmers 1100 Series Tri-axle Suspension may be done with any of the commercially available alignment systems. If this type of specialized equipment is not available, alignment may be carried out using a tape measure and plumb bob.

No matter which method is used, due to the compressible design of the Chalmers rubber torque rod bushing, ALL measurements and adjustments MUST be made with the bushings in a neutral, fully relaxed state. Any compression remaining in the suspension will result in false readings or measurements and will lead to a misalignment being carried out. To reduce the chances of this happening, the following steps should be carried out prior to measurement and/or alignment.

STEP 1 To remove any cornering compression, either drive the trailer back and forth a few times or, if this is not possible, lift the rear of the trailer so all the load is just off the suspension. Hold for a few minutes, and then lower down. **Do not set park brake.**

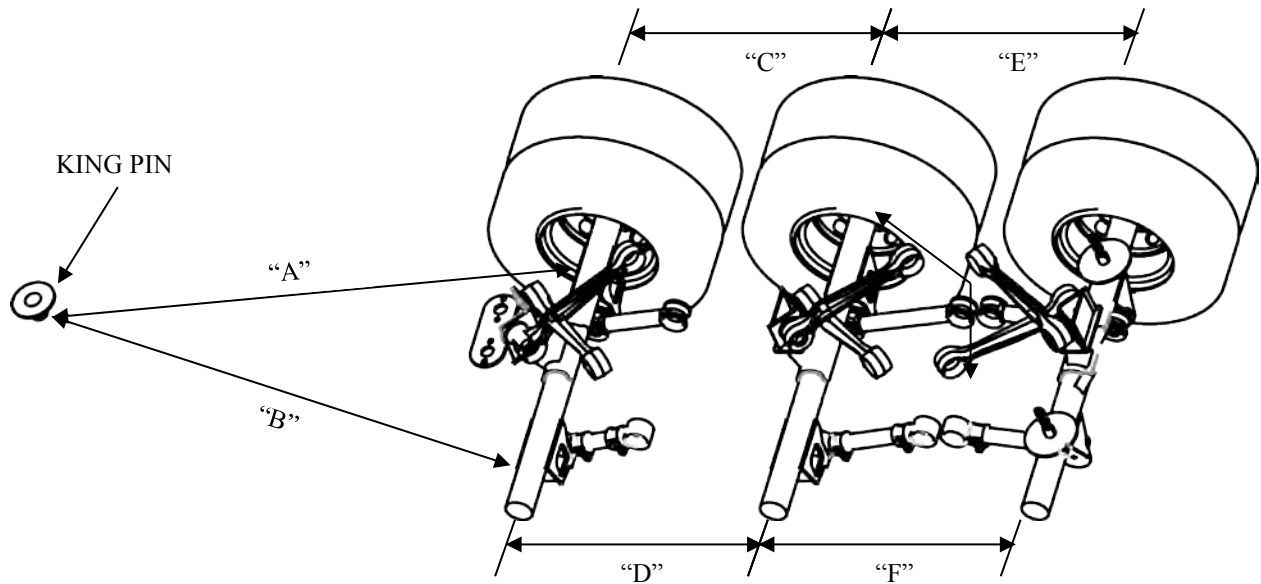
**DO NOT AT ANY TIME WORK AROUND OR UNDER A VEHICLE SUPPORTED ONLY ON LIFTING DEVICES. THE VEHICLE MUST BE SECURELY CHOCKED AND SUPPORTED ON RIGID STANDS BEFORE WORK MAY COMMENCE.**

STEP 2 Chock the tires to prevent the trailer from moving. Remove all axle loads releasing the brakes.

STEP 3 Using a relevant alignment system and following all the manufacturers operating and safety instructions, take measurements of the axle alignment. Compare these to the trailer manufacturers specification. If none are available, the following may be used as a guide:

The axles must “**TRAM**” to  $\pm 1/16$ ” side-to-side.



**AXLE ALIGNMENT (NO ALIGNMENT SYSTEM)****FIGURE 10****FOR COMPLETE AXLE ALIGNMENT**

- "A" Side measurement must equal "B" Side measurement to within 1/16" (1.5mm)
- "C" Side TRAM measurement must equal "D" Side TRAM measurement to within 1/16" (1.5mm)
- "E" Side TRAM measurement must equal "F" Side TRAM measurement to within 1/16" (1.5mm)



## 5.2 AXLE ALIGNMENT ADJUSTMENTS

Should the results of Step 3 from Section 5.1 show that the axles are not within either the trailer manufacturer's specifications or the Chalmers recommended guidelines, an axle adjustment will be required. This may be done without the use of any special tools using the following steps as a guide.

**STEP 1** If the trailer has been moved after measurement, then the bushings **MUST** be neutralized, and if a tape measurement is to be used, reference points marked. See Section 5.1, Steps 1 through 3.

**STEP 2** Working on the axle to be adjusted and on **ONLY ONE** torque rod at a time, loosen the lower torque rod eye pinch bolts (both ends). See Fig. 11.

**NOTE:** If the pinch bolt fasteners are badly corroded or damaged, replace with **NEW** hardware.

**STEP 3** Attach a pipe wrench to the torque rod tube. (A chain type wrench preferred). Rotate this tube to either lengthen or shorten the torque rod. Continue this process until the axle is within alignment specification referred to in Section 5.1, Steps 3 or 4.

**NOTE:** If difficulty is encountered rotating the tube, the threaded ends may have become corroded. Apply a quality penetrating oil to the threads. If difficulty is still encountered, wedges may be driven between the eye lugs to remove the clamp effect.

Before retightening the torque rod pinch bolts, visually check the rubber bushings. They should appear even around the eye with **NO** distortion. If distortion is seen, neutralize the bushing and re-measure.

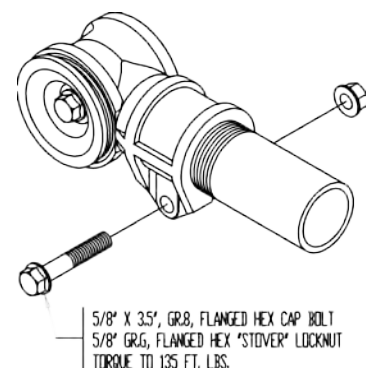
**STEP 4** Tighten and torque the eye pinch bolts. If the bolts are corroded or damaged, replace with **NEW** fasteners. See Fig. 11.

Torque 5/8" NC fasteners to 135 ft. lbs.

**STEP 5** Repeat Steps 1 through 3 to complete alignment.

**STEP 6** Torque **ALL** fasteners to values shown on Table 2.

**IMPORTANT:** FAILURE TO CHECK TORQUE MAY LEAD TO FASTENER FAILURE AND CONSEQUENT LOSS OF VEHICLE CONTROL AND VOID WARRANTY.



**FIGURE 11**



## 6.0 TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE AND CORRECTION
Loose Spigot Caps	<b>(Fasteners Not Torqued Properly)</b> Re-torque to 135 ft. lbs. And re-check at 1,600 km/1,000 miles. If repeated loosening occurs, replace fasteners & spigot cap if required. Torque to 135 ft. lbs. And re-check at 1,600 km/1,000 miles. See Sections 4.6 & 4.7.
Prematurely Loose or Worn Bushings	<b>(Chemical Attack, Petroleum Products or Worn Bushings Used in Installation or Cleaning)</b> Remove all traces of petroleum products and re-bush. See Sections 4.2 & 4.3. <b>(Hard Part Wear)</b> Re-Bush using oversize bushings, see Sections 4.2 & 4.3. <b>(Spigot Cap and/or Fasteners Loose)</b> Re-Bush and torque check to 135 ft. lbs. See Sections 4.2, 4.3 & Table 2.
Adjustable Torque Rod Tube Pull Out or Back Off.	<b>(Eye Pinch Bolts Not Torqued Properly)</b> Replace torque rod and torque check pinch bolts. See Table 2.
Walking Beam Touching Frame Hanger.	<b>(Worn or Loose Upper Torque Rod Bushings)</b> Re-Bush upper torque rods. See Sections 4.2 & 4.3.
Premature Beam End Wear	<b>(Wet Highly Abrasive Road Conditions)</b> Add wear pads to beam or replace beam. See Sections 4.9.
Excessive Tire Wear	<b>(Axles Out of Align)</b> Re-Align. See Sections 5.1 & 5.2. <b>(Tire Pressure)</b> Check tire pressure and inflate to manufactures specification.
Excessive Axle Movement	<b>(Worn Bushings)</b> Re-Bush. See Sections 4.2 & 4.3 <b>(Adjustable Torque Rod Pull Out)</b> Replace torque rod and torque check pinch bolts. See Table 2.
Trailer Does Not Sit Level	<b>(Broken or Missing Restrictor Can)</b> Replace both restrictor cans. See Sections 4.5A. & 4.5B. <b>(Damaged Spring)</b> Replace spring. See Sections 4.5A & 4.5B. <b>(Damaged Walking Beam)</b> Replace tandem beam. See Sections 4.9.
Trailer Unstable Rolls	<b>(Broken or Missing Restrictor Can)</b> Replace both restrictor cans. See Sections 4.5A. & 4.5B <b>(Damaged Spring)</b> Replace spring. See Sections 4.5A. & 4.5B
Trailers Rides Excessively Hard	<b>(Tire Pressure)</b> Check tire pressure and inflate to manufacturers specifications. <b>(Damaged Spring)</b> Replace spring. See Sections 4.12. & 4.13 <b>(Insufficient Clearance Between Beam Stop and Beam)</b> Replace with correct length stop.
Trailer Handles Poorly	<b>(Tire Pressure)</b> Check tire pressure and inflate to manufacturers specification. <b>(Axles Out of Align)</b> Re-align. See Sections 5.1 5.2. <b>(Worn Bushings)</b> Re-bush. See Sections 4.2 & 4.3 <b>(Broken or Missing Restrictor Can)</b> Replace both restrictor cans. See Sections 4.5A. & 4.5B. <b>(Damaged Spring)</b> Replace spring. See Sections 4.5A. & 4.5B. <b>(Insufficient Beam Stop/Beam Clearance)</b> Replace with correct length stop.

**TABLE 6**                      **SPIGOT WEAR LIMITS**

ITEM	PART NO.	SPIGOT	WEAR LIMIT FOR STANDARD BUSHING	WEAR LIMIT FOR OVERSIZE BUSHING*
1	800021	Spigot #2	2.530" Min.	2.530" Max 2.500" Min.

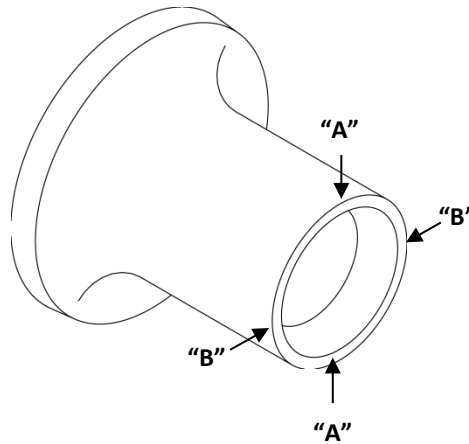
\*SERVICE BUSHING

**WEAR MEASUREMENT**

To determine the amount of wear, take two measurements 90 deg. apart "A-A" and "B-B" as shown, or measure over visible wear area.

The smaller of the two dimensions is to be taken as the wear limit. See Table 6 for values.

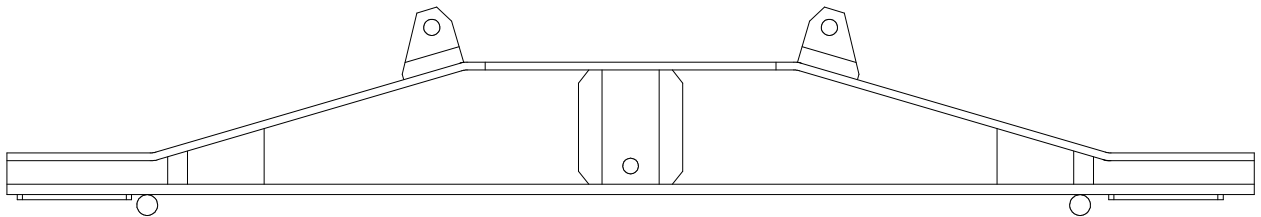
**NOTE:** If spigot is below min. dimension shown in Oversize Table, contact Chalmers for guidelines.



**#2 Joint**  
1100 Series Tri-axle

**APPENDIX “A”**

TSB 20170817

**WEAR PLATE INSTALLATION ON CHALMERS UNDERSLUNG  
BEAMS****1.0 Scope:**

- 1.1 This procedure shall be used when installing Chalmers Suspensions International Inc. wear plates on underslung style beams. This will apply to 700, 800 and 1100 series suspensions

**2.0 Safety:**

- 2.1 The following safety instructions must be read and followed. Failure to do so could lead to serious injury or possible loss of life.
- 2.2 Prior to any work commencing on the trailer, the cargo compartments and delivery systems must contain a non-explosive and non-toxic atmosphere.
- 2.3 Any stands or jacks used to support or lift the trailer must be of sufficient capacity to do so with adequate safety margins. Do not work under the trailer when supported by jacks only.
- 2.4 All welding equipment and power tools must be used in and according to the manufacturer's safety and operating instructions.

**3.0 General Instructions:**

- 3.1 MATERIAL CLEANING – all material shall be free from loose scale, slag, oil, rust and other foreign material.
- 3.2 JOINT PREPARATION – joint surfaces shall be free from loose scale and rust. Burned surfaces shall be smooth within 1/32”.
- 3.3 TACK WELD – use appropriate size electrode and same type as specified below. Employ corresponding weld data from chart below.
- 3.4 PREHEAT weld joint area as specified in 4.0.
- 3.5 CLEAN all slag and spatter between passes.

**4.0 Welding Process(es):**

- 4.1 USE REVERSE POLARITY – electrode positive.
- 4.2 WELDING SPEED shown is the ABSOLUTE MINIMUM. DO NOT WELD SLOWER.
- 4.3 THICKNESS in between those specified on the chart, use data from column of next smaller weld size.



## 4.4 MANUAL SHIELDED ARC PROCESS:

Thickness	1/4"	3/8"
Type	7018	7018
Electrode		
Size	1/8"	1/8"
Amperage	130	130
Voltage	22	22
Weld Speed		
I.P.M.	9	6

Preheat to room temperature, 70 – 110 deg. F.  
Number of passes depends on type and size of joint.

## 4.5 METAL – INERT GAS PROCESS:

Thickness	1/4"	3/8"
Type	E70T1	E70T1
Electrode		
Size	1/16"	5/64"
Amperage	250	350
Voltage	28	26
Weld Speed		
I.P.M.	20	19

Preheat to room temperature, 70-100 deg. F.  
Number of passes depends on size of joint.

- 4.6 ELECTRODE WIRE – use E70T1 electrode wire or equivalent.  
4.7 COVER GAS – use welding grade C02 cover gas (Minimum Dew Point – 50), or 95Ar-5C02.  
4.8 REGULAR SETTING – 35-48 cu. ft. per hour.

## 5.0 Welding Sequence:

- 5.1 PREHEAT to temperature as specified in Section 4.0.  
5.2 CHIP AND BRUSH all slag and spatter between passes, grind out all defects.

## 6.0 Inspection:

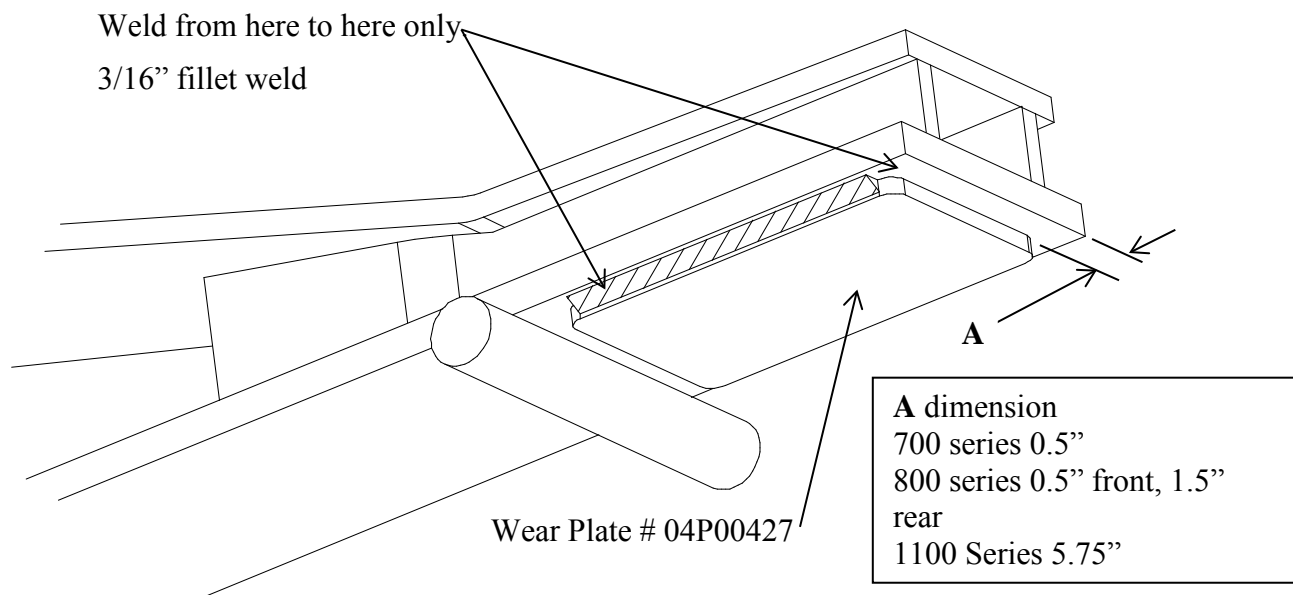
- 6.1 Visually inspect every completed row.

## 7.0 Installation:

- 7.1 Prior to any installation work, read all safety notes in Section 2.0.  
7.2 Prior to any installation, support the trailer on stands, apply brakes and block wheels.  
7.3 Prior to any welding, read all general notes and welding process in Sections 3.0, 4.0, 5.0 and 6.0.  
7.4 Remove both beams from the suspension; clean and inspect.



- 7.5 Inspect beam-ends for cracks. Only cracks in or through the web and stop plate may be repaired. Any cracks that propagate into or through the flanges may not be repaired and the beam must be replaced. See Technical Service Bulletin #8905.
- 7.6 Clamp wear plate #04P00427 to bottom flange of beam. Make sure plate is located centrally on flange and is a good profile fit to flange. If required, slightly grind to obtain this.
- 7.7 Tack weld plate to flange. Tack on sides only.
- 7.8 Remove clamps. Weld plate to flange as shown building weld to 3/16" fillet.
- CAUTION: Do not weld at either end of the wear plate.
- 7.9 Prime and repaint reworked areas.
- 7.10 Reinstall beams into suspensions. Check all bolts for correct torque. See Technical Service Bulletin #8018.
- 7.11 Remove all stands and wheel blocks.



**APPENDIX “B”****ENGINEERING BULLETIN 8905****REPAIR & WELD INSTRUCTIONS  
Walking Beam Ends****1.0 Scope:**

- 1.1 This procedure shall be used when repairing and welding Chalmers Suspensions International Inc. walking beam-ends.

**2.0 Safety:**

- 2.1 The following safety instructions must be read and followed. Failure to do so could lead to serious injury or possible loss of life.
- 2.2 Prior to any work commencing on the vehicle, the cargo compartments and delivery systems must contain a non-explosive and non-toxic atmosphere.
- 2.3 Any stands or jacks used to support or lift the vehicle must be of sufficient capacity to do so with adequate safety margins. Do not work under the vehicle when supported by jacks only.
- 2.4 All welding equipment and power tools must be used in and according to the manufacturer's safety and operating instructions.

**3.0 General Instructions:**

- 3.1 MATERIAL CLEANING – all material shall be free from loose scale, slag, oil, rust and other foreign material.
- 3.2 JOINT PREPARATION – joint surfaces shall be free from loose scale and rust. Burned surfaces shall be smooth within 1/32”.
- 3.3 TACK WELD – use appropriate size electrode and same type as specified below. Employ corresponding weld data from chart below.
- 3.4 PREHEAT weld joint area as specified in 4.0.
- 3.5 CLEAN all slag and spatter between passes.

**4.0 Welding Process(es):**

- 4.1 USE REVERSE POLARITY – electrode positive.
- 4.2 WELDING SPEED shown is the ABSOLUTE MINIMUM. DO NOT WELD SLOWER.
- 4.3 THICKNESS in between those specified on the chart, use data from column of next smaller weld size.





## 4.4 MANUAL SHIELDED ARC PROCESS:

Thickness	1/4"	3/8"
Type	7018	7018
Electrode		
Size	1/8"	1/8"
Amperage	130	130
Voltage	22	22
Weld Speed		
I.P.M.	9	6

Preheat to room temperature, 70 – 110 deg.F.  
Number of passes depends on type and size of joint.

## 4.5 METAL – INERT GAS PROCESS:

Thickness	1/4"	3/8"
Type	E70T1	E70T1
Electrode		
Size	1/16"	5/64"
Amperage	250	350
Voltage	28	26
Weld Speed		
I.P.M.	20	19

Preheat to room temperature, 70-100 deg. F.  
Number of passes depends on size of joint.

4.6 ELECTRODE WIRE – use E70T1 electrode wire or equivalent.

4.7 COVER GAS – use welding grade C02 cover gas (Minimum Dew Point – 50), or 95Ar-5C02.

4.8 REGULAR SETTING – 35-48 cu.ft. per hour.

5.0 Welding Sequence:

5.1 PREHEAT to temperature as specified in Section 4.0.

5.2 CHIP AND BRUSH all slag and spatter between passes, grind out all defects.



## 6.0 Inspection:

- 6.1 Visually inspect every completed row.

## 7.0 Repair:

- 7.1 Prior to any repair work, read all safety notes in Section 2.0.
- 7.2 Prior to any installation, support the vehicle on stands, apply brakes and block wheels.
- 7.3 Prior to any welding, read all general notes and welding process in Sections 3.0, 4.0, 5.0 and 6.0.
- 7.4 Remove both beams from the suspension; clean and inspect.
- 7.5 Inspect beam-ends for cracks. Only cracks in or through the web and stop plate may be repaired. Any cracks that propagate into or through the flanges may not be repaired and the beam must be replaced. See Fig. 1.
- 7.6 Check the bottom flange of the beams to be repaired. If a beam does not have wear plates #700313 attached, install them at this point. See Technical Service Bulletin #8904.
- 7.7 Grind or air-arc out the crack areas. Do not cut into the flanges.
- 7.8 Reweld beam end web and stop plates. Build welds to  $\frac{1}{4}$ " minimum,  $\frac{5}{16}$ " maximum fillets.
- 7.9 Clamp  $\frac{3}{8}$ " x  $1\text{-}\frac{7}{8}$ " x  $3\text{-}\frac{1}{2}$ " end web reinforcement plate to end web (it may be necessary to grind the plate to obtain a good fit to end webs). Tack weld in place. Remove clamp and finish weld, building weld to  $\frac{1}{4}$ " minimum,  $\frac{5}{16}$ " maximum fillet.
- 7.10 Prime and repaint reworked areas.
- 7.11 Reinstall beams into suspensions. Check all bolts for correct torque. See Technical Service Bulletin #8018.
- 7.12 Remove all stands and wheel blocks.

