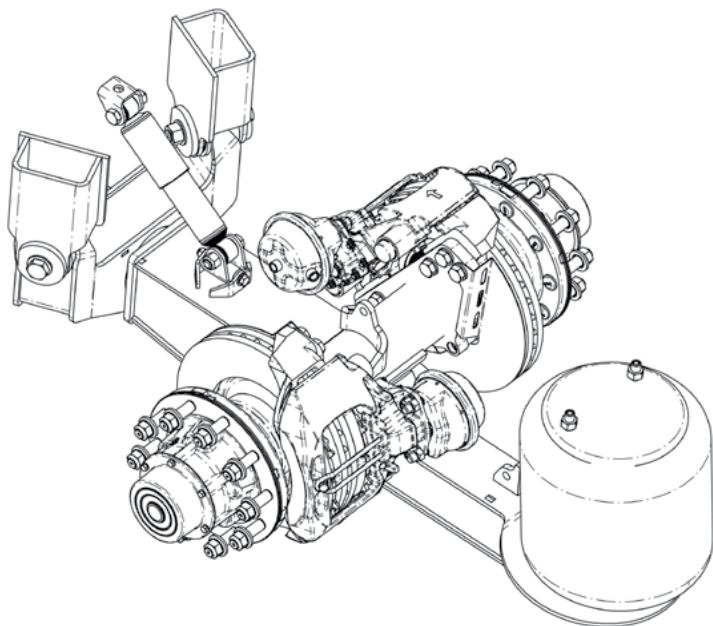


RAR 251-Stub Axle Suspension

Air-Ride Trailer Suspension



Installation and Service Manual

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SUSPENSION IDENTIFICATION

The Ridewell Air Ride 251-Trailer Suspension can be purchased with or without an integrated stub-axle.

The base suspension mounting hardware kit supplied with the RAR-251 Trailer Suspension is designed for trailer installations that accommodate up to 5/8" -thick hanger side plates.

The trailer OEM is responsible for designing a hanger and alignment mechanism that fits to the trailer frame.


 RIDEWELL SUSPENSIONS The Engineered Suspension Company	
PART NO:	
SUSP. NO:	
SERIAL NO:	
GROSS AXLE WEIGHT RATING CERTIFICATION IS PER THE FINAL STAGE MANUFACTURER OR ALTERER. THIS PRODUCT MAY BE COVERED UNDER ONE OR MORE PATENTS, ADDITIONAL PATENTS MAY BE PENDING.	
www.ridewellcorp.com	(800) 641-4122

Suspension Identification Tag

A (606-) **Installation/Assembly Number** is listed as the **Part Number** on the ID tag when other system components are factory installed onto the suspension.

The **Suspension Number** and **Serial Number** refer to the model and date of manufacture of an individual suspension system.

Refer to the suspension number/part number and serial number when contacting Ridewell for customer service, replacement parts and warranty information.

 RIDEWELL SUSPENSIONS			
MODEL:		PART NO.	
SERIAL NO.		CAPACITY	TON

Axle-Body Identification Tag

The **Base-Axle Part Number (165-)** and the **Serial Number** of the axle tube are listed for Ridewell-branded round axles. The **Base-Axle Part Number** refers to Ridewell-branded round axles manufactured in various axle wall thicknesses and widths.

More information on Ridewell-branded axles can be found in the "Trailer Axle Parts Guide" (9710029) on Ridewell's ISM support webpage.



Notes and Cautions

All work should be completed by a properly trained technician using the proper/special tools and safe work procedures.

Read through the entire Installation and Service Manual (ISM) before performing any installation or maintenance procedures.

The ISM uses two types of service notes to provide important safety guidelines, prevent equipment damage and ensure the suspension system operates correctly. The service notes are defined as:

"NOTE": Provides additional instructions or procedures to complete tasks and make sure that the suspension functions properly.

CAUTION Indicates a hazardous situation or unsafe practice that, if not avoided, could result in equipment damage and serious injury.

Prior to Installation

Refer to the suspension model engineering drawing for detailed information on system components; range of available ride heights; dimensional requirements; and, operating parameters.

The suspension is designed to fit-up onto a standard I-beam trailer frame at beam centers that correspond with standard axle-track widths.

Installation at wider beam centers will reduce suspension clearances. Installation at narrower beam centers will de-rate the axle beam capacity.

For non-standard beam centers, frames, frame centers, axle track widths and wheel-end equipment, the installer is responsible for verifying clearances, axle capacity, proper fit-up, and any additional required support structure.

Installations can vary and procedures should be adapted for different vehicles as needed.

- The Gross Axle Weight Rating (GAWR) is determined by the system component with the lowest load rating. Please consult with tire, wheel, axle and brake manufacturers before installation to determine the GAWR.
- If vehicle chassis modifications are required, consult with the vehicle manufacturer to ensure that such changes are permitted.
- Welding or altering suspension components is not permitted without the express written permission of Ridewell Suspensions.

Installer Responsibilities

The installer of the suspension has the sole responsibility for proper attachment of the suspension system to the vehicle chassis.

- The installer is responsible for locating the suspension system on the vehicle to provide the proper load distribution.
- The installer must verify that vehicle crossmembers are positioned to support the suspension at the installing location.
- It is the installer's responsibility to determine that axle spacing conforms to any applicable federal and local bridge laws.
- The installer must verify that air reservoir volume requirements are met after suspension installation. Consult the vehicle manufacturer or Federal Motor Vehicle Safety Standards (FMVSS) 121 for more information.
- The installer must verify there is sufficient clearance for proper functioning of the suspension, air springs, brake chambers, axle and tires.

Axle Integration

Suspension systems are available with and without a factory integrated axle. Customer-supplied axle assemblies must be positioned and oriented (rotated) properly before welding the axle to the axle seats.

Use the top-center mark on the axle, if available, to identify the center of the axle and orient the axle assembly on the suspension.

The axle assembly should be installed so that the camshafts, when activated, rotate in the same direction as the wheels.

⚠ CAUTION Failure to follow procedures and design specifications could result in injury, damage to the axle or suspension and void the warranty.

Weld Preparation

The joint to be welded should be positioned in the flat or horizontal position. All grease, dirt, paint, slag or other contaminants must be removed from the weld joint.

The axle and suspension components should be at a minimum temperature of 60°F (15.5°C). Pre-heat the weld zone to the axle manufacturer's recommended pre-heat temperature, if required.

Weld Procedure

1. Center the axle assembly on the beam center (Figure 1).
2. Check the engineering drawing for the brake component orientation (rotation) before clamping into place and making the final welds.
 - 2.1. Drum brake camshafts are spaced off the tail of the trailing arm beam. Make sure the brake chamber brackets are oriented properly and clamp the axle assembly into place.
 - 2.2. Disc brake assemblies have a right- and left-hand caliper assembly. Make sure the callipers are located on the correct side and rotated to the proper position before clamping the axle assembly into place.
3. Check the gap between the axle and the axle seats before welding (Figure 2). Side gaps should be no greater than 1/8-inch. The gap at the bottom of the axle seat should be no greater than 1/16-inch.
4. Weld the axle to the seat according to Ridewell Weld Process #1 Procedure (Page 5).

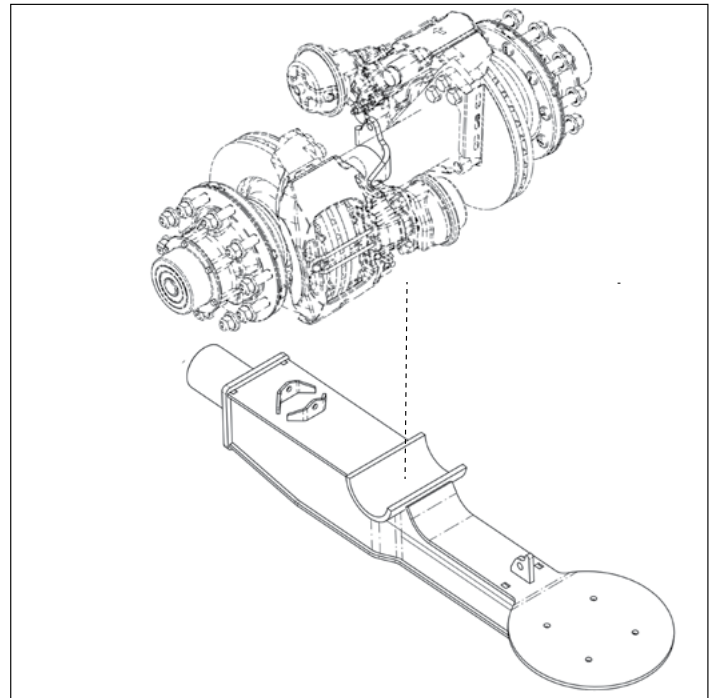


Figure 1.
Axle should be centered on beam. Refer to the engineering drawing for measurements.

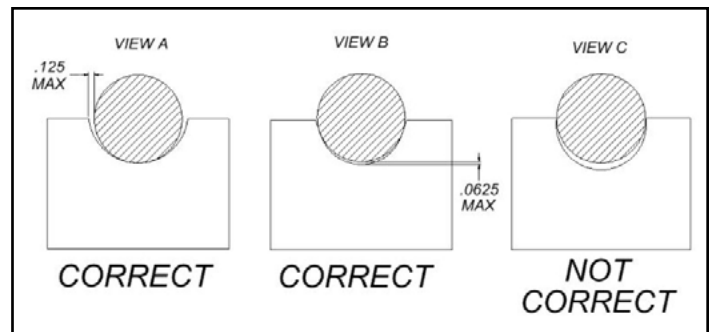
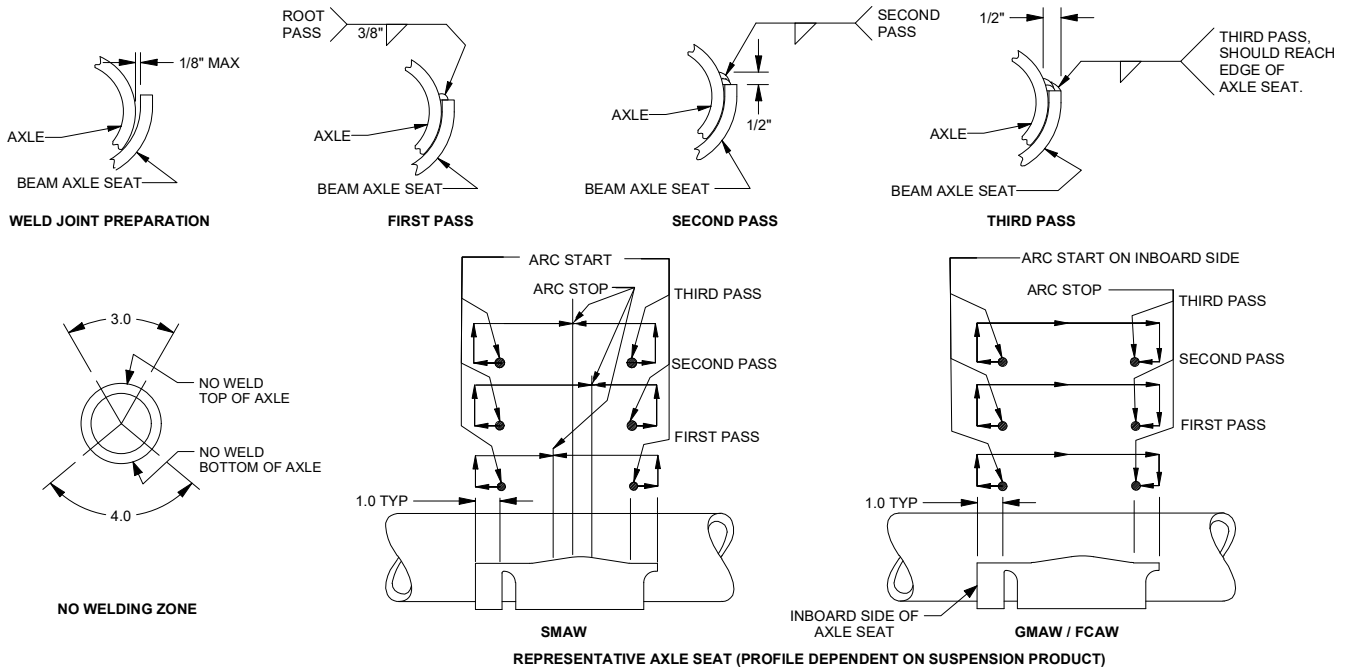
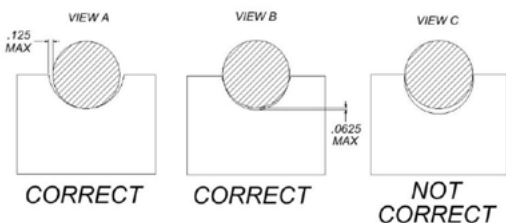


Figure 2.
Correct axle tube seating for welding.



- 1 - CAUTION: All welds must be kept away from the top and bottom of the axle where maximum stresses occur (see "NO WELDING ZONE" illustration above). Do not test-weld the arc on any part of the axle tube.
- 2 - All welders and welding operators should be certified as per the requirements of the American Welding Society (AWS) or equivalent. All electrodes used should meet the AWS specifications and classifications for welding carbon and low-alloy steels.
- 3 - Recommended Welding Methods: Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW) or Flux Cored Arc Welding (FCAW). The welding method used and the electrode selected must develop a minimum weld tensile strength of 70,000 psi per AWS specifications. The best fusion and mechanical properties will be obtained by using the voltage, current, and shielding medium recommended by the electrode manufacturer. If the SMAW method is used, the stick electrodes must be new, dry, free of contaminants and stored per AWS specifications.
- 4 - Weld Joint Preparation: The joint to be welded should be positioned in the flat or horizontal position. All grease, dirt, paint, slag or other contaminants must be removed from the weld joint without gouging the axle tube. It is recommended that paint be removed a minimum of 2" away from the weld joint. CAUTION: Never weld when the axle is cold. The axle and beam assemblies to be welded should be at a temperature of at least 60°F (15°C). Pre-heat the weld zone to the axle manufacturer's recommended pre-heat temperature, if required. This will reduce the chance of an area of brittle material forming adjacent to the weld.
- 5 - The axle should fit into the beam assembly with a maximum root gap of 1/8-inch between the axle and the beam axle seat (see "WELD JOINT PREPARATION" illustration above). The root gap should be as equal as possible on each side of the beam axle seat. The axle must be centered laterally in the beams.
- 6 - NOTE: Clamp the axle to the beam axle seat with a C-clamp prior to welding to make sure that proper contact occurs (see "CORRECT" illustration below).
- 7 - Ground the axle to one of the attached axle parts such as the brake chamber brackets, cam brackets or brake spider. Never ground the axle to a wheel or a hub as the spindle bearing may sustain damage.
- 8 - Multiple pass welding should be used on the beam/axle connection using the following guidelines: 8.1-Total fillet weld size should be 1/2-inch. 8.2-Weld pass starts and stops should be performed as illustrated above. 8.3-Never start or stop welds at the end of the weld joint. 8.4-Each pass must be accomplished in one or two segments. 8.5-Start welds at least 1-inch from the end and backweld over the start. Backstep fill all craters. 8.6-If process is not GMAW all slag must be removed between passes. 8.7-Welds must go to within 1/8-inch +/- 1/16-inch of the ends of the axle seat and must not go beyond or around the ends of the axle seat. 8.8-Post-weld peening is recommended, but not required: Needle peen the entire toe of the second pass, including around the ends of the axle seat. Hold the needles perpendicular to the axle. A uniform dimpled pattern will appear when properly peened.



J	23101	ADDED 9710039 TO DRAWING NUMBER	11/13/23	AAS	BB	CJB
REV	PROJ/ECR	DESCRIPTION	DATE	BY	CHK	APPD
DRAWN BY:	CBC	11/13/2023	RIDEWELL CORPORATION PO BOX 4586 SPRINGFIELD, MISSOURI 65808			
CHECKED:	MDJ	2/21/2003				
APPROVED:	CJB	2/21/2003				
PROJECT NO:	03103	SCALE: A-SIZE: NTS	TITLE: RIDEWELL WELD PROCESS #1, 5" DIA. AXLE, 3 PASS WELD			
MATERIAL:	-	WEIGHT:	SHEET 1 OF 1			
			PART NO:	9710039-WELD PROCESS No1		REV: J

UNCONTROLLED IF PRINTED

Suspension Mounting

Refer to the suspension model engineering drawing for available ride heights, torque values, and the spacing/clearance requirements of the suspension.

The suspension installer has the final responsibility of attaching the suspension to the vehicle frame.

Optional Hanger

The trailer OEM is responsible for designing the hanger and alignment mechanism that fits to the trailer frame.

Ridewell can provide a hanger mount hardware kit designed for trailer installations that accommodate up to 5/8"-thick hanger side plates (Figure 3).

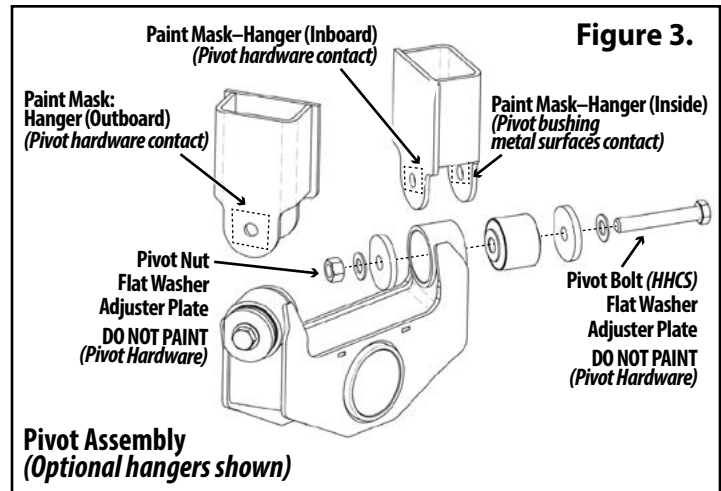
CAUTION Do not apply undercoating; paint or any other top coat to the suspension; trunnion hanger assembly; or pivot connection hardware until axle alignment procedure is completed.

NOTE: Areas where metal surfaces of alignment plates; washers; pivot bolts/nuts or pivot bushing (bushing sleeve) contact the trunnion/compensator assembly must be masked if applying under- or top coating prior to suspension assembly (Figure 3).

Weld-On Installation (Optional Hanger)

1. Verify location provides adequate clearance for suspension components.
Hangers and air spring mounting plates should be perpendicular to the chassis frame and in alignment with each other.
2. Mark the desired location of the hangers on the vehicle frame. Hangers must be installed as shown on the suspension model engineering drawing for proper axle alignment.
3. Weld the hangers to the frame with 1/4" fillet welds completely around the hangers. Stop the welds 1/2" from the corners and edges.
4. Mark the desired location of the air spring mounting plates on the frame.
A minimum 0.75" clearance must be maintained around the air spring when the air spring is at its maximum diameter.
5. Weld the air spring mounting plates to the frame with 3/16" fillet welds.

CAUTION Stub-axle suspensions are designed with a roll-joint. Roll stops are not provided in this suspension. Tire rub-plates must be installed on the trailer frame to limit roll to 10-degrees or less.



Final Assembly and Inspection

- Verify hanger and air spring mounting plate welds.
- Brake chamber clamps and ports must be clocked (rotated) to prevent interference with surrounding components.
- Attach pivot assemblies to hangers.
Note: Do not fully torque pivot hardware until axle alignment is completed (Torque Chart-Page 9).
- Installer must set suspension to the specified mounting height before torquing the pivot bolt to prevent pre-loading the rubber in the bushing.
- Dowel pin must be installed in roll-joint before welding on anti-turn washer. Anti-turn washer must cover dowel pin.
- Refer to suspension model engineering drawing to install shock absorber. Torque to specifications (Pg 9).
- Complete assembly and installation of air springs as shown on the engineering drawing. Torque to specifications (Page 9).
- Verify the suspension ride height is adjusted within the range shown on the engineering drawing. Complete axle alignment procedure.

NOTE: The Limiter Chain must be the suspension travel limiter. The Limiter Chain connection point shown on engineering drawing is for reference only.

The Limiter Chain should be located on the frame so that the chain does not interfere with the axle assembly, the brake chambers, or the wheels/tires.

The Frame Tab should be placed after the suspension has been installed, with the suspension in full rebound position.

CAUTION Failure to torque suspension components to specifications can result in suspension failure and void the warranty.

Recommended Service Intervals

Ridewell Suspensions recommends the following minimum service intervals for standard duty, on-highway usage applications. More frequent intervals are recommended for heavier duty applications.

Daily/Pre-Trip Inspections

- ___ Check tires for proper inflation, damage or excessive wear.
- ___ Check wheel-ends for obvious signs of lubricant leakage. Check for missing components.
- ___ Check axle assemblies for damage or loose components.
- ___ Visually inspect suspension structure for signs of damage or excessive wear.
- ___ Check for loose/missing bolts/nuts. Check for irregular movement in suspension components.
- ___ Make sure air controls are operating properly.
- ___ Drain all moisture from air reservoirs.

First 6,000 miles of use

- ___ Torque suspension components to specifications (Page 9/Engineering Drawing).
- ___ Verify that suspension is operating at the installed ride height.

Every 12,000 miles of use

- ___ Inspect air springs for damage/excessive wear. Torque air spring bolts/nuts to specifications (Page 9/Engineering Drawing).
- ___ Check air lines and connections for leaks.

Every 50,000 miles of use

- ___ Torque suspension components to specifications (Page 9/Engineering Drawing).

Refer to these Technology & Maintenance Council (TMC) publications for additional information	
RP 609	Self-Adjusting/Manual Brake Adjuster Removal, Installation and Maintenance
RP 618	Wheel Bearing Adjustment Procedure
RP 619	Air System Inspection Procedure
RP 622	Wheel Seal and Bearing Removal, Installation, and Maintenance
RP 631	Wheel End Lubrication Recommendations
RP 643	Air Ride Suspension Maintenance
RP 728	Trailer Axle Maintenance

Annually/100,000 miles of use

- ___ Inspect pivot connection for worn pivot bushing and wear washers. Replace if necessary.
- ___ Torque component bolts/nuts to specifications (Page 9/Engineering Drawing).
- ___ Check arm beam-to-axle connection welds.

Check lubrication level in wheel ends:

- ___ 1) Oil-Filled Wheel Ends:
Refill/Replace lubricant as needed (TMC RP 631-“100K/Annual Inspection”).
- ___ 2) Semi-Fluid Grease:
Pull outer bearing and visually inspect the lubrication level. Refill/Replace as needed (RP 631-“Level 3 Lubrication Level Inspection”) (RP 618-“Wheel Bearing Adjustment Procedure”).
- ___ Check air lines and connections for leaks.
- ___ Test air control system pressure protection valve (PPV), if equipped.
- ___ Check height control valve (HCV) adjustment.
- ___ Verify operation at installed ride height.

⚠ CAUTION Failure to torque suspension components to specifications can result in suspension failure and void the warranty.

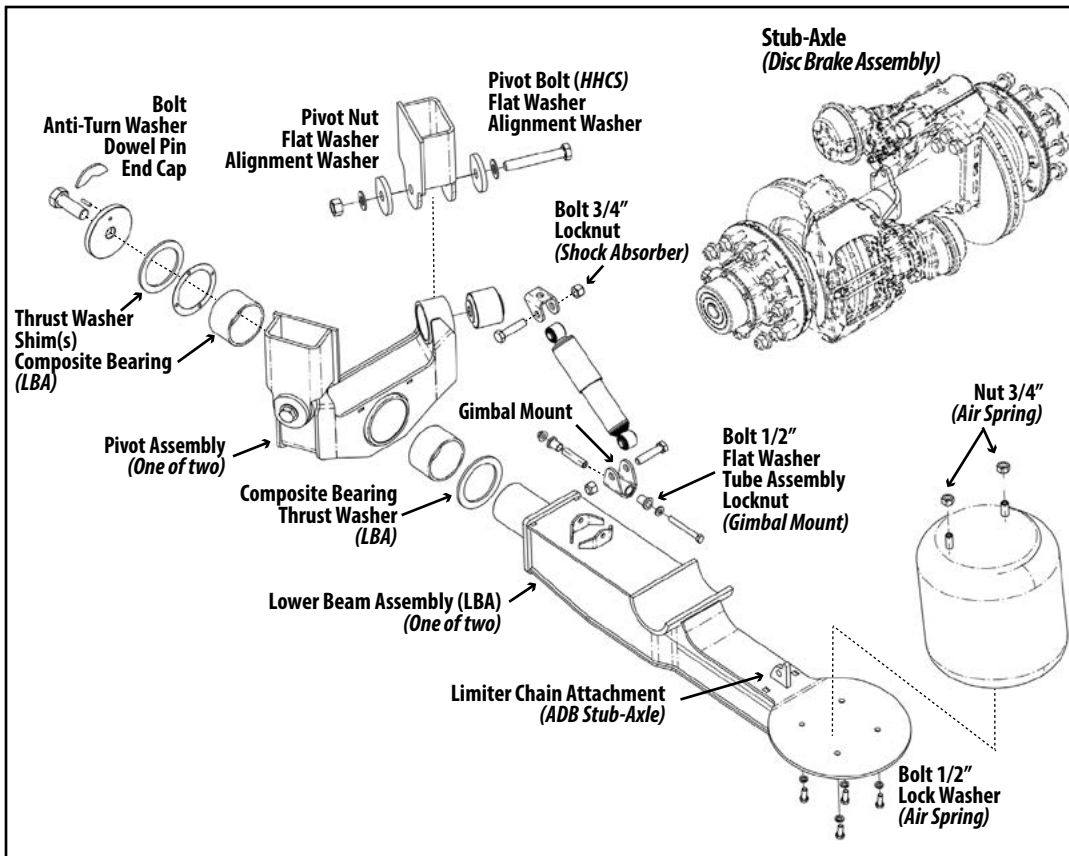


Figure 4.
251 Trailer Suspension
ADB Axle Components
(Optional Base Hanger
System Shown)

Refer to the suspension model engineering drawing for the individual component part number.

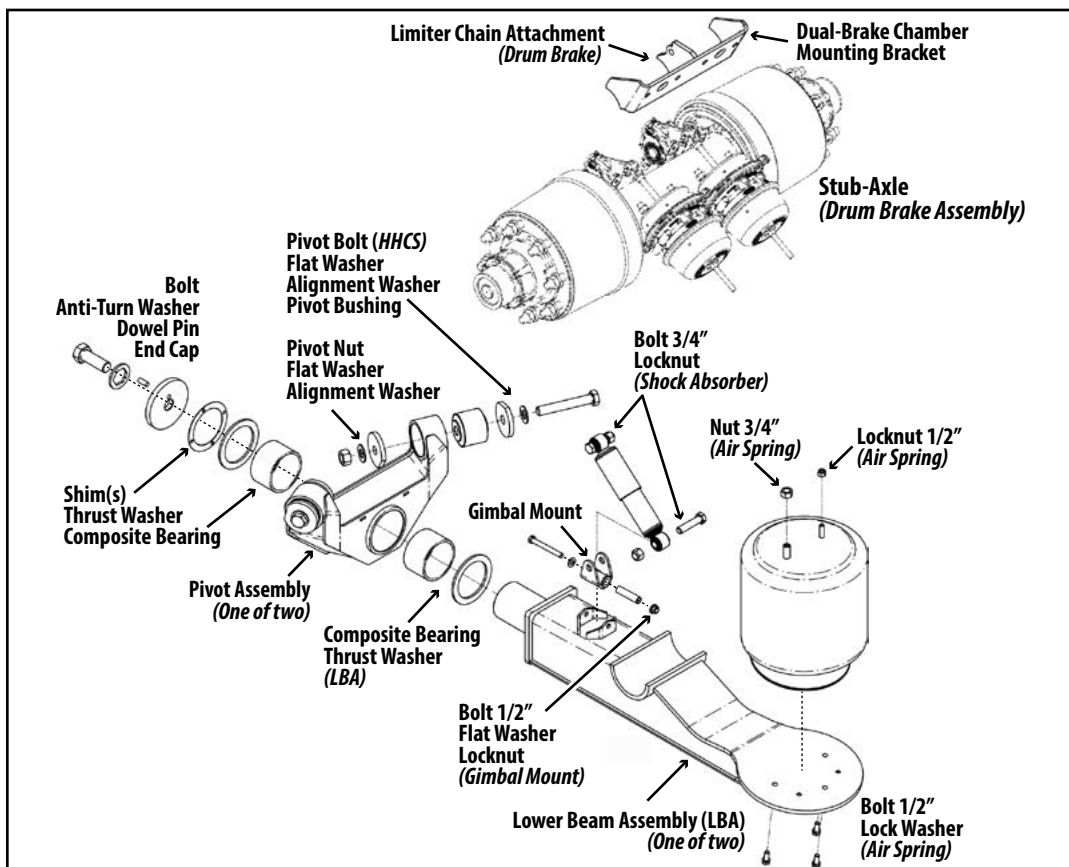


Figure 5.
251 Trailer Suspension-
Drum Brake Components

Refer to the suspension model engineering drawing for the individual component part number.

RAR-251 TORQUE SPECIFICATIONS – PIVOT BUSHING; LOWER BEAM ASSEMBLY COMPONENTS

Part Number (Component)	Item Description	Size	Torque Values	
			foot-pound	Newton-meter
1140016	Pivot Bolt (HHCS-Grade 8)	1"-14NF	500 ft-lb	675 N-m
1150031	Pivot Nut			
1110088	Spherical Bushing			
7002768	Alignment Washer			
1161480B100	Flat Washer			
Lower Beam Assembly – Bearing Replacement Components				
1145923B105	Center Bolt (HHCS-Grade 5)	1-1/4"-7NC	750 ft-lb	1017 N-m
1120045	Composite Bearings for Pivot Assembly			
1160022	Thrust Washer 1/4"			
7002339	End Cap			
7002747	Shim, End Cap			
9280042	Dowel Pin			
9003092B000	Anti-Turn Washer			
Fasteners	Bolt (Air Spring, Lower)	1/2"-13NC	25 ft-lb	35 N-m
	Locknut (Air Spring, Upper)	1/2"-13NC	25 ft-lb	35 N-m
	Nut (Air Spring, Upper)	3/4"-16NF	50 ft-lb	70 N-m
	Bolt/Locknut (Shock Absorber)	3/4"-10NC	160 ft-lb	217 N-m
	Bolt/Locknut (Gimbal Mount)	1/2"-13NC	80 ft-lb	108 N-m

Torque values reflect a lubricated thread condition (Nuts are pre-lubed). Do not overtorque.

⚠ CAUTION Suspension is shipped with minimal torque applied to fasteners. All fasteners must be re-torqued after first 6,000 miles of operation. Failure to install and maintain fasteners at torque specifications could result in suspension failure and void the warranty.

Pivot Bushing Replacement Procedure

Vehicle Preparation

Chock wheels. Raise vehicle to height that removes load from suspension and support with jack stands.

Disconnect linkage from the height control valve(s), if necessary. Exhaust all air from the air springs.

CAUTION Failure to properly chock wheels, exhaust the air system and raise and safely support the vehicle could allow vehicle/suspension movement that could result in serious injury.

Pivot Bushing Replacement Procedure

Replace the two (2) pivot connections on each axle at the same time (Figure 6).

1. Remove wheels and tires. Support lower beam/pivot assembly.
2. Remove the shock absorber. Disconnect limiter chain. Disconnect air spring from frame.
3. Disassemble pivot connections. Discard pivot hardware. Inspect flat washers and alignment washers. Replace, if necessary.
4. Remove lower beam assembly (LBA)/Pivot Assembly from hangers.
5. Remove the two pivot bushings and discard.
6. Inspect end cap and washers on pivot assembly for damage/wear. Repair or replace as needed.

7. Check pivot assembly for excessive play by moving assembly back and forth. Remove from Lower Beam Assembly (LBA) for further inspection and replacement if necessary (Figure 6).
8. Clean the pivot connection eyes with a wire brush.
9. Liberally apply P80[®] lubricant to the inside of the eyes and outside of replacement bushings.
10. Press bushings into the pivot connections. Check that bushings are centered within each eye.
11. Attach LBA/Pivot Assembly to hangers. Install pivot hardware and washers.
NOTE: Do not apply final torque.
12. After aligning axle to SAE or TMC recommended standards, torque pivot bolts to 500 ft-lb.
NOTE: Set the suspension to specified mounting height before torquing pivot bolt to prevent pre-loading the rubber in the bushing.
13. Reassemble suspension. Torque to spec (Page 9).
14. Connect height control valve linkage (if disconnected). Inflate air springs.
15. Install wheels and tires.
16. Raise vehicle and remove support stands. Lower vehicle to ground.

CAUTION Failure to torque suspension hardware can result in suspension failure and void the warranty.

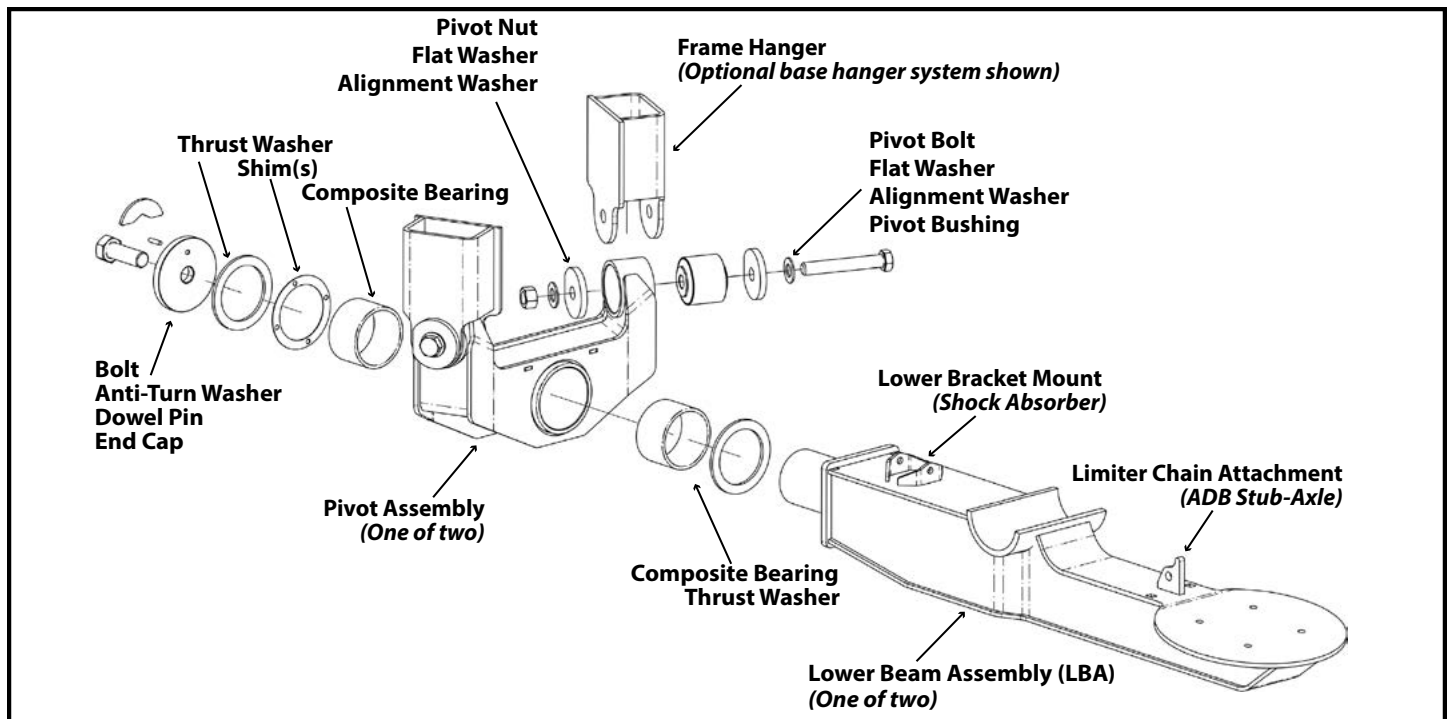


Figure 6. Bushing replacement includes components for two pivot connections (one pivot assembly) on each axle. Replace the two pivot bushings in the pivot assembly at the same time.

Lower Beam Assembly (LBA) Bearing Replacement Procedure

Vehicle Preparation

Chock wheels. Raise vehicle to height that removes load from suspension and support with jack stands.

Disconnect the linkage from the height control valve(s), if necessary. Exhaust all air from air springs.

CAUTION Failure to properly chock wheels, exhaust the air system and raise and safely support the vehicle could allow vehicle/suspension movement that could result in serious injury.

Lower Beam Assembly (LBA) Bearing Replacement

1. Remove wheels and tires. Support lower beam/pivot assembly.
2. Remove the shock absorber. Disconnect Limiter Chain. Disconnect air spring from frame.
3. Disassemble the two pivot connections of the pivot assembly. Inspect and replace components as necessary (Figure 6/Page 8).
4. Remove the Lower Beam Assembly and the Pivot Assembly from the hangers.
5. Grind/Cut weld around anti-turn washer. Remove LBA bolt, end-cap and dowel pin. Inspect and replace components as necessary (dowel pin must be retained for re-assembly).
6. Separate LBA from pivot assembly.
7. Remove bearing and thrust washer from lower beam assembly and discard.
8. Remove the end-cap shim(s); the thrust washers; and, the composite bearings from pivot assembly and discard.
9. Inspect the lower beam assembly for excessive wear. NOTE: Outside diameter of the roll-joint should be 4.438-inches \pm 0.003".
10. Press new composite bearing into both sides of pivot assembly. The bearings should meet in the center of the pivot assembly
11. Install thrust washer onto roll-joint of lower beam assembly. Insert LBA into the pivot assembly.
12. Check pivot assembly gap by installing thrust washer, end-cap and bolt onto end of LBA roll-joint and tightening. Shim(s) will not be needed if there is less than 0.040" gap between roll-joint end and the outside of the pivot assembly.
13. Complete assembly by installing shim (if needed), thrust washer, end-cap and bolt onto the end of the LBA roll-joint. Torque bolt on the lower beam assembly to 750 ft-lb (1017 N-m).

14. Insert dowel pin into end-cap. Weld anti-turn washer to end-cap as shown on engineering drawing.
15. Install pivot assembly to hangers with pivot hardware. Torque pivot bolt/nut hardware to 500 ft-lb (675 N-m).
16. Attach air spring, shock absorber, and limiter chain. Torque to specifications (Page 9).
17. Connect height control valve linkage and inflate air springs.
18. Install wheels and tires.
19. Raise vehicle and remove support stands. Lower vehicle to ground.

CAUTION Failure to torque suspension hardware can result in suspension failure and void the warranty.

Terms and coverage in this warranty apply only to the United States and Canada.

Ridewell Suspensions warrants the suspension systems manufactured by it to be free of defects in material and workmanship. Warranty coverage applies only to suspensions that have been properly installed, maintained and operated within the rated capacity and recommended application of the suspension. The responsibility for warranty coverage is limited to the repair/replacement of suspension parts. The liability for coverage of purchased components is limited to the original warranty coverage extended by the manufacturer of the purchased part.

All work under warranty must have prior written approval from the Ridewell warranty department. Ridewell has the sole discretion and authority to approve or deny a claim and authorize the repair or replacement of suspension parts. All parts must be held until the warranty claim is closed.

Parts that need to be returned for warranty evaluation will be issued a Returned Materials Authorization (RMA). Parts must be returned to Ridewell with the transportation charges prepaid. The transportation charges will be reimbursed if the warranty claim is approved.

This non-transferable warranty is in lieu of all other expressed or implied warranties or representations, including any implied warranties of merchantability or fitness or any obligations on the part of Ridewell. Ridewell will not be liable for any business interruptions, loss of profits, personal injury, any costs of travel delays or for any other special, indirect, incidental or consequential losses, costs or damages.

Contact the Ridewell Warranty Dept. at 417.833.4565 - Ext. 135, for complete warranty information.