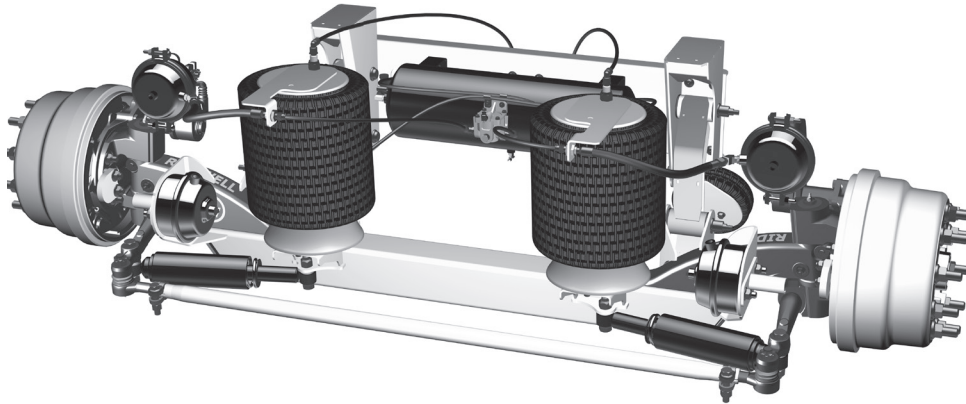


# RSS-233T - 13K Trailer

## Self-Steering Air-Ride Suspension



## Installation and Service Manual

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Part No.: 9710107

Doc.: 233T-Trailer-13K-ISM-RevB-03-29-17

# SUSPENSION IDENTIFICATION

## Introduction

It's important that the proper suspension model be chosen for the application in which it is to be used. The Ridewell Self-Steering (RSS) 233 Suspension series is a fully integrated, auxiliary axle suspension system available for truck and trailer applications.

The RSS-233T 13K Trailer Suspension System can be configured with either drum or disc brake axle assemblies and with an optional steering lock.

Refer to the engineering drawing for detailed information on the suspension system components and operating parameters.

## Identification Tag

Ridewell suspension systems can be identified by the Part Number and Serial Number listed on the serial identification tags.

### Suspension Serial Tag

The Suspension Serial Tag (Figure 1) is attached to the left-hand side (driver's side) of the frame hanger.

The **Part Number (233xxxx)** refers to the individual suspension system.

The nine-digit **Serial Number (1xxxxxxx)** refers to the date and order of manufacture of the suspension.

Please refer to both numbers when contacting Ridewell for customer service, replacement parts and warranty information.

## Notes and Cautions

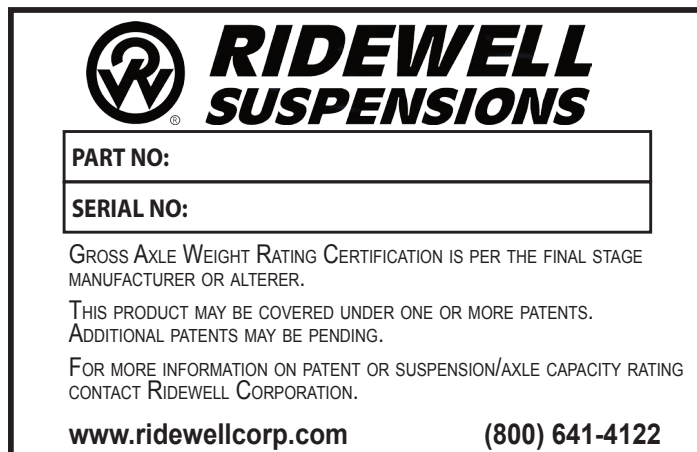
Read through the entire Installation and Service Manual (ISM) before performing any installation or maintenance procedures.

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

The ISM uses two types of service notes to provide important safety guidelines, prevent equipment damage and make sure that 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.



**Figure 1. The Suspension Serial Tag is located on the left-hand (driver's side) suspension hanger.**

## Notes on Self-Steering Option

Self-steering suspensions are designed to steer only in the forward direction. The suspension should be raised off the ground or locked into a non-steering configuration during reverse travel to avoid damaging the suspension.

Ridewell Suspensions strongly recommends the use of automated systems that raise/lock the lift-axle during reverse travel. For manual operations, Ridewell recommends the installation of a visual/audible indicator to assist the driver.

Use caution when maneuvering in reverse with the steering lock engaged. The driver should maintain slow maneuvering speeds and avoid extreme turns.

**CAUTION** Failure to lift the suspension and-or engage the steering-lock during reverse travel can cause component damage and void the warranty.

## Prior to Installation

Refer to the engineering drawing to confirm dimensional requirements and the range of ride heights available.

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 auxiliary suspension, air springs, brake chambers, steering components. axle (including axle to driveline) and tires.

### RSS-233T 13K Trailer Suspension - Torque Specifications

| Fastener Type  | Size      | Torque Values |              |
|--|-----------|---------------|--------------|
|  |           | foot-pound    | Newton-meter |
| Hex Head Cap Screw (Air Spring)                                    | 1/2"-13NC | 50 ft-lb      | 68 N-m       |
| Flanged Lock Screw   | 3/8"-16NC | 25 ft-lb      | 35 N-m       |
| Lock Nut (Air Spring)  | 3/4"-16NF | 50 ft-lb      | 68 N-m       |
| Lock Nut (Steering Damper)   | 3/4"-10NC | 160 ft-lb     | 217 N-m      |
| Pivot Bolt - (Hex Head Cap Screw (HHCS))<br>Pivot Nut - (Lock Nut) | 3/4"-16NF | 310 ft-lb     | 420 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. It is the installer’s responsibility to apply the proper torque values. All fasteners **MUST** be re-torqued after the first 6,000 miles of operation. Failure to install and maintain suspension component fasteners at torque specifications could result in suspension failure and void the warranty.

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## Mounting the suspension to the trailer frame

Refer to the engineering drawing for the range of ride heights available as well as spacing and clearance requirements of the suspension.

All models of the RSS-233T 13K Trailer Suspension are shipped fully assembled. If the system is taken apart for installation, the components must be reassembled with the proper torque applied (Page 3).

### Weld-On Installation Procedure

Recommended locations of customer-furnished filler plates and supporting crossmembers for the suspension hangers and air spring mounting plates are shown on the engineering drawing.

NOTE: A single bridge assembly instead of the two air spring mounting plates is available as an option on some RSS-233T 13K Trailer suspension models.

**CAUTION** The welding method used must develop a minimum weld tensile strength of 70,000 psi per AWS specifications.

1. Mark the desired location for the frame hangers and air spring mounting plates (or bridge assembly) and customer-furnished filler plates on the frame. NOTE: For proper support, a crossmember must be located within six inches of the leading or trailing edge of the frame hanger. Check the location for sufficient clearances in both the raised and lowered positions of the suspension.
2. Weld customer-furnished filler plates, as needed, to crossmembers with 1/4" fillet welds down the length of the crossmember.
3. Weld the customer-furnished filler plates for the air spring mounting plates (or bridge assembly) to the frame and crossmember(s), as needed. Weld the filler plates with 1/4" fillet welds down the length of the crossmember.
4. Weld the hangers to the frame/filler plates with 1/4" fillet welds completely around the hangers. Stop the welds 1/2" from the corners and edges.
5. Weld the air spring mounting plates (or bridge assembly) to the frame/filler plates with 3/16" fillet welds all the way around the mounting plates/bridge assembly.
6. If components have been removed for installation, reinstall as shown on engineering drawing. Torque to specifications (Page 3).
7. Install/connect the air control kit (ACK) to the suspension. Check the air system installation for leaks and proper operation of controls (page 6).

8. Perform final assembly and inspection and check the wheel toe setting (Page 5).

**CAUTION** Failure to torque bolts/nuts of suspension components to specifications can result in failure of the suspension and void the warranty.

### Bolt-On Installation Procedure

Refer to the engineering drawing for the range of ride heights available, spacing and clearance requirements of the suspension and bolting pattern detail.

Bolts/nuts for attaching the suspension to the vehicle are supplied by the installer. Grade 8 bolts and flanged lock nuts or lock nuts with hardened washers are recommended.

**CAUTION** Check to make sure that wires, hoses or other components located within the frame rail are not affected by drilling.

## Final Assembly and Inspection

1. Verify welds on hangers and air spring mounting plates. Verify that all suspension component bolts/nuts are torqued to specifications (Page 3).
2. Install wheels and tires.  
**CAUTION** When lowering an auxiliary axle on an unloaded vehicle, pressure to the load air springs must be reduced to below 10 psi.  
Failure to reduce the air pressure could cause the vehicle's drive axles to rise from the ground and the vehicle could roll in an unsafe manner.
3. Check that tires are inflated to recommended pressure. Check wheel hubs for proper level of lubricant recommended by the manufacturer.
4. Lift the axle to the raised position. Check the air system tubing and connections for leaks.
5. Check that wheels can rotate freely and that brakes and slack adjusters are properly adjusted.
6. Raise and lower the suspension assembly (wheels and tires installed) through the entire range of travel. Make sure that sufficient clearances for air springs, brake chambers and other components has been provided.
7. Check the vehicle's reverse travel options:
  - 7.1 Check steer lock operation.
  - 7.2 Check automated system (if installed) to make sure that suspension raises/locks wheels during reverse travel.  
**CAUTION** Failure to check reverse travel operations can result in component damage and void the suspension warranty.  
**CAUTION** Do not lower the auxiliary axle while the vehicle is moving in forward or reverse travel above 10 mph.
8. Check wheel toe-in setting and adjust, if necessary (between 1/32" and 3/32").

### Wheel Toe Setting

Wheel toe is the relationship of the distance between the front of the tires and the distance between the rear of the tires on the same axle.

When the front distance is less than the rear distance, the wheels are in a "toe-in" (positive toe) condition.

The correct setting for the RSS-233 suspension should be toe-in between 1/32" and 3/32".

### Air springs pressure regulates axle load

The load capacity of the auxiliary axle is adjusted by increasing or decreasing the pressure to the air springs. By applying more air, the lift axle takes on a greater percentage of the load's weight. The load capacity is decreased as the air pressure decreases.

Accurate readings of the load capacity can be obtained by parking a loaded vehicle over a calibrated scale and lowering the axle onto the scale. The air pressure to the air springs is manually adjusted up or down to obtain the axle load weight at various air pressures.

**CAUTION** Do not exceed the rated load capacity of the suspension system or other components. Exceeding the capacity can cause component failure and void the warranty.

### Check Wheel Toe Setting

1. Deflate the air springs.
2. Lift the axle enough for tires to rotate freely. Support with jack stands to ensure axle is level.
3. Position tires to point straight ahead. Spin each tire. Use a piece of chalk to mark a line on the center tread all the way around the tire.
4. Use the centerline mark to measure the distance from the front of the tire to the frame. Measure the distance from the back of the tire to the frame.
5. Subtract the front of the tire distance from the rear distance to obtain the wheel toe setting.

### Adjust Wheel Toe

1. Loosen clamps on both ends of the tie rod. Twist the tie rod forward/backward to move the front of the tire towards or away from the frame.
2. Continue rotating the tie rod until the proper toe-in setting is achieved.
3. Torque tie-rod clamps to 60-80 ft-lb (81-108 N-m).

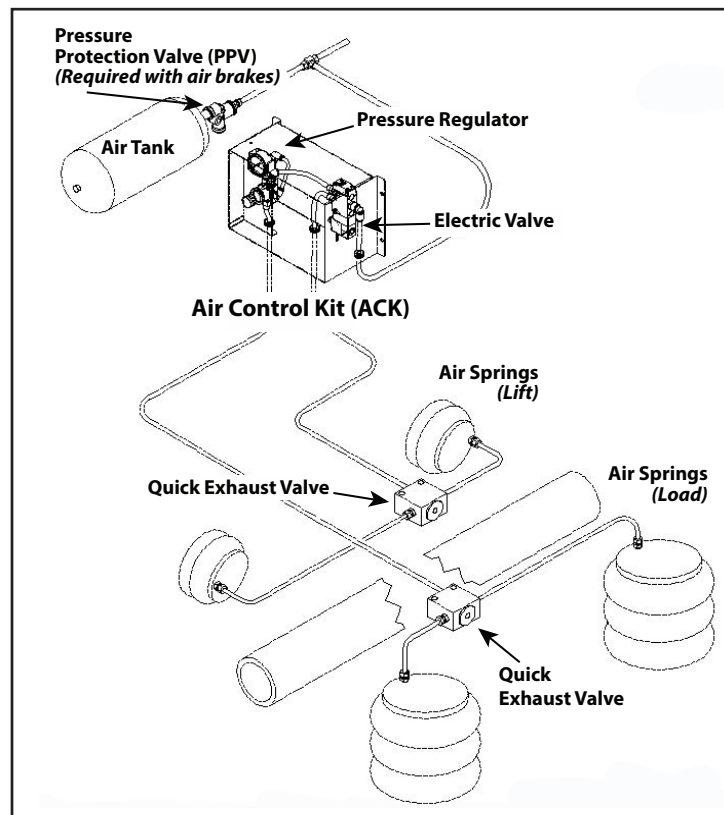
## Install air system components

Connect the load and lift air springs and an air control kit to the air system (Figure 2).

The air control kit (ACK) consists of a pressure regulator with a gauge connected to an air valve controlled by an electric switch or manual knob. The ACK allows the operator to control the air spring pressure so that the auxiliary axle can support different loads.

Ridewell has a number of manual/electric ACK configurations available. Installation will vary by the type of configuration.

**CAUTION** The installer is responsible for making sure that air system requirements comply with the appropriate Federal Motor Vehicle Safety Standards.



**Figure 2.**  
Example of Air Control Kit (ACK) installation

## Troubleshooting – Air System Installation

| Problem  | Possible Cause   | Solution   |
|--|--|--|
| <b>Air springs fill but do not exhaust.</b>                | <ul style="list-style-type: none"> <li>– Obstructed air line.</li> <li>– Faulty controls wiring.</li> <li>– Manual override pushed in</li> </ul>   | <ul style="list-style-type: none"> <li>– Check for pinched/blocked lines.</li> <li>– Check wiring with voltmeter and correct wiring/installation.</li> <li>– Release manual override.</li> </ul>   |
| <b>Air system leaks down after a short period of time.</b> | <ul style="list-style-type: none"> <li>– Leak in air system beyond accepted standards.</li> </ul>  | <ul style="list-style-type: none"> <li>– Pressurize system and spray soap water solution onto the tubing, valves and fittings. Check for bubbles (leaks). Note: Some valves will leak at an acceptable rate.</li> <li>– Check that tubing cuts are straight and smooth. Re-cut and reassemble fitting joints, if necessary.</li> </ul>   |
| <b>Auxiliary unit will not stay up</b>                     | <ul style="list-style-type: none"> <li>– Loose Air Fittings.</li> <li>– Damaged Air Lines.</li> <li>– Air lines to lift and load air springs are reversed.</li> <li>– Damaged or Worn Air Springs.</li> </ul>  | <ul style="list-style-type: none"> <li>– Check and retighten fittings. Repair or replace component, as necessary.</li> <li>– Check installation. Air line from regulator goes to (load) air springs.</li> <li>– Replace if worn or damaged.</li> </ul>   |
| <b>Auxiliary unit not getting the correct lift</b>         | <ul style="list-style-type: none"> <li>– Air lines to lift and load air springs are reversed.</li> <li>– Lift air springs do not have proper air pressure.</li> <li>– Interference with driveline or other chassis components.</li> <li>– Air control system not installed correctly.</li> </ul> | <ul style="list-style-type: none"> <li>– Check installation. Air line from regulator goes to (load) air springs.</li> <li>– Check for loose fittings or worn/damaged lines. Verify air tank pressure with gauge.</li> <li>– Visually inspect unit operation for proper clearance. Check for loose fasteners and retighten.</li> <li>– Check installation; refer to OEM installation procedures.</li> </ul> |

A visual inspection of the suspension structure should be performed during each pre-trip/safety inspection. Ridewell Suspensions recommends the following minimum service intervals for standard duty, on-highway usage applications. More frequent intervals are recommended for heavier duty applications.

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## Daily/Pre-Trip Inspections

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

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## First 6,000 miles of use

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- \_\_\_ Torque all suspension bolts/nuts to specifications (torque values chart on Page 3).

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## Every 12,000 miles of use

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- \_\_\_ Lubricate Brake Cam and Slack Adjuster.
- \_\_\_ Inspect kingpins and upper/lower kingpin bushings for wear. Grease thrust bearings.
- \_\_\_ Inspect steering damper for damage/wear.
- \_\_\_ Inspect air springs for any damage or excessive wear. Torque air spring bolts/nuts to specifications (Page 3).
- \_\_\_ Check air system for leaks.

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## First 50,000 miles of use

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- \_\_\_ Torque all suspension bolts/nuts to specifications (Page 3).
- \_\_\_ Check wheel ends for excessive play.
- \_\_\_ Check suspension pivot bushings for wear.
- \_\_\_ Check operation of (reverse) steering lock (if equipped).
- \_\_\_ Verify operation of manual/automatic lift-in-reverse control (if equipped).
- \_\_\_ Inspect tie-rod and tie-rod ends for damage and wear. Lubricate tie-rod ends. Check that the tie-rod boot is in place and completely over the end of the tie-rod. Replace entire tie-rod end if boot is damaged.

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## Annually/100,000 miles of use

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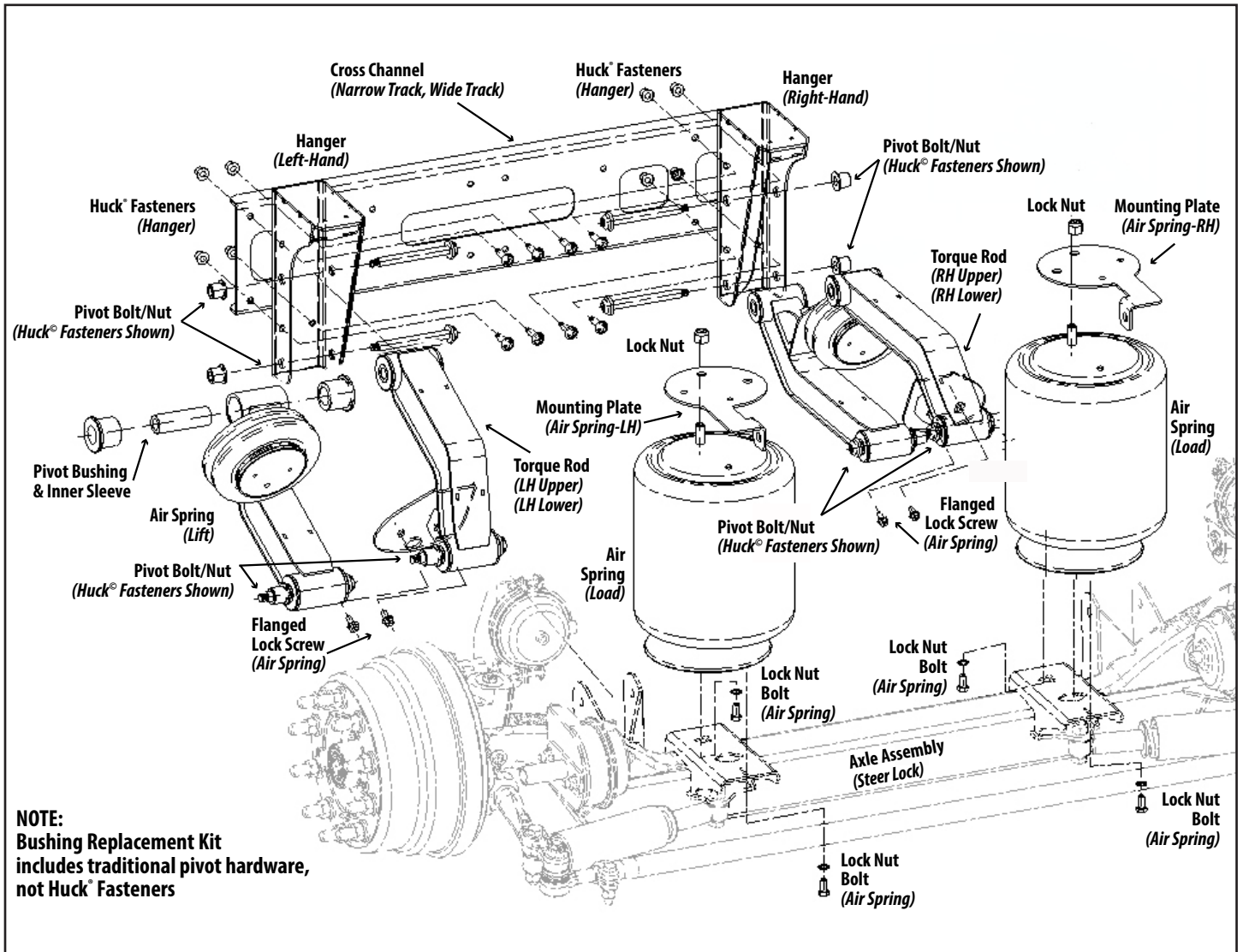
- \_\_\_ Inspect pivot connections for worn pivot bushings and replace, if necessary. Torque pivot hardware and component bolts/nuts to specifications (Page 3).
- \_\_\_ Check suspension hanger and air spring mounting plate connections to frame.
- \_\_\_ Check lubrication level in wheel ends:
  - 1) Oil-Filled Wheel Ends: Refill/Replace lubricant as needed (Refer to TMC RP 631 "100K/Annual Inspection").
  - 2) Semi-Fluid Grease: Pull outer bearing and visually inspect lubrication level. Refill/Replace as needed (Refer to TMC RP 631 "Level 3 Lubrication Level Inspection" and TMC RP 618 "Wheel Bearing Adjustment Procedure").
- \_\_\_ Check air system for leaks.
- \_\_\_ Test air system pressure protection valve (if equipped).
- \_\_\_ Check brake chambers and brakes for damage and proper function.

**⚠ CAUTION** Failure to exhaust all pressure from the air system before working on the vehicle can cause serious injury.

**⚠ CAUTION** Failure to torque bolts/nuts of suspension components to specifications can result in failure of the suspension and void the warranty.

**Refer to the following Technology & Maintenance Council (TMC) publications for additional maintenance information.**

|            |  |
|------------|--|
| TMC RP 609 | Self-Adjusting and Manual Brake Adjuster Removal, Installation and Maintenance |
| TMC RP 618 | Wheel Bearing Adjustment Procedures  |
| TMC RP 619 | Air System Inspection Procedure  |
| TMC RP 622 | Wheel Seal and Bearing Removal, Installation, and Maintenance                  |
| TMC RP 631 | Recommendations for Wheel End Lubrication                                      |
| TMC RP 643 | Air Ride Suspension Maintenance Guidelines                                     |
| TMC RP 645 | Tie Rod End Inspection and Maintenance Procedure                               |
| TMC RP 651 | Steer Axle Maintenance Guidelines  |

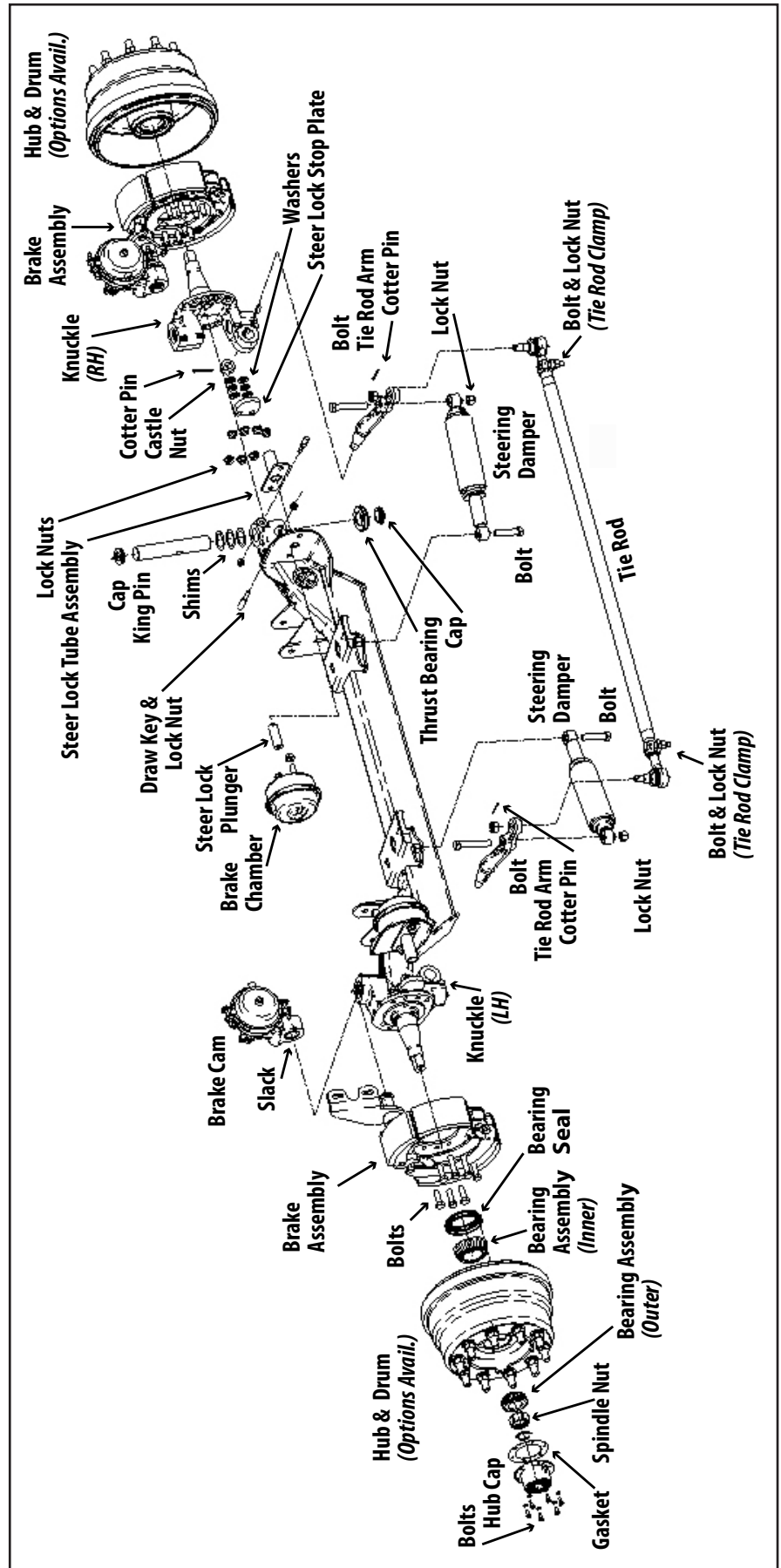


**Figure 3.**  
 RSS-233T - 13K Trailer Suspension (Narrow Track or Wide Track).  
 Refer to engineering drawing of the suspension model for the individual component part number.



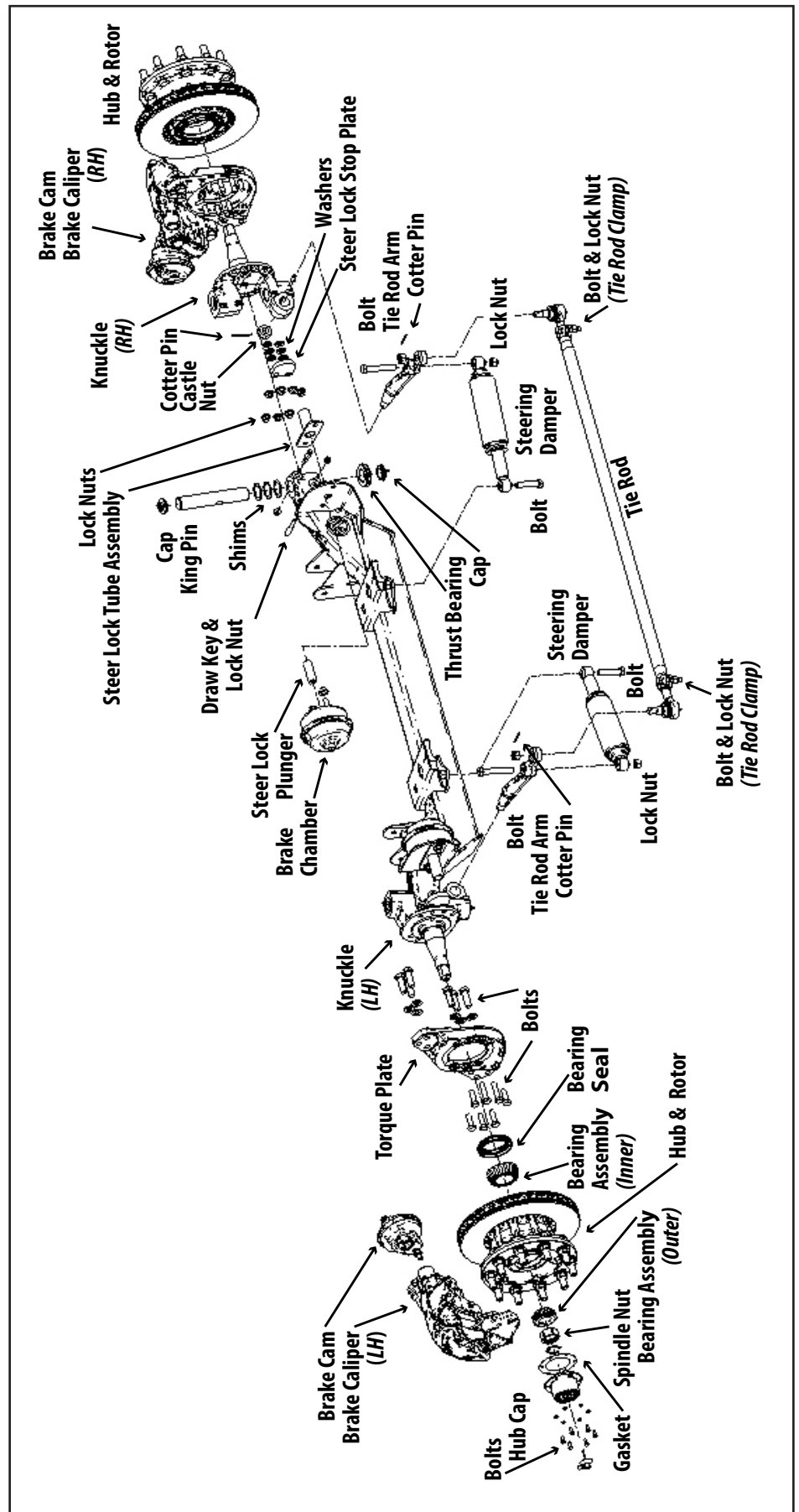
**Figure 4.**  
**RSS-233T - 13K Trailer Suspension**  
**Drum Brake Axle Assembly**  
**(Steer Lock version)**

Refer to the Steer Lock (S) version of the engineering drawing for the individual component part number.



**RSS-233T - 13K Trailer Suspension  
Disc Brake Axle Assembly  
(Steer Lock version)**

Refer to the Steer Lock (S) version  
of the engineering drawing for the  
individual component part number.



## RSS-233T - 13K Trailer Suspension – Bushing Replacement Kit

| Suspension Type | Bushing Rplcmnt Kit Part No. | Pivot Hardware                            | Torque Values |              |
|-----------------|------------------------------|---|---------------|--------------|
|                 |                              |   | foot-pound    | Newton-meter |
| All models      | 6040133                      | Bushing kit - No pivot bolt               | 310 ft-lb     | 420 N-m      |
| All models      | 6040134                      | Pivot Bolt (HHCS)<br>Pivot Nut (Lock Nut) | 310 ft-lb     | 420 N-m      |

**CAUTION** Failure to install and maintain fasteners at torque specifications could result in suspension failure and voiding of the warranty. Refer to the engineering drawing for torque specifications.

Park the vehicle on a level surface. Chock wheels to keep vehicle from moving. Exhaust all air from the air system. Disassemble suspension, if necessary, to reach pivot connections.

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

### Bushing Replacement Procedure

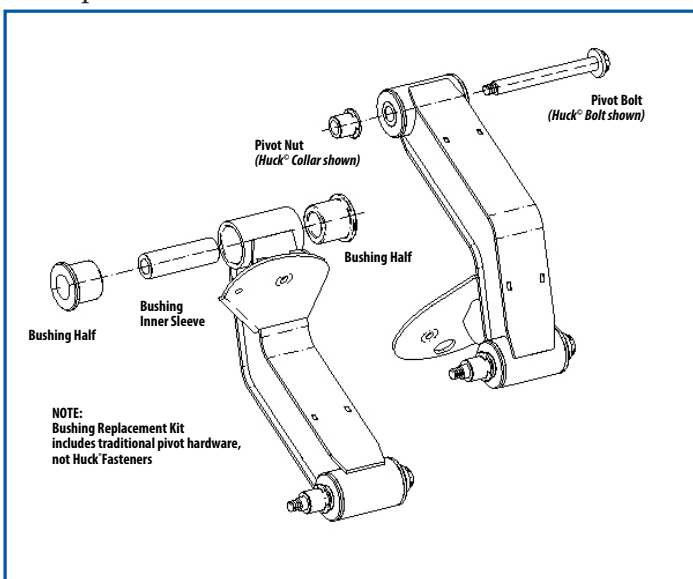
Bushings should be replaced in the eight (8) pivot connections at the same time (Figure 8).

The bushing replacement kit with pivot hardware includes traditional hardware to replace the Huck® Fasteners used for initial assembly.

1. Remove the pivot bolt by cutting/grinding away the Huck® Collar. Discard pivot bolt.
2. Remove the bushing and sleeve assembly from the rod eye. Clean the rod eye of any foreign debris/corrosion.
3. Apply Energy Suspensions® Formula 5 Prelube to the bore (inside) of each bushing half. NOTE: Do not substitute - lubricant included with bushing replacement kit.

4. Press bushing halves into the pivot connection. NOTE: Rubber mallet may be needed.
5. Press the bushing sleeve into the center opening of the installed bushing. NOTE: Rubber mallet may be needed.
6. Check that internal sleeve is flush with both sides of replacement bushing.
7. Install pivot hardware and torque to specifications (Appendix).  
**CAUTION** Failure to torque pivot hardware can result in suspension failure and void the suspension warranty.

Reassemble suspension, if necessary. Check and adjust wheel toe, if necessary.



**Figure 5.** Bushing replacement kit with hardware includes pivot bolt, pivot nut and replacement components for eight (8) pivot connections.

## 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 caused by Ridewell.

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