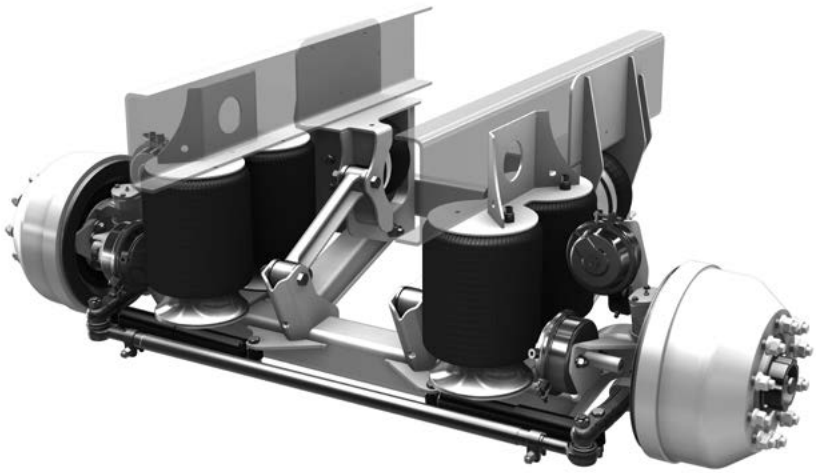
RSS-232/232T 20K – Truck and Trailer
Self-Steering Auxiliary Axle Suspension



Installation and Service Manual

RIDEWELL SUSPENSIONS

SUSPENSION IDENTIFICATION

The Ridewell Self-Steering (RSS)-232/232T 20K Suspension series is a fully integrated, auxiliary axle suspension system available for a range of applications.

The RSS-232/232T 20K Suspension System can be configured with drum or disc brake axle assemblies and with an optional steering lock.

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 when other components are factory installed onto the suspension.

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

Please refer to suspension number/part number and serial number when contacting Ridewell Customer Service Department for replacement parts/warranty information.

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.

Scan/double-click QR-Code or visit the online support page at www.ridewellcorp.com

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 service note types 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

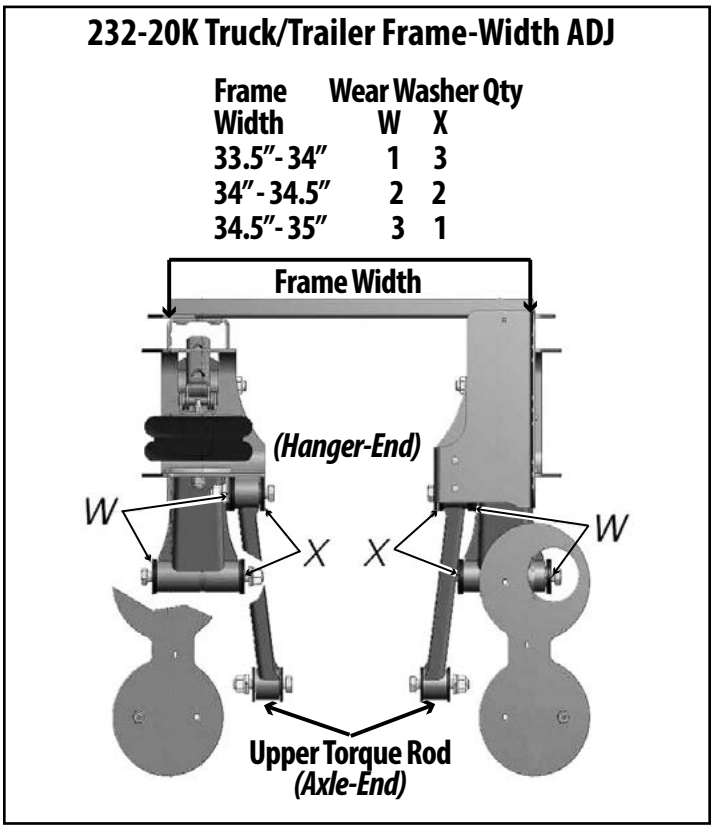


Figure 1.
232/232T-20K Suspension Frame-Width Adjustment
1) Adjust the suspension frame-width by securing the crosschannel at the desired width.
2) Install wear washers at marked locations to obtain proper suspension alignment.

Frame Width Adjustment: The RSS-232 suspension system is provided at a pre-configured frame width or adjusted before installation.

Adjust the frame width by moving the two cross channel sections along a center slot to the desired width and temporarily bolt in place.

Attach the hangers, drill through the supplied pilot holes and bolt the two sections together.

Shim washers (wear washers) are installed to properly align the torque rods (Figure 1).

Engineering Drawing: Refer to the suspension model engineering drawing for dimensional requirements; available ride height; and operating parameters.

Installations can vary. 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 the 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 of 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 to provide the proper load distribution.
- The installer must verify that vehicle crossmembers are positioned to support the suspension at the installing location.
- The installer must verify there is sufficient clearance for proper functioning of the installed auxiliary suspension – air springs; brake chambers; steering components; axle (including axle to driveline clearance); and, tires and wheels.
- 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 the Federal Motor Vehicle Safety Standards (FMVSS) 121 for more information.

Suspension Mounting

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

All RSS-232/RSS-232T 20K Suspension Systems are shipped fully assembled. If the system is taken apart for installation, components must be reassembled with the proper torque applied (Appendix).

(Trailer) - Weld-On Installation Procedure

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

Before welding, check the location for sufficient clearances in both the raised and lowered positions.

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

(Truck) - Bolt-On Installation Procedure

The ride height on RSS-232 20K Truck Suspensions can be adjusted by installing a 2-inch spacer above the hangers and air spring mounting plates before installing the suspension (Figure 4 - pg 8).

An installed spacer requires a change from the standard 8-inch bolting rail height (the portion of the hanger extending above the bottom of the frame). Predrilled holes in the RSS-232 20K truck suspension are provided to locate the hanger flange at the correct bolting rail height.

Suspension hangers are attached to the vehicle frame with six 5/8-inch bolts in each hanger. Air spring mounting brackets require two 5/8-inch bolts in each bracket.
Grade 8 bolts and flanged locknuts or locknuts with hardened washers are required.

1. Measure the vehicle frame width and the hanger-to-hanger inside dimensions of the suspension. Customer-supplied filler plates are required for the hangers and air spring mounting brackets if the vehicle frame width is narrower than that of the suspension.
2. Place the suspension (with hanger and air spring filler plates and air spring mounting plate spacer(s), if required) in desired location.
   NOTE: A crossmember must be located on the frame within six inches of the leading or trailing edge of the hanger.
3. Check that the location provides adequate clearance for suspension components. Make sure the top of the hangers and air spring mounting plates are parallel to the chassis frame to maintain the proper caster angle.
4. Hangers and air spring mounting plates should be perpendicular to the chassis frame and in alignment with each other. Clamp the hangers, mounting plates and the spacer and filler plates (if required) firmly in place.
5. Refer to the engineering drawing for the recommended bolt hole locations on the hangers and air spring mounting plates. If it is not possible to use the recommended bolt locations, space the bolt holes as far apart as possible to provide the greatest support for the suspension.
   ⚠CAUTION Check to make sure that wires, hoses or other components located within the frame rail are not affected by drilling.
6. Center punch and drill six bolt holes in each hanger. Bolt each hanger to the frame with six 5/8-inch bolts and locknuts.
7. Center punch and drill two bolt holes in each air spring mounting bracket. Bolt each air spring bracket to the frame with two 5/8-inch bolts and locknuts.
8. Install/connect air control kit (ACK) to the suspension (Page 6). Check the air system after installation for leaks and proper controls operation.
9. Perform final assembly and inspection. 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.

Final Assembly and Inspection

1. Verify that all suspension component bolts/nuts are torqued to specifications (Page 9).
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.

Check wheel toe-in setting and adjust, if necessary (between 1/32" and 3/32").

⚠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 above 10 mph.

Regulate load with air spring pressure

The auxiliary axle load capacity is adjusted by increasing or decreasing 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 then 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.

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 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 a positive toe-in between 1/32" and 3/32".

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 each tire.
4. Use a tape measure to measure the distance between the center mark at the front and the rear of the tires.
5. Subtract the distance measured at the front of the tires from the distance measured at the rear of the tires to obtain the wheel toe setting (between 1/32" and 3/32").

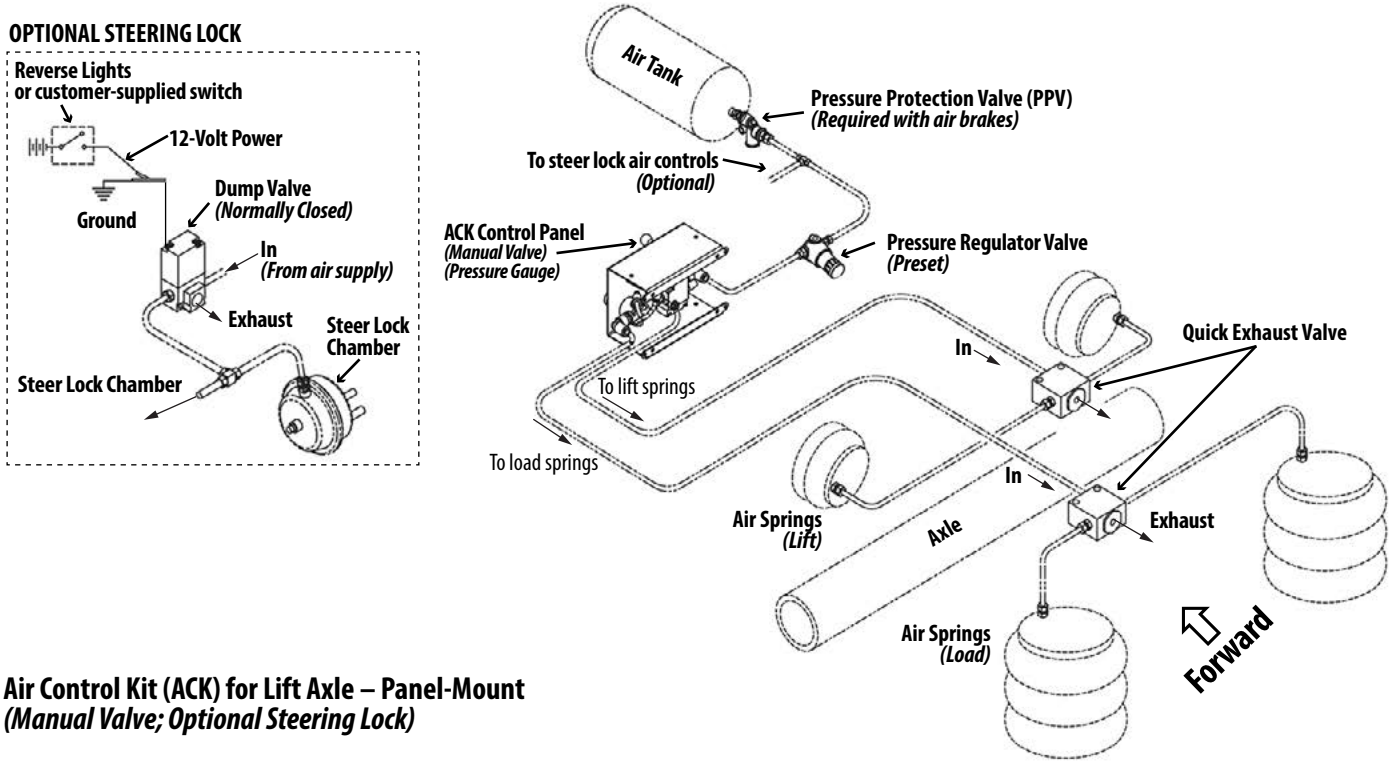
Adjust Wheel Toe

1. Loosen the clamps on both ends of the tie rod. Twist the tie rod forward/backward to move the front of the tires towards or away from each other (increase/decrease toe-in setting).
2. Continue rotating the tie rod until the proper toe-in setting is achieved.
3. Torque the tie-rod clamps to 50 ft-lb (68 N-m).

Air Control Kit Components - Lift Axle

The air control kit (ACK) consists of a pressure regulator with a gauge connected to an air valve controlled by a manual knob or an electric switch. The operator uses the ACK to control the pressure to the air springs to support different loads.

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



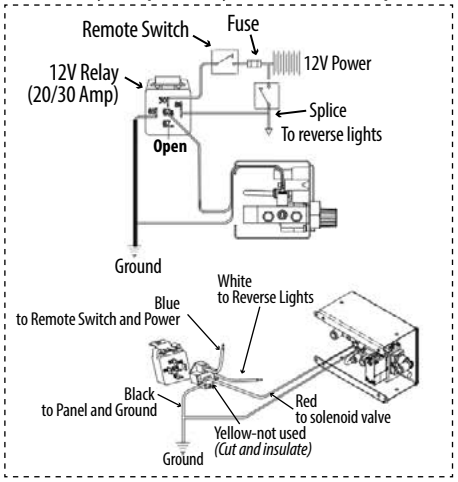
Air Control Kit (ACK) for Lift Axle – Panel-Mount
(Manual Valve; Optional Steering Lock)

TROUBLESHOOTING – AIR CONTROL KIT

Problem	Possible Cause	Solution
Air springs fill but do not exhaust.	— Obstructed air line. — Faulty controls wiring. — Manual override pushed in.	— Check for pinched/blocked lines. — Check wiring w/ voltmeter. Correct wiring/installation. — Release manual override.
Air system leaks down after a short period of time.	— Leak in air system beyond accepted standards. NOTE: Some valves will leak at an acceptable rate.	— Pressurize system and spray soapy water solution onto tubing, valves and fittings. Check for bubbles (leaks). — Check that tubing cuts are straight and smooth. Re-cut and reassemble fitting joints, if necessary.
Auxiliary unit will not stay up	— Loose air fitting connection/Damaged air lines. — Air lines to lift and load air springs are reversed. — Damaged or worn air springs.	— Check and retighten fittings. Repair or replace component, as necessary. — Check installation. Air line from regulator goes to (load) air springs. — Replace air spring if worn or damaged.
Auxiliary unit not achieving correct lift	— Air lines to lift and load air springs are reversed. — Lift air springs do not have proper air pressure. — Interference with driveline/other chassis components. — Air control system not installed correctly.	— Check installation. Air line from regulator goes to (load) air springs. — Check for loose fittings or worn/damaged lines. Verify air tank pressure with gauge. — Visually inspect auxiliary unit operation for proper clearance. Retighten any loose fasteners. — Check air control kit installation; refer to OEM installation procedures.

Panel-Mount ACK for Lift Axle w/ Lift-In-Reverse
(Electric Valve; Optional Steering Lock)

Lift-In-Reverse-Wiring Diagram
Note: Relay is required only for lift-in-reverse operation



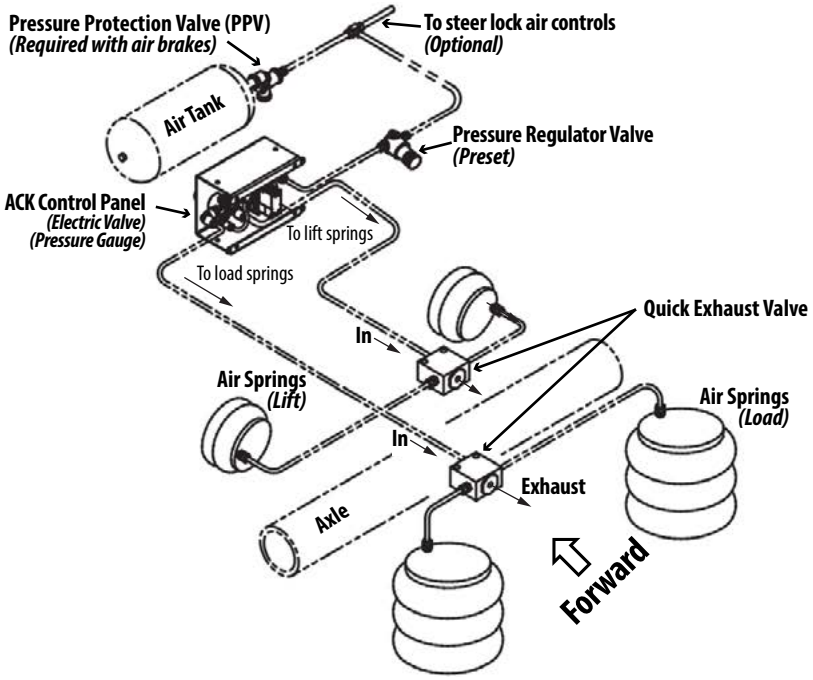
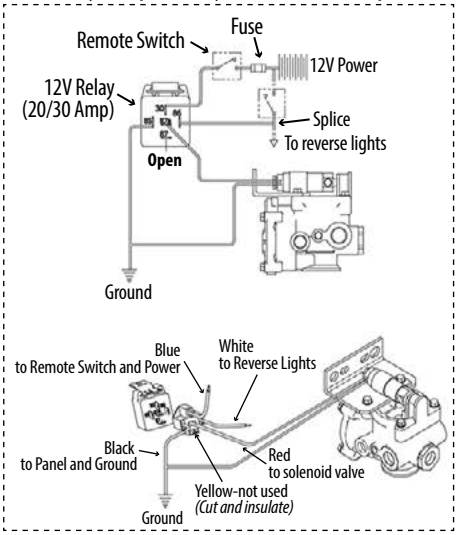


Figure 3.
Plumbing Example - Air Control Kit w/ Lift-In-Reverse system

ACK-Lift Axle Control Module with Lift-In-Reverse

Lift-In-Reverse-Wiring Diagram
Note: Relay is required only for lift-in-reverse operation



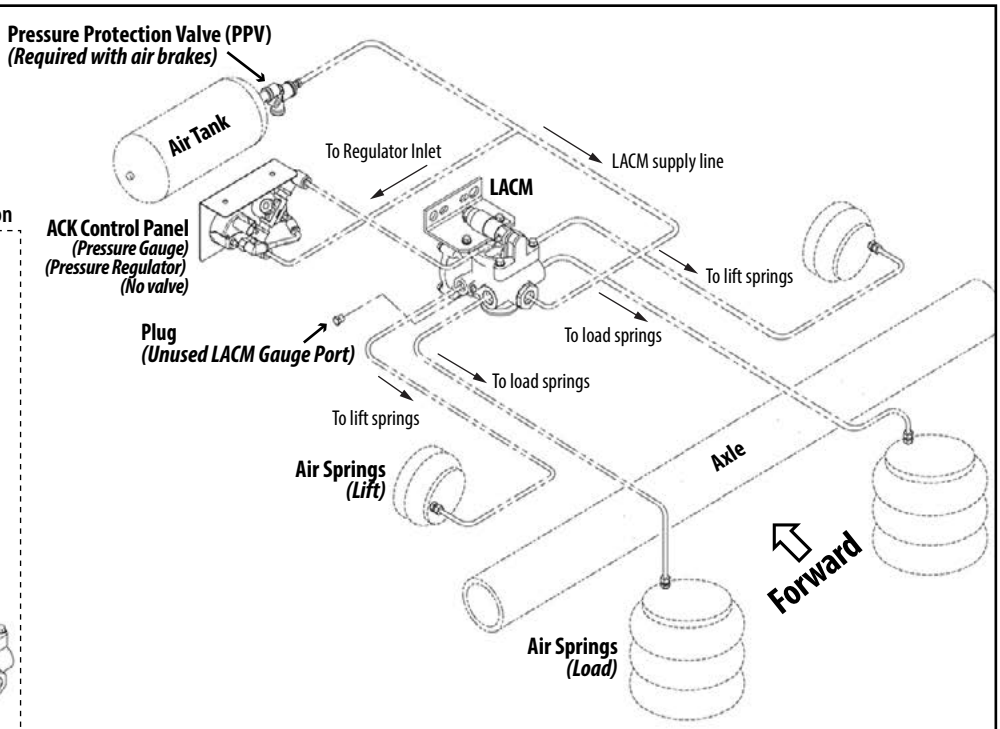


Figure 2.
Plumbing Example - Lift Axle Control Module (LACM) with Lift-In-Reverse system

Recommended Service Intervals

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

Daily/Pre-Trip Inspections

___ Visually inspect suspension structure for signs of damage or excessive wear.

___ Check for loose or missing bolts/nuts. Check for irregular movement in suspension system components.

___ Check tires for proper inflation, road damage or excessive wear.

___ Check wheel-ends for obvious signs of lubricant leakage. Check for missing components.

___ Make sure air controls are operating properly. Drain all moisture from air reservoirs.

First 6,000 miles of use

____ Torque suspension bolts/nuts to specifications (Chart/ENG DWG).

Every 12,000 miles of use

___ Lubricate Brake Cam and Slack Adjuster.

___ Grease kingpin thrust bearings. Apply grease in upper and lower grease fittings until new grease is visible at purge location. Wipe excess grease from purge areas and grease fittings.

___ Inspect steering damper for damage/wear.

___ Inspect air springs for damage/excessive wear. Torque bolts/nuts to specifications (Page 9).

___ Check air system for leaks.

First 50,000 miles of use

____Torque suspension bolts/nuts to specifications (Page 9).

____ 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 tie rod boot is in place and completely over the end of the tie rod.
Replace entire tie rod end if boot is damaged.

Annually/100,000 miles of use

___ Inspect pivot connections for worn bushings/wear washers. Replace if necessary. Torque pivot hardware to specifications (Page 9).

___ Check the 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 *(See TMC RP 631 "100K/Annual Inspection").*

2) Semi-Fluid Grease:
Pull outer bearing and visually inspect lubrication level. Refill/Replace as needed (*See 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 components to specifications can result in suspension failure and void the warranty.

Refer to these Technology & Maintenance Council (TMC) Recommended Procedures 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 Maintenance
RP 631	Wheel End Lubrication Procedures
RP 643	Air Ride Suspension Maintenance Guidelines
RP 645	Tie-Rod End Inspection/Maintenance
RP 651	Steer Axle Maintenance Guidelines

Available Wheel-End Lubricants		
Lubricant Type	**Part No.**	**Item Description**
Mineral Oil	**380008G**	(CITGO) MP GearOil 631310001-80W-90
Synthetic Oil	**1980006**	(SHELL) Synthetic API GI-5 75W-90 Oil
Synthetic Hard-Pack Grease	**1980007**	(CITGO) Synthetic Grease

232/232T-20K Truck/Trailer – Bushing Replacement Kits				
Part No. (Suspension Type)	**Item Description**	**Size**	**TORQUE VALUES** foot-pound	Newton-meter
6040112 (Truck Suspension)	Bushing Replacement Kit (Traditional Hardware)	7/8″ 14NF	500 ft-lb	678 N-m
6040086	(No Hardware) Bushing Replacement Kit			
6040111 (Trailer Suspension)	Bushing Replacement Kit (Traditional Hardware)			
6040085	(No Hardware) Bushing Replacement Kit			
Fasteners	Bolt/Lock Washer/Nut (Air Spring)	1/2″-13NC	25 ft-lb	35 N-m
	Locknut (Air Spring)	3/4″-16NF	50 ft-lb	68 N-m
	Bolt/Locknut (Crosschannel)	1/2″-13NC	50 ft-lb	68 N-m
	Locknut (Steering Damper)	3/4″-10NC	160 ft-lb	217 N-m

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

Failure to install and maintain fasteners at torque specifications could result in suspension failure and void the warranty.

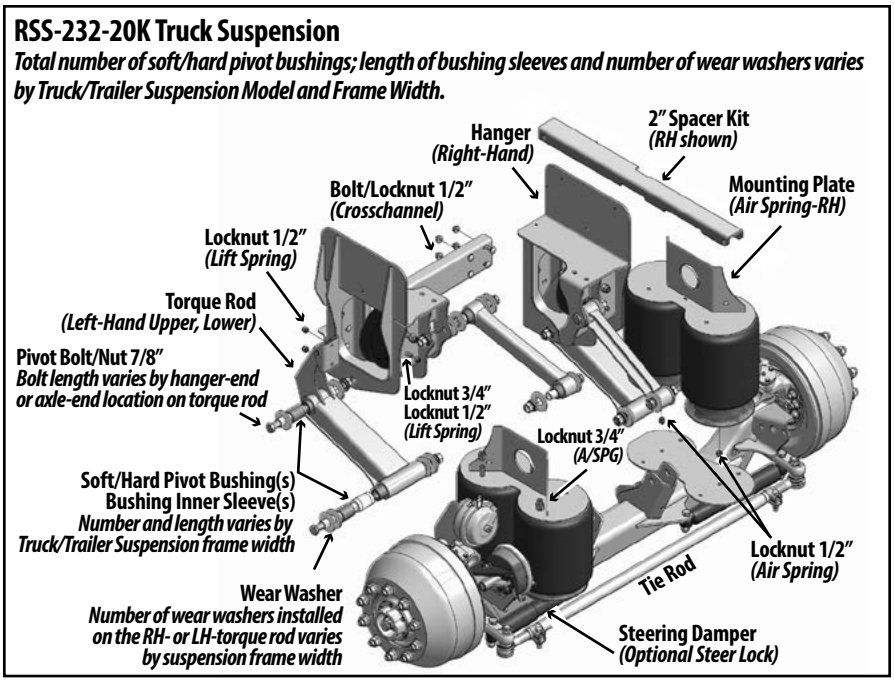


Figure 4.
232-20K Truck Suspension Shown Refer to the engineering drawing Steer Lock(S) version for the individual component part number.

Bushing Replacement Procedure

Vehicle Preparation

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 chock wheels and exhaust air system could allow movement that could result in serious injury.

Bushing Replacement

Bushing replacement kits include both soft and hard urethane bushings for torque rods. Wear washers are included in bushing replacement kits.

1. Count and note the number of wear washers on each side of the upper torque-rod (Hanger End) and the lower torque-rod (Axle End). The wear washer number will vary with frame width (Figure 5).
2. Remove pivot hardware and discard. Remove and discard the wear washers. NOTE: Wear washers are included in bushing replacement kits. Pivot hardware is an optional purchase with bushing kit.
3. Remove bushing assemblies and discard. Use a wire brush to clean rod eye of any debris/corrosion.
4. Apply Energy Suspensions® Formula 5 Prelube to the bore (inside) of new bushings. NOTE: Do not substitute - special lubricant included with all kits.
5. Lower Torque Rod (Axle End):
   - 5.1. Press replacement hard and soft bushings into the axle end of lower torque rod (Fig. 4 - Pg 9).
   - 5.2. Press inner sleeve into the installed bushings. Check to make sure that bushing ends are flush with the eye of the torque rod.
   - 5.3. Position the inner sleeve to extend slightly past the right or left side of the torque rod eye, depending on the number of wear (shim) washers needed (Figure 5). NOTE: Trim bushing ends flush to torque rod eye, if necessary.
   - 5.4. Assemble pivot connection with the number of wear washers on either side of the torque rod. Torque pivot hardware to specifications.
6. Lower Torque Rod (Hanger End):
   - 6.1. Install soft bushings into hanger end of lower torque rod. Verify bushing ends are flush with the torque rod eye.
   - 6.2. Press inner sleeve into installed bushing. Center sleeve so that both ends extend slightly past the torque rod eye sides. Assemble the pivot connection with one wear washer on either side of bushing (Figure 5).
   - 6.3. Torque pivot hardware to spec. NOTE: Trim bushing ends flush to rod eye if necessary.

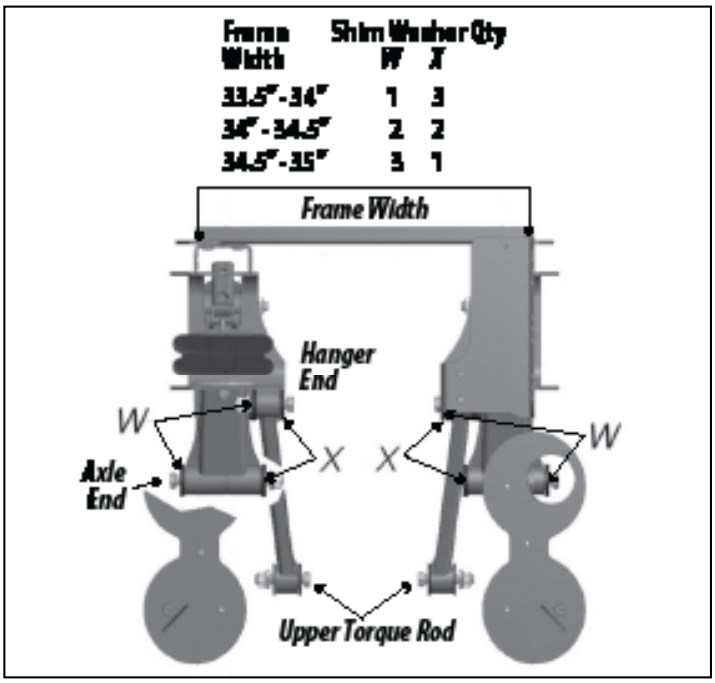


Figure 5.
Install listed number of wear washers at marked locations to obtain suspension alignment.

7. Upper Torque Rod (Hanger End)
   7.1 - Install soft bushing into the eye of the upper torque rod.
   7.2 - Press inner sleeve into the installed bushing. Position sleeve to extend past the right or left side of the torque rod eye, depending on the number of wear (shim) washers needed. NOTE: Check to make sure that bushing ends are flush with the eye of the torque rod. Trim, if necessary.
   7.3 - Assemble the pivot connection with the appropriate number of wear washers (Figure 5). Torque pivot hardware to specifications.
8. Upper Torque Rod (Axle End)
   8.1 - Install soft bushing into the hanger end of the lower torque rod. Check to make sure that bushing ends are flush with torque rod eye. Trim bushing ends flush to eye, if necessary.
   8.2 - Press inner sleeve into the installed bushing. Center inner sleeve so that both ends extend slightly past the sides of the torque rod eye. Assemble the pivot connection with one wear washer on either side of the bushing. Torque pivot hardware to specifications (Page 9).
9. Reassemble suspension, if necessary. Torque components to specifications (Page 9).
10. Check wheel toe-in setting (between 1/32″ and 3/32″) and adjust, if necessary.

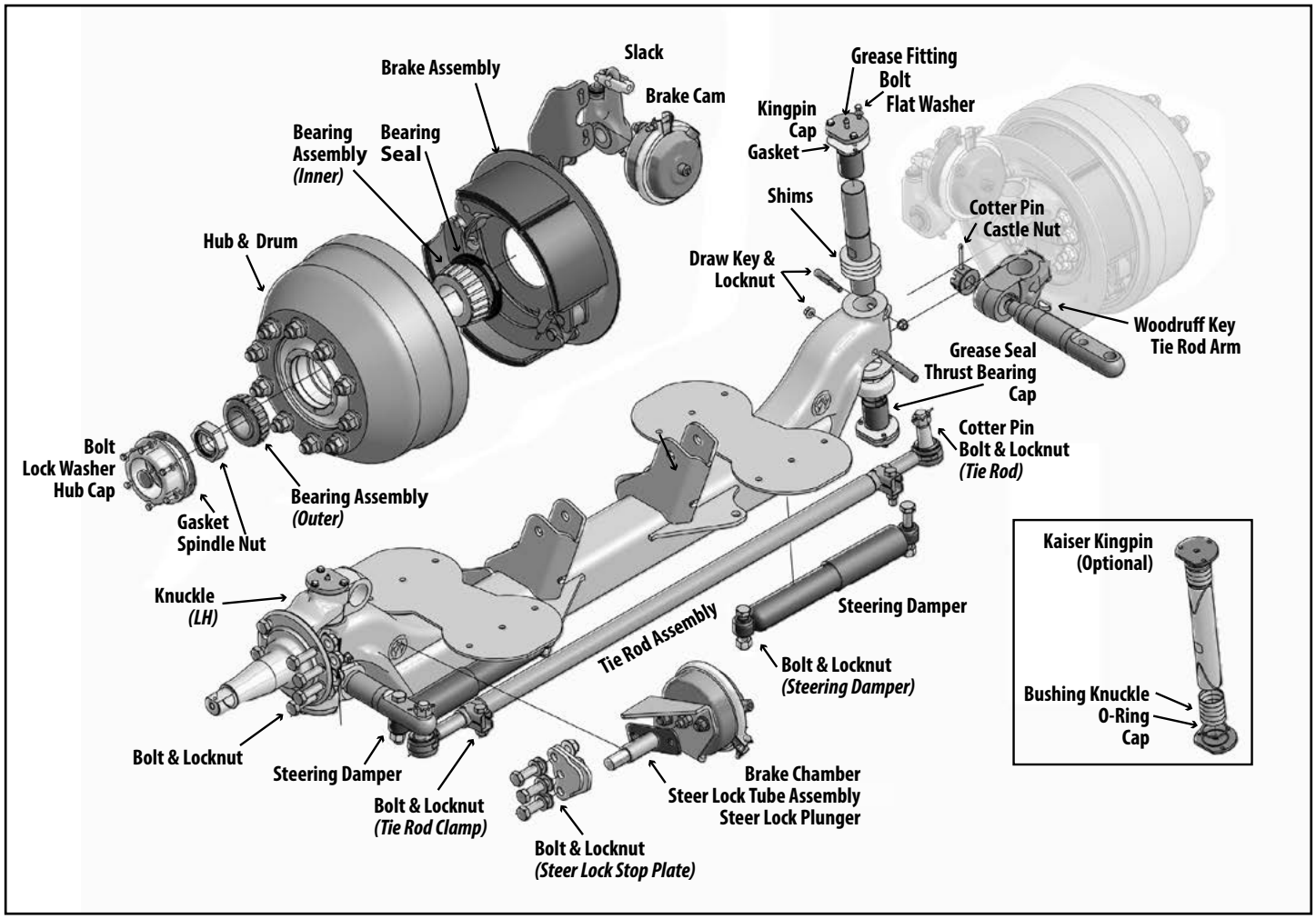


Figure 6.
RSS-232-20K Truck Suspension - Drum Brake Axle Assembly (Steer Lock version)
Refer to the Steer Lock (S) version of the RSS-232/232T - 20K Truck and Trailer engineering drawing for the individual component part number.

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 for suspensions is limited to the original warranty coverage extended by the manufacturer of the purchased part.

All work performed 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 charges for parts transportation 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.