

Overview

Rear Suspension

This chapter includes routine maintenance and a procedure for removal of the axle and suspension from the bus chassis. Manufacturer's documentation is provided in the appendixes and on the TechReference CD for more involved servicing of the axle and suspension components.

All Americans are equipped with one of three rear suspension systems:

Hendrickson™ Softek™ The Softek rear suspension is a 13-leaf (AAFE) or 14-leaf(AARE) slipper spring configuration, and is standard equipment on both Front Engine and Rear Engine All American.

Hendrickson™ Comfort Air™ The Comfort Air rear suspension is a trailing arm configuration with 2 heavy duty rolling lobe air springs mounted rearward of axle and steel springs forward of the axle. The system features a quick align dog tracking adjustment. A transverse track rod controls lateral motion. Vertical motion is controlled by two 1 $\frac{3}{8}$ " bore Sachs shock absorbers. A single height control valve maintains suspension height at varying loads.

Ridewell™ Model 227. The Ridewell 227 rear suspension is a 4-bag air spring suspension incorporating a parallelogram linkage, and is optional on Rear Engine All American only. Vertical motion is controlled by adjustable heavy duty Koni shock absorbers. Two leveling valves permit leveling side to side and front to rear. Axle dog tracking is adjustable via eccentric torque arm bolts.

Forward Engine Rear Axle

Meritor single reduction speed with synthetic bearing lubrication. Standard model is RS21-145; 21,000 lb GAWR; 5.29:1 reduction ratio. All American FE may be equipped with optional models depending upon GVWR and reduction ratio, suspension, and/or brakes options:

| Meritor Model | GAWR | Details |
|---------------|------------|-----------|
| RS19-144 | 19,000 lbs | Standard. |
| RS21-145 | 21,000 lbs | |
| RC23-160 | 23,000 lbs | |
| RS23-160 | 23,000 lbs | |

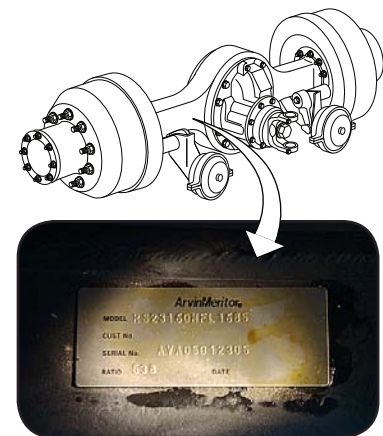
Rear Engine Rear Axle

Meritor single reduction speed with synthetic lubed bearings. Standard model is RS23-160; 23,000 lbs. capacity; 5.38 to 1 ratio. All American RE may be equipped with optional models depending upon GVWR and reduction ratio, suspension, and/or brakes options:

| Meritor Model | GAWR | Details |
|---------------|------------|-----------|
| RS19-144 | 19,000 lbs | Standard. |
| RS21-145 | 21,000 lbs | |
| RC23-160 | 23,000 lbs | |
| RS23-160 | 23,000 lbs | |



Single Reduction Rear Differential Carriers
Meritor Publication Maintenance Manual SA



The specific axle model installed may be identified by referring to the axle data plate affixed to driveshaft side (front on Forward Engine, rear on Rear Engine) of the axle's housing.

RIDEWELL
SUSPENSION

COMFORT AIR
REAR SUSPENSION



Whether the bus is equipped with air or hydraulic brakes, wheel hubs and brake drums or rotors are mounted similarly. The wheel hub (with either an attached drum or rotor) is mounted upon to the axle spindles. Axle shafts pass through the center of the spindles and bolt to the outer flange of the wheel hub. Thus, the rear wheel bearings are lubricated by the axle oil. Synthetic axle lubricant is standard.

CAUTION *Towing the bus with the rear wheels on the road requires removal of the rear axle shafts in order to avoid potential damage to the automatic transmission. See **Jacking & Towing** in the **Specs & Maintenance** chapter for the required procedure.*

Appendixes In This Chapter

[For Hendrickson Softek suspension service procedures, see Front Axle & Suspension chapter, Appendix 1.]

Appendix 1. Comfort Air Rear Suspension. Hendrickson Technical Procedure number 17730-246 covers maintenance, disassembly, and troubleshooting for the Comfort Air rear suspension.

Appendix 2. Ridewell Air Rear Suspension. Ridewell publication covers maintenance, adjustment, and component replacement information on the Ridewell front and rear air suspension

On The TechReference CD

Rear Axle. Arvin Meritor Maintenance Manual 5A includes thorough servicing information on the disassembly, inspection, and servicing of the rear axles, differential, and reduction gears. The axles used on Blue Bird All Americans are single-speed axles without Driver Controlled Main Differential Lock (DCDL).

Also See...

The Hydraulic Brakes chapter of this manual includes a detailed procedure for removing the rear disc rotor/hub assembly.

Maintenance

Maintenance of the rear axle and suspension consists of periodic general inspection, checking tightness of fasteners, and axle lubrication fluid level check and/or replacement. Refer to the maintenance charts on the next page (also included in the **Specs & Maintenance** chapter) for intervals and lubricant specs.



Rear Axle & Suspension

INTERVAL:
MONTHS/1000 MILES
whichever occurs first

| OPERATION | first 1000 miles | 1 / 10,000 | 6 / 6,000 | 6 / 10,000 | 12 / 12,000 | 12 / 24,000 | 12 / 50,000 | 12 / 100,000 | NOTES |
|------------------------------------|------------------|------------|-----------|------------|-------------|-------------|-------------|--------------|--|
| Rear Axle | | | | | | | | | |
| Check lubricant | | • | | | | | | | Hypoid Gear Oil. Capacity: 35 pints (16.9 litres). For viscosity recommendation, see Axle Lubricant chart, below. |
| Change Lubricant, Petroleum Based | | | | | | • | • | | |
| Change Lubricant Synthetic | | | | | | | | • | |
| Spring Suspension | | | | | | | | | |
| Inspect visually | | | • | | | | | | |
| Check rebound pins | | | | | • | | | | Verify that cotter pins are installed. |
| Torque spring radius fasteners | | | | | • | | | | Tighten locknuts to 100–125 ft-lb (11–14 Nm). |
| Torque shock mounting bolts | | | | | • | | | | Tighten locknuts to 75–100 ft-lb (9–11 Nm). |
| Torque U-bolt fasteners | | | | | • | | | | Torque U-bolts to 300–350 ft-lb (34–39 Nm). |
| Air Suspension | | | | | | | | | |
| Inspect visually | | | • | | | | | | Check for wear, damage; loose or missing parts. |
| Torque upper shock mount | | | | • | | | | | Tighten to 50–70 ft-lb (68–95 Nm) |
| Torque lower shock mount | | | | • | | | | | Tighten to 150–180 ft-lb (203–244 Nm) |
| Check ride height | • | | • | | | | | | Shock length, eye to eye: 22.68" ± .25" (576 ± 6 mm) |
| Check U-bolts 7/8-14 UNF 28 | • | | | • | | | | | Tighten to 400–450 ft-lb (542–610 Nm) |
| Check U-bolts 3/4-16 UNF 28 | • | | | • | | | | | Tighten to 260–320 ft-lb (353–434 Nm) |
| Torque lower shock mount to spring | | | | • | | | | | Tighten to 260–320 ft-lb (353–434 Nm) |
| Torque air spring anchor bolts | | | | • | | | | | Tighten to 20–30 ft-lb (27–41 Nm) |
| Torque quick align bolts | | | | • | | | | | Tighten to 525–575 ft-lb (712–800 Nm) |
| Torque lever linkage locknut | | | | • | | | | | Tighten to 100–150 in. lbs. (11–17 Nm) |
| Torque Leveling valve mount bolt | | | | • | | | | | Tighten to 60–85 in. lbs. (7–10 Nm) |

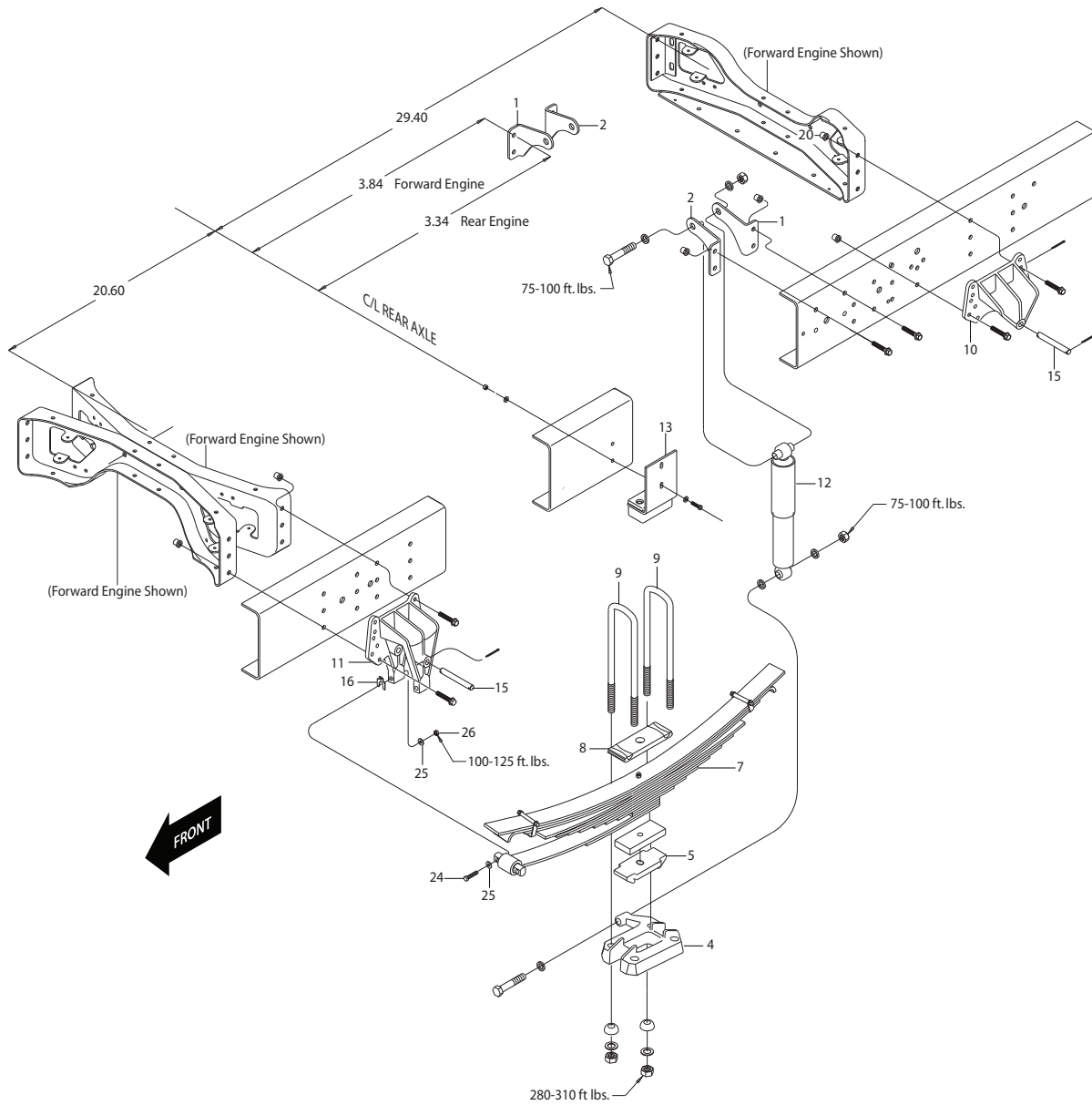
Rear Axle Viscosity /Temperature Chart

| Meritor Lubricant Specification | Description | Cross Reference | Minimum Outside Temperature | Maximum Outside Temperature |
|---------------------------------|-----------------|----------------------|-----------------------------|-----------------------------|
| 0-76-A | Hypoid Gear Oil | GL-5, S.A.E. 85W/140 | +10° F (-12.2° C) | * |
| 0-76-B | Hypoid Gear Oil | GL-5, S.A.E. 80W/140 | -15° F (-26.1° C) | * |
| 0-76-D | Hypoid Gear Oil | GL-5, S.A.E. 80W/90 | -15° F (-26.1° C) | * |
| 0-76-E | Hypoid Gear Oil | GL-5, S.A.E. 75W/90 | -40° F (-40° C) | * |
| 0-76-J | Hypoid Gear Oil | GL-5, S.A.E. 75W | -40° F (-40° C) | +35° F (+1.6° C) |
| 0-76-L | Hypoid Gear Oil | GL-5, S.A.E. 75W/140 | -40° F (-40° C) | * |

* No upper limit on these temperatures. However, axle sump temperature must never exceed +250° F (121° C).

Rear Softek Suspension

270



0077616P



Rear Softek Suspension Installation

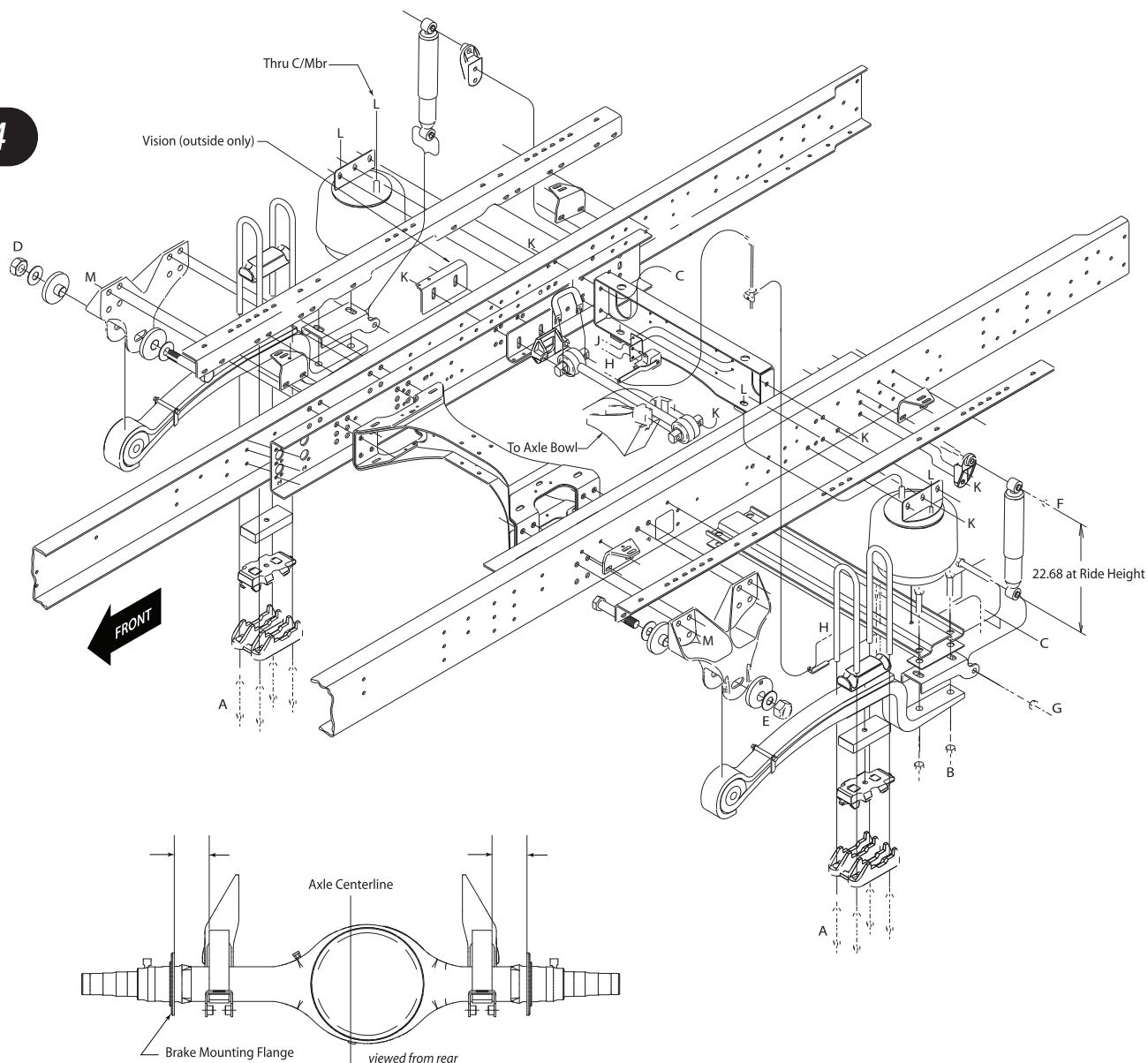
1. Install spring hanger brackets (items 10 & 11) as shown.
2. Install pad assembly (item 13) using fasteners shown. The pad assembly should be installed so that the bracket makes contact with the bottom of the frame rail before tightening fasteners.
3. Place springs in the rear suspension installation jig with the radius leaf toward front of chassis.
4. Select proper axle per production order.
5. install saddle (item 5) over axle dowels at 40.00 spring centers.
6. Place axle housing on axle saddles (item 5) w/ axle centered on springs. To center axle housing, measure distance between outside edge of spring stack and inboard face of brake mtg. Flange (see detail a) for both left & right sides. Move axle side to side if required until difference of left & right measurement is .38 or less. Axle saddle (item 5) is to remain centered on spring (item 7.)
7. Square axle saddle with axle housing $\pm .06$ at outer edge of pad.
8. Install u-bolt bracket (item 4) and spherical washers.
9. Install u-bolts (item 9) with u-bolt seat (item 8), between u-bolts and top of spring. Note u-bolt length variations by model.
10. Install shock on shock arm of bracket (item 4) as shown in diagram.
11. Use hardened flat washer and hi-nut on ends of u-bolts. Torque to 300-310 ft-lb. To prevent distortion of u-bolts, tighten nuts simultaneously w/4 spindle equipment or alternately in diagonal pattern w/manual equipment.
12. Install frame mounted shock brackets (items 1 & 2) as shown.
13. Install inner dual tire and wheel assemblies temporarily for movement of spring and axle assembly only. (if req'd)
14. Assemble spring and axle assembly to chassis.

15. When spring assembly makes contact with the rear spring hanger bracket (item 10), install rebound pin (item 15). Install cotter pin thru rebound pin as shown. (both sides of casting) when spring assembly makes contact w/ frt spring hanger brkt (item 11), install rebound pin (item 15). Install cotter pin thru cotter pin hole in casting and rebound pin as shown.
16. Attach spring radius leaf pin to front side of hanger (item 11), using fasteners as shown. Torque 5/8 fastener to 100-125 ft-lb.
17. Install shocks (item 12) as shown. If axle housing interferes with installing bolt, reverse bolt direction. Torque shock mounting 3/4 fasteners to 75-100 ft-lb.
18. If axle dog track adjustment is required, follow procedure below:
 - 18.1 using beeline or other suitable equipment, make standard check for drive axle dog tracking. If laser mark is within 1/4" of center, no further alignment is required. Skip to step c).
 - 18.2 if laser mark is greater than 1/4" from center, loosen fasteners (item 24) and add shims (item 16*) as req'd. Add only equal number of shims on each side of spring. Tighten fasteners and re-check alignment. Repeat step until laser mark is within 1/4" of center.
 - 18.3 torque fasteners 100-125 ft-lbs.
19. See appropriate fuel tank & barrier installation diagram for part numbers and fasteners.
20. Due to initial relaxation and/or seating of suspension to axle connection hardware, retorquing of nuts on suspension u-bolts (items 9) prior to delivery is required. A minimum of two tightenings, one at initial assembly & one after body mount. It is preferable to do second one after road test, but anytime after body mount is acceptable.



Rear Comfort Air Suspension, Forward Engine

274



Centering Axle on Frame

Measure from outside face of frame rail web to brake mounting flange, edge of brake drum, or edge of new tire. Measure both sides of chassis. Measurements should be equal within $\frac{1}{4}$ ".

0040114FF

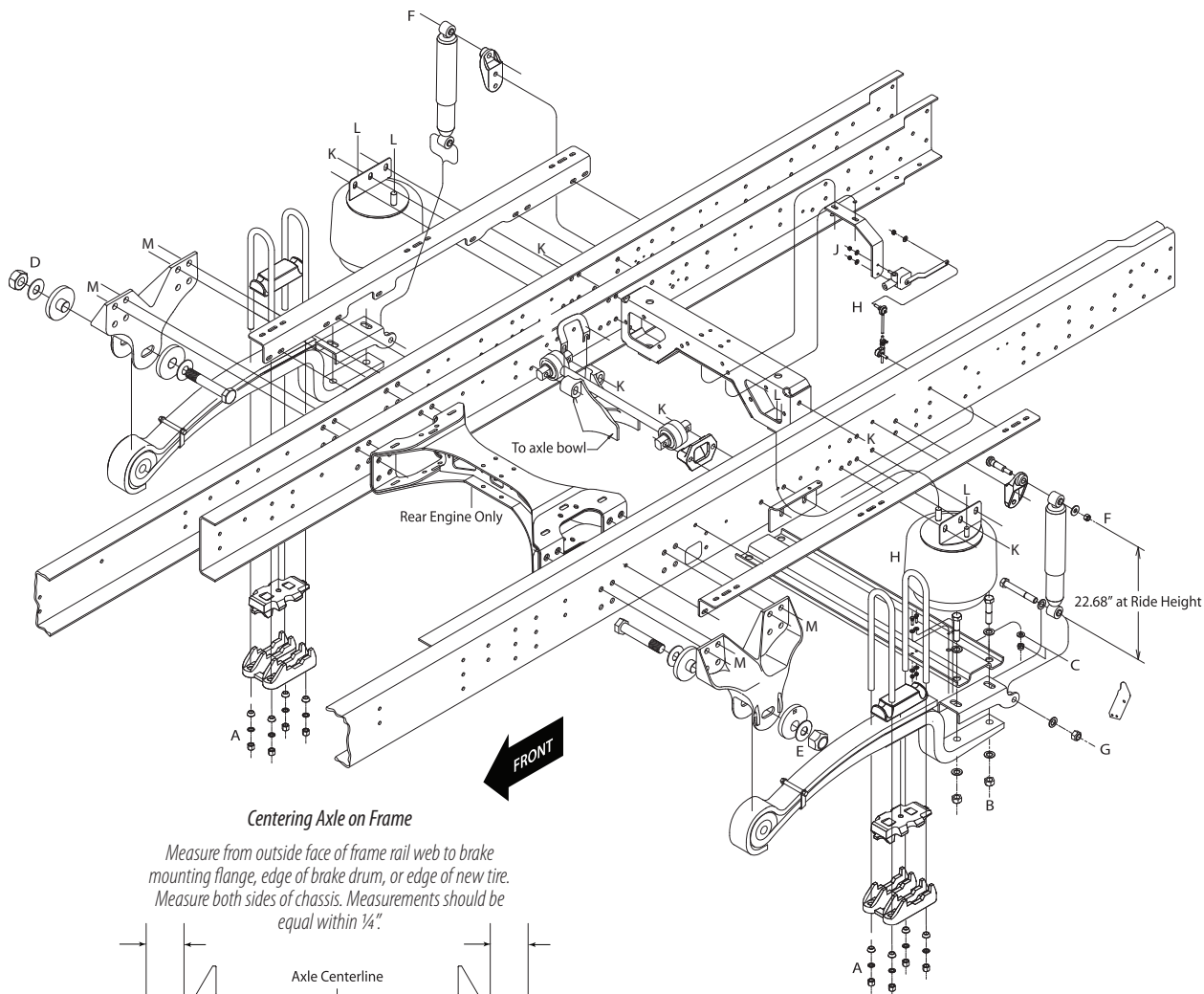


Torque Requirements

| KEY | DESCRIPTION | TORQUE |
|-----|---|---|
| A | U-bolt (High Locknut), 7/8"-14 Unf 2b | 425 Ft.lbs. |
| | 3/4"-16 Unf 2b | 290 Ft.lbs. |
| B | Cross Channel To Main Support Mbr, 3/4"-10 Unc 2b | 290 Ft.lbs. |
| C | Air Spring To Cross Channel, 1/2"-13 Unc 2b | 25 Ft.lbs. |
| D | Quick Align Joint, Right Side Only, 1" - 8 Unc 2b | 550 Ft.lbs. |
| E | Quick Align Joint, Left Side Only, 1" - 8 Unc 2b | 550 Ft.lbs. (100 Ft-lbs During Alignment) |
| F | Shock Absorber, Upper Shock, 1/2"-13 Unc 2b | 60 Ft.lbs. |
| G | Shock Absorber, Lower Shock, 3/4"-10 Unc 2b | 170 Ft.lbs. |
| H | Linkage Rod Assy Locknut, 5/16"-24 Unf 2b | 125 In.lbs. |
| J | Leveling Valve Mounting, 1/4"-20 Unc 2b | 72 In.lbs. |
| K | Capscrew, 5/8"-11, Gr8 | 110 Ft.lbs. |
| L | Air Spring Stud Nut, 3/4"-16 | 25 Ft.lbs. |
| M | Hanger Assembly Nut, 3/4"-10 | 175 Ft.lbs. |

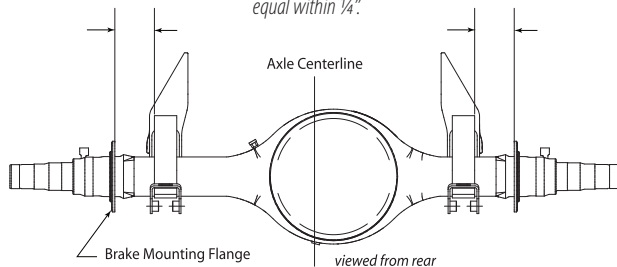
Rear Comfort Air Suspension, Rear Engine

276



Centering Axle on Frame

Measure from outside face of frame rail web to brake mounting flange, edge of brake drum, or edge of new tire. Measure both sides of chassis. Measurements should be equal within $\frac{1}{4}$ ".



0040115J

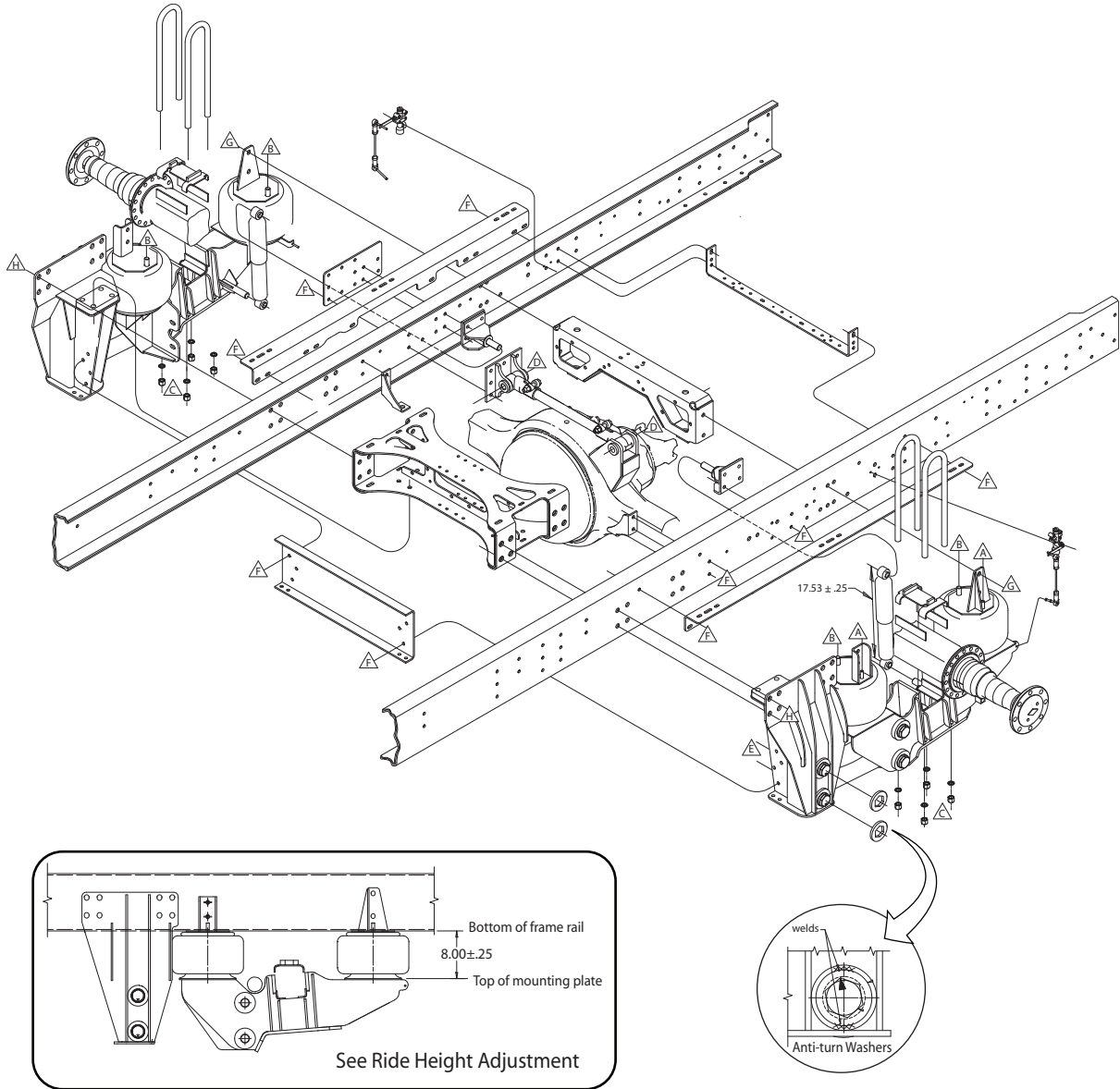


Torque Requirements

| KEY | DESCRIPTION | TORQUE |
|-----|-----------------------------------|---|
| A | U-bolt (High Locknut) | 400-450 ft·lb |
| B | Cross Channel To Main Support Mbr | 260-320 ft·lb |
| C | Air Spring To Cross Channel | 20-30 ft·lb |
| D | Quick Align Joint Right Side Only | 525-575 ft·lb |
| E | Quick Align Joint Left Side Only | 525-575 ft·lb /(100 ft·lb during alignment) |
| F | Shock Absorber, Upper Shock | 50-70 ft·lb |
| G | Shock Absorber, Lower Shock | 160-180 ft·lb |
| H | Linkage Rod Assy Locknut | 100-150 ft·lb |
| J | Leveling Valve Mounting | 60-85 ft·lb |
| K | Capscrew, 5/8"-11, Gr8 | 90-122 Ft.lbs. |
| L | Air Spring Stud Nut, 3/4"-16 | 25 Ft.lbs. |
| M | Hanger Assembly Nut, 3/4"-10 | 155-210 Ft.lbs. |

Rear Ridewell Suspension, Rear Engine

278



0042329H



Torque Requirements

| KEY | DESCRIPTION | TORQUE |
|-----|--|---------------|
| A | Air Spring Stud Nut | 25 ft·lb |
| B | Air Spring Stud Nut | 50 ft·lb |
| C | U-Bolt Nuts | 350 ft·lb |
| D | Sway Bar L'Nut | 460 ft·lb |
| E | Hanger Beam L'Nut | 1000 ft·lb |
| F | Hex Nut, 1/2"-13, Grd 8 | 56 ft·lb |
| G | Hex Nut, 5/8"-11, Grd 8 | 160-180 ft·lb |
| H | Suspension Hanger, Hex Nut, 3/4"-10, Grd 8 | 155-210 ft·lb |

Ride height

Ride height is defined as the distance between the axle and the bottom of the frame rail, and may be verified by measuring either shock length or air spring height:

| | |
|--|----------------------------|
| Ridewell Ride Height (Frame to Axle): | 8.50" ±0.25" |
| Shock length @ Ride Height | |
| Hendrickson: | 22.68" ±0.25" (eye to eye) |
| Ridewell: | 17.53" ±0.25" (eye to eye) |
| Air Spring Ride Height: | 8.0 ±0.25" |

280

Ride Height Adjustment Air Suspension

1. Vehicle to be on level ground with 70-120 psi system air pressure maintained. Left and right rear height control valves to be adjusted independently.
2. Remove vertical rod from first valve horizontal arm & from lower stud. Rotate horizontal lever arm down to fully exhaust air springs.
3. Rotate horizontal lever up, filling air springs until affected side of vehicle is at specified ride height. Bring arm to neutral (horizontal) position when proper height is reached.
4. Place centering pins in valve to hold arm horizontal. Insert vertical link into upper connector, sliding up or down until lower grommet can be pushed onto lower mounting stud. Tighten hose clamp on upper connector and remove centering pins from valve.
5. Remove vertical link lower grommet from mounting stud and rotate horizontal link down to exhaust air.
6. Reinstall grommet on mounting stud and recheck ride height.
7. If adjustments are necessary, loosen hose clamp, slide connector up or down as required. Tighten clamp and repeat steps 5 & 6 until ride height measurement is within specifications.
8. Repeat steps 2-7 for 2nd valve.

Drive Axle Alignment—Ridewell Air Suspension

1. Center axle in chassis, as follows:
 - 1.1 With chassis at normal ride height, measure from outside face of frame rail web to drive axle brake-mounting flange, edge of brake drum, or edge of tire (w/new tires only). Do for both sides. If measurements are within 1/8" skip to step 4.



- 1.2 Loosen track rod pinch bolts and with pipe wrench, rotate track rod shaft (item #18) to move frame laterally relative to axle.
- 1.3 Repeat steps 1) and 2) until axle has been centered within 1/8".
- 1.4 Retighten pinch bolts to 150 ft-lbs.
2. Axle Dog-Track Alignment
 - 2.1 Using beeline or other suitable equipment, make standard check for drive axle dog tracking. If laser mark is within 1/4" of center, no further drive axle alignment is required. Skip to step 3).
 - 2.2 If laser mark is greater than 1/4" from center, loosen nuts (item #28), Rotate eccentric bolts (item #27) on appropriate side to center laser mark. Rotate both upper and lower eccentric bolts equally. Rotating eccentric bolts on both sides of chassis (in opposite directions) may be required to center laser mark.
 - 2.3 Torque drive axle eccentric bolt nuts (item #28) to 1000 ft-lbs.
 - 2.4 Add anti-turn washers (item #26) over head of eccentric bolt (item #27) and weld to receiver ring.

Adjusting of Koni Shocks

1. Remove the shock absorber from the vehicle. Place the lower eye attachment in a vise. Fully collapse shock absorber while turning dust cap to the left (counterclockwise) until it is felt that cams of internal adjusting nut engages in the recesses of the internal foot valve. While engaged, turning the dust cap fully counterclockwise puts the shock at its minimum dampening setting. Skip to step 3) if no damping increase is required.
2. Keeping shock absorber collapsed, turn dust cap to the right (clockwise) until a stop is felt. Stop turning and do not use any more force!! This is the maximum dampening setting. To reduce dampening, turn counterclockwise.
3. Pull shock absorber out vertically without turning for at least 3/8" to disengage the adjusting mechanism. The dust cap may now be turned freely. Shock absorber can then be re-fitted to the vehicle. When reinstalling, tighten shock absorber upper & lower nut (item #23) until a dimension of 1.75" between washers is attained, as shown.
4. Make certain both left and right shocks are at equal settings. Repeat steps 1-3 as required.

Rear Spring & Axle Removal

WARNING *Never work under a bus supported solely by hydraulic jacks. Always use jack stands or blocks to secure the vehicle. Ensure that the floor is firm enough to support the weight of the vehicle on the reduced footprint of the lifting/holding device.*

282

1. Raise the vehicle observing all appropriate safety precautions for working under the bus.
 - 1.1 Park the bus on a level surface.
 - 1.2 Apply the parking brakes.
 - 1.3 Chock the wheels opposite those being lifted.
 - 1.4 Using a jack or lift of sufficient strength, lift the bus to take the wheels off the floor.
 - 1.5 Place jack stands of sufficient strength under the frame rails, forward of the front spring hanger brackets.
2. Remove rear wheels.
3. Disconnect the driveline at the differential by removing capscrews and u-joint straps.
4. Suspend the driveline safely out of the way.
5. Disconnect the wheel speed sensors.
6. If bus is equipped with hydraulic brakes, disconnect the hydraulic lines at the frame rails.
7. If bus is equipped with air brakes, release the air pressure from the air tanks. Then disconnect the air lines at the chassis frame rail.
8. Remove Shock Absorber as follows:
 - 8.1 Lift the axle/suspension assembly enough to take the weight off the suspension hangers.
 - 8.2 Remove hexnut, flat washers, and bolt from the bottom end of the shock absorber.
 - 8.3 Remove hexnut, flat washers and bolt from the top end of the shock absorber. The shock absorber can now be removed.



CAUTION When reinstalling shock absorbers, torque the bolts to 75 – 100 ft lb (102 – 135 Nm). Use the longer bolt at the bottom of the shock absorber. Install the top bolt with its head toward the front of the vehicle. Install the bottom bolt with its head toward the rear.

9. Remove the stabilizer bar, if so equipped, by removing locknut, flat washers and bolt from each end of the axle.
10. To drop the axle, remove hex nuts, flat washer and spherical washer from 4 places, and lower the axle/wheels assembly.

CAUTION If working on only one end of the axle, it is possible to do so by dropping only one side. However, care must be taken to avoid twisting the suspension on the other side. Lower the end being worked on only enough to clear the location pins on the springs and axle. This will make location of components easier during reassembly.

11. To drop the springs, skip step 12 and remove and discard the cotter pin from the rebound pin at the forward spring hanger.
12. Remove the rebound pin.
13. Remove and discard the cotter pin from the rebound pin at the rearward spring hanger.

CAUTION Carefully note the position of any shims in the next step. During reassembly, they must be replaced in the same positions.

14. Remove hexnuts (26), flat washers (25), shims (16) and bolt (24) from 2 places at the rearmost spring hanger (11).
15. Loosely install the inner wheels onto axle ends.
16. Carefully lower the suspension/axle/wheels assembly and roll it out from under the vehicle.

WARNING If any frame members are to be removed, or any suspension hangers, they must be replaced in accordance with instructions in the Frame section of this service manual.

Rear Spring & Axle Installation

Installation of the rear spring suspension is accomplished in the reverse order of the removal instructions above, and according to the torque values below:

WARNING *Always use new hardware when installing high torque, suspension applications.*

- Torque hexnuts at the rear hanger to 100 – 125 ft lb (135 – 169 Nm).
- Use new cotter pins at the rebound pins. Bend each leg of the cotter pin, at least, 45° to secure it.
- Torque hexnuts (30) to 75 – 100 ft lb (102 – 135 Nm).
- Torque hexnuts (32) to 300 – 350 ft lb (407 – 474 Nm).
- Torque hexnuts (40) to 106 – 112 ft lb (144 – 151 Nm).
- Install brake lines in accordance with instructions in the Brakes Section of this service manual.
- Install speed sensors in accordance with instructions in the Brakes Section of this manual.
- Install wheels in accordance with instructions in the Front Suspension Section of this service manual.

WARNING *Always use new hardware in high-torque applications. Never re-use hardware in suspension applications.*

1. Position the axle saddle block over the location pin on the axle housing.
2. Position the spring assembly in the saddle block.
3. Position the U-bolt seat on the top of the spring.
4. Position a new U-bolt at the forward groove in the U-bolt seat.
5. Position a new U-bolt at the rearward groove of the U-bolt seat.
6. Position the lower U-bolt bracket over the ends of the U-bolts.
7. Install the spherical washers on the U-bolt.

CAUTION *Flat washers must be hardened.*

8. Install the flat washers on the U-bolt.
9. Loosely install the hexnuts on U-bolt.
10. Install the spherical washers on U-bolt at 2 places.



11. Install the stabilizer bar bracket, if so equipped, on U-bolt.
12. Install the lower shock absorber bracket on U-bolt.
13. Install flat washers on U-bolt.
14. Loosely (snugly enough to prevent movement) install hexnuts on U-bolt.

CAUTION *To prevent distortion of the U-bolts, tighten hexnuts in a crisscross pattern after initial contact (snug).*

15. Temporarily install the inner wheels and position the axle assembly in the hanger brackets to ensure the springs are located properly. Then remove the wheels.
16. Position the rearward spring end in the rearward spring bracket.
17. Install the rebound pin in the aft mounting bracket.
18. Position the forward spring end in the forward mounting bracket.
19. Locate the spring radius leaf pin at the forward side of the bracket.
20. Install the rebound pin.
21. Install new bolts through the spring end assembly and the forward spring mounting bracket lugs.
22. Install new cotter pins.

CAUTION *Ensure that any shim(s) removed during disassembly are replaced in the proper positions. Ensure that the bolts are oriented in the proper direction.*

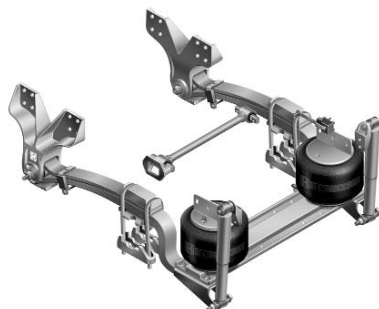
23. Install shims (16) between the head of the bolts and the lugs on the mounting bracket.
24. Install new cotter pins at rebound pins, front and rear.
25. Install flat washers on bolts.
26. Install hexnuts.
27. Make standard check for dog tracking adjustment.

28. When laser mark is within 1/4-inch of center (adjusted with shims in step 23 above), torque hexnuts to 100 – 125 ft lb (135 – 169 Nm).
29. Using a crisscross pattern, torque hexnuts to 300 – 350 ft lb (407 – 474 Nm) in 10 ft lb (13 Nm) increments.
30. Install flat washer on bolt.
31. Position the top end of the shock absorber between the shock absorber brackets on the frame rails. Ensure that the bolt is properly oriented with the head toward the front of the bus.
32. Install bolt and washer through the hanger brackets and the top end of the shock absorber.
33. Install the flat washer on bolt.
34. Install hexnut on bolt. Torque to 75 – 100 ft lb (102 – 135 Nm).
35. Position the lower end of the shock absorber at the lower shock mount. Ensure the bolt is properly oriented with the head toward the rear of the bus.
36. Install a flat washer on bolt.
37. Install bolt and flat washer through the lower end of the shock and install a flat washer on the bolt.
38. Position the lower end of the shock at the lower shock mounting bracket and install the bolt and washer assembly through the lower mounting bracket.
39. Install a flat washer and hexnut on bolt. Torque to 75 – 100 ft lb (102 – 135 Nm).
40. Install brake lines in accordance with instructions in the Brakes Section of this service manual.
41. Install speed sensors in accordance with instructions in the Brakes Section of this service manual.
42. Install wheels in accordance with instructions in the Brakes Section of this service manual.

Air Rear Suspension

For servicing the Hendrickson Comfort Air™ rear suspension, see Appendix 1 of this chapter, Hendrickson publication number 17730-246.





TECHNICAL PROCEDURE

COMFORT AIR™

SUBJECT: Service Instructions

LIT NO: 17730-246

DATE: December 2001 **REVISION:** A

TABLE OF CONTENTS

| | | |
|-------------------|--|-----------|
| Section 1 | Introduction | 2 |
| Section 2 | Product Description | 2 |
| Section 3 | Important Safety Notice | 3 |
| Section 4 | Parts Lists | 6 |
| Section 5 | Preventive Maintenance | |
| | Main Support Member Bushings | 8 |
| | U Bolt Locknuts | 8 |
| | Ride Height Setting | 8 |
| | Transverse Rods | 10 |
| | Shock Absorber | 10 |
| Section 6 | Alignment | 12 |
| Section 7 | Component Replacement | |
| | Frame Hanger | 14 |
| | Main Support Member Assembly | 15 |
| | Main Support Member Assembly Pivot Bushing | 17 |
| | Spring Seat/Bottom Cap | 19 |
| | Air Spring | 21 |
| | Cross Channel | 22 |
| | Shock Absorber | 23 |
| | Upper Shock Absorber Frame Bracket | 23 |
| | Lower Shock Absorber Bracket | 24 |
| | Ride Height Control Valve | 25 |
| | Transverse Rod | 26 |
| | Transverse Rod Bushing | 26 |
| Section 8 | COMFORT AIR Plumbing Diagram | 28 |
| Section 9 | Trouble Shooting Guide | 29 |
| Section 10 | Tightening Torque Specifications | 30 |

For The Road Ahead

HENDRICKSON

COMFORT AIR™



SECTION 1 Introduction

This publication is to acquaint and assist maintenance personnel in preventive maintenance and rebuild of the COMFORT AIR™ suspension system.

NOTE

Use only Genuine Hendrickson parts for servicing this suspension system. Most Hendrickson parts can be identified by the Hendrickson trademark.

It is important to read and understand the entire Technical Procedure publication prior to performing any maintenance, service, repair, or rebuild of the product. The information in this publication contains parts lists, safety information, product specifications, features, proper maintenance and rebuild instructions for the COMFORT AIR Suspension.

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Contact Hendrickson Tech Services at 630-910-2800 for information on the latest version of this manual.

SECTION 2 Product Description

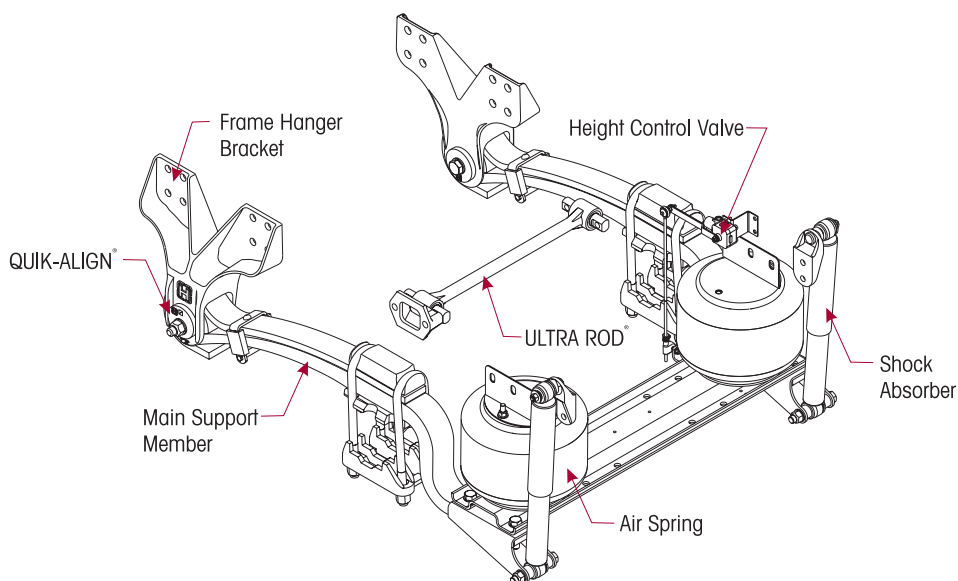
The COMFORT AIR rear suspension system, based on Hendrickson's proven HAS technology, is designed for the needs of buses, motor homes, and ambulances. The new system combines superior ride and handling with enhanced equipment protection.

- Frame Hanger Bracket — Wide footprint distributes load over a larger area for reduced frame stress.
- QUIK-ALIGN® — Fast and easy alignment without shims, see Figure2-1.
- Main Support Member — Extended-length generates lower spring rate for optimized roll stiffness providing a more comfortable and compliant ride. It also provides neutral roll steer for better handling
- Shock Absorbers — Shock absorbers are tuned for optimum damping characteristics to provide maximum driving comfort.
- Air Springs — Adjusts to changing load conditions to deliver superior ride quality.
- ULTRA ROD® — Lightweight and durable torque rod, the ULTRA ROD is an integral component of the COMFORT AIR suspension that enhances handling during cornering and helps maintain lateral axle position.
- Height Control Valve — Maintains precise ride height control through changing road surfaces, load, and driving conditions.



COMFORT AIR is available in suspension capacities up to 23,000 pounds, and in ride heights of 8.5" and 10.5". The suspension weighs 487 pounds and includes the frame hanger brackets, main support member assembly, axle clamp group, air springs, shock absorbers, cross channel, upper and lower shock brackets, ULTRA ROD transverse torque rod and frame bracket, and height control system.

Figure 2-1



SECTION 3 IMPORTANT SAFETY NOTICE

Proper maintenance service and repair is important to the reliable operation of the suspension. The procedures recommended by Hendrickson and described in this technical publication are methods of performing such maintenance, service and repair.

The warnings and cautions should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper servicing may damage the vehicle, cause personal injury, render it unsafe in operation, or void manufacturer's warranty.

Failure to follow the safety precautions in this manual can result in personal injury and/or property damage. Carefully read and understand all safety related information within this publication, on all decals and that provided by the vehicle manufacturer before conducting any maintenance, service or repair.

EXPLANATION OF SIGNAL WORDS

Hazard "Signal Words" (Danger-Warning-Caution) appear in various locations throughout this publication. Information accented by one of these signal words must be observed to help minimize the risk of personal injury to service personnel, or possibility of improper service methods which may damage the vehicle or render it unsafe. Additional Notes or Service Hints are utilized to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these signal words as they appear throughout the publication.

COMFORT AIR™



DANGER

INDICATES IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH.

WARNING

INDICATES HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH.

CAUTION

INDICATES HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN DAMAGE TO MACHINE OR MINOR PERSONAL INJURY.

NOTE

An operating procedure, practice condition, etc. which is essential to emphasize.

SERVICE HINT

A helpful suggestion which will make the servicing being performed a little easier and/or faster.

WARNINGS

WARNING

FASTENERS

LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUE AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED.

WARNING

LOAD CAPACITY

ADHERE TO THE PUBLISHED CAPACITY RATINGS FOR THE SUSPENSION. ADD ON AXLE ATTACHMENTS AND OTHER LOAD TRANSFERRING DEVICES CAN INCREASE THE SUSPENSION LOAD ABOVE ITS RATED AND APPROVED CAPACITIES, WHICH CAN RESULT IN COMPONENT DAMAGE AND LOSS OF VEHICLE CONTROL, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

MODIFYING COMPONENTS

DO NOT MODIFY OR REWORK PARTS. DO NOT SUBSTITUTE PARTS OF THE SUSPENSION. USE OF MODIFIED OR REPLACEMENT PARTS NOT AUTHORIZED BY HENDRICKSON MAY NOT MEET HENDRICKSON'S SPECIFICATIONS, AND CAN RESULT IN COMPONENT DAMAGE, LOSS OF VEHICLE CONTROL, AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE. USE ONLY HENDRICKSON AUTHORIZED REPLACEMENT PARTS. DO NOT MODIFY PARTS WITHOUT AUTHORIZATION FROM HENDRICKSON.

WARNING

TORCH/WELDING

DO NOT USE A CUTTING TORCH TO REMOVE ANY ATTACHING FASTENERS. THE USE OF HEAT ON SUSPENSION COMPONENTS WILL ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. EXERCISE EXTREME CARE WHEN HANDLING OR PERFORMING MAINTENANCE IN THE AREA OF THE MAIN SUPPORT MEMBER. DO NOT CONNECT ARC WELDING GROUND LINE TO THE MAIN SUPPORT MEMBER. DO NOT STRIKE AN ARC WITH THE ELECTRODE ON THE MAIN SUPPORT MEMBER ASSEMBLY AND AXLE. DO NOT USE HEAT NEAR THE MAIN SUPPORT MEMBER ASSEMBLY. DO NOT NICK OR GOUGE THE MAIN SUPPORT MEMBER ASSEMBLY. SUCH IMPROPER ACTIONS CAN CAUSE DAMAGE TO THE MAIN SUPPORT MEMBER ASSEMBLY COULD FAIL, AND CAUSE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

**CAUTION****PROCEDURES AND TOOLS**

A TECHNICIAN USING A SERVICE PROCEDURE OR TOOL WHICH HAS NOT BEEN RECOMMENDED BY HENDRICKSON MUST FIRST SATISFY HIMSELF THAT NEITHER HIS SAFETY NOR THE VEHICLE'S SAFETY WILL BE JEOPARDIZED BY THE METHOD OR TOOL SELECTED. INDIVIDUALS DEVIATING IN ANY MANNER FROM THE INSTRUCTIONS PROVIDED WILL ASSUME ALL RISKS OF CONSEQUENTIAL PERSONAL INJURY OR DAMAGE TO EQUIPMENT INVOLVED.

**WARNING****SHOCK ABSORBERS**

THE SHOCK ABSORBERS ARE THE REBOUND TRAVEL STOPS FOR THE SUSPENSION. ANYTIME THE AXLE ON A COMFORT AIR SUSPENSION IS SUSPENDED IT IS MANDATORY THAT THE SHOCK ABSORBERS REMAIN CONNECTED. FAILURE TO DO SO CAN CAUSE THE AIR SPRINGS TO SEPARATE FROM THE PISTON AND RESULT IN PREMATURE AIR SPRING FAILURE.

**WARNING****PERSONAL PROTECTIVE EQUIPMENT**

ALWAYS WEAR PROPER EYE PROTECTION AND OTHER REQUIRED PERSONAL PROTECTIVE EQUIPMENT TO HELP PREVENT PERSONAL INJURY WHEN PERFORMING VEHICLE MAINTENANCE, REPAIR OR SERVICE.

**WARNING****PARTS CLEANING**

SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS, AND CAUSE BURNS. TO HELP AVOID SERIOUS PERSONAL INJURY, CAREFULLY FOLLOW THE MANUFACTURER'S PRODUCT INSTRUCTIONS AND GUIDELINES AND THE FOLLOWING PROCEDURES:

1. WEAR PROPER EYE PROTECTION.
2. WEAR CLOTHING THAT PROTECTS YOUR SKIN.
3. WORK IN A WELL-VENTILATED AREA.
4. DO NOT USE GASOLINE, OR SOLVENTS THAT CONTAIN GASOLINE. GASOLINE CAN EXPLODE.
5. HOT SOLUTION TANKS OR ALKALINE SOLUTIONS MUST BE USED CORRECTLY. FOLLOW THE MANUFACTURER'S RECOMMENDED INSTRUCTIONS AND GUIDELINES CAREFULLY TO HELP PREVENT PERSONAL ACCIDENT OR INJURY.

DO NOT USE HOT SOLUTION TANKS OR WATER AND ALKALINE SOLUTIONS TO CLEAN GROUND OR POLISHED PARTS. DOING SO WILL CAUSE DAMAGE TO THE PARTS AND VOID WARRANTY.

**WARNING****QUIK-ALIGN FASTENERS**

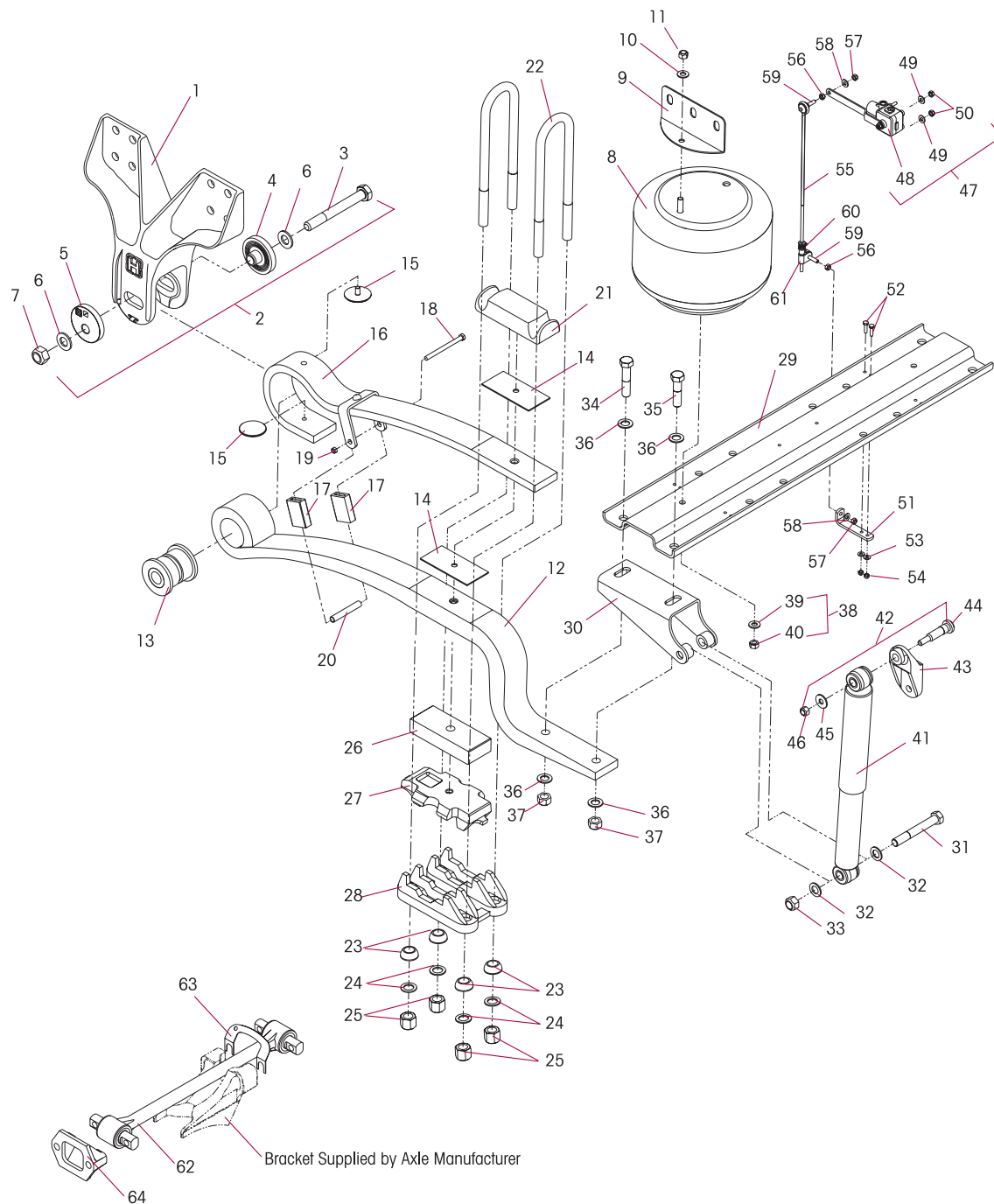
DO NOT ASSEMBLE QUIK-ALIGN JOINT WITHOUT PROPER FASTENERS. USE ONLY DACROMET PLUS XL PLATED FASTENERS TO SUSTAIN PROPER CLAMP FORCE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.

ENSURE THAT QUIK-ALIGN FASTENERS TORQUE VALUE IS SUSTAINED AS RECOMMENDED IN THE TORQUE REQUIREMENTS SECTION OF THIS PUBLICATION. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.

SECTION 4 Parts Lists

COMFORT AIR™

294



COMFORT AIR™



| KEY NO. | PART NO. | DESCRIPTION | NO.REQ. | KEY NO. | PART NO. | DESCRIPTION | NO.REQ. |
|-----------|-----------|--|-----------|-----------|-----------|---|---------|
| 1 | 60784-000 | Frame Hanger | 2 | 57356-000 | | Lower Shock Bracket Assy. | 2 |
| 2 | 60632-001 | QUIK-ALIGN® Kit (Includes Key Nos. 3-7) | 1 | | | (Includes Key Nos. 30-33) | |
| 34013-103 | | Pivot Bushing Service Kit (Includes Key Nos. 3, 6, 7, 13, 15) Services 1 Side Only | | 30 | -- | Lower Shock Bracket | 2 |
| 3 | 64107-000 | 1" 8UNC 7.50" Bolt | 2 | 31 | 50764-002 | 3/4" 10UNC 5.50" Bolt | 2 |
| 4 | 64097-000 | QUIK-ALIGN Concentric Collar | 3 | 32 | 22962-001 | 3/4" Hardened Washer | 4 |
| 5 | 64096-000 | QUIK-ALIGN Eccentric Collar | 1 | 33 | 49842-000 | 3/4" 10UNC Locknut | 2 |
| 6 | 22962-035 | 1" Hardened Washer | 4 | 50763-004 | | Cross Channel Fastener Kit (Includes Key Nos. 34-37) | 1 |
| 7 | 64108-000 | 1" 8UNC Locknut | 2 | 34 | 50764-003 | 3/4" 10UNC 3.50" Bolt | 2 |
| 60925-002 | | Air Spring Assy. (Includes Key Nos. 9-11) | 2 | 35 | 50764-005 | 3/4" 10UNC 3.00" Bolt | 2 |
| 60929-002 | | Air Spring Assy, Front Engine (Includes Key Nos. 9-11) | 2 | 36 | 22962-001 | 3/4" Hardened Washer | 8 |
| 8 | -- | Air Spring | 2 | 37 | 49842-000 | 3/4" 10UNC Locknut | 4 |
| 9 | 57096-002 | Air Spring Hanger | 2 | 38 | 49177-006 | Air Spring Fastener Kit (Includes Key Nos. 39-40) | 1 |
| 10 | 22962-014 | Washer | 2 | 39 | 22962-014 | 1/2" Hardened Washer | 2 |
| 11 | 17700-010 | 1/2"-13UNC Nylocknut | 2 | 40 | 17700-010 | 1/2" 13UNC Nylocknut | 2 |
| 60779-000 | | MSM Assy. (Includes Key Nos. 12-20) | 2 | 41 | 60998-001 | Shock Absorber | 2 |
| 12 | -- | Main Support Member | 2 | 42 | 57322-002 | Upper Shock Frame Bracket Assembly (Includes Key Nos. 43-45) | 2 |
| 13 | 58648-000 | Pivot Bushing | 2 | 43 | -- | Shock Frame Hanger | 2 |
| 14 | 37674-051 | Liner | 4 | 44 | 50368-000 | 1/2" 13UNC Serrated Shank Bolt | 2 |
| 15 | 64817-000 | Puck | 4 | 45 | 22962-031 | 1/2" Hardened Washer | 2 |
| 49175-026 | | Spring Clip Fastener Kit (Includes Key Nos. 17, 18, Washer, 19) | | 46 | 49846-000 | 1/2" 13UNC Locknut | 2 |
| 16 | -- | Secondary Leaf | 4 | 47 | 59013-000 | Height Control Valve Kit (Includes Key Nos. 48-50) | 1 |
| 17 | 64272-000 | Spring Clip Sleeve | 4 | 48 | -- | Height Control Valve | 1 |
| 18 | 37042-002 | 7/16" 14UNC Bolt | 2 | 49 | 22962-028 | 1/4" Hardened Washer | 2 |
| 22962-027 | | 7/16" Washer | Not Shown | 50 | 49983-000 | 1/4" 20UNC Locknut | 2 |
| 19 | 17700-007 | 7/16" 14UNC Nut | 2 | | | Control Valve Lower Link Bracket Kit (Includes Key Nos. 51-54) | 1 |
| 20 | -- | Clip Bolt Spacer | 2 | 57430-000 | | All Except Rear Engine | |
| 21 | 56805-000 | Top Pad | 2 | 57430-003 | | Rear Engine Only | |
| 57724-000 | | Top Pad (15,000 lb. capacity) | 2 | 51 | 56789-000 | Control Valve Link Bracket | 1 |
| 48718- | | U Bolt Kit | | 58367-000 | | Control Valve Link Bracket (Rear Engine) | |
| 48718-104 | | 7/8" Specify Length, (Includes Key Nos. 22, 23, 24, 25) | | 52 | 56935-002 | 1/4" 20UNC 1.00" Bolt | 2 |
| 22 | 47417- | 3/4" 15,000 lb. capacity, (Includes Key Nos. 22, 24, 25) | 4 | 53 | 22962-028 | 1/4" Hardened Washer | 4 |
| 49684-014 | | 7/8" 14UNF U Bolt - Specify Length (15,000 lb. Capacity) | 4 | 54 | 49983-000 | 1/4" 20UNC Locknut | 2 |
| 23 | 48574-000 | Spherical Washer | 8 | 58994- | | Height Control Valve Link Assy., Specify Length (Includes Key Nos. 55-61) | 1 |
| 24 | 22962-002 | 7/8" Hardened Flat Washer | 8 | 55 | -- | Extension Rod | 1 |
| 22962-001 | | 3/4" Hardened Flat Washer (15,000 lb. Capacity) | 8 | 56 | -- | 5/16" 18UNC Jam Nut | 2 |
| 25 | 50765-000 | 7/8" 14UNF U-Bolt Locknut | 8 | 57 | -- | 5/16" 18UNC Locknut | 2 |
| 49685-000 | | 3/4" 16UNF U-Bolt Locknut (15,000 lb. Capacity) | 8 | 58 | -- | 5/16" Hardened Washer | 2 |
| 26 | 48531-014 | Spacer 1.5" (As Required) | 2 | 59 | -- | 5/16" 18UNC Stud | 2 |
| 27 | | Spring Seat | 2 | 60 | -- | Valve Arm Clamp | 1 |
| 57022-010 | | Meritor RS15-120 | | 61 | -- | Adjustable Valve Arm Joint | 1 |
| 56501-006 | | 4.5° Pinion Angle LH/RH | | 62 | 62000- | Transverse Rod Assy., Specify Length | 1 |
| 56501-019 | | 0.0° Pinion Angle LH/RH | | 63 | 49689-000 | Torque Rod Shim | As Req. |
| 56501-020 | | 4.5° Pinion Angle LH/RH | | 64 | 22186-000 | Transverse Rod Frame Bracket | 1 |
| 56501-021 | | 0.0° Pinion Angle LH/RH | | | | | |
| 56501-020 | | Meritor RC23-160 | | | | | |
| 28 | | Negative 4.5° Pinion Angle LH/RH | 2 | | | | |
| 57024-000 | | Axle Bottom Cap | | | | | |
| 50216-000 | | Meritor RS15-120 | | | | | |
| 50216-000 | | 2-5.0° Pinion Angle LH/RH | | | | | |
| 50216-000 | | Meritor RS21-145, RS23-160 | | | | | |
| 50216-000 | | 0-9.5° Pinion Angle LH/RH | | | | | |
| 29 | -- | Meritor RC23-160 | 1 | | | | |
| | | Negative 0-9.5° Angle LH/RH | | | | | |
| | | Cross Channel | | | | | |
| | | (Contact Tech Services for proper Cross Channel) | | | | | |

SERVICE KITS QUICK REFERENCE

| | |
|-----------|---|
| 60632-001 | QUIK-ALIGN® Kit |
| 34013-103 | Pivot Bushing Service Kit |
| 49175-026 | Spring Clip Fastener Kit |
| 50763-004 | Cross Channel Fastener Kit |
| 49177-006 | Air Spring Fastener Kit |
| 59013-000 | Height Control Valve Kit |
| 57430-000 | Lower Control Valve Link Kit (All Except Rear Engine) |
| 57430-003 | (Rear Engine Only) |
| 48718- | U Bolt Kit (Specify Length) |
| 48718-104 | U Bolt Kit 15,000 lb. Capacity |

SECTION 5 Preventative Maintenance

MAIN SUPPORT MEMBER ASSEMBLY BUSHINGS

Bushings should function satisfactorily during normal vehicle operation. However premature bushing wear can occur and will require replacement. The main support member assembly pivot bushing should be replaced if it exhibits excessive fore-aft movement or the vehicle is experiencing excessive tire wear on the rear axle. For instructions on bushing replacement, see the Component Replacement section of this publication.

U BOLT LOCKNUTS

Retighten to proper torque, as shown in Figure 5-1 after the first 1,000 miles of service on new vehicle or vehicle with serviced axle attachment assembly, and then at regular intervals as experience dictates. DO NOT EXCEED SPECIFIED TORQUE ON U BOLT LOCKNUTS.



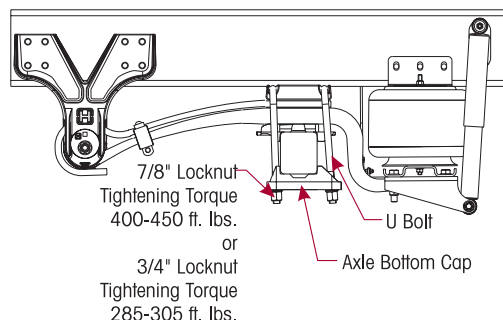
- 19,000 to 23,000 pound capacity equipped with 7/8" locknuts tighten to  400-450 foot pounds torque.
- 15,000 pound capacity equipped with 3/4" locknuts to  285-305 foot pounds torque.

Figure 5-1



RIDE HEIGHT SETTING

Proper ride height is essential for maximum ride quality and performance. Proper adjustment of the ride height control valve is described below. If the valve or linkage assembly becomes damaged they will require replacement. See the Component Replacement Section in this publication.

1. Place vehicle on level floor.
2. Free and center all suspension joints by slowly moving the vehicle back and forth without applying the brakes. When coming to a complete stop, make sure the parking brakes are released.
3. Chock front wheels of vehicle.
4. Loosen the clamp on the adjustable extension rod.
5. Remove the locknut and washer at height control valve leveling arm.
6. Verify that air system is at full operating pressure. Exhaust the air in the air springs to relax the suspension. Then refill the air springs to proper ride height.



Dimension A

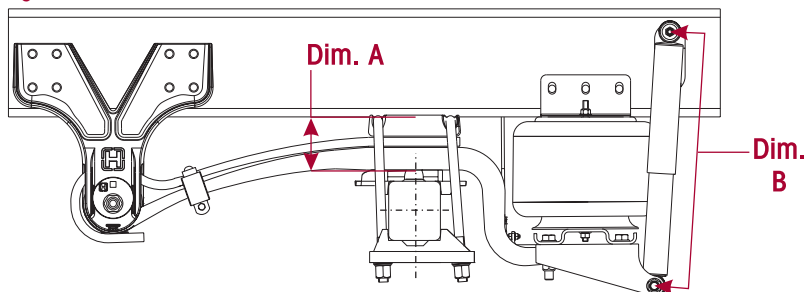
The ride height can be measured at the centerline of the main support member assembly as shown in Figure 5-2. The ride height is $4\frac{7}{8} \pm \frac{1}{4}$ " at the A dimension shown.

Dimension B

This option to measure the normal running length of the shock absorber will measure the ride height on the shock from center of eye to center of eye, see dimension B in Figure 5- 2. The specific running length of the shock absorber varies per specific OEM applications as shown in the matrix.

| OEM AND MODEL | DIMENSION A | DIMENSION B |
|----------------------------|---|---|
| | RIDE HEIGHT FROM BOTTOM OF FRAME TO BOTTOM OF MAIN SUPPORT MEMBER | SHOCK ABSORBER LENGTH AT RIDE HEIGHT WITH A TOLERANCE OF 1/4" |
| BLUE BIRD - RE/QBRE | 4 7/8" | 22.75" |
| BLUE BIRD -TCFE/CSFE | 4 7/8" | 22.75" |
| BLUE BIRD -TSFE/CIFE | 4 7/8" | 23" |
| BLUE BIRD -TCFE FLAT FLOOR | 4 7/8" | 22.75" |
| BLUE BIRD - HDRE | 4 7/8" | 22.75" |
| BLUE BIRD - C4RE | 4 7/8" | 22.75" |

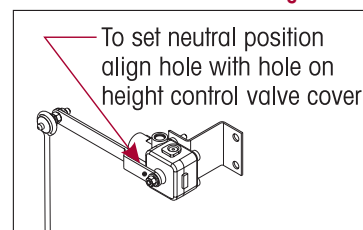
Figure 5-2



- Use a $\frac{1}{8}$ " wooden dowel rod (golf tee) to set the neutral position for the height control valve by aligning hole in leveling arm with hole in control valve cover, as shown in Figure 5-3. **DO NOT** use a metal rod or nail as this may cause damage to the height control valve.

Figure 5-3

- Reposition the extension rod in the rubber joint.
- Attach washer and locknut and tighten to 80-90 inch pounds torque.
- Tighten clamp on the rubber joint with a screwdriver until securely fastened.



NOTE

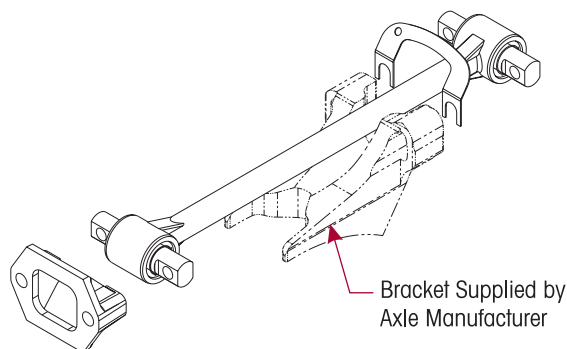
During cycle operation of the height control valve it is normal to experience a limited amount of exhaust noise.



TRANSVERSE RODS

The length of the transverse rod is determined by the vehicle manufacturer in order to center the axles under the frame. The transverse rod maintains lateral axle position during cornering. See Figure 5-4. The mounting bracket at the axle end of the torque rod is furnished and welded into position on the axle housing by the axle or vehicle manufacturer.

Figure 5-4



Torque rod end attaching fasteners are furnished by the vehicle manufacturer. It is important that the tightening torque of the nuts be checked during preventive maintenance service. Follow the vehicle manufacturer's specifications for tightening torque values.

All torque rods can be inspected for looseness, or torn or shredded rubber. With brakes applied, slowly rock an empty vehicle with power while a mechanic visually checks the action at both ends. Or with the vehicle shut down, a lever check can be made with a long pry bar placed under each rod end and pressure applied.

Rod ends can be renewed by pressing out the worn end, and installing a replacement bushing. A two-piece rod is also available to cut and weld to the desired length, see Hendrickson publication no. 59310-001.

NOTE

Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts be used for all rod attachments.

SHOCK ABSORBER INSPECTION

Hendrickson uses a long life, premium shock absorber on all COMFORT AIR suspensions. When the shock absorber replacement is necessary, Hendrickson recommends that the shock absorbers be replaced with identical Hendrickson Genuine parts for servicing. Failure to do so will affect the suspension performance and will void the warranty.

Inspection of the shock absorber can be performed by doing a heat test, and a visual inspection. For instructions on shock absorber replacement see the Component Replacement Section of this publication. It is not necessary to replace shock absorbers in pairs if one shock absorber requires replacement.



HEAT TEST

1. Drive the vehicle at moderate speeds for fifteen minutes.

WARNING

DO NOT GRAB THE SHOCK AS IT COULD POSSIBLY CAUSE PERSONAL INJURY DUE TO HOT SURFACE OF SHOCK BODY.

2. Lightly touch the shock body carefully below the dust cover, see Figure 5-5.
3. Touch the frame to get an ambient reference. A warm shock absorber is acceptable, a cold shock absorber should be replaced.

Figure 5-5

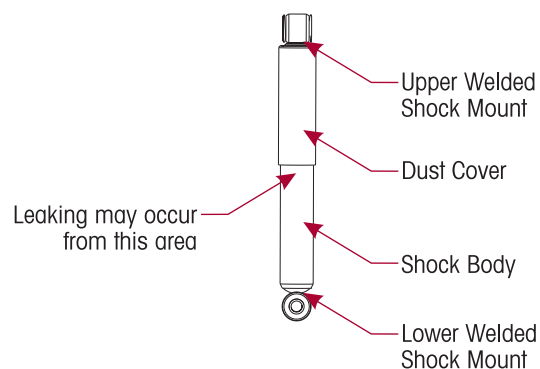


SHOCK ABSORBER VISUAL INSPECTION PROCEDURE

Inspect the shock absorbers fully extended. Shock absorbers (see Figure 5-6), will need to be replaced for any of the following:

- Damaged upper or lower mount
- Damaged upper or lower bushing
- Damaged dust cover and/or shock body
- Bent or dented shock.
- Leaking shock, when streams of fluid travel down the side of the shock, particularly from the upper seal. The suspension is equipped with a premium seal on the shock, however this seal will allow for misting to appear on the shock body (misting is not a leak and is considered acceptable).
- Shock is damaged internally, jammed in the collapsed position. It can also be determined by removing the shock, shake and listen to the sound of metal parts rattling inside the shock body.

Figure 5-6



COMFORT AIR™



SECTION 6 Alignment

ALIGNMENT

Proper alignment is essential for maximum ride quality, performance, and tire service life. The recommended alignment procedure is described below. This procedure should be performed if excessive or irregular tire wear is observed, or any time the Main Support Member Assembly is removed for service.

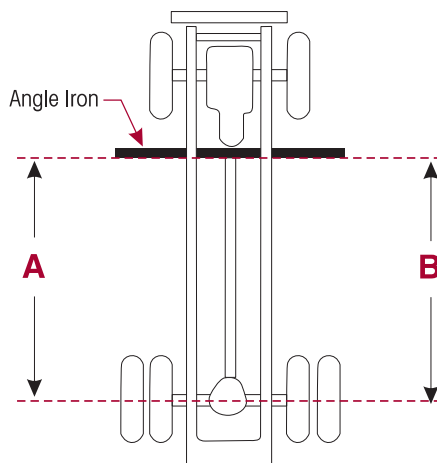
The following procedure should be performed after all repairs are completed.

NOTE It is important to have the QUIK-ALIGN locknut pre-torqued to 100 foot pounds on the left side of vehicle only. All other suspension fasteners tightened to their specified torque values. The total range of adjustment is 1.0".

NOTE Use a new QUIK-ALIGN kit Part No. 60632-001 for any axle alignment or disassembly of the QUIK-ALIGN connection. This ensures proper torque is applied to the connection.

1. Place vehicle on level floor.
2. Free and center all suspension joints by slowly moving the vehicle back and forth without applying the brakes. When coming to a complete stop make sure the parking brakes are released.
3. Chock front wheels of vehicle.
4. Verify proper ride height is set. For proper ride height instructions see Ride Height Adjustment in this section of this publication.

Figure 6-1



5. Using "C" clamps, securely clamp a six foot piece of STRAIGHT bar stock or angle iron across the lower frame flange as shown in Figure 6-1. Select a location as far forward of the drive axle as possible where components will not interfere.
6. Accurately square straight edge to frame using a carpenter's square.



7. Using a measuring tape, measure from straight edge to forward face of drive axle arm at the centerline of the spring seat on both sides of vehicle as shown in Figure 6-1, and B. If both sides measure within $\frac{1}{8}$ " of being equal, alignment of drive axle is acceptable. If A and B differ by more than $\frac{1}{8}$ " the following procedure must be followed.
 - Loosen the left pivot bolt locknut to snug (100 foot pounds). See Figure 6-2. This will hold the eccentric flanged washer in place against the hanger face, and within the adjustment guide, but loose enough to permit the eccentric flanged washer to rotate freely.
 - Using an alignment tool or $\frac{1}{2}$ " square drive breaker bar rotate the left eccentric alignment collar to align axle (Clockwise rotation moves axle forward, counter clockwise rotation moves axle rearward). A 90° rotation of the QUIK-ALIGN collar will move axle fore and aft $\pm \frac{1}{2}$ " from center.

WARNING

DO NOT ASSEMBLE QUIK-ALIGN JOINT WITHOUT PROPER FASTENERS. USE ONLY DACROMET PLUS XL PLATED FASTENERS TO SUSTAIN PROPER CLAMP FORCE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.

ENSURE THAT QUIK-ALIGN FASTENERS TORQUE VALUE IS SUSTAINED AS RECOMMENDED IN THE TORQUE REQUIREMENTS SECTION OF THIS PUBLICATION. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.

- Measure from straight edge to forward face of axle arm to verify both sides of axle are equal and tighten the 1" QUIK-ALIGN locknuts to $\frac{1}{2}$ 525-575 foot pounds torque.

NOTE

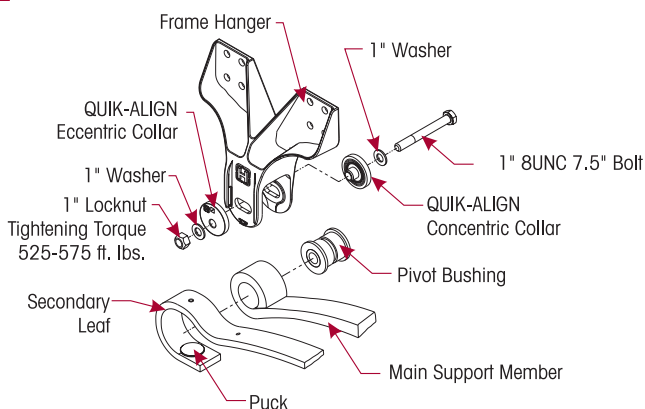
The Eccentric collar is located on the outside frame on the left side of chassis with the concentric collar on the inside. On the right side of chassis are (2) concentric collars located on the inside and outside of the frame hanger.

NOTE

Axle adjustment is applied to LEFT side of vehicle only. If adjustment to the right side of vehicle is necessary, it will require replacement of the outside concentric collar with an eccentric collar (Hendrickson Part No. 64096-000) and repeat step 7 on the right side of vehicle.

8. Following alignment of axle, move vehicle back and forth several times prior to removing straight edge from frame, and recheck measurements to confirm adjustments.
9. Repeat steps 7 and 8 until alignment is achieved.

Figure 6-2



COMFORT AIR™



SECTION 7 Component Replacement

FRAME HANGER

The frame hanger should function satisfactorily during normal vehicle operation. Replacement is required when the frame hanger has been damaged or worn.

DISASSEMBLY

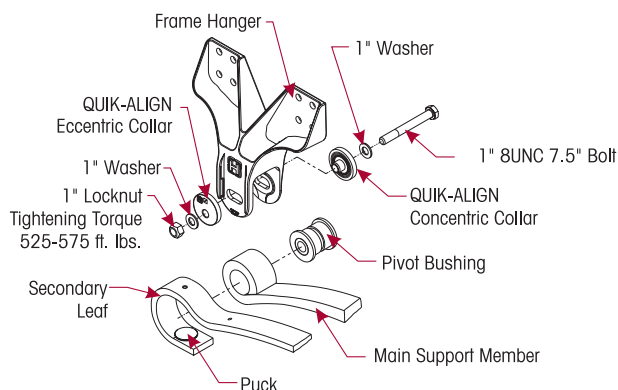
1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.

WARNING

VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

3. Verify air is removed from the system.
4. Remove the dacromet locknut and washers, 1" pivot bolt, and QUIK-ALIGN collars that connect main support member assembly to frame hanger, see Figure 7-1.
5. Remove the fasteners that attach the frame hanger to the vehicle per vehicle manufacturer specifications.
6. Remove frame hanger.

Figure 7-1



ASSEMBLY

1. Install new frame hanger by attaching fasteners per vehicle manufacturer specifications.
2. Install the new QUIK-ALIGN collars, new 1" dacromet pivot bolt, washers, and locknut that attach the main support member assembly to the frame hanger. Verify that the nose of each QUIK-ALIGN collar is installed into the pivot-bushing sleeve, and the flanged side is flat against the hanger face within the alignment guides.

NOTE

The eccentric collar is located on the outside frame on the left side of chassis with the concentric collar on the inside. On the right side of chassis are (2) concentric collars located on the inside and outside of the frame hanger.

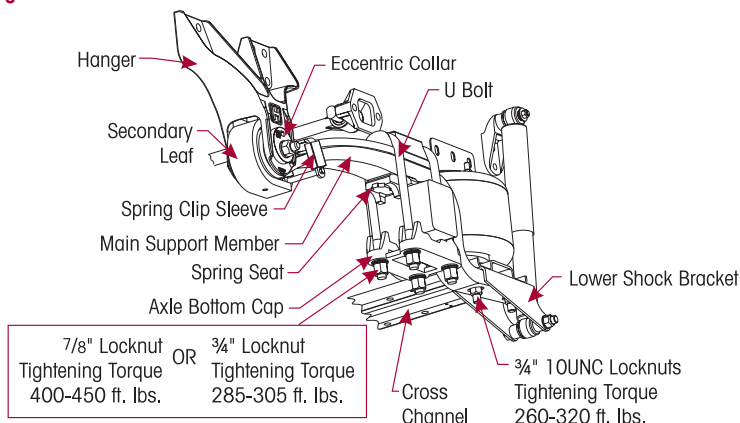


3. Snug the left pivot bolt to 100 foot pounds torque. Tighten the right pivot bolt to 525-575 foot pounds torque.
4. Remove jack stands and lower frame of vehicle.
5. Air up the system.
6. Align the rear axle (see alignment Preventive Maintenance Section of this publication).

MAIN SUPPORT MEMBER ASSEMBLY

The Main Support Member Assembly should function satisfactorily during normal vehicle operation. Replacement is only required when the Main Support Member Assembly has been damaged or worn.

Figure 7-2



DISASSEMBLY

1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.

WARNING

VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

3. Verify air is removed from the system, and remove height control valve extension rod from valve by removing locknuts and washers.
4. Mark the position of QUIK-ALIGN collar on the frame hanger.

SERVICE HINT

Marking the position will create a starting point for the alignment procedure following assembly.

5. Remove the 1" pivot bolt, nut and QUIK-ALIGN collars that connect the main support member assembly to the frame hanger, see Figure 7-2.
6. Remove the U bolts, locknuts and washers.
7. Remove the axle bottom cap and top pad.
8. Remove the 3/4" bolts, washers and locknuts that connect the cross channel to both main support assemblies.
9. Lift cross channel off of the main support assemblies with jacks.

COMFORT AIR™



10. Lift and rotate the shock absorber and lower mounting bracket away from the main support assembly to be replaced.
11. Remove the main support assembly.

ASSEMBLY

1. Position main support member assembly on spring seat, or on spacer plate (if equipped), with the main support member assembly center dowel pin piloting into hole in spring seat or spacer plate. Galvanized steel liner must be positioned on the topside of the main support member assembly.
2. Assemble the top pad, U bolts, axle bottom cap, washers and locknuts. **DO NOT TIGHTEN** U bolt locknuts at this time, see Figure 7-4.

WARNING

DO NOT ASSEMBLE QUIK-ALIGN JOINT WITHOUT PROPER FASTENERS. USE ONLY DACROMET PLUS XL PLATED FASTENERS TO SUSTAIN PROPER CLAMP FORCE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.

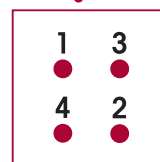
3. Install NEW QUIK-ALIGN collars, NEW 1" dacromet pivot bolt, washers and locknut. Verify the nose of each QUIK-ALIGN collar is installed into the pivot-bushing sleeve, and the flanged collar is flat against the hanger face within the adjustment guides. **DO NOT TIGHTEN** at this time.

NOTE

The eccentric collar is located on the outside frame on the left side of chassis with the concentric collar on the inside. On the right side of chassis are (2) concentric collars located on the inside and outside of the frame hanger.

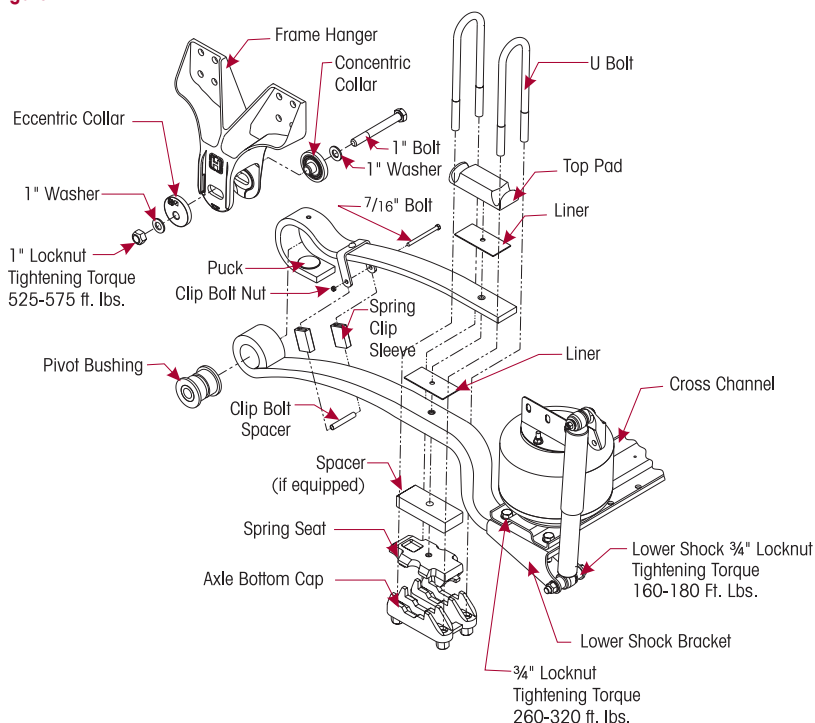
4. Position shock absorber and lower mounting bracket assembly on main support assembly.
5. Position cross channel on main support assemblies. Install ¾" bolts, washers and locknuts. Tighten to 260-320 foot pounds torque.
6. Snug 1" NEW QUIK-ALIGN locknuts to 100 foot pounds torque.

Figure 7-3



7. Tighten the U bolt locknuts evenly and tighten to the proper torque in the proper sequence, see Figure 7-3. rap top of U bolts, and retighten to proper torque. DO NOT EXCEED SPECIFIED TORQUE ON U BOLT LOCKNUTS.
 - 19,000 to 23,000 pound capacity equipped with 7/8" locknuts tighten to 400-450 foot pounds torque.
 - 15,000 pound capacity equipped with ¾" locknuts to 285-305 foot pounds torque.
8. Remove jack stands and lower the frame of vehicle.
9. Install upper extension rod stud onto the height control valve arm. Tighten locknut to 80-90 inch pounds torque.
10. Air up the system.
11. Align rear axle, see alignment in the Preventative Maintenance Section of this publication.

Figure 7-4



MAIN SUPPORT MEMBER ASSEMBLY PIVOT BUSHING

Figure 7-5

DISASSEMBLY

Use a vertical shop press with a capacity of at least 10 tons. A 6" long piece of 4" I.D. by .25" wall steel tubing receiving tool is required. A 6" long piece of 1 3/4" O.D. round bar stock with a 1 1/2" x 1 3/8" O.D. machined pilot push out tool is also required.

1. Remove the 7/16" bolt, clip bolt spacer and nut from the secondary leaf spring clip.
2. Cut the splicing tape that holds the liners to the center of the main support member assembly and rotate the secondary leaf to clear the spring clip from main support member.
3. Slide the secondary leaf off of the main support member eye.
4. Support the main support member on the receiving tool with the end hub centered on the tool. Be sure the main support member is squarely supported on the press bed. See Figure 7-5



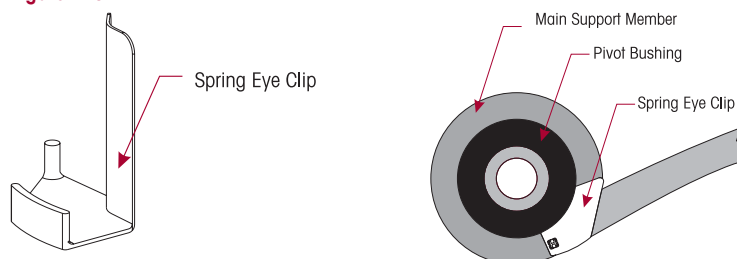
COMFORT AIR™



NOTE

At the time of manufacture, a spring eye clip was used to insert the pivot bushing into the spring eye of the the main support member. See Figure 7-6. If spring eye clip is equipped on the main support member you have the option to carefully press out the bushing from the opposite side of the spring eye (where the spring eye clip is NOT visible). If the spring eye clip is not damaged it can be used again to facilitate the pressing in of the pivot bushing into the spring eye. If clip is damaged use the tape option as shown in Figure 7-7.

Figure 7-6

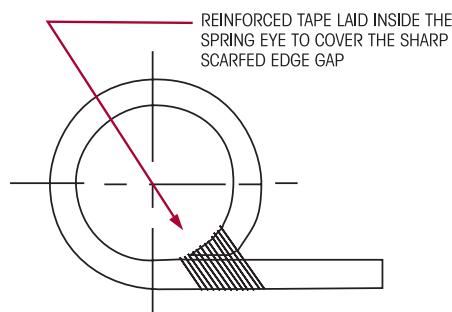


5. Center the push out tool on inner sleeve and press out the old bushing. (These bushings are not cartridge type bushings. They do not have outer metals).
6. Clean and inspect the I.D. of the main support member eye.

ASSEMBLY

1. Insert the spring eye clip (if equipped) into the gap of the main support member eye, (see note above). If spring eye clip is damaged or not present it is necessary to cut a strip of 3M Scotch #890T black fiber tape, or heavy bodied duct tape 1" x 6" long.
2. Feed the tape into the spring eye, adhesive side facing gap in the eye. Center the tape equally around each end.
3. Pull the tape tight, and wrap it around the outside of the eye. Additional tape may be required depending on gap size. Ensure that the gap is completely covered. See Figure 7-7.

Figure 7-7



4. Lubricate inner diameter of steel spring bore and the new rubber bushing with a vegetable base oil (cooking oil). **DO NOT** use petroleum or soap base lubricant, it can cause an adverse reaction with the bushing material, such as deterioration.
5. Support the main support member on the receiving tool with the end hub centered on the tool. Be sure the main support member is squarely supported on the press bed.



Figure 7-8



6. Locate the push out tool on inner sleeve, and press in the new bushing. Bushings must be centered within the spring eye. When pressing in the new bushings, over-shoot desired final position by $\frac{3}{16}$ " and press again from opposite side to center the bushing within the main support member assembly. See Figure 7-8.
7. Trim all protruding tape from the underside of the eye. Wipe off excess lubricant. Allow the lubricant four hours to dissipate before operating vehicle.
8. Replace the two nylon pucks inside the secondary leaf eye.
9. Slide secondary leaf around main support member eye and rotate into position.
10. Place one liner between the secondary leaf and the main support member. Place the second liner on top of the secondary leaf and tape the assembly together using two 1" x 12" long strips of splicing tape.

CAUTION

DO NOT WRAP EXCESSIVE TAPE AROUND THE ASSEMBLY AS THIS WOULD CREATE HIGH SPOTS IN THE CLAMP GROUP. DO NOT WRAP TAPE AROUND THE ASSEMBLY MORE THAN TWICE. FAILURE TO DO SO CAN CAUSE PREMATURE WEAR OR DAMAGE TO THE MAIN SUPPORT MEMBER.

11. Install the $\frac{7}{16}$ " bolt and nut into the spring clip and tighten to 30-34 foot pounds torque. See Figure 7-4.
12. Replace main support member assembly per instructions in this section.

SPRING SEAT/BOTTOM CAP

The spring seat and bottom cap are unlikely to require replacement. In normal use they should function satisfactorily throughout the life of the vehicle. Replacement is required when they have been damaged.

SPRING SEAT DISASSEMBLY

1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.

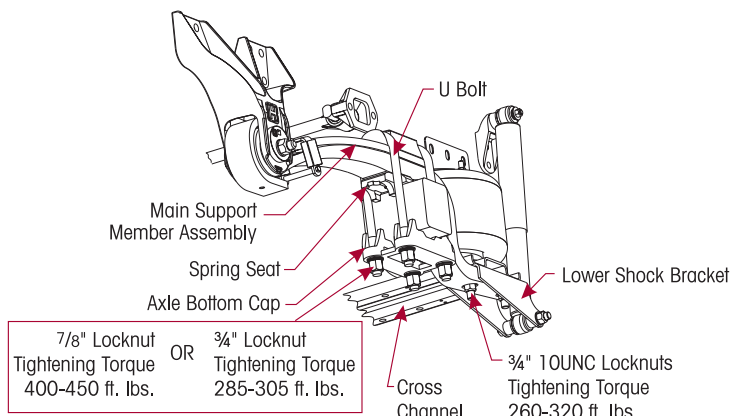
WARNING

VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

3. Verify air is removed from the system, and remove height control valve extension rod from valve by removing locknut and washer.
4. Remove the U bolt locknuts and washers. See Figure 7-9.
5. Remove U bolts, axle bottom cap and top pad.
6. Loosen the $\frac{3}{4}$ " bolts, washers and locknuts that connect the cross channel to both main support assemblies.
7. Lift cross channel and the main support member assembly with a jack.
8. Remove spring seat.



Figure 7-9

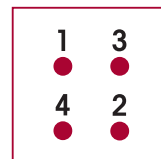


SPRING SEAT ASSEMBLY

1. Install spring seat on axle in proper direction.
2. Position main support assembly on spring seat, or on spacer plate if so equipped, with main support assembly center dowel pin piloting into hole in spring seat or spacer plate. Delrin liner must be positioned on the topside of the main support member assembly.
3. Assemble U bolts, axle bottom cap, washers and locknuts. DO NOT TIGHTEN U bolt locknuts at this time.
4. Tighten the $\frac{3}{4}$ " bolts, washers and locknuts that connect the cross channel to the main support member assemblies to 260-320 foot pounds torque.

Figure 7-10

5. Tighten the U bolt locknuts evenly and tighten to the proper torque in the proper sequence, see Figure 7-10. rap top of U bolts, and retighten to proper torque. DO NOT EXCEED SPECIFIED TORQUE ON U BOLT LOCKNUTS.
- 19,000 to 23,000 pound capacity equipped with $\frac{7}{8}$ " locknuts tighten to 400-450 foot pounds torque.
 - 15,000 pound capacity equipped with $\frac{3}{4}$ " locknuts to 285-305 foot pounds torque.
6. Remove jack stands and lower the frame of vehicle.
 7. Install height control valve link on control valve arm. Tighten $\frac{5}{16}$ " lockwasher and nut to 80-90 inch pounds torque. Air up the system.



AXLE BOTTOM CAP DISASSEMBLY

1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.

WARNING

VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

3. Verify air is removed from the system.



17. Remove the U bolt locknuts and washers.
18. Remove axle bottom cap.

AXLE BOTTOM CAP ASSEMBLY

1. Install axle bottom cap on axle in proper direction.
2. Assemble U bolts, washers and locknuts.
3. Tighten the U bolt locknuts evenly and tighten to the proper torque in the proper sequence, see Figure 7-10. rap top of U bolts, and retighten to proper torque. **DO NOT EXCEED SPECIFIED TORQUE ON U BOLT LOCKNUTS.**
 - 19,000 to 23,000 pound capacity equipped with 7/8" locknuts tighten to 400-450 foot pounds torque.
 - 15,000 pound capacity equipped with 3/4" locknuts to 285-305 foot pounds torque.
4. Remove jack stands and lower the frame of vehicle.
5. Air up the system.

AIR SPRING

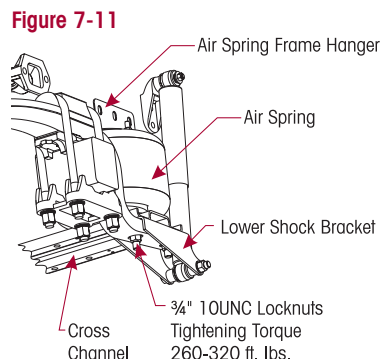
DISASSEMBLY

1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.


WARNING

VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

3. Verify air is removed from the system.
4. Remove the 1/2" locknut and washer that connect air spring to the cross channel. See Figure 7-11.
5. Remove air line from air spring.
6. Remove brass fittings from air spring.
7. Remove the 1/2" locknut and washer that connect air spring to the upper air spring hanger.
8. Remove air spring.




ASSEMBLY

1. Install air spring in upper air spring hanger by inserting stud into hole and attach the 1/2" washer and locknut.
2. Install air spring in spring seat by inserting stud into hole and attach the 1/2" washer and locknut.

COMFORT AIR™



3. Tighten ½" locknuts to  20-30 foot pounds torque.
4. Install brass fitting in air spring using Teflon thread seal.
5. Connect air line to air spring.
6. Remove jack stands and lower frame of vehicle.
7. Air up system.

CROSS CHANNEL

DISASSEMBLY

1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.






WARNING

VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

3. Verify air is removed from the system.
4. Remove the ½" locknuts and washers that connect air springs to the cross channel, and push air springs out of cross channel.
5. Remove the ¼" bolts, washers and locknuts that connect the lower linkage mounting bracket to the cross channel. See Parts Lists in Section 4.
6. Remove the ¾" bolts, washers and locknuts that connect the cross channel to the main support member assemblies.
7. Remove cross channel.

ASSEMBLY

1. Install the cross channel to the lower shock absorber brackets and main support member assemblies by attaching the ¾" bolts, washers and locknuts. Tighten to  260-320 foot pounds torque.
2. Install air springs in cross channel by inserting studs into appropriate holes and attach washers and locknuts. Tighten ½" locknuts to  20-30 foot pounds torque.
3. Install the lower linkage mounting bracket to the cross channel by attaching the ¼" bolts, washers and locknuts. Tighten ¼" locknuts to  40-50 inch pounds torque.
4. Remove jack stands and lower frame of vehicle.
5. Air up system.



SHOCK ABSORBER

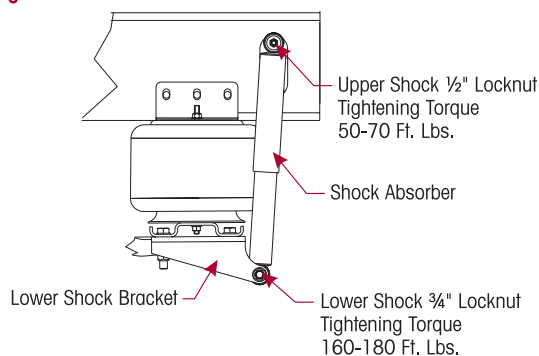
DISASSEMBLY

1. Remove the 1/2" locknut and washers, that connect shock absorber to frame hanger. See Figure 7-12.
2. Remove the 3/4" bolt, washers, and locknut that connect shock absorber to lower shock absorber bracket.
3. Remove shock absorber.

ASSEMBLY

1. Install shock absorber to frame bracket stud by attaching washers and 1/2" locknut. Washers must be installed on each side of shock absorber bushing.
2. Install shock absorber to lower shock absorber bracket by attaching the 3/4" bolt, washers, and locknut.
3. Tighten 1/2" locknut to 50-70 foot pounds torque, and 3/4" locknut to 160-180 foot pounds torque.

Figure 7-12



UPPER SHOCK ABSORBER FRAME BRACKET

DISASSEMBLY

1. Remove the 1/2" locknut and washers, that connect shock absorber to frame bracket.
2. Remove the 3/4" bolt, washers, and locknut that connect shock absorber to lower shock absorber bracket.
3. Remove shock absorber.
4. Remove the fasteners that attach the upper frame bracket per vehicle manufacturer specifications.
5. Remove frame bracket.

ASSEMBLY

1. Install the upper shock absorber frame bracket by attaching the fasteners per vehicle manufacturer specifications.

COMFORT AIR™



2. Install shock absorber to upper frame bracket stud by attaching washers and ½" locknut. Washers must be installed on each side of shock absorber bushing.
3. Install shock absorber to lower shock absorber bracket by attaching the ¾" bolt, washers, and locknut.
4. Tighten ½" locknut to 50-70 foot pounds torque, and ¾" locknut to 160-180 foot pounds torque.

LOWER SHOCK ABSORBER BRACKET

DISASSEMBLY

1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.



WARNING

VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

3. Verify air is removed from the system.
4. Remove the ½" locknut and washers that connect the shock absorber to the upper frame bracket.
5. Remove the ¾" bolt, washers and locknut that connect the shock absorber to the lower bracket. See Figure 7-12.
6. Remove the shock absorber.
7. Remove the ¾" bolts, washers and locknuts that connect the cross channel and lower shock absorber bracket to the main support member assembly on the affected side. Loosen the ¾" bolts, washers and locknuts on the opposite side.
8. Remove lower shock absorber bracket.

ASSEMBLY

1. Install the lower shock absorber bracket to the cross channel and main support member assembly by attaching the ¾" bolts, washers and locknuts. Tighten ¾" locknuts to 260-320 foot pounds torque.
2. Install shock absorber to frame bracket stud by attaching washers and ½" locknut. Washers must be installed on each side of shock absorber bushing.
3. Install shock absorber to lower shock absorber bracket by attaching the ¾" bolt, washers, and locknut.
4. Tighten ½" locknut to 50-70 foot pounds torque, and ¾" locknut to 160-180 foot pounds torque.
5. Remove jack stands and lower frame of vehicle.
6. Air up system.



RIDE HEIGHT CONTROL VALVE

DISASSEMBLY

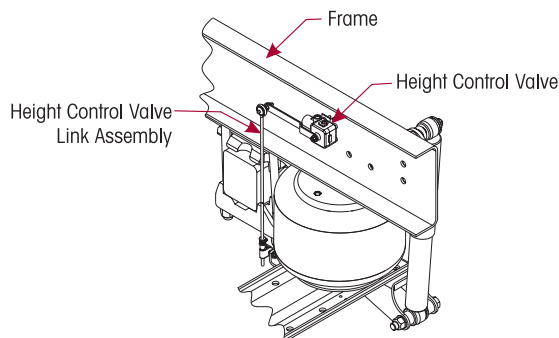
1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.

WARNING

VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

3. Verify air is removed from the system.
4. Remove the 5/16" washer and locknut that attach the extension rod to the ride height control valve arm.
5. Remove the air lines from the ride height control valve.
6. Remove the brass fittings from the ride height control valve.
7. Remove the 1/4" washers and locknuts, that attach the ride height control valve to the frame mounting bracket.
8. Remove the ride height control valve. See Figure 7-13.

Figure 7-13



ASSEMBLY

1. Install the ride height control valve to the frame mounting bracket by attaching the 5/16" washers and locknuts. Tighten to 80-90 inch pounds torque.
2. Install brass fittings into height control valve using Teflon thread seal.
3. Install air lines to ride height control valve.
4. Install the height control valve link assembly to the ride height control valve arm by attaching the 5/16" washer and locknut. Tighten to 80-90 inch pounds torque.
5. Remove jack stands and lower frame of vehicle.
6. Air up system.
7. Verify proper ride height adjustment, (see ride height adjustment Preventive Maintenance Section of this publication).

COMFORT AIR™



TRANSVERSE ROD

DISASSEMBLY

1. Remove the 5/8" bolts, washers, and locknuts that connect the transverse torque rod to the frame bracket and axle.
2. Remove transverse torque rod.

ASSEMBLY

NOTE

Hendrickson requires the use of Grade 8 bolts and Grade C locknuts be used for all rod attachments.

1. Install transverse torque rod by attaching the 5/8" bolts, washers, and locknuts to the frame bracket and axle. See manufacturers for torque specifications.
2. Verify lateral axle alignment, and correct with drop in shims between the torque rod bar pin and the frame or axle bracket depending on the direction of alignment.

TRANSVERSE ROD BUSHING

Remove transverse torque rods as detailed in the previous section.



CAUTION

DO NOT USE HEAT OR USE A CUTTING TORCH TO REMOVE THE BUSHINGS FROM THE TORQUE ROD. THE USE OF HEAT WILL ADVERSELY AFFECT THE STRENGTH OF THE TORQUE ROD, HEAT CAN CHANGE THE MATERIAL PROPERTIES. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

You will need:

- A vertical press with a capacity of at least 10 tons.
 - A receiving tool (5" long, 2" inner diameter by 1/4" wall steel tubing)
1. Support the torque rod end on the receiving tool with the end tube of torque rod centered on the tool. Be sure the torque rod is squarely supported on the press bed.
 2. Push directly on the bushing straddle mount bar pin until top of the bushing is level to the top of torque rod end tube. Press until the bushing clears the torque rod end tube.
 3. Clean and inspect the inner diameter of the torque rod ends, removing any nicks with an emery cloth or a rotary sander (See Figure 7-14).
 4. Lubricate the inner diameter of the torque rod ends and the new rubber bushings with a vegetable base oil (cooking oil), see Figure 7-15. **DO NOT** use a petroleum or soap base lubricant, it can cause and adverse reaction with the bushing, such as deterioration of the rubber.
 5. Press in the new bushings. Support the torque rod end on the receiving tool with the end tube of torque rod centered on the receiving tool. The straddle mount bar pin bushings must have the mounting flats positioned at zero degrees to shank of the torque rod.
 6. Press directly on the straddle mount bar pin of bushing. The rubber bushings of the bar pin must be centered within the torque rod end tubes.



COMFORT AIR™

7. When pressing in the new bushings, overshoot the desired final position by approximately $\frac{3}{16}$ ", see Figure 7-16.
8. Press the bushing again from opposite side to center the bar pin within the torque rod end, see Figure 7-17.
9. Wipe off excess lubricant. Allow the lubricant four hours to dissipate before operating vehicle.
10. Replace torque rod assembly as detailed in the Component Replacement section.

Figure 7-14



Figure 7-15



Figure 7-16



Figure 7-17

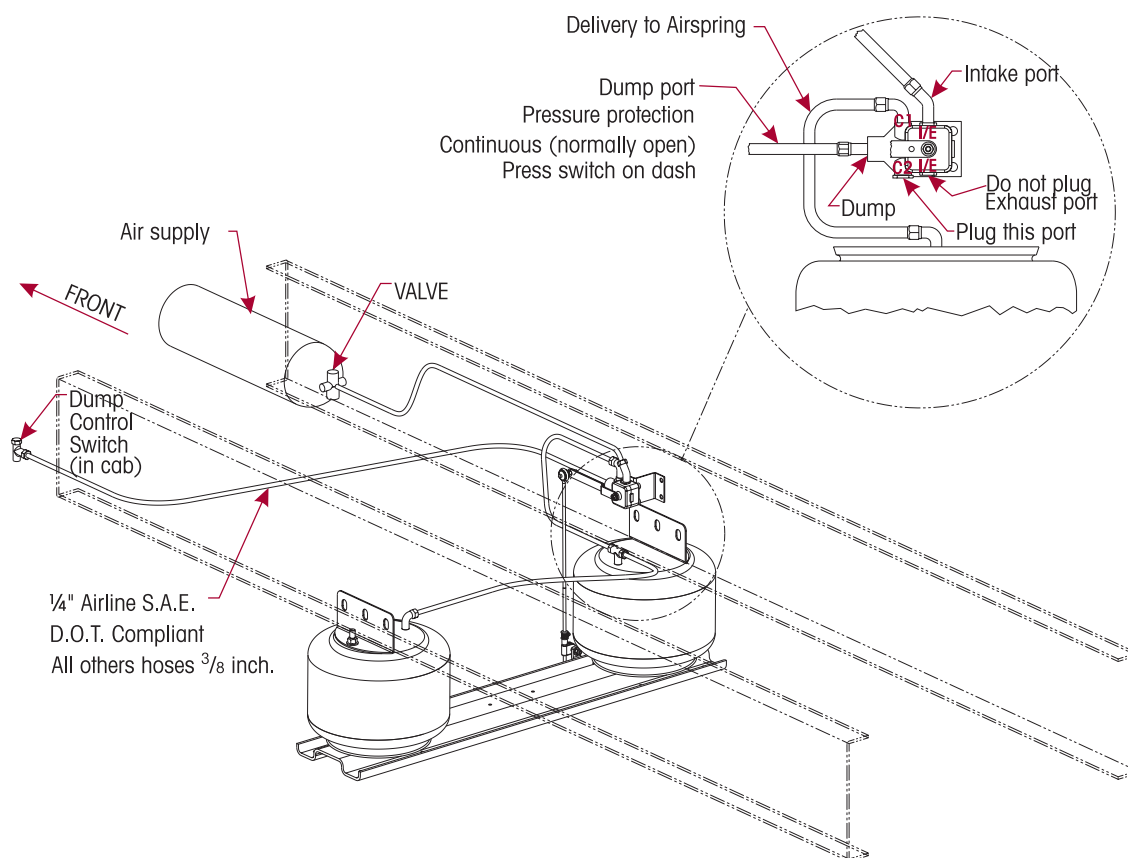


COMFORT AIR™



SECTION 8 COMFORT AIR Plumbing Diagram

316





SECTION 9

Troubleshooting Guide

COMFORT AIR

TROUBLE SHOOTING GUIDE

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|------------------------------------|---------------------------------------|---|
| Vehicle bouncing excessively | Leaking shock absorber | Replace shock absorber. |
| | Damaged shock absorber | Replace shock absorber |
| | Air spring(s) not inflated | Check air supply to air spring, repair as necessary. |
| | Incorrect ride height | Adjust ride height to proper setting. See Ride Height Setting in the Preventative Maintenance Section of this publication. |
| Suspension has harsh or bumpy ride | Broken main support member assembly | Replace main support member assembly. |
| | Damaged height control valve | Replace height control valve. |
| Excessive driveline vibration | Incorrect ride height | Adjust ride height to proper setting. See Ride Height Setting in the Preventative Maintenance Section of this publication. |
| | Broken main support member assembly | Replace main support member assembly. |
| | Air spring(s) not inflated. | Check air supply to air spring, repair as necessary. |
| Vehicle leans | Main support member assembly broken | Replace main support member assembly. |
| | Axle connection not torqued correctly | Perform U bolt retorque procedure. See Torque Specification Section of this publication. |
| | Worn pivot bushing | Replace pivot bushing. |
| | Air spring(s) not inflated. | Check air supply to air spring, repair as necessary. |
| Suspension is noisy | Loose QUIK-ALIGN® attachment | Replace QUIK-ALIGN connection, and check suspension alignment. Check frame hanger for wear around QUIK-ALIGN plates & replace if necessary. |
| | Loose U bolts | Perform U bolt retorque procedure. See Torque Specification Section of this publication. |
| | Worn main support eye spacers | Replace worn main support eye spacers ("pucks"). |
| | Worn main support clip spacers | Replace worn main support clip spacers ("sleeves"). |
| Irregular tire wear | Worn pivot bushing | Replace pivot bushing |
| | Loose QUIK-ALIGN attachment | Replace QUIK-ALIGN connection, and check suspension alignment. Check frame hanger for wear around QUIK-ALIGN plates & replace if necessary. |

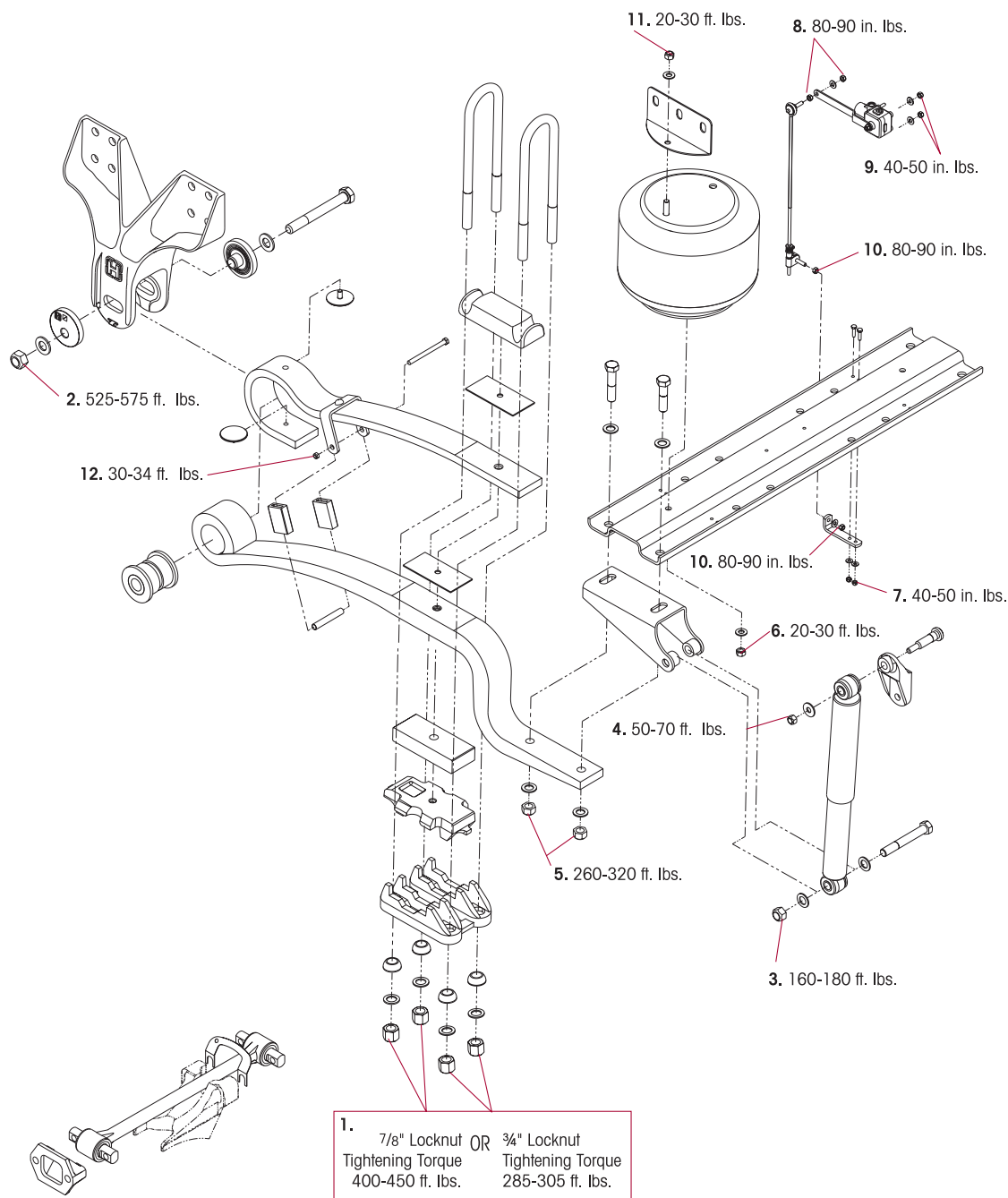
COMFORT AIR™



SECTION 10

Torque Specifications

318






COMFORT AIR™

COMFORT AIR

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

| NO. | COMPONENT | QUANTITY | SIZE | TORQUE FT./LBS. |
|---|--|----------|-------|-----------------|
| Frame Fasteners Furnished & Installed by Truck Manufacturer ¹ | | | | |
| 1 | U Bolt (high locknut) 19,000 to 23,000 lb. capacity | 8 | 7/8" | 400-450 |
| | | 8 | 3/4" | 285-305 |
| 2 | QUIK-ALIGN Locknut 15,000 lb. capacity | 4 | 1" | 525-575 |
|  WARNING DO NOT ASSEMBLE QUIK-ALIGN JOINT WITHOUT PROPER FASTENERS. USE ONLY DACROMET PLUS XL PLATE FASTENERS TO MAINTAIN PROPER CLAMP FORCE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY. | | | | |
| 3 | Shock Absorber Upper Shock Mount Locknut | 2 | 1/2" | 50-70 |
| 4 | Shock Absorber Lower Shock Mount Locknut | 2 | 3/4" | 160-180 |
| 5 | Cross Channel to Main Support Member Locknut | 4 | 3/4" | 260-320 |
| 6 | Air Spring to Cross Channel Locknut | 2 | 1/2" | 20-30 |
| 7 | Extension Rod Bracket to Cross Channel Locknut | 2 | 1/4" | 40-50 in. lbs. |
| 8 | Height Control Valve Arm to Extension Rod Stud Locknut | 2 | 5/16" | 80-90 in. lbs. |
| 9 | Height Control Valve Studs to Frame Locknut | 2 | 1/4" | 40-50 in. lbs. |
| 10 | Adj. Valve Arm Joint Stud to Bracket Locknut | 2 | 5/16" | 80-90 in. lbs. |
| 11 | Air Spring to Frame Bracket Locknut | 2 | 1/2" | 20-30 |
| 12 | Main Support Member Assembly Spring Clip Nut | 2 | 7/16" | 30-34 |
| NOTE: ¹ Follow torque specifications furnished by Truck Manufacturer's for OEM supplied fasteners. The torque values listed above apply only if Hendrickson furnished fasteners are use. | | | | |

319



Information contained in this literature was accurate at the time of publication. Product changes may have been made after the copyright date that are not reflected.

17730-246A 2M 12-01 Printed in United States of America.

Truck Suspension Systems
800 S. Frontage Road
Woodridge, IL 60517-4904

630.910.2800
FAX 630.910.2899
www.hendrickson-intl.com

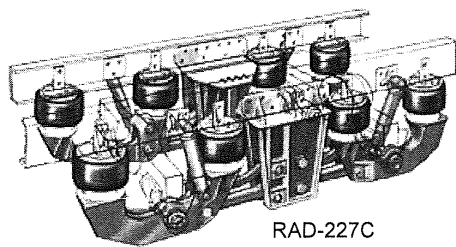
The Boler Company
Copyright © 2001
All Rights Reserved



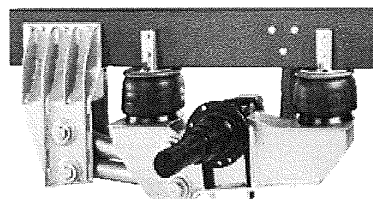
Service Manual for Air-Ride 227 Series

321

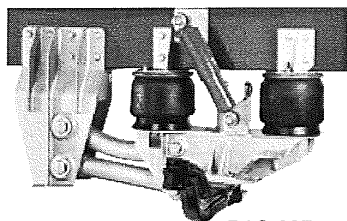
MODELS: RAD-227, RAD-227C,
RAD-227WB AND RAS-227



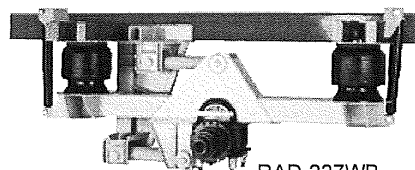
RAD-227C
100% Air-Ride
Cap. 34,000 - 48,000 lbs.



RAD-227
Cap. 10,000 - 25,000 lbs.



RAS-227
Cap. 7,000 - 15,000 lbs.



RAD-227WB
"Wide Base" 100% Air-Ride
Cap. 10,000 - 25,000 lbs.

Revised 11/2006

Ridewell Corporation ♦ P.O. Box 4586 ♦ Springfield, MO 65808
800-641-4122 (417) 833-4565 ♦ Fax (417) 833-4560
www.ridewellcorp.com

CONTENTS

| | |
|---|---------|
| Basic Operation | Page 3 |
| Operational Inspection | Page 4 |
| Preventative Maintenance | Page 5 |
| Basic Troubleshooting | Page 6 |
| Axle Alignment Procedure | Page 7 |
| Bushing Replacement Procedure | Page 8 |
| Ride Height/Height Control Valve Adjustment | Page 9 |
| Shock Absorber Adjustment | Page 10 |
| Parts Illustrations | Page 11 |

SUSPENSION IDENTIFICATION: Ridewell Suspensions are identified by a metal tag welded to the left-hand hanger that indicates part number, model number, capacity and date of manufacture. Consult your vehicle manufacturer for your correct mounting height.

PARTS: For optimum suspension performance, order only Ridewell parts. Replacement parts for Model RAS-227, RAD-227, RAD-227C and RAD-227WB are shown in Section 9 of this manual.

SALES, SERVICE & WARRANTY: If you need assistance regarding this product, please contact us and we will be glad to help you.

Mailing Address

Ridewell Corporation
P.O. Box 4586
Springfield, MO 65808

Shipping Address

Ridewell Corporation
3715 E. Farm Rd. 94
Springfield, MO 65803

Phones, Fax, email

800-641-4122, (417) 833-4565
(417) 833-4560, fax
info@ridewellcorp.com



BASIC OPERATION

When properly maintained and operated within design limits, Ridewell's **RAD-227** (Drive Axle), **RAS-227** (Steer Axle) and **RAD-227WB** (Drive Axle Wide Base) will provide many years of trouble-free service. The **RAD-227** series suspensions have several unique features which keep maintenance to a minimum and performance at a maximum.

- 1.) 100% ride on air.
- 2.) Parallelogram design promotes road stability allowing axle movement with no change in steering or drive line angle.
- 3.) A patented eccentric bolt and/or screw rod feature allows for simple, positive axle alignment.
- 4.) Rubber bushed pivot points require no lubrication.
- 5.) A self-contained shock absorber that allows precise installation and insures proper shock and air spring tolerance.

Air Springs & Height Control Valve

Your air ride suspension is designed to dampen the shocks transmitted from road surface to vehicle frame through the **air springs**. The **height control valve** is used to maintain the volume of air in the air springs. You may use a **single valve system** to maintain **ride height** only or use a **double valve system** to maintain **ride height** and **level** the vehicle. Please check with your vehicle manufacturer for your suspension's ride height.

IMPORTANT NOTE:

The air springs used on all Model 227 suspensions have internal rubber bumpers designed to carry the vehicle load should air spring failure or sudden loss of air supply occur. Should an air spring fail on a **single height control valve system**, all of the air springs will deflate allowing the suspension to operate on internal bumpers until repairs can be made. Should an air spring fail on a **double height control or leveling valve system**, the springs would deflate on one side only. Simply deflate the other side by removing the vertical linkage rod from the valve and rotate the horizontal lever arms **down** to fully exhaust the springs.

Air Pressure & Brake Protection Valve

This air-ride suspension is dependent on air pressure from the vehicle supply system. Air pressure must be maintained above 65 p.s.i. before operation. **A brake protection valve must be installed in the air system to prevent air loss below 65 p.s.i. and to insure safe air brake pressure in the event of air loss in the suspension system.**

Shock Absorbers

The suspension is equipped with **shock absorbers** to dampen dynamic frequencies. The shock absorber is very important and must be maintained to insure smooth operation.

OPERATIONAL INSPECTION

1. Inspect all fasteners at hanger to frame connections.
2. Build and maintain vehicle air pressure to 65 p.s.i. minimum.
3. Inspect air springs. Make sure all springs inflate and do not leak. Soap test if leaking is suspected.
4. Check all air connections for leaks and tighten if needed.
5. Inspect air lines. They should be free of sharp edge contact to prevent premature failure.
6. Check for proper ride height. If incorrect, adjust per **Section 7** of this manual.
7. Cross members must be installed between hangers.



PREVENTATIVE MAINTENANCE

DAILY

Check for loose or broken parts on or around suspension to prevent any serious problems from occurring.

EVERY 30 DAYS

Check clearances around all moving suspension parts, air springs, tires and shock absorbers. Any signs of interference should be immediately corrected.

Visually inspect axle beam bolted connection to make sure bolts are tight and there are no signs of wear.

EVERY 90 DAYS & WITH ANNUAL INSPECTION

Inspect items required in daily and 30-day inspections.

Inspect all welded connections.

Inspect all pivot and clamping connections such as the suspension pivots and shock mounts.

DO NOT PAINT THIS STICKER

| RIDEWELL SUSPENSION TORQUE CHART | | |
|--|--------------------|---------------------------|
| BOLT SIZE | LUBRICATED THREADS | |
| 1 1/2" | | 1,100 FT. LB. (1,490 N·m) |
| 1 1/4" | | 1,000 FT. LB. (1,020 N·m) |
| 1 1/8" | | 500 FT. LB. (680 N·m) |
| 1" | GRADE 5 | 360 FT. LB. (490 N·m) |
| 1" | GRADE 8 | 460 FT. LB. (625 N·m) |
| 7/8" | | 350 FT. LB. (475 N·m) |
| 3/4" | GRADE 5 | 160 FT. LB. (220 N·m) |
| 3/4" | GRADE 8 | 190 FT. LB. (260 N·m) |
| 5/8" | | 100 FT. LB. (135 N·m) |
| *3/4" | | 50 FT. LB. (70 N·m) |
| *1/2" | | 25 FT. LB. (35 N·m) |
| * AIR SPRING CONNECTION ONLY | | |
| After suspension has been in operation for approximately 6,000 miles (10,000 KLMS), all fasteners must be re-tightened to specified torque. Repeat every 50,000 miles (80,000 KLMS). | | |
| DO NOT OVER TORQUE! | | |
| 990301 | | |

BASIC TROUBLESHOOTING

NOTE: Do not check system until minimum 65 p.s.i. air pressure is built and maintained.

1. All Air Springs Flat or Slow to Fill - Check the following:

- a. Air pressure
- b. Air brake protection valve
- c. Height control valve

2. Air Springs Flat on One Side of Suspension - Check the following:

- a. Air springs
- b. Height control valve
- c. Height control valve setting

3. When Vehicle is Parked Suspension Deflates Rapidly - Check the following:

- a. Air lines
- b. Air springs

4. Vehicle Pulls to Left or Right - Check the following:

- a. Tire pressure
- b. Axle alignment
- c. Suspension bushings

5. Vehicle has Excessive Sway - Check the following:

- a. Air springs firmness
- b. Sway bar bushings
- c. Torque beam bushings



AXLE ALIGNMENT PROCEDURES

Procedure 1

For suspensions with eccentric bolts only:

1. Loosen all 1 ¼" eccentric bolt nuts.
2. Remove anti-turn washers from head of eccentric bolts.
3. Align axle by turning eccentric arrow (on bolt head) on the lower most torque beam to the direction the axle needs to move.
4. Turn the upper eccentric arrow to the same position of the lower arrow. Check alignment and repeat as necessary.
5. After alignment is achieved, install anti-turn washers to eccentric bolt heads.
6. Tighten 1 ¼" nuts to **1,000 ft. lbs. torque.**

327

Procedure 2

For suspensions with threaded rod type adjustable torque arms only:

1. Loosen cast clamp bolts on threaded torque arms.
2. Turn lower most torque arm threaded rod either clockwise or counter-clockwise to lengthen or shorten torque rod as required.
3. Measure new length of lower torque arm using center of mounting bolts as reference.
4. Adjust upper torque arm to match lower arm length.
5. Check alignment and repeat as necessary.
6. Tighten cast clamps on adjustable torque arm to **100 ft. lbs. torque.**

Procedure 3

For suspensions with eccentric bolt adjustment on lower torque beam and an upper threaded rod type type adjustable torque arm:

1. Loosen all 1 ¼" eccentric bolt nut.
2. Remove anti-turn washer from eccentric bolt head.
3. Align axle by turning eccentric bolt arrow (on bolt head) to the direction the axle needs to move.
4. Loosen cast clamps on torque arm and adjust the upper threaded rod type torque arm approximately the same distance the axle has moved. Check alignment and repeat as necessary.
5. After alignment is achieved, install anti-turn washer to eccentric bolt head.
6. Tighten 1 ¼" nut to **1,000 ft. lbs. torque.**
7. Tighten cast clamps on adjustable torque arm to **100 ft. lbs. torque.**

BUSHING REPLACEMENT PROCEDURES

Procedure 1

Replacement of Torque Beam Bushings:

1. Lift frame of vehicle with proper jacks or stands and exhaust air from suspension system.
2. Remove tires from axle.
3. Block axle with proper jacks or stands.
4. Remove anti-turn washers from heads of eccentric bolts. Remove weld from clamp block.
5. Remove 1 ¼" nuts on eccentric bolts. Turn eccentric bolt arrow to 12 o'clock position and tap out (**Caution: Do Not Damage Threads**).
6. Remove 1 ½" cap screws from lower beam assembly.
7. Remove torque beams from suspension and press bushings out in hydraulic press.
8. Using an approved rubber lubricant, press in new bushings. Make sure bushings are centered in torque beam sleeve.
9. Install torque beams into suspension.
10. Move axle up or down to proper ride height and torque 1 ½" cap screws to **1,100 ft.lbs.**
11. Re-install eccentric bolts and the 1 ¼" nuts.
12. Align axle (see Section 5).
13. Install anti-turn washers after alignment.
14. Torque 1 ¼" nuts to **1,000 ft. lbs.**

Procedure 2

Replacement of Adjustable Torque Arms or Sway Bar Bushings:

1. Remove 1" bolts from torque arms or sway bar.
2. Remove torque arms or sway bar, and using an approved rubber lubricant, re-bush making sure bushings are centered in sleeves.
3. Install torque arms or sway bar. Tighten 1" cap screws to **360 ft. lbs. torque.**
4. Align axle if required (see Section 5).



RIDE HEIGHT/HEIGHT CONTROL VALVE ADJUSTMENT

Operation

As load is applied, the horizontal actuating lever arm moves from **neutral** position to **up** (intake) position. As load is removed, the horizontal actuating lever arm moves from neutral position to down (exhaust) position. The valve opens and air is allowed to exhaust from air springs bringing the horizontal actuating lever back to a neutral position. Optimum performance is achieved when valve is adjusted accurately to the suspension by increasing or decreasing horizontal lever arm length to a point where valve and lever arm approach 45 degrees maximum, up or down from neutral position.

329

Adjustment

1. With vehicle on level ground, build and maintain supply air pressure in excess of 65 p.s.i.
2. Loosen vertical link hose clamp to allow **P** shaped rubber connector to slide freely up and down vertical link.
3. Rotate horizontal lever arm down to exhaust air springs or rotate up to inflate springs until proper ride height is achieved.
4. Tighten hose clamp on vertical link connector while holding horizontal lever arms in neutral position.
5. **TEST:** Disconnect vertical link rod grommet from pin bracket at axle. Rotate horizontal lever arm **down** to exhaust air springs about halfway. Rotate horizontal lever arm **up** until grommet is back to pin bracket level. Air springs should re-inflate to ride level height.
6. Re-connect grommet to pin. Check to see if air springs are of equal firmness. Make sure vertical link rod **extends completely through** the rubber **P** connector at all times.

SHOCK ADJUSTMENT PROCEDURES

If your suspension is equipped with Koni Adjustable Shock Absorbers and require adjustment, proceed as follows:

NOTE: Read this entire procedure before starting.

1. Remove the shock absorber from the vehicle and hold it vertically with the lower eye in a vice.
2. Press top of shock down while turning **gently** counter-clockwise until you feel the cams of the adjusting nut engage in the recesses of the front valve assembly. When engagement is made, turn top of shock 2 **half** turns clockwise and stop. Adjustment is complete.
3. Pull top of shock up about ½" and remove from vice.
4. Re-install on vehicle.

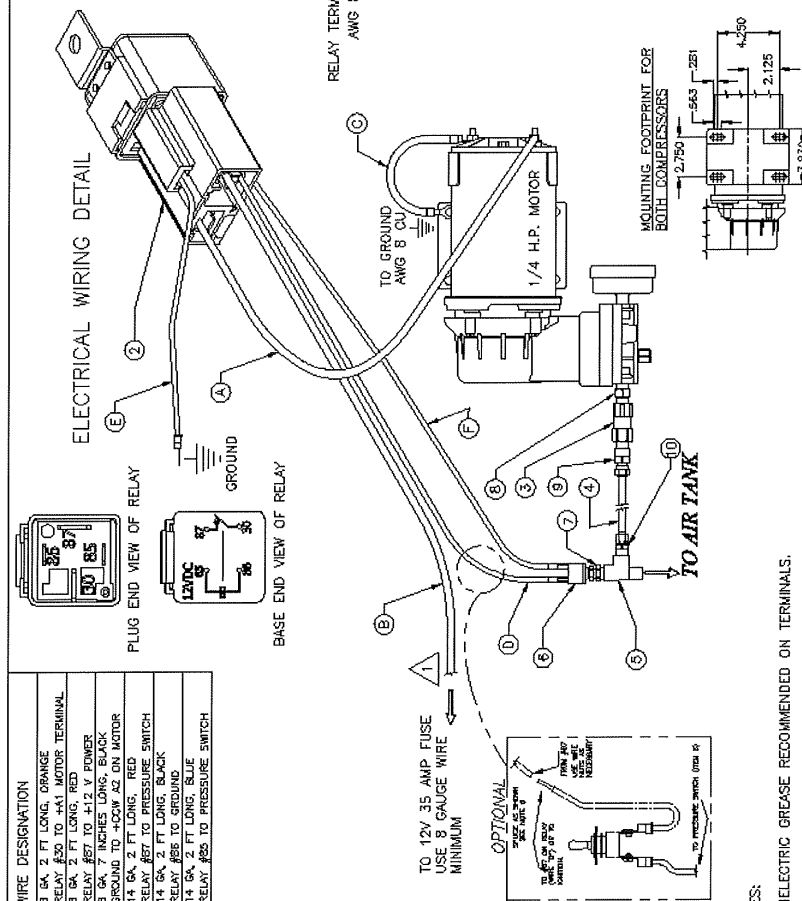
IMPORTANT NOTE:

Shock absorbers must be adjusted in pairs. There is a maximum of 5 half turns clockwise adjustment on your shock absorber. Do not use excessive force when making adjustments. If you are having difficulty, please contact your nearest Ridewell representative.

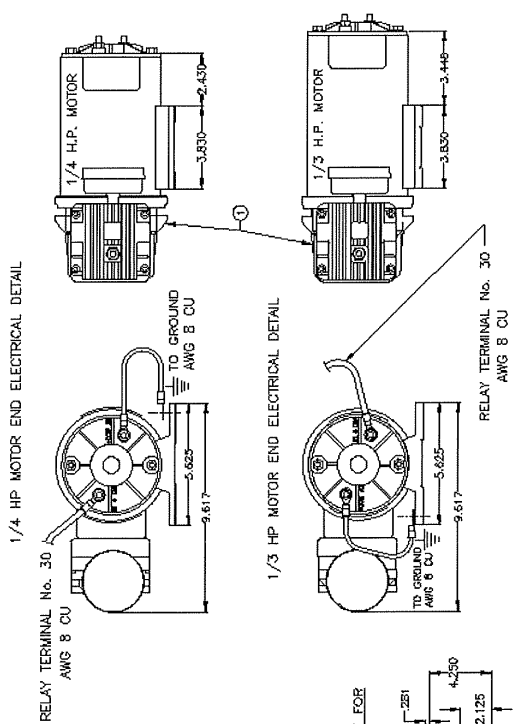


PARTS ILLUSTRATIONS

| | WIRE DESIGNATION |
|---|--|
| A | B GA. 2 FT LONG, ORANGE RELAY #30 TO +41 MOTOR TERMINAL |
| B | B GA. 2 FT LONG, RED RELAY #57 TO +12 V. POWER |
| C | B GA. 7 INCHES LONG, BLACK GROUND TO +00W A2 ON MOTOR |
| D | 14 GA. 2 FT LONG, RED RELAY #57 TO PRESSURE SWITCH |
| E | 14 GA. 2 FT LONG, BLACK RELAY #85 TO GROUND |
| F | 14 GA. 2 FT LONG, BLUE RELAY #85 TO PRESSURE SWITCH |




| PARTS REQUIRED FOR 1220016 (1 1/3 H.P. AIR COMPRESSOR) | | PARTS REQUIRED FOR 1220017 (1 1/4 H.P. AIR COMPRESSOR) | |
|--|-------------|--|------|
| ITEM No. | PART No. | DESCRIPTION | QTY. |
| 1 | 12371BSB000 | AIR COMPRESSOR, 1/3 H.P., 12 VDC | 1 |
| 2 | 1237257B000 | AIR COMPRESSOR, 1/4 H.P., 12 VDC | 1 |
| 3 | 1230067 | RELAY/WIRE ASSY, 12VDC, 70 AMP | 1 |
| 4 | 1234924B000 | CHECK VALVE - ONE WAY | 1 |
| 5 | 1240108 | TUBING, COPPER, 3 FT. | 1 |
| 6 | 1234250B327 | TEE, STREET, 1/4" NPT | 1 |
| 7 | 1230037 | SWITCH, PRESSURE | 1 |
| 8 | 1230038 | BUSHING, HEX, 1/4" NPT X 1/8" NPT | 1 |
| 9 | 1234250B301 | HEX NIPPLE - 1/4" NPT | 1 |
| 10 | 1230065 | CONN, FEMALE, 1/4" FNPT X 1/4" TUBE | 1 |
| 11 | 1234250B303 | CONN, MALE, 1/4" NPT X 1/4" TUBE | 1 |



NOTES:

1. DIELECTRIC GREASE RECOMMENDED ON TERMINALS.
2. A SCREWDRIVER IS REQUIRED TO REMOVE RELAY FROM BASE. EXCESSIVE PULLING ON RELAY HOUSING MAY CAUSE DAMAGE. DISCONNECT WIRE BEFORE REMOVING RELAY.
3. RECOMMENDED WIRE TYPE: 5XL
4. USE PIPE SEALANT ON ALL FITTINGS AND TIGHTEN TO 10-12 FT LBS. ALL CONNECTIONS MUST BE AIR TIGHT FOR PROPER PERFORMANCE.
5. AIR FILTER IS PART OF AIR COMPRESSOR ASSEMBLY (ITEM 1). THE AIR FILTER MUST BE CHANGED ANNUALLY UNDER NORMAL CONDITIONS. MORE FREQUENT CHANGES ARE NECESSARY WHEN OPERATED IN A DUSTY ENVIRONMENT. REPLACEMENT AIR FILTER ASSEMBLY P/N 123275ZF8001.

NOTES: (CON'T)

6. **OPTIONAL WIRING:** MAIN POWER  SHOULD BE DRAWN FROM THE BATTERY AND THE PRESSURE SWITCH (WIRE D) MAY DRAW POWER AS AN ACCESSORY THROUGH THE IGNITION AS SHOWN FOR NON-CONSTANT OPERATION. IF A TOGGLE SWITCH IS DESIRED, SPICE IN CUSTOMER FURNISHED SWITCH, WHERE INDICATED.

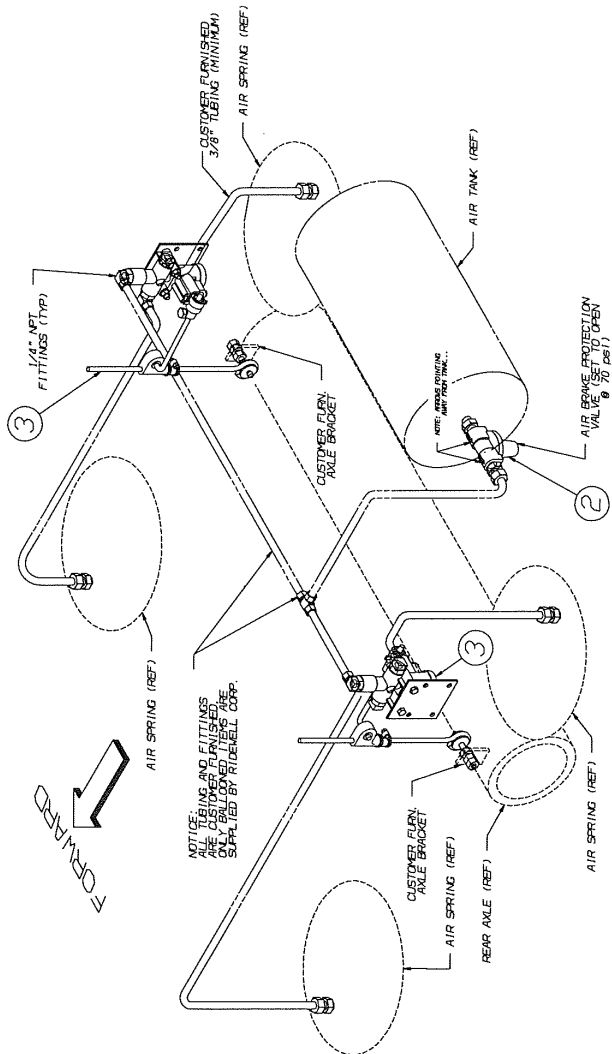
This drawing and/or electronic media containing this drawing is the sole property of the Federal Corp. and is loaned with the express condition that it is not to be used in any way that would be detrimental to the interest of the Federal Corp. The acceptance of this drawing and/or electronic media by the addressee of this drawing is deemed to be an acceptance of the above-stated conditions. Drawings and/or electronic media containing this drawing are to be returned to the Federal Corp. upon request.

[illegible]

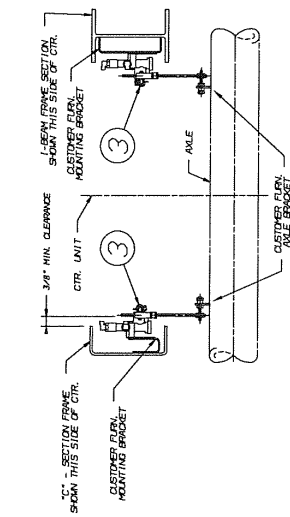
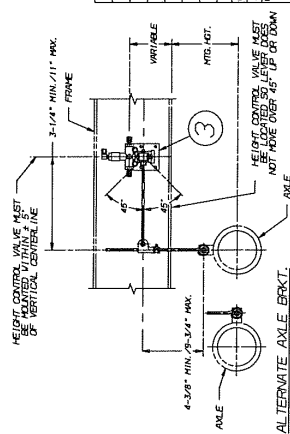


| ITEM | LET | PART NO. | DESCRIPTION | NO. |
|------|-------------|----------|---------------------------|-------|
| 1 | OMITTED | | OMITTED (PER REV. B) | REV'D |
| 2 | 1244761B000 | | PR578 PRCT'N VLV W/SCREEN | 1 |
| 3 | 16240605 | | RV HCV W/LINK & MTD. SET | 2 |

NOTE 1: FOR ADDITIONAL PARTS BREAK-DOWN ON ITEM NO. "A", SEE PART NO. 1640605.
 NOTE 2: FOR TANDEN AXLE APPLICATIONS MOUNT HEIGHT CONTROL VALVES ON THE REAR AXLE (CUSTOMER SUPPLIED). HEIGHT CONTROL VALVES MAY BE MOUNTED AHEAD OF THE AXLE (OPPOSITE OF DRAWING).
 NOTE 3: HEIGHT CONTROL VALVES MAY BE MOUNTED TO REAR OF AIR TANK AS SPACE PERMITS. AIR TANK MAY BE LOCATED TO SUIT...



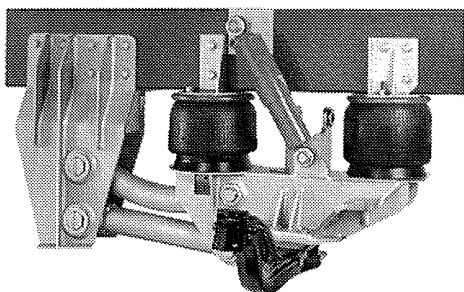
This drawing and/or electronic media containing the drawing is the sole property of All American Corporation. It is not to be used in any way without the written consent of All American Corporation. This drawing is to be used in accordance with the drawing and/or electronic media. It is not to be altered or modified in any way without the written consent of All American Corporation. This drawing is to be used in accordance with the drawing and/or electronic media. It is not to be altered or modified in any way without the written consent of All American Corporation.



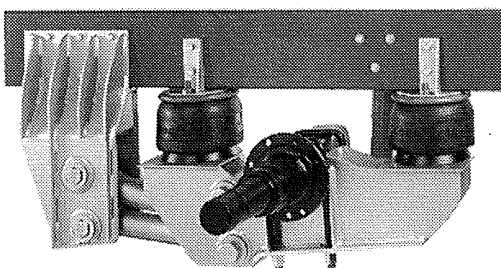
| | | | | | | |
|---|----------|---|----------|-------|-----|------|
| D | 00169 | CHGD FRV TO SHOW 70 PSI | 4/19/01 | DJ/KT | MJ | DK |
| 3 | 00123 | ROTATED ESCHMUT BOLT COW 90 DEGS. ON ITEM 3 | 5/14/00 | CSB | | |
| B | ECN 1122 | ITEM 3 WAS 1247423B0005 | 11/27/98 | JMK | | |
| | | GEN'L REV TO DWG. OMITTED "A", "B" WAS | 8/14/93 | BM | | |
| | | 1234781B000 & "C" TO REV. "C" | | | | |
| A | | UPGRADED REVISION LEVEL OF "C" TO REV. "C" | 10/25/91 | BM | | |
| REV | PROJECT | REVISION DESCRIPTION | DATE | BY | CHK | APPD |
| 00169 | BM | 7/13/99 | | | | |
| APPROVED: | | | | | | |
| DRAWN BY: | | | | | | |
| DESIGNED: | | | | | | |
| PRODUCT NO. | | | | | | |
| B-SIZE: NTS | | | | | | |
| D-SIZE: | | | | | | |
| SEE BOM | | | | | | |
| TOLERANCES UNLESS OTHERWISE SPECIFIED: | | | | | | |
| FRACTIONS: 1/16 IN. MIN. 1/8 IN. MIN. 1/4 IN. MIN. 3/16 IN. MIN. 1/2 IN. MIN. 3/4 IN. MIN. 1 IN. MIN. 1 1/2 IN. MIN. 2 IN. MIN. 3 IN. MIN. 4 IN. MIN. 6 IN. MIN. 8 IN. MIN. 10 IN. MIN. 12 IN. MIN. 14 IN. MIN. 16 IN. MIN. 18 IN. MIN. 20 IN. MIN. 24 IN. MIN. 30 IN. MIN. 36 IN. MIN. 48 IN. MIN. 60 IN. MIN. 72 IN. MIN. 84 IN. MIN. 96 IN. MIN. 108 IN. MIN. 120 IN. MIN. 144 IN. MIN. 168 IN. MIN. 192 IN. MIN. 216 IN. MIN. 240 IN. MIN. 270 IN. MIN. 300 IN. MIN. 324 IN. MIN. 360 IN. MIN. 400 IN. MIN. 432 IN. MIN. 480 IN. MIN. 540 IN. MIN. 600 IN. MIN. 648 IN. MIN. 720 IN. MIN. 792 IN. MIN. 864 IN. MIN. 936 IN. MIN. 1008 IN. MIN. 1080 IN. MIN. 1152 IN. MIN. 1224 IN. MIN. 1296 IN. MIN. 1368 IN. MIN. 1440 IN. MIN. 1512 IN. MIN. 1584 IN. MIN. 1656 IN. MIN. 1728 IN. MIN. 1800 IN. MIN. 1872 IN. MIN. 1944 IN. MIN. 2016 IN. MIN. 2088 IN. MIN. 2160 IN. MIN. 2232 IN. MIN. 2304 IN. MIN. 2376 IN. MIN. 2448 IN. MIN. 2520 IN. MIN. 2592 IN. MIN. 2664 IN. MIN. 2736 IN. MIN. 2808 IN. MIN. 2880 IN. MIN. 2952 IN. MIN. 3024 IN. MIN. 3096 IN. MIN. 3168 IN. MIN. 3240 IN. MIN. 3312 IN. MIN. 3384 IN. MIN. 3456 IN. MIN. 3528 IN. MIN. 3600 IN. MIN. 3672 IN. MIN. 3744 IN. MIN. 3816 IN. MIN. 3888 IN. MIN. 3960 IN. MIN. 4032 IN. MIN. 4104 IN. MIN. 4176 IN. MIN. 4248 IN. MIN. 4320 IN. MIN. 4392 IN. MIN. 4464 IN. MIN. 4536 IN. MIN. 4608 IN. MIN. 4680 IN. MIN. 4752 IN. MIN. 4824 IN. MIN. 4896 IN. MIN. 4968 IN. MIN. 5040 IN. MIN. 5112 IN. MIN. 5184 IN. MIN. 5256 IN. MIN. 5328 IN. MIN. 5400 IN. MIN. 5472 IN. MIN. 5544 IN. MIN. 5616 IN. MIN. 5688 IN. MIN. 5760 IN. MIN. 5832 IN. MIN. 5904 IN. MIN. 5976 IN. MIN. 6048 IN. MIN. 6120 IN. MIN. 6192 IN. MIN. 6264 IN. MIN. 6336 IN. MIN. 6408 IN. MIN. 6480 IN. MIN. 6552 IN. MIN. 6624 IN. MIN. 6696 IN. MIN. 6768 IN. MIN. 6840 IN. MIN. 6912 IN. MIN. 6984 IN. MIN. 7056 IN. MIN. 7128 IN. MIN. 7200 IN. MIN. 7272 IN. MIN. 7344 IN. MIN. 7416 IN. MIN. 7488 IN. MIN. 7560 IN. MIN. 7632 IN. MIN. 7704 IN. MIN. 7776 IN. MIN. 7848 IN. MIN. 7920 IN. MIN. 7992 IN. MIN. 8064 IN. MIN. 8136 IN. MIN. 8208 IN. MIN. 8280 IN. MIN. 8352 IN. MIN. 8424 IN. MIN. 8496 IN. MIN. 8568 IN. MIN. 8640 IN. MIN. 8712 IN. MIN. 8784 IN. MIN. 8856 IN. MIN. 8928 IN. MIN. 9000 IN. MIN. 9072 IN. MIN. 9144 IN. MIN. 9216 IN. MIN. 9288 IN. MIN. 9360 IN. MIN. 9432 IN. MIN. 9504 IN. MIN. 9576 IN. MIN. 9648 IN. MIN. 9720 IN. MIN. 9792 IN. MIN. 9864 IN. MIN. 9936 IN. MIN. 10008 IN. MIN. 10080 IN. MIN. 10152 IN. MIN. 10224 IN. MIN. 10296 IN. MIN. 10368 IN. MIN. 10440 IN. MIN. 10512 IN. MIN. 10584 IN. MIN. 10656 IN. MIN. 10728 IN. MIN. 10800 IN. MIN. 10872 IN. MIN. 10944 IN. MIN. 11016 IN. MIN. 11088 IN. MIN. 11160 IN. MIN. 11232 IN. MIN. 11304 IN. MIN. 11376 IN. MIN. 11448 IN. MIN. 11520 IN. MIN. 11592 IN. MIN. 11664 IN. MIN. 11736 IN. MIN. 11808 IN. MIN. 11880 IN. MIN. 11952 IN. MIN. 12024 IN. MIN. 12096 IN. MIN. 12168 IN. MIN. 12240 IN. MIN. 12312 IN. MIN. 12384 IN. MIN. 12456 IN. MIN. 12528 IN. MIN. 12600 IN. MIN. 12672 IN. MIN. 12744 IN. MIN. 12816 IN. MIN. 12888 IN. MIN. 12960 IN. MIN. 13032 IN. MIN. 13104 IN. MIN. 13176 IN. MIN. 13248 IN. MIN. 13320 IN. MIN. 13392 IN. MIN. 13464 IN. MIN. 13536 IN. MIN. 13608 IN. MIN. 13680 IN. MIN. 13752 IN. MIN. 13824 IN. MIN. 13896 IN. MIN. 13968 IN. MIN. 14040 IN. MIN. 14112 IN. MIN. 14184 IN. MIN. 14256 IN. MIN. 14328 IN. MIN. 14400 IN. MIN. 14472 IN. MIN. 14544 IN. MIN. 14616 IN. MIN. 14688 IN. MIN. 14760 IN. MIN. 14832 IN. MIN. 14904 IN. MIN. 14976 IN. MIN. 15048 IN. MIN. 15120 IN. MIN. 15192 IN. MIN. 15264 IN. MIN. 15336 IN. MIN. 15408 IN. MIN. 15480 IN. MIN. 15552 IN. MIN. 15624 IN. MIN. 15696 IN. MIN. 15768 IN. MIN. 15840 IN. MIN. 15912 IN. MIN. 15984 IN. MIN. 16056 IN. MIN. 16128 IN. MIN. 16200 IN. MIN. 16272 IN. MIN. 16344 IN. MIN. 16416 IN. MIN. 16488 IN. MIN. 16560 IN. MIN. 16632 IN. MIN. 16704 IN. MIN. 16776 IN. MIN. 16848 IN. MIN. 16920 IN. MIN. 16992 IN. MIN. 17064 IN. MIN. 17136 IN. MIN. 17208 IN. MIN. 17280 IN. MIN. 17352 IN. MIN. 17424 IN. MIN. 17496 IN. MIN. 17568 IN. MIN. 17640 IN. MIN. 17712 IN. MIN. 17784 IN. MIN. 17856 IN. MIN. 17928 IN. MIN. 18000 IN. MIN. 18072 IN. MIN. 18144 IN. MIN. 18216 IN. MIN. 18288 IN. MIN. 18360 IN. MIN. 18432 IN. MIN. 18504 IN. MIN. 18576 IN. MIN. 18648 IN. MIN. 18720 IN. MIN. 18792 IN. MIN. 18864 IN. MIN. 18936 IN. MIN. 19008 IN. MIN. 19080 IN. MIN. 19152 IN. MIN. 19224 IN. MIN. 19296 IN. MIN. 19368 IN. MIN. 19440 IN. MIN. 19512 IN. MIN. 19584 IN. MIN. 19656 IN. MIN. 19728 IN. MIN. 19800 IN. MIN. 19872 IN. MIN. 19944 IN. MIN. 20016 IN. MIN. 20088 IN. MIN. 20160 IN. MIN. 20232 IN. MIN. 20304 IN. MIN. 20376 IN. MIN. 20448 IN. MIN. 20520 IN. MIN. 20592 IN. MIN. 20664 IN. MIN. 20736 IN. MIN. 20808 IN. MIN. 20880 IN. MIN. 20952 IN. MIN. 21024 IN. MIN. 21096 IN. MIN. 21168 IN. MIN. 21240 IN. MIN. 21312 IN. MIN. 21384 IN. MIN. 21456 IN. MIN. 21528 IN. MIN. 21600 IN. MIN. 21672 IN. MIN. 21744 IN. MIN. 21816 IN. MIN. 21888 IN. MIN. 21960 IN. MIN. 22032 IN. MIN. 22104 IN. MIN. 22176 IN. MIN. 22248 IN. MIN. 22320 IN. MIN. 22392 IN. MIN. 22464 IN. MIN. 22536 IN. MIN. 22608 IN. MIN. 22680 IN. MIN. 22752 IN. MIN. 22824 IN. MIN. 22896 IN. MIN. 22968 IN. MIN. 23040 IN. MIN. 23112 IN. MIN. 23184 IN. MIN. 23256 IN. MIN. 23328 IN. MIN. 23400 IN. MIN. 23472 IN. MIN. 23544 IN. MIN. 23616 IN. MIN. 23688 IN. MIN. 23760 IN. MIN. 23832 IN. MIN. 23904 IN. MIN. 23976 IN. MIN. 24048 IN. MIN. 24120 IN. MIN. 24192 IN. MIN. 24264 IN. MIN. 24336 IN. MIN. 24408 IN. MIN. 24480 IN. MIN. 24552 IN. MIN. 24624 IN. MIN. 24696 IN. MIN. 24768 IN. MIN. 24840 IN. MIN. 24912 IN. MIN. 24984 IN. MIN. 25056 IN. MIN. 25128 IN. MIN. 25200 IN. MIN. 25272 IN. MIN. 25344 IN. MIN. 25416 IN. MIN. 25488 IN. MIN. 25560 IN. MIN. 25632 IN. MIN. 25704 IN. MIN. 25776 IN. MIN. 25848 IN. MIN. 25920 IN. MIN. 25992 IN. MIN. 26064 IN. MIN. 26136 IN. MIN. 26208 IN. MIN. 26280 IN. MIN. 26352 IN. MIN. 26424 IN. MIN. 26496 IN. MIN. 26568 IN. MIN. 26640 IN. MIN. 26712 IN. MIN. 26784 IN. MIN. 26856 IN. MIN. 26928 IN. MIN. 27000 IN. MIN. 27072 IN. MIN. 27144 IN. MIN. 27216 IN. MIN. 27288 IN. MIN. 27360 IN. MIN. 27432 IN. MIN. 27504 IN. MIN. 27576 IN. MIN. 27648 IN. MIN. 27720 IN. MIN. 27792 IN. MIN. 27864 IN. MIN. 27936 IN. MIN. 28008 IN. MIN. 28080 IN. MIN. 28152 IN. MIN. 28224 IN. MIN. 28296 IN. MIN. 28368 IN. MIN. 28440 IN. MIN. 28512 IN. MIN. 28584 IN. MIN. 28656 IN. MIN. 28728 IN. MIN. 28800 IN. MIN. 28872 IN. MIN. 28944 IN. MIN. 29016 IN. MIN. 29088 IN. MIN. 29160 IN. MIN. 29232 IN. MIN. 29304 IN. MIN. 29376 IN. MIN. 29448 IN. MIN. 29520 IN. MIN. 29592 IN. MIN. 29664 IN. MIN. 29736 IN. MIN. 29808 IN. MIN. 29880 IN. MIN. 29952 IN. MIN. 30024 IN. MIN. 30096 IN. MIN. 30168 IN. MIN. 30240 IN. MIN. 30312 IN. MIN. 30384 IN. MIN. 30456 IN. MIN. 30528 IN. MIN. 30600 IN. MIN. 30672 IN. MIN. 30744 IN. MIN. 30816 IN. MIN. 30888 IN. MIN. 30960 IN. MIN. 31032 IN. MIN. 31104 IN. MIN. 31176 IN. MIN. 31248 IN. MIN. 31320 IN. MIN. 31392 IN. MIN. 31464 IN. MIN. 31536 IN. MIN. 31608 IN. MIN. 31680 IN. MIN. 31752 IN. MIN. 31824 IN. MIN. 31896 IN. MIN. 31968 IN. MIN. 32040 IN. MIN. 32112 IN. MIN. 32184 IN. MIN. 32256 IN. MIN. 32328 IN. MIN. 32400 IN. MIN. 32472 IN. MIN. 32544 IN. MIN. 32616 IN. MIN. 32688 IN. MIN. 32760 IN. MIN. 32832 IN. MIN. 32904 IN. MIN. 32976 IN. MIN. 33048 IN. MIN. 33120 IN. MIN. 33192 IN. MIN. 33264 IN. MIN. 33336 IN. MIN. 33408 IN. MIN. 33480 IN. MIN. 33552 IN. MIN. 33624 IN. MIN. 33696 IN. MIN. 33768 IN. MIN. 33840 IN. MIN. 33912 IN. MIN. 33984 IN. MIN. 34056 IN. MIN. 34128 IN. MIN. 34200 IN. MIN. 34272 IN. MIN. 34344 IN. MIN. 34416 IN. MIN. 34488 IN. MIN. 34560 IN. MIN. 34632 IN. MIN. 34704 IN. MIN. 34776 IN. MIN. 34848 IN. MIN. 34920 IN. MIN. 34992 IN. MIN. 35064 IN. MIN. 35136 IN. MIN. 35208 IN. MIN. 35280 IN. MIN. 35352 IN. MIN. 35424 IN. MIN. 35496 IN. MIN. 35568 IN. MIN. 35640 IN. MIN. 35712 IN. MIN. 35784 IN. MIN. 35856 IN. MIN. 35928 IN. MIN. 36000 IN. MIN. 36072 IN. MIN. 36144 IN. MIN. 36216 IN. MIN. 36288 IN. MIN. 36360 IN. MIN. 36432 IN. MIN. 36504 IN. MIN. 36576 IN. MIN. 36648 IN. MIN. 36720 IN. MIN. 36792 IN. MIN. 36864 IN. MIN. 36936 IN. MIN. 37008 IN. MIN. 37080 IN. MIN. 37152 IN. MIN. 37224 IN. MIN. 37296 IN. MIN. 37368 IN. MIN. 37440 IN. MIN. 37512 IN. MIN. 37584 IN. MIN. 37656 IN. MIN. 37728 IN. MIN. 37800 IN. MIN. 37872 IN. MIN. 37944 IN. MIN. 38016 IN. MIN. 38088 IN. MIN. 38160 IN. MIN. 38232 IN. MIN. 38304 IN. MIN. 38376 IN. MIN. 38448 IN. MIN. 38520 IN. MIN. 38592 IN. MIN. 38664 IN. MIN. 38736 IN. MIN. 38808 IN. MIN. 38880 IN. MIN. 38952 IN. MIN. 39024 IN. MIN. 39096 IN. MIN. 39168 IN. MIN. 39240 IN. MIN. 39312 IN. MIN. 39384 IN. MIN. 39456 IN. MIN. 39528 IN. MIN. 39600 IN. MIN. 39672 IN. MIN. 39744 IN. MIN. 39816 IN. MIN. 39888 IN. MIN. 39960 IN. MIN. 40032 IN. MIN. 40104 IN. MIN. 40176 IN. MIN. 40248 IN. MIN. 40320 IN. MIN. 40392 IN. MIN. 40464 IN. MIN. 40536 IN. MIN. 40608 IN. MIN. 40680 IN. MIN. 40752 IN. MIN. 40824 IN. MIN. 40896 IN. MIN. 40968 IN. MIN. 41040 IN. MIN. 41112 IN. MIN. 41184 IN. MIN. 41256 IN. MIN. 41328 IN. MIN. 41400 IN. MIN. 41472 IN. MIN. 41544 IN. MIN. 41616 IN. MIN. 41688 IN. MIN. 41760 IN. MIN. 41832 IN. MIN. 41904 IN. MIN. 41976 IN. MIN. 42048 IN. MIN. 42120 IN. MIN. 42192 IN. MIN. 42264 IN. MIN. 42336 IN. MIN. 42408 IN. MIN. 42480 IN. MIN. 42552 IN. MIN. 42624 IN. MIN. 42696 IN. MIN. 42768 IN. MIN. 42840 IN. MIN. 42912 IN. MIN. 42984 IN. MIN. 43056 IN. MIN. 43128 IN. MIN. 43200 IN. MIN. 43272 IN. MIN. 43344 IN. MIN. 43416 IN. MIN. 43488 IN. MIN. 43560 IN. MIN. 43632 IN. MIN. 43704 IN. MIN. 43776 IN. MIN. 43848 IN. MIN. 43920 IN. MIN. 43992 IN. MIN. 44064 IN. MIN. 44136 IN. MIN. 44208 IN. MIN. 44280 IN. MIN. 44352 IN. MIN. 44424 IN. MIN. 44496 IN. MIN. 44568 IN. MIN. 44640 IN. MIN. 44712 IN. MIN. 44784 IN. MIN. 44856 IN. MIN. 44928 IN. MIN. 45000 IN. MIN. 45072 IN. MIN. 45144 IN. MIN. 45216 IN. MIN. 45288 IN. MIN. 45360 IN. MIN. 45432 IN. MIN. 45504 IN. MIN. 45576 IN. MIN. 45648 IN. MIN. 45720 IN. MIN. 45792 IN. MIN. 45864 IN. MIN. 45936 IN. MIN. 46008 IN. MIN. 46080 IN. MIN. 46152 IN. MIN. 46224 IN. MIN. 46296 IN. MIN. 46368 IN. MIN. 46440 IN. MIN. 46512 IN. MIN. 46584 IN. MIN. 46656 IN. MIN. 46728 IN. MIN. 46800 IN. MIN. 46872 IN. MIN. 46944 IN. MIN. 47016 IN. MIN. 47088 IN. MIN. 47160 IN. MIN. 47232 IN. MIN. 47304 IN. MIN. 47376 IN. MIN. 47448 IN. MIN. 47520 IN. MIN. 47592 IN. MIN. 47664 IN. MIN. 47736 IN. MIN. 47808 IN. MIN. 47880 IN. MIN. 47952 IN. MIN. 48024 IN. MIN. 48096 IN. MIN. 48168 IN. MIN. 48240 IN. MIN. 48312 IN. MIN. 48384 IN. MIN. 48456 IN. MIN. 48528 IN. MIN. 48600 IN. MIN. 48672 IN. MIN. 48744 IN. MIN. 48816 IN. MIN. 48888 IN. MIN. 48960 IN. MIN. 49032 IN. MIN. 49104 IN. MIN. 49176 IN. MIN. 49248 IN. MIN. 49320 IN. MIN. 49392 IN. MIN. 49464 IN. MIN. 49536 IN. MIN. 49608 IN. MIN. 49680 IN. MIN. 49752 IN. MIN. 49824 IN. MIN. 49896 IN. MIN. 49968 IN. MIN. 50040 IN. MIN. 50112 IN. MIN. 50184 IN. MIN. 50256 IN. MIN. 50328 IN. MIN. 50400 IN. MIN. 50472 IN. MIN. 50544 IN. MIN. 50616 IN. MIN. 50688 IN. MIN. 50760 IN. MIN. 50832 IN. MIN. 50904 IN. MIN. 50976 IN. MIN. 51048 IN. MIN. 51120 IN. MIN. 51192 IN. MIN. 51264 IN. MIN. 51336 IN. MIN. 51408 IN. MIN. 51480 IN. MIN. 51552 IN. MIN. 51624 IN. MIN. 51696 IN. MIN. 51768 IN. MIN. 51840 IN. MIN. 51912 IN. MIN. 51984 IN. MIN. 52056 IN. MIN. 52128 IN. MIN. 52200 IN. MIN. 52272 IN. MIN. 52344 IN. MIN. 52416 IN. MIN. 52488 IN. MIN. 52560 IN. MIN. 52632 IN. MIN. 52704 IN. MIN. 52776 IN. MIN. 52848 IN. MIN. 52920 IN. MIN. 52992 IN. MIN. 53064 IN. MIN. 53136 IN. MIN. 53208 IN. MIN. 53280 IN. MIN. 53352 IN. MIN. 53424 IN. MIN. 53496 IN. MIN. 53568 IN. MIN. 53640 IN. MIN. 53712 IN. MIN. 53784 IN. MIN. 53856 IN. MIN. 53928 IN. MIN. 54000 IN. MIN. 54072 IN. MIN. 54144 IN. MIN. 54216 IN. MIN. 54288 IN. MIN. 54360 IN. MIN. 54432 IN. MIN. 54504 IN. MIN. 54576 IN. MIN. 54648 IN. MIN. 54720 IN. MIN. 54792 IN. MIN. 54864 IN. MIN. 54936 IN. MIN. 55008 IN. MIN. 55080 IN. MIN. 55152 IN. MIN. 55224 IN. MIN. 55296 IN. MIN. 55368 IN. MIN. 55440 IN. MIN. 55512 IN. MIN. 55584 IN. MIN. 55656 IN. MIN. 55728 IN. MIN. 55800 IN. MIN. 55872 IN. MIN. 55944 IN. MIN. 56016 IN. MIN. 56088 IN. MIN. 56160 IN. MIN. 56232 IN. MIN. 56304 IN. MIN. 56376 IN. MIN. 56448 IN. MIN. 56520 IN. MIN. 56592 IN. MIN. 56664 IN. MIN. 56736 IN. MIN. 56808 IN. MIN. 56880 IN. MIN. 56952 IN. MIN. 57024 IN. MIN. 57096 IN. MIN. 57168 IN. MIN. 57240 IN. MIN. 57312 IN. MIN. 57384 IN. MIN. 57456 IN. MIN. 57528 IN. MIN. 57600 IN. MIN. 57672 IN. MIN. 57744 IN. MIN. 57816 IN. MIN. 57888 IN. MIN. 57960 IN. MIN. 58032 IN. MIN. 58104 IN. MIN. 58176 IN. MIN. 58248 IN. MIN. 58320 IN. MIN. 58392 IN. MIN. 58464 IN. MIN. 58536 IN. MIN. 58608 IN. MIN. 58680 IN. MIN. 58752 IN. MIN. 58824 IN. MIN. 58896 IN. MIN. 58968 IN. MIN. 59040 IN. MIN. 59112 IN. MIN. 59184 IN. MIN. 59256 IN. MIN. 59328 IN. MIN. 59400 IN. MIN. 59472 IN. MIN. 59544 IN. MIN. 59616 IN. MIN. 59688 IN. MIN. 59760 IN. MIN. 59832 IN. MIN. 59904 IN. MIN. 59976 IN. MIN. 60048 IN. MIN. 60120 IN. MIN. 60192 IN. MIN. 60264 IN. MIN. 60336 IN. MIN. 60408 IN. MIN. 60480 IN. MIN. 60552 IN. MIN. 60624 IN. MIN. 60696 IN. MIN. 60768 IN. MIN. 60840 IN. MIN. 60912 IN. MIN. 60984 IN. MIN. 61056 IN. MIN. 61128 IN. MIN. 61200 IN. MIN. 61272 IN. MIN. 61344 IN. MIN. 61416 IN. MIN. 61488 IN. MIN. 61560 IN. MIN. 61632 IN. MIN. 61704 IN. MIN. 61776 IN. MIN. 61848 IN. MIN. 61920 IN. MIN. 61992 IN. MIN. 62064 IN. MIN. 62136 IN. MIN. 62208 IN. MIN. 62280 IN. MIN. 62352 IN. MIN. 62424 IN. MIN. 62496 IN. MIN. 62568 IN. MIN. 62640 IN. MIN. 62712 IN. MIN. 62784 IN. MIN. 62856 IN. MIN. 62928 IN. MIN. 63000 IN. MIN. 63072 IN. MIN. 63144 IN. MIN. 63216 IN. MIN. 63288 IN. MIN. 63360 IN. MIN. 63432 IN. MIN. 63504 IN. MIN. 63576 IN. MIN. 63648 IN. MIN. 63720 IN. MIN. 63792 IN. MIN. 63864 IN. MIN. 63936 IN. MIN. 64008 IN. MIN. 64080 IN. MIN. 64152 IN. MIN. 64224 IN. MIN. 64296 IN. MIN. 64368 IN. MIN. 64440 IN. MIN. 64512 IN. MIN. 64584 IN. MIN. 64656 IN. MIN. 64728 IN. MIN. 64800 IN. MIN. 64872 IN. MIN. 64944 IN. MIN. 65016 IN. MIN. 65088 IN. MIN. 65160 IN. MIN. 65232 IN. MIN. 65304 IN. MIN. 65376 IN. MIN. 65448 IN. MIN. 65520 IN. MIN. 65592 IN. MIN. 65664 IN. MIN. 65736 IN. MIN. 65808 IN. MIN. 65880 IN. MIN. 65952 IN. MIN. 66024 IN. MIN. 66096 IN. MIN. 66168 IN. MIN. 66240 IN. MIN. 66312 IN. MIN. 66384 IN. MIN. 66456 IN. MIN. 66528 IN. MIN. 66600 IN. MIN. 66672 IN. MIN. 66744 IN. MIN. 66816 IN. MIN. 66888 IN. MIN. 66960 IN. MIN. 67032 IN. MIN. 67104 IN. MIN. 67176 IN. MIN. 67248 IN. MIN. 67320 IN. MIN. 67392 IN. MIN. 67464 IN. MIN. 67536 IN. MIN. 67608 IN. MIN. 67680 IN. MIN. 67752 IN. MIN. 67824 IN. MIN. 67896 IN. MIN. 67968 IN. MIN. 68040 IN. MIN. 68112 IN. MIN. 68184 IN. MIN. 68256 IN. MIN. 68328 IN. MIN. 68400 IN. MIN. 68472 IN. MIN. 68544 IN. MIN. 68616 IN. MIN. 68688 IN. MIN. 68760 IN. MIN. 68832 IN. MIN. 68904 IN. MIN. 68976 IN. MIN. 69048 IN. MIN. 69120 IN. MIN. 69192 IN. MIN. 69264 IN. MIN. 69336 IN. MIN. 69408 IN. MIN. 69480 IN. MIN. 69552 IN. MIN. 69624 IN. MIN. 69696 IN. MIN. 69768 IN. MIN. 69840 IN. MIN. 69912 IN. MIN. 69984 IN. MIN. 70056 IN. MIN. 70128 IN. MIN. 70200 IN. MIN. 70272 IN. MIN. 70344 IN. MIN. 70416 IN. MIN. 70488 IN. MIN. 70560 IN. MIN. 70632 IN. MIN. 70704 IN. MIN. 70776 IN. MIN. 70848 IN. MIN. 70920 IN. MIN. 70992 IN. MIN. 71064 IN. MIN. 71136 IN. MIN. 71208 IN. MIN. 71280 IN. MIN. 71352 IN. MIN. 71424 IN. MIN. 71496 IN. MIN. 71568 IN. MIN. 71640 IN. MIN. 71712 IN. MIN. 71784 IN. MIN. 71856 IN. MIN. 71928 IN. MIN. 72000 IN. MIN. 72072 IN. MIN. 72144 IN. MIN. 72216 IN. MIN. 72288 IN. MIN. 72360 IN. MIN. 72432 IN. MIN. 72504 IN. MIN. 72576 IN. MIN. 72648 IN. MIN. 72720 IN. MIN. 72792 IN. MIN. 72864 IN. MIN. 72936 IN. MIN. 73008 IN. MIN. 73080 IN. MIN. 73152 IN. MIN. 73224 IN. MIN. 73296 IN. MIN. 73368 IN. MIN. 73440 IN. MIN. 73512 IN. MIN. 73584 IN. MIN. 73656 IN. MIN. 73728 IN. MIN. 73800 IN. MIN. 73872 IN. MIN. 73944 IN. MIN. 74016 IN. MIN. 74088 IN. MIN. 74160 IN. MIN. 74232 IN. MIN. 74304 IN. MIN. 74376 IN. MIN. 74448 IN. MIN. 74520 IN. MIN. 74592 IN. MIN. 74664 IN. MIN. 74736 IN. MIN. 74808 IN. MIN. 74880 IN. MIN. 74952 IN. MIN. 75024 IN. MIN. 75096 IN. MIN. 75168 IN. MIN. 75240 IN. MIN. 75312 IN. MIN. 75384 IN. MIN. 75456 IN. MIN. 75528 IN. MIN. 75600 IN. MIN. 75672 IN. MIN. 75744 IN. MIN. 75816 IN. MIN. 75888 IN. MIN. 75960 IN. MIN. 76032 IN. MIN. 76104 IN. MIN. 76176 IN. MIN. 76248 IN. MIN. 76320 IN. MIN. 76392 IN. MIN. 76464 IN. MIN. 76536 IN. MIN. 76608 IN. MIN. 76680 IN. MIN. 76752 IN. MIN. 76824 IN. MIN. 76896 IN. MIN. 76968 IN. MIN. 77040 IN. MIN. 77112 IN. MIN. 77184 IN. MIN. 77256 IN. MIN. 77328 IN. MIN. 77400 IN. MIN. 77472 IN. MIN. 77544 IN. MIN. 77616 IN. MIN. 77688 IN. MIN. 77760 IN. MIN. 77832 IN. MIN. 77904 IN. MIN. 77976 IN. MIN. 78048 IN. MIN. 78120 IN. MIN. 78192 IN. MIN. 78264 IN. MIN. 78336 IN. MIN. 78408 IN. MIN. 78480 IN. MIN. 78552 IN. MIN. 78624 IN. MIN. 78696 IN. MIN. 78768 IN. MIN. 78840 IN. MIN. 78912 IN. MIN. 78984 IN. MIN. 79056 IN. MIN. 79128 IN. MIN. 79200 IN. MIN. 79272 IN. MIN. 79344 IN. MIN. 79416 IN. MIN. 79488 IN. MIN. 79560 IN. MIN. 79632 IN. MIN. 79704 IN. MIN. 79776 IN. MIN. 79848 IN. MIN. 79920 IN. MIN. 79992 IN. MIN. 80064 IN. MIN. 80136 IN. MIN. 80208 IN. MIN. 80280 IN. MIN. 80352 IN. MIN. 80424 IN. MIN. 80496 IN. MIN. 80568 IN. MIN. 80640 IN. MIN. 80712 IN. MIN. 80784 IN. MIN. 80856 IN. MIN. 80928 IN. MIN. 81000 IN. MIN. 81072 IN. MIN. 81144 IN. MIN. 81216 IN. MIN. 81288 IN. MIN. 81360 IN. MIN. 81432 IN. MIN. 81504 IN. MIN. 81576 IN. MIN. 81648 IN. MIN. 81720 IN. MIN. 81792 IN. MIN. 81864 IN. MIN. 81936 IN. MIN. 82008 IN. MIN. 82080 IN. MIN. 82152 IN. MIN. 82224 IN. MIN. 82296 IN. MIN. 82368 IN. MIN. 82440 IN. MIN. 82512 IN. MIN. 82584 IN. MIN. 82656 IN. MIN. 82728 IN. MIN. 82800 IN. | | | | | | |



RAS-227 for Steer Axle and RAD-227 for Drive Axle

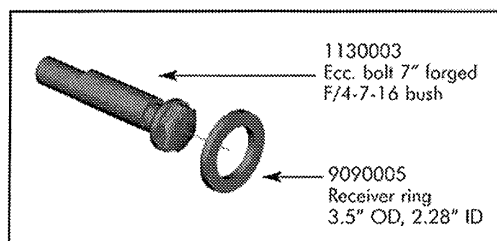


RAS-227 Parallelagram Designed Steer Axle Suspension; 7,000 - 15,000 lb. cap.



RAD-227 Parallelagram Designed Drive Axle Suspension; 10,000 - 25,000 lb. cap.

Common replacement parts are shown below. For air springs, hangers and torque beams, refer to your specific installation drawing.



NOTE: This new style eccentric bolt replaces previous style with square head

