

## Overview

The Blue Bird Vision Propane is equipped with either a conventional leaf spring/hydraulic shock absorber rear suspension; or an optional Hendrickson Comfort Air rear air suspension. In both cases, the rear axle assembly is an Arvin Meritor model RS-21-145.

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.

This chapter describes the 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.

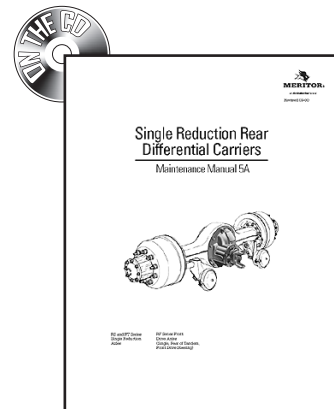
**CAUTION** *Towing the bus with the rear wheels on the road requires removal of the rear axle shafts in order to avoid potential damage to the automatic transmission. See **Jacking & Towing in the Specs & Maintenance** chapter for the required procedure.*

## Appendixes In This Chapter

**Appendix 1. Comfort Air Rear Suspension.** Hendrickson Technical Procedure number 17730-246 covers maintenance, disassembly, and troubleshooting for the Comfort Air rear 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 RS-21-145 axle used on the Vision is a single-speed axle without Driver Controlled Main Differential Lock (DCDL)



*Single Reduction Rear Differential Carriers  
Meritor Publication Maintenance Manual 5A*

## 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. lbs. (11–14 Nm).
Torque shock mounting bolts					•				Tighten locknuts to 75–100 ft. lbs. (9–11 Nm).
Torque U-bolt fasteners					•				Torque U-bolts to 300–350 ft. lbs. (34–39 Nm).
Air Suspension									
Inspect visually			•						Check for wear, damage; loose or missing parts.
Torque upper shock mount				•					Tighten to 50–70 ft. lbs. (68–95 Nm)
Torque lower shock mount				•					Tighten to 150–180 ft. lbs. (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. lbs. (542–610 Nm)
Check U-bolts 3/4-16 UNF 28	•			•					Tighten to 260–320 ft. lbs. (353–434 Nm)
Torque lower shock mount to spring				•					Tighten to 260–320 ft. lbs. (353–434 Nm)
Torque air spring anchor bolts				•					Tighten to 20–30 ft. lbs. (27–41 Nm)
Torque quick align bolts				•					Tighten to 525–575 ft. lbs. (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).

**Also See...**

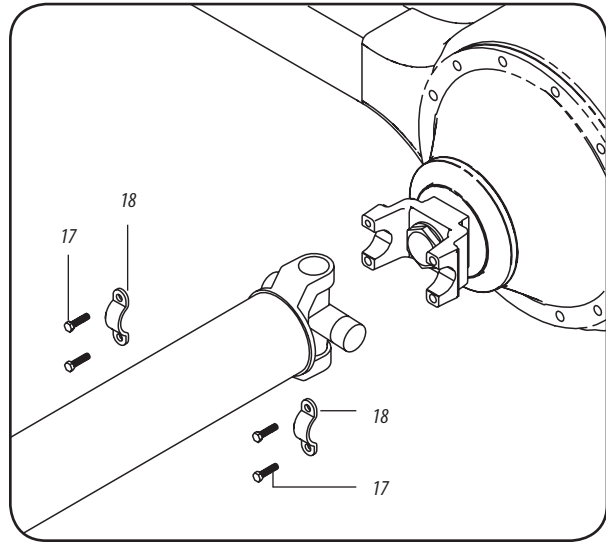
The Hydraulic Brakes chapter of this manual includes a detailed procedure for removing the rear disc rotor/hub assembly.

**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 Suspension & Axle Removal**

The following removal procedures were documented using a Blue Bird Vision bus with a Caterpillar 3126 engine and an Allison 2000 transmission. Vehicles with other engine/transmission options may differ in detail.

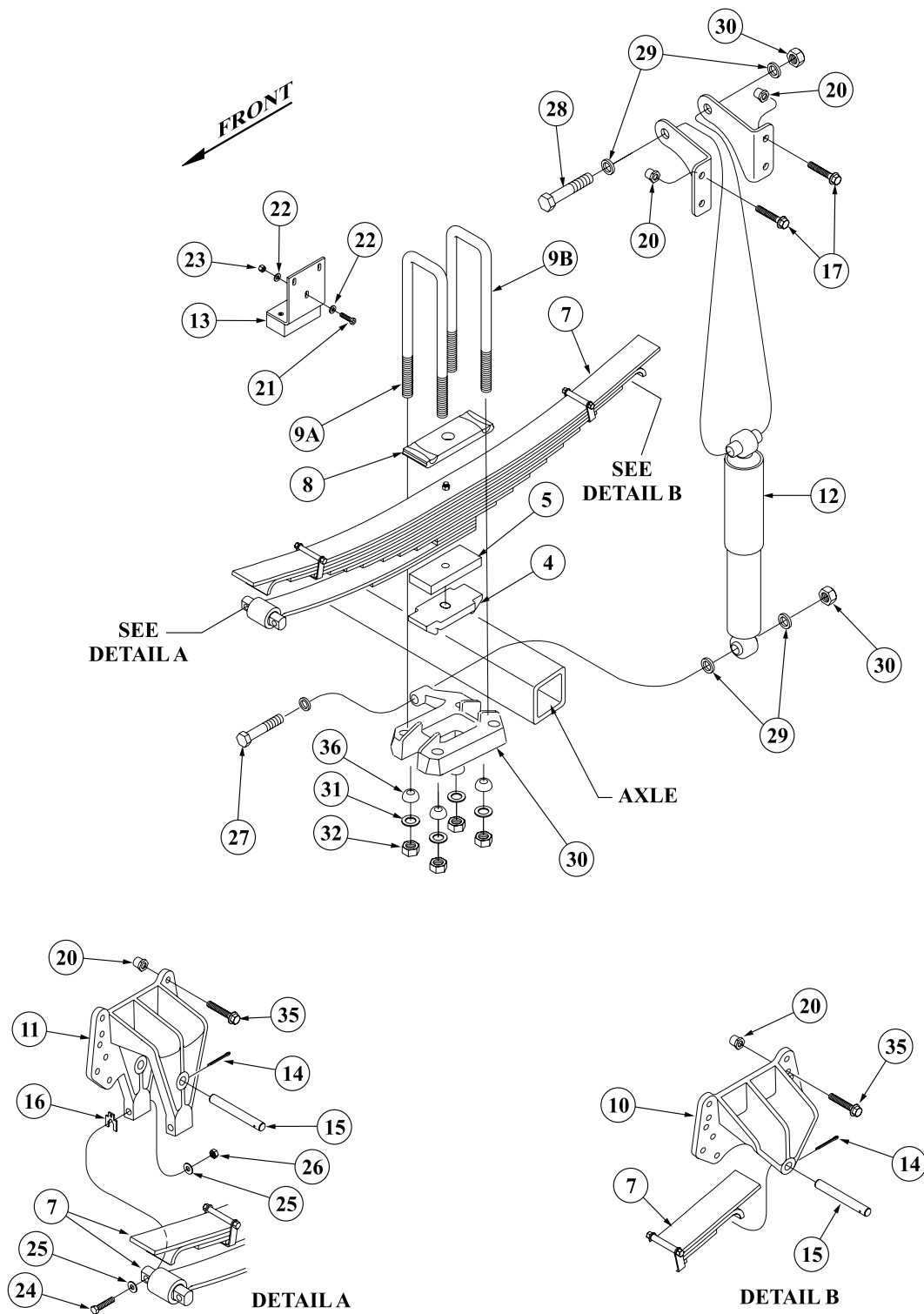


**WARNING** *Never work under a bus supported solely by hydraulic jacks. Always use jack stands or blocks to secure the vehicle. Ensure that the floor is firm enough to support the weight of the vehicle on the reduced footprint of the lifting/holding device.*

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 (or blocks) of sufficient strength under the frame rails, forward of the front spring hanger brackets.
2. Remove rear wheels. (If only replacing shock absorbers, skip to step 8.)

## Rear Spring Suspension

190





3. Disconnect the driveline at the differential by removing capscrews (17) and u-joint straps (18), as illustrated at right.
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 (30), flat washers (29), and bolt (27) from the bottom end of the shock absorber (12). See Figure 2.
  - 8.3. Remove hexnut (30), flat washers (29) and bolt (28) 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. See Rear Spring Suspension Illustration on preceding page.*

9. Remove the stabilizer bar, if so equipped, by removing locknut (40), flat washers (42) and bolt (39) from each end of the axle.
10. To drop the axle, remove hex nuts (32), flat washer (31) and spherical washer (36) 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 (14) from the rebound pin at the forward spring hanger (11).
12. Remove the rebound pin (15).

13. Remove and discard the cotter pin (14) from the rebound pin (15) at the rearward spring hanger (10).

**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 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 (26) at the rear hanger to 100 – 125 ft lb (135 – 169 Nm).
- Use new cotter pins (14) at the rebound pins (15). 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.

## Rear Spring/Axle Reassembly

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

1. Position the axle saddle block (5) over the location pin on the axle housing.



2. Position the spring assembly (7) in the saddle block (5).
3. Position the U-bolt seat (8) on the top of the spring.
4. Position a new U-bolt (9A— the shorter U-bolt) at the forward groove in the U-bolt seat (8).
5. Position a new U-bolt (9B — the longer U-bolt) at the rearward groove of the U-bolt seat (8).
6. Position the lower U-bolt bracket (4) over the ends of the U-bolts (9A & 9B).
7. Install the spherical washers (36) on the U-bolt (9A).

**CAUTION** *Flat washers (31) must be hardened.*

8. Install the flat washers (31) on the U-bolt (9A).
9. Loosely install the hexnuts (32) on U-bolt (9A).
10. Install the spherical washers (36) on U-bolt (9B) at 2 places.
11. Install the stabilizer bar bracket (43), if so equipped, on U-bolt (9B).
12. Install the lower shock absorber bracket (3) on U-bolt (9B).
13. Install flat washers (31) on U-bolt (9B).
14. Loosely (snugly enough to prevent movement) install hexnuts (32) on U-bolt (9B).

**CAUTION** *To prevent distortion of the U-bolts, tighten hexnuts (32) 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 (7) in the rearward spring bracket (10).
17. Install the rebound pin (15) in the aft mounting bracket (10).
18. Position the forward spring end (7) in the forward mounting bracket (11).
19. Locate the spring radius leaf pin at the forward side of the bracket (11).

20. Install the rebound pin (15).
21. Install new bolts (24) through the spring end assembly and the forward spring mounting bracket (11) lugs.
22. Install new cotter pins (14).

**CAUTION** *Ensure that any shim(s) removed during disassembly are replaced in the proper positions. Ensure that the bolts (24) are oriented in the proper direction.*

23. Install shims (16) between the head of the bolts (24) and the lugs on the mounting bracket (11).
24. Install new cotter pins (14) at rebound pins, front and rear.
25. Install flat washers (25) on bolts (24).
26. Install hexnuts (26).
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 (26) to 100 – 125 ft lb (135 – 169 Nm).
29. Using a crisscross pattern, torque hexnuts (32) to 300 – 350 ft lb (407 – 474 Nm) in 10 ft lb (13 Nm) increments.
30. Install flat washer (29) on bolt (28).
31. Position the top end of the shock absorber (12) between the shock absorber brackets on the frame rails. Ensure that the bolt (28) is properly oriented with the head toward the front of the bus.
32. Install bolt (28) and washer (29) through the hanger brackets and the top end of the shock absorber (12).
33. Install the flat washer (29) on bolt (28).
34. Install hexnut (30) on bolt (28). Torque to 75 – 100 ft lb (102 – 135 Nm).
35. Position the lower end of the shock absorber (12) at the lower shock mount (3). Ensure the bolt (27) is properly oriented with the head toward the rear of the bus.



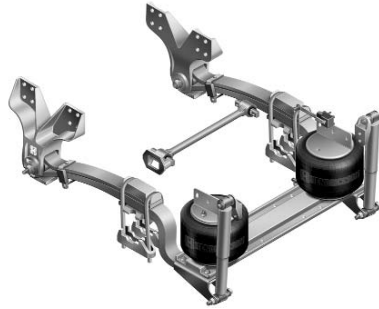


36. Install a flat washer (29) on bolt (27).
37. Install bolt (27) and flat washer (29) through the lower end of the shock and install a flat washer (29) on the bolt.
38. Position the lower end of the shock at the lower shock mounting bracket and install the bolt (27) and washer (29) assembly through the lower mounting bracket.
39. Install a flat washer (29) and hexnut (30) on bolt (27). 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**

<b>Section 1</b>	<b>Introduction</b> . . . . .	<b>2</b>
<b>Section 2</b>	<b>Product Description</b> . . . . .	<b>2</b>
<b>Section 3</b>	<b>Important Safety Notice</b> . . . . .	<b>3</b>
<b>Section 4</b>	<b>Parts Lists</b> . . . . .	<b>6</b>
<b>Section 5</b>	<b>Preventive Maintenance</b>	
	Main Support Member Bushings . . . . .	8
	U Bolt Locknuts . . . . .	8
	Ride Height Setting . . . . .	8
	Transverse Rods . . . . .	10
	Shock Absorber . . . . .	10
<b>Section 6</b>	<b>Alignment</b> . . . . .	<b>12</b>
<b>Section 7</b>	<b>Component Replacement</b>	
	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
<b>Section 8</b>	<b>COMFORT AIR Plumbing Diagram</b> . . . . .	<b>28</b>
<b>Section 9</b>	<b>Trouble Shooting Guide</b> . . . . .	<b>29</b>
<b>Section 10</b>	<b>Tightening Torque Specifications</b> . . . . .	<b>30</b>

*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

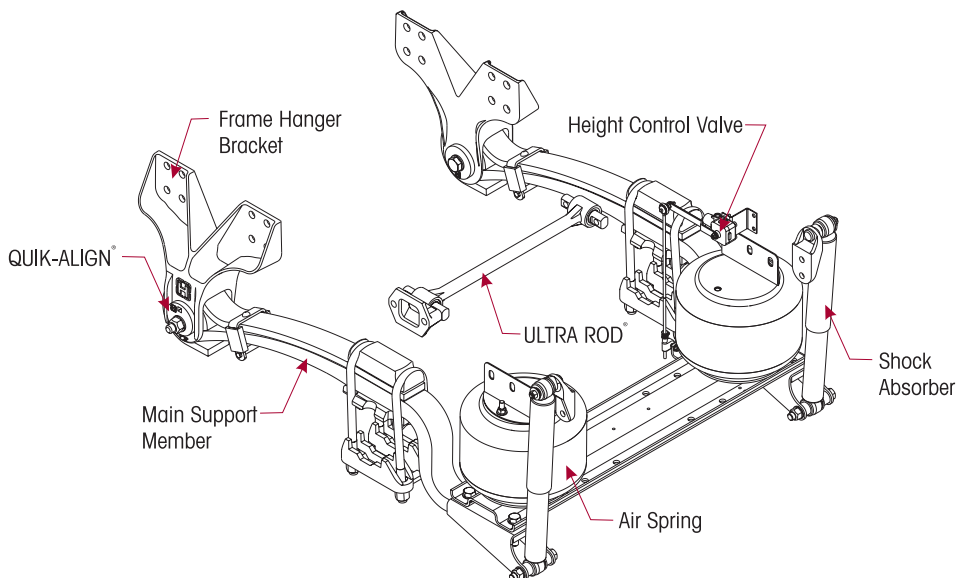
The COMFORT AIR rear suspension system, based on Hendrickson's proven HAS technology, is designed for the needs of buses, motor homes, and ambulances. The new system combines superior ride and handling with enhanced equipment protection.

- 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**

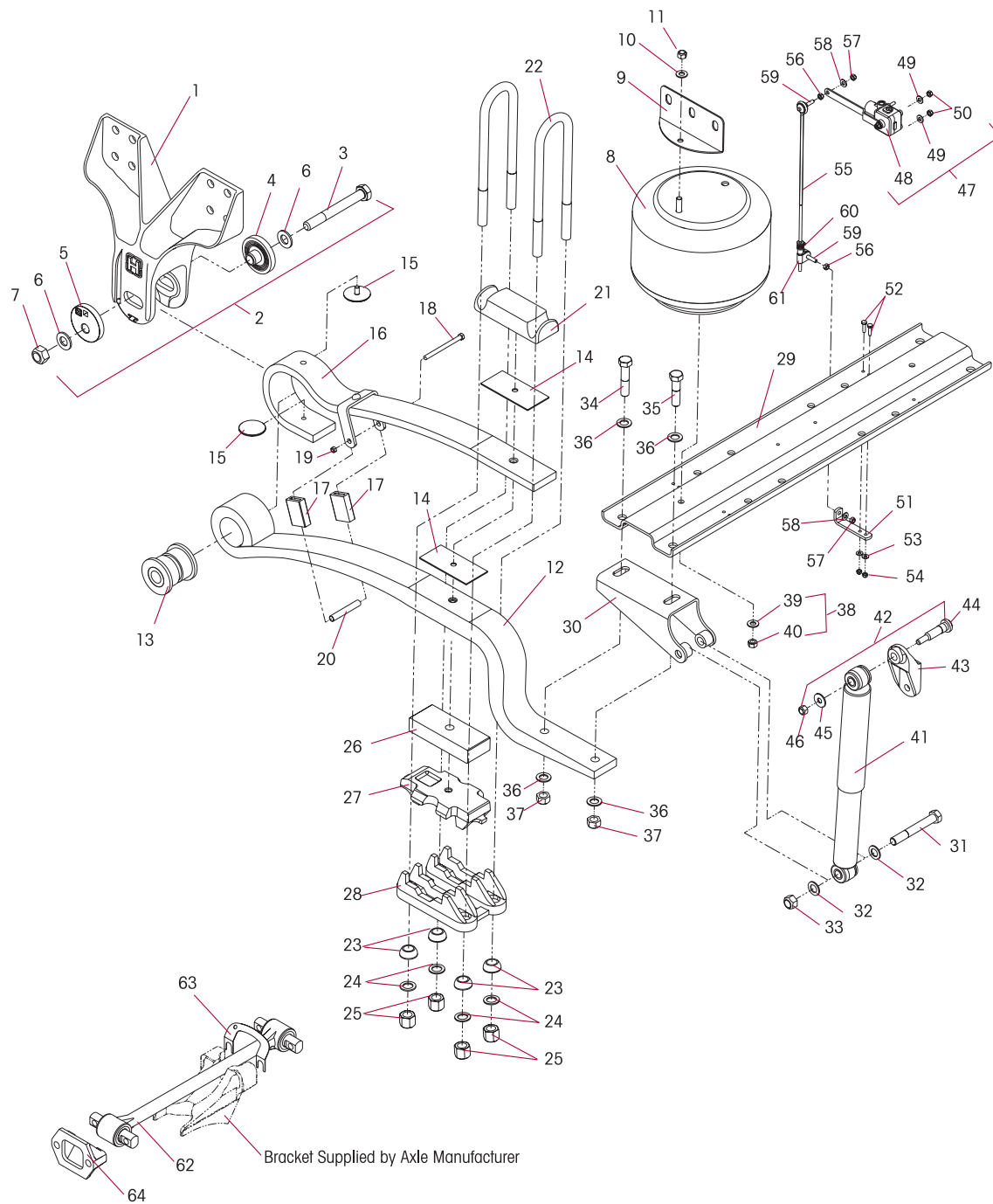
DO NOT ASSEMBLE QUIK-ALIGN JOINT WITHOUT PROPER FASTENERS. USE ONLY DACROMET PLUS XL PLATED FASTENERS TO SUSTAIN PROPER CLAMP FORCE. FAILURE TO DO SO CAN CAUSE LOSS OF VEHICLE CONTROL, PROPERTY DAMAGE OR PERSONAL INJURY.

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™

202





## 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		Meritor RS21-145, RS23-160		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					
56501-020		Negative 4.5° Pinion Angle LH/RH					
28		Axle Bottom Cap	2				
57024-000		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					
50216-000		Meritor RC23-160					
29	--	Negative 0-9.5° Angle LH/RH	1				
		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
57430-003	(All Except Rear Engine)
48718-	(Rear Engine Only)
48718-104	U Bolt Kit (Specify Length)
	U Bolt Kit 15,000 lb. Capacity



## SECTION 5 Preventative Maintenance

### MAIN SUPPORT MEMBER ASSEMBLY BUSHINGS

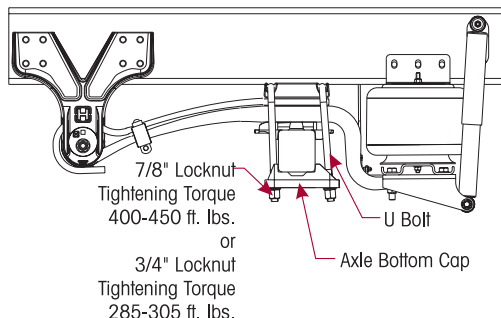
Bushings should function satisfactorily during normal vehicle operation. However premature bushing wear can occur and will require replacement. The main support member assembly pivot bushing should be replaced if it exhibits excessive fore-aft movement or the vehicle is experiencing excessive tire wear 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

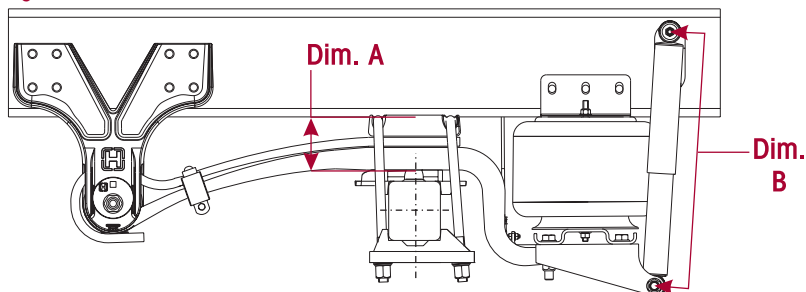
The ride height can be measured at the centerline of the main support member assembly as shown in Figure 5-2. The ride height is  $4\frac{7}{8} \pm \frac{1}{4}$ " at the A dimension shown.

### 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"

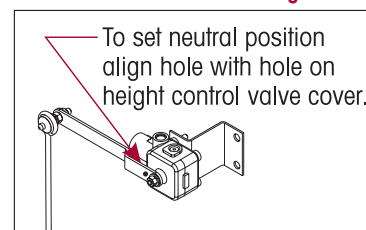
Figure 5-2



- 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

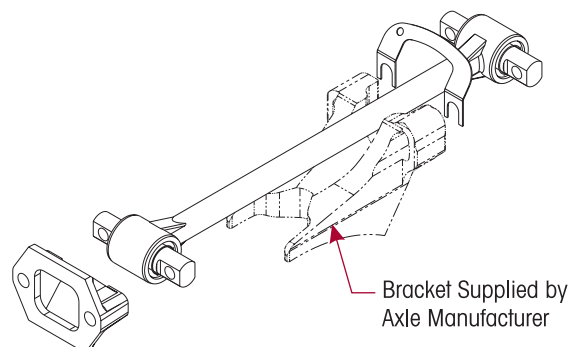
During cycle operation of the height control valve it is normal to experience a limited amount of exhaust noise.



### 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

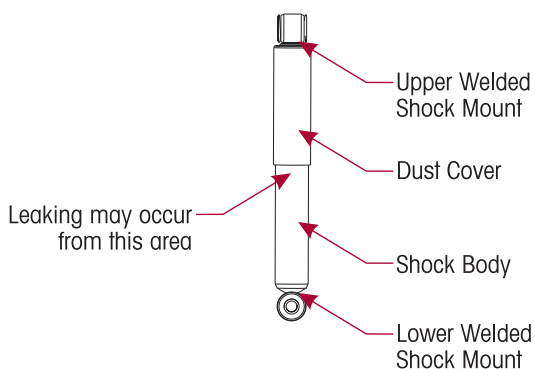


### SHOCK ABSORBER VISUAL INSPECTION PROCEDURE

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.

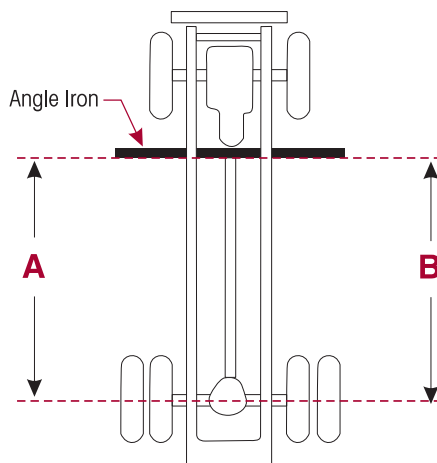
The following procedure should be performed after all repairs are completed.

**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 525-575 foot pounds torque.

### NOTE

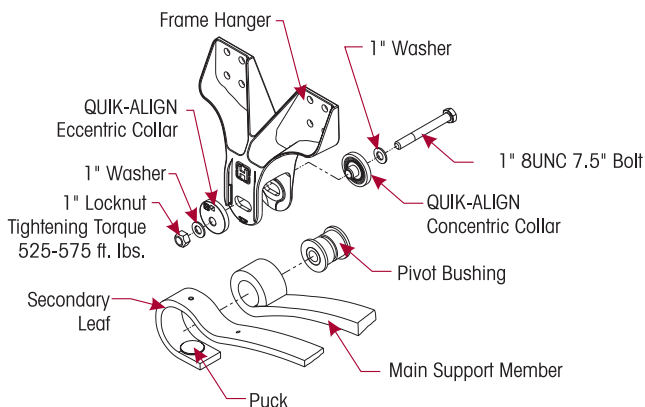
The Eccentric collar is located on the outside frame on the left side of chassis with the concentric collar on the inside. On the right side of chassis are (2) concentric collars located on the inside and outside of the frame hanger.

### 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



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### 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.

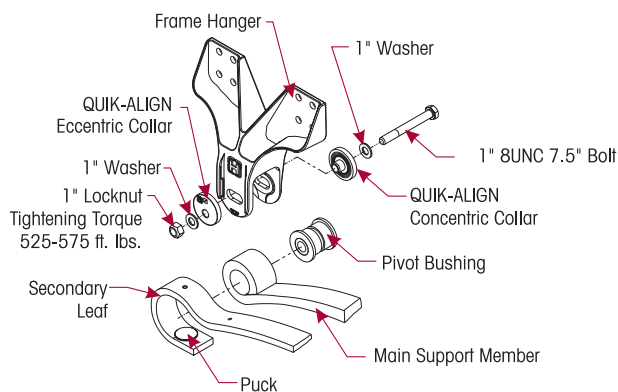


#### WARNING

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.



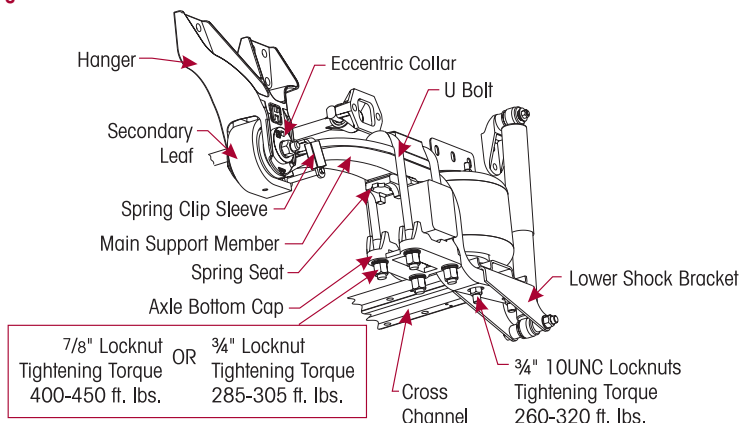


3. Snug the left pivot bolt to 100 foot pounds torque. Tighten the right pivot bolt to 525-575 foot pounds torque.
4. Remove jack stands and lower frame of vehicle.
5. Air up the system.
6. Align the rear axle (see alignment Preventive Maintenance Section of this publication).

## 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.

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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.

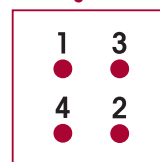
3. Install NEW QUIK-ALIGN collars, NEW 1" dacromet pivot bolt, washers and locknut. Verify the nose of each QUIK-ALIGN collar is installed into the pivot-bushing sleeve, and the flanged collar is flat against the hanger face within the adjustment guides. **DO NOT TIGHTEN** at this time.

### 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.

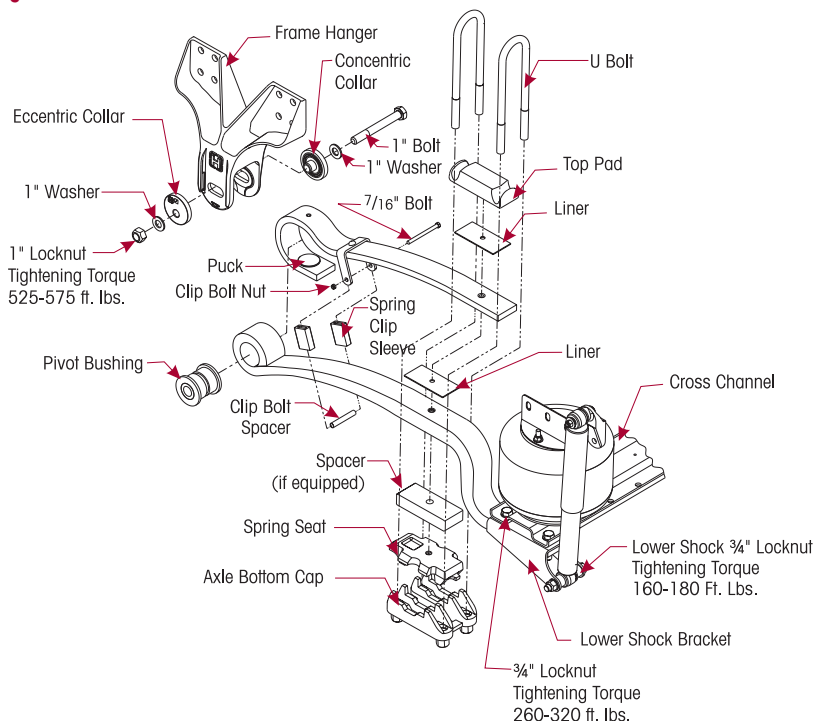
4. Position shock absorber and lower mounting bracket assembly on main support assembly.
5. Position cross channel on main support assemblies. Install ¾" bolts, washers and locknuts. Tighten to 260-320 foot pounds torque.
6. Snug 1" NEW QUIK-ALIGN locknuts to 100 foot pounds torque.

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



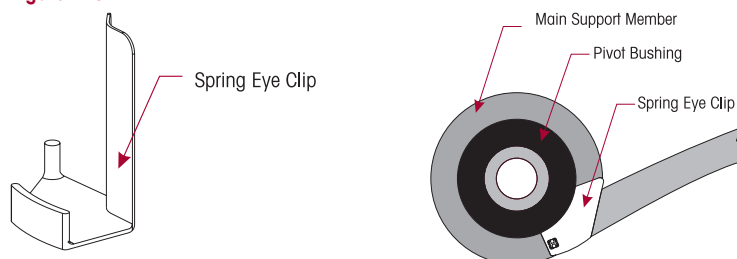
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### NOTE

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**

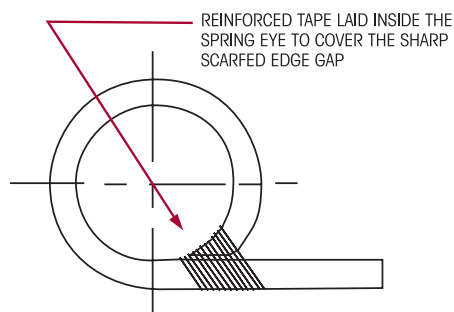


5. Center the push out tool on inner sleeve and press out the old bushing. (These bushings are not cartridge type bushings. They do not have outer metals).
6. Clean and inspect the I.D. of the main support member eye.

### 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

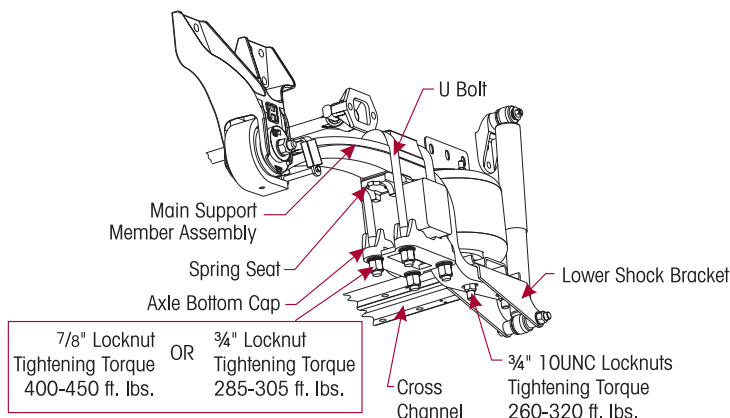
VEHICLE MUST BE FIRMLY SUPPORTED WITH JACK STANDS PRIOR TO SERVICING. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

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.

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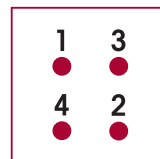
Figure 7-9



### 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 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 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.
6. Remove jack stands and lower the frame of vehicle.
7. Install height control valve link on control valve arm. Tighten 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

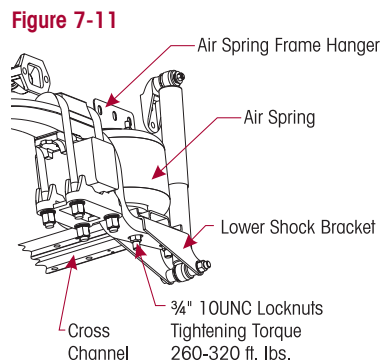
1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.



#### 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.

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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

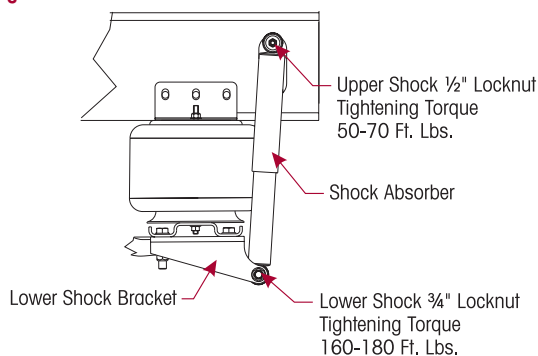
### DISASSEMBLY

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.

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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

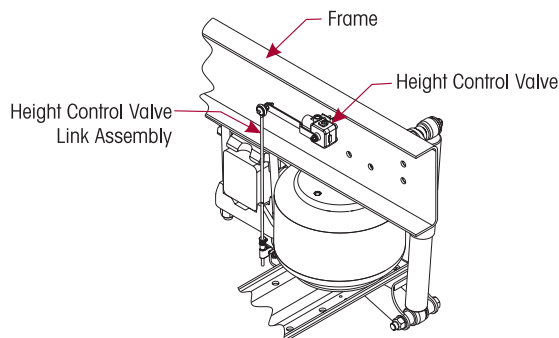
1. Chock wheels of axle.
2. Raise frame of vehicle to remove load from suspension.

### 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  $\frac{5}{16}$ " 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  $\frac{1}{4}$ " 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  $\frac{5}{16}$ " 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  $\frac{5}{16}$ " 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).

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### 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 an 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.



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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

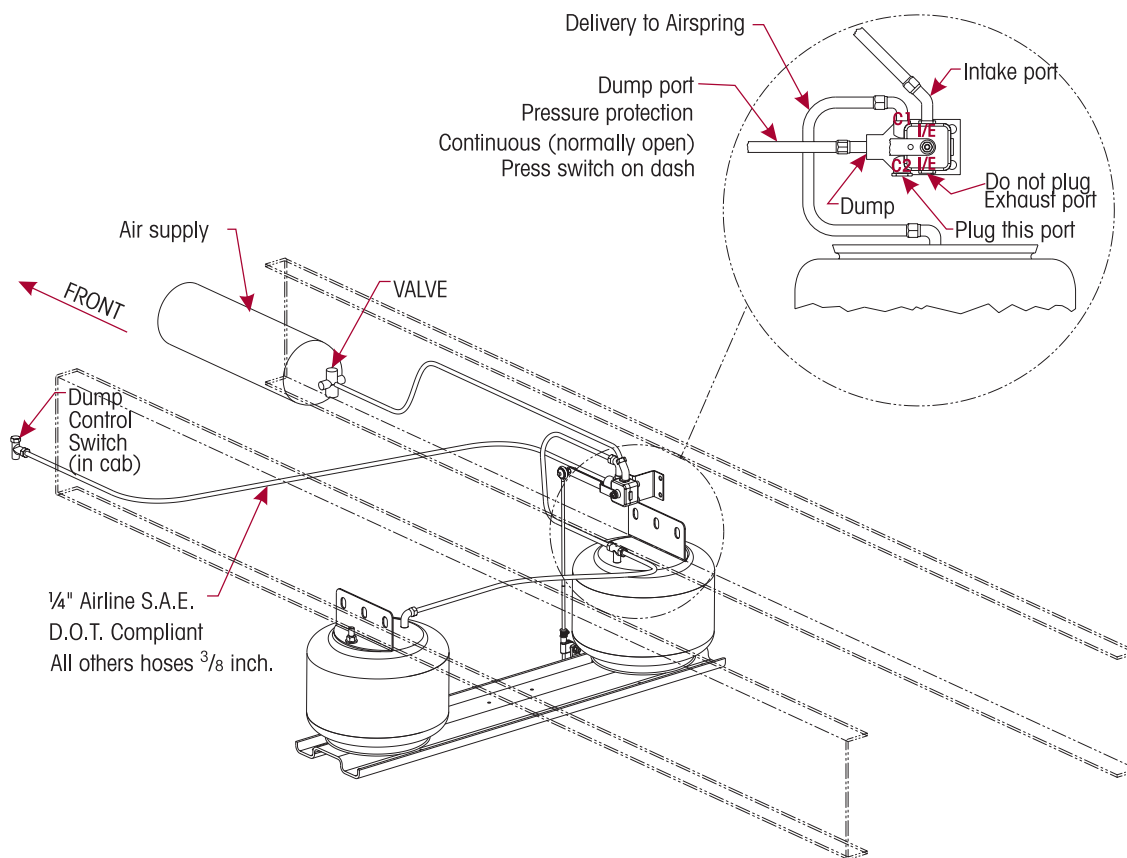


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### SECTION 8 COMFORT AIR Plumbing Diagram

224





## SECTION 9

### Troubleshooting Guide

## COMFORT AIR

### TROUBLE SHOOTING GUIDE

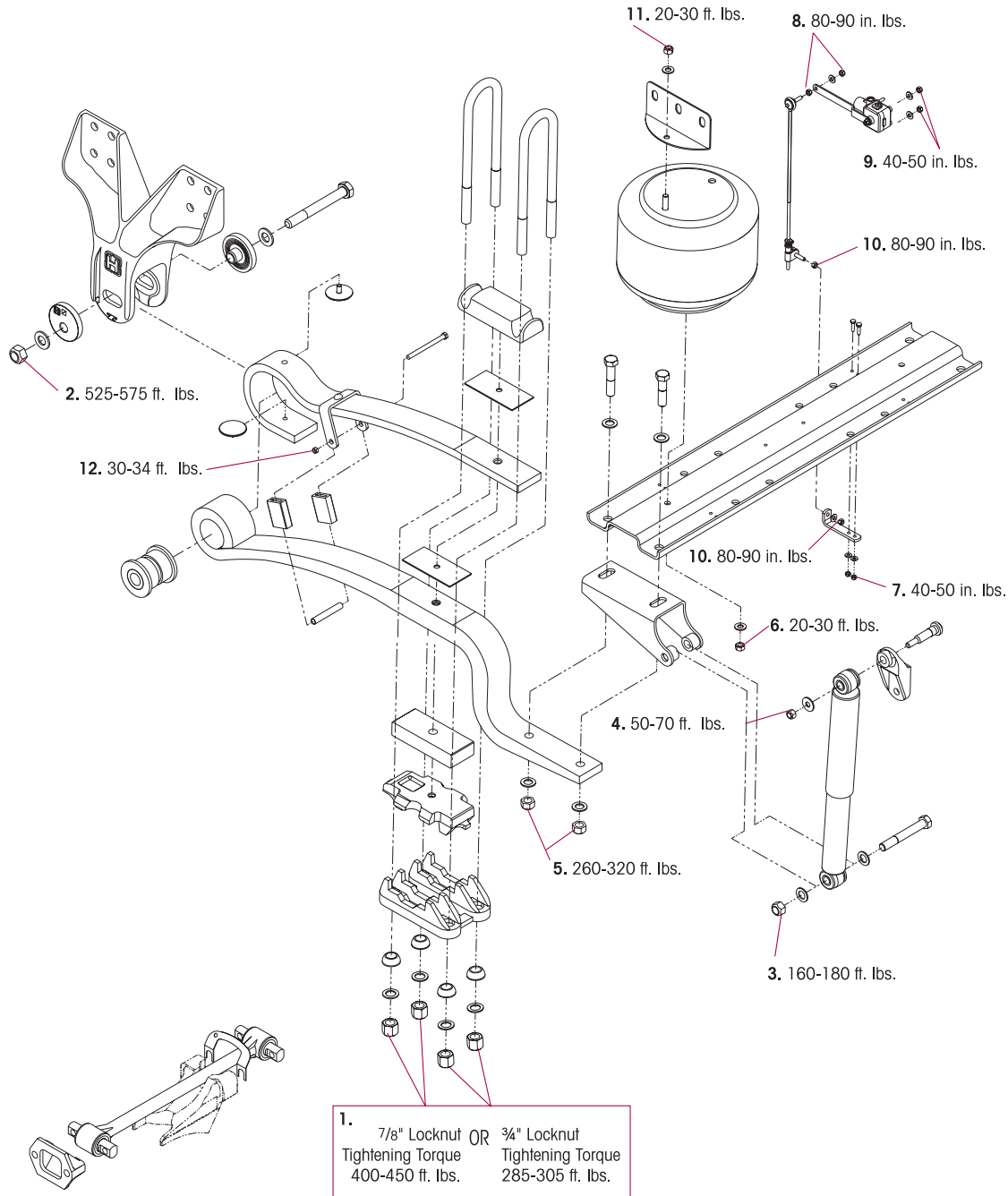
CONDITION	POSSIBLE CAUSE	CORRECTION
Vehicle bouncing excessively	Leaking shock absorber	Replace shock absorber.
	Damaged shock absorber	Replace shock absorber
	Air spring(s) not inflated	Check air supply to air spring, repair as necessary.
	Incorrect ride height	Adjust ride height to proper setting. 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.

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### SECTION 10 Torque Specifications

226








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## HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	QUANTITY	SIZE	TORQUE FT./LBS.
Frame Fasteners Furnished & Installed by Truck Manufacturer <sup>1</sup>				
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
 <b>WARNING</b> 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
<b>NOTE:</b> <sup>1</sup> 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.				

227



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