Rear (Comfort Air™) Suspension

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Comfort Air Rear Suspension

Introduction

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

Hendrickson reserves the right to make changes and improvements to its products and manuals at any time. Contact Hendrickson Tech Services at 630.910.2800 for information on the latest version of this manual.

Note

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

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.
- 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, 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.

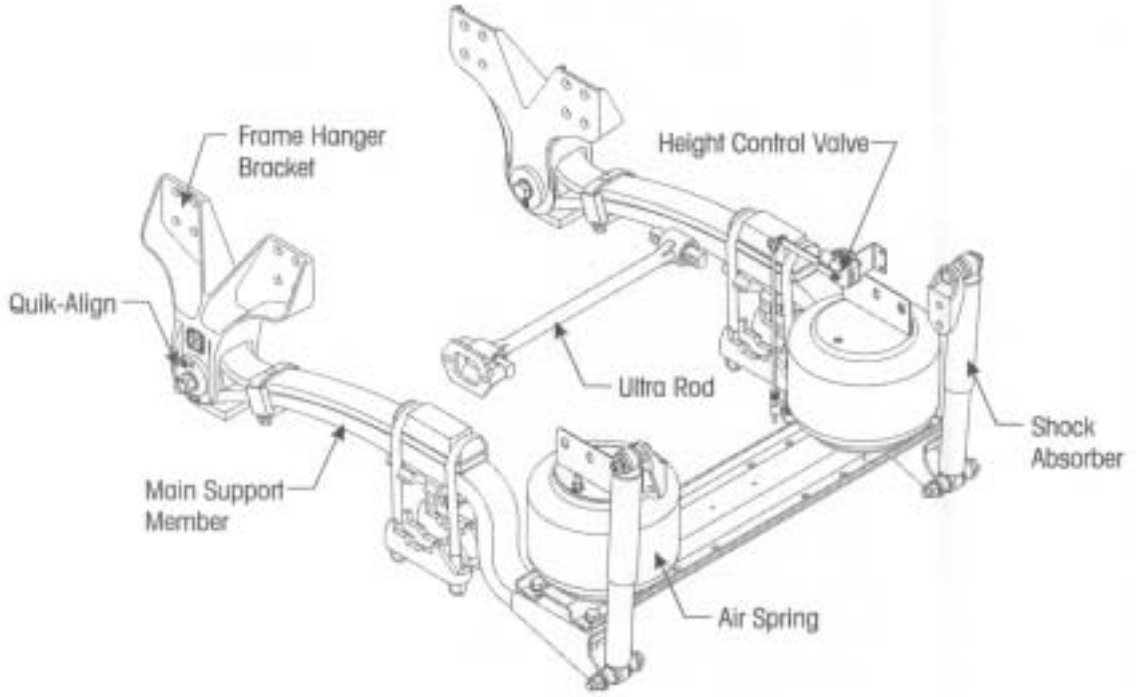


Figure 2.2

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 rear, understand and follow all safety related information within this publication and on all decals.

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.

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

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 the rated and approved capacities which could result in failure and loss of vehicle control, possibly causing personal injury or property damage.

Modifying Components
Do not modify or rework parts. Do not substitute parts of the suspension or axle components. Use of modified or replacement parts not authorized by Hendrickson may not meet Hendrickson's specifications, and can result in failure of the part, 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.

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. A component damaged in this manner can result in the loss of vehicle control and possible personal injury or property damage. Exercise extreme care when handling or performing maintenance in the area of the main support member and axle. Do not connect arc welding ground line to the main support member and axle. 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 or axle. Do not nick or gouge the main support member assembly or axle. Such improper actions can cause damage to the main support member assembly or the axle could fail, and cause loss of vehicle control and possible personal injury or property damage.

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.

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 could cause the air springs to separate from the piston and result in premature air spring failure.

Personal Protective Equipment
Always wear proper eye protection and other required personal protective equipment to help prevent personal injury when you perform vehicle maintenance, repair or service.

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.*

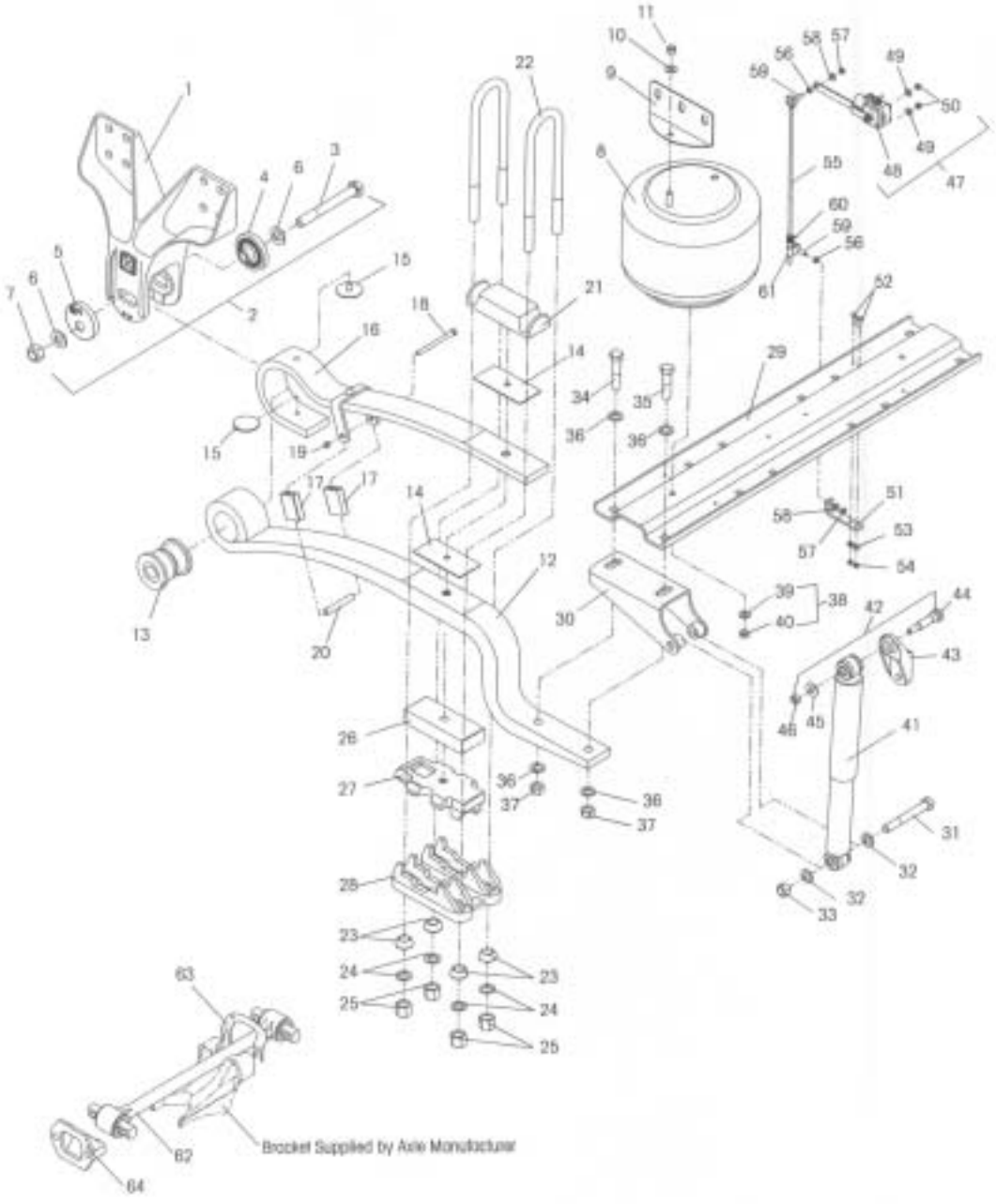
Do not use hot solution tanks or water and alkaline solutions to clean ground or polished parts. Doing so will cause damage to the parts and void warranty.

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 Comfort Air™ section. Failure to do so can cause loss of vehicle control, resulting in personal injury or property damage.

Parts Lists



1	60784-000 Frame Hanger	2
2	60632-001 QUIK-ALIGN ® Kit (Includes Key Nos. 3-7)	1
3	4013-103 Pivot Bushing Service Kit (Includes Key Nos.3, 6, 7, 13, 15) Services 1 Side Only	
3	64107-000 1" 8UNC 7.50" Bolt	2
4	64097-000 QUIK-ALIGN Concentric Collar	3
5	64096-000 QUIK-ALIGN Eccentric Collar	1
6	22962-035 1" Hardened Washer	4
7	64108-000 1" 8UNC Locknut	2
	60925-002 Air Spring Assy. (Includes Key Nos. 9-11)	2
	60929-002 Air Spring Assy, Front Engine (Includes 2Key Nos. 9-11)	
8 --	Air Spring	2
9	57096-002 Air Spring Hanger	2
10	22962-014 Washer	2
11	17700-010 1/2"-13UNC Nylocknut	2
	60779-000 MSM Assy. (Includes Key Nos. 12-20)	2
12 --	Main Support Member	2
13	58648-000 Pivot Bushing	2
14	37674-051 Liner	4
15	64817-000 Puck	4
	49175-026 Spring Clip Fastener Kit (Includes Key Nos.17, 18, Washer, 19)	
16 --	Secondary Leaf	4
17	64272-000 Spring Clip Sleeve	4
18	37042-002 7/16" 14UNC Bolt	2
	22962-027 7/16" Washer Not Shown	
19	17700-007 7/16" 14UNC Nut	2
20 --	Clip Bolt Spacer	2
21	56805-000 Top Pad	2
	57724-000 Top Pad (15,000 lb. capacity)	2
	U Bolt Kit (Includes Key Nos. 22,23, 24,25) 48718- 7/8" (Specify Length)	
	48718-058 3/4"15,000 lb. capacity	
22	47417- 7/8" 14UNF U Bolt – Specify Length	4
	49684-011 3/4" 26UNF U Bolt - 12.5" (15,000 lb.Capacity)	4
23	48574-000 Spherical Washer	8
24	22962-002 7/8" Hardened Flat Washer	8
	22962-001 3/4" Hardened Flat Washer (15,000 lb. Capacity)	8
25	50765-000 7/8" 14UNF U-Bolt Locknut	8
	49685-000 3/4" 16UNF U-Bolt Locknut (15,000 lb. Capacity)	8
26	48531-014 Spacer 1.5" (As Required)	2
27	Spring Seat	2
	Meritor RS15-120	
	57022-006 4.5º Pinion Angle LH/RH	
	Meritor RS21-145, RS23-160	
	56501-006 4.5º Pinion Angle LH/RH	
	56501-019 0.0º Pinion Angle LH/RH	
	56501-020 4.5º Pinion Angle LH/RH	
	56501-021 0.0º Pinion Angle LH/RH	
	Meritor RC23-160	
	56501-020 Negative 4.5º Pinion Angle LH/RH	
28	Axle Bottom Cap	2
	Meritor RS15-120	
	57024-000 2-5.0º Pinion Angle LH/RH	
	Meritor RS21-145, RS23-160	
	50216-000 0-9.5º Pinion Angle LH/RH	
	Meritor RC23-160	
	50216-000 Negative 0-9.5º Angle LH/RH	
29	Cross Channel	1
	Meritor RS15-120, RS21-145, RS23-160	
	57317- Specify Dowel Pin Centers	
	Meritor RS23-160 - Rear Engine	
	58982-001 Specify Dowel Pin Centers	
	Meritor RC23-160 - Rear Engine	
	58982-002 Specify Dowel Pin Centers	
	57356-000 Lower Shock Bracket Assy. (Includes Key Nos. 30-33)	2
30 --	Lower Shock Bracket	2
31	50764-002 3/4" 10UNC 5.50" Bolt	2
32	22962-001 3/4" Hardened Washer	4
33	49842-000 3/4" 10UNC Locknut	2
	50763-004 Cross Channel Fastener Kit (Includes Key Nos. 34-37)	1
34	50764-003 3/4" 10UNC 3.50" Bolt	2
35	50764-005 3/4" 10UNC 3.00" Bolt	2
36	22962-001 3/4" Hardened Washer	8
37	49842-000 3/4" 10UNC Locknut	4
38	49177-006 Air Spring Fastener Kit (Includes Key Nos. 39-40)	1
39	22962-014 1/2" Hardened Washer	2
40	17700-010 1/2" 13UNC Nylocknut	2
41	60998-001 Shock Absorber	2
42	57322-002 Upper Shock Frame Bracket Assembly (Includes Key Nos. 43-45)	2
43 --	Shock Frame Hanger	2
44	50368-000 1/2" 13UNC Serrated Shank Bolt	2
45	22962-031 1/2" Hardened Washer	2
46	49846-000 1/2" 13UNC Locknut	2
47	59013-000 Height Control Valve Kit (Includes Key Nos. 48-50)	1
48 --	Height Control Valve	1
49	22962-028 1/4" Hardened Washer	2
50	49983-000 1/4" 20UNC Locknut	2
	57430-000 Control Valve Lower Link Bracket Kit (Includes Key Nos. 51-54)	1
51	56789-000 Control Valve Arm Bracket	1
52	56935-002 1/4" 20UNC 1.00" Bolt	2
53	22962-028 1/4" Hardened Washer	4
54	49983-000 1/4" 20UNC Locknut	2
	58994-Height Control Valve Link Assy. , Specify Length (Includes Key Nos. 55-61)	1
55 --	Extension Rod	1
56 --	5/16" 18UNC Jam Nut	2
57 --	5/16" 18UNC Locknut	2
58 --	5/16" Hardened Washer	2
59 --	5/16" 18UNC Stud	2
60 --	Valve Arm Clamp	1
61 --	Adjustable Valve Arm Joint	1
62	62000- Transverse Rod Assy., Specify Length	1
63	49689-000 Torque Rod Shim As Req.	
64	22186-000 Transverse Rod Frame Bracket	1

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
48718- U Bolt Kit (Specify Length)
48718-058 U Bolt Kit 15,000 lb. Capacity

Preventative Maintenance

Main Support Member Assembly Bushings

In normal use, these components will function satisfactorily throughout the life of the vehicle. 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 ¾" locknuts to 285-305 foot pounds torque.

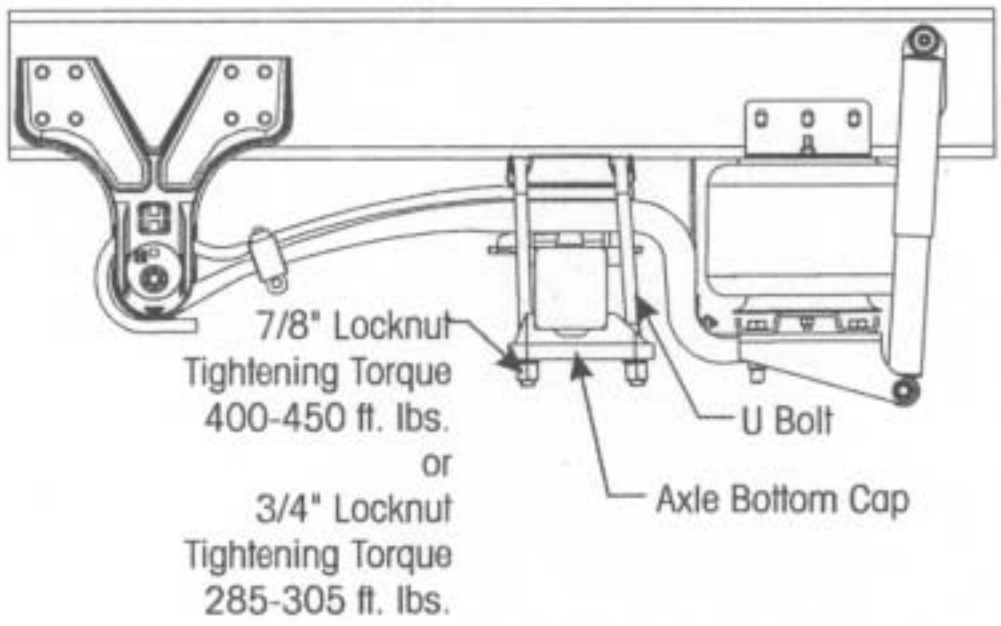


Figure 5.1

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 of this Comfort Air™ 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.

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 7/8" ± ¼" 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.

Dimension A

OEM and Model	Dimension A Ride Height From Bottom of Frame to Bottom of Main Support Member	Dimension B Shock Absorber Length At Ride Height with a Tolerance of ¼"
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"

7. Use a 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.
8. Reposition the extension rod in the rubber joint.
9. Attach washer and locknut and tighten to 80-90 inch pounds torque.
10. 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.

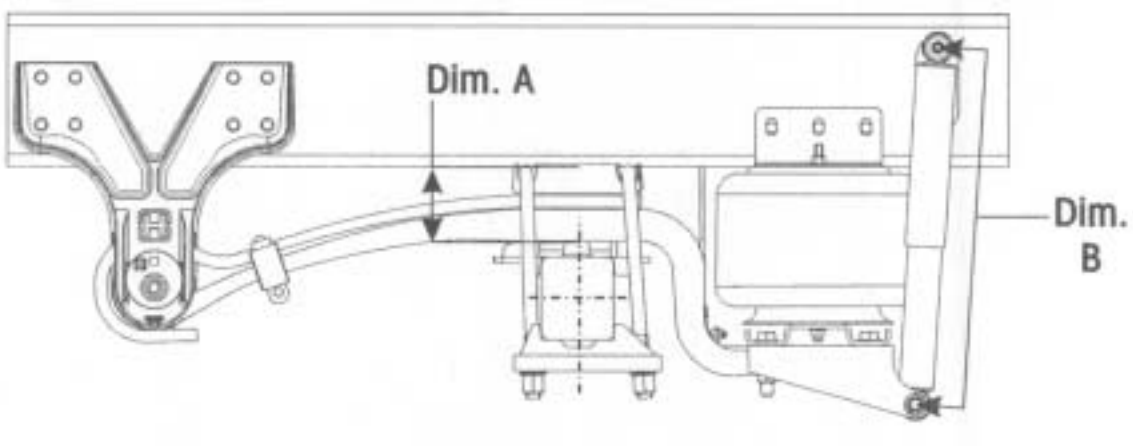


Figure 5.2

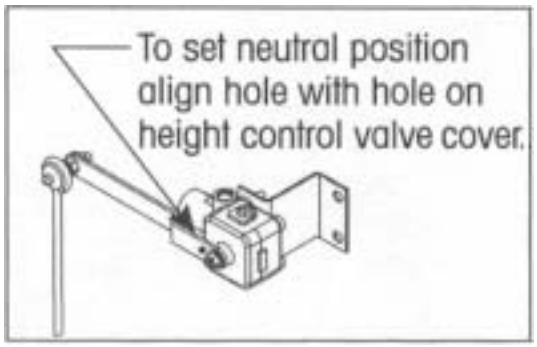


Figure 5.3

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.

Torque rod end attaching fasteners are furnished by Blue Bird. It is important that the tightening torque of the nuts be checked during preventive maintenance service. Follow Blue Bird'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 number 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 Comfort Air™ 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.

Figure 5.5

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.

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.

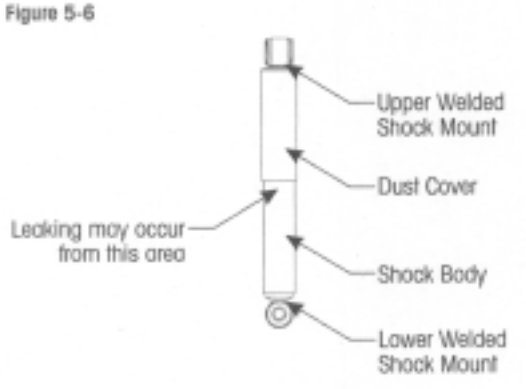


Figure 5.6

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.

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 QUICK-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 Comfort Air section.

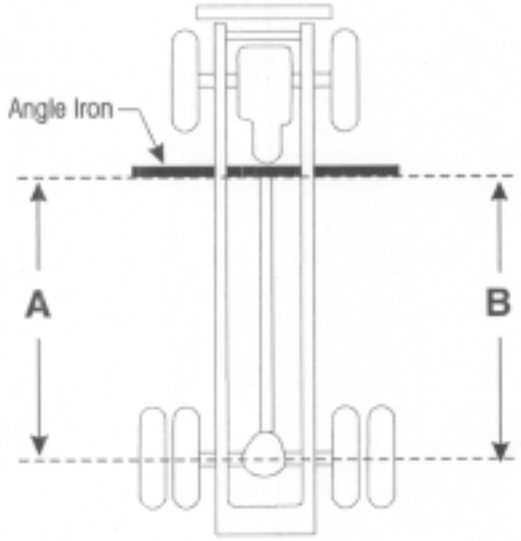


Figure 6.1

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 1/8' of being equal, alignment of drive axle is acceptable. If A and B differ by more than 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 ½" 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 ± 1/2"' from center.

Warning

Do not assemble QUICK-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.

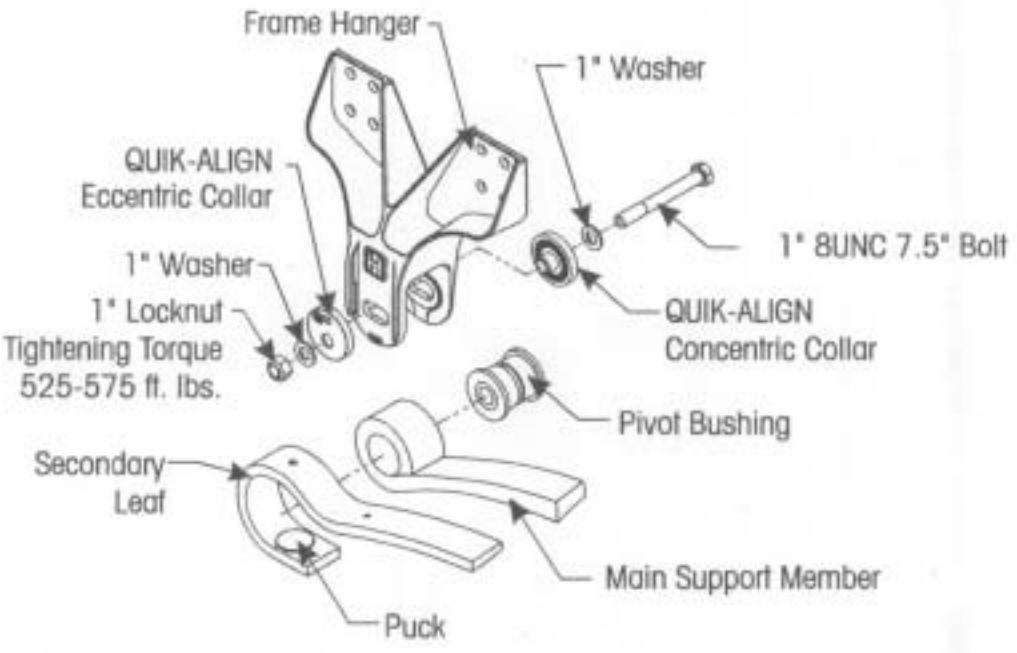


Figure 6.2

Component Replacement

Frame Hanger

The frame hanger in normal use should function satisfactorily throughout the life of the vehicle. Replacement is only required when the frame hanger has been damaged.

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 could result in 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 min support member assembly to frame hanger. See **Figure 7.1**.
5. Remove the fasteners that attach the frame hanger to the vehicle per Blue Bird specifications.
6. Remove frame hanger.

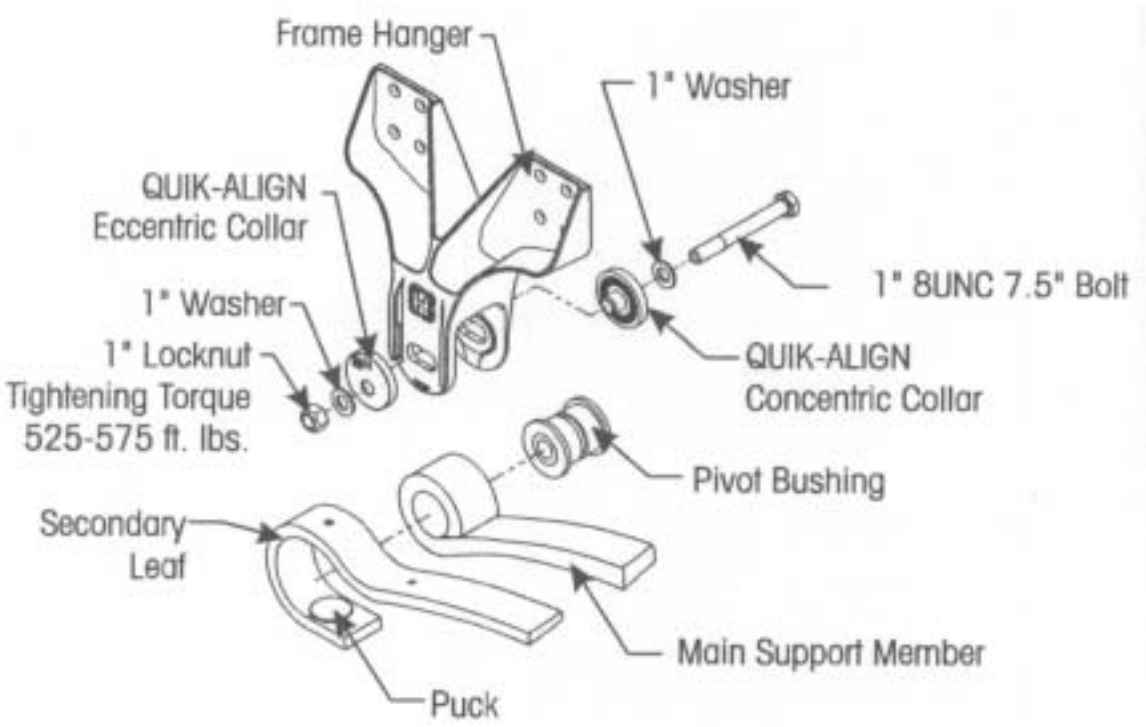


Figure 7.1

Assembly

1. Install new frame hanger by attaching fasteners per Blue Bird 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 Comfort Air section.)

Main Support Member Assembly

The Main Support Member Assembly in normal use should function satisfactorily throughout the life of the vehicle. Replacement is only required when the Main Support Member Assembly has been damaged.

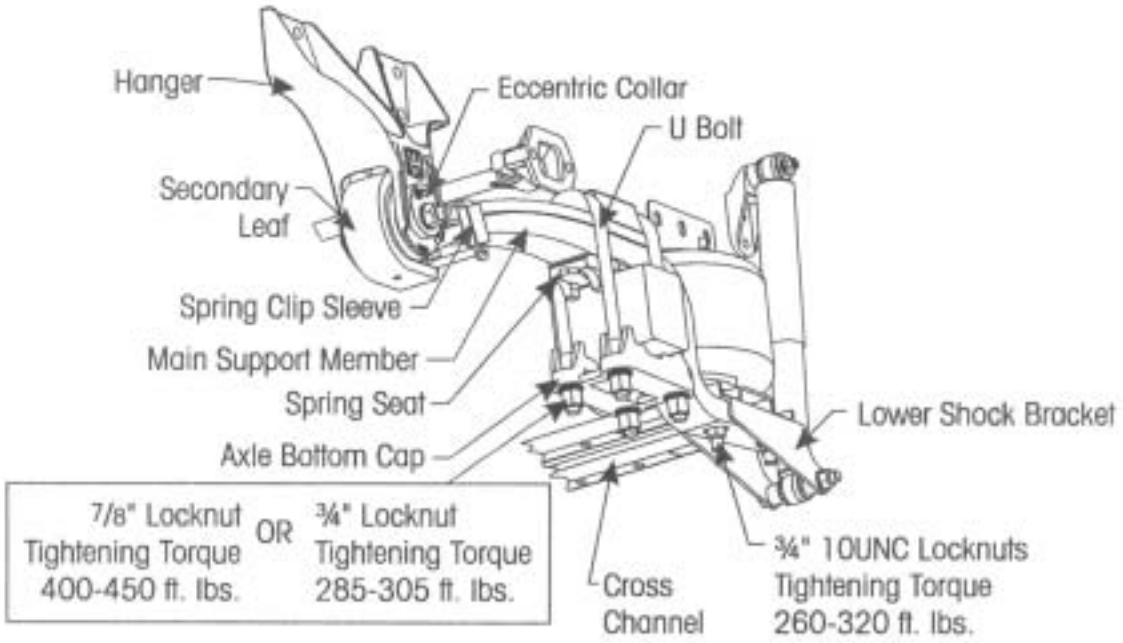


Figure 7.2

Disassembly

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

Warning

Vehicle must be firmly supported with jack stands prior to servicing. Failure to do so could result in personal injury or property damage.

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 ¾" 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.
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. **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.
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.

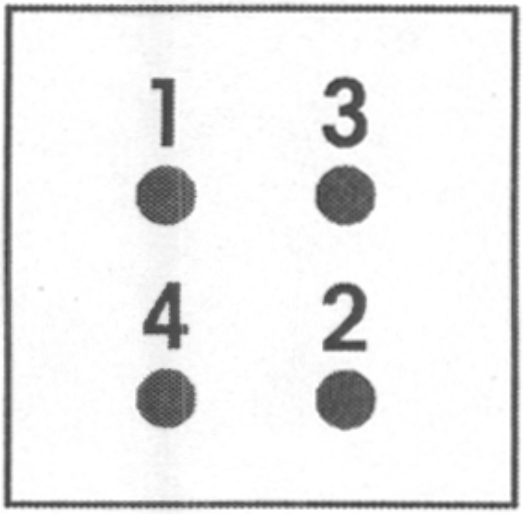


Figure 7.3

- 19,000 to 23,000 pound capacity equipped with ¾"

locknuts to 285-305 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 Comfort Air™ publication.

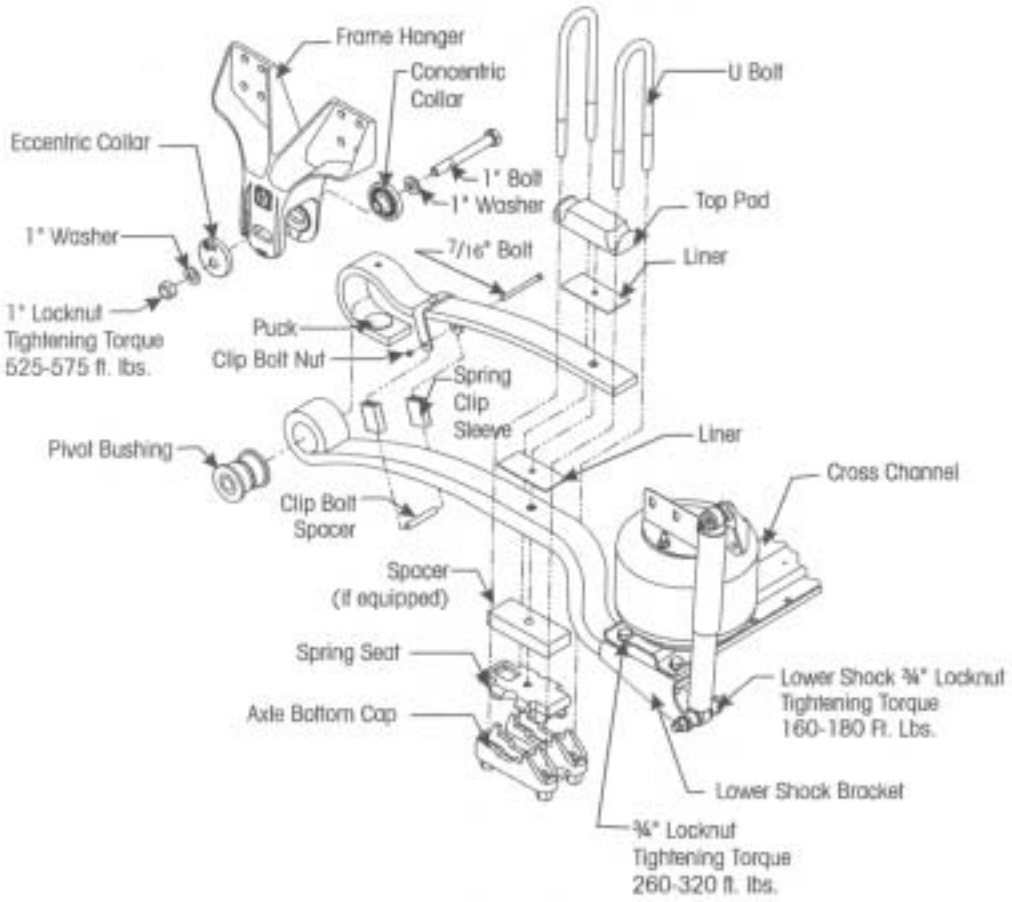


Figure 7.4

Main Support Member Assembly Pivot Bushing

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 ¾" O.D. round bar stock with a 1 ½" 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 at the center of the main support

member assembly and rotate the secondary leaf to clear 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 for safety. See **Figure 7.5**.

Figure 7.5

Note

*In production, a spring eye clip was used to insert the pivot bushing into the spring eye of the main support member. See Figure 7.16. 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 damaged, use the tape option as shown in **Figure 7.7**.*

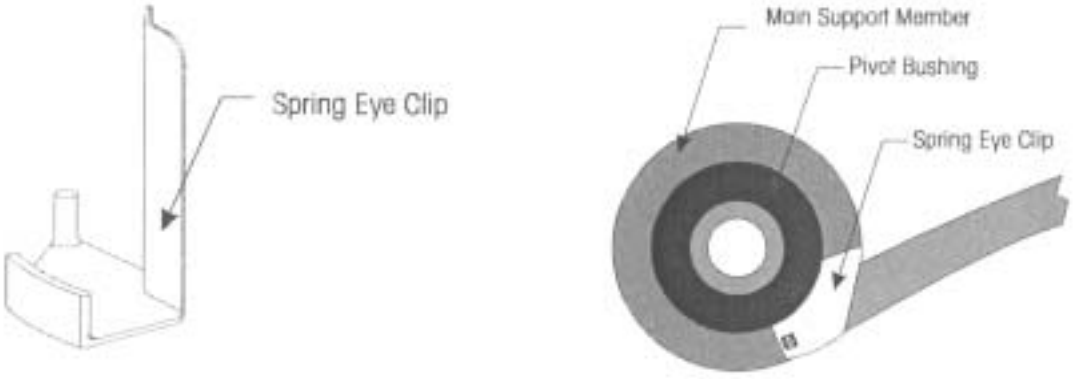


Figure 7.6

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 not equipped or if spring eye clip is damaged, 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**.

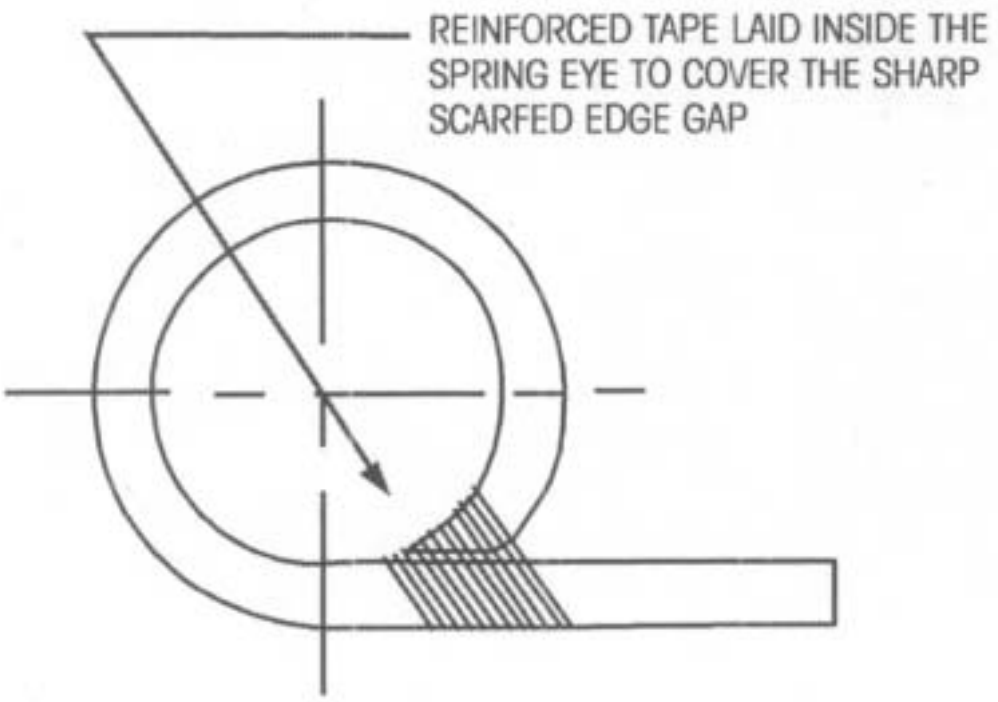


Figure 7.7

4. Lubridate 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 as it can cause an adverse reaction with the bushing material.
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 for safety.
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 3/16" and press again from opposite side to center the bushing within the main support member assembly. See **Figure 7.8**.

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 t ape 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 main support member failure.

11. Install the 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 only 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 could 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 locknut and washer. See **Figure 7.9**.
5. Remove U bolts, axle bottom cap and top pad.
6. Loosen the ¾" 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.

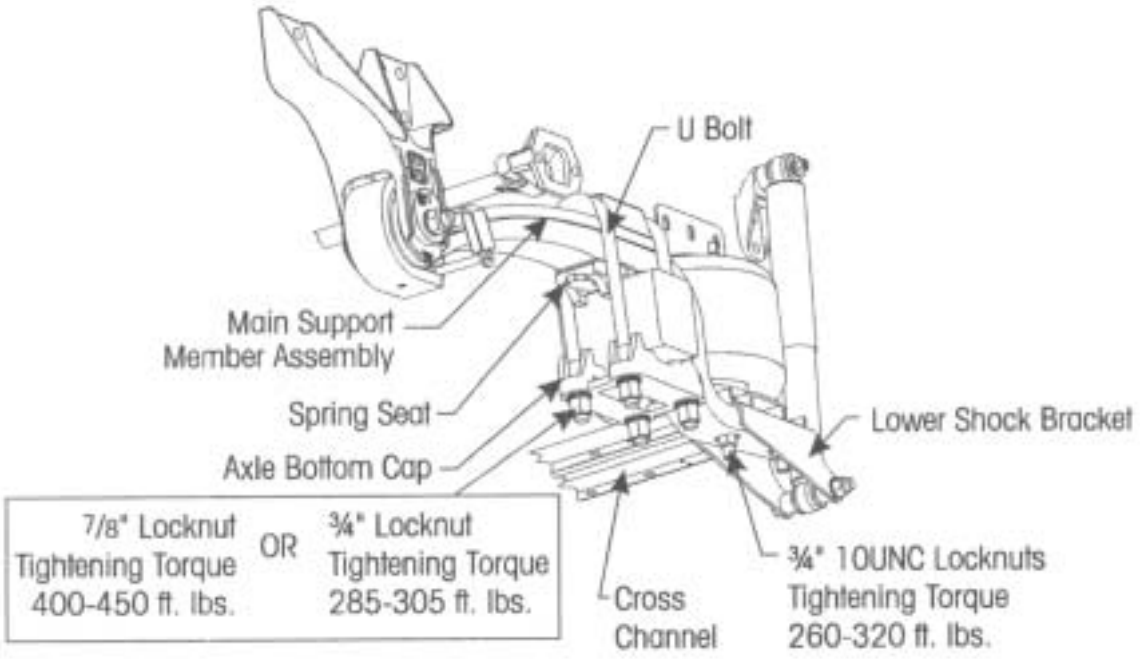


Figure 7.9

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 ¾" bolts, washers and locknuts that connect the cross channel to the main support member assemblies to 260-320 foot pounds torque.
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 ¾" locknuts to 285-305 foot pounds torque.

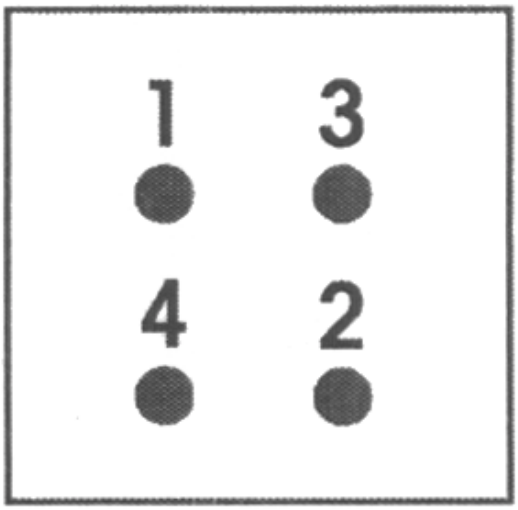


Figure 7.10

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 could result in personal injury or property damage.

3. Verify air is removed from the system.
4. Remove the U bolt locknuts and washers.
5. 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 ¾" 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 could result in personal injury or property damage.

3. Verify air is removed from the system.
4. Remove the ½" locknut and washer that connect air spring to the cross channel. See **Figure 7.11**.

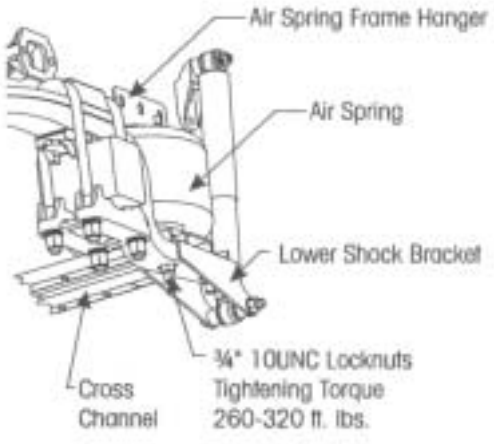


Figure 7.11

5. Remove air line from air spring.
6. Remove brass fittings from air spring.
7. Remove the ½" 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 ½" washer and locknut.
2. Install air spring in spring seat by inserting stud into hole and attach the ½" washer and locknut.
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 could 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 List in Section 4.
6. Remove the ¾" bolts, washers and locknuts that connect the cross channel to the man 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 ½" locknut and washers, that connect shock absorber to frame hanger. See **Figure 7.12**.
2. Remove the ¾" 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 ½" locknut. Washers must be installed on each side of shock absorber bushing.

2. Install shock absorber to lower shock absorber bracket by attaching the ¾" bolt, washers, and locknut.
3. Tighten ½" locknut to 50-70 foot pounds torque, and ¾" locknut to 160-180 foot pounds torque.

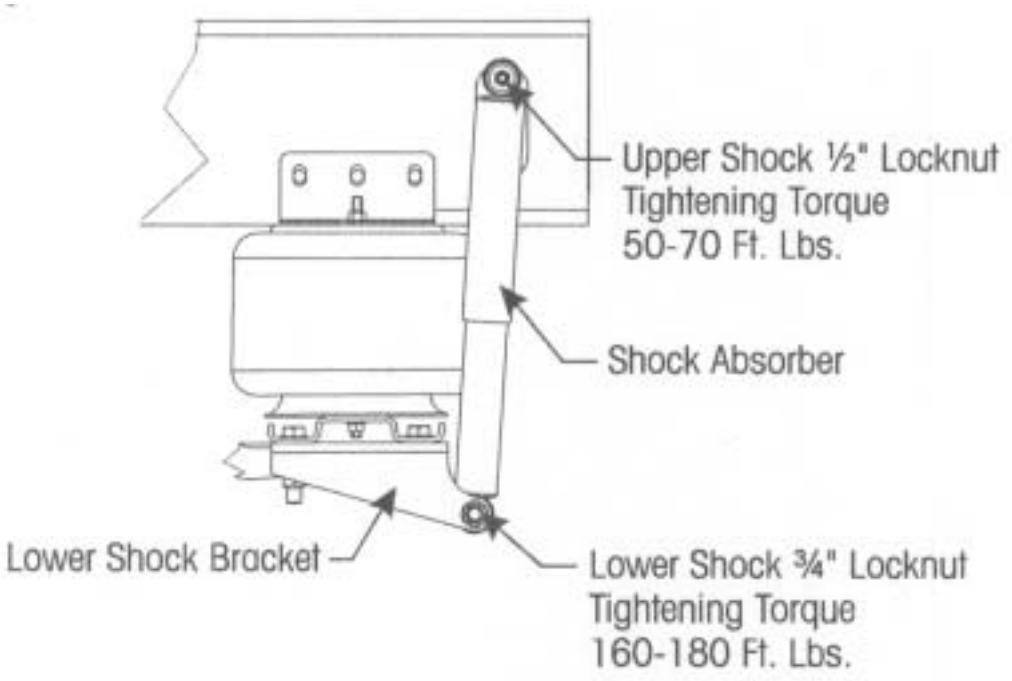


Figure 7.12

Upper Shock Absorber Frame Bracket

Disassembly

1. Remove the ½" locknut and washers that connect shock absorber to frame bracket.
2. Remove the ¾" 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 Blue Bird specifications.
5. Remove frame 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 and 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" bolt, washers and locknut.
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.

Note

Vehicle must be firmly supported with jack stands prior to servicing. Failure to do so could 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 ¼": washers and locknuts that attach the ride height control valve to the frame mounting bracket.
8. Remove the ride height control valve. **Figure 7.13**.

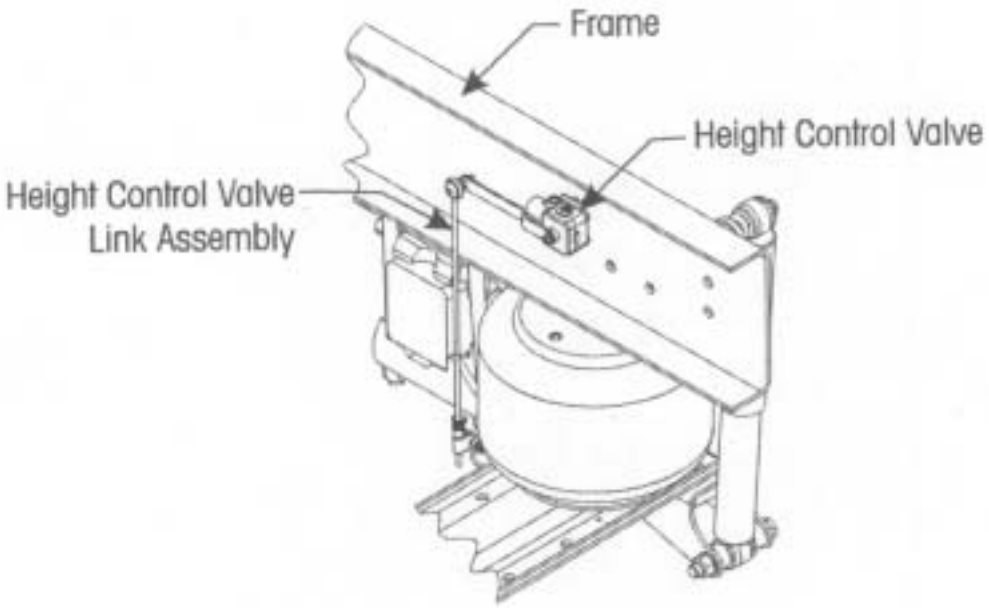


Figure 7-13

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 5/6" 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 of this Comfort Air section.)

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.

Note

Hendrickson recommends the use of Grade 8 bolts and Grace 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 Blue Bird 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 details in the previous section.

Note

Do not use heat or a cutting torch to remove the bushings from the torque rod. The use of heat will adversely affect the strength of the torque rod.

You will need:

- A vertical press with a capacity of at least 10 tons.
- A receiving tool (5" long, 2" inner diameter by ¼" 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 for safety.
2. Push directly on the bushing straddle mount bar pin until top of the bushing is level to the top of toque 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 as it can cause an adverse reaction with the bushing.
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.
7. When pressing in the new bushings, overshoot the desired final position by approximately 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.

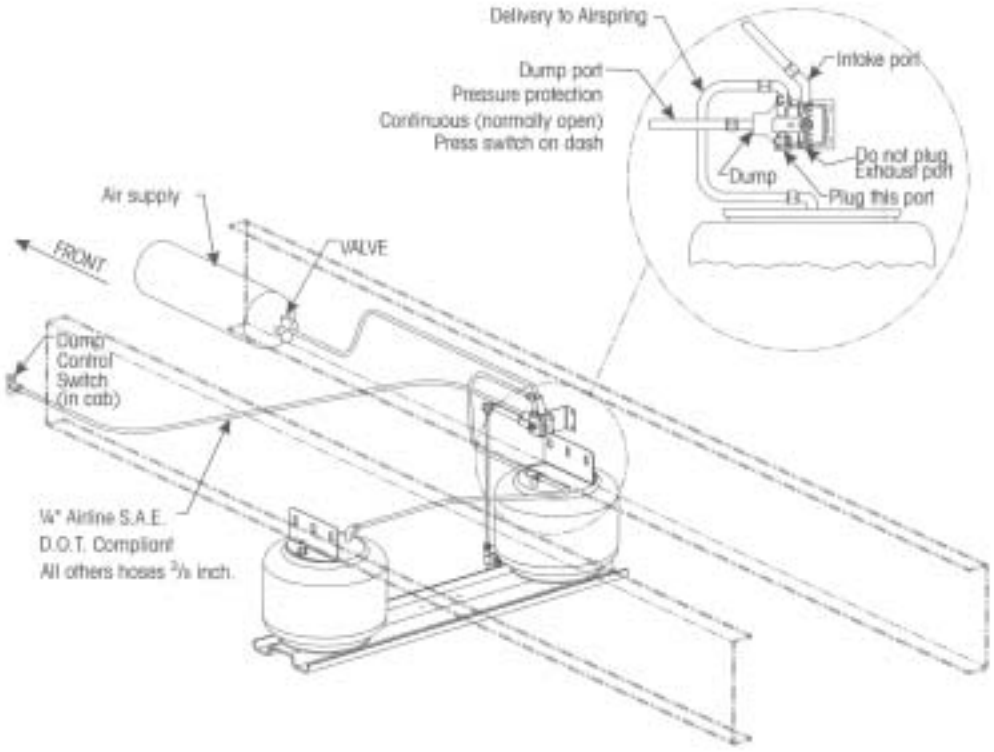
Figure 7.14

Figure 7.16

Figure 7.15

Figure 7.17

Comfort Air Plumbing Diagram



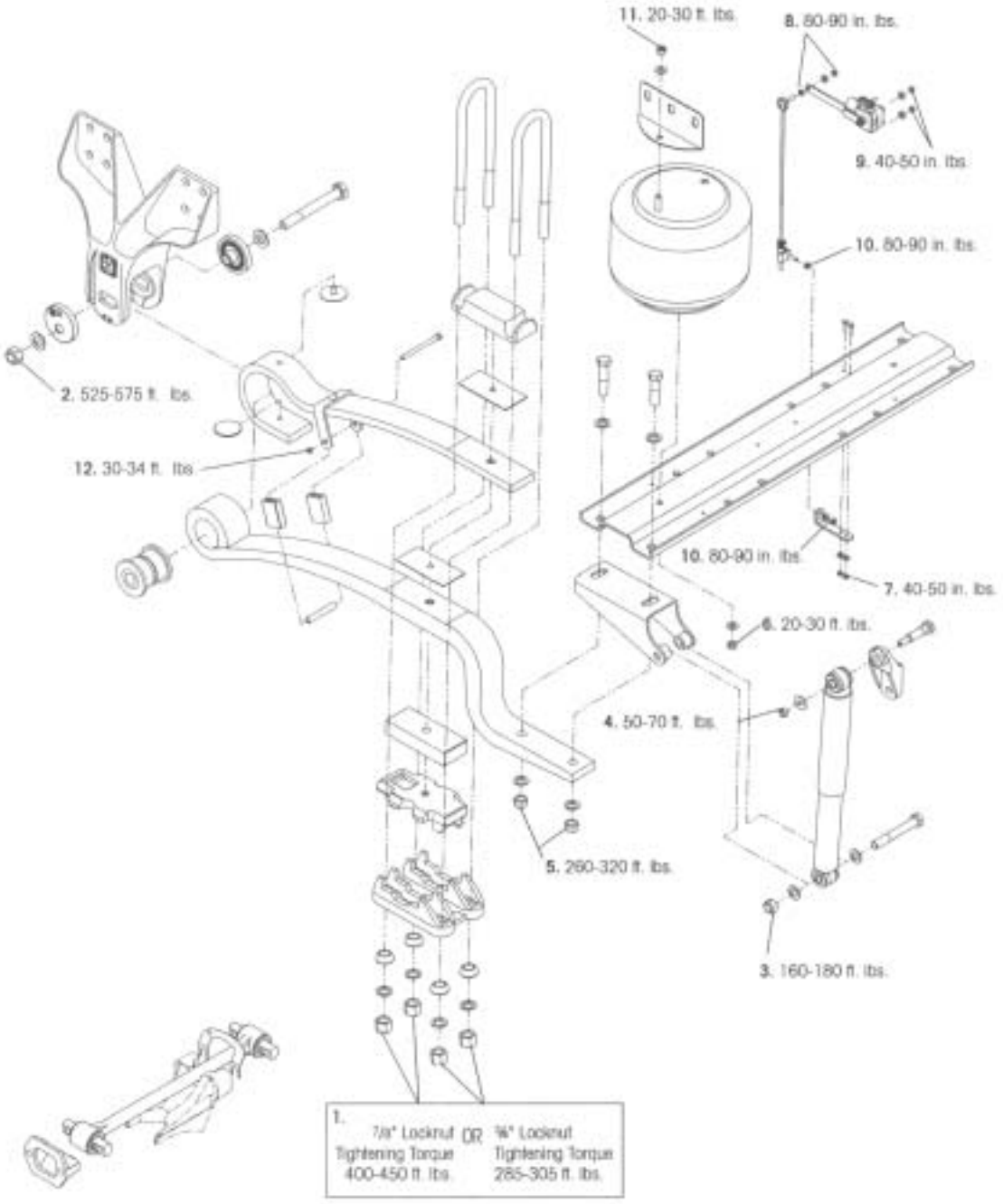
Troubleshooting Matrix

Comfort Air

Troubleshooting 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 re-torque 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 and replace if necessary.
	Loose U bolts	Perform U bolt re-torque 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 and replace if necessary.

Torque Specifications



Comfort Air

Hendrickson Recommended Torque Specifications

No.	Component	Quantity	Size	Torque Ft/lbs
	*Frame Fasteners Furnished and Installed by Blue Bird**			
1	U Bolt (high locknut) 19,000 to 23,000 lb capacity	8	7/8"	400-450
	15,000 lb capacity	8	3/4"	285-305
2	QUIK-ALIGN Locknut	4	1"	525-575
	Warning. Do not assemble QUIK-ALIGN joint without proper fasteners. Use only Dacromet Plus XL plated fasteners to maintain proper clamp force. Failure to do so can cause loss of vehicle control, property damage or personal injury.			
3	Chock 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:
Torque values listed above apply only if Hendrickson supplied fasteners are used.

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