

SERVICE MANUAL

SERVICE MANUAL SECTION

INTERNATIONAL RIDE OPTIMIZED SUSPENSION (IROS)

Model: 3200

Model: 3300

Model: CE Bus

Model: FE Bus

Model: RE Bus

Unit Code: 14TBJ

Unit Code: 14TBG

Unit Code: 14TBH

Unit Code: 14TBT

Unit Code: 14WAW

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DESCRIPTION

The air ride suspension is the ultimate in smooth, shock and vibration-free ride with a preset constant frame height.

The air springs on the air ride suspension take the place of steel springs, which means there is no inter-leaf friction to overcome; thereby, minimum road shock is transferred to the frame, cargo and driver (Figure 1 and Figure 2).

NOTE – The air ride system dump feature is only available on the 3200 Model. See Section 9 of this service manual for description and operation of the 14899 Dump Option for the 3200 model.

The air ride suspension adjusts to load changes automatically, providing a low rate suspension with a light or no load condition, and a higher rate suspension with heavier loads. The major components of the air suspension system, used on single axles are shown in the Figure below.

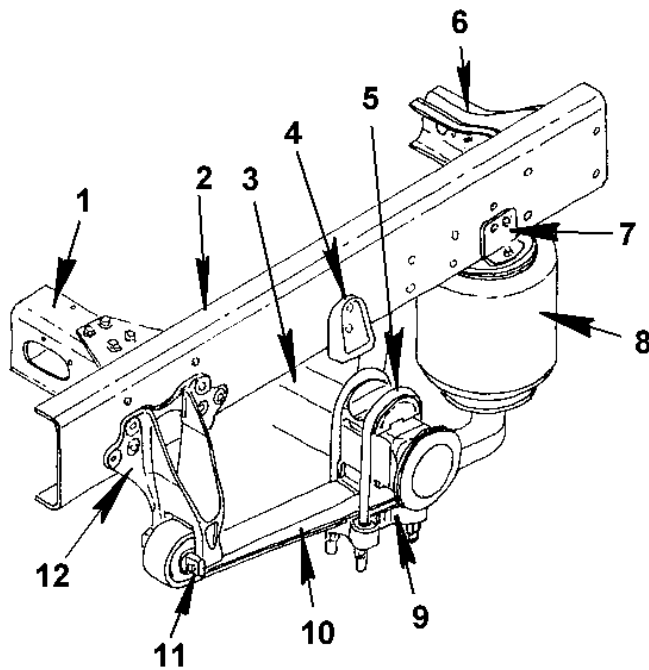


Figure 1 Air Suspension (CE, FE, RE)

1. FORWARD CROSSMEMBER
2. FRAME RAIL
3. REAR AXLE
4. AXLE STOPS
5. U-BOLTS
6. REAR CROSSMEMBER
7. AIR SPRING MOUNTING BRACKET
8. AIR SPRING
9. LOWER U-BOLT MOUNTING BRACKET
10. TAPERED LEAF SPRING
11. TAPERED LEAF SPRING FRONT MOUNTING BUSHING ASSEMBLY
12. SUSPENSION MOUNTING BRACKET

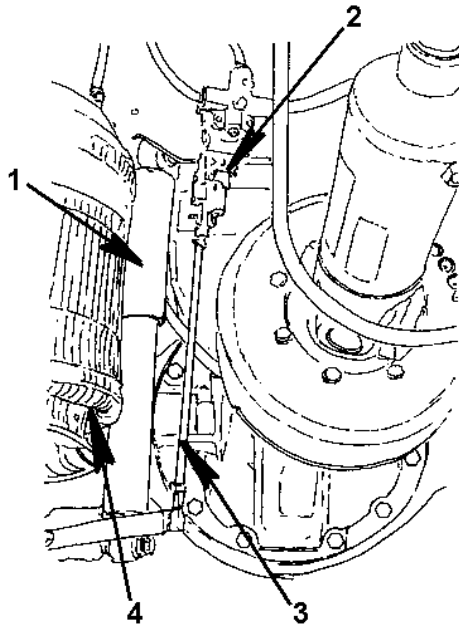


Figure 2 IROS Suspension (RE Shown)

- 1. SHOCK ABSORBER
- 2. HEIGHT CONTROL VALVE
- 3. HEIGHT CONTROL ROD
- 4. AIR SPRING

1. HEIGHT CONTROL VALVE

1.1. DESCRIPTION

The height control valve (Figure 3, Item 11) is the brain of the air suspension and is sensitive to height. When properly adjusted it will provide and maintain ride height.

The height control valve is mounted rearward of the rear axle assembly, driver side frame rail. The valve has a lever arm connected to the axle assembly with a vertical linkage rod. This height control valve lever is sensitive to frame height thus providing automatic filling or exhausting of the air springs to maintain the vehicle ride height.

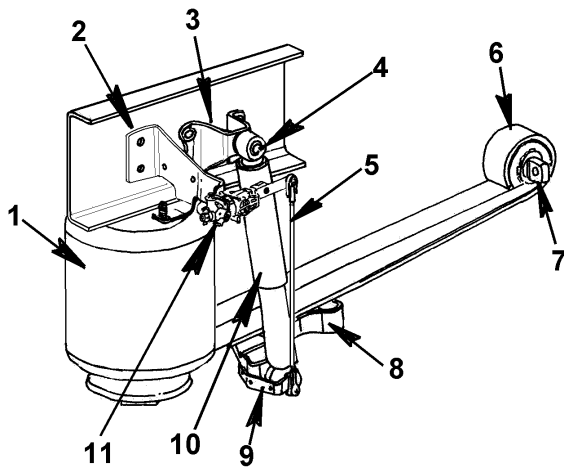


Figure 3 Height Control Valve System Components

1. AIR SPRING
2. HEIGHT CONTROL VALVE MOUNTING BRACKET
3. SHOCK ABSORBER UPPER MOUNTING BRACKET
4. SHOCK ABSORBER MOUNTING BOLT
5. HEIGHT CONTROL ROD
6. TAPERED SPRING BUSHING WRAP
7. TAPERED LEAF SPRING FRONT MOUNTING BUSHING ASSEMBLY
8. LOWER U-BOLT AND TAPERED LEAF SPRING MOUNTING BRACKET
9. LOWER HEIGHT CONTROL ROD MOUNTING BRACKET
10. SHOCK ABSORBER
11. HEIGHT CONTROL VALVE

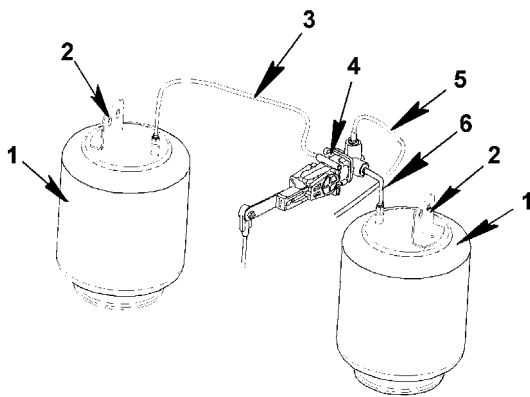


Figure 4 Height Control Valve and Air Springs

1. AIR SPRING
2. AIR SPRING MOUNTING BRACKET
3. AIR SPRING SUPPLY LINE (PASSENGER SIDE)
4. HEIGHT CONTROL VALVE
5. MAIN FEED AIR LINE SUPPLY
6. AIR SPRING SUPPLY LINE (DRIVER SIDE)

Place valve arm in neutral position (on center-indent) (Figure 7) to automatically return the valve to a closed position. The height control valve is closed in the neutral position.

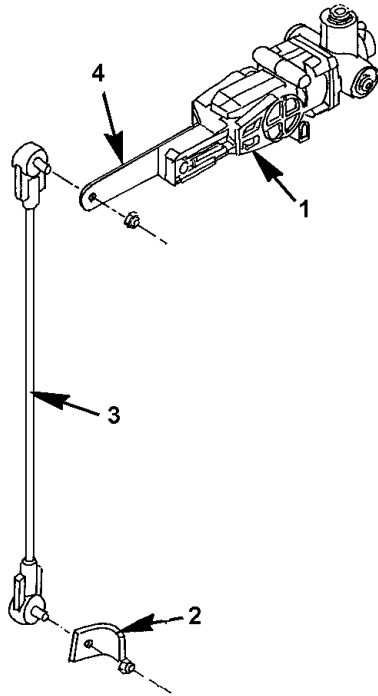


Figure 5 Height Control Valve Components

- 1. VALVE ASSEMBLY
- 2. LOWER HEIGHT CONTROL VALVE BRACKET ASSEMBLY
- 3. HEIGHT CONTROL ROD
- 4. HEIGHT CONTROL LEVER ARM

1.2. OPERATION

Figure 5 illustrates the height control valve in the neutral (closed position). At this point, the lever is parallel to the ground and the air suspension has been properly inflated to level the vehicle. No air can pass through the valve at this time.

When a load is applied, the frame lowers. The lever is moved through an angle above horizontal and the valve opens. As air passes through the valve and the air suspension inflates, the frame resumes its design height.

The frame rises when the load is diminished. The lever moves through an angle below horizontal and once the time delay is surpassed, the valve exhausts air until the frame once again resumes its design height.

1.3. SERVICE CHECKS (VALVE ON TRUCK)

Often a valve is unnecessarily replaced. There are basic steps to be performed to determine if the valve is defective or if proper adjustment has not been performed. To determine the status of a valve, perform the following service checks:

1. Remove cotter pin and washer from upper link. Loosen the clamp and detach the vertical linkage from the height control lever arm.
2. Assure that brake air reservoir pressure is at governor cutoff pressure or about 100 psi (689.5 kPa).
3. Raise height control valve lever approximately 45 degrees above horizontal. Air pressure at the air springs should begin to increase within 15 seconds which will cause the truck frame to rise. This can easily be detected by feeling the shock absorber extend at the dust tube to shock absorber body joint.
4. Lower height control valve lever approximately 45 degrees below horizontal. Air pressure at the air springs should begin to decrease. Let air escape until air spring height is approximately 10 inches (254 mm).
5. Raise valve lever to 45 degrees above horizontal again, until air spring height is to dimension shown in RIDE HEIGHT DIMENSIONS. Refer to Figure 6, Item 2. Release the valve lever.
6. Check valve body and all tubing connections and air springs for air leaks with soapy water. Repair as necessary.
7. Recheck air spring height 15 minutes after step 5 above has been completed. If the air spring height has changed, return to step 5 and repeat until the correct height is obtained.
8. If no leaks are found, and the height control valve functions as described above, and air spring height is at the specified dimension after 15 minutes, the valve is functioning properly.
9. Refer to RIDE HEIGHT ADJUSTMENT and perform the adjustment.

1.4. CHECKING RIDE HEIGHT PROCEDURE

Procedure for checking air spring height on the International Ride Optimized Suspension (IROS):

NOTE – Chassis ride height is not measured directly. Instead, axle travel measurement will be taken. Specifications for axle travel have been calculated to result in the correct chassis ride height.

1. Park the vehicle unloaded on a level surface with a light application of the brakes.
2. Do not apply the parking brake. Chock wheels to prevent vehicle movement.
3. Make sure at least 100 psi is in the vehicle air system, and then shut off engine.
4. Dump air from system, then re-pressurize and allow it to return to the ride height. (See Ride Height Adjustment Section.)
5. To measure the axle travel you will need a tape measure that will remain rigid when extended to 6 inches and one (1) 6–inch straight edge such as a piece of 3/8" flat bar.

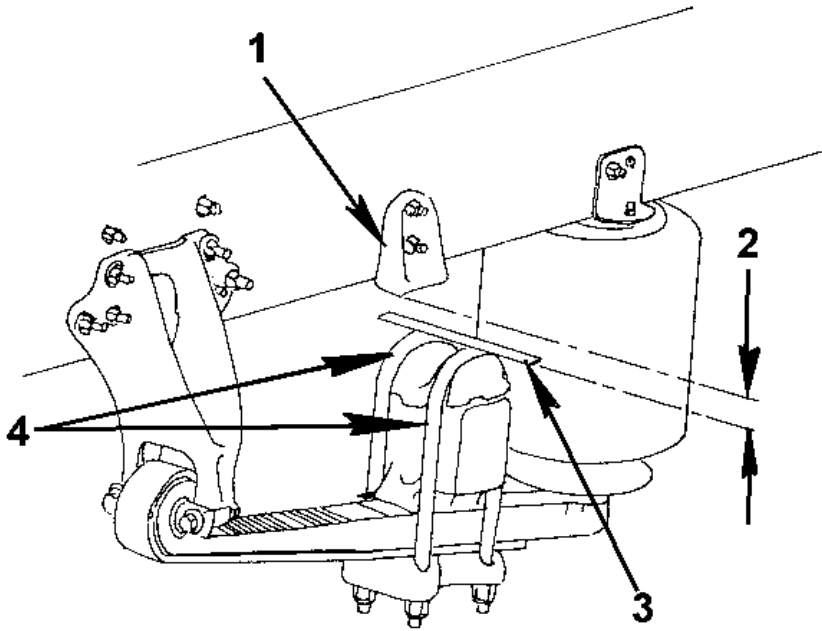


Figure 6 Axle Travel Measurement

1. AXLE STOP
2. RIDE HEIGHT DIMENSION
3. 3/8" FLAT BAR
4. SUSPENSION U-BOLTS

6. Measurements are taken at the air spring assembly closest to the height control valve (usually forward left).
7. Measure the vertical distance from the bottom of the straight edge that is resting against the u-bolts, to the bottommost position of the axle stop. **There should be no angle created between the two measurement points.**
8. The measurement you obtain should fall within the values listed in the tables.
9. If they do not fall within the listed values on the table, the height control valve will need to be adjusted as per the instructions listed in the Ride Adjustment Section of this service manual.

1.5. RIDE HEIGHT ADJUSTMENT

NOTE – Do not bend the height control system brackets or rods to adjust suspension height. The lower bracket (Figure 9 and 10), by design, is specially contoured or shaped to facilitate shock absorber servicing. Do not confuse its complex shape with damage.

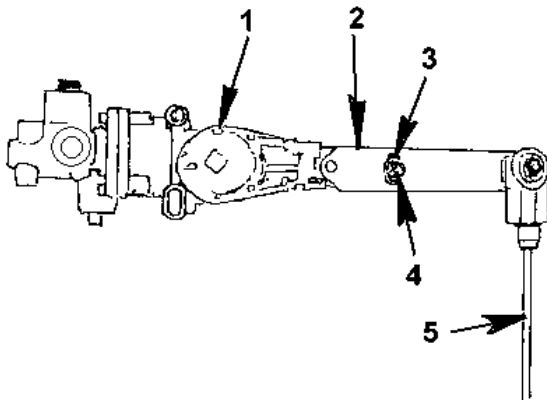


Figure 7 Height Control Valve Assembly

1. HEIGHT CONTROL VALVE
2. LEVER ARM
3. VALVE ARM ADJUSTMENT SLOT
4. LEVER ARM BOLT
5. HEIGHT CONTROL ROD

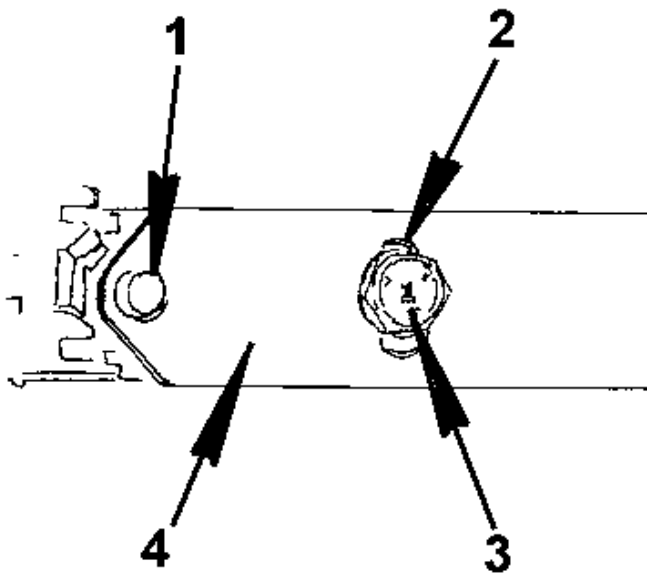


Figure 8 Lever Arm "D" Slot and Bolt — Detail

1. LEVER LOCATOR PIN
2. LEVER MOUNTING SLOT
3. LEVER ATTACHMENT AND ADJUSTMENT BOLT
4. VALVE LEVER ASSEMBLY

Final Assembly Instructions

1. If the air spring height **exceeds** specifications, loosen the bolt that holds the lever arm to the height control valve. Pivot the loosened lever arm down and exhaust air from the suspension, lowering the chassis to some point below the correct air spring height. Final air spring height must be achieved by adding air to the suspension, not exhausting. Add air until the air spring reaches the proper length according to the chart specifications. When the correct air spring length has been achieved, retighten the lever arm bolt.

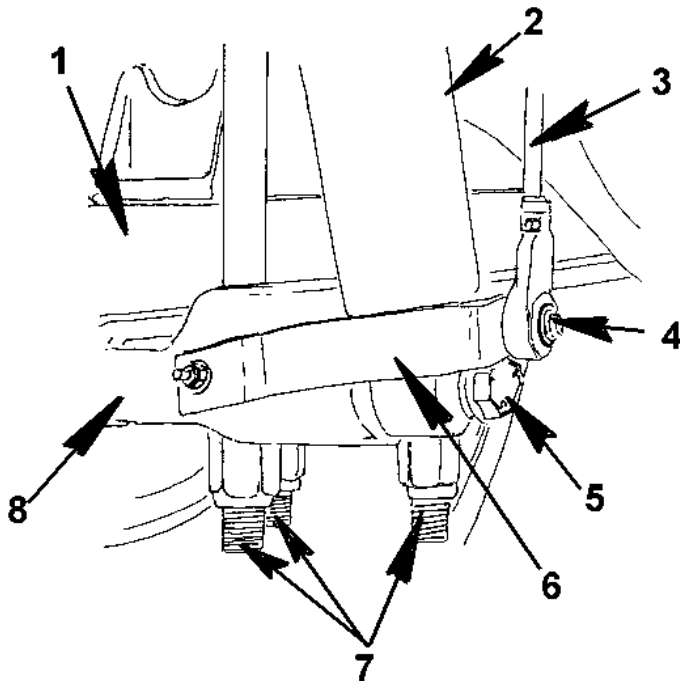


Figure 9 Lower Bracket

1. MAIN SUPPORT MEMBER
2. CHASSIS SHOCK ABSORBER
3. HEIGHT CONTROL ROD
4. HEIGHT CONTROL ROD AND LOWER LEVER MOUNTING BOLT AND NUT
5. LOWER SHOCK ABSORBER MOUNTING BRACKET
6. LOWER HEIGHT CONTROL BRACKET
7. U-BOLT AND MOUNTING NUTS
8. LOWER SUSPENSION MOUNTING BRACKET

If the axle travel is less than specifications

2. If the air spring height **is less** than specifications, loosen the lever arm to the height control valve. Push the lever up and add air to the suspension, raising the chassis, until the air spring reaches proper length according to the chart specifications. When the correct air spring length has been achieved, retighten the lever arm bolt.

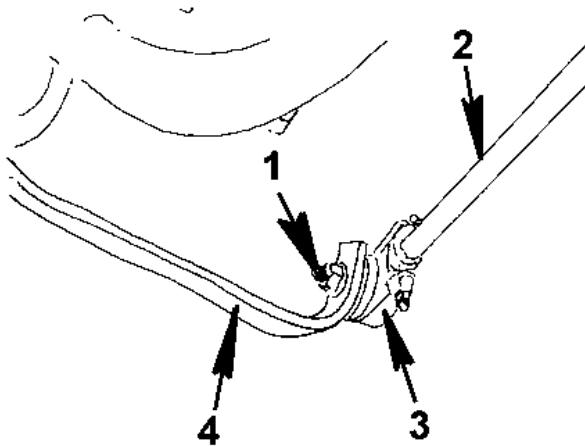


Figure 10 Lower Bracket

1. LOWER HEIGHT CONTROL BRACKET ATTACHMENT NUT AND BOLT
2. HEIGHT CONTROL ROD
3. HEIGHT CONTROL ROD ENDS
4. LOWER SUSPENSION BRACKET

IMPORTANT – Air spring height and chassis ride height are not the same thing. Specifications for air spring height (length) have been calculated to result in the correct chassis ride height. When you have adjusted the air spring height to chart specifications, the chassis ride height is also correct.

1.6. ROD CUTTING INSTRUCTIONS

Before any measurements are taken for determining the correct control rod length, check for proper vehicle ride height according to procedures explained in your Original Equipment Manufacturer (OEM) service manual. If the chassis height is not correct, make adjustments necessary to bring it into compliance with the manufacturer specifications.

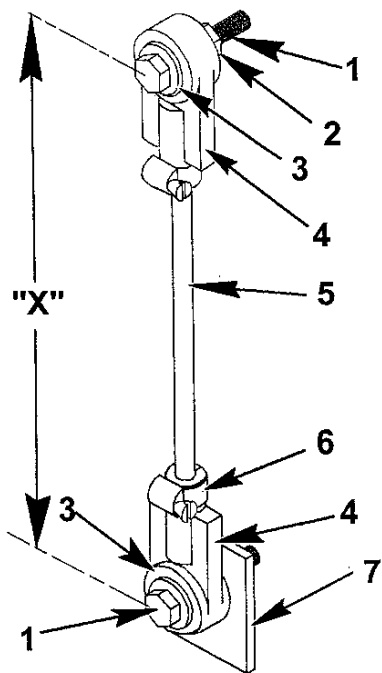


Figure 11 Height Control Rod

1. HEIGHT CONTROL ROD UPPER MOUNTING BOLT
2. HEIGHT CONTROL ROD UPPER MOUNTING NUT AND WASHER
3. HEIGHT CONTROL ROD MOUNTING BOLT
4. HEIGHT CONTROL ROD BUSHING
5. HEIGHT CONTROL ROD
6. HEIGHT CONTROL ROD LOWER BUSHING AND CLAMP ASSEMBLY
7. LOWER HEIGHT CONTROL ROD BRACKET

After the correct chassis ride height specification has been confirmed or adjusted, use a tape measure or steel rule and measure the center-to-center distance between the attachment hole in the ride height control valve actuating lever and the attachment hole in the lower linkage mounting bracket (Figure 11, Item "X"). This center-to-center dimension will be your "X" dimension.

To calculate the proper final cut length of the new control rod:

Subtract $1\frac{5}{8}$ (1.625) inches from the "X" dimension ($X - 1.625$)

Example:

If the center-to-center measurement is $16\frac{1}{2}$ inches ($X = 16.5$).

$16\frac{1}{2}$ inches minus $1\frac{5}{8}$ inches = $14\frac{7}{8}$ inches.

The length of the rod after cutting should be $14\frac{7}{8}$ inches long.

Final Assembly Instructions

1. The new linkage must be assembled using only those parts supplied with this kit. Substituting any other parts will void the manufacturer warranty.
2. Remove all burrs and sharp edges from both ends of the rod.
3. Install a rubber rod end onto one end of the rod. Make sure it is pushed on until it bottoms out on the rod.
4. Slide two loose hose clamps onto the opposite end of the rod.
5. Install the remaining rubber rod end according to step 3.
6. Rotate the rubber rod ends to align the mounting bolt holes so they are aligned identically with one another.
7. Place one hose clamp on each rubber end as shown in (Figure 11, Item 6), and torque the clamps to 15 lbf-in.
8. Measure the center-to center distance to insure that it is equal to the "X" dimension.
9. Attach one end of the completed rod assembly to the ride height control valve arm and the opposite end to the lower mounting bracket. Tighten both nuts to 60–80 lbf-in.
10. Examine the linkage for any valve lever interference through the entire range of suspension travel.

Table 1 IROS Suspension Height Chart Adjustment Specification

IROS Suspension Feature Code	Conf.	Model	Ride Height (Ref. Only)	Axle Travel in Inches (measured from axle stop)
14TBJ, 14TBG, 14TBH, 14TBT (not RE or Flat Floor)	4x2	3000, 3200	9.25	3.0 ± 0.125
14WAW (Flat Floor)	4x2	3000	11.3	2.7 ± 0.125
with RE	4x2	3000 RE	9.25	
All dimensions are in inches.				

2. AIR LINES

Air is supplied to the air springs (Figure 12, Item 10) from the air system. There are two delivery ports in the height control valve supplying air to the right and left air springs.

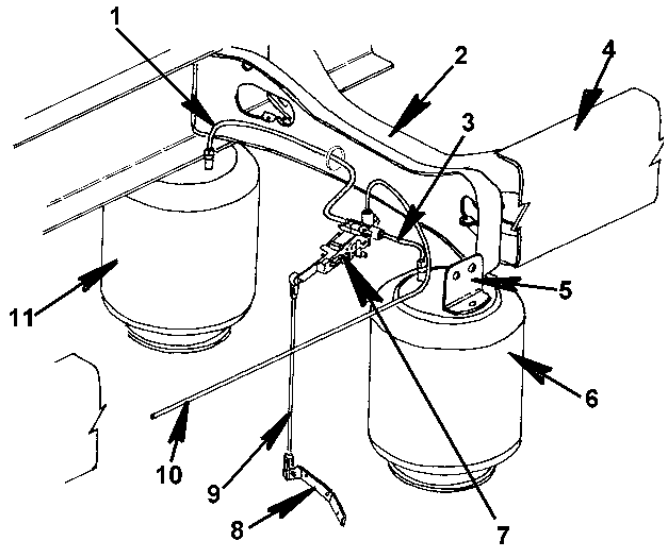


Figure 12 Air Spring Hosing and Valves

1. CURB SIDE AIR SPRING SUPPLY LINE
2. CHASSIS CROSSMEMBER
3. STREET SIDE AIR SPRING SUPPLY LINE
4. STREET SIDE FRAME RAIL SECTION
5. AIR SPRING UPPER MOUNTING BRACKET
6. STREET SIDE AIR SPRING
7. HEIGHT CONTROL VALVE
8. LOWER AIR VALVE BRACKET
9. HEIGHT CONTROL ROD
10. MAIN AIR SUPPLY LINE FROM AIR TANK
11. CURB SIDE AIR SPRING

Air lines between the air springs (Figure 12, Items 1 and 3) provide air flow transfer across the axle to maintain constant frame rail height and equal distribution at the axle ends.

3. MAIN SUPPORT MEMBER

The main support member acts as a lightweight one-piece beam to transfer the load directly to the axle and also absorb road shock, starting and braking loads.

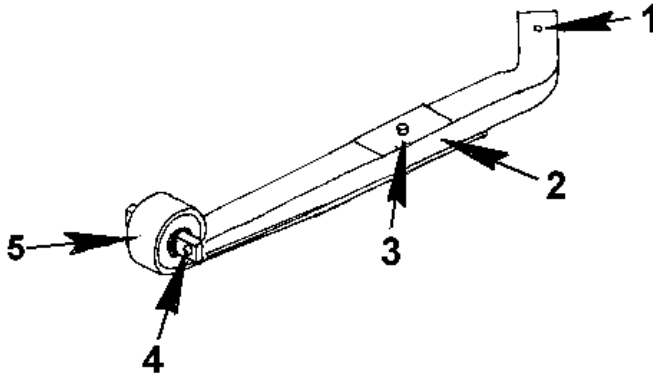


Figure 13 Main Support Member

1. AIR SPRING LOWER MOUNTING LOCATION
2. TAPERED LEAF SPRING
3. AXLE MOUNTING PLATE LOCATOR PIN
4. TAPERED LEAF SPRING BUSHING ASSEMBLY
5. TAPER LEAF SPRING BUSHING WRAP

Remove and install procedures — follow procedures outlined under MAIN SUPPORT MEMBER in the COMPONENT REMOVAL and COMPONENT INSTALLATION sections.

4. SHOCK ABSORBERS

Each axle is controlled by hydraulic shock absorbers (Figure 14, Item 3) which are mounted where shock travel is greatest to provide maximum control.

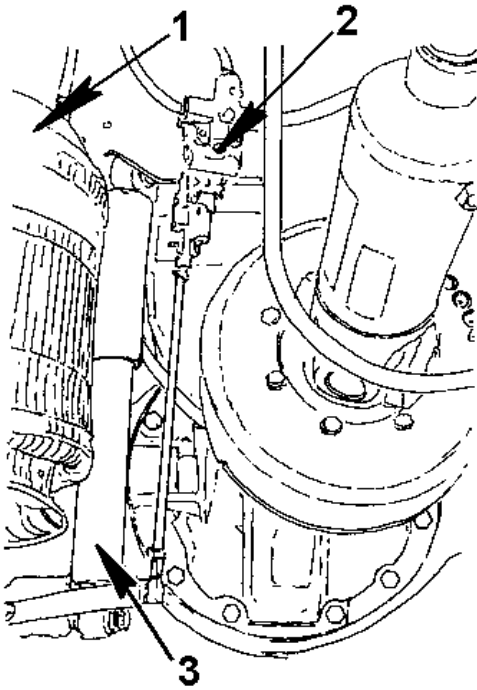


Figure 14 Shock Absorber (RE Shown)

1. SYSTEM AIR SPRING (CURB SIDE SHOWN)
2. HEIGHT CONTROL VALVE
3. SHOCK ABSORBER (PASSENGER SIDE SHOWN)

Refer to Removal and Installation procedures outlined in respective sections.

5. TORQUE RODS

Lateral torque rods (Figure 15, Item 4) provide stiffness during cornering of the vehicle.

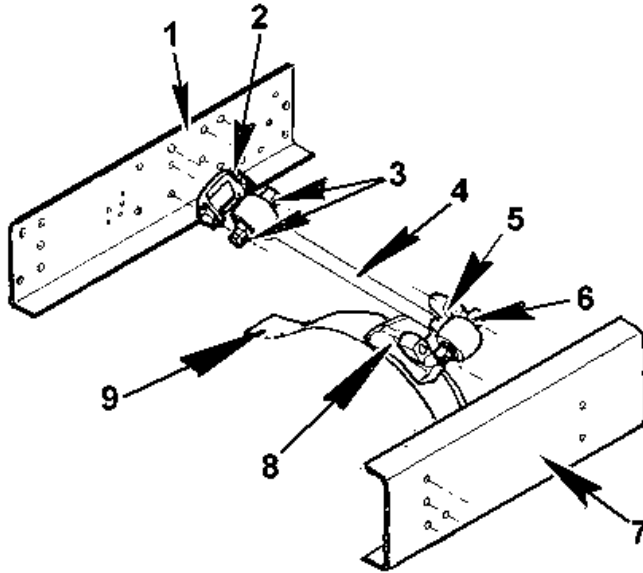


Figure 15 Torque Rod Assembly

1. CURB SIDE INNER FRAME LINER
2. TORQUE ROD TO FRAME MOUNTING BRACKET
3. TORQUE ROD MOUNTING BUSHINGS
4. TORQUE ROD
5. AXLE TO TORQUE ROD MOUNTING BRACKET
6. AXLE TO TORQUE ROD MOUNTING BUSHING
7. FRAME RAIL
8. TORQUE ROD TO AXLE WELDMENT ASSEMBLY
9. REAR AXLE HOUSING

6. COMPONENT REMOVAL

6.1. SUSPENSION AIR SPRINGS



WARNING – Prior to removing any suspension components, park the vehicle on a flat surface. Place the transmission in the park position. Set the parking brake, and set the wheel chocks in place.

1. When replacing air springs, use only approved International parts.

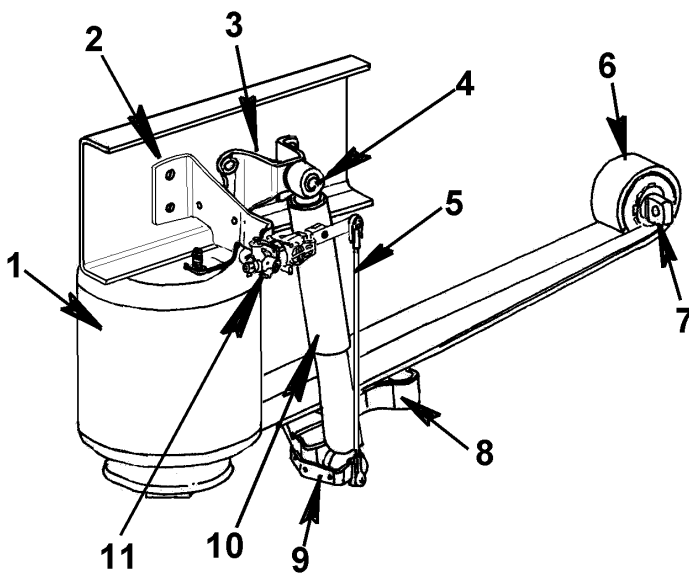


Figure 16 Rear Air Spring assembly

1. AIR SPRING
 2. HEIGHT CONTROL AND AIR SPRING MOUNTING BRACKET
 3. SHOCK ABSORBER UPPER MOUNTING BRACKET
 4. SHOCK ABSORBER UPPER MOUNTING BOLT
 5. HEIGHT CONTROL ROD
 6. TAPERED SPRING BUSHING WRAP
 7. TAPERED SPRING MOUNTING BUSHING
 8. SHOCK ABSORBER LOWER MOUNTING BRACKET
 9. HEIGHT CONTROL ROD LOWER MOUNTING BRACKET
 10. SHOCK ABSORBER
 11. HEIGHT CONTROL VALVE
2. Park vehicle on flat service, set parking brake, and block wheels to prevent vehicle from rolling. Support vehicle with floor stands.

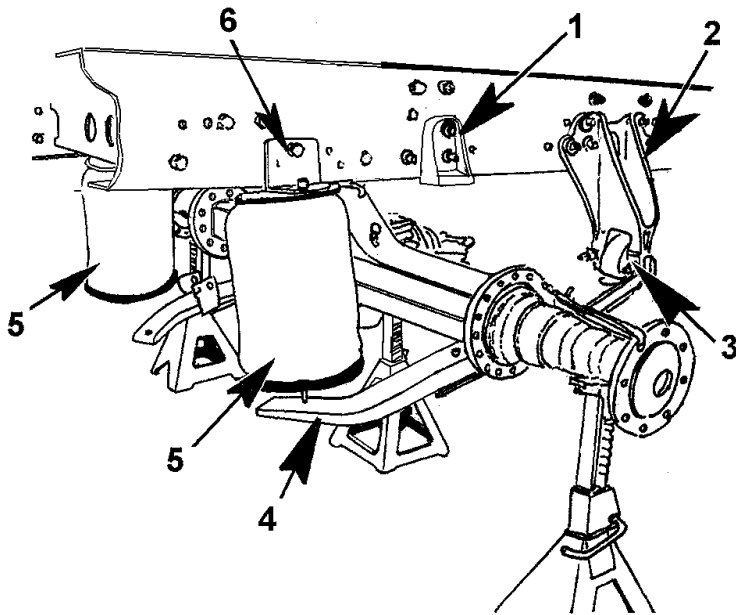


Figure 17 Lower Shock Remove / Install

1. AXLE STOP BRACKET
2. FORWARD TAPERED LEAF SPRING MOUNTING BRACKET
3. MOUNTING BUSHING, BOLTS AND NUTS
4. TAPERED LEAF SPRING
5. AIR SPRING
6. AIR SPRING MOUNTING BRACKET



WARNING – A jack must never be used alone to support vehicle while under-chassis service is being performed. The jack may lower and serious personal injury could result. Always support vehicle with floor stands.

3. Exhaust air from vehicle and suspension system. Exhaust air by:

NOTE – Even if air spring has a leak and is deflated, the air must still be exhausted from system.

- a. Automatic control — height control valve - disconnect link at lower connection, then rotate control arm to exhaust (approximately 45 degrees down) position.
- b. Disconnect air supply line from air spring.
- c. Exhaust air from reservoir.

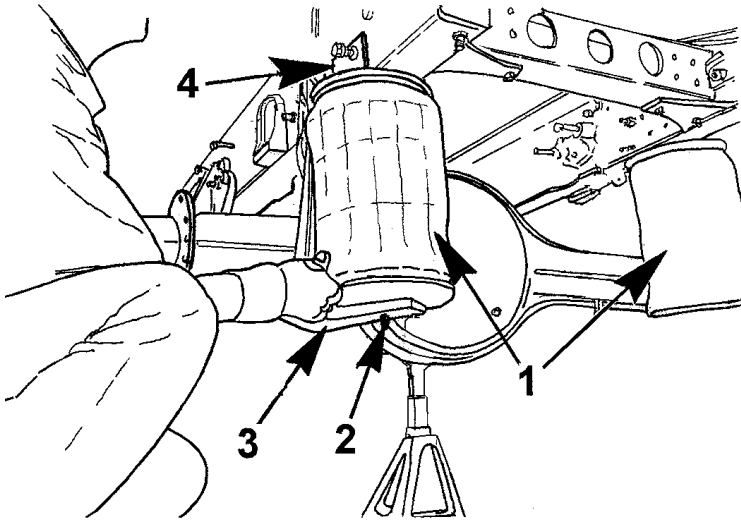


Figure 18 Air Spring Mounting Points

1. AIR SPRING
2. LOWER AIR SPRING MOUNTING STUD
3. SUSPENSION MAIN SUPPORT MEMBER
4. AIR SPRING UPPER MOUNTING BRACKET

4. Remove air spring assembly.

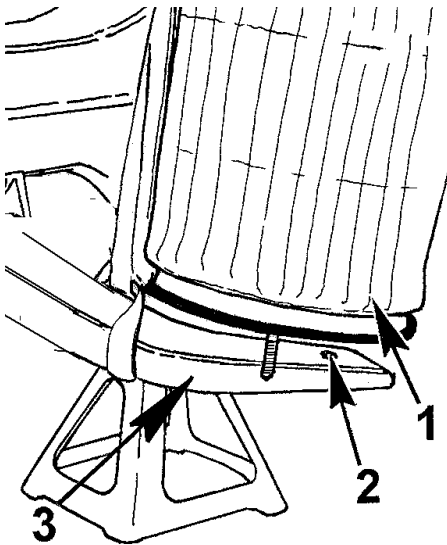


Figure 19 Air Spring Removal

1. AIR SPRING
2. LOWER AIR SPRING MOUNTING HOLE
3. TAPERED LEAF SPRING

6.2. SHOCK ABSORBERS

Support the main support member prior to disconnecting the lower shock absorber from mounting bracket.

Locate the shock absorber mounting brackets at the chassis frame rail and main support member.

1. Park the vehicle on a flat surface and assure that frame is at approximate ride height so that tension is relieved on shocks.
2. Loosen the upper shock absorber mounting bolts and nuts.
3. Loosen and remove the upper shock absorber bolts and nuts.

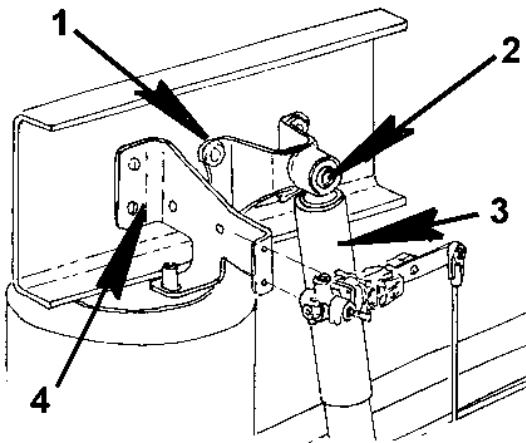


Figure 20 Upper Shock Absorber Mounting Bolts

1. SHOCK ABSORBER MOUNTING BRACKET
2. SHOCK ABSORBER UPPER MOUNTING BOLT
3. SHOCK ABSORBER
4. HEIGHT CONTROL VALVE AND AIR SPRING MOUNTING BRACKET

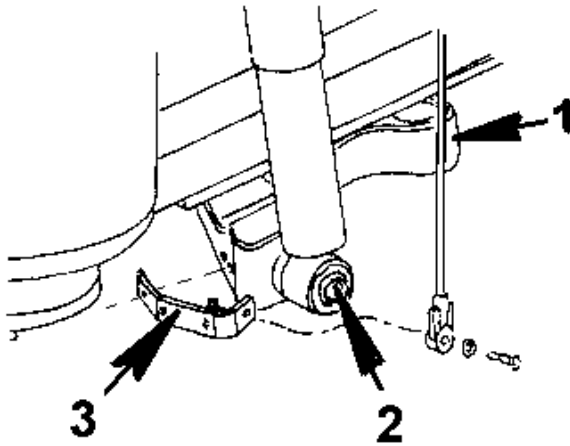


Figure 21 Lower Shock Absorber Mounting Bolt Removal

1. LOWER TAPERED LEAF SPRING BRACKET AND U-BOLT MOUNTING PLATE
2. LOWER SHOCK ABSORBER MOUNTING BOLT
3. LOWER HEIGHT CONTROL MOUNTING BRACKET

4. Remove the shock absorber.

6.3. SUSPENSION U-BOLTS

1. Loosen and remove u-bolt nuts from axle brackets and taper leaf spring lower u-bolt plate.

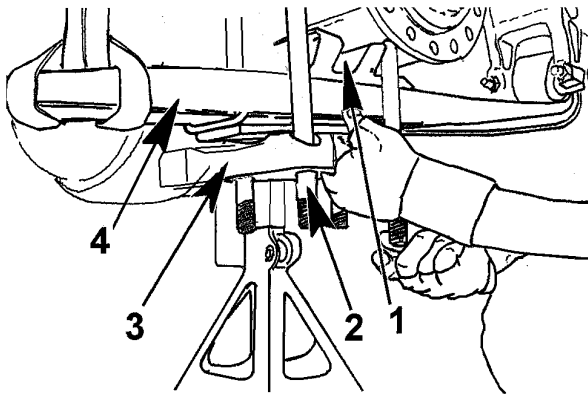


Figure 22 U-Bolt Removal

1. AXLE SEAT
2. SUSPENSION U-BOLTS AND NUTS
3. LOWERED TAPERED LEAF SPRING MOUNTING BRACKET
4. TAPERED LEAF SPRING ASSEMBLY

2. Remove u-bolts.

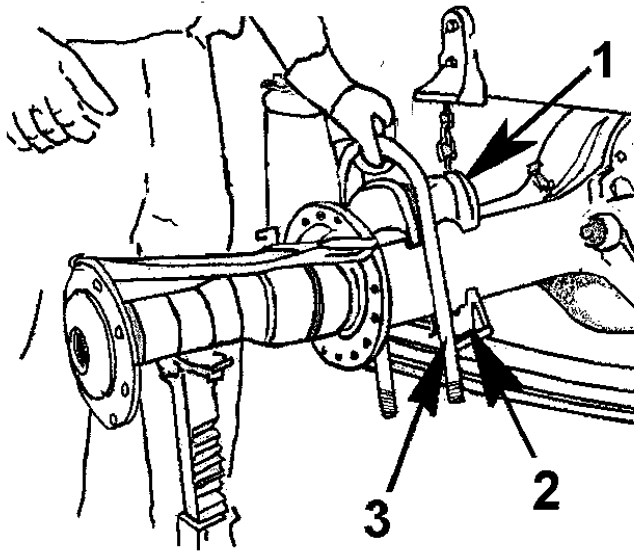


Figure 23 U-Bolt Remove

1. U-BOLT/AXLE SEAT
2. LOWER AXLE SEAT
3. U-BOLT

6.4. MAIN SUPPORT MEMBERS



WARNING – Prior to removing the main support members, park the vehicle on a flat surface. Place the transmission in the park position. Set the parking brake, and set the wheel chocks in place.



WARNING – A jack must never be used alone to support vehicle while under chassis service is being performed. The jack may lower and serious personal injury could result. Always support vehicle with floor stands.

1. When replacing the MAIN SUPPORT MEMBER, use only approved International parts.
2. Unload vehicle and block wheels to prevent vehicle from rolling. Support vehicle with floor stands.
3. Exhaust air from vehicle and suspension system.
 - a. Automatic control-height control valve- disconnect link at lower connection, then rotate arm to exhaust (approximately 45 degrees down) position.
 - b. Disconnect air supply line from air spring.
 - c. Exhaust air from reservoir.
4. Remove air spring assembly.

5. Support the rear axle assembly before proceeding to remove shock absorber.
6. Loosen and remove u-bolt nuts (Figure 22) from axle brackets and taper leaf spring lower u-bolt plate.
7. Remove spring U-bolts while supporting lower U-bolt plate and related parts. Remove and discard spring liner (Figure 23).

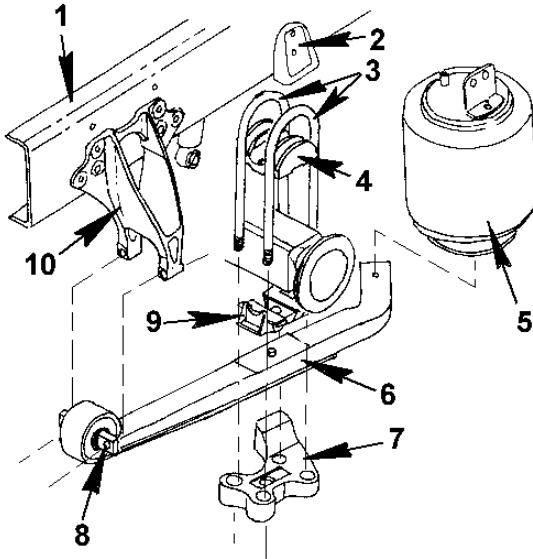


Figure 24 Main Support Member And Suspension Components

1. FRAME RAIL ASSEMBLY
2. AXLE STOP
3. U-BOLTS
4. U-BOLT UPPER SEAT
5. AIR SPRING
6. TAPERED LEAF SPRING
7. TAPER LEAF SPRING LOWER BRACKET
8. TAPERED LEAF SPRING BUSHING
9. AXLE SEAT
10. TAPERED LEAF SPRING ASSEMBLY REAR MOUNTING BRACKET

8. Remove the upper shock absorber mounting bolt from upper shock mounting bracket (Figure 20).
9. Remove lower shock absorber mounting bolt, and remove shock absorber (Figure 21).
10. With rear portion of tapered leaf spring supported, loosen forward tapered leaf spring bolts from chassis mounting bracket, at front bushing.
11. Inspect all parts for wear or damage and replace all hardware if any contamination may exist.

NOTE – When replacing main support members, it is recommended that you replace all hardware items also.

6.5. TORQUE RODS

Refer to Figure 25.

It may not be necessary to remove the chassis suspension torque rod during IROS replacement procedures. It is advised to check the axle bracket boss for excessive wear, and replace if needed. Inspect all parts for wear, cracking or failed welds. Repair or replace as needed.

1. To remove the torque rod assembly, locate the bushing mounting bolts and nuts at the frame rail mounting bracket.
2. Loosen and remove the mounting bolts. Check any shims or spacers for wear or damage.
3. Locate the torque rod bushing mounting bolts and nuts at the axle housing bracket.
4. Loosen and remove the torque rod mounting bolts and nuts. Inspect the axle boss for excessive wear. Replace if needed.

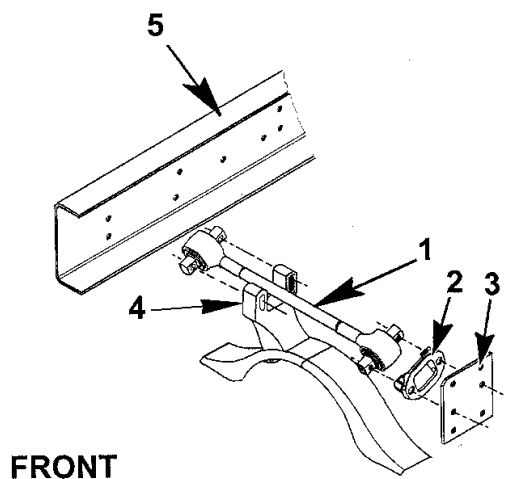


Figure 25 Torque Rod Assembly

1. TORQUE ROD ASSEMBLY
2. TORQUE ROD FRAME RAIL MOUNTING BRACKET
3. REINFORCING PLATE
4. TORQUE ROD AXLE MOUNTING BRACKET
5. FRAME RAIL

5. Remove torque rod.

NOTE – Note the position and quantity of alignment spacers for reassembly.

6.6. MAIN SUPPORT MEMBER BUSHINGS

The bushing assembly is mounted in each main support member assembly.

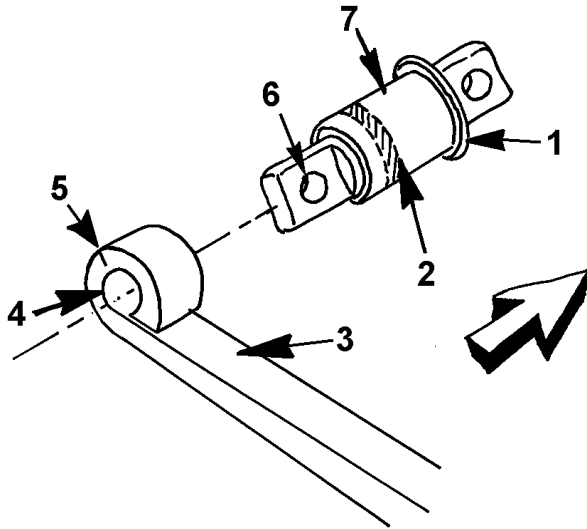


Figure 26 Bushing Removal

1. BUSHING FLANGE (MUST BE INBOARD)
2. BONDING AGENT
3. TAPERED LEAF SPRING
4. TAPERED SPRING BUSHING RAP
5. BUSHING BOLT MOUNTING HOLE
6. TAPERED SPRING ASSEMBLY FRONT MOUNTING HOLES
7. BUSHING FLANGE

The bushing assembly is mounted in each main support member assembly. This assembly is pressed into the main support member assembly; **flange must be on the in-board side**. The main support member assembly with bushing is placed into the chassis forward spring suspension mounting bracket and is bolted in place.

The bushing pin angle must be relative to the main support member. Mark the orientation of bushing on main support member. When replacing new bushing check alignment with mark on main support member. The bolts are tightened to the correct torque value as specified in the TORQUE CHART.

7. COMPONENT INSTALLATION

This manual section is set up for the component installation. **Only International Truck and Engine certified parts should be used for the installation procedures to insure proper fit and service of the vehicle suspension system.**

7.1. SUSPENSION AIR SPRINGS

1. Install replacement air spring assembly and tighten fasteners to specified torque values. Refer to the TORQUE CHART.
2. Connect air line to air spring and install height control valve linkage at lower end.
3. Build vehicle system air pressure to governor cutout pressure and use soap solution to check for leaks.

4. Check for proper ride height adjustment. Refer to RIDE HEIGHT ADJUSTMENT.

7.2. CHASSIS SHOCK ABSORBERS

1. Position shock absorber and install mounting bolts.
2. Tighten shock mounting fasteners to specified torque values. Refer to the TORQUE CHART.

7.3. MAIN SUPPORT MEMBERS



WARNING – A jack must never be used alone to support vehicle while under-chassis service is being performed. The jack may lower and serious personal injury could result. Always support vehicle with floor stands.

1. Inspect all parts for wear, cracks or failed welds. Repair or replace.

CAUTION – Do not repair a cracked spring, U-bolt or spacer plates. The listed parts must be replaced if cracks are present.

Prior to installing the MAIN SUPPORT MEMBER assembly, a careful inspection of component parts including tapered leaf spring mounting bushing should be undertaken. Only authorized International parts should be used in the installation procedure.

Position spring to approximate installed position (Figure 17) and install the bar pin in hanger **on the forward side of the spring hanger**. Also install lower shock bracket end and **do not** tighten fasteners (Figure 21).

2. Locate main support member end with (Figure 13, Item 5) bushing assembly, at the forward suspension mounting bracket (Figure 22, Item 1).
3. Insert bolt and hand tighten.
4. Place axle seat bracket on main support member with alignment pin, axle seat bracket forward mark indicator should be facing in forward direction.
5. Place u-bolts and u-bolt axle top mounting bracket on axle assembly.
6. Install air spring assembly to top bracket mounted on chassis frame (Figure 16, Item 4).
7. Align and install lower u-bolt mounting plate, install u-bolt nuts and hand tighten (Figure 22, Items 2 and 3).
8. Insert mounting nut on air spring threaded stud and hand tighten.
9. Locate and install shock absorber to upper shock absorber mounting bracket. Install bolts and hand tighten (Figure 20, Items 1, 2 and 3).
10. Place lower air spring mounting stud in applicable mounting hole in rear of tapered leaf spring (Figure 13, Item 1).

11. Tighten all mounting hardware to appropriate values as indicated in the torque chart.
12. When all torque requirements are met and installations complete, follow procedures for re-inflating suspension to proper ride height. See the first section and appropriate subsection for correct ride height procedures.
13. Place U-bolt seat on top of spring (Figure 23, Item 2) with tab towards vehicle frame then install U-bolt assembly to spring and axle. **Do not** tighten fasteners to specified values at this time.
14. At this point assemble the spring clamp group and main support member to the axle, align the suspension and tighten assembly. Tighten to specifications in the following sequence: U-bolts (tighten diagonally), (Figure 28) front torque rod nuts, rear torque rod nuts, and the lower shock absorber mounting plate on the transverse beam. Refer to the TORQUE CHART.
15. Connect lower air spring, shock absorbers and height control valve linkage and any air lines that were removed. Tighten all fasteners to values specified. Refer to the TORQUE CHART.
16. Install tires/wheels. Refer to GROUP 17 - WHEELS in the Master Service Manual.
17. Lower vehicle. Remove all stands.
18. Build vehicle air pressure to governor cutout pressure and use soap and water solution to check for leaks.

7.4. TORQUE RODS

1. Install replacement torque rods (be sure to use correct length torque rods for vehicle), connecting the end to the frame side rail first and end to axles second (for transverse rods).
2. Tighten fasteners to specified torque values. Refer to the TORQUE CHART.
3. Recheck axle alignment. Adjust if necessary.

7.5. MAIN SUPPORT MEMBER BUSHINGS

For all bushing types:

TO INSURE PROPER MOUNTING OF NEW BUSHING, CLEAN MAIN SUPPORT MEMBER WHERE BUSHING IS TO BE PRESS FITTED WITH DEGREASING FLUID AND WIRE BRUSH. USE DRILL MOUNTED WIRE BRUSH ONLY.

Apply 1/4– 1/2" wide ring of bonding agent to lower quarter of bushing as shown (Figure 26, Item 2), before pressing into spring eye.

NOTE – APPROVED COMPOUNDS ARE:

1. PERMABOUND HM160

2. LOCTITE RC/680

LOCTITE RC/680 IS PREFERRED

Apply 1/4– 1/2" ring of bonding agent to top edge of eye I.D. (Figure 27, Items 1 and 3), as shown, before installing bushing.

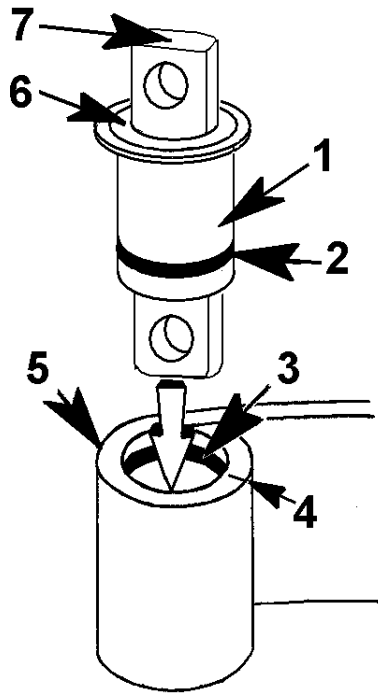


Figure 27 Bonded Bushings

1. PRESSED BUSHING
2. BONDING AGENT
3. THREADED BUSHINGS
4. BONDING AGENT
5. TAPERED LEAF SPRING END
6. BUSHING FLANGE
7. BUSHING MOUNTING ENDS

NOTE: Unless otherwise specified, minimum push out force after 24 hours cure is 6750 lbs. for threaded bushings and 4000 lbs. for all other bushings.

Bushing must be clean and free of oil and grease prior to installation.

After bushing installation, residual bonding agent must be removed.

7.6. U-BOLTS

NOTE – When tightening spring U-bolts, torque rod fasteners and other related mounting fasteners to specifications, the vehicle must be at proper ride height to avoid introducing unnecessary stress on the bushings. Refer to the **TORQUE CHART** for specified torque values.

1. Inspect the U-bolt threads and U-bolt nuts for rust and debris and clean the threads if contaminated.
2. Install the U-bolts and nuts and torque the nuts to 15 lbf-ft, using a diagonal pattern.
3. Re-torque the nuts to 100 lbf-ft, using a diagonal pattern.

4. Re-torque the nuts to 200 lbf-ft, using a diagonal pattern.
5. Re-torque the nuts to 300 lbf-ft, using a diagonal pattern.
6. Re-torque the nuts to 425 lbf-ft, using a diagonal pattern.
7. Use the same diagonal pattern with each U-bolt nut re-torque.

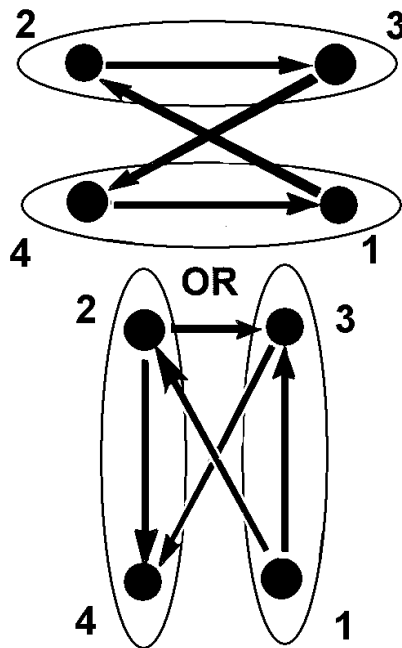


Figure 28 U-Bolt Torque Patterns

8. CHECKING U-BOLT NUT TORQUE AND U-BOLT NUT TIGHTENING PROCEDURE

1. Inspect the U-bolt threads and U-bolt nuts for rust and debris and clean threads if contaminated.
2. Using a torque wrench determine the torque required to turn the U-bolt nuts while tightening (clockwise rotation)
3. Using the lowest nut torque discovered as the reference starting point, re-tighten the nuts using the sequence noted in "Installing U-bolts and U-Bolt nuts".

9. SUSPENSION DUMP FEATURE

The suspension dump system is only available on the 3200 bus chassis. This feature pertains only to vehicles equipped with the 14899 feature code. This feature is not available on any other bus models.

9.1. DESCRIPTION

The Suspension Dump Feature controls permit the driver to deflate the air springs from the driver position. This operation is done by a solenoid switch in the 3200 series bus chassis located in the center dash panel.

To dump the air from the springs, place the switch in the dump position by pushing the lower section of the switch assembly

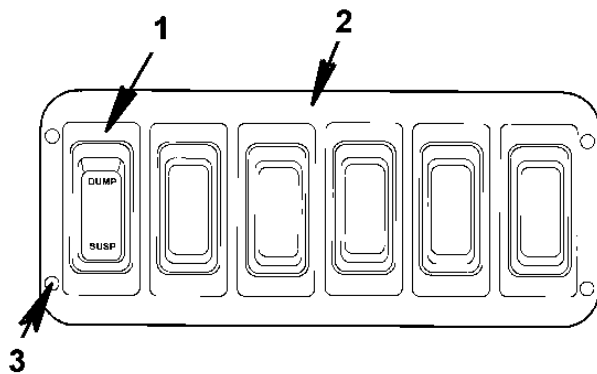


Figure 29 Suspension Dump Feature Switch Panel

1. SUSPENSION DUMP SWITCH
2. SUSPENSION SWITCH PANEL
3. SWITCH PANEL MOUNTING SCREWS

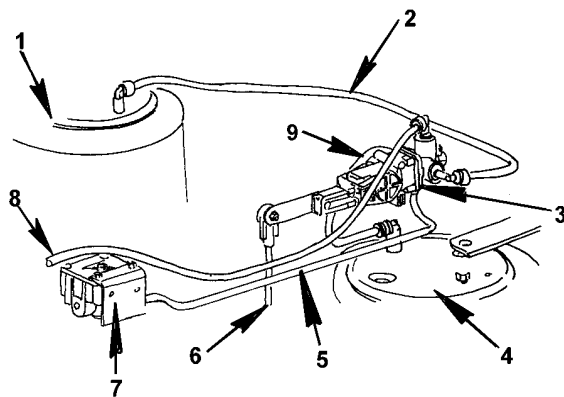


Figure 30 Suspension Dump Feature Air Plumbing

1. PASSENGER SIDE AIR SPRING ASSEMBLY
2. PASSENGER SIDE AIR SPRING SUPPLY LINE
3. HEIGHT CONTROL VALVE
4. DRIVER SIDE AIR SPRING ASSEMBLY
5. DUMP FEATURE SOLENOID
6. HEIGHT CONTROL ROD
7. AIR SUSPENSION DUMP SOLENOID
8. AIR SUSPENSION SUPPLY LINE FROM CHASSIS AIR TANK
9. DRIVER SIDE AIR SPRING SUPPLY LINE

9.2. SUSPENSION DUMP FEATURE OPERATION

With the “Suspension Dump Feature” the air piping for the system includes an air switch (Figure 29 and 30).

1. The control valve in the switch panel has two positions. In the on position the valve is closed. Placing the valve in the Dump position opens the valve and sends air pressure to the leveling valve.
2. The air supply to the height control valve, air comes from the pressure protection valve. Air is delivered from the height control valve which distributes air to the tight and left air spring.
 - a. Placing the Suspension Dump Feature in the Dump position directs air to the valve causing it to stop the air supply to the air springs and dumps the air from the air springs.
 - b. Placing the Suspension Dump Feature back to the run position returns air spring control to the height control valve and the air springs will inflate until the vehicle is at ride height.
 - c. The air suspension dump valve must always be in the run position.

TORQUE

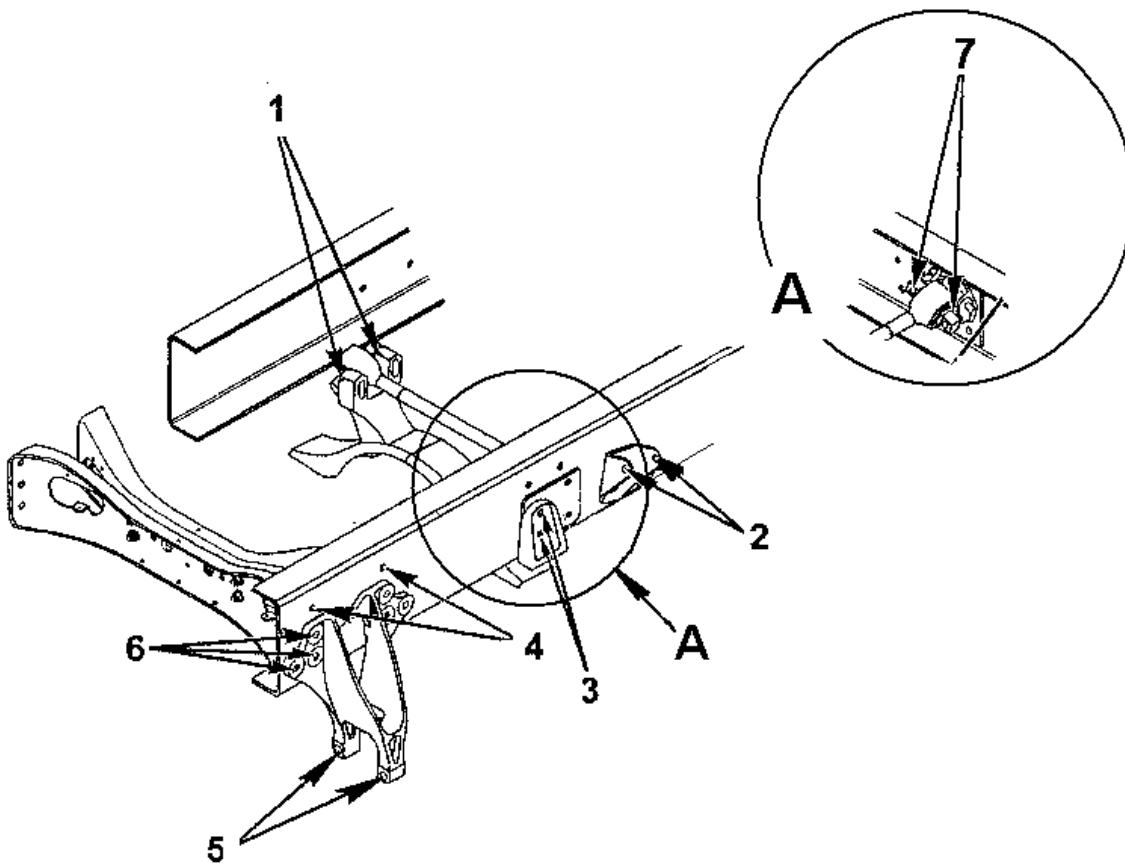


Figure 31 Torque Locations

1. TRANSVERSE TORQUE ROD AXLE MOUNTING
2. AIR SPRING MOUNTING BRACKET
3. AXLE STOP
4. CROSSMEMBER MOUNTING BOLTS
5. TAPERED LEAF FRONT MOUNTING WITH BUSHING
6. MAIN SUPPORT MEMBER FRONT MOUNTING BRACKET
7. TRANSVERSE TORQUE ROD FRAME MOUNTING

Table 2 Torque Chart

Figure #	Item #	Description	Lbf-ft	N•m
9	7	U-Bolt Lock Nuts	400–450	542–610
17	1	3/4 Inch Nut (grade 8/ grade 10.9) Axle Stop	300–370	407–501
17	6	Air Spring Mounting Bolts and Nuts — M12 STUD	40–60	54–81
18	2	3/4" Stud On Air Spring M12–Stud	45–50	61–68
20 and 21	2	Shock Absorber Bolts and Nuts	100–130	135–176
31	2, 6	M20 Flange Bolt Stud Nut (grade 8/ grade 10.9)	369–461	500–625
31	1, 7	Torque Rod Nuts For 9.25 Ride Ht.	200–240	271–325
31	4	5/8" or M16 Flange Bolt (grade 8/ grade 10.9)	200–240	271–325