SECTION 16: SUSPENSION

CONTENTS

ILLUSTRATIONS

1. DESCRIPTION

The vehicle is provided with an air suspension system. The system consists of air springs, height control valves, radius rods, sway bars, tripod and shock absorbers. The system operation is fully automatic and maintains a constant vehicle height regardless of load, or load distribution.

The vehicle is also equipped with this system:

- Front Kneeling;

2. I-BEAM AXLE FRONT SUSPENSION

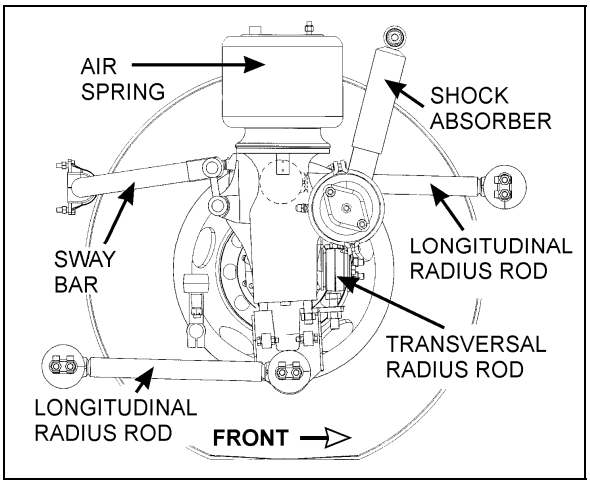


FIGURE 1: FRONT SUSPENSION COMPONENTS 16096

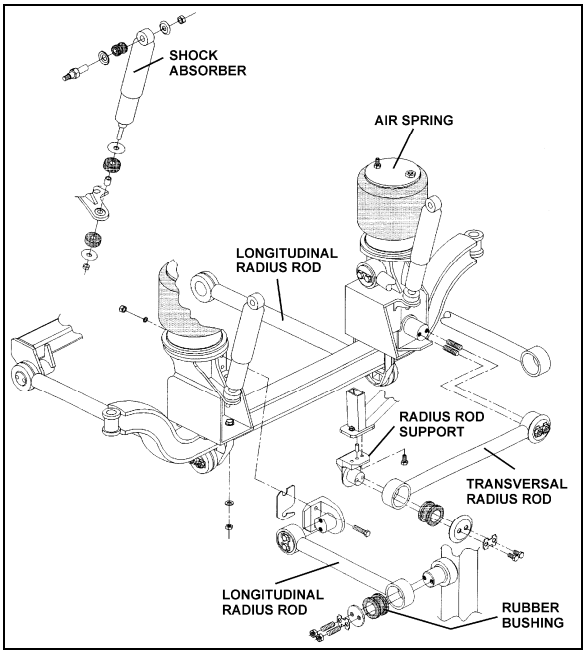


FIGURE 2: DETAILS OF FRONT SUSPENSION 16110

2.1 AIR SPRINGS

The air springs are made from a special compound rubber molded to the proper contour and dimensions. The entire vertical load of the vehicle is supported by these springs. The I-beam front axle is provided with air springs that are attached to the subframe and to the axle (Fig. 3).

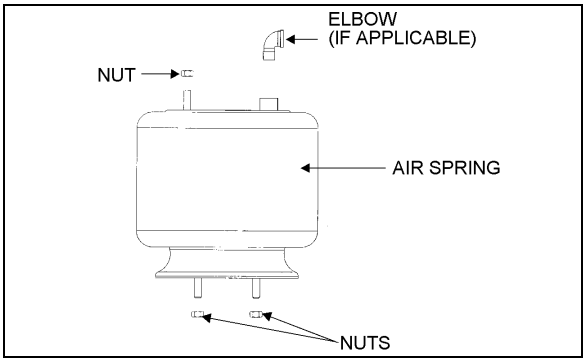


FIGURE 3: AIR SPRING 16052

2.1.1 Inspection

1. Check operation of bellows.
2. Visually inspect bellows for evidence of cracks, punctures, deterioration, or chafing. Replace the bellows if any damage is evident.

MAINTENANCE

Inspect air bellows every 6,250 miles (10 000 km) or twice a year whichever comes first.

3. With the primary air system at normal operating pressure (95 - 125 psi (655 - 860 kPa)), coat all suspension air line connections and bellows mounting areas with a water and soap solution. Bubbles will indicate an air leak, and none is permissible. Repair or replace defective parts.

NOTE

If air spring is removed from vehicle, bellows can be lightly inflated and submerged in water to detect any leakage. If any leakage is detected, replace bellows.

WARNING

To prevent personal injury, do not apply more than 10 psi (69 kPa) of air pressure to the uninstalled air spring.

2.1.2 Removal

NOTE

Front suspension air springs can be removed without removing the entire axle assembly.

1. Safely support vehicle at the recommended body jacking points. To gain access to a given air spring, the corresponding wheel can be removed as follows.
   a) Jack vehicle until the tire clears the ground, and place safety supports underneath body.

CAUTION

Only the recommended jacking points must be used as outlined in Section 18, “Body”.

   b) Support the axle with a suitable hydraulic floor jack at the recommended jacking point.
   c) Remove wheel.
2. Exhaust compressed air from accessory air tank by opening drain cock under reservoir.
3. Disconnect the height control valve link and pull down the overtravel lever to ensure all air is exhausted from air springs.

NOTE

While performing this step, do not change the height control valve overtravel lever adjustment.

4. Disconnect air line from air spring, remove elbow (if applicable), and cover both the line end and fitting to prevent the entry of foreign matter.
5. Remove the air spring upper nut, and then the two lower nuts. Remove air spring.

2.1.3 Installation

1. Compress air spring as necessary, then aligning studs with their holes, position air spring between both the lower and upper supports. Thread the lower nuts and the small upper nut a few turns.

NOTE

To facilitate air spring installation, compress it manually then put a piece of tape over the air line threaded fitting. This prevents air from getting back into the bag and keeps it compressed, thus enabling to place the bag in between the mounting plates and greatly easing installation.

2. Tighten the lower stud nuts, and then the upper one to appropriate torque (see Torque Table 1).
3. Thread the remaining upper nut (large nut) and tighten to appropriate torque (see Torque Table 1).
4. Install elbow (if applicable), then connect air line.
5. Connect the height control valve link.
6. Build up air pressure in system.

NOTE

To accelerate this operation, air reservoirs can be filled from an exterior air supply connected to the accessory tank fill valve or to the emergency fill valve.

7. Check operation of bellows, and with the primary air system at normal operating pressure (95 – 125 psi (655 – 860 kPa)), coat the air line connections and air spring mounting areas with a water and soap solution. Bubbles will indicate an air leak, and none is permissible. Repair or replace defective parts.
8. Reinstall wheel.
9. Remove the hydraulic floor jack from under the axle, then lower vehicle to ground.

2.2 SHOCK ABSORBERS

Double-action, telescoping-type shock absorbers ensure a smooth ride and enhance vehicle stability on the road. The front axle is provided with two shock absorbers (Fig. 1, 2, and 4).

Shock absorbers are non-adjustable and non-repairable. Maintenance requirements involve replacement of the rubber mounting bushings, and tightening of all shock absorber pins at the proper torque (see Torque Table 1) when shock

absorber replacement occurs. If a shock absorber becomes inoperative, complete unit must be replaced.

> **CAUTION**
>
> When a shock absorber is found defective, always replace with a new set on affected axle, except if there has been a recent replacement of one unit. The following method will help in determining if both shock absorbers on the same axle have to be replaced.

2.2.1 Inspection

Loosen lower mounting of both shocks, and then carefully attempt to raise and lower the bottom portion of each shock. Note the rate of effort for distance of travel. Replace both shocks if a definite differential rate is found.

The shock must be bench checked in an upright, vertical position. If checked in any other position, air will enter the cylinder tube and make the shock absorber appear defective.

Proceed as follows to check shock absorbers:

1. With the shock absorber in a vertical position (top end up), clamp the bottom mount in a vise.

> **CAUTION**
>
> Do not clamp the reservoir tube or the dust tube.

2. Rotate the dust tube. Notice any binding condition (may be compared with new unit). Binding condition indicates a scored rod. Units with scored rods should be replaced.
3. Fully extend shocks and check for leaks in the seal cover area. Shock fluid is a very thin hydraulic fluid that has a characteristic odor and dark brown tint. A slight trace of shock fluid around the seal cover area is not a cause for replacement. The shock seal is designed to permit a very slight seepage to lubricate the rod. Units that leak should be replaced.
4. Visually check shock for dents that could cause the shock to bind. Also, check for a bent rod.
5. Extend and collapse shock several times to determine that it has control (resistance) in both rebound and compression.
6. Visually inspect the shock mountings and vehicle mounting for:
   a. Broken mounts;
   b. Extreme bushing wear;
   c. Shifted bushing or sleeve;
   d. Deep cracks in bushing material (shallow surface cracks are normal);
   e. Loose shock absorber pins;
   f. Presence of convex washers, and their position relative to the rubber bushing.

2.2.2 Removal

1. Remove nuts and washers from shock absorbers on upper and lower mounting pins, taking care to identify the inner and outer washers to ease reinstallation. Refer to figure 4 for details.
2. Remove the shock absorber assembly from pins.
3. Remove the inner bushings from the shock absorber and discard.

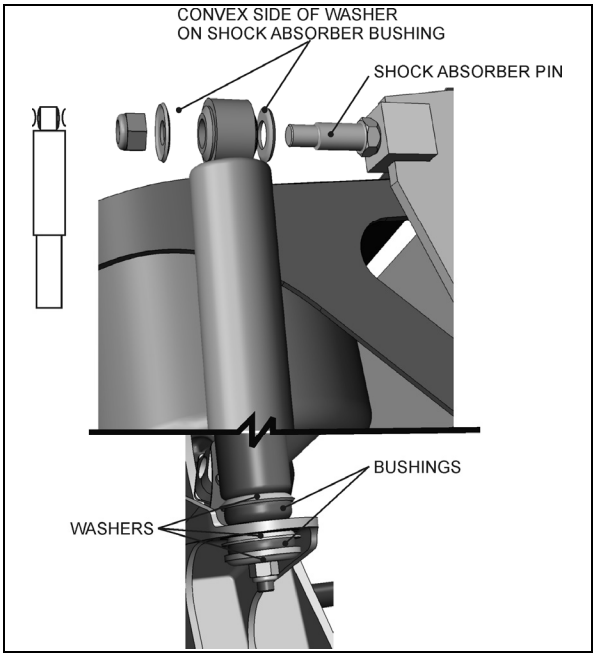


FIGURE 4: SHOCK ABSORBER 16008

2.2.3 Installation

1. Ensure that the shock absorber mounting pins are tight and that the threads are not stripped.
2. Install new rubber mounting bushings on shock absorbers (upper and lower).
3. Place the inner washer (with washer convex side leaning on the shock absorber rubber bushing).
4. Install the shock absorber eyes over the mounting pins, then the outer washers (with washer convex side leaning on the shock absorber rubber bushing) on each shock extremity.

NOTE
If shock absorber pins are removed, they must be reinstalled using "Loctite" (see "Parts Specifications" in this section).

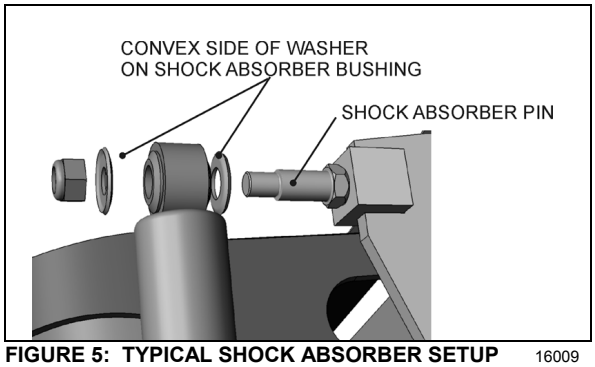


FIGURE 5: TYPICAL SHOCK ABSORBER SETUP 16009

5. Place the lower and upper mounting pin stud nuts and tighten to appropriate torque (see Torque Table 1).

2.3 RADIUS RODS

Radius rods are used to secure the axles in the proper transversal and longitudinal positions. Five radius rods are provided on the front axle suspension (four longitudinal and one transversal).

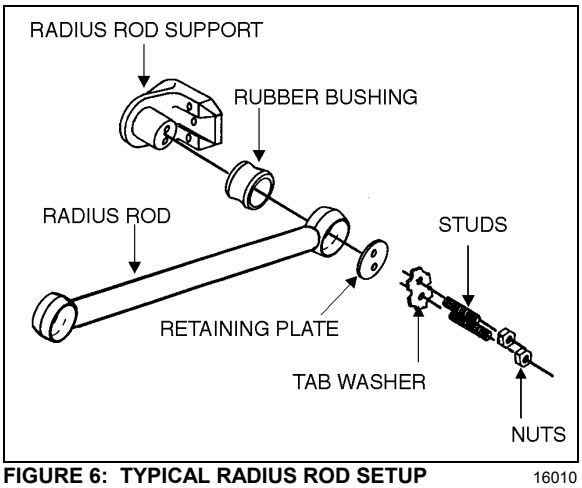


FIGURE 6: TYPICAL RADIUS ROD SETUP 16010

Refer to figures 1, 2 and 6 for details. These rods transmit both braking and driving forces from the axles to the vehicle body.

2.3.1 Radius Rod Inspection

The following instructions apply to all radius rods used on this vehicle:

1. Clean all parts thoroughly.
2. Inspect radius rods for distortion and cracks. We recommend the "Magnaflux" process to detect cracks in the radius rod. Any damaged part should be replaced with a new one.

NOTE
New bushings should be used when rods are replaced.

3. The radius rod bushings should be checked periodically for signs of shearing, deterioration, or damage. Any defective part should be replaced with a new one.

2.3.2 Radius Rod Removal

1. Flatten the tab washer which secures the two retaining nuts (or bolts), then unscrew the nuts (or bolts) at each extremity of the radius rod (Fig. 6).
2. Remove the tab washer and the retaining plates and radius rod ends from anchor pins, and then remove the radius rod.

2.3.3 Bushing removal

1. Safely support the radius rod as shown in figure 7.

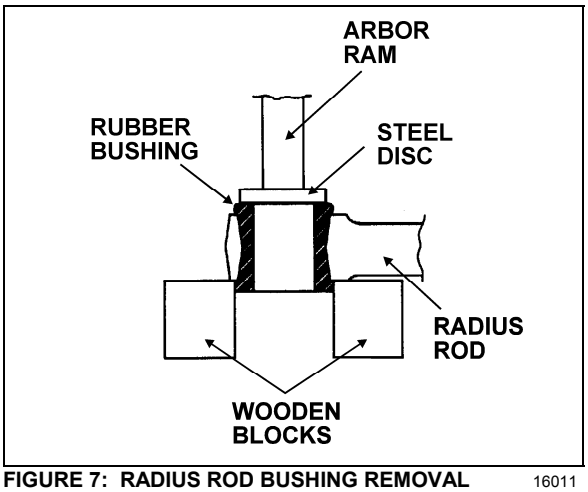


FIGURE 7: RADIUS ROD BUSHING REMOVAL 16011

2. Place a flat steel disc, slightly smaller than the outside diameter of the bushing (Fig. 7).
3. Using an arbor press or a suitable driving tool, press or drive the old bushing out of the rod and discard the bushing.

> **CAUTION**
>
> Make sure to prevent the steel disc from contacting the radius rod end.

2.3.4 Bushing installation

1. Lightly spray the inner and outer surfaces of radius rod bushing with water.

> **CAUTION**
>
> No lubricant whatsoever is to be used on the rubber bushing.

2. Safely support the radius rod, and place new bushing on top of the radius rod end (Fig. 8).
3. Place a block of wood on top of bushing and press on it manually.
4. If necessary, use an arbor press or a suitable driving tool. Press or drive the bushing into the radius rod end until it extends equally on both sides of the rod.
5. It is also possible to proceed differently. Place radius rod bushing on a plane surface. Spray a light coat of water on the inner and outer surfaces of radius rod bushing.
6. Take radius rod, align the bushing. Tap radius rod on bushing until latter is positioned correctly.

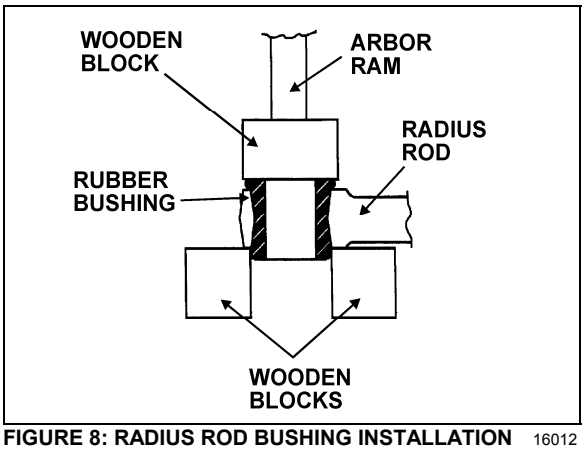


FIGURE 8: RADIUS ROD BUSHING INSTALLATION 16012

2.3.5 Radius Rod Installation

1. Lightly spray the radius rod support with water. Place the radius rod end over the radius rod support (Fig. 9).
2. Position the retaining plate. Install the tab washer and nuts (or bolts).

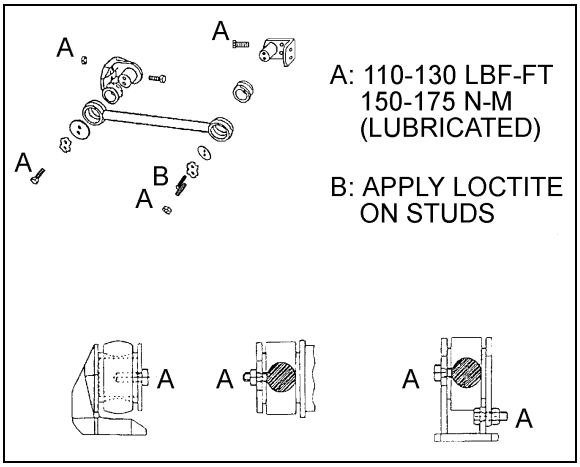


FIGURE 9: RADIUS ROD INSTALLATION 16028

> **CAUTION**
>
> Always use new tab washers at installation.

3. Tighten the nuts (or bolts) lightly, and repeat at the other end.
4. Refer to heading *"Suspension Height Adjustment"* later in this section, and set the vehicle to normal ride height.
5. With the vehicle at normal ride height, apply oil on threads and tighten all radius rod anchor pin nuts or bolts to appropriate torque (see Torque Table 1).

⚠ CAUTION

It is extremely important upon reconnection of the rods that the proper clearance height between the axle and body be maintained. Otherwise, the rubber bushings in radius rod ends will become preloaded, thus reducing their life span.

2.4 SWAY BAR

A sway bar is provided on the front axle to increase vehicle stability. It controls lateral motion (swaying movement) of the vehicle (Fig. 10).

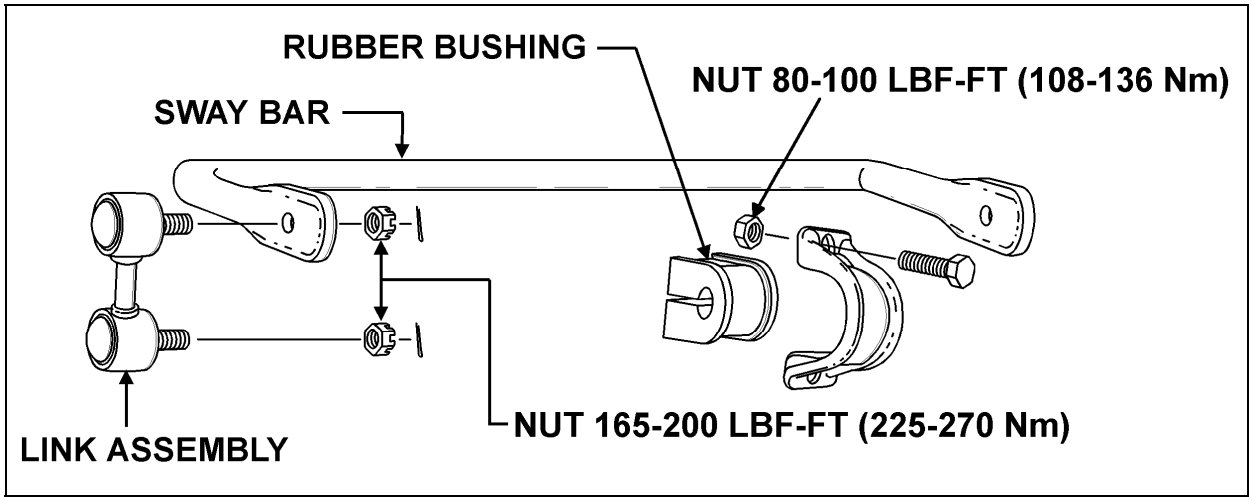


FIGURE 10: I-BEAM FRONT AXLE SWAY BAR 16099

2.4.1 Removal

1. Disconnect the two links from sway bar.
2. Safely support the sway bar. Unbolt the four bushing collars from subframe.
3. Remove sway bar.

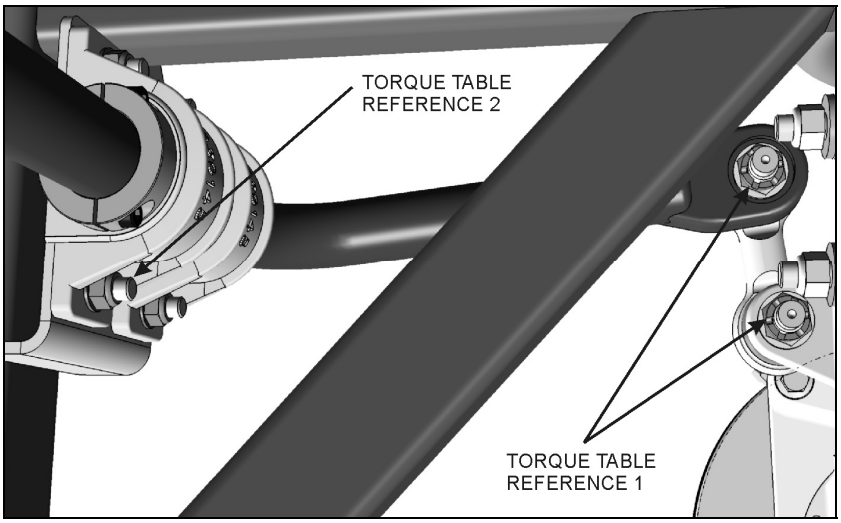
NOTE

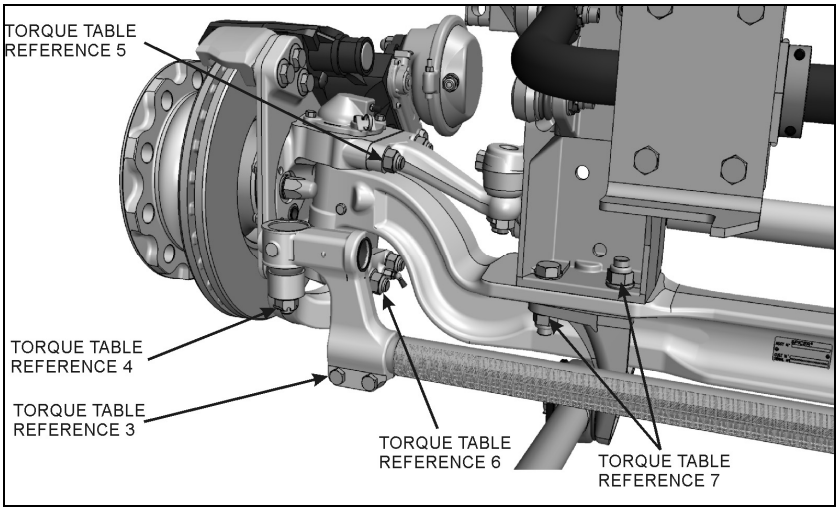
Sway bar bushings are slitted to ease their removal.

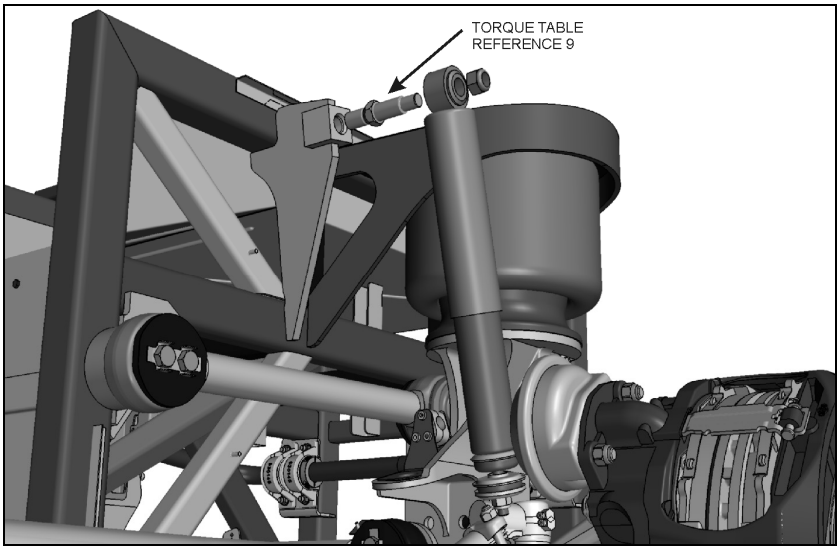
2.4.2 Installation

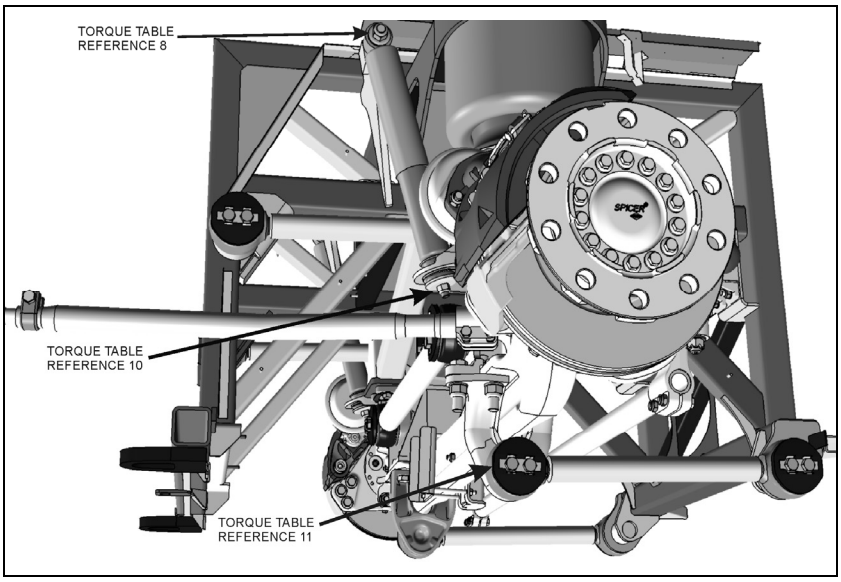
1. Loosely install the sway bar.
2. Tighten the eight bushing collar nuts to appropriate torque (see Torque Table 1).
3. Install two sway bar link upper and lower nuts and tighten to appropriate torque (see Torque Table 1).
4. Install a cotter pin on each nut and bend.

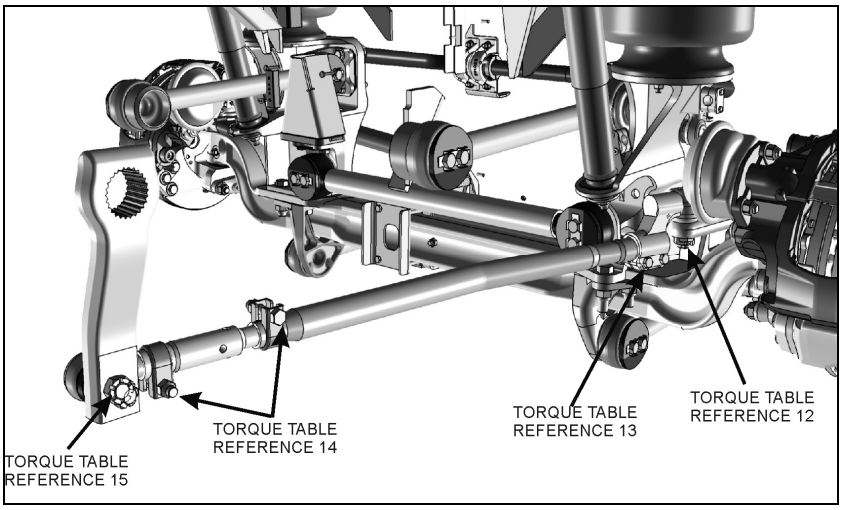
2.5 TORQUE SPECIFICATIONS








TORQUE TABLE
REFERENCE 8
TORQUE TABLE
REFERENCE 10
TORQUE TABLE
REFERENCE 11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TORQUE TABLE
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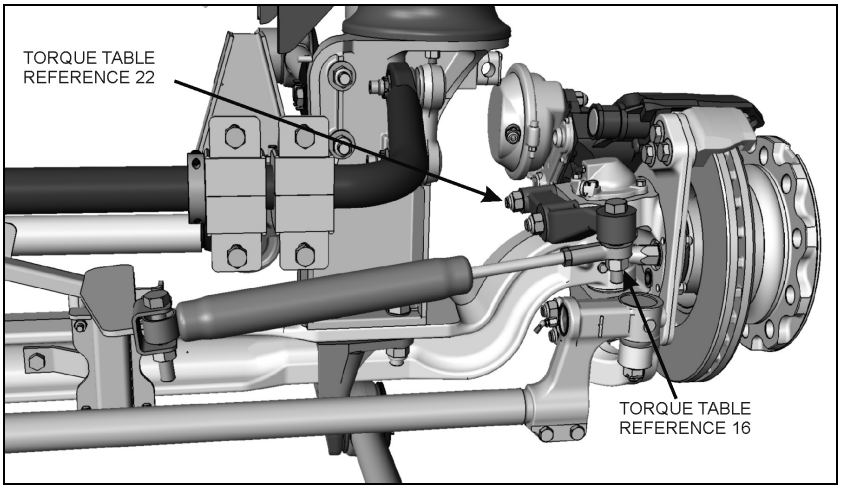
TORQUE TABLE
REFERENCE 13
TORQUE TABLE
REFERENCE 12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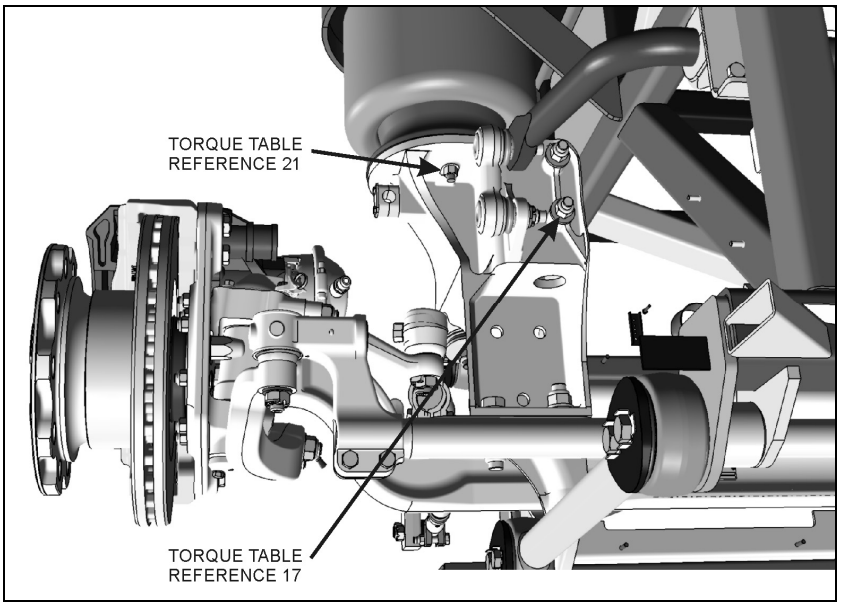
REFERENCE 16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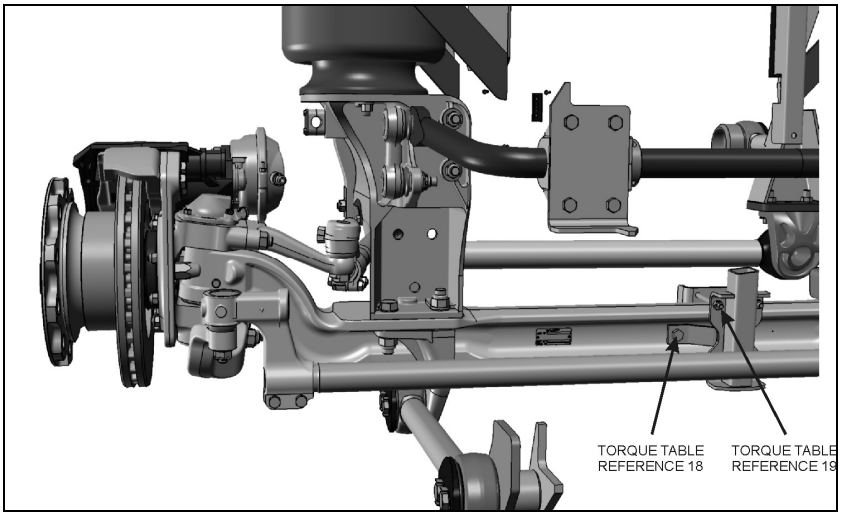
TORQUE TABLE
REFERENCE 17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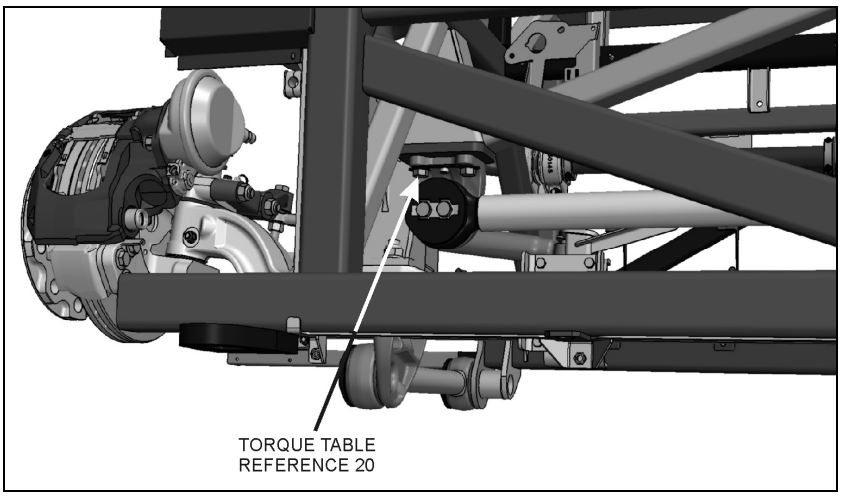
REFERENCE 19


TORQUE TABLE
REFERENCE 20

TORQUE TABLE 1 – FRONT AXLE SUSPENSION & STEERING				
DESCRIPTION	***QTY***	***REFERENCE***	***TORQUE DRY*** *(lbf-ft / Nm)*	
SWAY BAR LINK UPPER AND LOWER NUTS	*4*	*1*	*165-200*	*224-271*
SWAY BAR BUSHING COLLAR (FRONT SUSPENSION)	*8*	*2*	*80-100*	*108-136*
TIE ROD END CLAMP PINCH BOLT	*4*	*3*	*65-75*	*88-102*
TIE ROD END BALL PIN NUT	*2*	*4*	*150-200*	*203-271*
STEERING ARM STUD NUT	*2*	*5*	*520-575*	*705-780*
TIE ROD ARM STUD NUT	*4*	*6*	*520-575*	*705-780*
I-BEAM AXLE MOUNT	*8*	*7*	*230-280*	*311-378*
SHOCK ABSORBER UPPER MOUNTING PIN STUD NUT	*2*	*8*	*99-121*	*134-164*
SHOCK ABSORBER PIN	*2*	*9*	*350-400*	*475-545*
SHOCK ABSORBER LOWER MOUNTING PIN NUT	*2*	*10*	*60-75*	*81-102*
RADIUS ROD RETAINING BOLT	*20*	*11*	*140-155*	*190-210*
DRAG LINK BALL PIN NUT	*1*	*12*	*150-200*	*203-271*
DRAG LINK CLAMP BOLT NUT	*2*	*13*	*65-75*	*88-102*
DRAG LINK SOCKET END CLAMP PINCH BOLT	*2*	*14*	*50-60*	*68-81*
DRAG LINK TO PITMAN ARM STUD NUT	*1*	*15*	*150-200*	*203-271*
STEERING DAMPER	*2*	*16*	*100-120*	*135-160*
RADIUS ROD SUPPORT	*4*	*17*	*228-252*	*309-342*
STEERING DAMPER BRACKET	*1*	*18*	*39-45*	*53-61*
STEERING DAMPER BRACKET	*4*	*19*	*30-36*	*41-49*
RADIUS ROD SUPPORT	*2*	*20*	*200-220*	*271-298*
AIR SPRING NUT	*6*	*21*	*31-38*	*42-52*
STEERING DAMPER ARM NUTS	*2*	*22*	*285-315*	*386-427*

3. REAR SUSPENSION

For a description of all these systems, refer to the appropriate heading in this section.

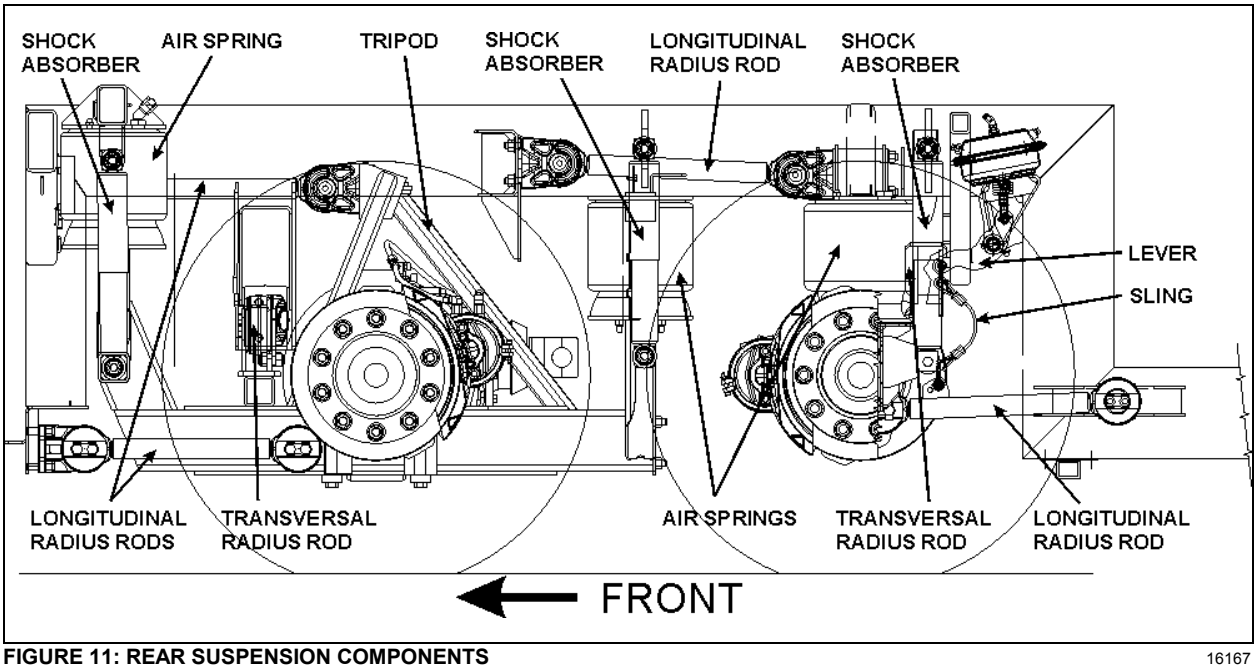


FIGURE 11: REAR SUSPENSION COMPONENTS 16167

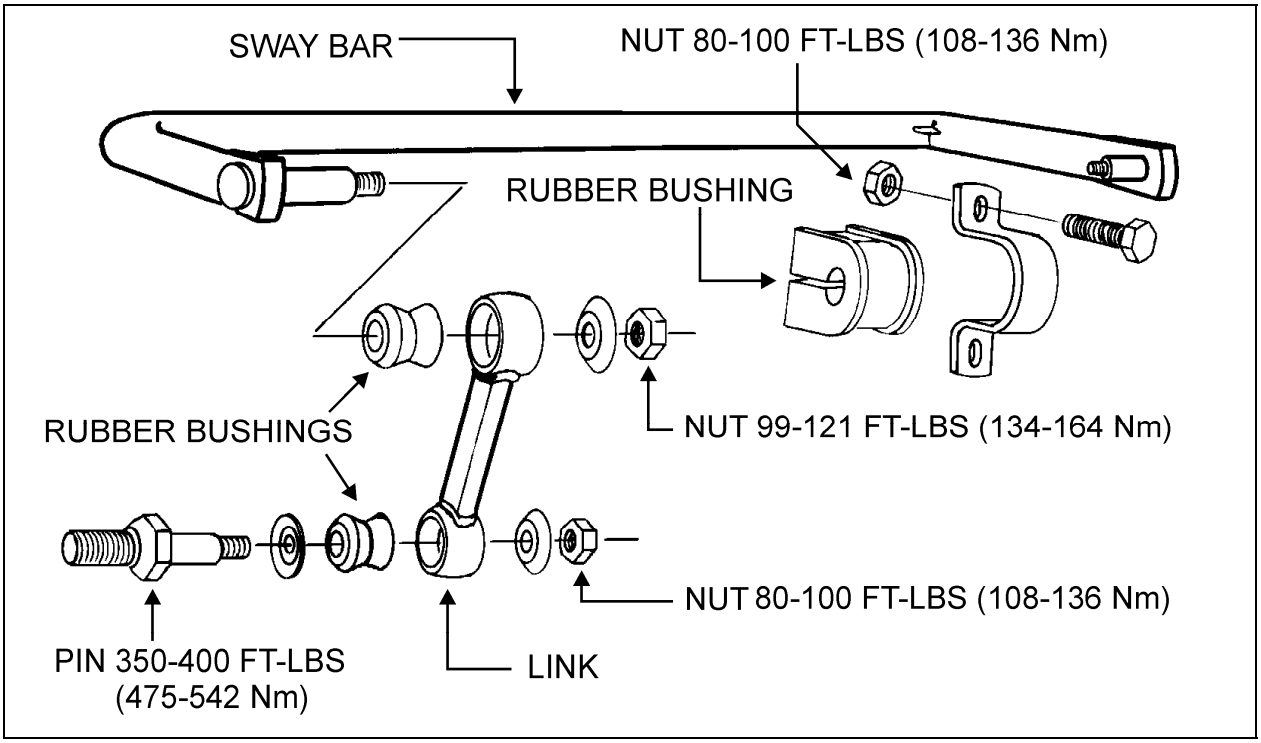


FIGURE 12: SWAY BAR (REAR SUSPENSION) 16144

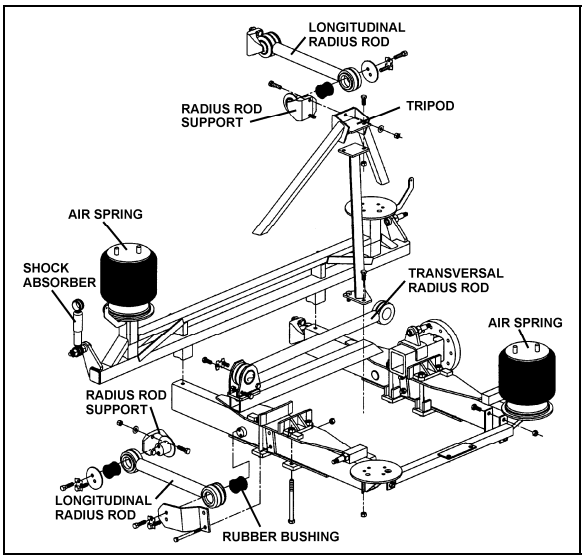


FIGURE 13: REAR UNDERFRAME SUSPENSION 16106

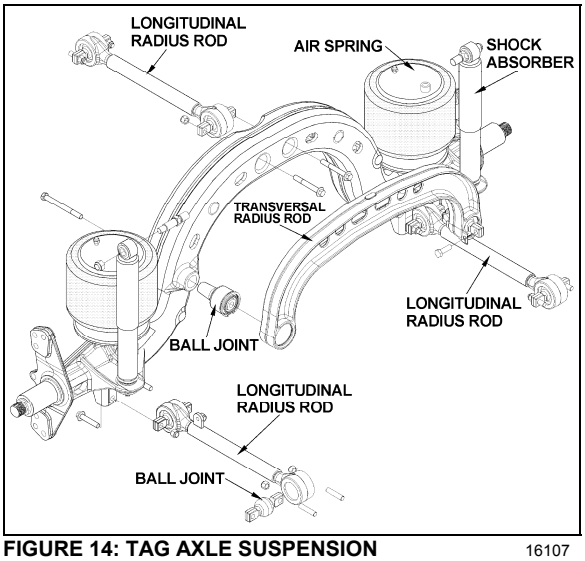


FIGURE 14: TAG AXLE SUSPENSION 16107

3.1 AIR SPRINGS

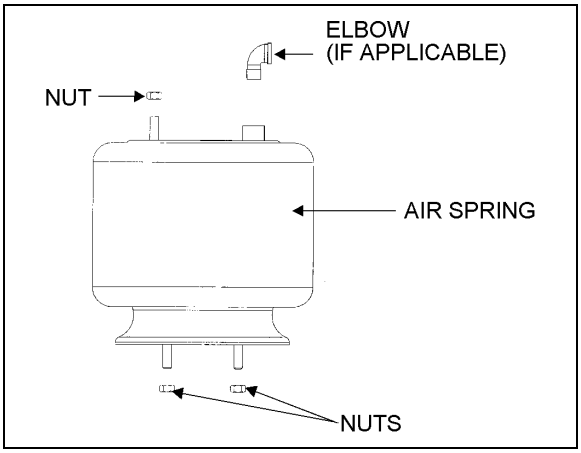


FIGURE 15: AIR SPRING 16052

The air springs are made from a special compound rubber molded to the proper contour and dimensions. The entire vertical load of the vehicle is supported by these springs. Each of the two axles is provided with air springs that are attached to the subframe and to the axles (Fig. 41).

3.1.1 Inspection

1. Check operation of bellows.
2. Visually inspect bellows for evidence of cracks, punctures, deterioration, or chafing. Replace the bellows if any damage is evident.

MAINTENANCE

Inspect air bellows every 6,250 miles (10 000 km) or twice a year whichever comes first.

3. With the primary air system at normal operating pressure (95 - 125 psi (655 - 860 kPa)), coat all suspension air line connections and bellows mounting areas with a water and soap solution. Bubbles will indicate an air leak, and none is permissible. Repair or replace defective parts.

NOTE

If air spring is removed from vehicle, bellows can be lightly inflated and submerged in water to detect any leakage. If any leakage is detected, replace bellows.

WARNING

To prevent personal injury, do not apply more than 10 psi (69 kPa) of air pressure to the uninstalled air spring.

3.1.2 Removal

NOTE

Suspension air springs (drive and tag axles) can be removed without removing the entire axle assembly.

1. Safely support vehicle at the recommended body jacking points. To gain access to a given air spring, the corresponding wheel can be removed as follows.

a) Jack vehicle until the tire clears the ground, and place safety supports underneath body.

CAUTION

Only the recommended jacking points must be used as outlined in Section 18, “Body”.

b) Support the axle with a suitable hydraulic floor jack at the recommended jacking point.

c) Remove wheel.

2. Exhaust compressed air from accessory air tank by opening drain cock under reservoir.
3. Disconnect the height control valve link and pull down the overtravel lever to ensure all air is exhausted from air springs.

NOTE

While performing this step, do not change the height control valve overtravel lever adjustment.

4. Disconnect air line from air spring, remove elbow (if applicable), and cover both the line end and fitting to prevent the entry of foreign matter.
5. Remove the air spring upper nut, and then the two lower nuts. Remove air spring.

3.1.3 Installation

1. Compress air spring as necessary, then aligning studs with their holes, position air spring between both the lower and upper supports. Thread the lower nuts and the small upper nut a few turns.

NOTE

To facilitate air spring installation, compress it manually then put a piece of tape over the air line threaded fitting. This prevents air from getting back into the bag and keeps it compressed, thus enabling to place the bag in between the mounting plates and greatly easing installation.

2. Tighten and torque the lower stud nuts, and then the upper one to 20–25 lbf-ft (27–34 Nm).
3. Screw on the remaining upper nut (large nut) and tighten to 20–25 lbf-ft (27–34 Nm).
4. Install elbow (if applicable), then connect air line.
5. Connect the height control valve link.
6. Build up air pressure in system.

NOTE

To accelerate this operation, air reservoirs can be filled from an exterior air supply connected to the accessory tank fill valve or to the emergency fill valve.

7. Check operation of bellows, and with the primary air system at normal operating pressure (95 – 125 psi (655 – 860 kPa)), coat the air line connections and air spring mounting areas with a water and soap solution. Bubbles will indicate an air leak, and none is permissible. Repair or replace defective parts.
8. Reinstall wheel.
9. Remove the hydraulic floor jack from under the axle, then lower vehicle to ground.

3.2 SHOCK ABSORBERS

Double-action, telescoping-type shock absorbers ensure a smooth ride and enhance vehicle stability on the road. All shock absorbers are eye-type mountings. The tag axle is provided with two shock absorbers while the drive axle is provided with four of them (Fig. 13, 14 and 16).

Shock absorbers are non-adjustable and non-repairable. Maintenance requirements involve replacement of the rubber mounting bushings, and tightening of all shock absorber pins at the proper torque of 500 - 550 lbf-ft (680 - 750 Nm) when shock absorber replacement occurs. If a shock absorber becomes inoperative, complete unit must be replaced.

CAUTION

When a shock absorber is found defective, always replace with a new set on affected axle, except if there has been a recent replacement of one unit. The following method will help in determining if both shock absorbers on the same axle have to be replaced.

3.2.1 Inspection

Loosen lower mounting of both shocks, and then carefully attempt to raise and lower the bottom portion of each shock. Note the rate of effort for distance of travel. Replace both shocks if a definite differential rate is found.

The shock must be bench checked in an upright, vertical position. If checked in any other position, air will enter the cylinder tube and make the shock absorber appear defective.

Proceed as follows to check shock absorbers:

1. With the shock absorber in a vertical position (top end up), clamp the bottom mount in a vise.

⚠ CAUTION

Do not clamp the reservoir tube or the dust tube.

2. Rotate the dust tube. Notice any binding condition (may be compared with new unit). Binding condition indicates a scored rod. Units with scored rods should be replaced.
3. Fully extend shocks and check for leaks in the seal cover area. Shock fluid is a very thin hydraulic fluid that has a characteristic odor and dark brown tint. A slight trace of shock fluid around the seal cover area is not a cause for replacement. The shock seal is designed to permit a very slight seepage to lubricate the rod. Units that leak should be replaced.
4. Visually check shock for dents that could cause the shock to bind. Also, check for a bent rod.
5. Extend and collapse shock several times to determine that it has control (resistance) in both rebound and compression.
6. Visually inspect the shock mountings and vehicle mounting for:
   a) Broken mounts;
   b) Extreme bushing wear;
   c) Shifted bushing or sleeve;
   d) Deep cracks in bushing material (shallow surface cracks are normal);
   e) Loose shock absorber pins;
   f) Presence of convex washers, and their position relative to the rubber bushing.

3.2.2 Removal

1. Remove nuts and washers from shock absorbers on upper and lower mounting pins, taking care to identify the inner and outer washers to ease reinstallation. Refer to figure 16 for details.
2. Remove the shock absorber assembly from pins.
3. Remove the two inner bushings from the shock absorber and discard them.

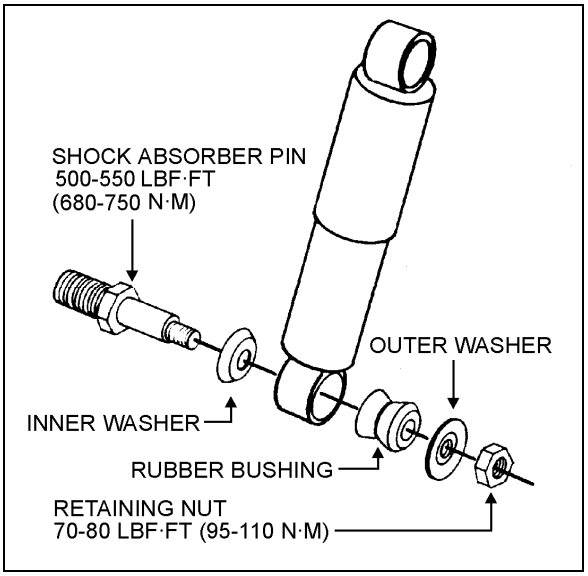


FIGURE 16: SHOCK ABSORBER 16008

3.2.3 Installation

1. Ensure that the shock absorber mounting pins are tight and that the threads are not stripped.
2. Install new rubber mounting bushings on shock absorbers (upper and lower).
3. Place the inner washers (with washer convex side facing the shock absorber rubber bushing) on each shock absorber pin (Fig. 16).
4. Install the shock absorber eyes over the mounting pins, then the outer washers (with washer convex side facing the shock absorber rubber bushing) on each shock extremity.

NOTE

If shock absorber pins are removed, they must be reinstalled using "loctite" (see "Parts Specifications" in this section).

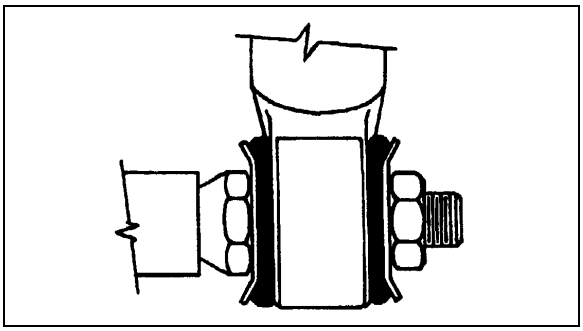


FIGURE 17: TYPICAL SHOCK ABSORBER SETUP 16009

5. Place the lower and upper mounting pin stud nuts and torque to 70 - 80 lbf-ft (95 – 110 Nm).

3.3 RADIUS RODS

Radius rods are used to secure the axles in the proper transversal and longitudinal positions. Four radius rods are provided on the drive axle suspension (three longitudinal and one transversal) and also four on the tag axle with a layout similar to the drive axle. Refer to figures 13, 14 and 18 for details. These rods transmit both braking and driving forces from the axles to the vehicle body.

3.3.1 Rear Underframe Suspension

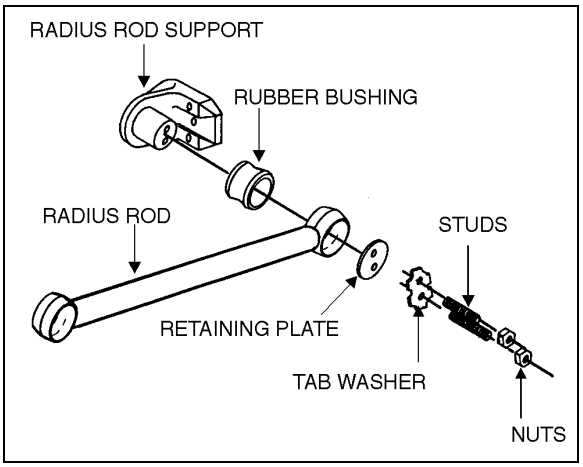


FIGURE 18: TYPICAL RADIUS ROD SETUP 16010

Radius Rod Inspection

The following instructions apply to the radius rods used on the rear underframe suspension:

1. Clean all parts thoroughly.
2. Inspect radius rods for distortion and cracks. We recommend the “Magnaflux” process to detect cracks in the radius rod. Any damaged part should be replaced with a new one.

NOTE
New bushings should be used when rods are replaced.

3. The radius rod bushings should be checked periodically for signs of shearing, deterioration, or damage. Any defective part should be replaced with a new one.

Radius Rod Removal

1. Flatten the tab washer which secures the two retaining nuts (or bolts), then unscrew the nuts (or bolts) at each extremity of the radius rod (Fig. 19).
2. Remove the tab washer and the retaining plates and radius rod ends from anchor pins, and then remove the radius rod.

Bushing removal

1. Safely support the radius rod as shown in figure 19.

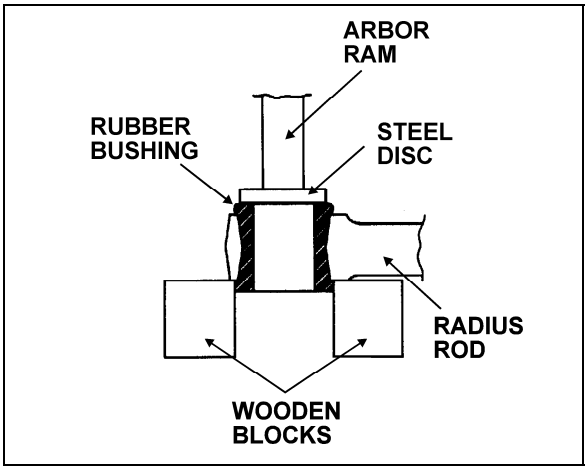


FIGURE 19: RADIUS ROD BUSHING REMOVAL 16011

2. Place a flat steel disc, slightly smaller than the outside diameter of the bushing (Fig. 19).
3. Using an arbor press or a suitable driving tool, press or drive the old bushing out of the rod and discard the bushing.

⚠ **CAUTION**
Make sure to prevent the steel disc from contacting the radius rod end.

Bushing installation

1. Lightly spray the inner and outer surfaces of radius rod bushing with water.

> **CAUTION**
>
> No lubricant whatsoever is to be used on the rubber bushing.

2. Safely support the radius rod, and place new bushing on top of the radius rod end (Fig. 20).
3. Place a block of wood on top of bushing and press on it manually.
4. If necessary, use an arbor press or a suitable driving tool. Press or drive the bushing into the radius rod end until it extends equally on both sides of the rod.
5. It is also possible to proceed differently. Place radius rod bushing on a plane surface. Spray a light coat of water on the inner and outer surfaces of radius rod bushing.
6. Take radius rod, align the bushing. Tap radius rod on bushing until latter is positioned correctly.

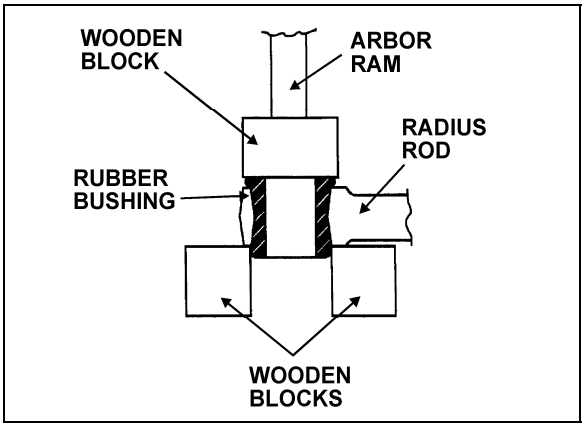


FIGURE 20: RADIUS ROD BUSHING INSTALLATION 16012

Radius Rod Installation

1. Lightly spray the radius rod support with water. Place the radius rod end over the radius rod support (Fig. 21).
2. Position the retaining plate. Install the tab washer and nuts (or bolts).

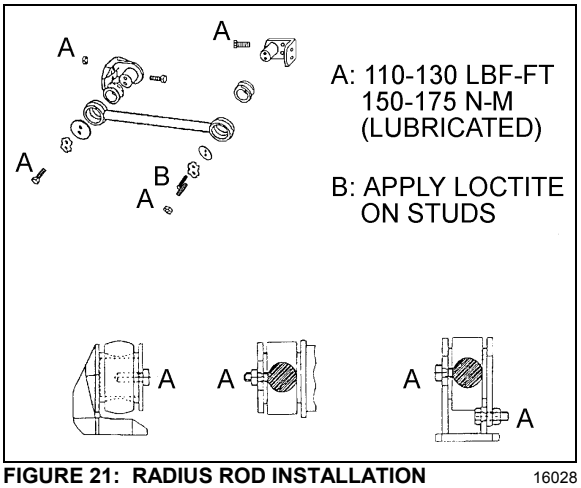


FIGURE 21: RADIUS ROD INSTALLATION 16028

> **CAUTION**
>
> Always use new tab washers at installation.

3. Tighten the nuts (or bolts) lightly, and repeat at the other end.
4. Refer to heading *"Suspension Height Adjustment"* later in this section, and set the vehicle to normal ride height.
5. With the vehicle at normal ride height, apply oil on threads and tighten all radius rod anchor pin nuts or bolts to 110 – 130 lbf-ft (150 – 175 Nm).

> **CAUTION**
>
> It is extremely important upon reconnection of the rods that the proper clearance height between the axle and body be maintained. Otherwise, the rubber bushings in radius rod ends will become preloaded, thus reducing their life span.

3.3.2 Tag Axle Suspension

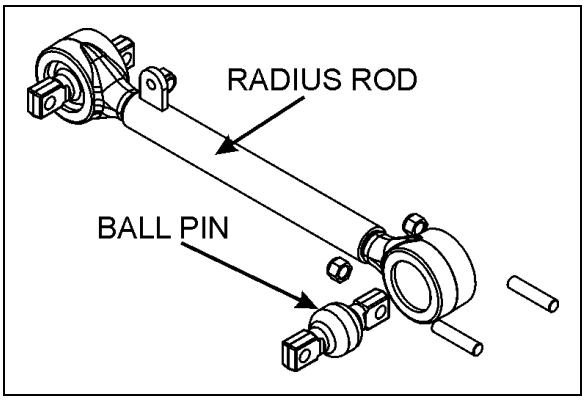


FIGURE 22: TYPICAL RADIUS ROD SETUP 16010

The assembly work may be done only by a recognized specialized workshop. Ensure that old and new parts do not get mixed up with each other. It is for this reason that all the old parts are to be scrapped immediately after a joint has been stripped down. A complete repair set must be used for each joint repaired, i.e. use of only part of a repair set is not permissible.

Radius Rod Inspection

Take off the load from the ball joint by lifting the rear of the vehicle. Apply a load on the joint in all of the degrees of freedom in an axial, radial, etc. sense with a suitable lever tool. After the load is taken off, the joint has to spring back into its starting position. Free play is not acceptable.

Separation of rubber from ball pin or external joint shell is in accordance with "normal wear characteristics".

When the following characteristics are noted, the joint is to be changed:

- Free play;
- Radial cracking of the external sheet-metal race.

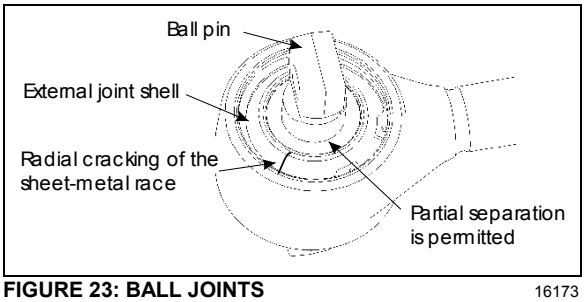


FIGURE 23: BALL JOINTS 16173

Stripping Down

Strip down the defective joint through removal of retaining ring, annular spacer and ball pin/bushing, assembly and thereafter clean out housing bore and locking circlips groove.

Radius Rod Assembly

Execute assembly of the new joint parts in the following sequence:

1. Complete moistening of the contact surface between housing bore and ball pin through application of the grease.

NOTE
Apply grease, only in the case of repair kit (Prevost # 611114)).

2. Insert ball pin/bushing, assembly. In case of the two-bolt type, ensure that the bolt bores are in the correct position in relation to the axis of the tube.
3. Place joint in receiving fixture and mount annular assembly tool on the housing. Then locate annular spacer and retaining ring in the housing using axial load with the aid of assembly matrix. If the ends of the annular spacer are not in contact with each other, the thus formed opening must be located at 180° to the opening of the retaining ring. Pay attention during assembly to ensure that the retaining ring eyelets are located at each side of the housing shaft axis (retaining ring eyelet lug points to tube), and that retaining ring is properly engaged in the groove of the housing.

When repairing defective ball pin assemblies, the necked down-bolt must regularly be replaced with a new one.

3.4 TORQUE SPECIFICATIONS

TORQUE TABLE 2 – REAR SUSPENSION			
DESCRIPTION	***QTY***	***TORQUE DRY*** *(lbf-ft / Nm)*	
Radius Rod Stud	*2*	*20-40*	*27-54*
Radius Rod Retaining Nut or Bolt	*2*	*110-130*	*150-175*
Radius Rod Support Nut	*4*	*110-130*	*150-175*
Sway Bar Link Upper Nuts	*2*	*99-121*	*134-164*
Sway Bar Link Lower Nuts	*2*	*80-100*	*108-136*
Shock Absorber Support	*4*	*145-165*	*196-224*
Air Spring Lower Nut	*4*	*20-25*	*27-34*
Air Spring Upper Nut	*2*	*20-25*	*27-34*

*** Tighten nut to specified torque, then advance to next aligning cotter pin slot and install a new cotter pin.**

4. SUSPENSION HEIGHT ADJUSTMENT

The flow of pressurized air from the accessory air tank to the air springs is controlled by three height control valves. The two rear valves are mounted to the subframe and connected to the rear axles through an arm and link connection. The front valve is mounted to the subframe and connected to the front air tank support. These connections allow the valves to apportion air pressure in the springs to the vehicle load, maintaining normal ride height.

Immediate response height control valves increase or decrease the air pressure in the suspension system as required. One height control valve is located **at center of front sway bar**, and regulates air to front suspension air springs in order to maintain the vehicle at the required height. Two are located at the drive axle, one on each inner side of rear wheelhousing.

The appropriate vehicle body height is obtained by measuring the clearance of all the air springs installed on the vehicle. The two front air springs clearance should be 11 ± ¼“ (279 ± 6 mm). Refer to figure 24 to identify the correct area to take measurement. The rear air springs clearance should be 11 ½ ± ¼" (292 ± 6 mm).

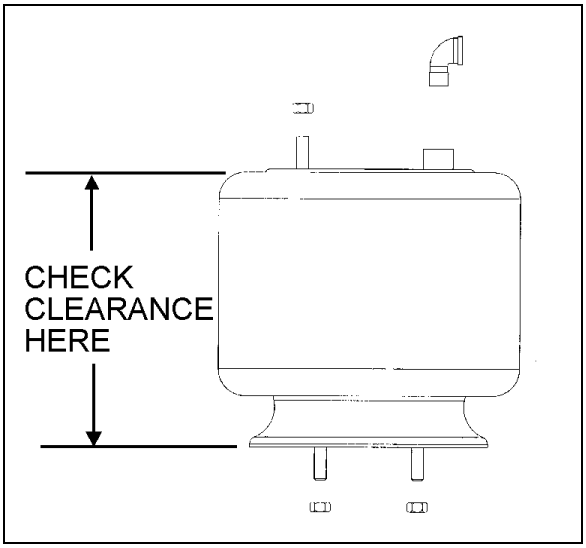


FIGURE 24: TYPICAL AIR SPRING CLEARANCE 16058

At this point, it should not be necessary to make an adjustment under normal service conditions. However, if an adjustment is required, change the position of the overtravel lever in relation to the overtravel control body. The lever should be moved up to raise vehicle height, and down to lower it. Check that main air pressure is at normal operating pressure and raise the vehicle to the specified height.

⚠ CAUTION

Always adjust on "fill cycle". If it is necessary to lower vehicle height, release sufficient air to be well below height, and adjust to height or fill cycle.

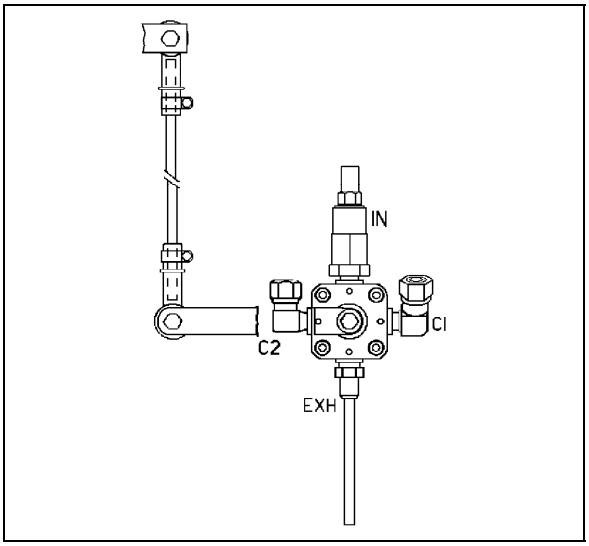


FIGURE 25: FRONT HEIGHT CONTROL VALVE 16100

The normal ride height is obtained by adjusting air spring clearance of both front and rear suspension as follows:

Front air spring clearance

1. With the vehicle at normal operating air pressure [100 - 125 psi (689 - 860 kPa)], measure air spring clearance. This clearance should be 11 ± ¼“ (279 ± 6 mm).

NOTE

The measurement should be taken from underneath the upper air spring support on subframe to top of the lower air spring support on axle (refer to figure 24 for more details). If adjustment is required, begin with the drive axle.

2. Loosen the clamp on the height control valve rubber coupling and bring it up or down (Fig. 25).

NOTE

Allow suspension to stabilize before taking reading.

When the desired height is obtained, tighten clamp.

Rear air spring clearance

1. With the vehicle at normal operating air pressure [100 - 125 psi (689 - 860 kPa)], measure air spring clearance. This clearance should be 11 ½ ± ¼" (292 ± 6 mm).

NOTE
The measurement should be taken from underneath the upper air spring support on subframe to top of the lower air spring support on axle (refer to figure 24 for more details).

2. Loosen the clamp on the height control valve rubber coupling and bring it up or down (Fig. 26).

NOTE
Allow suspension to stabilize before taking reading.

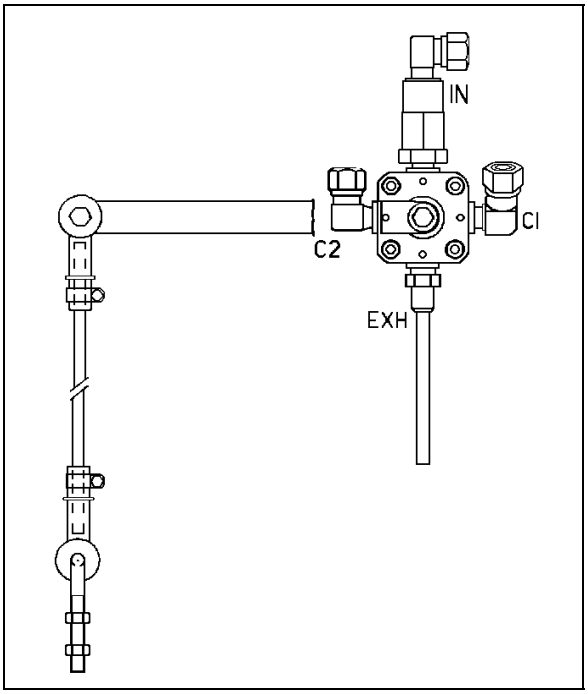


FIGURE 26: REAR HEIGHT CONTROL VALVE 16093

When the desired height is obtained, tighten clamp.

5. HEIGHT CONTROL VALVE

The height control valves automatically add air to, or release air from air springs to maintain constant suspension height regardless of load, or load distribution. Each valve adjusts independently according to the following conditions:

Loading Position

As the load increases and lowers the vehicle body, the overtravel lever commands the height control valve to add air to air springs.

Neutral Position

When vehicle body reaches the normal ride height, the height control valve overtravel lever reaches the "neutral" position and keeps both the supply and exhaust ports closed to ensure normal ride height is maintained. This condition remains static until the vehicle load is altered.

Unloading Position

As the load decreases and raises the vehicle body, the overtravel lever commands the height control valve to release air from air springs.

5.1 MAINTENANCE

The height control valve requires no periodic maintenance. Height control valve linkage operates on rubber bushings and no lubrication should be attempted at this location. Inspect the valve for loose joints, air leaks and worn bushings.

5.2 REMOVAL AND INSTALLATION

Before disconnecting a height control valve air line, securely support the vehicle by its jacking points on the body, and place safety supports underneath body. Refer to paragraph *"16. Vehicle Jacking Points"* in Section 18, *"Body"*.

1. Exhaust air from air system by opening all air tank drain cocks. Remove height control valves.
2. Disconnect overtravel lever from link and pull down lever to exhaust remaining air from air springs.
3. Disconnect air supply and delivery lines from the height control valve. Cover line ends with tape to prevent entry of foreign matter.
4. Remove the nuts retaining the height control valve to the mounting bracket, then remove valve assembly.

Reverse removal procedure to replace height control valve. After installation, check for leakage using a soap and water solution.

6. AIR SYSTEM

The basic air system consists of an air compressor, tanks, valves, filters and interconnecting lines and hoses (refer to Maintenance Manual, Section 12, "Brake and Air System" for complete information). It provides a means for braking, operating controls and accessories, and suspension. An air system schematic diagram is annexed at the end of this section for better understanding of the system.

The air coming from the air dryer is first directed to the wet air tank, then to the primary (for the primary brake system), secondary (for the secondary brake system), and accessory (for the pneumatic accessories) air tanks (Fig. 27).

6.1 AIR TANK MAINTENANCE

Ensure that the accessories air tank is purged during pre-starting inspection. A good practice is to purge this tank at the end of every driving day by the remote air tank drain valve located in the front service compartment (Fig. 29).

Moreover, purge all tanks by their bottom drain valves at specified intervals.

6.1.1 Wet Air Tank

This tank is installed above the drive axle on the L.H. side, and is provided with a bottom drain valve. It is recommended to **purge** the wet air tank by its bottom drain valve every 12,500 miles (20 000 km), or once a year, whichever comes first.

A remote valve located in engine compartment and accessible through engine R.H. side door is used to **drain** the air dryer (Fig. 28).

6.1.2 Primary Air Tank

The primary air tank is located above the drive axle on the R.H. side.

This tank is provided with a bottom drain valve (Fig. 53 and 54). It is recommended to purge the primary air tank by its bottom drain valve every 12,500 miles (20 000 km) or once a year, whichever comes first.

6.1.3 Secondary Air Tank

This tank is located in front wheelhousing, between air springs. The tank is provided with a bottom drain valve (Fig. 27).

It is recommended to purge the tank by its bottom drain valve, every 12,500 miles (20 000 km) or once a year, whichever comes first.

6.1.4 Accessory Air Tank

The accessory air tank is installed next to the secondary air tank. The tank is provided with a bottom drain valve (Fig. 27).

It is recommended to purge the tank by its bottom drain valve, every 12,500 miles (20 000 km) or once a year, whichever comes first.

A remote drain valve is located in front service compartment (Fig. 29) underneath the accessory air filter. Refer to Section 12, paragraph "4. Accessory Air Filter" of the maintenance manual for daily purge procedure.

6.1.5 Kneeling Air Tank

The kneeling air tank is located in the front wheelhousing (Fig. 27), and is provided with a bottom drain valve.

6.1.6 Parking Brakes Overrule Air Tank

The parking brakes overrule air tank is installed at the ceiling of the rear baggage compartment, on the L.H. side and is provided with a bottom drain valve.

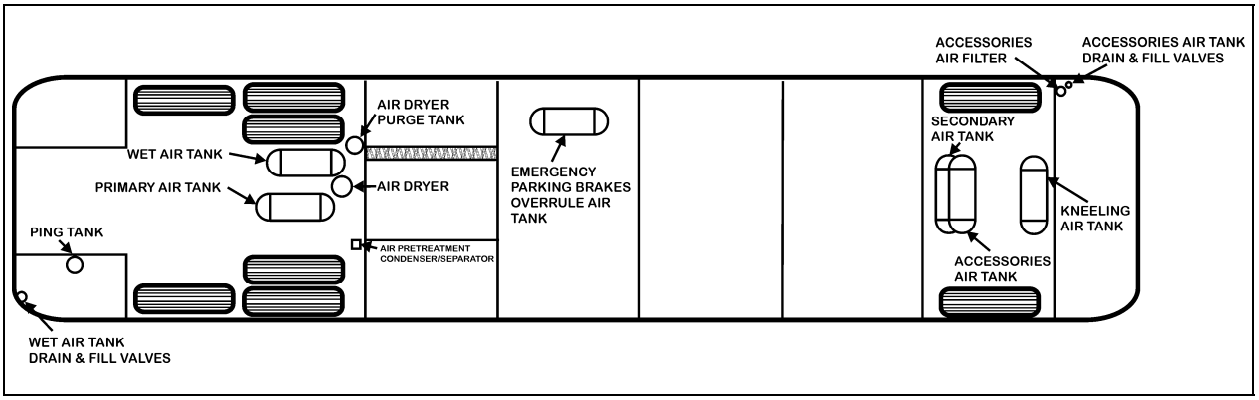


FIGURE 27: I-BEAM FRONT SUSPENSION AIR TANKS LOCATION 24035

6.2 EMERGENCY FILL VALVES

The vehicle is equipped with two air system emergency fill valves to supplement the air system when air pressure is low and engine cannot be operated.

The rear valve is located in engine compartment and accessible from engine R.H. side door (Fig. 28).

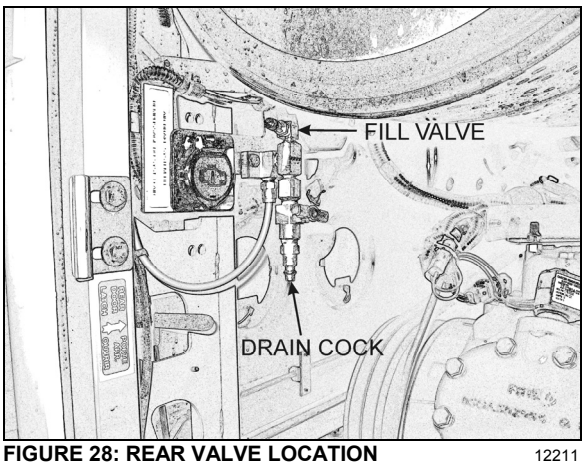


FIGURE 28: REAR VALVE LOCATION 12211

CAUTION

No other point should be used to supply air system. The maximum allowable air pressure is 125 psi (860 kPa).

The front valve is located in the front service compartment close to accessory air filter (Fig. 29).

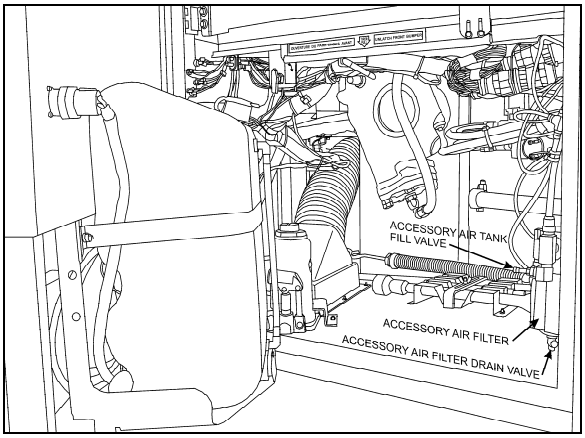


FIGURE 29: FRONT SERVICE COMPARTMENT

These two air valves are fitted with the same valve stems as standard tires, and can be filled by any standard external air supply line.

The rear valve will supply air for all systems (brakes, suspension and accessories) while the front valve will supply air for accessories only.

CAUTION

Air filled through these two points will pass through the standard air filtering system provided by Prevost. Do not fill air through any other points.

7. FRONT KNEELING SYSTEM

The kneeling system is used to lower the front of vehicle. This allows passengers to board the vehicle with greater ease. The kneeling action is achieved by exhausting air from the front air springs (bellows). This system bypasses the height control valve to provide a fast up and down movement of the front suspension. Only four seconds are required to lower vehicle from normal level to the lowered position, and approximately the same time to raise the vehicle back to normal level. The quick response is achieved by an auxiliary air tank installed beside the secondary air reservoir (for exact position, refer to Section 12, *"Brake and Air System").* This tank provides sufficient air supply to the kneeling system for some successive operations.

The system is provided with two safety features; first, a speed switch will enable the kneeling system to work only at less than 5 mph (8 km/h). Secondly, the parking brake is automatically applied, and a limit switch will keep it applied as long as the vehicle has not returned to a certain height where the driver will be able to manually remove the parking brake.

7.1 PRINCIPLE OF OPERATION

Refer to the air system schematic diagram annexed at the end of Section 12, *"Brake and Air System".*

DOWN (FRONT KNEELING):

Both the bellows control and bellows exhaust solenoid valves are energized, so the air control valves release air from front air springs. The height control valve is bypassed to ensure no air is forwarded to air springs while lowering the front suspension.

7.2 MAINTENANCE

Since the kneeling action is issued from both the air system and electrical system, refer to Section: 12, *"Brake and Air System"* and Section 06, *"Electrical System".*

For diagnosis and understanding of the system, refer to wiring diagrams, and to the appropriate air system schematic diagram annexed to Section 12, *"Brake and Air System".*

7.3 BELLOWS CONTROL SOLENOID VALVES

7.3.1 Removal and installation

1. On the rear side of steering compartment, locate both the bellows control and bellows exhaust solenoid valves.
2. Identify hoses and wires to ease reinstallation. Disconnect solenoid wires and the three flexible black hoses from solenoid valves.
3. Unscrew and remove the control solenoid valve and exhaust solenoid valve assembly. Place on a clean working place.

Reverse removal procedure to reinstall.

⚠ CAUTION

Any cable tie that has been cut during removal procedure should be replaced with a new one.

8. TROUBLESHOOTING

Condition	Cause	Correction
Bellows deflate over time	1. Defective check valve assembly. 2. Defective exhaust valve assembly. 3. Leak in air line and/or bellows. 4. Defective valve cover, rubber O-rings or gasket.	1. Replace check valve assembly. 2. Replace exhaust valve assembly. 3. Replace air line or bellows. 4. Replace valve cover, O-rings or gasket.
Bellows raise to full height and fail to exhaust air pressure	1. A clogged exhaust screen in height control valve assembly. 2. A combination clogged exhaust screen and defective air inlet valve assembly.	1. Remove and clean screen. 2. Clean exhaust screen and replace air inlet valve assembly.
Erratic valve action	1. Dirt or foreign matter in the air valve lever chamber. 2. Defectives valves.	1. Remove valve cover and blow out dirt. Install cover using new gasket. 2. Overhaul height control valve assembly
Vehicle body fails to level to satisfactory ride height	1. Improper height control valve overtravel lever adjustment	Adjust lever as directed.

9. PARTS SPECIFICATIONS

I-Beam Front Axle and tag axle air springs

Make..... Goodyear Tire and Rubber
Model.....1200
Type ..... Mae West
Nominal diameter.....12” (304 mm)
Prevost number.....630125

Drive axle air springs

Make..... Goodyear Tire and Rubber
Model.....1100
Type .....Double Flare
Nominal diameter.....11.5” (292 mm)
Prevost number.....630104

I-Beam Front suspension shock absorbers

Make.....Sachs
Color.....Black
Type NUV45X230HA
Ext. Diam.....75 mm
Collapsed length .....14.88” (378 mm)
Extended length .....23.86” (606 mm)
Prevost number.....630254

Drive and tag axle shock absorbers

Make.....Sachs
Color.....Black
Type N45X225HA
Ext. Diam.....75 mm
Collapsed length .....15.51” (394 mm)
Extended length .....24.37” (619 mm)
Prevost number.....630253

Height control valve (Front only)

Make..... Barksdale
Quantity used 1
Prevost number.....630157

Height control valve (Rear only)

Make..... Barksdale
Quantity.....2
Prevost number.....630156

Bellows control and exhaust solenoid valve assembly

Make..... Norgren

Solenoid valve manifold

Prevost number 641130

Coil

Voltage..... 24 V DC
Current draw .....29 amperes
Prevost number 641144

Valve (3 way, 2 positions)

Type .....N/C
Prevost number 641357
Type ..... N/O
Prevost number 641356

Radius rod bushing

Make .....Prevost
Prevost number 630021

Loctite

Make ..... Loctite
Prevost number 680039

Sway bar bushing (Front Suspension)

Make .....Prevost
Prevost number 630020

Sway bar link

Make .....Tennaco Automotive
Prevost number 630230

Shock absorber bushings

Make .....Monroe
Prevost number 630062

Air regulator

Make .....Norgren
Recommended pressure sett. . 90 psi (621 kPa)
Prevost number 641352