SECTION 16: SUSPENSION

CONTENTS

LIST OF 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 and shock absorbers (Fig. 1 and 2). The system operation is fully automatic and maintains a constant vehicle height regardless of load, or load distribution.

The vehicle can also be equipped with systems such as *Front kneeling & hi-buoy*, *Low-buoy*, *Hi-buoy*, and/or *Level-low*. For a description of all these systems, refer to the appropriate heading in this section.

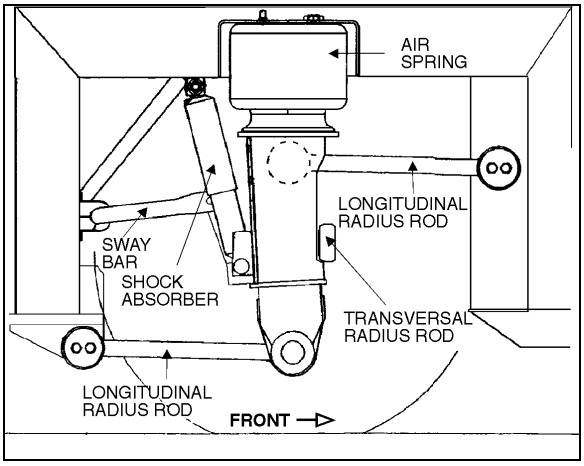


FIGURE 1: FRONT SUSPENSION COMPONENTS 16026

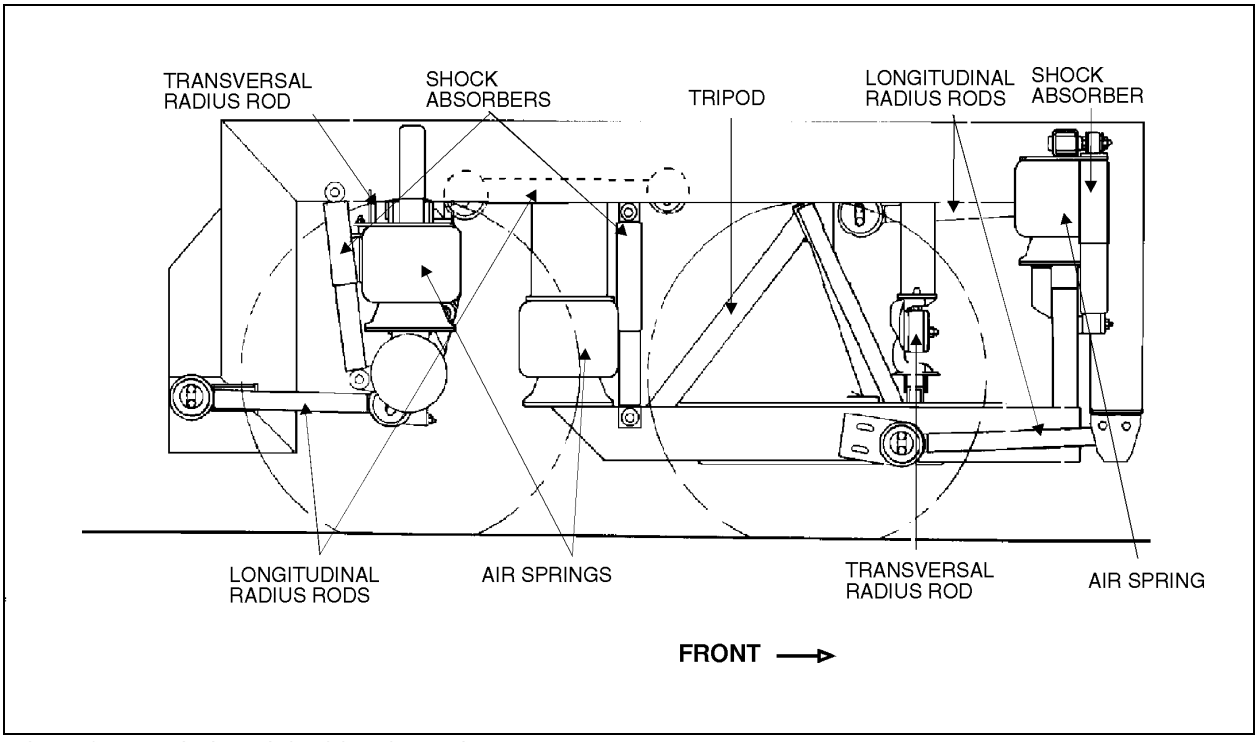


FIGURE 2: REAR SUSPENSION COMPONENTS 16027

2. AIR SPRING

The *"rolling lobe"* type 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 three axles is provided with air springs that are attached to the subframe and to the axles.

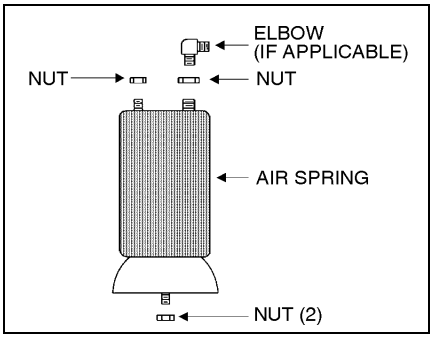


FIGURE 3: AIR SPRING 16007

2.1 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.
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) air pressure with the air spring unmounted.***

2.2 Removal

Note: ***Suspension air springs (front, 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 (Fig. 3).
5. Remove the two air springs upper nuts, and then the two lower nuts (Fig. 3). Remove air spring.

2.3 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.
2. Tighten and torque the lower stud nuts, and then the upper one to 20 - 25 lbf·ft (27 - 34 N·m) (Fig. 3).
3. Thread the remaining upper nut (large nut) and tighten to 20 - 25 lbf·ft (27 - 34 N·m) (Fig. 3).
4. Install elbow (if applicable), then connect air line (Fig. 3).
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. Remove the hydraulic floor jack from under the axle, then lower vehicle to ground.

3. SHOCK ABSORBER

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 front and tag axles are each provided with two shock absorbers while the drive axle is provided with four of them (Fig. 1 and 2).

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 (350 - 400 lbf·ft (475 - 545 N·m)) 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.***

3.1 Inspection

Loosen lower mounting of both shocks, 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 which 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 to determine that it has control (resistance) in both rebound and compression.
6. Visually inspect the shock mountings and vehicle mountings 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 according to the rubber bushing.

3.2 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.

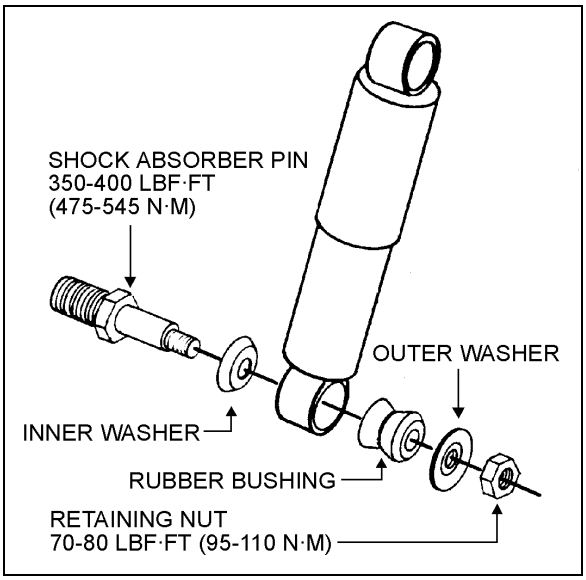


FIGURE 4: SHOCK ABSORBER 16008

2. Remove the shock absorber assembly from pins.
3. Remove the two inner bushings from the shock absorber, and discard them.

3.3 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. 5).

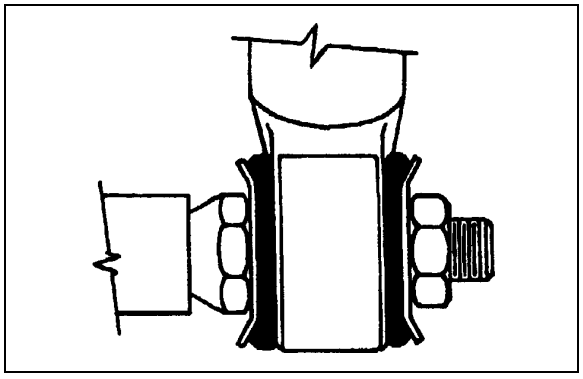


FIGURE 5: TYPICAL SHOCK ABSORBER SETUP 16009

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.
5. Place the lower and upper mounting pin stud nuts and torque them to 70 - 80 lbf·ft (95 - 110 N·m).

4. RADIUS ROD

Radius rods are used to secure the axles in the proper transversal and longitudinal positions. Four radius rods are provided on the front axle suspension (three longitudinal and one transversal), four 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 1 and 2 for details. These rods transmit both braking and driving forces from the axles to the vehicle body.

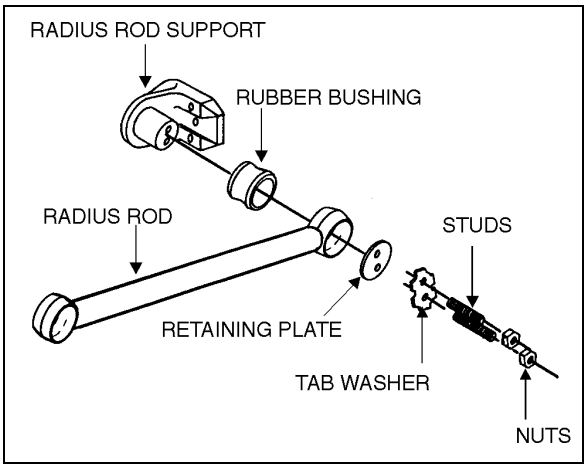


FIGURE 6: TYPICAL RADIUS ROD SETUP 16010

4.1 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.

4.2 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, then remove the radius rod.

4.3 Bushing Removal

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

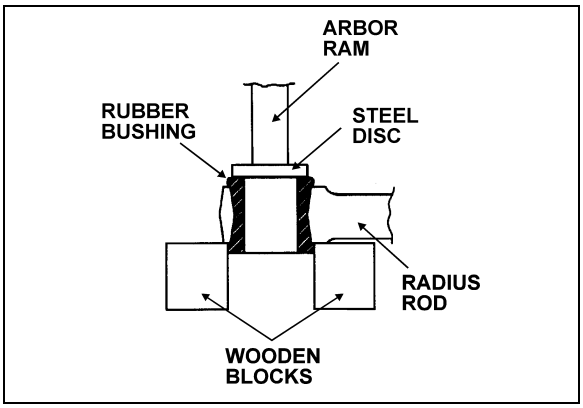


FIGURE 7: RADIUS ROD BUSHING REMOVAL 16011

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 radius rod end.***

4.4 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.

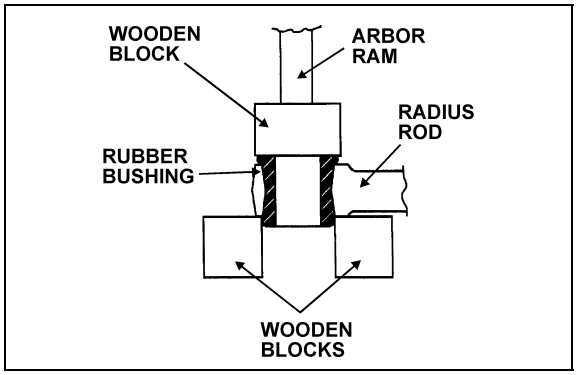


FIGURE 8: RADIUS ROD BUSHING INSTALLATION 16012

4.5 Installation

1. Lightly Spray the anchor pin with water. Place the radius rod end over the anchor pin.

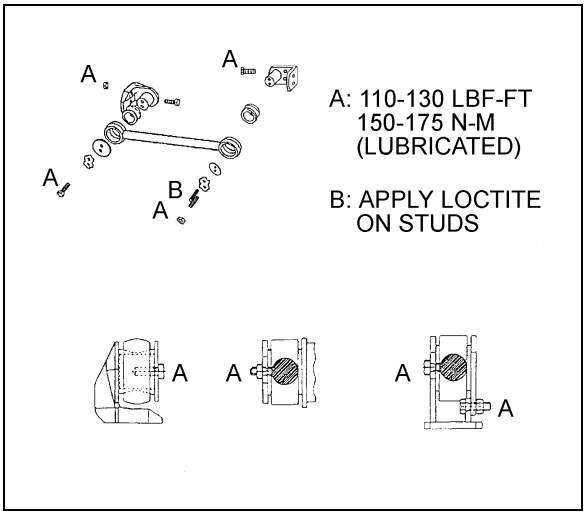


FIGURE 9: RADIUS ROD INSTALLATION 16028

2. Position the retaining plate. Install the tab washer and nuts (or bolts).

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 N·m).

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

5. SWAY BAR

A sway bar is provided on the front axles to increase vehicle stability (Fig. 1). It controls lateral motion (swaying movement) of vehicle.

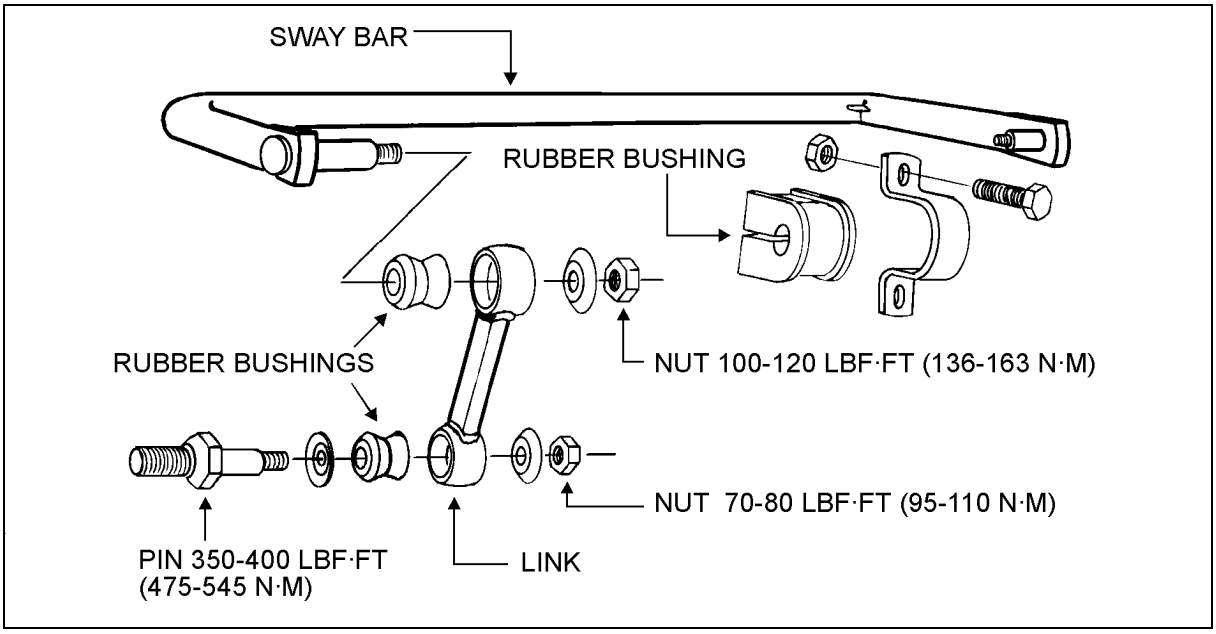


FIGURE 10: SWAY BAR 16014

5.1 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.***

5.2 Installation

1. Loosely install the sway bar.
2. Tighten the eight bushing collar nuts to 70 - 80 lbf•ft (95 - 110 N•m) (Fig. 10).
3. Tighten sway bar link upper nuts to 100 - 120 lbf•ft (136 - 163 N•m) and lower nuts to 70 - 80 lbf•ft (95 - 110 N•m) (Fig. 10).

6. SUSPENSION AIR SYSTEM

6.1 Description

The suspension air system has its own air reservoir (accessory tank) which is located above the front axle. Pressurized air from the main tank (wet tank) flows through a pressure protection valve (PR-2) installed on the accessory air tank, then flows to the accessory air tank.

The pressure protection valve (PR-2) controls the pressure at which compressed air would be delivered to the accessory air tank. The valve remains closed until a preset pressure is reached (approximately 75 psi (517 kPa)). It then opens and passes air out the delivery port.

The main use for this valve is to protect the main air system by ensuring at all times a sufficient air pressure in the main system (i.e. air delivered to the accessories will be shut off in case of a decrease in pressure).

Another protection valve (PR-2) is installed on the manifold block, and insures at all times a minimum pressure of 75 psi (517 kPa) in suspension air system in the event that a pressure drop occurs in either the suspension air system or accessory air system. This valve is located in the steering compartment

Maintenance and repair information on the pressure protection valve is supplied in the applicable booklet, annexed to Section 12, *"Brakes and Air System"* under reference number SD-03-55.

6.2 Inspection

The following inspection should be performed at established service inspection periods. Performing these procedures will allow substandard performance to be discovered before the condition becomes bad enough to cause operator complaints and failure on a run.

1. Visually inspect the suspension air lines for evidence of chafing on metal parts or other damage.
2. Visually inspect the air springs for cracks, abrasion or other damage.
3. Replace any parts found to be damaged.

6.3 Air Line Test

With the main air system at normal operating pressure (95 - 125 psi (655 - 860 kPa)), coat all suspension air line connections and air spring mountings with a solution of soap and water. Air leakage will produce soap bubbles. Any leak found must be corrected as no air leakage is permissible.

6.4 Air Tank Maintenance

Refer to Section 12, *"Brakes and Air System"* under paragraph "2.2 *Maintenance"* for complete instructions on air tank maintenance.

7. SUSPENSION HEIGHT ADJUSTMENT

The flow of pressurized air from the accessory air tank to the air springs is controlled by three height control valves. These valves are mounted to the subframe and connected to the axles through an arm and link connection. This connection allows 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 axle, and regulates air to front axle 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 wheelhouse. Refer to figure 11.

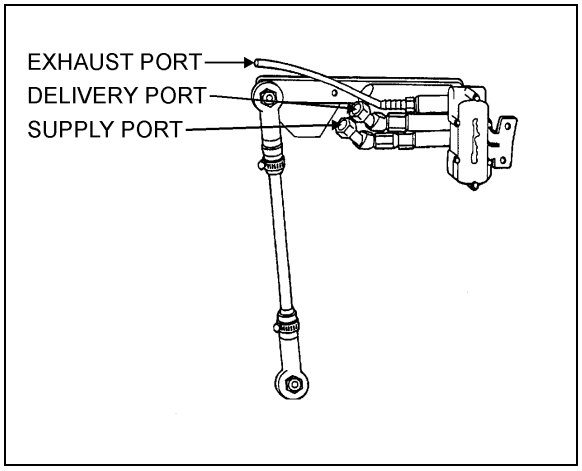


FIGURE 11: HEIGHT CONTROL VALVE 16029

The appropriate vehicle body height is obtained by measuring the clearance of all the air springs installed on the vehicles. All air springs clearance should be 11.5 ± 0.25" (292 ± 6 mm). Refer to figure 12 to identify the correct location where the measure has to be taken. 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 the height of vehicle, 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.***

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

1. With the vehicle at normal operating air pressure (95 - 125 psi (655 - 860 kPa)), measure air spring clearance as illustrated in figure 12. This clearance should be 11.5 ± 0.25" (292 ± 6 mm) for all the air springs.

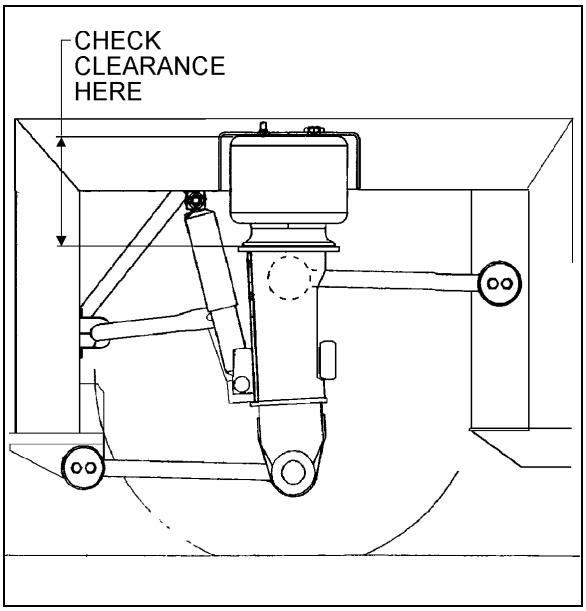


FIGURE 12: TYPICAL AIR SPRING CLEARANCE 16018

Note: ***The measure should be taken from under the upper air spring support on subframe to top of the lower air spring support on axle (refer to fig. 12 for more details). If adjustment is required, begin with the drive axle.***

2. Loosen the adjusting nuts on the connecting rod of height control valve to raise or lower the overtravel lever until the desired clearance is reached (Fig. 13).

Note: ***Allow suspension to stabilize before taking reading.***

3. When the desired height is obtained, tighten adjusting lock nuts to 2 - 4 lbf-ft (2,5 - 5 N-m) (Fig. 13).

8. HEIGHT CONTROL VALVE

8.1 Operation

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:

8.1.1 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.

8.1.2 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.

8.1.3 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.

8.2 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 point.

8.2.1 Removal and Installation

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

Note: ***The XL-40 coach battery main disconnect switch door gives access to the rear right height control valve.***

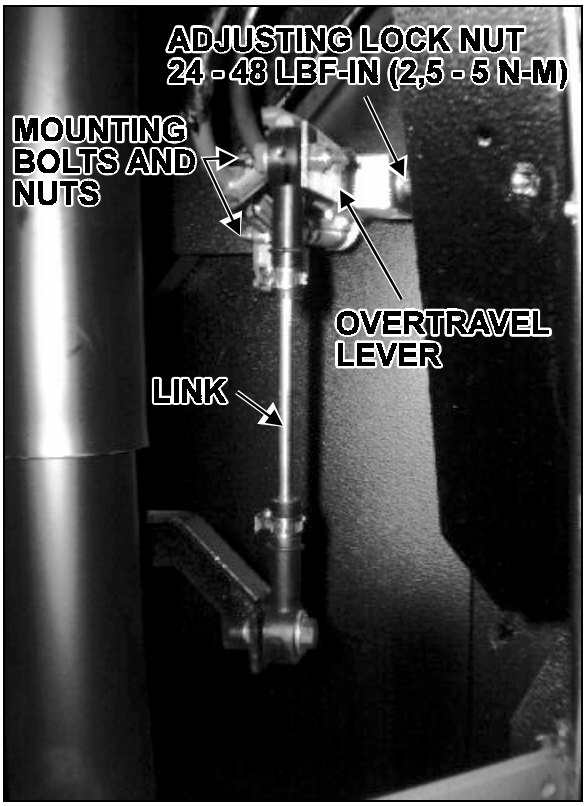


FIGURE 13: HEIGHT CONTROL VALVE 16030

1. To gain access to a rear height control valve, the corresponding wheel and mudguard can be removed.
2. Exhaust air from air system by opening the drain cock of each air reservoir. Remove height control valve.
3. Disconnect overtravel lever from link and pull down lever to exhaust remaining air from air springs.
4. Disconnect air supply and delivery lines from the height control valve. Cover ends of the lines with tape to prevent the entry of foreign matter (Fig. 11).
5. Remove the two nuts retaining the height control valve to the mounting bracket, then remove valve assembly (Fig. 13).

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

8.2.2 Air Leakage Test

Note: ***The following procedure applies when valve assembly has been removed from vehicle.***

1. Remove the height control valve from vehicle, and clean thoroughly the exterior of valve assembly.
2. Connect air pressure line to air inlet port, then allow air pressure build-up (70- 100 psi (480 - 690 kPa)).
3. Dip the valve assembly in a container of water, and watch for air bubbles when the overtravel lever is in the center position. No air should escape from any point of the valve assembly.
4. If bubbles appear from the air spring port, this is an indication that the air inlet valve assembly is defective and must be replaced.
5. Remove air pressure line from air inlet fitting and connect it to the air spring port. If bubbles appear at the air inlet check valve port, this is an indication that check valve unit is defective and must be replaced.
6. If bubbles appear at the exhaust port, this is an indication that the exhaust valve assembly is defective and must be replaced.
7. If bubbles appear around edge of valve cover plate, the cover plate gasket must be replaced.
8. If no leaks are found, remove valve assembly from water, then with air pressure still connected to the air spring port, actuate overtravel lever to remove any excess water which may have entered exhaust valve chamber. Remove air line, connect it to the air inlet port, and repeat operation to remove water from the air inlet valve chamber.

9. FRONT KNEELING AND HI-BUOY SYSTEM (IF APPLICABLE)

The kneeling system is used to lower 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 five seconds are required to lower vehicle from normal level to the lower position, and approximately nine seconds to raise it. This quick response is achieved by the kneeling air tank installed in front of steering (for exact position, refer to Section 12, paragraph "2.1 Location and Function"). This tank provides sufficient air supply to the kneeling system for some successive operations.

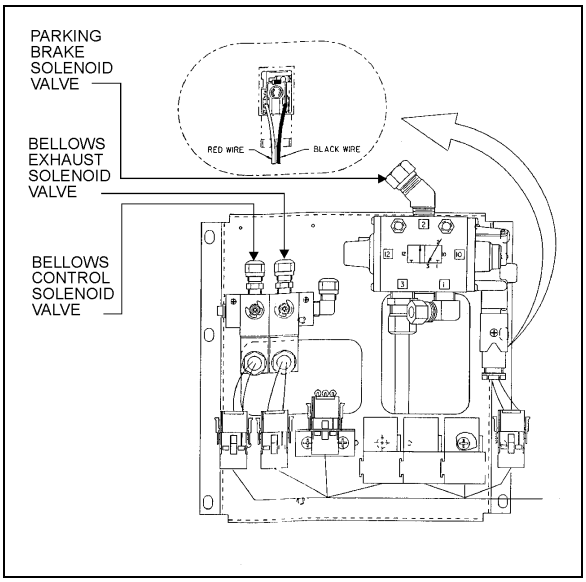


FIGURE 14: KNEELING/HI-BUOY PANEL (STEERING COMPARTMENT) 16031

The system is provided with two safety features; first, a speed switch will enable the kneeling system to work only under 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.

The purpose of the hi-buoy function in this system is to raise the front end of the vehicle to allow passengers to board the vehicle with greater ease. It is also used to allow an extra ground clearance for particular situations. In normal conditions, the height control valve is in operation and only the hi-buoy can be operated.

9.1 Principle of Operation

Refer to the system pneumatic diagram annexed in the technical publication box provided with the vehicle.

DOWN:

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 (Fig. 14).

UP:

Only the bellows control solenoid valve is energized, so the air coming from the kneeling air tank is routed through air control valves, and up to front air springs (Fig. 14). The height control valve is bypassed until the kneeling proximity switch signals the kneeling module to cut off the bellows control solenoid valve, about 1" (25 mm) below normal ride height. The final height adjustment is achieved by the height control valve.

HI-BUOY FUNCTION:

Only the bellows control solenoid valve is energized, so the air coming from the kneeling air tank is routed through air control valves, and up to front air springs (Fig. 14). The height control valve is bypassed during the up motion. However, the down motion is achieved through the height control valve.

9.2 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 along with the appropriate system pneumatic diagram annexed in the technical publication box provided with the vehicle.

9.3 Kneeling Sense Switch

The kneeling sense switch is bolted to the same bracket as for the front height control valve, right over the steering axle.

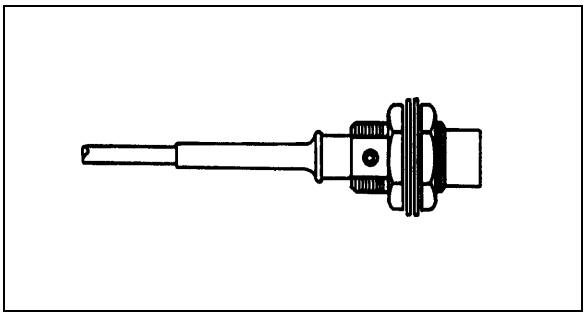


FIGURE 15: KNEELING SENSE SWITCH 16032

9.4 Bellows Control and Bellows Exhaust Solenoid Valves

9.4.1 Removal and Installation

1. On the right wall of steering compartment, locate both the bellows control and bellows exhaust solenoid valves (Fig. 14).
2. Identify hoses and wires to ease reinstallation. Disconnect solenoid wires and the three flexible 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.***

10. HI-BUOY SYSTEM

The purpose of the hi-buoy system is the raise vehicle body about 4" (100 mm) in order to increase ground clearance to board a ferryboat, to avoid a curb, etc.. This system can be put into service during normal vehicle operation.

10.1 Principles of Operation

Refer to the system pneumatic diagram annexed in the technical publication box provided with the vehicle.

UP:

The air coming from the control valve on R.H. lateral console, flows through a quick release valve, then through double shuttle valves, to finally supply air springs. The double shuttle valves prevent height control valves from releasing air from air springs.

DOWN:

The control valve, on the dashboard, cuts off air supply, so the double shuttle valves allow height control valves to accomplish their function. Height control valves release air from air springs until suspension reaches the normal ride height.

11. LOW-BUOY SYSTEM

The purpose of the low-buoy system is to lower the whole suspension about 4" (100 mm) in order to reduce the overall height for low clearances. This system can be put into service during normal vehicle operation.

11.1 Principles of Operation

Refer to the system pneumatic diagram annexed in the technical publication box provided with the vehicle.

DOWN:

The control valve, on the R.H. lateral console dashboard, cuts off air supply, so air is released from air springs. A relay valve prevents height control valves from supplying air springs.

UP:

The control valve, on the dashboard, supplies air to close the passage between both the delivery and supply ports. A relay valve opens and provides air springs until the suspension reaches the normal ride height.

12. "LEVEL-LOW" LEVELING SYSTEM (IF APPLICABLE)

The purpose of the *"level-low"* leveling system is to adjust suspension in three separate points (front, rear right and rear left) in order to level vehicle body. This system can be put into service when the ignition key is turned to the *"ON"* position, and must be used only when the parking brake is applied. The *"level-low"* warning light on the dashboard indicates that the selector knob is not in the *"DRIVE"* position. Level low system controls are located on L.H. side control panel.

12.1 Principles of Operation

Refer to the system pneumatic diagram annexed in the technical publication box provided with the vehicle.

DOWN:

The (front/rear right/rear left) control solenoid valve supplies air to the (front/rear right/rear left) five-way three-position air control valve, which bypasses the (front/rear right/rear left) height control valve, and opens a passage to allow the air control and exhaust valve to release air from (front/rear right/rear left) air springs.

UP:

The (front/rear right/rear left) control solenoid valve supplies air to the (front/rear right/rear left) five-way three-position air control valve, which bypasses the (front/rear right/rear left) height control valve, and opens a passage to allow the air control and exhaust valve to supply air to (front/rear right/rear left) air springs.

DRIVE:

When the ignition key is turned to the *"ON"* position with selector knob in the *"DRIVE"* position, the drive control solenoid valve supplies air to all five-way three-position air control valves, each one opening a passage to allow height control valves to accomplish their function.
When the ignition key is turned to the *"OFF"* position and selector knob to the *"DRIVE"* position, the air is entrapped between air springs and five-way three-position air control valves to ensure the adjusted level will be kept.

***Warning:* Never move vehicle with selector knob in any other position than the "DRIVE" position.**

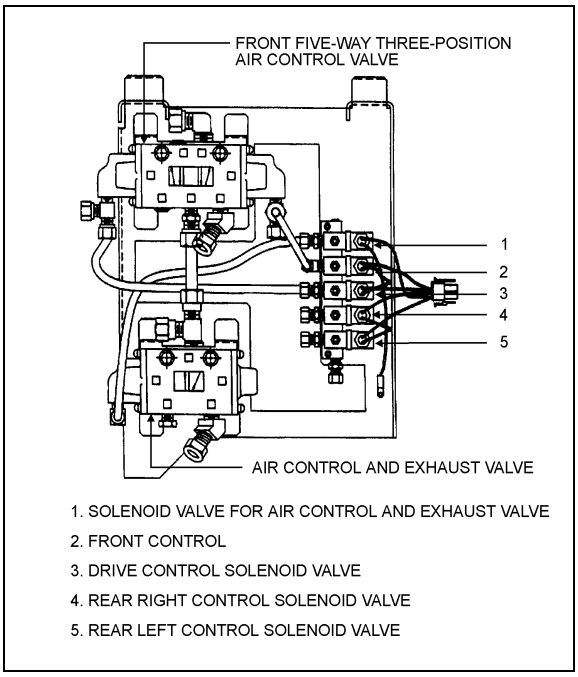


FIGURE 16: LEVEL-LOW PANEL (STEERING COMPARTMENT) 16033

13. DRIVE AXLE STABILIZER RESERVOIR (XL-45 CONVERTED VEHICLE)

The rear stabilizer system makes turning the vehicle easier. The only maintenance is to check oil level in a reservoir. This reservoir is located in the rear wheelhouse, before the drive axle (see under the vehicle). Check oil level every 50,000 miles (80 000 km) or once a year, whichever comes first.

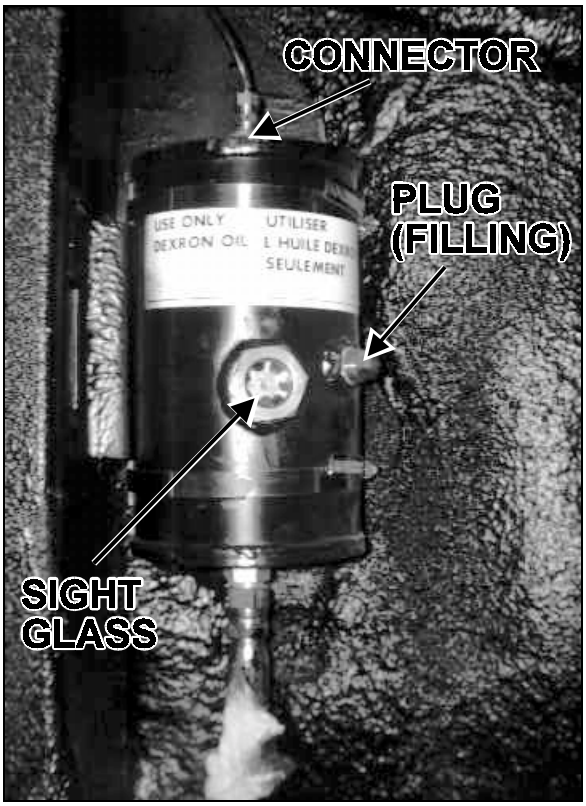


FIGURE 17: DRIVE AXLE STABILIZER RESERVOIR 16034

13.1 Lubrication (Fig. 17)

The sight glass indicates if oil must be added to the reservoir. If the small ball in the sight glass is at the bottom of the sight glass then add oil to the reservoir as per the following procedure:

1. Remove connector tube at the top of the reservoir to permit air to enter.
2. Remove the fill plug.
3. Fill the reservoir with Dexron oil until oil reach the bottom of filling plug.
4. Screw the fill plug and the connector tube on the reservoir.

14. TROUBLESHOOTING

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

15. PARTS SPECIFICATIONS

AIR SPRINGS

Front

XL-40 & XL-45E CONVERTED VEHICLES

Make..... Goodyear Tire and Rubber
Model.....Roll-over volume can
Type 1100
Diameter.....11" (279 mm)
Supplier number.....1R11-089
Prévost number.....630105

ELSE

Make..... Goodyear Tire and Rubber
Model..... M-West Long
Supplier number.....1R11-096
Prévost number.....630126

Drive

Make..... Goodyear Tire and Rubber
Model.....Roll-over volume can
Type 1100
Working diameter.....11.5" (292 mm)
Supplier number.....1R11-088
Prévost number.....630104

Tag

Make .....Goodyear Tire and Rubber
Model .....M-West Long
Supplier number 1R11-096
Prévost number 630126

SHOCK ABSORBERS

Front

FRONT ABSORBER - XL-45 COACH AND CONVERTED VEHICLE (ONLY)

Make .....Gabriel
Collapsed length..... 15.47" (393 mm)
Extended length..... 24.5" (622 mm)
Prévost number 630134

ELSE

Make .....Monroe
Type ..... Gas Magnum
Collapsed length..... 15.38" (390,5 mm)
Extended length..... 23.63" (600,1 mm)
Supplier number 650407
Prévost number 630127

HEIGHT CONTROL VALVE
Make.....Neway
Quantity used..... 3
Supplier number.....905 54 234
Prévost number.....630095

BELLOWS CONTROL AND EXHAUST SOLENOID VALVE ASSEMBLY
Make.....Norgren
Solenoid valve manifold
Supplier number.....D0043B
Prévost number.....641130
Coil
Voltage ..... 24 V DC
Current draw ..... 0.29 ampere
Supplier number.....54932-27
Prévost number.....641144

VALVE (3 WAYS, 2 POSITIONS)
Supplier number..... K41EAOO-KH1-KS6
Prévost number.....63-0081
Repair kit (spool) Supplier number.....54237-65
Repair kit (spool) Prévost number.....641169

RADIUS ROD BUSHING
Make ..... Prévost
Prévost number 630021

SWAY BAR BUSHING
Make ..... Prévost
Prévost number 130953

SHOCK ABSORBER AND SWAY BAR LINK BUSHINGS
Make ..... Monroe
Supplier number 45380
Prévost number 630062

16. TORQUE SPECIFICATIONS

1- Shock absorber pin.....350-400 lbf·ft (475-545 N·m)

2- Shock absorber pin nut.....70-80 lbf·ft (95-110 N·m)

3- Radius rod stud.....LOCTITE

4- Radius rod retaining nut or bolt .....110-130 lbf·ft lubricated (150-175 N·m lubricated)

5- Radius rod support nut .....110-130 lbf·ft lubricated (150-175 N·m lubricated)

6- Axle attachment nut.....425-475 lbf·ft (580-645 N·m)

7- Air spring stud nut.....20-25 lbf·ft (27-34 N·m)

8- Sway bar link pin stud.....350-400 lbf·ft (475-545 N·m)

9- Sway bar link lower nut.....70-80 lbf·ft (95-110 N·m)

10- Sway bar link upper nut.....100-120 lbf·ft (136-163 N·m)

Note:
During assembly, use "Loctite 242" (Prévost number 680038) with item 1, 3 and 8.
After assembly, apply "anti-seize compound" (Prévost number 680064) on all nuts.

SECTION 16: SUPPLEMENT INFORMATION ON INDEPENDENT FRONT SUSPENSION (IFS)

CONTENTS

LIST OF ILLUSTRATIONS

1. INTRODUCTION

This supplement contains service procedures and specifications that apply to the PRÉVOST XL converted coach shell vehicles equipped with an independent front suspension.

Where no differences (or minor differences) exist between informations given in XL Maintenance Manual, Section 10, 12, 14 and 16, (for vehicles equipped with beam axle suspension) and informations given in this SUPPLEMENT INFORMATION ON INDEPENDENT FRONT SUSPENSION (for vehicles equipped independent front suspension), no information is given in this section. In those instances, the original material included in the XL Maintenance Manual should be used.

2. STEERING LINKAGE

2.1 General Description

Turning motion of the steering wheel is transferred by the steering gear and steering linkage to the steering arms at the right and left front wheels. The steering linkage consists of tie rods connected to the bell crank and the steering arm at the left side of the coach, and to the idler arm and steering arm at the right side of the coach. The bell crank and idler arm are connected by a relay rod. A drag link connected to the bell crank and the pitman arm, which is mounted to the steering gear, transfers the turning motion of the steering wheel to the steering arms (Fig. 1).

Lower and upper A-arms are widely spaced. They are mounted on ball joints. Torque rods prevent rotation of the uprights around the lower and upper ball joints.

If the steering linkage is bent, twisted or worn, steering action of the coach will be seriously affected. Any time steering linkage components are replaced or adjusted, steering geometry and front wheel alignment must be checked as explained in this section of supplement.

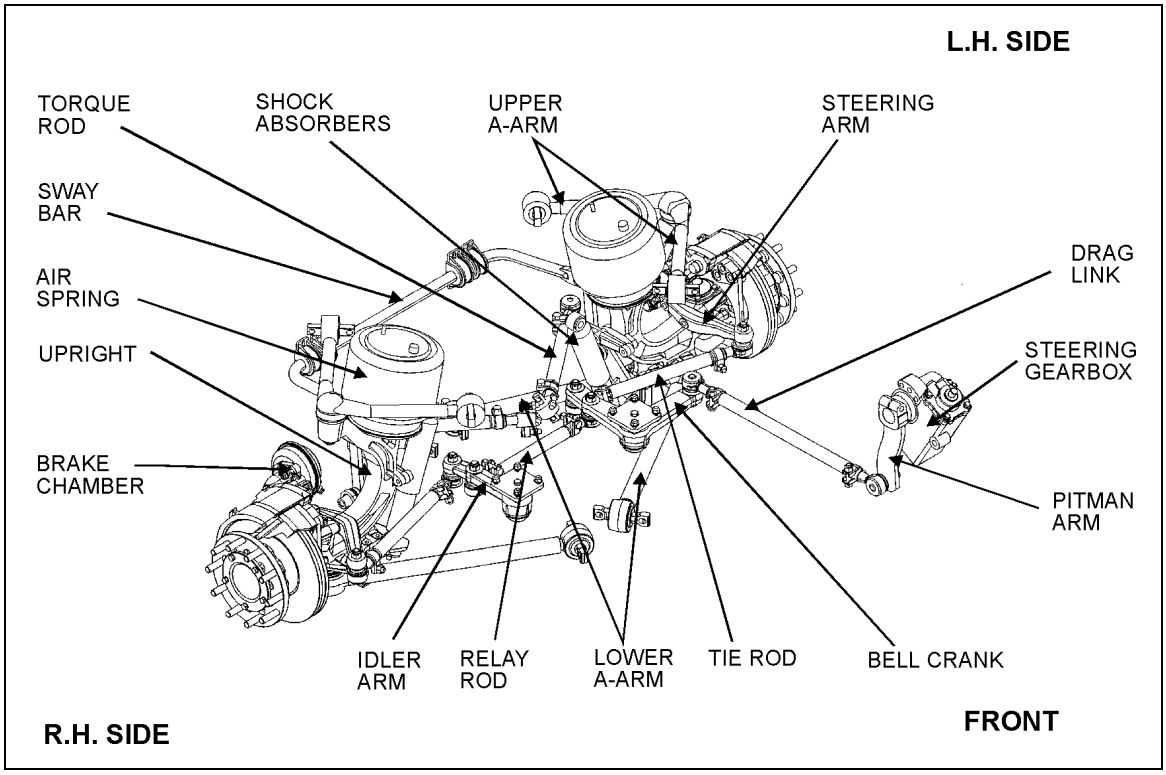


FIGURE 1: SUSPENSION AND STEERING LINKAGE 16036

2.2 Turning Angle

The maximum turning angle is set mechanically through the two steering stop screws installed on the swivel assembly. The turning angle (56° $^{+\ 0°}_{-\ 1°}$) mechanical stop is factory adjusted to accommodate the chassis design, and therefore, does not require adjustment on new vehicles.

However, turning angle should be checked and adjusted hydraulically, if necessary, any time a component of the steering system is repaired, disassembled or adjusted.

Before checking the turning angle, be sure the front end is properly aligned as described under paragraph "4. Front End Alignment" in this supplement.

To check steering maximum turning angle, proceed with the following method :

1. Check if front tires rub against the frame or if the steering gear has been serviced.

Caution: *If clamps are not correctly installed, they can interfere with other parts.*

2. For a full left and right turn, check clamps' position and for interfering parts. Refer to figures 2 to 6 for location and positioning of clamps. If readjustment is required, make the proper adjustment.

Note: *Prior to poppet valve readjustment, verify vehicle wheel alignment, and ensure that oil level is adequate and that air bleeding is done.*

3. If necessary readjust poppet valve. Refer to "TAS Steering Gear Service Manual" annexed to XL Maintenance Manual, Section 14, "Steering", under headings: "Filling and Air Bleeding the System" and "Poppet Readjustment".

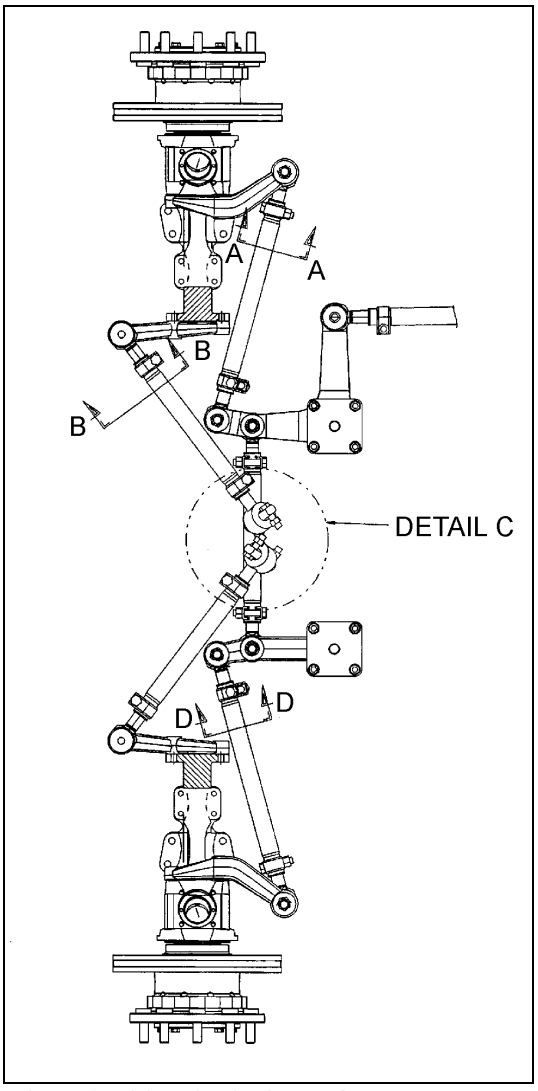


FIGURE 2: LOCATION OF CLAMPS 16037

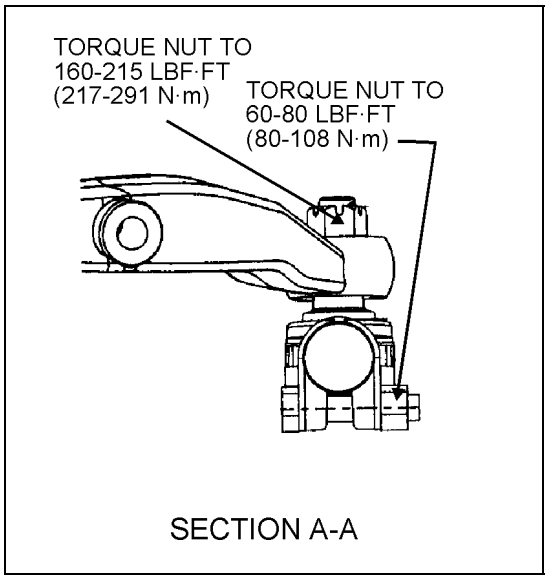


FIGURE 3: CLAMP POSITIONING 16038

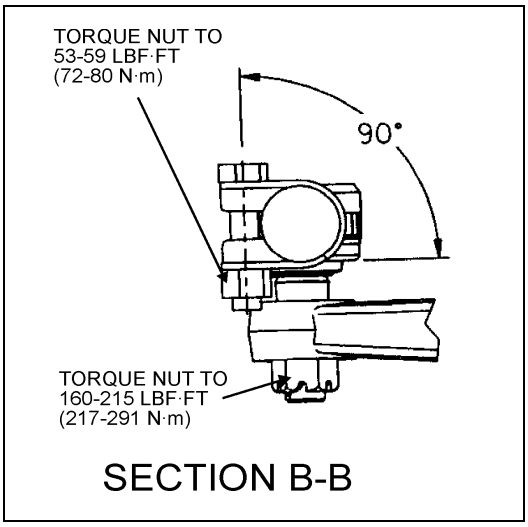


FIGURE 4: CLAMP POSITIONING 16039

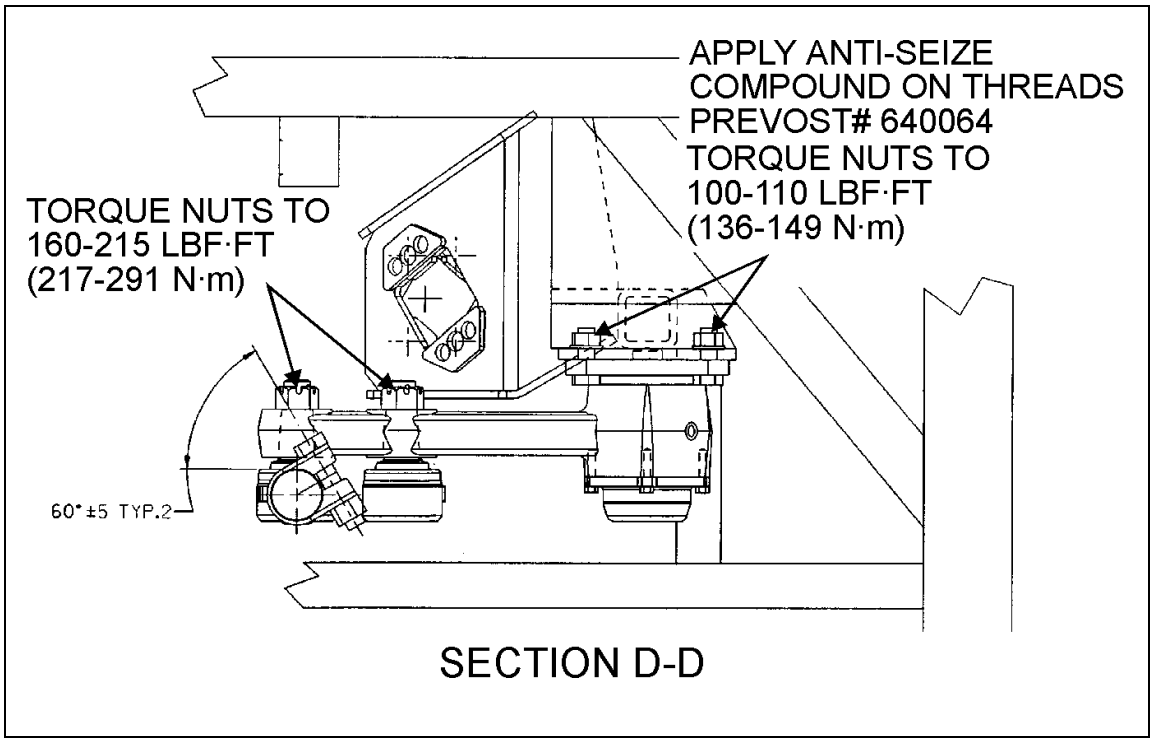


FIGURE 5: CLAMP POSITIONING 16040

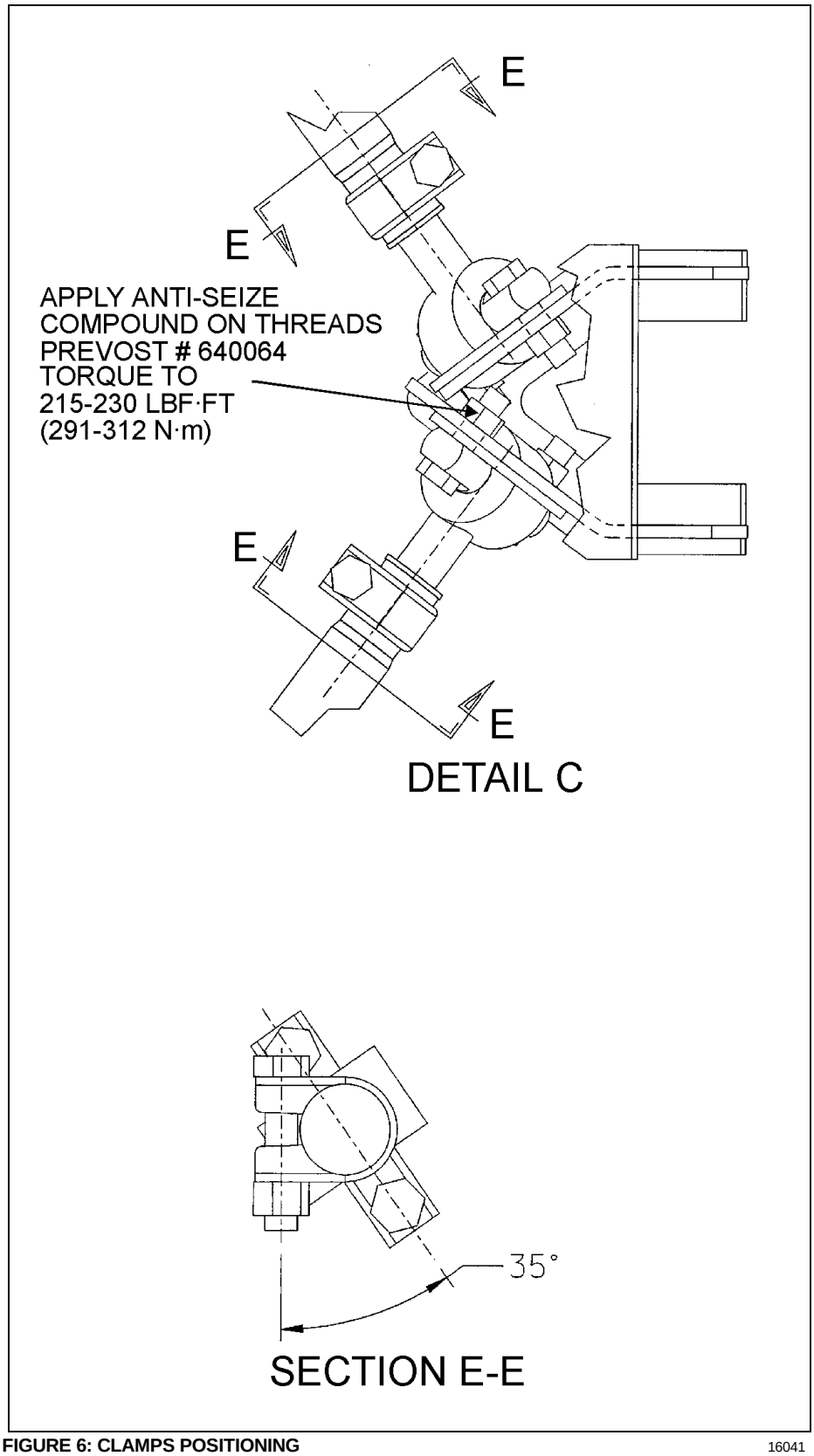


FIGURE 6: CLAMPS POSITIONING 16041

2.3 Steering Linkage Adjustment

Note: *Whenever a steering linkage component has been removed and replaced, check steering geometry and front end alignment as directed in this Supplement. Check to insure that all stud nuts and mounting bolts and nuts have been tightened to proper torques listed under "16. TORQUE TABLE" at the end of this supplement.*

1. The pitman arm should be adjusted with reference mark aligned or to an angle of 4.5° in relation with the vertical axis (Fig. 7).
2. Locate centerline of vehicle then install relay rod in boss at steering bell crank and idler arm. Align center of relay rod with centerline of vehicle.
3. Install drag link to pitman arm and adjust opposite end of drag link to fit mounting stud hole in bell crank.
4. Install tie rods, then adjust toe-in as per under paragraph "4 FRONT END ALIGNMENT" of this Supplement.

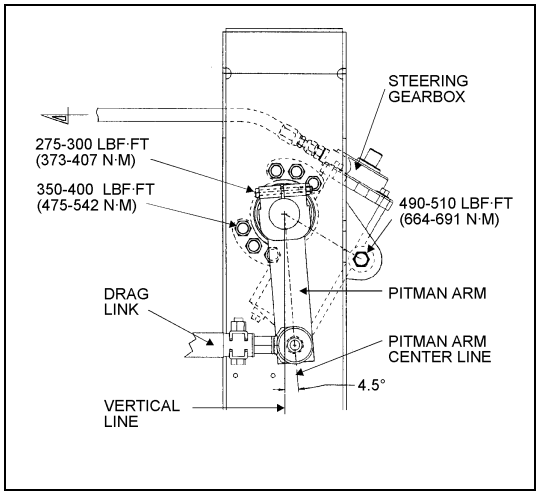


FIGURE 7: PITMAN ARM ALIGNMENT 16042

2.4 Pitman Arm

2.4.1 Removal

1. Remove cotter pin, nut and washer from drag link ball stud at pitman arm.
2. Disconnect drag link from pitman arm, using jaw style pullers (pressure screw type).

Warning: *Always wear approved eye protection when operating pullers.*

Caution: *Do not drive pitman arm on or off pitman shaft as this can damage the steering gear.*

Caution: *Heating of components to aid in disassembly is not allowed because it has a detrimental effect on axle components and steering linkages.*

3. Remove pitman arm clamp bolt nut, washer and bolt.
4. Check the radial position of the pitman arm in relation to the sector shaft prior to removal of pitman arm.
5. Add reference marks to the arm and shaft if necessary to ensure correct alignment at reassembly.
6. Remove pitman arm. A chisel will help you loosen the pitman arm. Use a puller if you cannot remove the pitman arm manually.

2.4.2 INSTALLATION

1. Position pitman arm on sector gear shaft with reference marks aligned. Ensure that the clamp bolt groove matches.
2. Install bolt, washer and nut. Tighten nut to 275-300 lbf•ft (373-408 N•m) (Fig. 7).
3. Connect drag link to pitman arm. Install washers. Tighten nut to 160 lbf•ft (217 N•m). Advance nut to next alignment cotter pin slot and install a new cotter pin.

2.5 Drag Link

Drag link assembly consist of three parts; a drag link and two end assemblies. Both end assemblies are identical and they are retained on the drag link with a clamp bolt and nut.

Stud nuts at the pitman arm and bell crank ends of the drag link must be kept tight or hole at ball stud end of drag link and hole in pitman arm may become enlarged as a result of excessive looseness. Subsequent tightening of stud nuts may draw studs too far into holes and dust cover parts may become damaged which can result in component failure.

Drag link end sockets are equipped with lubrication fittings and should be lubricated as directed in paragraph "2.10 LUBRICATION FITTINGS" in this supplement.

2.5.1 Adjustment

It should not be necessary to alter the length of the drag link except when a new link is installed or when removable end assembly has been replaced. If drag link adjustment is necessary, proceed as follows:

1. Position front wheels in straight ahead position.
2. Center steering gear as previously explained in paragraph "2.3 Steering Linkage Adjustment".
3. Remove cotter pin and stud from drag link at bell crank. Locate centerline of vehicle and center of relay rod. With center of relay rod aligned with centerline of vehicle, loosen clamp bolt at socket end (bell crank end) of drag link and adjust length of socket end assembly to fit in boss of bell crank.

Note: *Do not change position of pitman arm.*

Install stud nut and torque to 160 lbf•ft (217 N•m). Align nut with cotter pin slot (tighten) and install a new cotter pin.

Torque mounting clamp bolt nut to 60-80 lbf•ft (81-108 N•m), then test the adjustment. Front wheels should turn from right to left extremeties without noticeable binding at drag link ends.

2.6 Bell Crank and Idler Arm

Bell crank and idler arm are equipped with one lubrication fitting and should be lubricated as directed in paragraph "2.10 LUBRICATION FITTINGS" at the end of this Supplement.

2.6.1 Bell Crank and Idler Arm Removal

Note: *Use a piece of wire to anchor loose end of relay rod and tie rod in order to prevent placing an excessive load on opposite socket end.*

4.

1. **Bell crank :** Disconnect drag link, tie rod and relay rod from bell crank by removing cotter pins, stud nuts and washers from ball studs. Separate socket assemblies from the bell crank.

   Idler arm : Remove cotter pins, nuts and washers from ball studs connecting relay rod and tie rod to idler arm. Separate socket assemblies from idler arm.

2. Remove nuts and washers from bolt attaching bell crank or idler arm mounting bracket to vehicle understructure. Remove bell crank or idler arm mounting bracket.

2.6.2 Bell crank or Idler Arm Ball Joint Disassembly

1. Remove adjacent link assemblies from bell crank or idler arm as previously described.
2. Remove screws attaching the cap to the bell crank or idler arm mounting bracket. Remove the cap and o-ring (Fig. 8).

3. Remove the cotter pin, nut and tongue washer. Remove bearings, grease seal, bearing bushing and the bell crank or idler arm from its mounting bracket stud (Fig. 8).

2.6.3 Bell Crank or Idler Arm Ball Joint Reassembly

Note: *For bearing installation use tool Prévost # 110684.*

1. Install bearing bushing on bell crank or idler arm mounting bracket stud.
2. Install bearing and grease seal in bell crank or idler arm eye (Fig. 8).

Note : *Install grease seal according to figure 8. Grease must be able to exit the bell crank or idler arm mechanism. For grease seal installation use tool Prévost # 110683.*

3. Install bell crank or idler arm on its mounting bracket stud (Fig. 8).

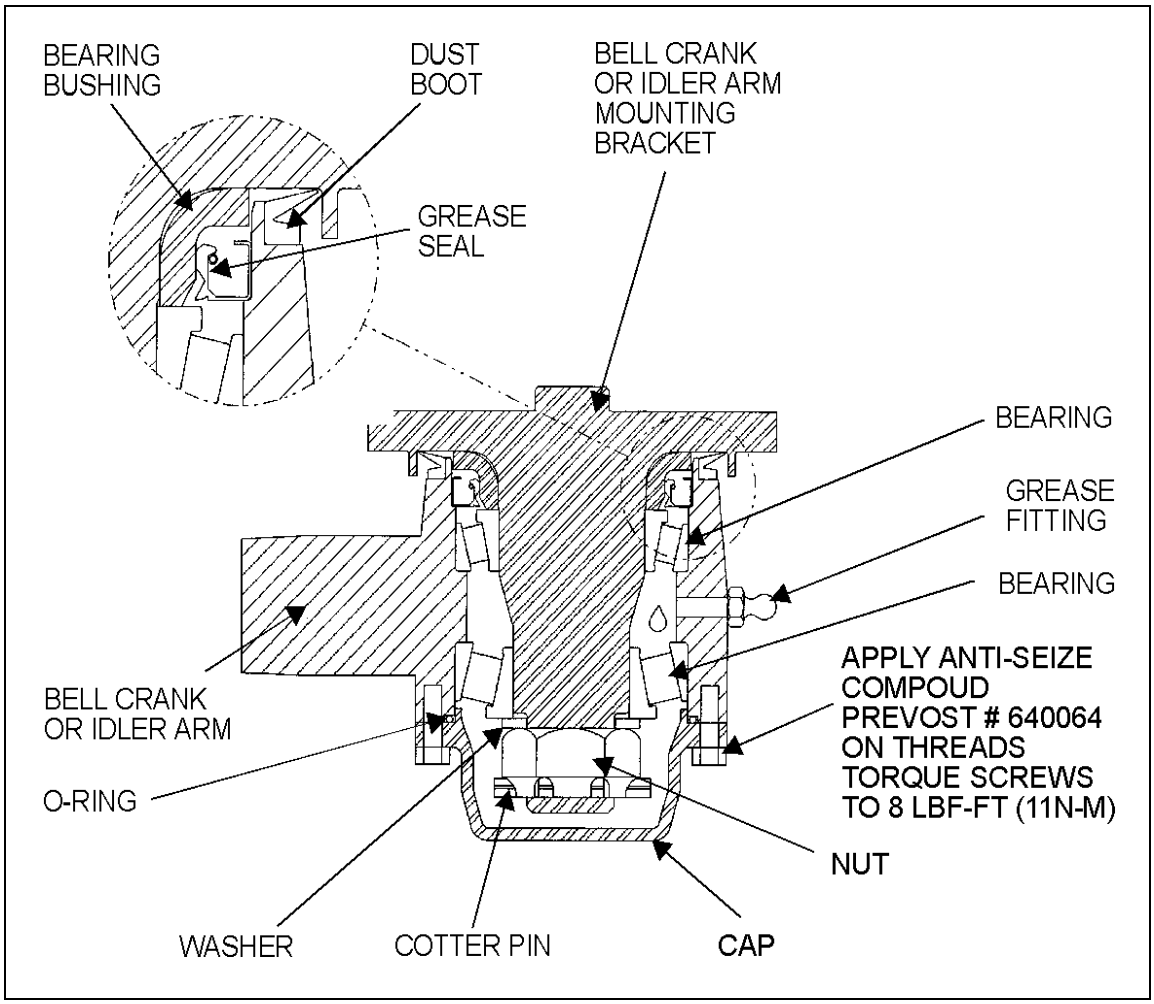


FIGURE 8: BELL CRANK AND IDLER ARM BALL JOINT 16043

5. Install bearing, o-ring and nut.

Note : *Apply grease on bearing before installation.*

5. Firmly tighten nut (Fig. 9).

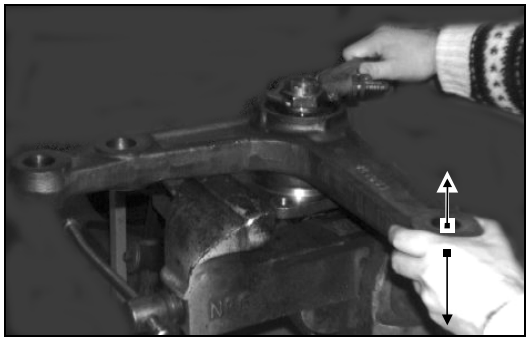


FIGURE 9: BELL CRANK 16044

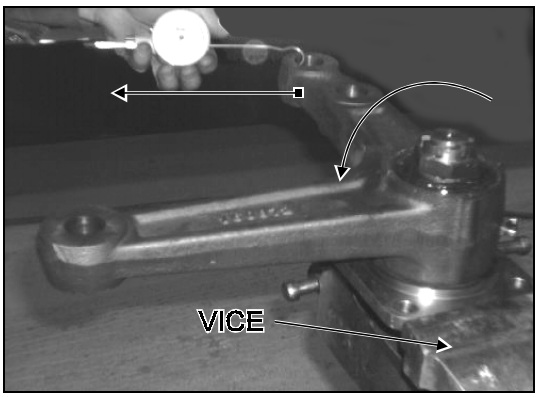


FIGURE 10: BELL CRANK 16045

6. Unscrew nut until bell crank or idler arm start to turn by the application of 1 to 3 pound load (Fig. 10).
7. Check for loose bearings by applying an up and down load on bell crank or idler lever (Fig. 9). The lever is not supposed to move in the vertical axis direction.

8. Align nut with cotter pin slot (tighten) and install a new cotter pin.

Note: *Bend cotter pin around the nut (Fig. 8). Do not bend the cotter pin in the direction of the cap, because it may interfere with the cap.*

9. Apply anti-seize compound PREVOST # 640064 on screws' threads. Install the cap screws. Torque cap screws to 8 lbf•ft (11 N•m).
10. **Bell crank :** Install drag link, tie rod and relay rod as directed herein under each specific subject.
11. **Idler arm :** Install tie rod and relay rod as directed herein under each specific subject.
12. Adjust turning angle as previously directed under paragraph "2.2 Turning Angle" and check front end alignment as specified in paragraph "4. Front End Alignment" of this supplement.

2.7 Relay Rod

Relay rod ends are equipped with lubrication fittings and should be lubricated as directed in paragraph "2.10 LUBRICATION FITTINGS" in this supplement.

2.7.1 Replacement

1. Remove cotter pins from bell crank and idler arm end of relay rod. Loosen nuts flush with end of studs.
2. Place a sledge hammer behind the adjacent part to absorb shocks. Strike the studs with a brass hammer to loosen end assemblies.
3. Remove stud nuts and washers then remove studs.
4. Position relay rod studs into bell crank and idler arm then tap stud ends with a brass hammer to seat tapered surfaces.
5. Install washers and stud nuts. Tighten nuts to 160 lbf•ft (217 N•m) torque. Align cotter pin slot (tighten) and install a new cotter pin.

2.8 TIE RODS

2.8.1 Description And Maintenance

Tie rod ends are connected to the bell crank and left steering arm, and to the idler arm and right steering arm. Each tie rod assembly consists of three parts; a tube and two socket end assemblies. The tie rod ends are threaded into the tube and secured with clamp bolts. Right and left hand threads are provided to ease toe-in adjustment. Tie rod assemblies are interchangeable from the right to the left side of the coach.

Tie rod end sockets require no maintenance other than periodic lubrication and inspection to see that ball studs are tight. Replace socket ends when there is excessive up and down motion, lost motion or end play at ball end of stud.

1. Periodically check bolt nut for tightness.
2. Inspect tie rod for bent condition and inspect tube for damaged threads. If tie rod is bent or threads are damaged, replace the assembly.
3. Lubricate tie rod end fittings as directed in paragraph "2.10 LUBRICATION FITTINGS" at the end of this section.

2.8.2 Removal

1. Remove cotter pins and stud nuts which attach tie rod socket ends to bell crank and left steering arm (or idler arm) and right steering arm.
2. Remove tie rod ball stud by tapping on steering arm and bell crank or idler arm with hammer, while using a sledge hammer to absorb shocks.

Note: *If tie rod end assemblies are damaged in any way, they must be replaced.*

2.8.3 Installation

1. Install socket end assemblies on tie rod. Be sure both ends are threaded an equal distance into the tube.
2. Make sure threads on stud and in stud nut are clean and not damaged.

3. Position ball studs (socket ends of tie rod) in holes in steering arm and bell crank or idler arm. Install a ball stud nut on each stud and tighten firmly.
4. Torque stud nuts to 160 lbf•ft (217 N•m). Align cotter pin slot (tighten) and install a new cotter pin.

Note: *Adjust toe-in as directed in paragraph "4.6 TOE-IN ADJUSTMENT" of this supplement.*

5. Make sure tie rod ends are properly aligned with ball studs, then torque tie rod end clamp bolts to 60-80 lbf•ft (81-108 N•m).

Note: *If tie rod is properly aligned with stud, binding will result.*

2.9 Steering Arms

The left and right wheel steering arms are secured to a swivel at one end and to a tie rod at the other end.

2.9.1 Removal

1. Remove wheel as directed in Section 13, "WHEELS AND TIRES" of the maintenance manual.
2. Remove cotter pin, washer and nut from stud securing tie rod to steering arm. Remove ball stud from steering arm by tapping on arm with a hammer, Placing a sledge hammer underneath steering arm to absorb shocks.
3. Remove cotter pin and nut securing steering arm to swivel assembly. Remove steering arm from swivel.

2.9.2 Installation

1. Insert steering arm in swivel.
2. Torque steering arm to swivel nut to 190 lbf•ft (258 N•m). Align cotter pin slot (tighten) and install a new cotter pin.
3. Position tie rod ball stud in steering arm and tap with a brass hammer to seat ball stud in steering arm. Install washer and nut on stud. Torque nut to 160 lbf•ft (217 N•m). Tighten nut to nearest cotter pin slot and install a new cotter pin.
4. Install wheel as directed in Section 13, "WHEEL, HUBS AND TIRES" under paragraph "3.2 Installation" of the maintenance manual.

2.10 Lubrication Fittings

All lubrication fittings must be clean before applying lubricant. Also, always be sure equipment used in applying lubricant is clean. Every precaution should be taken to prevent entry of dirt, grit, lint or other foreign matter into lubricant containers. Replace fitting when they become broken or damaged.

Intervals of application given in the following paragraphs are recommended for normal service. More frequent intervals may be applied under severe operating conditions. In selecting proper lubricants, supplier reputation must be considered. The supplier must be responsible for product quality. The diagram (Fig. 11) shows approximate location of steering lubrication fittings.

1. **Drag Link Ends :** Lubricate at two fittings, one at each end of link, every 6,250 miles (10 000 km) with a good quality lithium-base grease NLGI No. 2 (Shell Retinax LX or equivalent).
2. **Steering Column U-Joints :** The steering column has three lubrication points which must be serviced only when needed, using a good quality lithium-base grease NLGI No. 2 (Shell Retinax LX or equivalent). For more information, refer to the XL maintenance manual, Section 14, paragraph "8.1 Removal and Lubrication".
3. **Relay Rod Ends :** Lubricate at two fittings, one at each end of rod, every 6,250 miles
(10 000 km) with a good quality lithium-base grease NLGI No. 2 (Shell Retinax LX or equivalent).
4. **Tie Rod Ends :** Lubricate at four fittings, one at each end of both tie rods, every 6,250 miles (10 000 km) with a good quality lithium-base grease NLGI No. 2 (Shell Retinax LX or equivalent).
5. **Hub Unit and Swivel Assembly :** Refer to GKN AXLES LIMITED KIRKSTALL DIVISION, SERVICE MANUAL, paragraph "1. LUBRICATION" annexed at the end of this supplement.

6. **Idler Arm and Crank bell :** Lubricate at two fittings, one on the idler arm and the other on the crank bell, every 6,250 miles (10 000 km) with a good quality lithium-base grease NLGI No. 2 (Shell Retinax LX or equivalent). Apply grease gun pressure to the fitting until lubricant appears at the top seal.

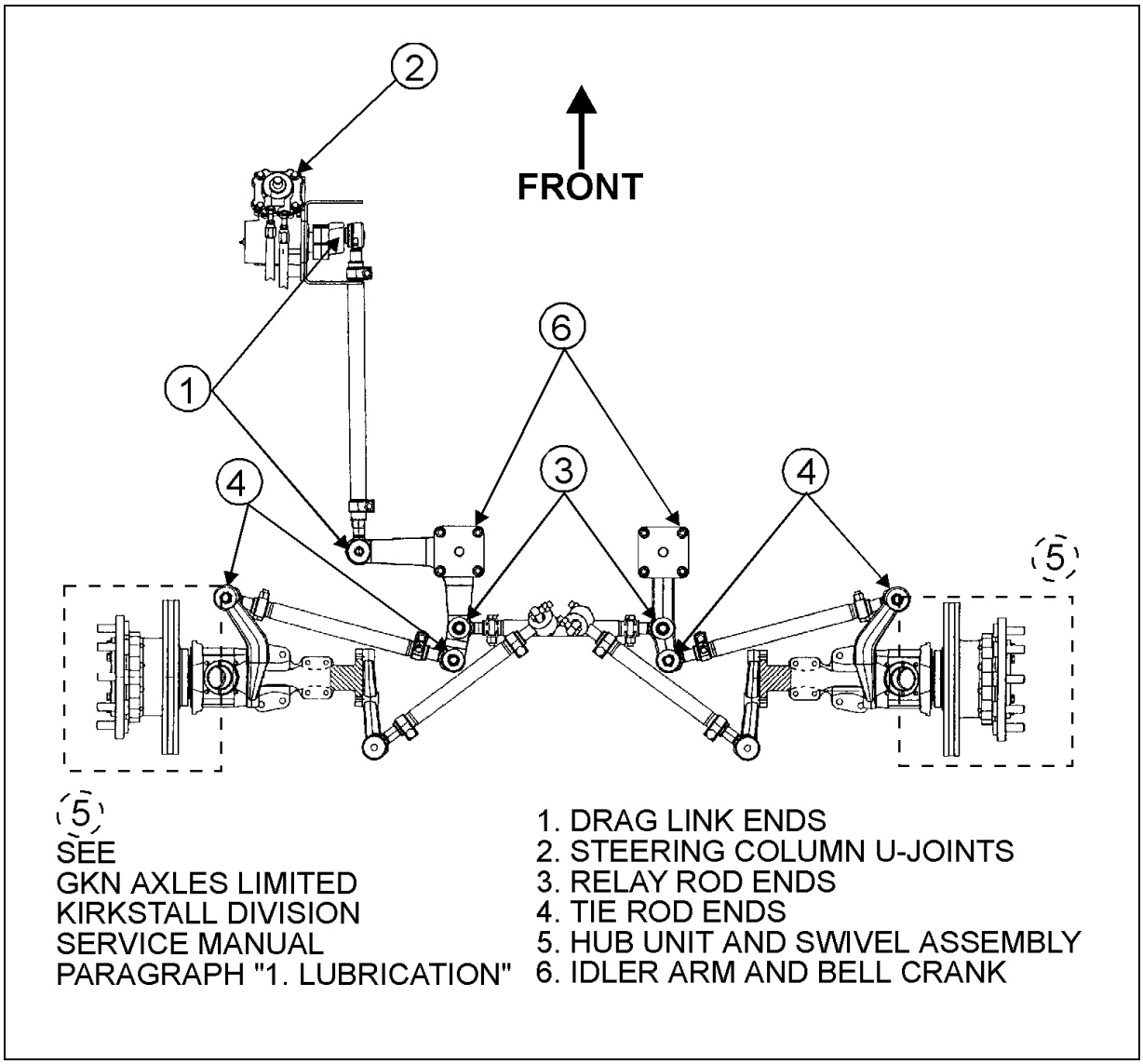


FIGURE 11: LUBRICATION FITTINGS' LOCATION DIAGRAM 16046

2.11 Power Steering Hydraulic Pump

Refer to the "TRW Power Steering Pump Service Manual" annexed at the end of this supplement.

3. INDEPENDENT FRONT SUSPENSION JOINTS

3.1 Lower and Upper A-Arm Ball Joint (Bonded Rubber Bush)

3.1.1 Instructions

The assembly work may be done only by a recognized specialised 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 which is repaired, i.e. use of only part of a repair set is not permissible. All numeral or letter designations mentioned below refer to figure 12.

3.1.2 Stripping Down

Strip down the defective joint through removal of locking ring (3), annular spacer (2) and ball pin/bushing, assembly (1) and thereafter clean out housing bore and locking circlip groove.

3.1.3 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 (Prévost # 611114)).*

2. Insert ball pin/bushing, assembly (1). 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 (C) and mount annular assembly tool (B) on the housing. Then locate annular spacer (2) and locking circlip (3) in the housing using axial load Fwith the aid of assembly matrix (A) (For axial load, refer to table 1) (For Prévost tools #, refer to table 2) . 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 locking circlip. Pay attention during assembly to ensure that the locking circlip eyelets are located at each side of the housing shaft axis (locking circlip eyelet lug points to tube), and that locking circlip (3) is properly engaged in the groove of the housing.

TABLE 1

Suitable for repair kits Prévost #	Position	Axial load F (kN)
611111	Upper A-arm	120
611114	Lower A-arm	160

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

In special cases where it is necessary to repair defective ball pin assemblies with sealing caps the following must be observed : Dismounting of the sealing cap cannot take place without destruction and after repair work is complete it must be replaced with a new one.

TABLE 2

Suitable for repair kits Prévost #	ORDER PRÉVOST TOOLS # SEE FIGURE 12		
	A	B	C
611111	683108	683109	683110
611114	683111	683112	683112

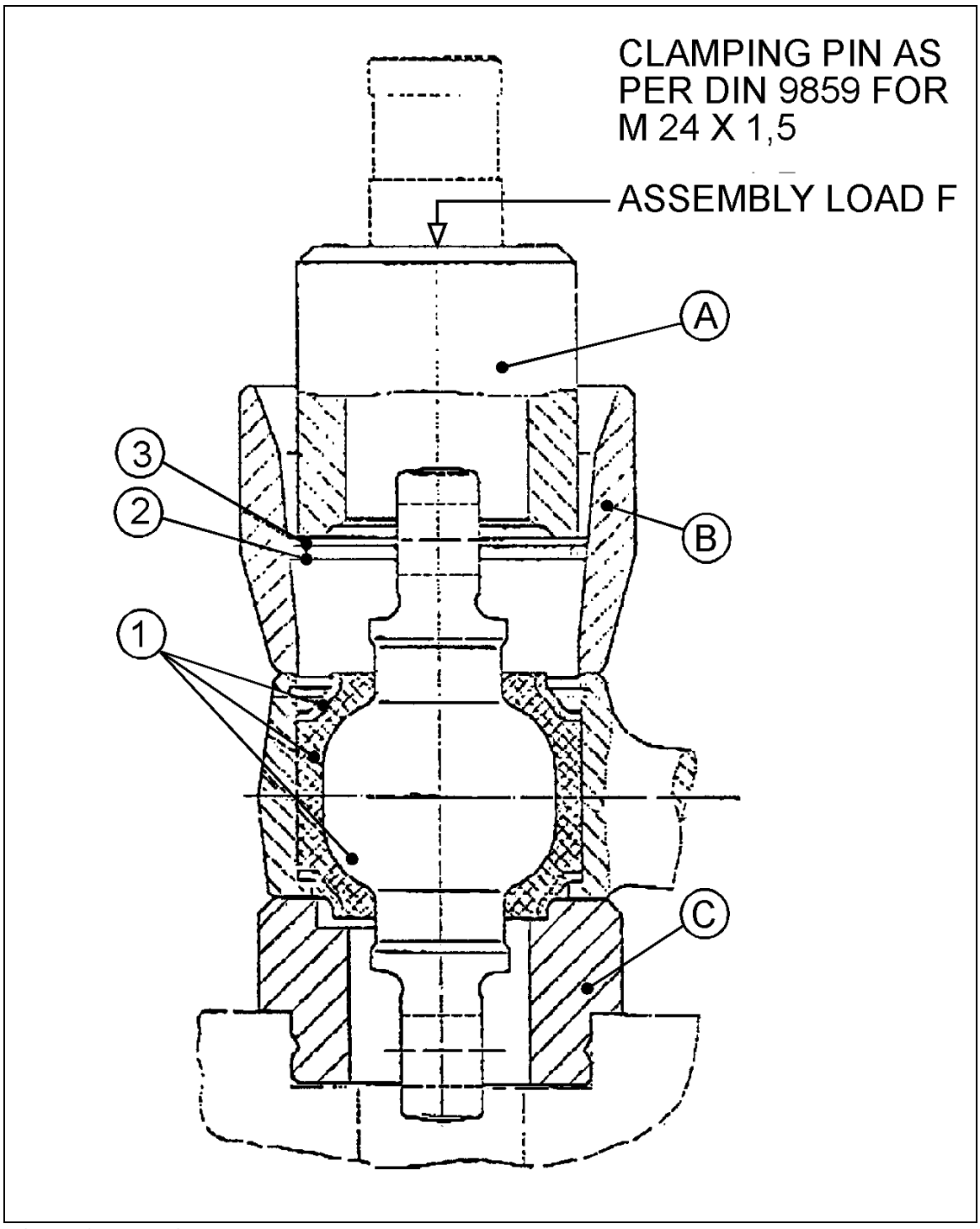


FIGURE 12: BALL JOINT 16047

3.2 Lower A- Arm Central Joints (Bt-Sectional Bearing System)

3.2.1 Instructions

All reference numbers mentioned refer to component parts shown in figure 13.

3.2.2 Stripping Down

1. The joint is to be stripped down in the following sequence :
2. Remove sheet metal-cap (10) with annular seal (11) and then loosen tightening clip (7).
3. Screw out necked down bolt (14) and use hex screw M 24 x 1.5 x 50 (DIN 961) to press bracket (15) out of ball sleeve (1).
4. Remove sealing boot (6) with tightening clip (7) and clamping ring (8).
5. Remove circlip (5) and strip down the bearing elements of the joint (12), (3), (1) and (2). Then clean out the housing bore and the circlip groove.

3.2.3 Assembly

Assemble the new component parts of the joint in the following sequence:

1. Insert into housing lower elements (3) and (2) : ensure that ball surface has first been greased. Then insert bearing element (1) and the upper bearing elements (2) and (3) and finally bearing element (12).
2. Place joint in fixture (C) and mount assembly ring (B) on housing. Thereafter apply axial pressure F1 through press tool (A) to insert circlip (5) in housing groove (For axial load, refer to table 3). Attention is to be paid to ensure that the circlip eyelets are positioned at approximately 90° to the axis of the tube and that the circlip is properly seated in the housing groove) (For Prévost tools #, refer to table 5).

TABLE 3		
Suitable for repair kits Prévost #	**Position**	**Axial load F1 (kN)**
611112	Lower A-arm	200

3. Use assembly sleeve (D) to mount sealing boot (6) including clamping ring (8) on bracket (15). Attention is to be paid to ensure that the clamping ring maintains its correct position in the clamping ring groove.
4. Faultlessly apply grease by mechanical means to bracket-outer core (15) and ball-inner cone (1). Insert bracket outer cone in fixture (E) with distance ring (G) and then use press tool (H) to apply pressure F2 to press mount with ball-inner cone (For axial load, refer to table 4).

TABLE 4		
Suitable for repair kits Prévost #	**Position**	**Axial load F2 (kN)**
611112	Lower A-arm	100

3. After lifting out of fixture prematurely mount, torque bolt M 14 x 1.5 between 3 to 4 N•m. Finally use a torque wrench to tighten bolt with a tightening torque of 135 N•m. Ensure that the maximum rotation during tightening does not exceed one complete turn. If the specified tightening torque is not reached during one turn, the bolt is to be replaced with a new one.
4. Fill the cavity under the sealing boot (6) with grease and fix tightly to housing with tightening clip (7).
5. Fill the upper cavity of the joint with grease and then mount annular seal (11) and sheet-metal cap (10).
6. Either fix sheet-metal cap to housing through screwing it into place or through 4 spot i.e. according to individual design specifications.

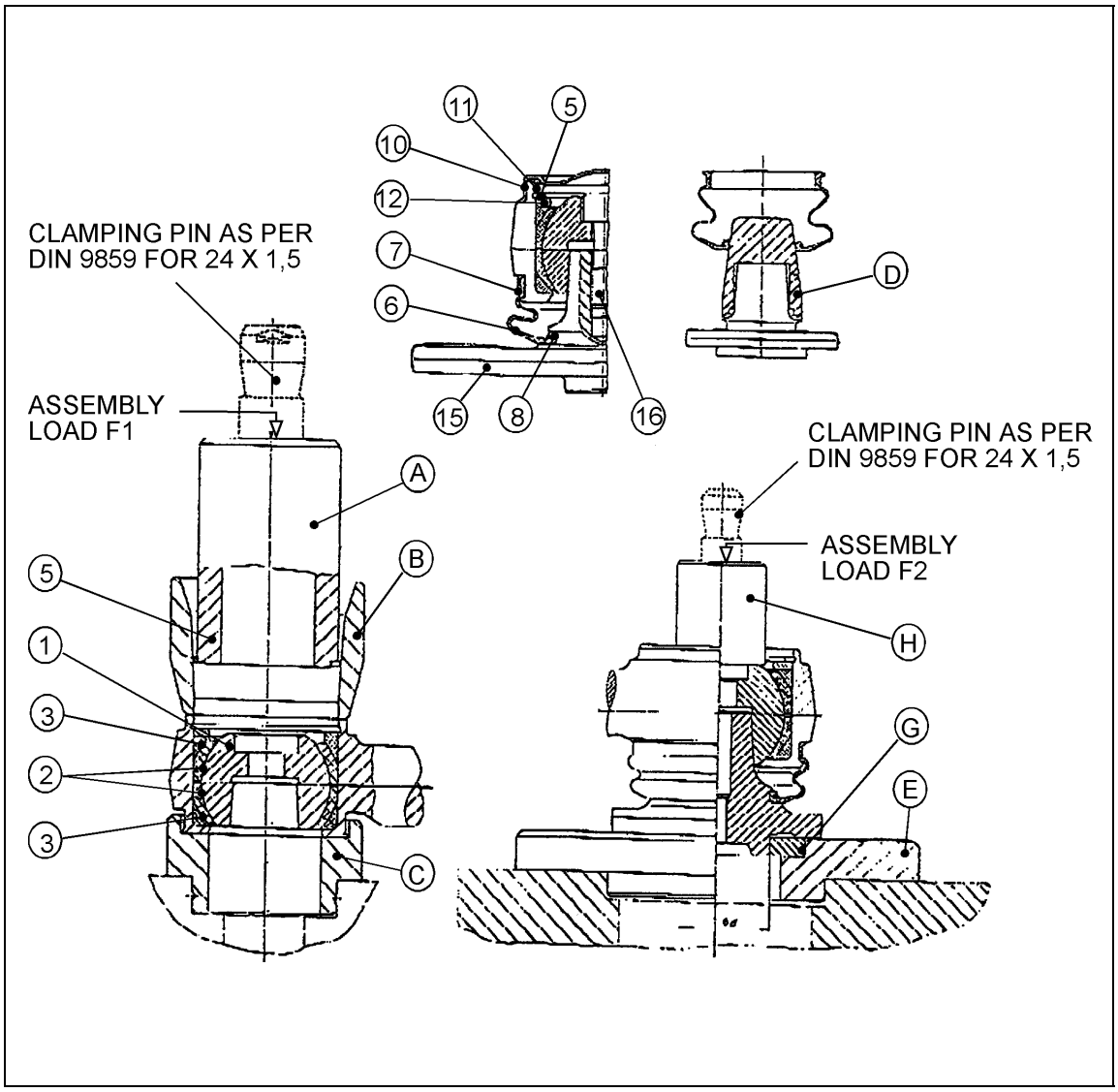


FIGURE 13: CENTRAL JOINT 16048

TABLE 5							
Suitable for repair kits Prévost #	**ORDER PRÉVOST TOOLS # SEE FIGURE 13**						
	A	**B**	**C**	**D**	**E**	**G**	**H**
611112	683114	683115	683116	683117	683118	683120	683119

3.3 Upper A-Arm Ball Joints (One-Part Bearing System)

3.3.1 Instructions

All reference numbers mentioned below refer to component parts shown in (Fig. 14).

To repair order Prévost kit # 611108.

3.3.2 Stripping Down

Stripping down of the defect joint is to be done in the following sequence:

1. Remove hose clip (6) and clamping ring (7).
2. Take off sealing boot (5).
3. Open up through forcing back peening point and screw out the end ring with hook-spanner (A)) (For Prévost tools #, refer to table 6). Remove joint bearing elements (1 and 2) and thereafter clean out ball shaped-housing.

3.3.3 Assembly

Reassemble the joint with the new component parts in the following sequence :

1. Insert bearing element (1) (with threaded shaft in vertical position) and (2) (preas-sembled with grease) in ball shaped-housing.
2. Screw end ring onto housing using hook spanner.
3. Fix end ring to housing through peening again at one point.
4. Fit sealing boot (5).
5. Fill space under sealing boot with special LM-grease (20 g ± 1,5 g). Make sure that sealing boot is properly seated in the housing retaining groove and then fit hose clip (6) and clamping ring (7).

TABLE 6

Suitable for repair kits Prévost #	ORDER PRÉVOST TOOLS # SEE FIGURE 14
	A
611108	683121

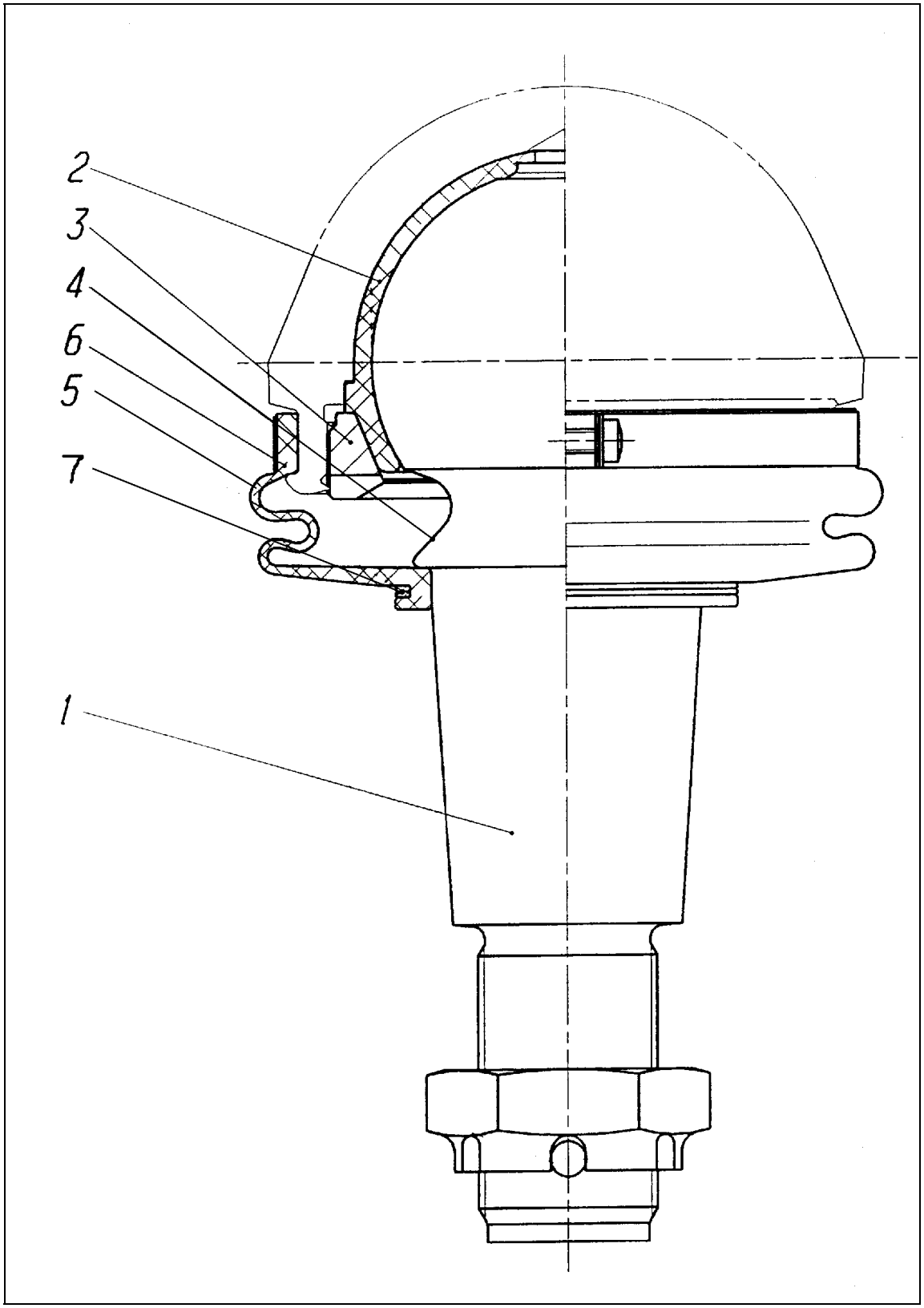


FIGURE 14: BALL JOINT 16049

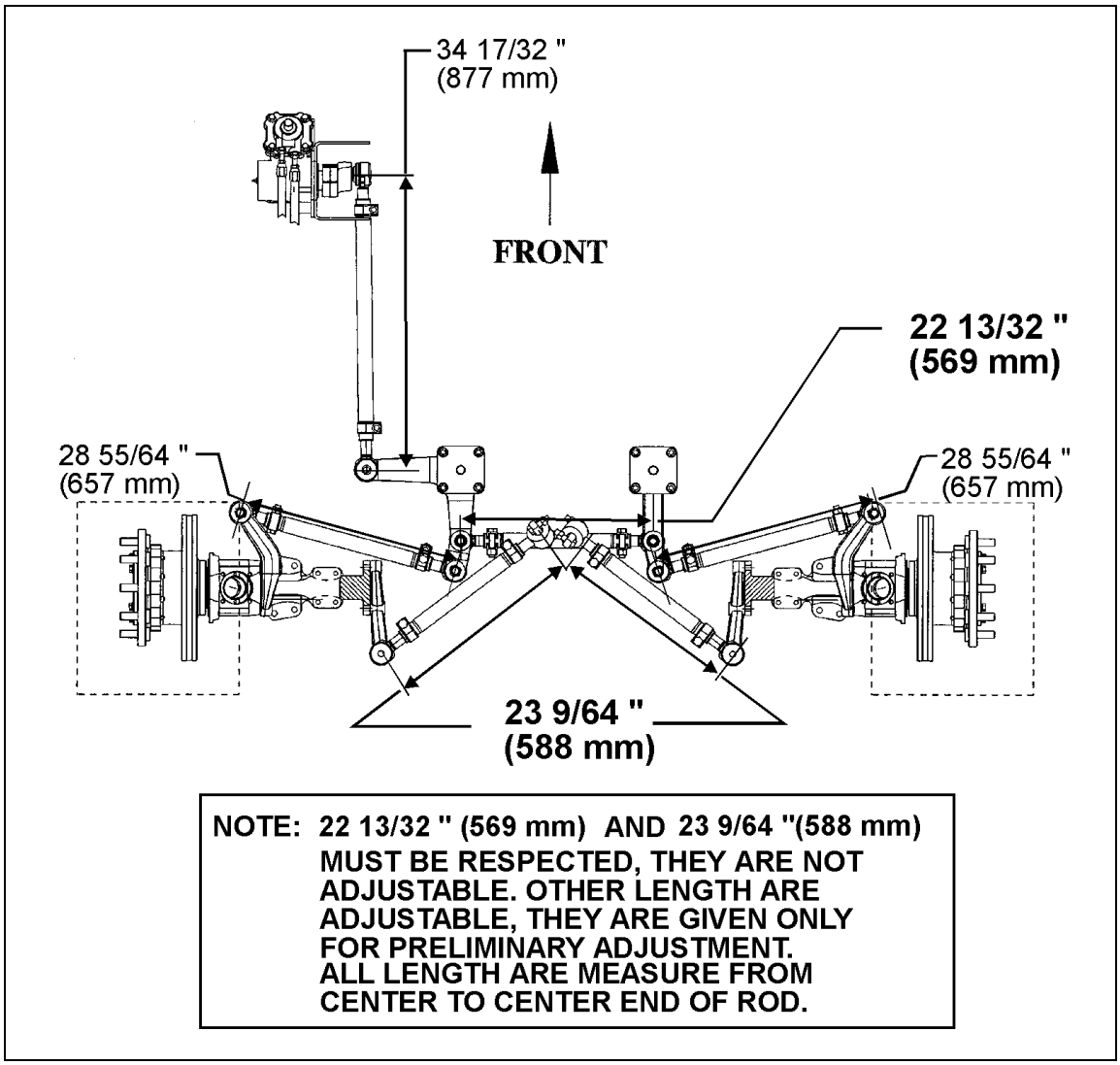


FIGURE 15: STEERING LINKAGE MEASURE 16050

4. FRONT END ALIGNMENT

Proper front end alignment must be maintained to insure ease of steering and provide satisfactory tire life. When making front end alignment inspections, the vehicle must be level and empty with the full weight of the vehicle on the wheels.

Front end alignment inspections fall into two groups : regular service inspections performed at periodic intervals, and inspections to determine the extent of damage after a collision or severe service.

Regular service inspections concern toe-in, camber and caster. Any variation from the specified alignment will indicate either a need for adjustment or a more thorough inspection to determine if parts replacement is required.

4.1 Definition Of Terms

4.1.1 Wheel Camber

The amount the wheels are inclined from the vertical plane (A, Fig. 16).

4.1.2 Wheel Toe-In

The distance the front wheels are closer together at the front than at the rear of the tires (D minus E, Fig. 16).

4.1.3 Front Axle Caster

The inclination of the king pin from vertical in the fore and aft direction (C, Fig. 16).

4.1.4 King Pin Inclination

The inclination of the king pin from vertical toward the center of the vehicle at the top and outward at the bottom (B, Fig. 16).

4.2 Front End Inspection

Before checking front end alignment, make the following inspection :

1. Check that the vehicle is at normal ride height (see paragraph "8. Suspension Height Adjustment").
2. Check the tires for proper inflation.
3. Check wheel installation and run-out.
4. Check wheel bearing adjustment.
5. Check tie rods and drag link ends for looseness.
6. Check king pins for looseness.
7. Check if the length of the torque rod is 23 9/64" (588 mm) (Fig. 15). Check if the length of the relay rod is 22 13/32" (569 mm)

4.3 Front Wheel Camber

Positive camber is the outward inclination of the wheels at the top, negative or reverse camber is the inward inclination of the wheels at the top. Camber variations may be caused by wear at the wheel bearings, wheel spindle bushings, or bent suspension parts.

Check camber, with an accurate gauge. If camber is incorrect, check suspension parts for wear and replace worn parts. If wear is not perceptible, suspension parts may be bent or lower suspension arm may be improperly shimmed.

Check King pin inclination. If King pin inclination is incorrect, readjust the camber and check king pin inclination again.

Note: *Camber is more important than king pin inclination, so adjust camber and verify king pin inclination.*

When shimming the lower suspension arm, an equal number of shims MUST be used at each mounting bolt (Fig. 16). This allows the proper clamp load to be maintained at each bolt. If the king pin inclination is incorrect, the wheel king pin assembly may be bent and therefore should be replaced.

Excessive positive camber results in irregular wear of the tires at the outer shoulders. Negative or reverse camber causes wear at the inner shoulders.

Note: *Shim only the lower suspension arm to adjust the front wheel camber.*

4.4 Front Wheel Toe-In

Toe-in is measured from the center of the tire treads. Measurements at the front and rear of the tires must be made at the same height from the floor. Incorrect toe-in results in excessive tire wear and steering instability with a tendency to wander.

4.5 Toe-In Check

1. Check the camber adjustment and adjust if necessary.
2. Hoist the front of the vehicle and spin the wheels marking the centerline of the tire treads.
3. Place the wheels in the straight ahead position and bring the vehicle to rest on the floor.
4. Roll the vehicle ahead several feet. This removes any slack caused by looseness in the wheel bearings or steering connections.
5. Check the distance between the tire centerlines at the front and rear of the front tires. These two measurements must be made at the same height above the floor. The front measurement must be 3/32 ±1/32 of an inch less than the rear measurement.

4.6 Toe-In Adjustment

1. Disconnect the drag link from the bell crank.
2. Loosen the tie rod clamp bolts.
3. Using a pipe wrench, turn the tie rod tubes to obtain the toe-in measurement specified in step 5 under paragraph "4.5 Toe-in Check" of this Supplement.
4. Tighten the tie rod clamp bolts and re-check toe-in.
5. Check that the angular relationship of the pitman arm to the steering gear is as shown in figure 7.
6. Adjust the drag link to mate with the bell crank and install the drag link.

Note: *Use only tie rods to adjust toe-in.*

4.7 Front Axle Caster

Positive caster is the inclination of the king pins toward the rear of the vehicle. Negative or reverse caster is the inclination of the king pins toward the front of the vehicle. This vehicle is designed with positive caster. The purpose of caster is to provide steering stability by keeping the wheels in a straight ahead position.

Caster variations may be caused by bent upper suspension arm, lower suspension arm, or king pin housing. Caster can not be adjusted. Incorrect caster must be corrected by replacing the damaged suspension parts. Precision instruments should be used to measure caster.

Variations from the specified caster will affect steering stability, cause wandering, wheel shimmy, and reduce returnability when pulling out of curves.

4.8 Major Damage

If the suspension has major damages, it may be necessary to shim the bell crank and the idler arm to avoid the bump steer or roll steer. Moreover refer to paragraph "4. Front End Alignment".

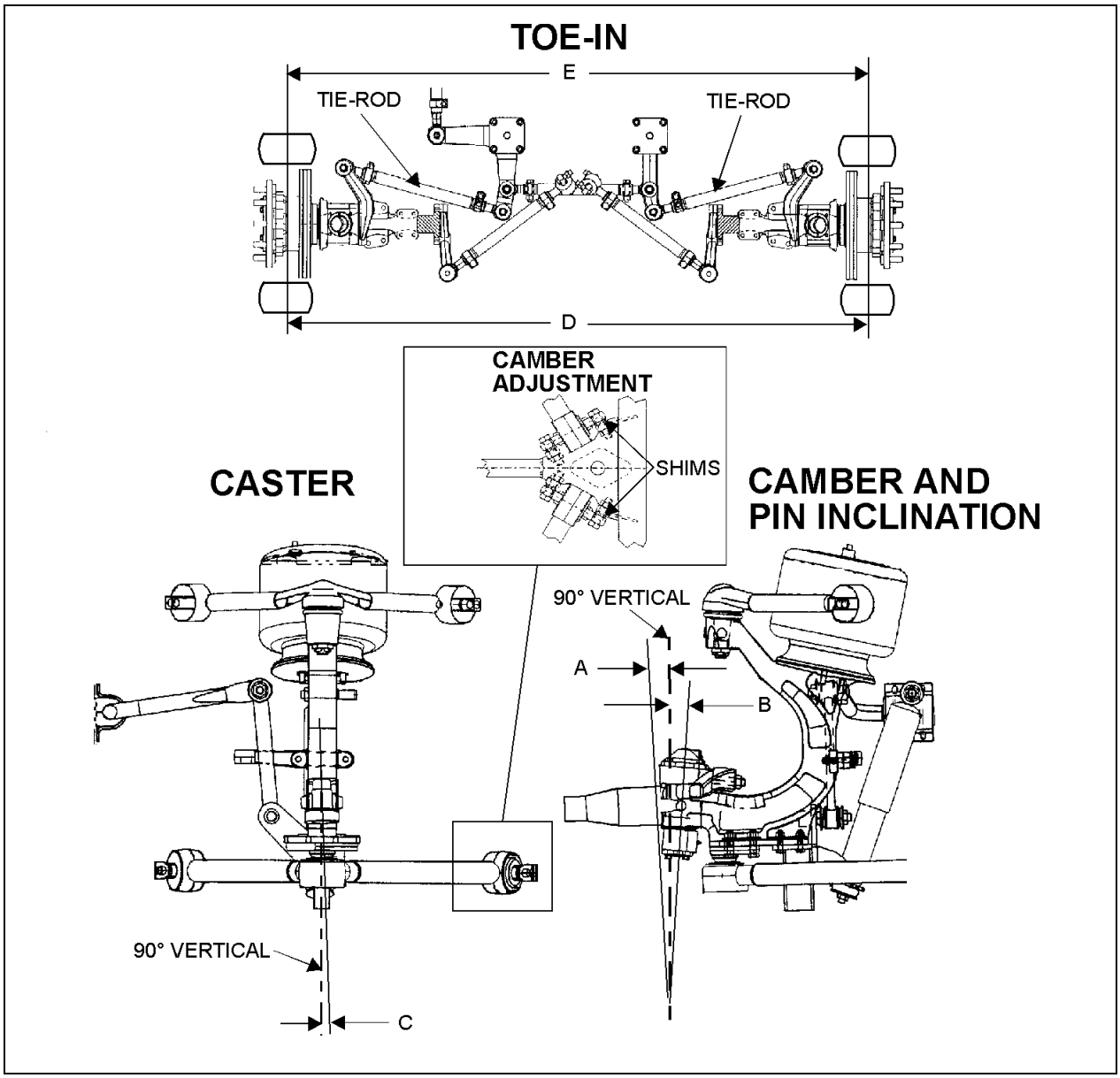


FIGURE 16: FRONT END ALIGNMENT DIAGRAM 16051

DIAGRAM SPECS (SEE FIGURE 16)		
A	WHEEL CAMBER	1/8° ± 1/4°
B	KING PIN INCLINATION	6,5° (not adjustable)
C	CASTER	2° (not adjustable)
D-E	TOE-IN	3/32 ± 1/32 inch.

5. AIR SPRING MAINTENANCE (FRONT AIR SPRINGS)

Two *"rolling lobe"* type air springs are used with the independent front suspension, one at each wheel. These air springs are special and use the complete piston as an extra reservoir to lower the spring stiffness. Front air springs are attached to the subframe and to uprights.

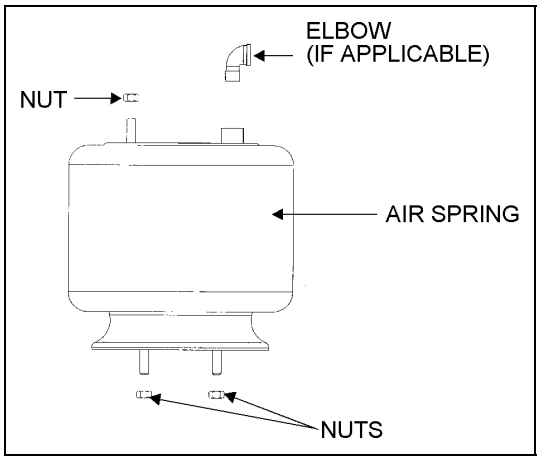


FIGURE 17: AIR SPRINGS 16052

5.1 Inspection

1. Check operation of bellows.
2. Visually inspect bellows for evidence of cracks, punctures, deterioration, or chafing. Replace the bellows if damage is evident.
3. With the primary air system at normal operating pressure (95 - 125 psi (655 - 860 kPa)), coat all suspension air line connections and bellow 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 leakage is detected, replace bellow.*

Warning: *To prevent personal injury, do not apply more than 10 psi (69 kPa) air pressure with the air spring unmounted.*

5.2 Removal

Note: *Front air springs can be removed without removing the entire suspension assembly.*

1. Safely support vehicle at the recommended body jacking points and jack up body understructure.
2. To gain access to a given air spring, the corresponding wheel can be removed.

Caution: *Only the recommended jacking points must be used as outlined in Section 18, "Body" in the maintenance manual.*

3. Support the assembly with a suitable jack.
   See figure 18 for jacking point.
4. Exhaust compressed air from accessory air tank by opening drain cock under reservoir.
5. 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.*

6. 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.
7. Remove the two air springs upper nuts, and then the two lower nuts. Remove air spring and remove the back up plate from the top of the air spring.

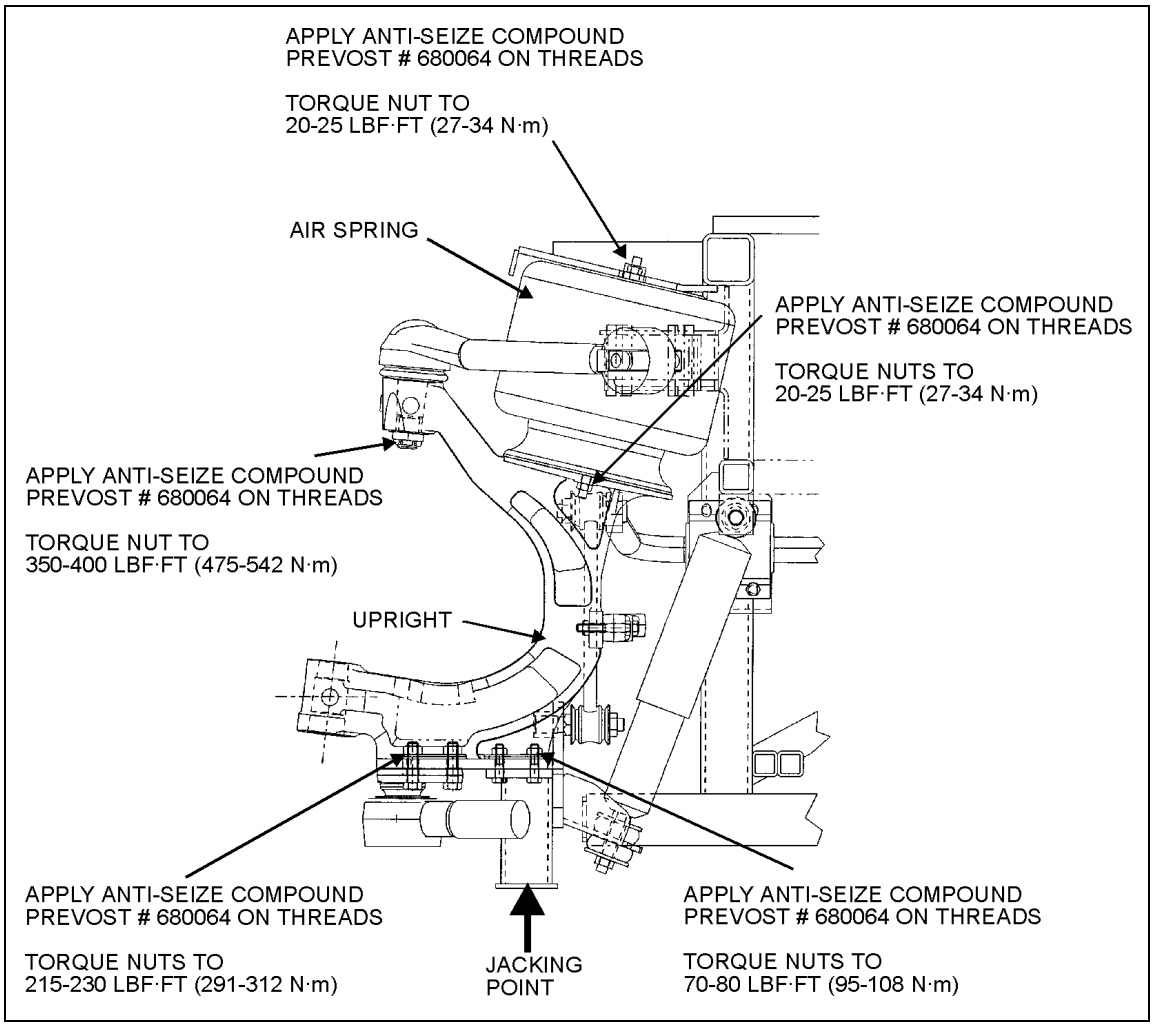


FIGURE 18: AIR SPRING AND SHOCK ABSORBER 16053

5.3 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.
2. Tighten and torque the lower stud nuts, and then the upper nut to 20 - 25 lbf·ft (27 - 34 N·m).
3. Install elbow (if applicable), then connect air line.
4. Connect the height control valve link.
5. 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.*

6. 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.
7. Remove the hydraulic floor jack from underneath shock absorber bracket.

6. SHOCK ABSORBER

The two front shock absorbers are double-acting and telescopic type. Shock absorbers ensure a smooth ride and enhance vehicle stability on the road. Front shock absorbers have eye-type mountings on the upper side and bayonet type on lower side. Shock absorbers are non-adjustable and non-repairable.

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.*

6.1 Shock Absorber Removal

1. Remove the nut, washer and rubber joint from shock absorber mounting stud. Discard the rubber joints.
2. Remove the nut and washer from shock absorber mounting pin (upper side), taking care to identify the inner and outer washers to ease reinstallation. Refer to figure 19 for details.
3. Remove the shock absorber from the vehicle.
4. Remove inner: washers, rubber joint and bushings from the shock absorber. Discard bushings and rubber joint.

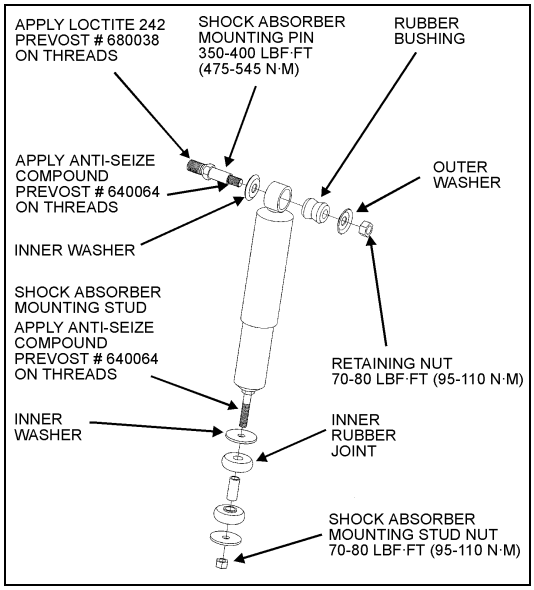


FIGURE 19: SHOCK ABSORBER 16054

6.2 Shock Absorber Installation

1. Check that the shock absorber mounting pin is properly torqued (350 - 400 lbf·ft (475 - 545 N·m)). Ensure that the stud is clean and not stripped (upper side).
2. Install new rubber (mounting) bushing on shock absorber (upper side).
3. Place the inner washer on shock absorber pin (Fig. 19).
4. Install washer and rubber joint on shock absorber mounting stud (lower side).
5. Install the shock absorber as shown in figure 18 with the mounting stud protruding through the hole in the mounting bracket and the shock absorber eyes over the mounting pins. Install the outer washer.
6. Place a rubber joint and washer on the shock absorber mounting stud. Place the lower shock absorber mounting stud nut and torque to 70 - 80 lbf·ft (95 - 110 N·m).
7. Place the upper mounting pin stud nut and torque to 70 - 80 lbf·ft (95 - 110 N·m).

7. SWAY BAR

A sway bar is provided on the front and drive axles to increase vehicle stability. It controls lateral motion (swaying movement) of vehicle.

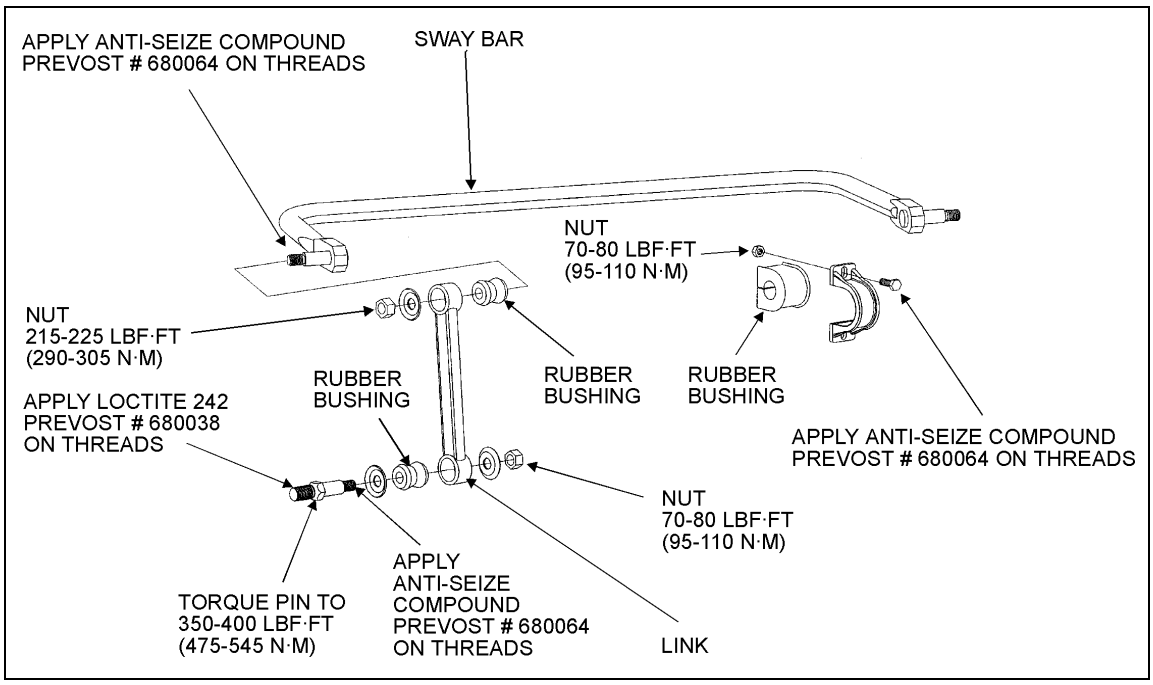


FIGURE 20: SWAY BAR (FRONT SUSPENSION) 16055

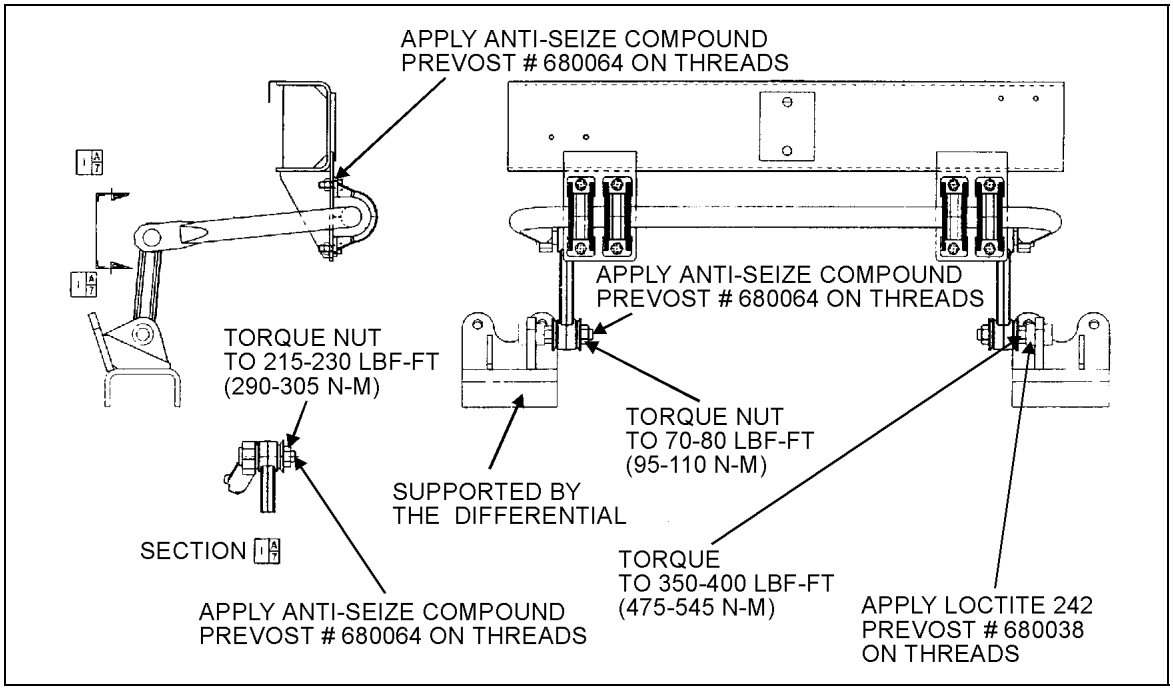


FIGURE 21: SWAY BAR (DRIVE AXLE) 16056

7.1 Sway Bar (Front Suspension)

7.1.1 Removal

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

Note: *Sway bar bushings are slitted to ease their removal.*

7.1.2 Installation

1. Loosely install the sway bar.

2. Torque bushing collar nuts to 70 - 80 lbf•ft (95 - 110 N•m).
3. Torque sway bar link upper nuts to 215 - 225 lbf•ft (290 - 305 N•m) and lower nuts to 70 - 80 lbf•ft (95 - 110 N•m).

7.2 Sway Bar (Drive Axle)

7.2.1 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.*

7.2.2 Installation

1. Loosely install the sway bar.
2. Torque the eight bushing collar nuts to 70 - 80 lbf•ft (95 - 110 N•m).
3. Torque sway bar link upper nuts to 215 - 230 lbf•ft (290 - 305 N•m) and lower nuts to 70 - 80 lbf•ft (95 - 110 N•m).

8. INDEPENDENT FRONT SUSPENSION ADJUSTMENT

Converted coach shell is equipped with "LEVEL-LOW" leveling system. The purpose of the "LEVEL-LOW" is to adjust suspension in three separate points (front, rear right and rear left air springs) in order to level vehicle body. Three height control valves, automatically control air pressure in the three separate points (air springs) and maintains a constant vehicle height regardless of load, or load distribution. The control solenoid valve supplies air to the five way three-position air control valve, which bypasses the height control valve, and opens a passage to allow the air control and exhaust valve to release/supply air from airs springs. To improve road comfort, an expansion air tank is installed in series with each air springs.

In addition to the above suspension components the system also includes : sway bar, upper and lower suspensions, bars and shock absorbers (Fig. 1).

Note: *Only for preliminary adjustment, refer to figure 15. Torque rod length must be fixed to 23 9/64" (588 mm) and relay rod to 22 13/32" (569 mm).*

Caution : *Parts must be replaced by ones with the same part numbers or with equivalent parts, if replacement becomes necessary. Do not use parts of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.*

8.1 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 (Fig. 22). 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.

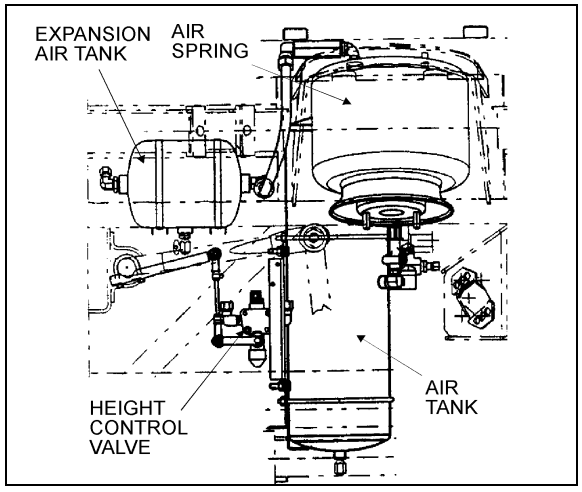


FIGURE 22: HEIGHT CONTROL VALVE LOCATION 16057

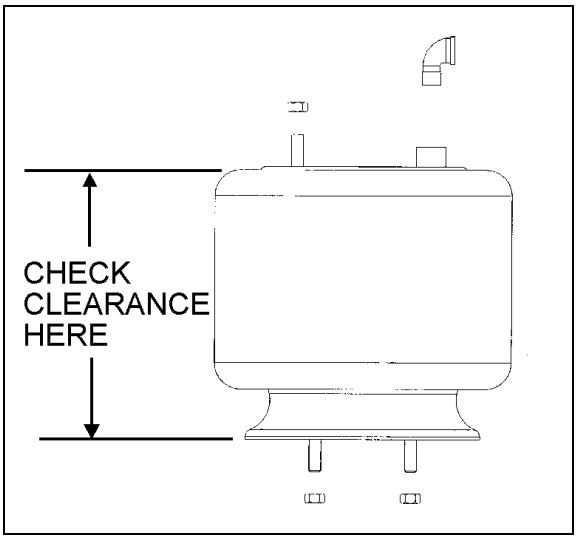


FIGURE 23: TYPICAL AIR SPRING CLEARANCE 16058

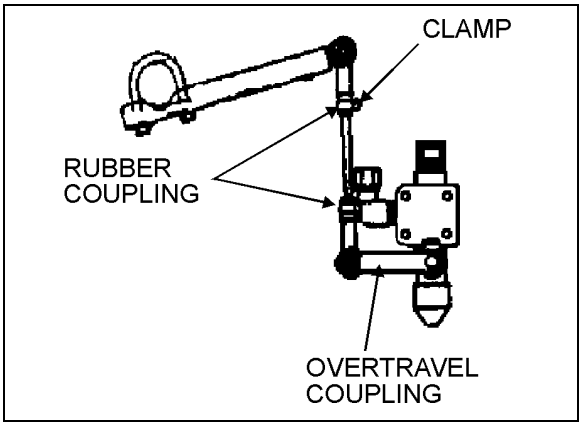


FIGURE 24: FRONT HEIGHT CONTROL VALVE 16059

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 11.7 inches (297.3 mm). Refer to figure 23 to identify the correct area to take measurement. The rear air springs clearance should be 11.5 ± 0.25" (292 ± 6 mm) (refer to XL Maintenance Manual, Section 16, paragraph "7. SUSPENSION HEIGHT ADJUSTMENT" for rear height control valves' adjustment). 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.*

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 (95 - 125 psi (655 - 860 kPa)), measure air spring clearance. This clearance should be 11.7 inches (297.3 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 23 for more details). If adjustment is required, begin with the drive axle.*

2. Loosen the clamp on the rubber coupling and bring it up or down (Fig. 24).

Note: *Allow suspension to stabilize before taking reading.*

3. When the desired height is obtained, tighten clamp.

REAR AIR SPRINGS CLEARANCE

1. Refer to XL Maintenance Manual, Section 16, paragraph "7. SUSPENSION HEIGHT ADJUSTMENT".

9. HEIGHT CONTROL VALVE

9.1 Operation

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:

9.1.1 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.

9.1.2 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.

9.1.3 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.

9.2 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.

9.2.1 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.

10. "LEVEL-LOW" LEVELING SYSTEM (IF APPLICABLE)

The purpose of the *"level-low"* leveling system is to adjust suspension in three separate points (front, rear right and rear left) in order to level vehicle body. This system can be put into service when the ignition key is turned to the *"ON"* position, and must be used only when the parking brake is applied. The *"level-low"* warning light on the dashboard indicates that the push-button shifter is not in the *"DRIVE"* position. Level low system controls are located on L.H. side control panel.

10.1 Principles of Operation

Refer to the systems pneumatic diagram annexed at the end of this section.

11. AIR SYSTEM

The basic air system consists of an air compressor, tanks, valves, filters and interconnecting lines and hoses (refer to 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 supplement for better understanding of the system.

11.1 Air Tanks' Locations and Functions

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. 25).

In addition, an expansion air tank is installed in series with each air spring.

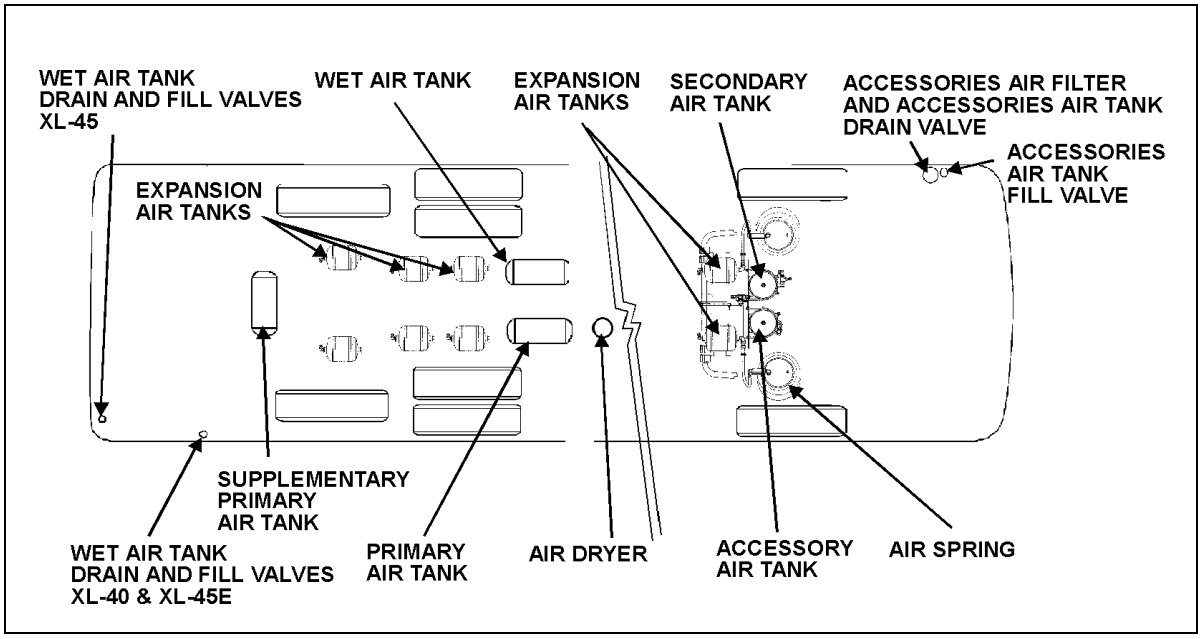


FIGURE 25: AIR TANKS' LOCATIONS 16060

11.2 Air Tank Maintenance

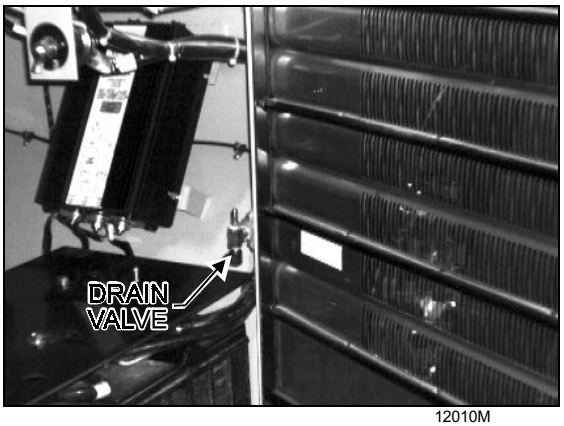
Ensure that the accessory air tank is purged during pre-starting inspection. A good practice is to purge this tank at the end of every working day by the remote air tank drain valve located in the steering compartment (Fig. 28).

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

11.2.1 Wet Air Tank

This tank is installed above L.H. wheel of drive axle, 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. On XL-40 & XL-45E converted coach shell vehicles, the valve is positioned over battery assembly, close to door hinge (Fig. 26). On XL-45, the valve is positioned under back up alarm, close to L.H. side of door opening (Fig. 27).



12010M

FIGURE 26: REAR VALVE LOCATION (XL-40 AND XL-45E)

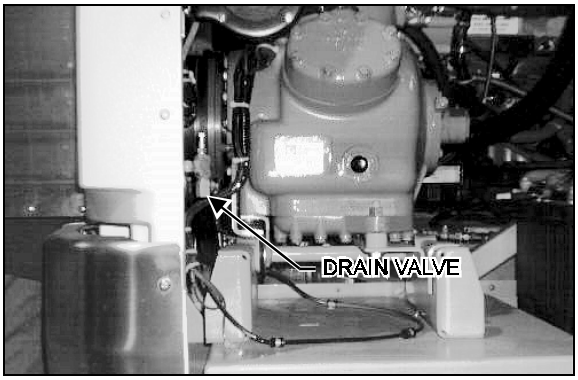


FIGURE 27: REAR VALVE LOCATION (XL-45) 12016M

11.2.2 Primary Air Tank

The primary air tank is located above R.H. wheel of drive axle.

To increase primary air tank volume, a supplementary air tank is added in series to the primary air tank. This supplementary tank is located underneath vehicle forward of tag axle.

These tank are provided with a bottom drain valve (Fig. 25). It is recommended to purge them by their bottom drain valve every 12,500 miles (20 000 km) or once a year, whichever comes first.

11.2.3 Secondary Air Tank

This tank is located in front wheelhousing, between air springs. The tank is installed vertically and is provided with a bottom drain valve (Fig. 25).

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.

11.2.4 Accessory Air Tank

The accessory air tank is installed next to the secondary air tank. The tank is installed vertically and is provided with a bottom drain valve (Fig. 25).

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 steering compartment (Fig. 28) at bottom of the accessory air filter. Refer to Section 12, paragraph "4. Accessory Air Filter" of the maintenance manual for daily purge procedure.

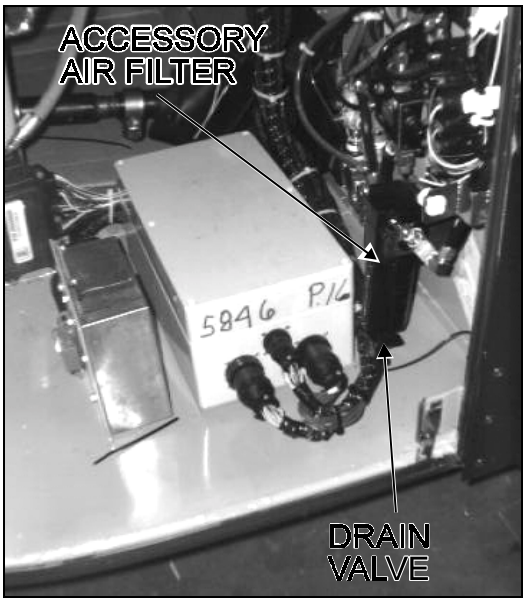


FIGURE 28: STEERING COMPARTMENT 12089M

11.2.5 Expansion Air Tank

Two expansion tanks are located in front wheelhousing. These air tanks are located behind secondary and accessory air tank. Also, six expansion tanks are located near rear air springs (Fig. 25). Expansion tanks are connected in series with air springs. Expansion tanks are used to lower the stiffness of the air spring. They are provided with a bottom drain valve.

It is recommended to purge them, with all other tanks, every 12,500 miles (20 000 km) or once a year, whichever comes first.

11.3 Air System 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. On XL-40 & XL-45E, the valve is positioned over battery assembly, close to door hinge (Fig. 29). On XL-45 vehicles, the valve is positioned under back up alarm, close to L.H. side of door opening (Fig. 30).

FIGURE 29: REAR VALVE LOCATION (XL-40 & XL-45E)
12010

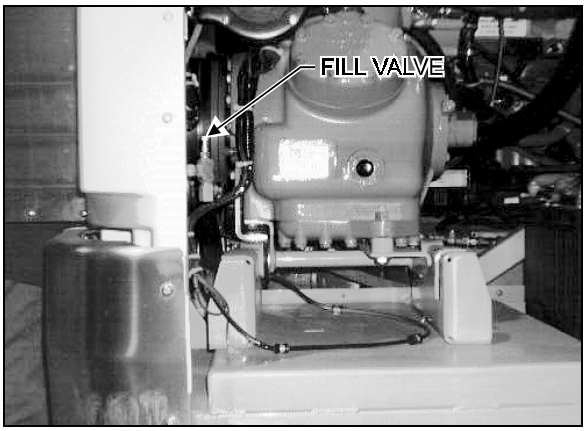


FIGURE 30: REAR VALVE LOCATION (XL-45) **12016**

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 steering compartment close to accessory air filter (Fig. 31).

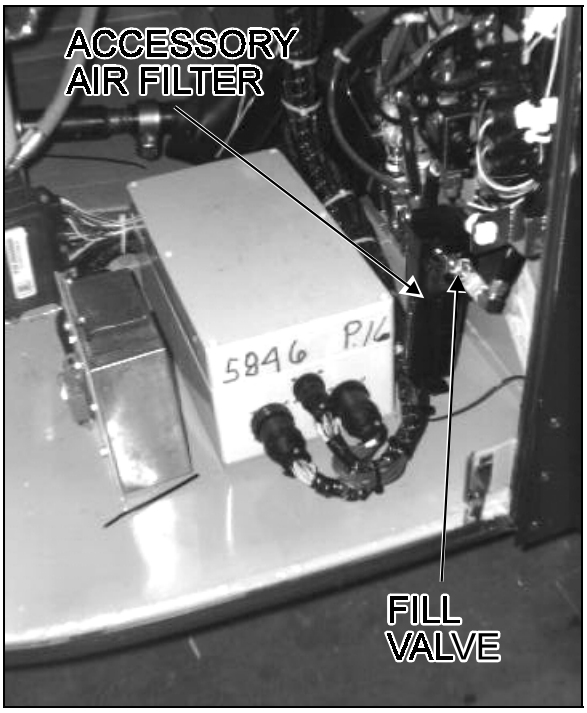


FIGURE 31: FRONT VALVE LOCATION 12089

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 Prévost. Do not fill air through any other points.*

12. AIR BRAKES

12.1 Disc Brakes

Knorr-Bremse SB7000 vented-type disc brakes are used on front wheels. The discs are actuated by 24 square inch effective area air brake chamber. The *Knorr-Bremse SB7000* brakes are supplied with automatic clearance (slack) adjusters as standard equipment for easier adjustment. For more information on disc brake components and maintenance, refer to the manufacturer's brochure at the end of this supplement.

12.1.1 Disc Brake Pads

Brake pads have to be checked on a regular basis depending on vehicle operation. The remaining thickness of the pads should never be less than 3/32 in (2 mm). To check pad condition without removing the wheel, verify the position of guide bushing relation to guide sleeve (Fig. 32). When guide sleeve is in alignment with guide bush, brake pad thickness has to be checked more precisely with wheel removed. When replacing the brake pads, all four pads on an axle have to be changed at the same time. There is no inner or outer pad, since all pads are the same.

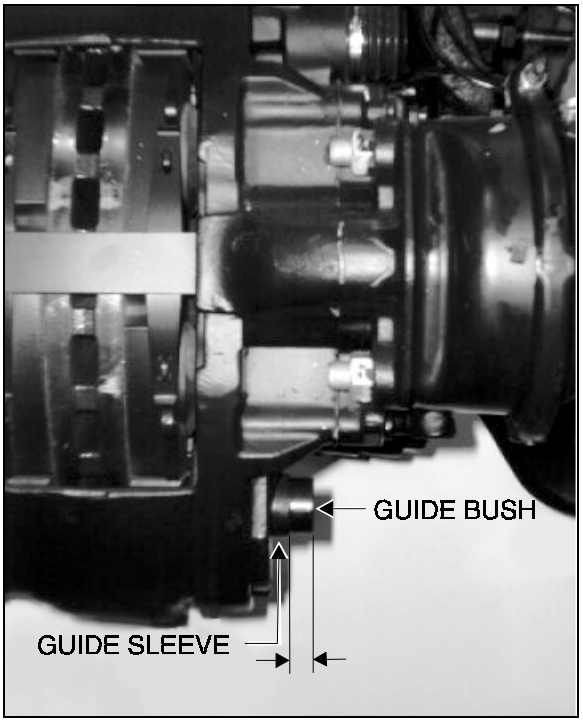


FIGURE 32: DISC BRAKE PADS CHECKING 12043

For information on how to change the brake pads, refer to the manufacturer's brochure, annexed to this supplement.

Note: *While braking in new brake pads, avoid long brake applications as well as harsh braking.*

13. BRAKE AIR CHAMBER

The front wheels are equipped with "Knorr-Bremse" brake chambers, used for service brake.

13.1 Maintenance

Refer to maintenance manual, Section 12, paragraph "16.2 Maintenance".

Caution: *On Knorr-Bremse air chamber (front wheels), do not use molybdenumsulphite combined grease. Use brake chamber with inner sealing, and ensure that the o-ring is in the correct position between the brake caliper and brake chamber.*

14. WHEELS AND TIRES

Either disc steel wheels or optional aluminum-polished wheels may be installed on the vehicle. Both are mounted with radial tubeless tires.

Both steel and aluminum wheel dimensions are 22.50 X 9 inches (571.5 X 228.6 mm) exept the inner dual wheel dimensions 22.5 X 8.25 inches (571.5 X 209.5 mm).

Recommended tire dimensions (in order of preference):

- 315/80 R 22.5;
- 12.75/80 R 22.5;
- 12.00 R 22.5;
- 295/80 R 22.5;
- 11.00 R 24.5.

15. HUB UNIT AND SWIVEL ASSEMBLY MAINTENANCE

Refer to GKN AXLES LIMITED KIRKSTALL DIVISION, Service Manual, annexed at the end of this Supplement.

16. TORQUE TABLE

DESCRIPTION	QTY	REFERENCE	TORQUE (DRY) lbf•ft / N•m	
Steering Gear to Mounting Bracket Bolt Nut	6	8	350-400	475-542
Pitman Arm to Steering Gear Clamp Bolt	1	8	275-300	373-407
Drag Link to Pitman Arm Stud Nut*	1	---	160	217
Drag Link to Bell crank Stud Nut*	1	---	160	217
Drag Link Socket End Clamp Bolt Nut	2	---	60-80	80-108
Relay Rod to Bell crank Stud Nut*	1	---	160	217
Relay Rod to Idler Arm Stud Nut*	1	5	160	217
Tie Rod to Bell crank Stud Nut*	1	---	160	217
Tie Rod to Idler Arm Stud Nut*	1	5	160	217
Tie Rod to Steering Arm Stud Nut*	2	3	160-215	217-291
Tie Rod End Clamp Bolt Nut	4	3	60-80	80-108
Steering Arm to Swivel Nut*	4	---	190-275	258-373
Torque Rod Stud Nut	2	4	160-215	217-291
Idler Arm and Bell Crank Mounting Bracket Nut	8	5	100-110	136-149
Idler Arm and Bell CrankCap Screws	8	9	8	11
Torque Rod Mounting Bracket Nut	4	6	215-230	291-312
Torque Rod Clamp Nut	4	4	53-59	72-80
Air Spring Nut	3	18	20-25	27-34
Upper A-Arm Stud Nut*	2	18	350-400	475-542
Lower A-Arm Bracket Nut	8	18	215-230	291-312
Jacking Point Bracket Nut	8	19	70-80	95-108
Shock Absorber Pin	2	19	350-400	475-545
Shock Absorber Pin Nut	2	19	70-80	95-110
Shock Absorber Mounting Stud Nut	2	19	70-80	95-110
Bushing Collar Nut	8	20	70-80	95-110
Sway Bar Link Upper Nut	2	20	215-225	290-305
Sway Bar Link Lower Nut	2	20	70-80	95-110
Sway Bar Pin	2	20	350-400	475-545

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

17. SPECIFICATIONS

Front Axle Brake Chambers

Make..... Knorr-Bremse
Type..... 24
Effective diaphragm area ... 24 sq.in. (154,8 sq.cm)
Supplier number..... BS 3517 II/31651
Prévost number..... 641309

Front Axle Air Springs

Make..... Goodyear Tire and Rubber
Diameter..... 12 inches
Air Inlet ..... 1/2''- 14 NPTF
Supplier number..... 1R12-377
Prévost number..... 630151

Shock Absorbers

Collapsed length..... 14.20 inches
Extended Length..... 22.45 inches
Piston diameter ..... 2 1/16 inches
Stroke ..... 8 ¼ inches
Prévost number..... 630136

Height Control Valve

Make..... Knorr
Supplier number..... SV1269L' 80086
Prévost number..... 630139

Steering Gear Box

Make..... TRW
Supplier number..... TAS85081
Prévost number..... 661008

Power Steering Hydraulic Pump

Make..... TRW
Supplier number..... PS251615L0200
Prévost number..... 661009

Shim (Camber Adjustment)

Thickness ..... 3.175 mm
Prévost number..... 160993

Thickness ..... 6.35 mm
Prévost number..... 160992

GKN AXLES LIMITED
KIRKSTALL DIVISION

SERVICE MANUAL

FOR AXLE TYPE S82

HUB UNIT AND SWIVEL ASSEMBLY

FITTED TO PRÉVOST'S
XL CONVERTED COACH SHELL
WITH INDEPENDENT SUSPENSION

REVISED BY PRÉVOST CAR INC.

CONTENTS

LIST OF ILLUSTRATIONS

1. LUBRICATION

Lubricate the top swivel bearing and the bottom swivel bush. They are provided with grease fitting for pressure lubrication (Fig. 1). These grease fittings should be serviced every 6,250 miles (10 000 km) or twice a year whichever comes first. Good quality lithium-base grease NLGI No. 2 (Shell Retinax LX or equivalent) is recommended.

Wheel hubs use oil lubrication which eliminates periodic grease repacking of the hubs. A sight glass is provided for convenient check of oil level. Oil level should be checked daily and must be maintained to the level mark in the sight glass. If oil is not visible through the sight glass, general purpose gear lubricant SAE 90 (A.P.I. spec. GL5) must be added by removing the fill plug in center of the hub cap to bring oil to the correct level. To check oil level after vehicle has been driven, wait at least 15 minutes to ensure that oil has settled. For hub unit removal or repairing, drain hub oil from drain plug (Fig. 1).

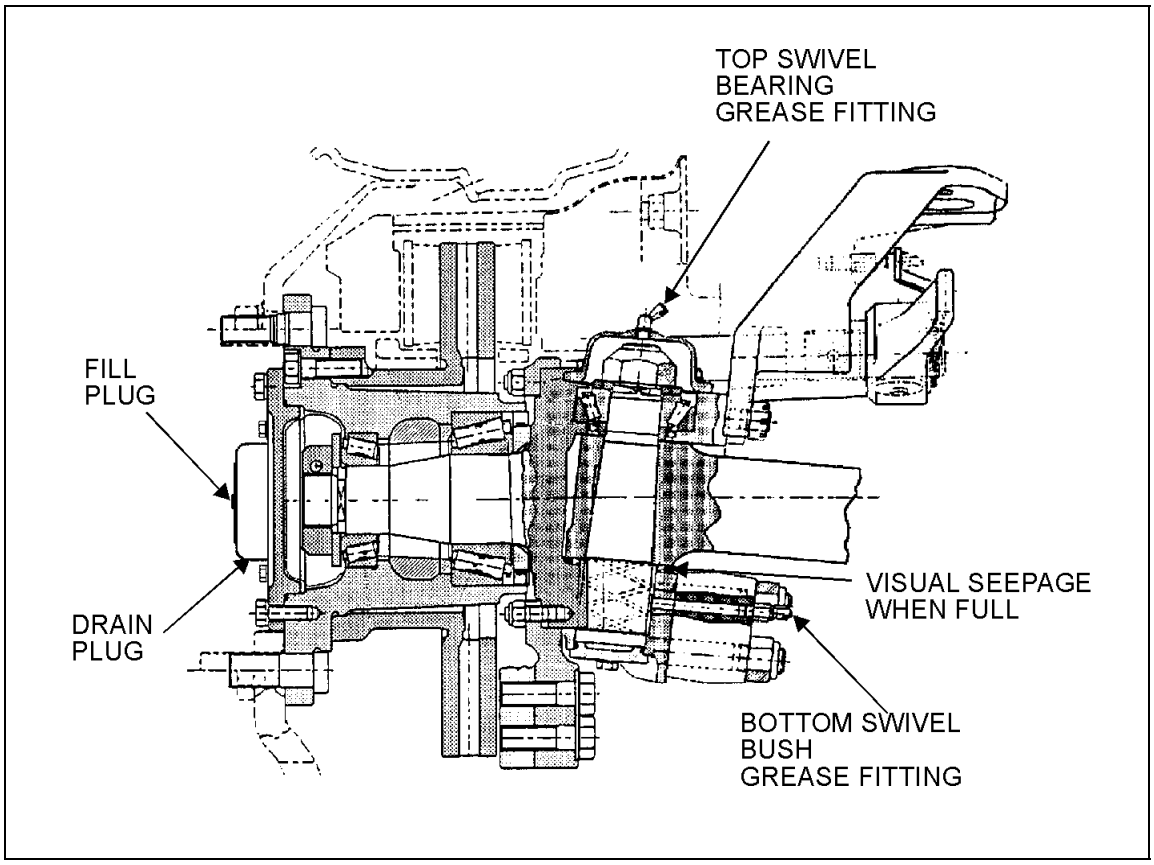


FIGURE 1: SWIVEL GREASING POINTS AND HUB OIL LUBRICATION 10016

2. ROUTINE MAINTENANCE

2.1 Hub Bearing Adjustment

An inspection should be made after the first 3,000 miles (4 800 km) and then at intervals of 25,000 miles (40 000 km). With the wheels raised they should revolve quite freely without roughness.

Hub bearings should have a slight end float movement within the limits 0.0005 to 0.002 inch when rocked forwards and backwards on stub axle. See paragraph *"8. HUB UNIT ASSEMBLY"*, if any adjustment is required.

Caution: *Hub oil fill cap is provided with a very small vent hole. Occasionally insert a small tip to avoid hole restriction, as it prevents over pressure in bearing housing.*

3. HUB UNIT REMOVAL

1. Chock the appropriate wheels.
2. Whilst road wheels are still on ground, loosen wheel nuts slightly.
3. Raise vehicle, remove road wheel nuts and remove road wheels.
4. Disconnect air line from brake caliper (13, Fig. 8).
5. Remove brake caliper setscrews with washers (15 & 16, Fig. 8) then lift off brake caliper assembly (13, Fig. 8).
6. Drain the oil lubricated hub cap.
7. Remove hub cap setscrews and washers (1 & 2, Fig. 8).
8. Remove hub cap (3, Fig. 8) with 'O' ring (4, Fig. 8) then discard 'O' ring.
9. Remove hub bearing pinch bolt nut (5, Fig. 8) and bolt (66, Fig. 8), then remove hub bearing nut (67, Fig. 8) along with hub bearing washer (6, Fig. 8).
10. Remove hub (8, Fig. 8) complete with its bearings (11/11A & 64/64A, Fig. 8) and oil seal (12, Fig. 8) then lift off outer bearing cone (64A, Fig. 8).
11. Remove oil seal (12, Fig. 8) and inner bearing cone (11A, Fig. 8) from hub (8, Fig. 8).
12. Drive out hub bearing cups (11 & 64, Fig. 8) from hub (8, Fig. 8).
13. If hub bearing distance piece (oil seal wear sleeve) (60, Fig. 8) shows signs of wear or corrosion it must be removed and replaced with a new part.

4. STUB AXLE ASSEMBLY REMOVAL

1. Remove cotter pins and stud nuts which attach tie rod socket ends to bell crank and left steering arm (47, Fig. 8) or to idler arm and right steering arm. Remove tie rod ball stud by tapping on steering arm and bell crank or idler arm with a hammer, while using a heavy hammer as a backing.
2. Remove swivel top cap setscrews and washers (25 & 24, Fig. 8), enabling swivel top cap (23, Fig. 8) to be removed.
3. Remove sealant from top cap and swivel mating faces (23 & 58, Fig. 8) using Loctite 'Chisel Gasket Remover' or by carefully scraping sealant from faces.
4. Remove bottom cap setscrews and washers (53 & 54, Fig. 8).
5. Pull off swivel bottom cap (55, Fig. 8) then remove sealant from bottom cap and swivel mating faces (55 & 58, Fig. 8) using Loctite 'Chisel Gasket Remover' or by carefully scraping sealant from faces.
6. Remove swivel pin nut and washer (22 & 21, Fig. 8).
7. Give axle beam (37, Fig. 8) a sharp tap to loosen swivel pin (56, Fig. 8). The swivel pin (56, Fig. 8) can then be driven out downwards, thus releasing it from axle beam.
8. The swivel assembly can be removed from axle beam (56, Fig. 8).
9. Take out swivel pin bearing (20/20A, Fig. 8), swivel bearing adjustment shims (19, Fig. 8), swivel bearing sleeve (17, Fig. 8) and swivel pin oil seal (18, Fig. 8) from top of swivel (58, Fig. 8).
10. Take out swivel bush seal (52, Fig. 8) and swivel pin bush (57, Fig. 8) from bottom of swivel (58, Fig. 8).

11. Check the condition of swivel stop nut (33, Fig. 8), and adjusting washer (32, Fig. 8), removing for replacement if required.

4.1 Inspection

Thoroughly clean all parts, inspect for wear and renew if required.

5. REFITTING STUB AXLE ASSEMBLY

1. Prior to assembly, pack swivel pin bearing (20/20A, Fig. 8) with lithium base grease (Shell Retinax LX or equivalent) using a bearing packer or manually knead grease between rollers, race and cage.
2. Coat all internal surfaces / parts with clean gear oil.
3. Fit swivel pin top oil seal (18, Fig. 8), open side first, into position in top swivel bore (58, Fig. 8).
4. Fit swivel pin bearing cup (20, Fig. 8) into position in swivel bore (58, Fig. 8).
5. Press swivel pin bottom bush (57, Fig. 8) into position in swivel bore (58, Fig. 8) flush with bottom face of swivel.
6. Fit swivel bush seal (52, Fig. 8) onto the protruding diameter of swivel pin bottom bush (57, Fig. 8) then place dirt excluder (78, Fig. 8) into position over seal.
7. Position swivel assembly onto axle beam (37, Fig. 8).

Note: *Care must be taken during this operation so as not to roll or trap swivel bush seal (52, Fig. 8). Suggest a thin piece of card or plastic places on seal during this operation. Make sure that swivel pin bore is free of burrs and corrosion, then grease bore with multi purpose chassis grease.*

1. Drive swivel pin (56, Fig. 8) through swivel (58, Fig. 8) and axle beam (37, Fig. 8).
2. Lubricate swivel pin bearing sleeve (17, Fig. 8) with clean oil / grease then fit over protruding swivel pin (56, Fig. 8), large chamfer first to locate in oil seal bore (18, Fig. 8) and abut upright (37, Fig. 8).
3. Select swivel bearing adjustment shims (19, Fig. 8) with total thickness of approximately 0.020 inch and place in position on top swivel bearing sleeve (37, Fig. 8).
4. Fit swivel pin cone (20A, Fig. 8) into swivel pin bearing cup (20, Fig. 8).
5. Fit swivel pin washer (21, Fig. 8) and swivel pin nut (22, Fig. 8) then tighten nut to 500-700 lbf•ft (678-949 N•m).
6. Using a 7/14 lb hammer, shock load axle beam (37, Fig. 8) on forged end area.

6. SWIVEL BEARING ADJUSTMENT

With nominal shim (19, Fig. 8) thickness of 0.020 inch placed between bearing (20/20A, Fig. 8) and bearing sleeve (17, Fig. 8), attach a cord and spring balance capable of reading 25 lbs (11,5 kg) to end of stub axle (58, Fig. 8) as shown in figure 2. Pull swivel from lock to lock, noting spring balance reading, ignoring the force needed to start movement. The correct reading should be between 12 to 24 lbs (5,5 to 11 kg) pull giving 10-20 lbf•ft (13,6-27 N•m). If the reading is outside these limits, it will be necessary to alter shim thickness (19, Fig. 8) between bearing cone (20A, Fig. 8) and its sleeve (17, Fig. 8).

To increase the load required, remove shims from nominal pack.

To decrease the force required, add shims to the nominal pack.

Add or subtract shims as required until a reading of 10-20 lbf•ft (13,6-27 N•m) is obtained.

When swivel is set correctly, check that swivel pin nut (22, Fig. 8) is tightened to 500-700 lbf•ft (678-949 N•m) torque.

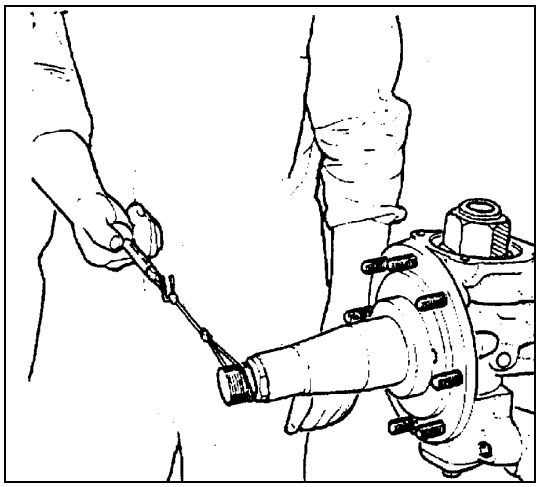


FIGURE 2: METHOD OF CHECKING SWIVEL BEARING ADJUSTMENT 10017

7. SWIVEL FINAL ASSEMBLY

1. Apply a thin layer 1/16" (1,5 mm) of lithium base grease (Shell Retinax LX or equivalent) to the inside of swivel top cap (23, Fig. 8).
2. Clean top cap and swivel mating faces (23 & 58, Fig. 8) with Loctite Superclean safety Solvent no. 706 or other suitable chlorinated solvent then apply a complete 1/8" bead of Loctite Superflex (black) around base of top cap (23, Fig. 8) before fitting to swivel (58, Fig. 8) within 5 minutes of applying Loctite. See figure 3.
3. Secure top cap (23, Fig. 8) with swivel top cap setscrews and washers (25 & 24, Fig. 8) and tighten to 51- 62 lbf•ft (69-84 N•m).
4. Clean bottom cap and swivel mating faces (55 & 58, Fig. 8) with Loctite Superclean Safety Solvent no. 706 or other suitable chlorinated solvent then apply a complete 1/8" bead of Loctite Superflex (black) around base of bottom cap (55, Fig. 8) before fitting to swivel (58, Fig. 8) within 5 minutes of applying Loctite. See figure 3.

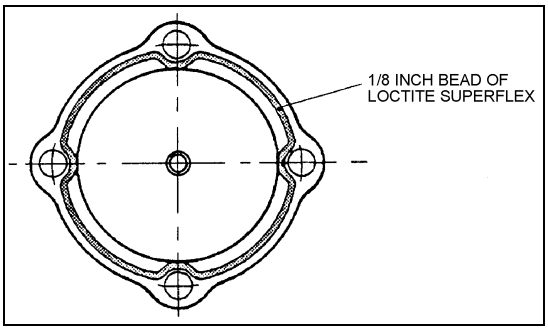


FIGURE 3: TOP AND BOTTOM CAP 10018

5. Secure bottom cap (55, Fig. 8) with swivel bottom cap setscrews and washers (53 & 54, Fig. 8) then tighten to 26-32 lbf•ft (33-35 N•m).
6. Check that tightening torque of top steering arm studs (28, Fig. 8) is between limits of 190-210 lbf•ft (258-285 N•m).
7. Fit top steering arm (29, Fig. 8) onto studs (28, Fig. 8) then fit nuts (30, Fig. 8) and tighten to 190-275 lbf•ft (258-353 N•m).
8. Fit new lubricators (26, Fig. 8) with protective caps (27, Fig. 8) into their respective positions in swivel top cap (23, Fig. 8).
9. Charge swivel assembly with grease. Swivel is full when grease seeps from between upper face of axle beam (37, Fig. 4) and swivel jaw (58, Fig. 4) in top half and from between swivel oil seal (58, Fig. 5) and lower face of axle beam (37, Fig. 5).

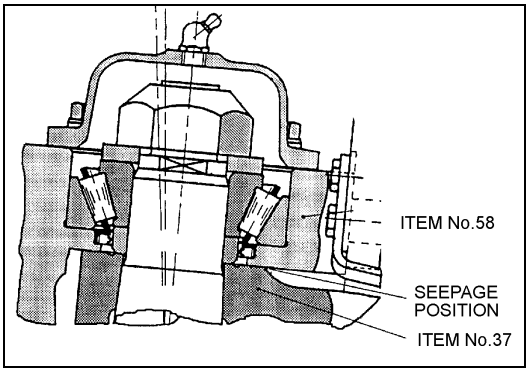


FIGURE 4: PART SECTION THRO' TOP OF SWIVEL SHOWING GREASE SEEPAGE POSITION WHEN FULL10019

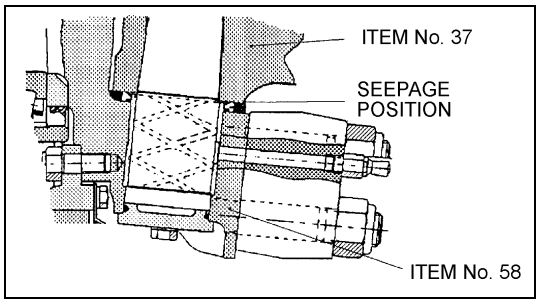


FIGURE 5: PART SECTION THRO' BOTTOM OF SWIVEL SHOWING GREASE SEEPAGE POSITION WHEN FULL 10020

12. Position ball studs on socket ends of tie rod in holes in steering arm and bell crank or idler arm. Install a ball stud nut on each stud and tighten firmly to seat the tapered seat.
13. Use a torque wrench to tighten stud nuts to 160-215 lbf•ft (217-291 N•m) torque. Advance nut to next aligning cotter pin slot and install a new cotter pin.

Note: *Adjust toe-in as directed in paragraph "TOE-IN ADJUSTMENT" of the PRÉVOST CAR INC. MAINTENANCE MANUAL.*

Note: *If tie rod is not properly aligned with stud, binding will result.*

8. HUB UNIT ASSEMBLY

1. Fit hub bearing distance piece (60, Fig. 8) onto swivel stub axle (58, Fig. 8).
2. Fit inner and outer hub bearing cups (11 & 64, Fig. 8) onto their bores in hub (8, Fig. 8).
3. Fit inner hub bearing cone (11A, Fig. 8) into its cup in hub (8, Fig. 8).
4. Press hub oil seal (12, Fig. 8) into position in hub (8, Fig. 8) using a suitable bumper tool which locates on outer part of seal to prevent damage on assemble.
5. Fit hub assembly onto swivel stub axle (58, Fig. 8).
6. Fit outer bearing cone (64A, Fig. 8) into its cup (64, Fig. 8).
7. Fit hub bearing washer and hub bearing nut (6 & 67, Fig. 8). Tighten nut hard with the aid of a small tommy bar just enough to take up bearing slack.
8. Fit hub bearing nut pinch bolt and nut (66 & 5, Fig. 8), tighten finger tight.
9. **Adjust 'End Float' as follows :** Rotate hub and using a hide faced mallet, knock hub backwards and forwards along axle arm to 'Shock Load' and thus settle bearings in position.

Note: *It is very important to rotate and 'shock load' the hub because :*

- *The rotation serves to ensure that bearing rollers settle into running in their correct tracks.*
- *The 'Shock Load' is to ensure that bearings are seated correctly up to their abutment shoulders.*
- *Test the tightness of hub bearing nut (67, Fig. 8), if loose, re-tighten hard.*
- *Rotate and 'Shock Load' the hub again.*
- *Continue this procedure until hub bearing nut (67, Fig. 8) cannot be tightened further after hub has been rotated and 'Shock Loaded'.*
- *Back off hub bearing nut (67, Fig. 8) by approximately 30° then rotate again and knock hub outward along axle arm to release bearings.*
- *Mount a dial indicator on hub flange (8, Fig. 8) and position its pointer on end of axle stub. See figure 6.*
- *Rock the hub backwards and forwards along axle arm, taking a reading on dial indicator.*
- *The correct 'End Float' is between limits 0.0005 inch to 0.002 inch (0,013 to 0,050 mm).*
- *Tighten the hub bearing pinch bolt nut (5, Fig. 8) to 24-26 lbf•ft (33-35 N•m).*

- *Check the 'End Float' again, using above procedure, and adjust if outside specified limits.*

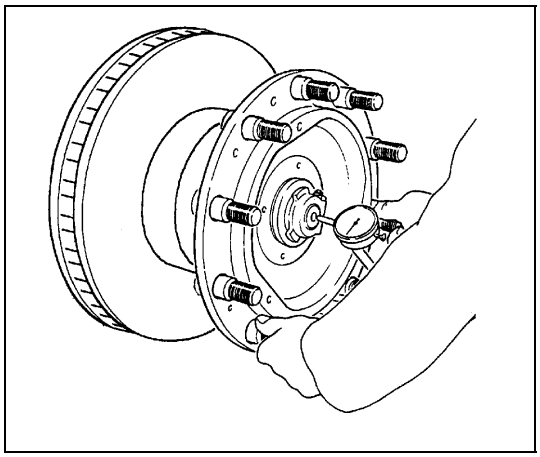


FIGURE 6: TO ADJUST HUB 'END FLOAT' 10021

10. Clean hub cap and hub mating faces (3 & 8, Fig. 8) with Loctite Superclean Safety Solvent no. 706 or other suitable chlorinated solvent then apply a complete 1/8 inch bead of Loctite Superflex (black) around mating face of hub cap (3, Fig. 8). See figure 7.

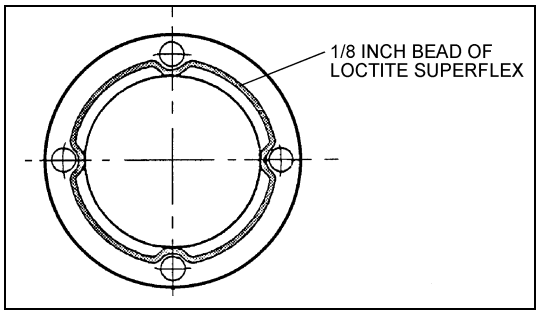


FIGURE 7: HUB CAP AND HUB MATING FACES 10022

12. Fit hub cap along (3, Fig. 8) within 5 minutes of applying sealant then secure with hub cap setscrews and washers (1 & 2, Fig. 8) tightening setscrews to 85-103 lbf•ft (115-140 N•m).

13. Fill the oil lubricated oil cap. See paragraph "1. LUBRICATION" of this manual.

9. TORQUE TABLE

ITEM No	DESCRIPTION	TORQUE (DRY) lbf•ft / N•m	
1	Hub Cap Setscrew	85-103	115-140
5	Hub Pinch Bolt Nut	24-26	33-35
7	Wheel Nut	475-525	644-712
16	Brake Caliper Setscrew	310-340	420-461
22	Swivel Pin Nut	500-700	678-949
25	Top Cap Setscrew	51-62	69-84
28	Top Steering Arm Stud	190-210	258-285
30	Top Steering Arm Nut	190-275	258-373
31	Caliper Bracket Nut	85-103	115-140
47	Ball Socket Nut	160-215	217-291
53	Bottom Cap Setscrew	26-32	35-43
59	Caliper Bracket Stud	51-62	69-84
62	Caliper Bracket Nut	85-103	115-140
65	Brake Disc Capscrew	295-325	400-441

10. PARTS LIST

ITEM No	DESCRIPTION	QTY/AXLE
1	Hub Cap Setscrew	8
2	Hub Cap Spring Washer	8
3	Hub Cap	2
4	Hub Cap 'O' Ring	2
5	Bearing Nut Pinch Nut	2
6	Hub Bearing 'D' Washer	2
7	Wheel Stud Protective Cover	20
8	Hub	2
9	Wheel Stud R.H.	10
	Wheel Stud L.H.	10
10	Pole Wheel	2
11	Hub Outer Bearing Cup	2
11A	Hub Outer Cone	2
12	Hub Oil Seal	2
13	Brake Caliper R.H.	1
	Brake Caliper L.H.	1
14	Caliper Mounting Bracket R.H.	1
	Caliper Mounting Bracket L.H.	1
15	Brake Caliper Retaining Washer	12
16	Brake Caliper Retaining Bolt	12
17	Swivel Pin Bearing Sleeve	2
18	Swivel Pin Oil Seal	2
19	Adjusting Shim (0.005 inch)	as required
	Adjusting Shim (0.010 inch)	as required
	Adjusting Shim (0.015 inch)	as required
	Adjusting Shim (0.008 inch)	as required
	Adjusting Shim (0.006 inch)	as required

20	Swivel Bearing Cup	2
20A	Swivel Bearing Cone	2
21	Swivel Pin 'D' Washer	2
22	Swivel Pin Nut	2
23	Top Cap	2
24	Top Cap Setscrew Spring Washer	8
25	Top Cap Setscrew	8
26	Lubricator	2
27	Lubricator Protective Cap	2
28	Top Steering Arm Stud L.H.	2
	Top Steering Arm Stud R.H.	2
29	Top Steering Arm (L.H.)	1
30	Top Steering Arm Nut	4
31	Brake Caliper Bracket Nut	6
32	Stop Screw Adjusting Washer	as required
33	Swivel Stop Screw L.H.	1
	Swivel Stop Screw R.H.	2
34	Supplied Within Item 58	
35	Clamping Bush	1
36	Sensor	1
37	Upright	1
40	Lubricator	2
41	Lubricator Protective Cap	2
43	Oil Lubricated Hub Cap Setscrew	6
44	Oil Lubricated Hub Cap	1
47	Ball Socket Nut	2
52	Swivel Pin Seal (upper) ('V' ring)	2
53	Bottom Cap Setscrew	4
54	Spring Washer	4

55	Swivel Bottom Cap	2
56	Swivel Pin	2
57	Swivel Pin Bottom Bush	2
58	Swivel Assembly L.H.	1
	Swivel Assembly R.H.	1
59	Brake Caliper Bracket Stud	10
60	Hub Bearing Distance Piece	2
61	Brake Caliper Bracket Bolt	6
62	Brake Caliper Bracket Nut	10
63	Brake Disc	2
64	Hub Inner Bearing Cup	2
64A	Hub Inner Bearing Cone	2
65	Brake Disc Capscrew	20
66	Bearing Nut Pinch Bolt	2
67	Hub Bearing Nut	2

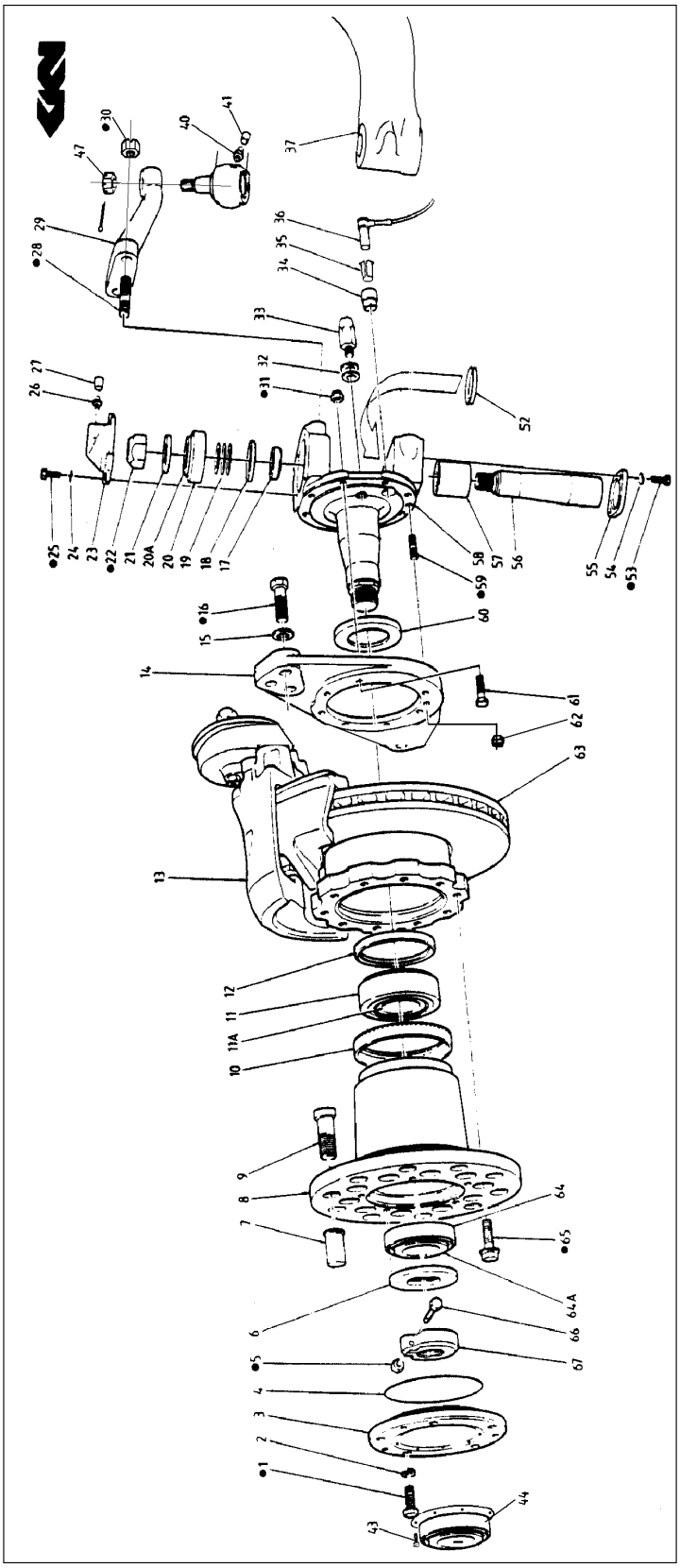


FIGURE 8: HUB UNIT AND STUB AXLE 10023