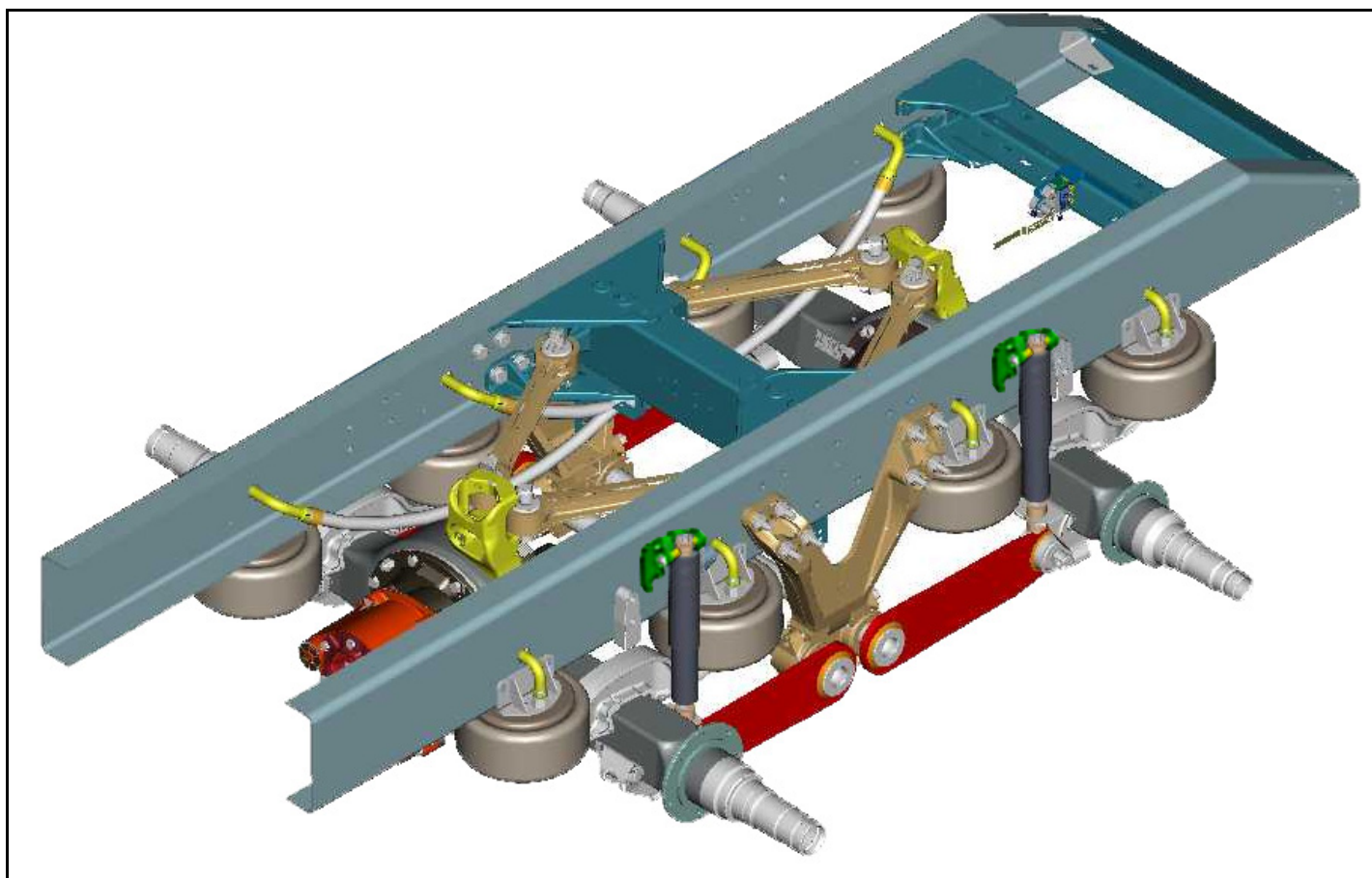


Service Manual

Department	Customer Service
Category	Service Manual
Section	Suspension
Title	Airglide 400 / 460 / 690 Air Spring Suspension
Number	KM817035
Date	02/02/05
Model	W900, T800, T600, C500 and T2000
Page	1 of 21

Airglide 400 / 460 / 690 Air Spring Suspension



Page	2 of 21
Number	KM817035

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Table of Contents

	Page
Identification Of Parts	3
Description	4
Operation	4
Maintenance	5
Inspection 60,000 miles (96 000 km)	5
Driving the Vehicle With Deflated Air Springs	6
Towing The Vehicle	6
Jacking Up The Vehicle	6
Torque Values (Dynamic)	7
Air System Components	8
Pressure Protection Valve Test	8
Air Leakage Test	8
Checking Suspension Ride Height (Using Ride Height Gauge)	9
Checking Suspension Ride Height (Without Ride Height Gauge)	11
Disassembly / Assembly	13
Axle	13
Swaybar Assembly	14
Removal	14
Installation	15
Swaybar Bushing Replacement	18
Removal	18
Installation	19

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Identification Of Parts

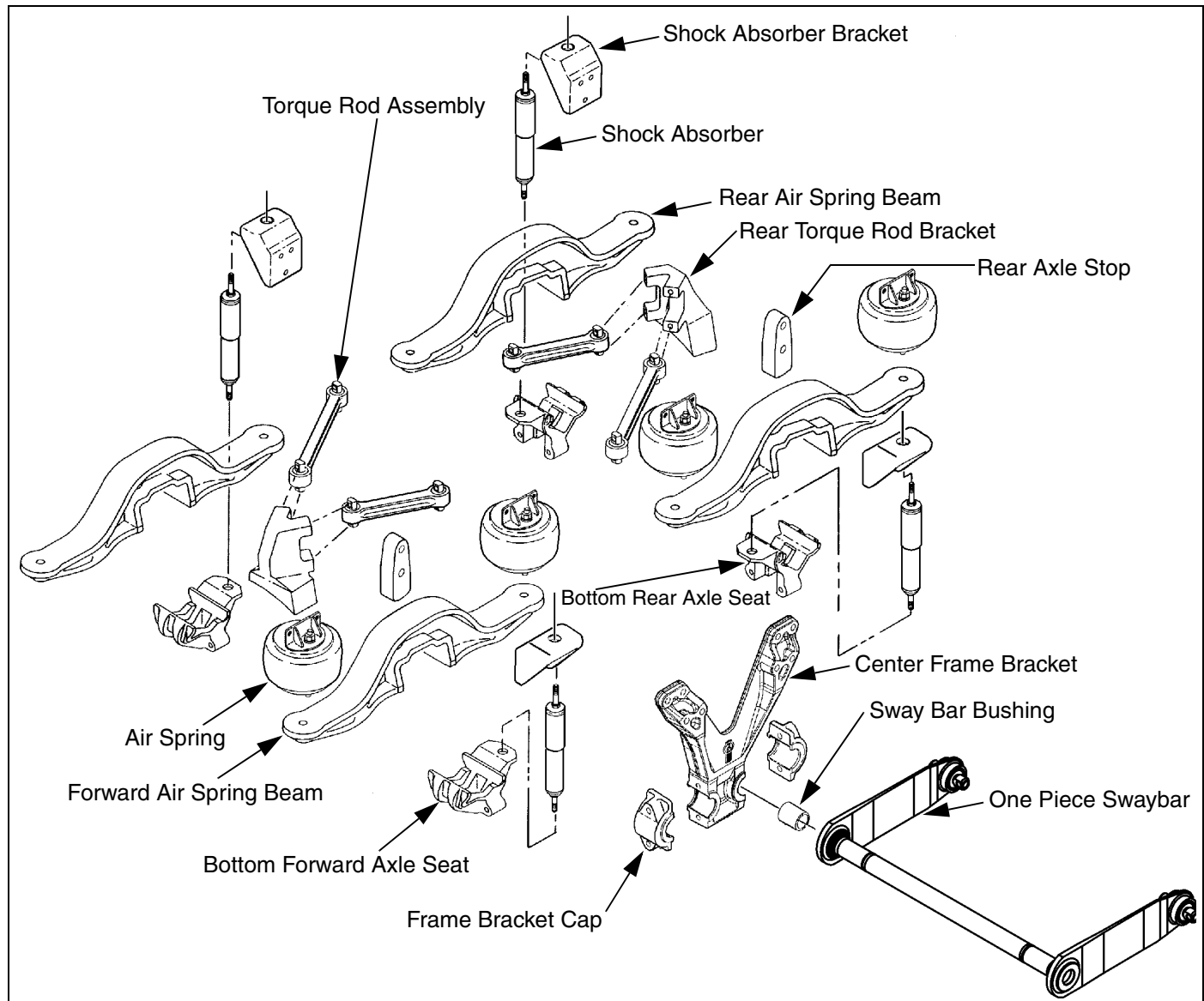


Figure 15-1

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Description

Kenworth's Airglide 400 Series Suspension is a light-weight design using four air springs on each axle for load support. The chassis rides on air springs, used in line with mechanical connections that absorb road shock forces that would otherwise be transmitted into the chassis.

Each axle is securely located to the chassis by an upper V-link and an articulated sway bar. Two shock absorbers mounted on each axle dampen vertical road shocks.

The air suspension system consists mainly of

- air springs
- height control valve
- air dump valve (integral to height control valve)
- pressure protection valve

Air pressure in the air springs is automatically regulated to keep the frame at normal ride height under all loads within the GAWR.

The rated load capacities, axle spacing and ride heights for AG400 Series Suspensions are as follows:

	AG400	AG460	AG690 (Tridem)
Rated Capacity	40,000 lbs	46,000 lbs	69,000 lbs
Ride Height	9 in.	10.5 in.	10.5 in.
Axle Spacing	52, 54 in.	52, 54, 60 in.	54 in.

Operation

The service tank supplies air pressure to the air springs which are mounted between the frame and spring beam at each axle end. When the truck encounters bumps, shocks are absorbed by the contraction and expansion of the air springs which provide a flexible support between the frame and axle.

During operation, as the load on the chassis is varied the frame is automatically leveled at normal ride height through the operation of the height control valve. The height control valve is mounted on the rear suspension crossmember. When the chassis load is increased, the distance between the frame and axle decreases. This movement operates control linkage which actuates the height control valve(s). Air is released by the valve(s) until the frame rises to its normal ride height. When the chassis load is decreased, air is exhausted from the air springs by the height control valve(s) until the frame descends to its normal ride height.

The pressure protection valve prevents a complete loss of air pressure in the brake system in the event of an air leak in the air suspension system.

Page	5 of 21
Number	KM817035

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Maintenance

The Kenworth Airglide 400 Series Suspension requires very little maintenance with no periodic adjustments or lubrication required. However, inspect components and check fastener torque after the first 2,000 miles or first week of operation (whichever comes first) and every 60,000 miles or annually (whichever comes first) thereafter. Check fastener tightness using the torque table ([“Torque Values \(Dynamic\)” on page 7](#)). Air line filter service is also required to keep dirt and other contaminants out of the air suspension system.

Daily Check

Check for loose or missing fasteners. Check damage to spring or other suspension parts.

Inspection 60,000 miles (96 000 km)

Replace assemblies as required.

- Air Springs
Inspect for cracks, gouges, distortions, bulges and chafing.
- Shock Absorbers
Inspect for leaks, dents, worn cylinders and/or worn rubber bushings.
- Sway Bar Bushing
Inspect for worn rubber bushings.
- V-Linkage: Check the condition of the rubber bushings
- Axle Connection Welds: Check visually for cracks

Fastener Torque: Inspect general condition of joint. Replace as necessary and verify torque per torque table on [“Torque Values \(Dynamic\)” on page 7](#).

Driving the Vehicle With Deflated Air Springs

If an air spring is ruptured, the vehicle may be driven a limited distance at reduced speed (maximum of 5 mph) on the axle stops. Before driving the vehicle, the air suspension supply piping must be plugged or system air pressure will be lost. Follow the procedures below.



WARNING! Failure to plug the source port will lead to system air loss and could cause the spring brakes to apply. This allows the brakes to drag and may burn up the linings, which could lead to an injury accident. Do not operate the vehicle in this condition.



CAUTION: Do not exceed 5 mph. Speeds in excess of 5 mph could damage suspension and/or driveline components.

Procedure

1. Disconnect the air suspension supply piping and plug the source port (air tank for chassis not equipped with an AD-IS air dryer or the accessory manifold for chassis equipped with an AD-IS air dryer).
2. For single Haldex PR height control valves, disconnect the leveling valve link and pull down on the height control valve to ensure air is exhausted from all bags.

3. For dual Haldex PR height control valves, disconnect the leveling valve link from the height control valve on the opposite side of the ruptured spring and pull down on the height control valve arm to ensure air is exhausted from all bags.



CAUTION: Do not release the parking brake or attempt to move the vehicle until the air system pressure has increased to the governed pressure of 120 psi (8327 kpa).

Towing The Vehicle

When the vehicle is towed with the rear axles hanging free of the ground, it will be necessary to chain the axles to the frame. This will prevent damage to the shock absorbers and the air springs.

For additional information concerning towing, refer to the Kenworth Operator's Manual.

Jacking Up The Vehicle

Place blocks between the axle and frame before jacking up the vehicle at the axles. This precaution will prevent a sudden drop in the frame should air accidentally exhaust from the air suspension system. See [Figure 15-2](#).



CAUTION: To prevent damage to the swaybar, do not place a jack under the swaybar or wrap a chain around the swaybar arms to lift the vehicle.

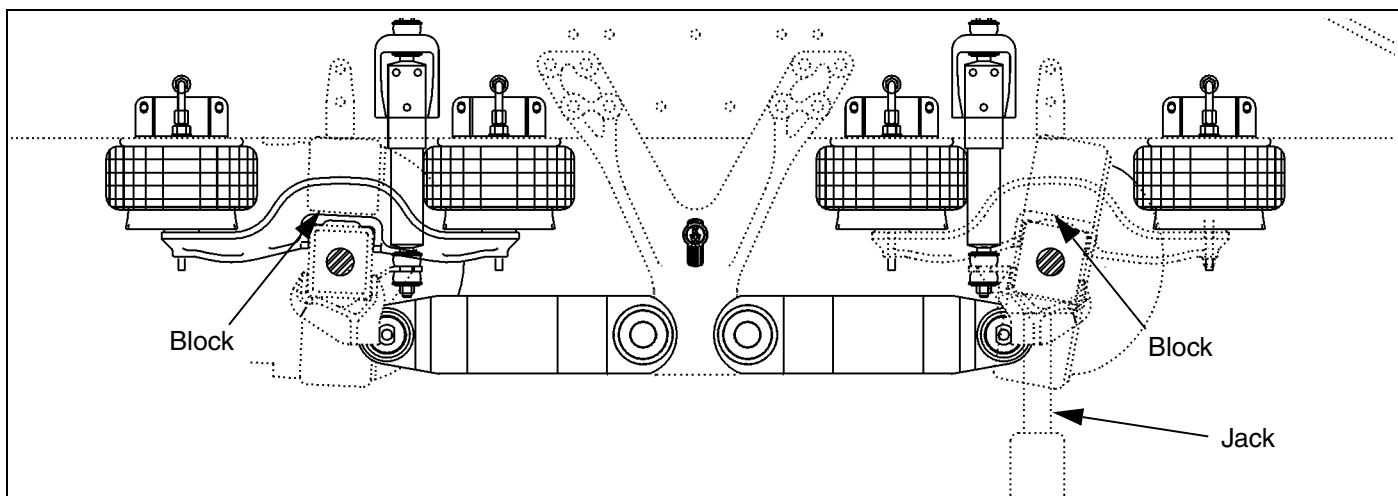


Figure 15-2

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Torque Values (Dynamic)

After the first 2,000 miles (3 218 km) or first week of operation, and every 60,000 miles thereafter, check the torque values for the following fasteners:

Component	Torque (Torque all fasteners on the nut end.)
1. Torque Rod Bolts At Axle Bracket	170 - 200 Lb-Ft (230 - 271 Nm)
2. Torque Rod Bolts At Frame (Gusset)	150 - 190 Lb-Ft (203 - 258 Nm)
3. Swaybar Arm To Axle Seat (Axle End)	150 - 190 Lb-Ft (203 - 258 Nm)
4. Swaybar Bushing Caps	150 - 180 Lb-Ft (203 - 258 Nm)
5. Shock Absorber Bushings	Torque Nuts Until Rubber Bushing Diameter Equals Retainer Diameter

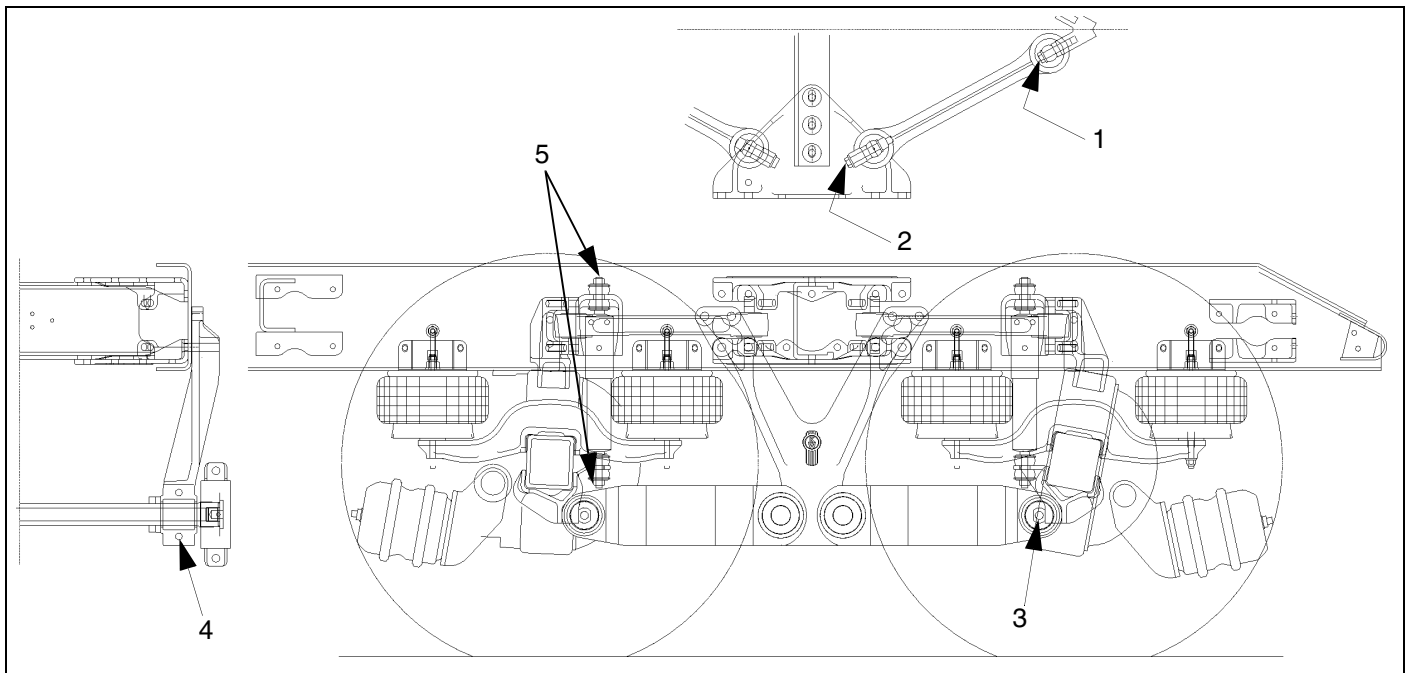


Figure 15-3

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Air System Components



WARNING! Do not engage the parking brake while vehicle is moving. Do not put vehicle in motion without a minimum of 100 psi (689 kPa) in the air system. Observe vehicle red warning lamps on gauges and discontinue vehicle operation until proper repairs or service is completed. Do not use the trailer hand brake or service brakes to park and hold an unattended vehicle - use parking brake.

Daily, drain air tanks by activating the moisture ejector valve.



NOTE: The air supply to the air suspension must be free of moisture and compressor oil. If excess moisture is encountered, check for proper operation of the moisture ejector valve. If excess oil is encountered overhaul the air compressor.

Pressure Protection Valve Air Filter

Verify that the pressure protection valve air filter (integral to the valve) is clean. The air filter is removable and can be cleaned or replaced, if necessary.



NOTE: The pressure protection valve is located on the rear service tank.

Height Control Valve Filter

The height control valve filter is integral to the pressure protection valve on the rear service tank reservoir. The filter is removable and should be checked periodically to verify it is clean. If the filter is clogged, clean it or replace if necessary.

Pressure Protection Valve Test

When the air brake system air pressure is reduced to a predetermined amount the pressure protection valve will close. The pressure protection valve will allow no air to flow into the air suspension system until the brake system air pressure rises to a predetermined amount.

To check the pressure protection valve:

1. Increase the air system pressure to 100 psi (690 kPa) or more.
2. Remove the supply hose at the outlet of the pressure protection valve.

NOTE: Air should exhaust until rear service pressure gauge reaches minimum required pressure. If air continues to exhaust, the valve is malfunctioning and should be replaced.

3. Connect and tighten supply hose after check is completed.

Air Leakage Test

NOTE: If the valve does not function during adjustment, check for restricted air lines.

With the vehicle loaded and the air system at normal operating pressure, apply a coating of soap and water solution to all air line connections. Soap bubbles will reveal air leakage. If necessary, re-seal fittings using a drop of thread locker or carefully apply pipe thread sealing compound. Use small amounts of sealant on threads only. Do not use Teflon tape.

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Checking Suspension Ride Height (Using Ride Height Gauge)



WARNING! This procedure requires servicing the vehicle with the transmission in neutral, keys removed from ignition, and the parking brakes released. The vehicle must be parked on a completely flat/level surface with both front wheels chocked on both sides. Failure to adequately chock the wheels or remove the keys may lead to the vehicle rolling into someone/something or someone starting the engine, causing an accident and possible serious personal injury and/or equipment damage.



WARNING! To prevent vehicle from rolling and causing personal injury and/or property damage, use chocks at the front tires.



NOTE: Suitable wheel chocks are at a minimum an 18-inch (46cm) long 4x4.

Follow this procedure to check the suspension ride height using the Kenworth Ride Height Gauge (P/N Q43-1068).

1. Ensure vehicle is in an unladen condition.
2. Ensure air system pressure is in excess of 110 psi throughout the procedure.
3. Ensure tire pressures are at rated psi. See door label for rating.
4. Without turning the steering wheel and with the wheel always in a straight line, drive the vehicle onto a flat/level surface. Back straight out for the length of the vehicle and slowly drive back onto the flat/level surface. Gently roll to a stop. Place the transmission in neutral and set the parking brakes.
5. Chock the front wheels on both sides.
6. Release the parking brakes.
7. Remove keys from ignition.
8. Ensure the Ride Height Gauge has the correct slide installed for the suspension being checked. See [Figure 15-4](#).

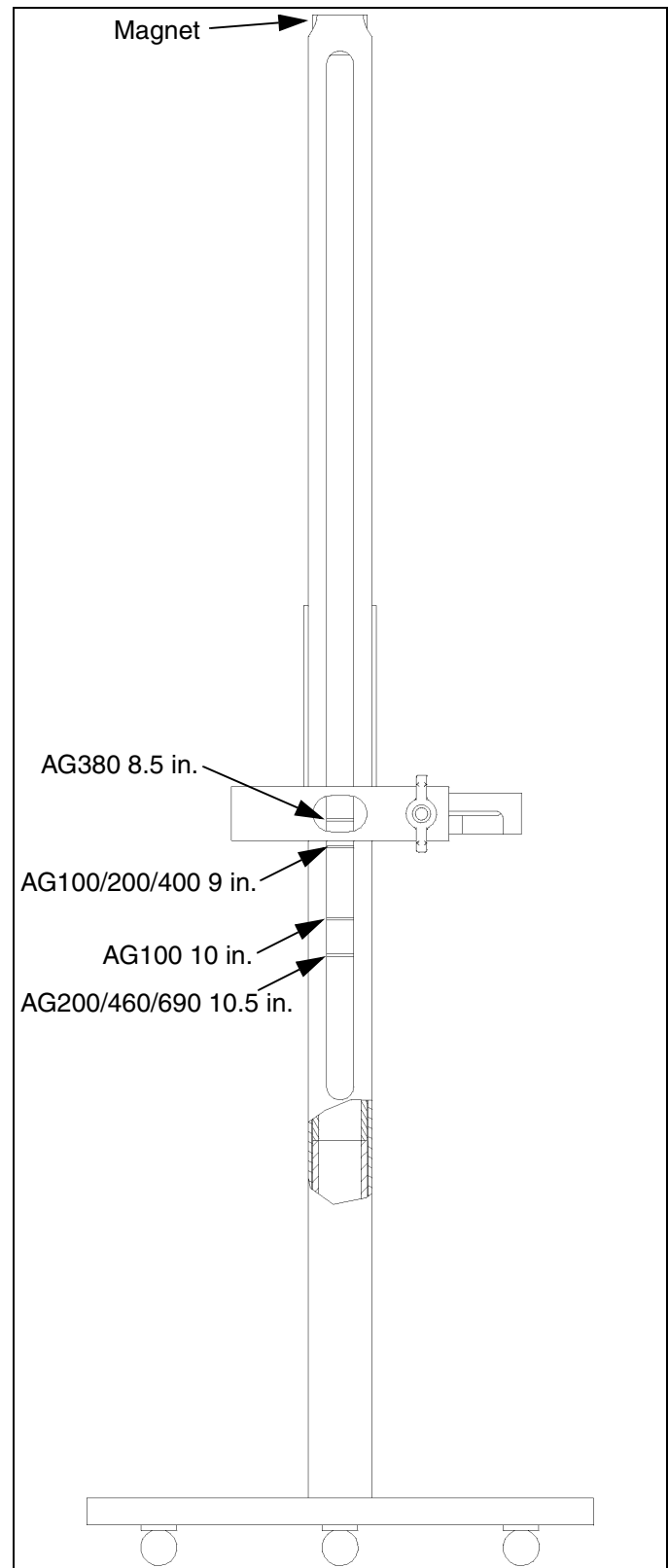
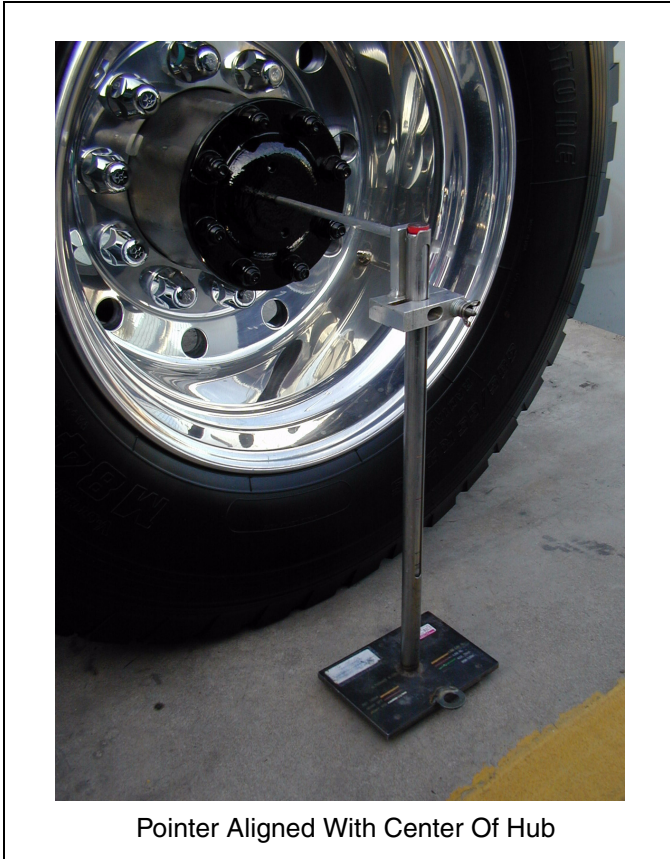


Figure 15-4

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Page	10 of 21
Number	KM817035

- Insert the pointer end of the Ride Height Gauge into the center of the axle hub hole of the rearmost drive axle. See Figure 15-5.



Pointer Aligned With Center Of Hub

Figure 15-5

i *NOTE: The clamp mechanism of the gauge holds the pointer and the tolerance box in place, allowing the gauge to be moved without disturbing the gauge position.*

- Move the Ride Height Gauge under the frame rail flange as close to the rearmost tandem axle as possible.

- Raise the gauge's internal calibrated slider to contact the bottom of the frame rail flange. See Figure 15-6.

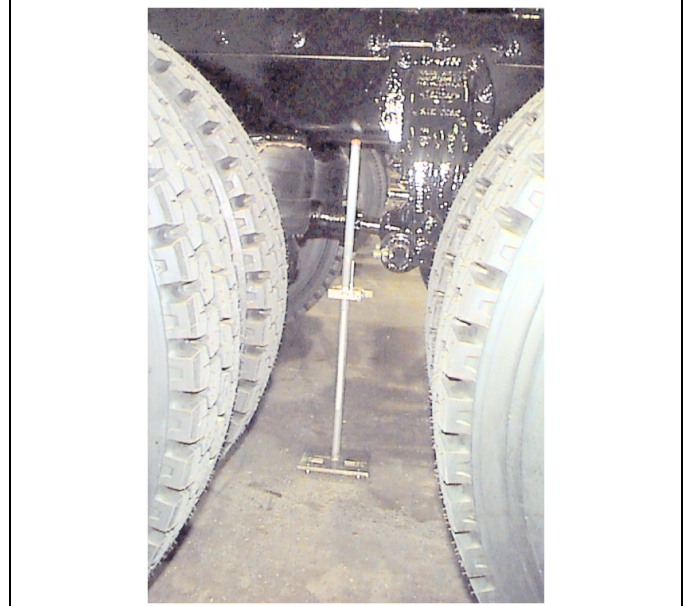


Figure 15-6

i *NOTE: The magnet imbedded in the slider of the Ride Height Gauge allows the slider to maintain contact with the frame rail flange while the measurement is made.*

- If the colored indicator groove for the suspension being checked appears in the tolerance box of the Ride Height Gauge, the suspension ride height setting is correct.

Refer to the base of the gauge to determine the proper indicator groove color for the suspension being checked.

	AG400	AG460	AG690 (Tridem)
Rated Capacity	40,000 lbs	46,000 lbs	69,000 lbs
Ride Height	9 in.	10.5 in.	10.5 in.
Axle Spacing	52, 54 in.	52, 54, 60 in.	54 in.

- If the colored indicator groove does not appear in the tolerance box of the Ride Height Gauge, the leveling valve(s) must be adjusted to obtain the correct ride height setting. Adjust as necessary.
- For dual leveling valve systems, repeat steps 9-13 on the opposite side of the vehicle.

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Checking Suspension Ride Height (Without Ride Height Gauge)



WARNING! This procedure requires servicing the vehicle with the transmission in neutral, keys removed from ignition, and the parking brakes released. The vehicle must be parked on a completely flat/level surface with both front wheels chocked on both sides. Failure to adequately chock the wheels or remove the keys may lead to the vehicle rolling into someone/something or someone starting the engine, causing an accident and possible serious personal injury and/or equipment damage.



WARNING! To prevent vehicle from rolling and causing personal injury and/or property damage, use chocks at the front tires.



NOTE: Wheel chocks are at a minimum an 18-inch (46cm) long 4x4.

Follow this procedure to check the suspension ride height without a Kenworth Ride Height Gauge (P/N Q43-1068).

1. Ensure that vehicle is in an unladen condition.
2. Ensure air system pressure is in excess of 110 psi throughout the procedure.
3. Ensure tire pressures are at rated psi. See door label for rating.
4. Without turning the steering wheel and with the wheel always in a straight line, drive the vehicle onto a flat/level surface. Back straight out for the length of the vehicle and slowly drive back onto the flat/level surface. Gently roll to a stop. Place the transmission in neutral and set the parking brakes.
5. Chock the front wheels on both sides.
6. Release the parking brakes.
7. Remove keys from ignition.
8. Measure the distance from the bottom of the frame rail to the top of the axle.
 - AG400 With 9 in. Ride Height: 149 mm \pm 3 mm (5-7/8 in. \pm 1/8 in.) See Figure 15-7.

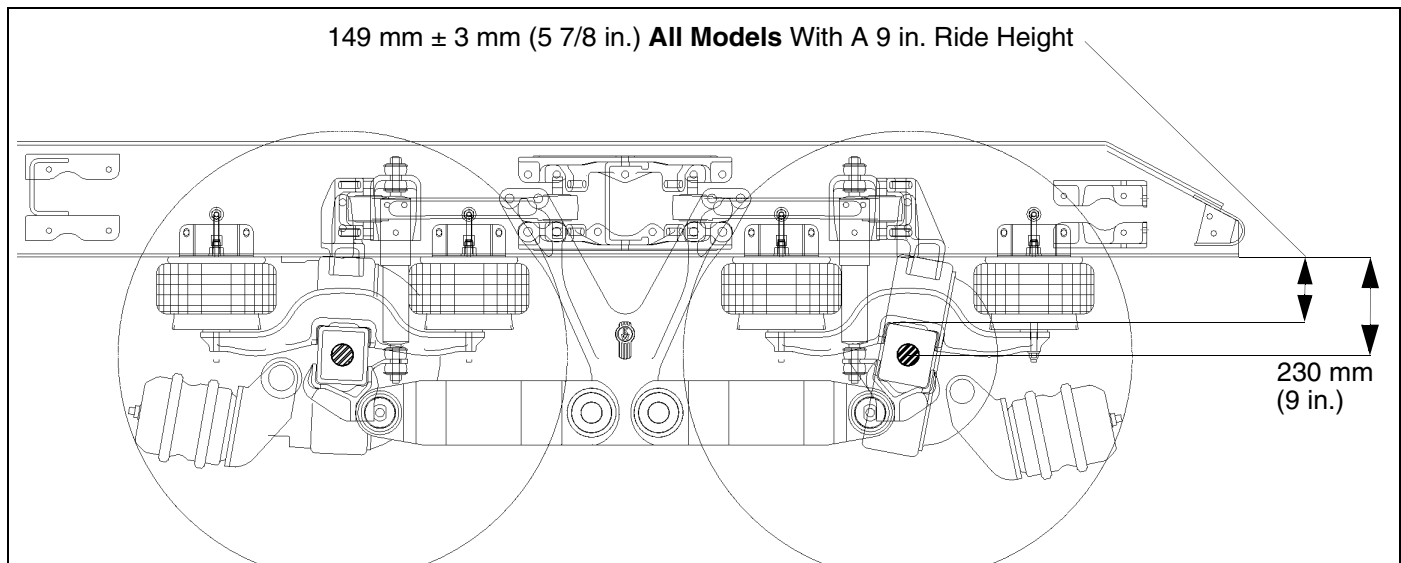


Figure 15-7

Suspension: Airslide 400 / 460 / 690 Air Spring Suspension

- AG460 / AG690 With 10.5 in. Ride Height: 193 mm \pm 3mm (7-5/8 in. \pm 1/8 in.) See Figure 15-8.

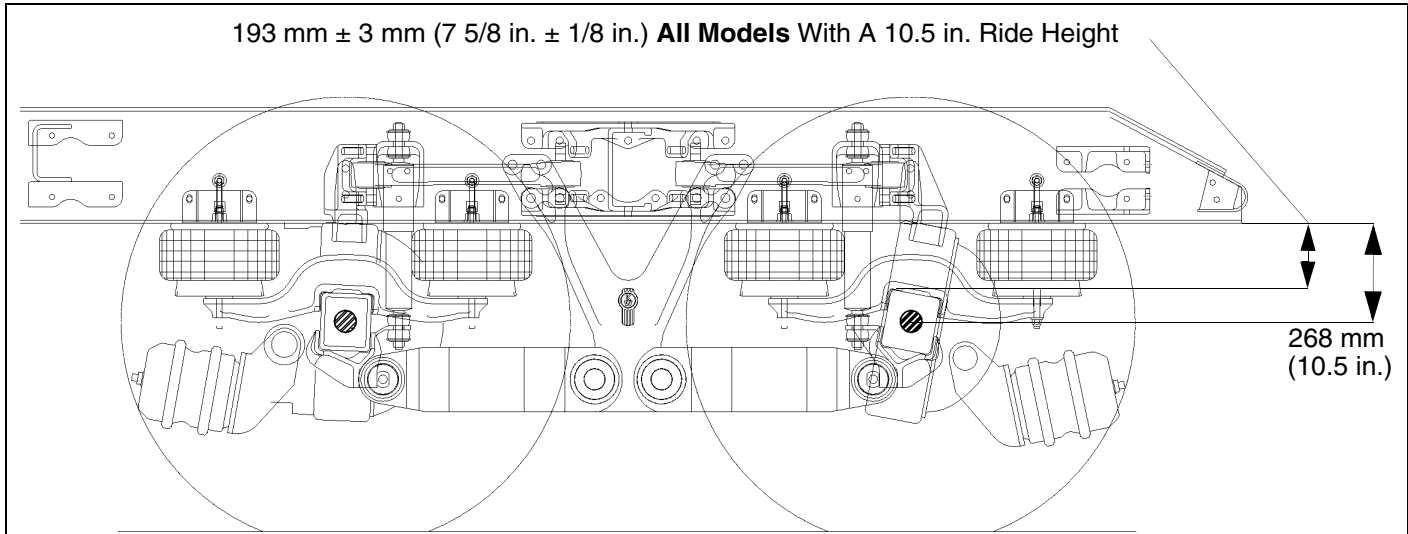


Figure 15-8

9. Adjust suspension ride height as necessary.

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Disassembly / Assembly



WARNING! Secure vehicle from rolling prior to beginning axle repair and/or replacement. Always support the vehicle with appropriate safety stands, if it is necessary to work underneath the vehicle. A jack is not adequate for this purpose. Failure to prevent rolling or proper support could result in serious injury to technician and/or bystanders.



CAUTION: Perform all of the following procedures with the vehicle unloaded. Park the vehicle on a level, solid surface with the wheels blocked. If the vehicle is to be raised to remove weight from the rear suspension, place jack stands under both frame rails.

Axle

The following procedure may be used to remove an air spring, air line, or an entire axle assembly.

Disassembly

1. Disconnect the shock absorbers.
2. Exhaust all air from the suspension system by pulling down on the height control valve arm(s).
3. Disconnect the height control valve linkage.
4. Jack up the rear of the vehicle by placing jacks under each frame rail. Raise the vehicle until the load is removed from the air springs.

At this point, air lines and air spring assemblies may be removed.

To remove the axle, continue with steps 5 through 8.

5. Disconnect the driveline.
6. Unbolt the bases of the air springs from the air spring beam assemblies.
7. Disconnect the V-link and the swaybar from the axle.
8. Disconnect the air lines and unbolt the springs from the frame.

Assembly

Complete the following procedure to replace a complete axle assembly.

1. Jack up the rear of the vehicle.
2. Bolt the air springs to the frame.
3. Position the axle and the air spring beams under the air springs.
4. Connect the swaybar to the frame brackets and axle. Leave the bolts loose enough at this time so the torque rod stabilizer can rotate within the bushing.
5. Raise or lower the vehicle frame as required to seat the air springs into the beam assemblies. Tighten the M12 bolts to 88 ± 13 Nm (65 ± 10 ft-lbs).
6. Attach the torque rods and the swaybar arm to the axle.
7. Torque all fasteners to the specified torque. See ["Torque Values \(Dynamic\)" on page 7](#).

Swaybar Assembly



WARNING! Secure vehicle from rolling prior to beginning any swaybar repair and/or replacement. Remove the keys from the ignition. Failure to prevent rolling or proper support could result in serious injury to technician and/or bystanders.



CAUTION: Perform all of the following procedures with the vehicle unloaded. Park the vehicle on a level, solid surface with the wheels blocked and parking brakes released.



NOTE: DO NOT remove wheels and tires.

NOTE: DO NOT jack up truck.

The following procedures apply to all AG400, AG460 and AG690 one-piece swaybar assemblies.

Removal

1. Remove and discard the fasteners from each frame bracket and cap joint. See Figure 15-9.



NOTE: New nuts, bolts and washers are included in each new swaybar Bushing Kit.

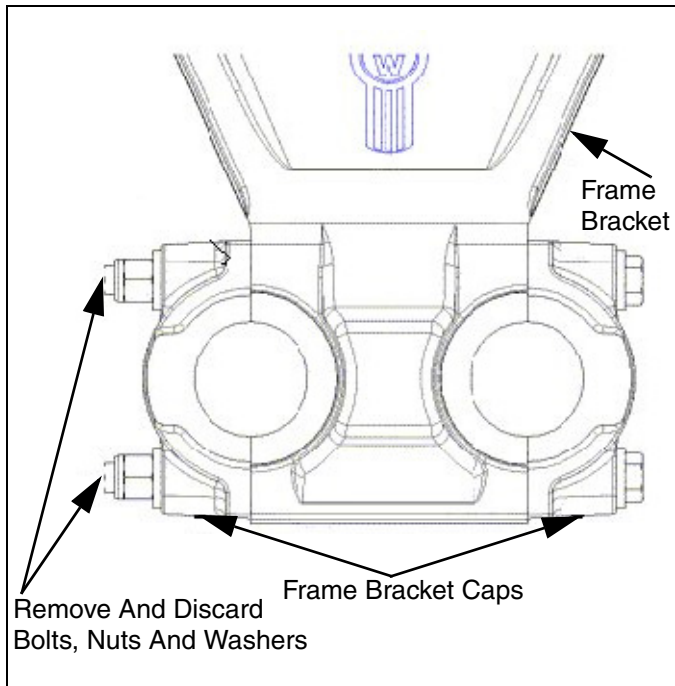


Figure 15-9

2. Remove the frame bracket caps.

3. Remove and discard the swaybar arm bolts from each axle seat.



NOTE: To avoid having to re-align the axles after installing a new swaybar assembly, note the number and location of any axle alignment spacers removed from the axle seat ends. Ensure the spacers are installed in the same position during reassembly.



NOTE: New axle seat bolts, washers and nuts are not included in the swaybar bushing kit. They must be ordered separately.

4. Separate the swaybar from the frame brackets.

TIP: A bottle jack between the tires can help separate the assembly. See Figure 15-10.



Figure 15-10

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

5. Scrape residual rubber or debris from the inside surface of the frame brackets and caps. See Figure 15-11.



Figure 15-11

Installation

1. With a spray bottle or by immersion, ensure the new swaybar bushings are well coated with plain water prior to installation (water provides lubrication to the bushings for proper installation).



NOTE: Do not use any lubricants, oils, soap, Armor All, glass cleaner, etc. during bushing installation as they have been found to significantly degrade bushing durability. Use plain water only.

2. Install the new bushings on the swaybar assembly. Orient the bushings with the split facing down. See Figure 15-12.

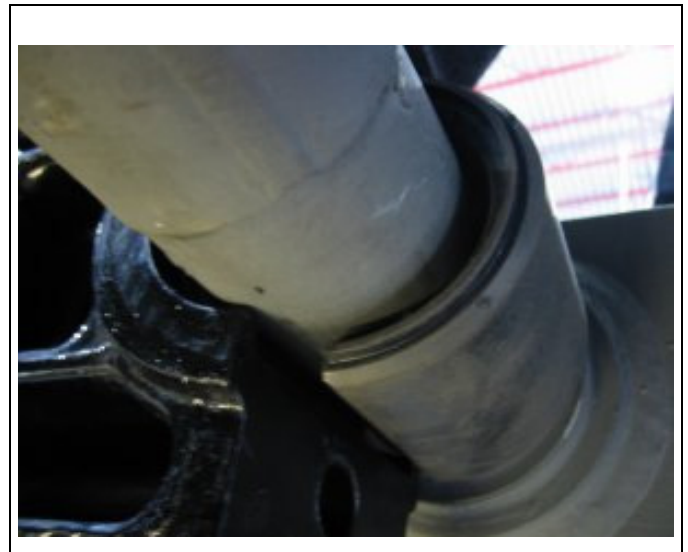


Figure 15-12

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Page	16 of 21
Number	KM817035

3. Install the new swaybar assembly using the frame bracket and axle seat bolts to temporarily hold the swaybar in place. See Figure 15-13.



Figure 15-13

4. Install new axle seat bolts and temporarily tighten until just “snug”. This will ensure the proper side-to-side alignment.



NOTE: Make certain any axle alignment spacers removed during disassembly are reinstalled in the same location.



NOTE: New axle seat bolts, washers and nuts are not included in the swaybar bushing kit. They must be ordered separately.

5. If a bottle jack was used to separate the axles, remove the bottle jack at this time.

6. Install the frame bracket caps, using new bolts, washers and nuts included with the swaybar Bushing Kit.

TIP: Using the old nuts, install the caps and torque down the bolts without the washers the first time. This is to help seat the bushings, otherwise there may not be enough threads to start the nut. Then remove the bolt, add the washers, and install using the new nuts.

7. Before tightening the frame bracket cap bolts, liberally spray the bushings with water one additional time to provide lubrication.
8. Tighten each joint evenly by alternating back and forth between the top and bottom cap bolts a minimum of 5 times (ensuring the joint is evenly clamped and the bushing is properly compressed). See Figure 15-14.

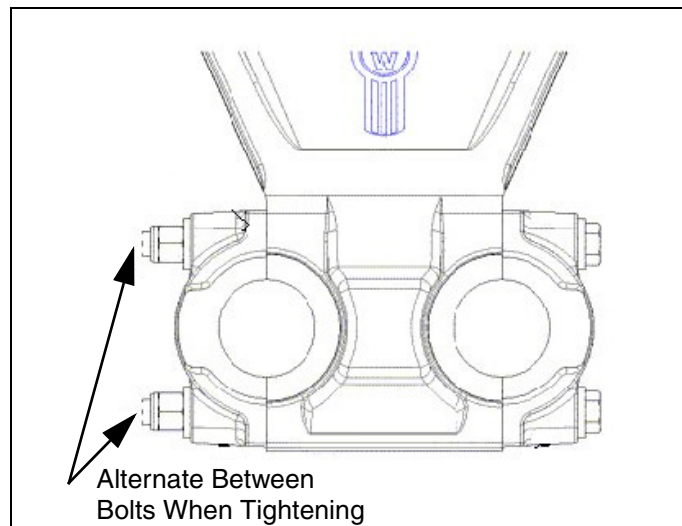


Figure 15-14



CAUTION: Each joint must be tightened evenly to prevent undue stress on the caps and to ensure the bushings are properly seated. Unevenly applied torque could result in damage to caps and bushings.

9. Final torque sequence:



NOTE: Click torque wrench is recommended.

a. Torque bolts to 140 ft-lbs.

b. Torque bolts to 180 ft-lbs.

10. After both joints have been torqued, allow rubber to relax and take a set for a **minimum of 5 minutes**.

11. Re-torque all bolts to 180 ft-lbs.

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

12. Inspect all joints for gaps between the frame bracket and caps. See Figure 15-15.



CAUTION: Ensure that there are no gaps between the frame brackets and caps. If a gap is present, proper bolt clamp load has not been attained. To achieve proper bolt clamp, loosen the joint but do not remove the nuts. Apply water to the bushing for lubrication and tighten the joint evenly. Repeat the final torque sequence.

- If any bushings or fasteners are damaged, replace the damaged components.

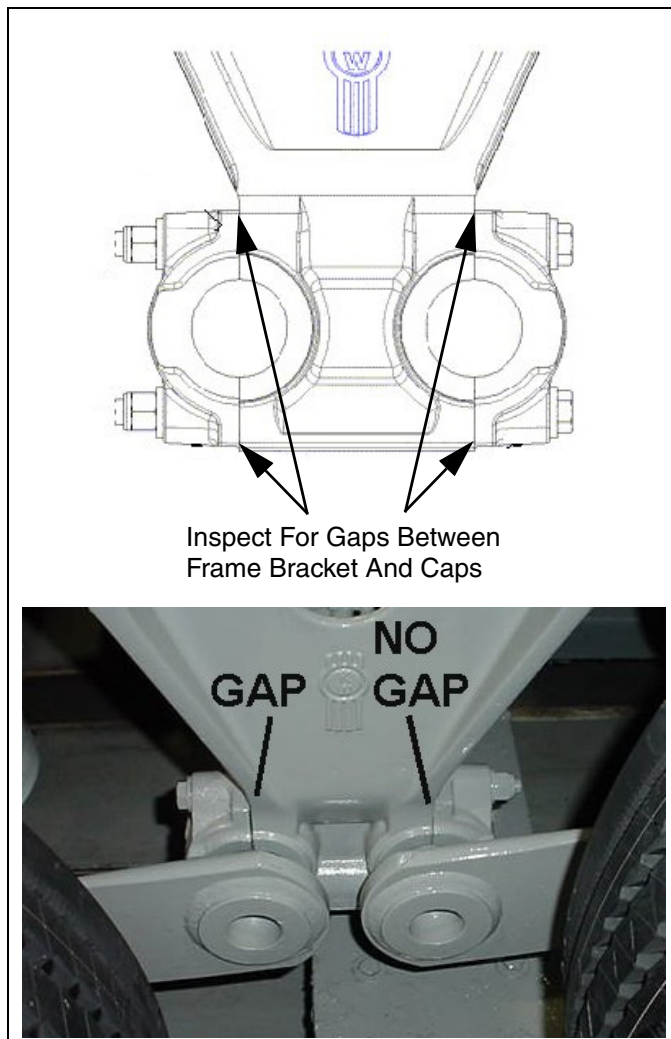


Figure 15-15

13. Tighten the bolts at the axle seats to 150-190 ft-lbs (203-258 Nm).



NOTE: New bolts, washers and nuts are required for attaching the swaybar assembly to the axle seat ends. They are not included in a new swaybar Bushing Kit. They must be ordered separately.

14. Ensure the clearance between the swaybar end to the frame bracket on both sides is at least 5/16 in. (8mm). If it is less than 5/16 in., the swaybar must be re-positioned (centered) between the frame brackets. See Figure 15-16.

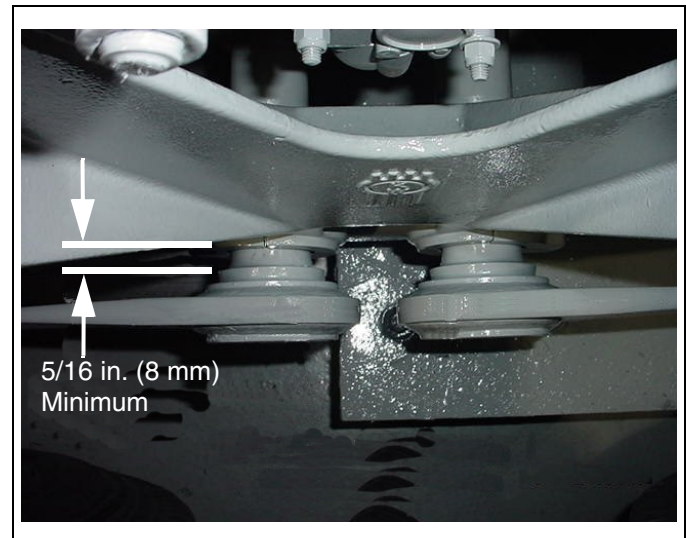


Figure 15-16

Swaybar Bushing Replacement



WARNING! Secure vehicle from rolling prior to beginning any swaybar repair and/or replacement. Remove the keys from the ignition. Failure to secure the vehicle could result in serious injury to technician and/or bystanders.



CAUTION: Perform all of the following procedures with the vehicle unloaded. Park the vehicle on a level, solid surface with the wheels blocked and parking brakes released.



NOTE: DO NOT remove wheels and tires.

NOTE: DO NOT jack up truck.

The following swaybar bushing replacement procedures apply to all AG400, AG460 and AG690 suspensions.

Removal

1. Remove and discard the fasteners from each frame bracket and cap joint. See Figure 15-17.

NOTE: New nuts, bolts and washers are included in each new swaybar Bushing Kit.

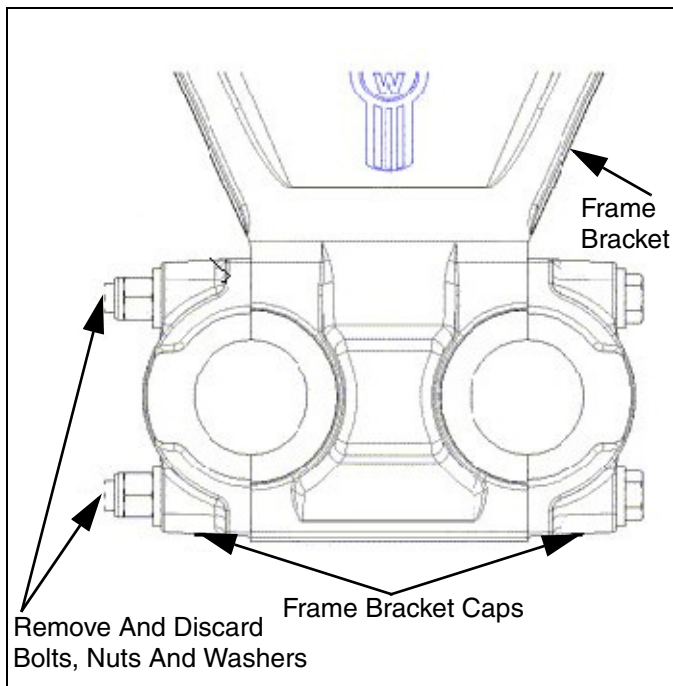


Figure 15-17

2. Remove the frame bracket caps.

3. Separate the swaybar from the frame brackets.

TIP: A bottle jack between the tires can help separate the assembly. See Figure 15-18.

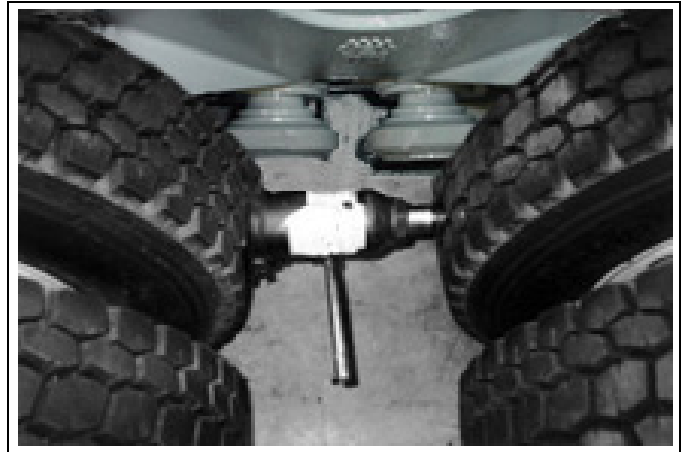


Figure 15-18

4. Scrape residual rubber or debris from the inside surface of the frame brackets, caps, and swaybar. See Figure 15-19.



Figure 15-19

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

Installation

1. With a spray bottle or by immersion, ensure the new swaybar bushings are well coated with plain water prior to installation (water provides lubrication to the bushings for proper installation).

i *NOTE: Do not use any lubricants, oils, soap, Armor All, glass cleaner, etc. during bushing installation as they have been found to significantly degrade bushing durability. Use plain water only.*

2. Install the new bushings on the swaybar assembly. Orient the bushings with the split facing down. See Figure 15-20.



Figure 15-20

3. Reinstall the swaybar assembly using the frame bracket bolts to temporarily hold the swaybar in place. See Figure 15-21.



Figure 15-21

4. If a bottle jack was used to separate the axles, remove the bottle jack at this time.
5. Install the frame bracket caps, using new bolts, washers and nuts included with the new swaybar Bushing Kit.

TIP: Using the old nuts, install the caps and torque down the bolts without the washers the first time. This is to help seat the bushings, otherwise there may not be enough threads to start the nut. Then remove the bolt, add the washers, and install using the new nuts.

6. Before tightening the frame bracket cap bolts, liberally spray the bushings with water one additional time to provide lubrication.

- Tighten each joint evenly by alternating back and forth between the top and bottom cap bolts a minimum of 5 times (ensuring the joint is evenly clamped and the bushing is properly compressed). See Figure 15-22.



CAUTION: Ensure that there are no gaps between the frame brackets and caps. If a gap is present, proper bolt clamp load has not been attained. To achieve proper bolt clamp, loosen the joint but do not remove the nuts. Apply water to the bushing for lubrication and tighten the joint evenly. Repeat the final torque sequence.

- If any bushings or fasteners are damaged, replace the damaged components.

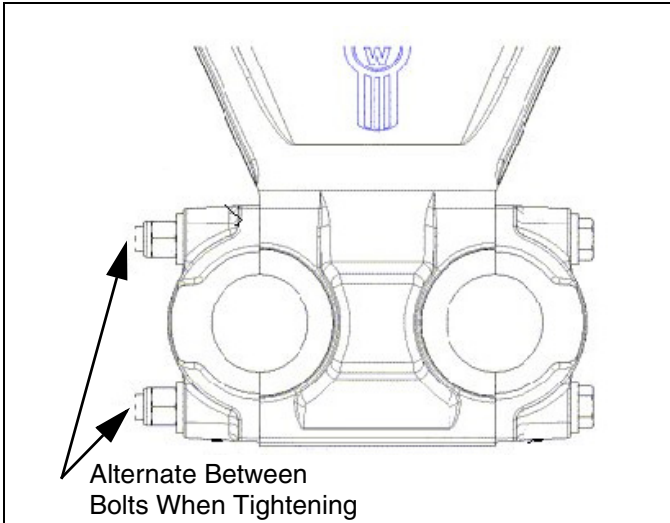


Figure 15-22



CAUTION: Each joint must be tightened evenly to prevent undue stress on the caps and to ensure the bushings are properly seated. Unevenly applied torque could result in damage to caps and bushings.

- Final torque sequence:



NOTE: Click torque wrench is recommended.

- Torque bolts to 140 ft-lbs.
- Torque bolts to 180 ft-lbs.

- After both joints have been torqued, allow rubber to relax and take a set for a **minimum of 5 minutes**.
- Re-torque all bolts to 180 ft-lbs.
- Inspect all joints for gaps between the frame bracket and caps. See [Figure 15-23](#).

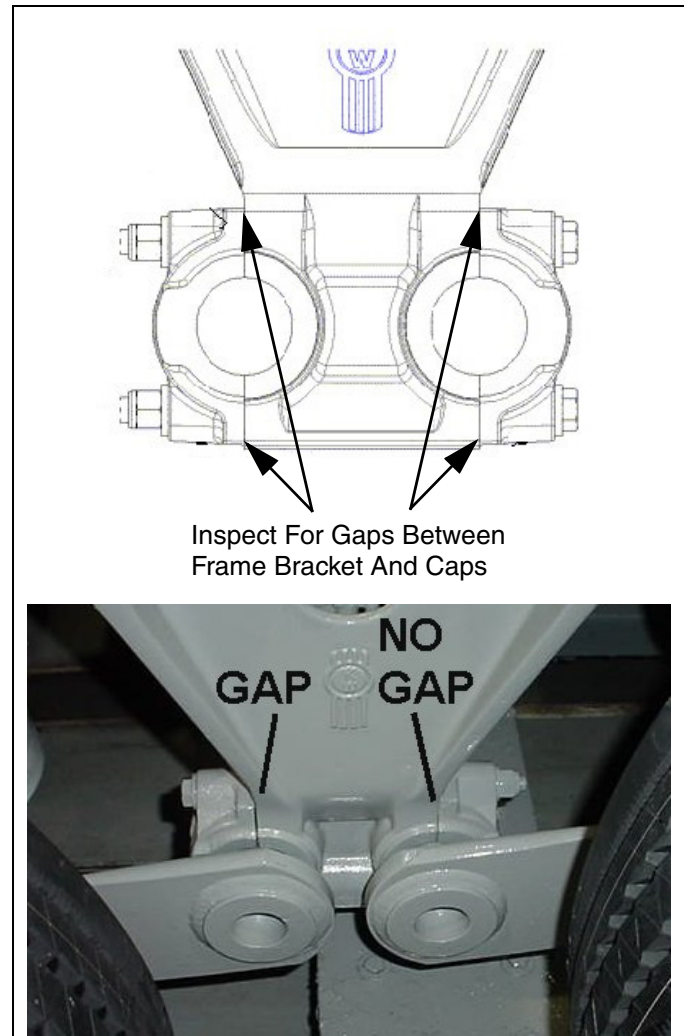


Figure 15-23

Suspension: Airglide 400 / 460 / 690 Air Spring Suspension

12. Ensure the clearance between the swaybar end to the frame bracket on both sides is at least 5/16 in. (8mm). If it is less than 5/16 in., the swaybar must be re-positioned (centered) between the frame brackets. See Figure 15-24.

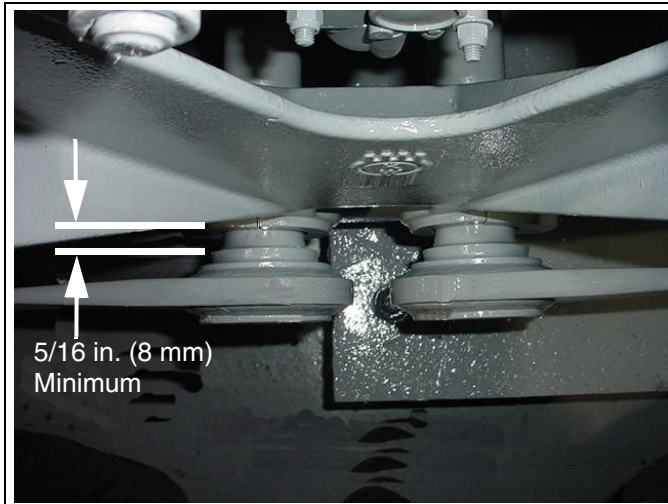


Figure 15-24