

**Upper Torque Arm, Air Disc Brake,
Replacement**

VN

**SP 722-001, Upper Torque Arm, Air Disc Brake,
Replacement**

(November 2012)

Note: Information is subject to change without notice.
Illustrations are used for reference only and may differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

This bulletin is intended to assist service technicians with the installation of Volvo Service Kit No. 21951871. This bulletin also includes instructions for rear suspension alignment for select Volvo vehicles, equipped with air disc brakes and Hendrickson's tandem PRIMAAX® EX 462 (PAX EX) suspension originally installed by Volvo.

A number of Volvo vehicles were built between December 1, 2010 through May 1, 2012 with the Hendrickson PRIMAAX EX suspension adapted by Volvo to accommodate air disc brakes. Upon review of some of these units it has been determined that some operation and service concerns may exist, which should be reviewed.

In general, the PRIMAAX EX suspension may require spacers to be installed between the longitudinal torque rods and frame hanger brackets to assure pinion angles and alignment are correct. In some cases these spacers may not have been correctly specified and/or installed correctly on the vehicles at the time of assembly. If so, this could cause the pinion angles and/or alignment to be incorrect. New spacers are provided in Volvo Service Kit No. 21951871 to correct this potential condition. Regular maintenance inspection procedures, as referenced in Hendrickson Technical Publication number 17730-254 will still be required to help ensure the adjacent joint retain their proper torque over time.

It has also been reported on some of these vehicles:

- Shock travel may be too long allowing the suspension to over travel
- Some chassis fasteners may be too long which may result in rubbing on vehicle components
- Some longitudinal torque rod bushings may be improperly centered which can cause contact with and accelerated wear to the top pads

Any such conditions should be completed with Volvo Service Kit No. 21951871 and proper maintenance to assure optimum performance.

Contact Volvo Tech Service at (866) 238-6586 for further information regarding this campaign.

This bulletin is to assist service technicians in the installation of Volvo Service Kit No. 21951871 which is intended to:

- Replace the factory installed torque rod to frame hanger open-end shim(s) with closed-end shim(s) (Part Numbers. 70240-001 and 70240-002) and/or torque rod spacer (Part Numbers. 67057-001, 67057-002, 67057-003, and 67057-004) connection as needed.
- Inspect and/or component replacement of the:
 - Longitudinal Torque Rods
 - Top Pad
 - D-Pin bushings (may require additional components not included in Volvo Service Kit No. 21951871)
 - Bottom caps (may require additional components not included in Volvo Service Kit No. 21951871)
 - Shock Absorber
- Inspection of the U-beam assembly and if necessary component replacement D-Pin bushings and/or bottom caps (may require additional components not included in Volvo Service Kit No. 21951871)
- Normal warranty guidelines apply
- Time not included in Service Program for D-Pin bushing replacement
- Axle alignment

Refer to Hendrickson Technical Publication number 17730-254 for complete service and safety instructions regarding PRIMAX EX for Volvo vehicles, available online at: www.hendrickson-intl.com.

Volvo Service Kit Number 21951871		
Part Number	Description	Quantity
60657-007	Shock Absorber	4
70240-001	Shim 3.04 mm	12
70240-002	Shim 1.52 mm	12
60961-653	Pinion Spacer Service Kit, Includes 4 of each: Pinion Spacer 4.0 mm Pinion Spacer 8.0 mm Pinion Spacer 12.0 mm	1
50754-008	Shock Fastener Service Kit	1
49176-032 49176-039	Torque Rod / Frame Hanger Fastener Service Kits	
	8.0 in Bolt Kit	2
	9.0 in Bolt Kit (Includes 4 of 16.0 mm pinion spacers)	2
60632-012	QUIK-ALIGN® Service Kit	2
68821-151 68821-152 68821-351	Torque Rod / Top Pad Service Kits	
	Left Hand Front	1
	Right Hand Front	1
68821-351	Left Hand Rear	1
68821-351	Right Hand Rear	1
48718-128	U-bolt Service	2

Repair Procedure

LATERAL ALIGNMENT

- 1 Use a work bay with a level surface.
- 2 Relax the suspension by slowly moving the vehicle back and forth several times in a straight line without using the brakes. This will slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead.
- 3 **DO NOT** set the parking brake. Chock the front wheels of the vehicle.
- 4 Verify and maintain the air system at full operating pressure.
- 5 Ensure all drive axle tires are the same size and properly inflated.
- 6 Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components before proceeding with the alignment process.
- 7 Verify the vehicle is at the correct ride height, see page 28 **SET VEHICLE TO RIDE HEIGHT** Section.
- 8 Measure from the outside of the frame rail to the rim flange of the inner tire. Record the measurement.
- 9 Measure the same distance on the opposite side of the same axle. Record the measurement.
- 10 Subtract the two measurements to get a difference between the two. If the difference is greater than 3 mm (0.125 in.), it will be necessary to correct the lateral alignment. Adding or removing shims that are located between the transverse torque rod and frame rail or the axle tower will accomplish this. A general rule of thumb is to use a shim with a thickness that is half of the difference between the two measurements. For example, If the lateral alignment is out of specification by 6 mm (0.25 in.), remove or install a 3 mm (0.125 in.) shim between the transverse torque rod and frame rail or axle tower as needed.

Note: Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts for all torque rod attachments.

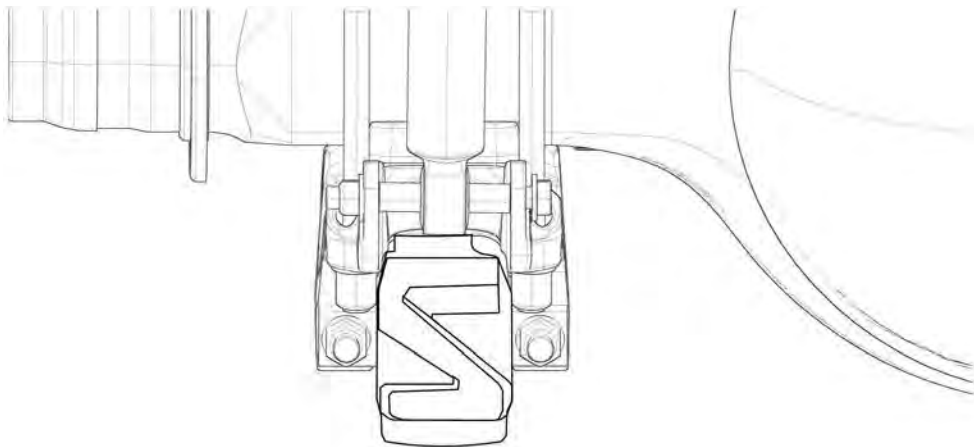
SUPPORT BEAM AND BOTTOM CAP INSPECTION

INSPECTION

- 1 Use a work bay with a level surface.
- 2 Relax the suspension by slowly moving the vehicle back and forth several times in a straight line without using the brakes. This will slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead.
- 3 **DO NOT** set the parking brake. Chock the front wheels of the vehicle.
- 4 Verify and maintain the air system at full operating pressure.
- 5 Ensure all drive axle tires are the same size and properly inflated.
- 6 Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components.
- 7 Verify the vehicle is at the proper ride height. See page 28 **SET VEHICLE TO RIDE HEIGHT** in the Section.
- 8 Verify suspension lateral alignment is correct (Lateral offset = 0 mm / 0 in.).
- 9 Visually inspect the support beam to bottom cap location (inside the legs of the bottom cap) for signs of contact.

- If there is contact between the support beam and bottom cap due to D-Pin offset in the support beam, replace the D-Pin. Center the D-Pin in the support beam ± 2 mm (0.02 in).
- Clearance between the support beam and the inside of the bottom cap legs should be a minimum of 2 mm (0.02 in). If needed this will be corrected in the page 15 **TORQUE ROD / TOP PAD ASSEMBLY** Section.
- Under normal operating conditions wear marks on the bottom cap may occur between the raised section of the support beam and the bottom cap. This is acceptable, See Figure 1, if gouges are more than 1 mm deep, replace bottom caps. See page 18 **BOTTOM CAP REPLACEMENT** Section.

Note: Bottom caps are not included in service kit. If replacement is required, normal warranty guidelines apply.



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Fig. 1

- 10 Repeat the support beam and bottom cap inspections for the remaining drive axles.
- 11 If D-Pin replacement is required for the affected U-beam assembly, proceed to the page 6 **D-PIN REPLACEMENT** Section.
- 12 If all the axles have been inspected and D-Pin replacement is not required proceed to the page 15 **TORQUE ROD / TOP PAD ASSEMBLY** in Section.

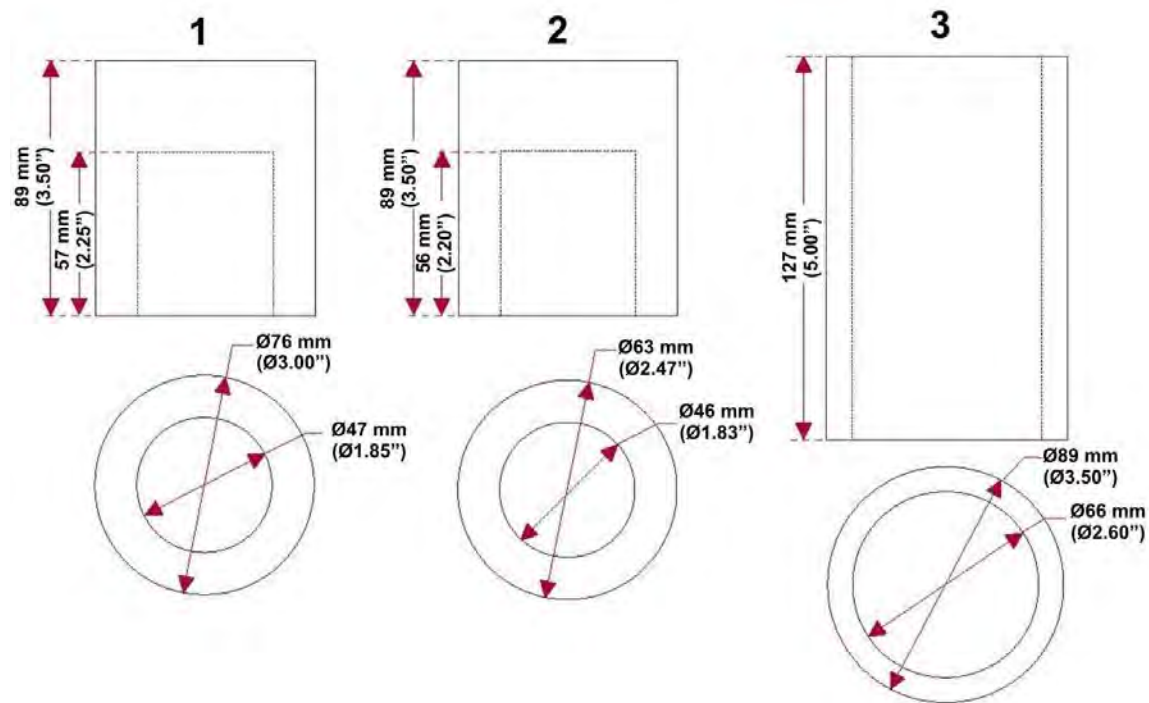
D-PIN REPLACEMENT

Note: D-Pin bushings are not included in service kit. If replacement is required normal warranty guidelines apply.

YOU WILL NEED:

- A vertical shop press with a capacity of at least 10160 kg (10 tons).
- A D-Pin Removal Tool, Installation Tool, and Receiving Tool, see Figure 2.

D-Pin Tools: These tools are designed to install and remove D-Pin bushing. Bushing tools are made from cold rolled steel or equivalent. Drawings are for reference only. Hendrickson does not supply these tools.



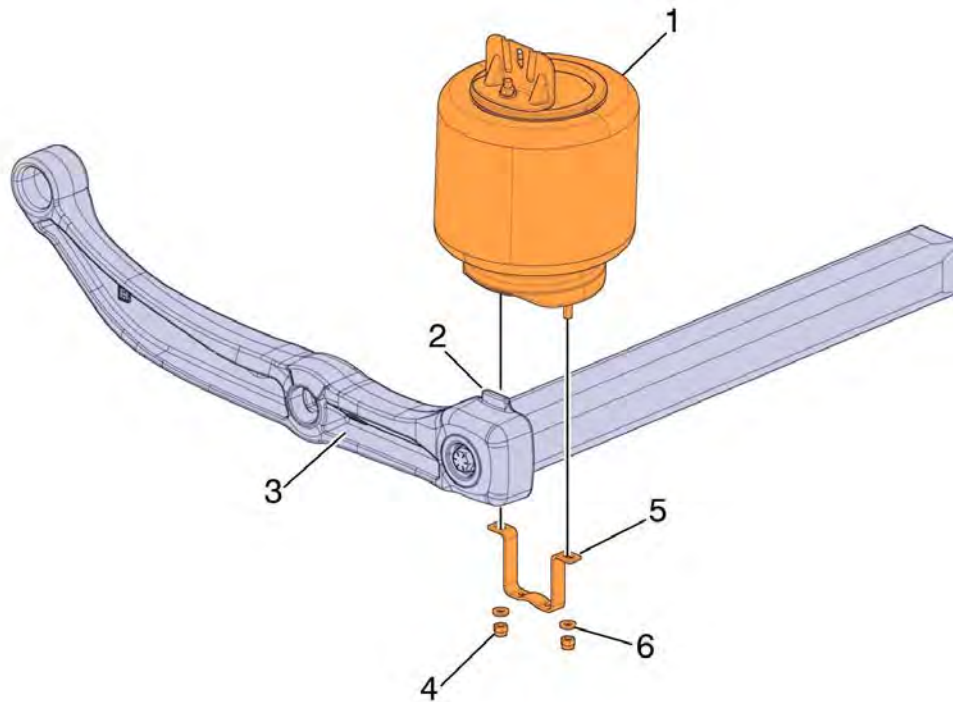
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Fig. 2

- 1 Installer
- 2 Remover
- 3 Receiver

REMOVAL

- 1 Chock the front axle wheels.
- 2 Support the frame at ride height.
- 3 Raise the axle being serviced just enough to remove the wheels and support the axle.
- 4 Disconnect the height control valve(s) linkage assembly from the height control valve arm (s), see vehicle manufacturer's instructions.
- 5 Lower the leveling valve arm(s) to exhaust the air in the air springs and deflate the rear suspension, see vehicle manufacturer's instructions.
- 6 Lubricate the lower mounting fasteners of the air springs with penetrating oil. This will help prevent the air spring mounting studs from damage during the removal process.
- 7 Remove the lower mounting fasteners from the air springs using **HAND TOOLS** only, and discard.
- 8 Remove both the lower air spring mounting brackets to disconnect air springs from the cross tube, see Figure 3.
- 9 Loosen both QUIK-ALIGN fasteners, **DO NOT** remove at this time.



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Fig. 3

- 1 Air Spring Assembly
- 2 Beam Notch
- 3 U-beam Assembly
- 4 1/2" Locknut (Tightening Torque 27-41 Nm (20-30 ft-lb))
- 5 Lower Mounting Bracket
- 6 Washer

10 Install a floor jack with a 102 mm (4 in.) support plate to support the U-beam assembly.

11 Remove the D-pin fasteners on both sides of the axle and discard.

Note: It may be necessary to raise the front of the differential to allow the D-pins to disengage the bottom caps.



WARNING

The weight of the U-beam assembly is approximately 102 kg (225 lb). Care should be taken at removal and installation to prevent personal injury or damage to components.

12 Lower the floor jack and pivot the U-beam assembly downward.

13 Remove the QUIK-ALIGN fasteners and discard.

14 Remove the QUIK-ALIGN eccentric and concentric collars.

15 Remove the U-beam assembly from the hangers.

16 Remove the U-beam assembly from the vehicle.

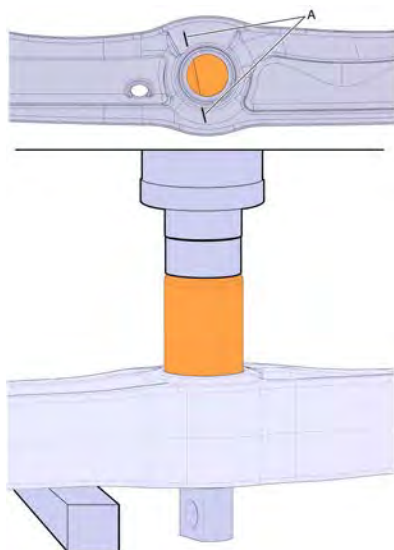
17 It is recommended that the U-beam assembly **NOT BE** disassembled.

INSTALLATION

1 Place the U-beam assembly in a shop press on top of a receiving tool with both ends of the support beam squarely supported on the press bed.

2 Mark the clocking position of the D-pin bushing on the support beam with a paint stick, see Figure 4.

3 Install the D-Pin Removal Tool centered on the D-Pin bushing, see Figure 4.

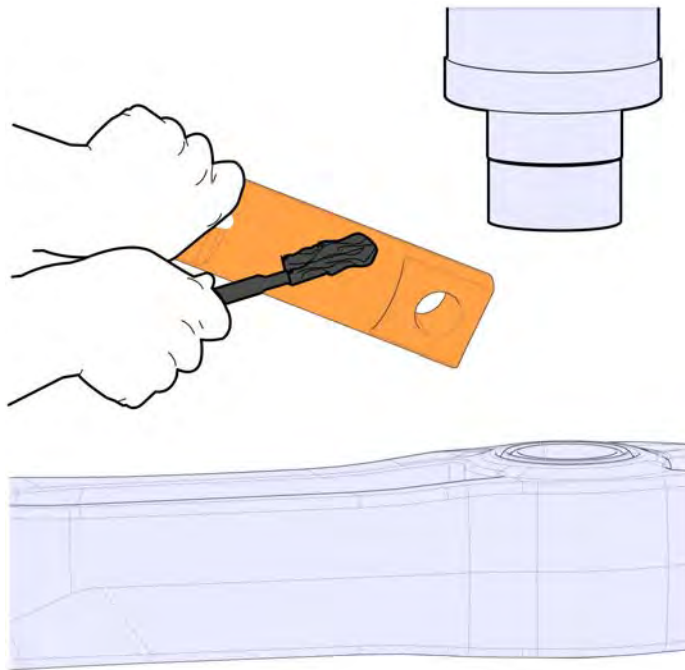


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Fig. 4

A Indexing marks

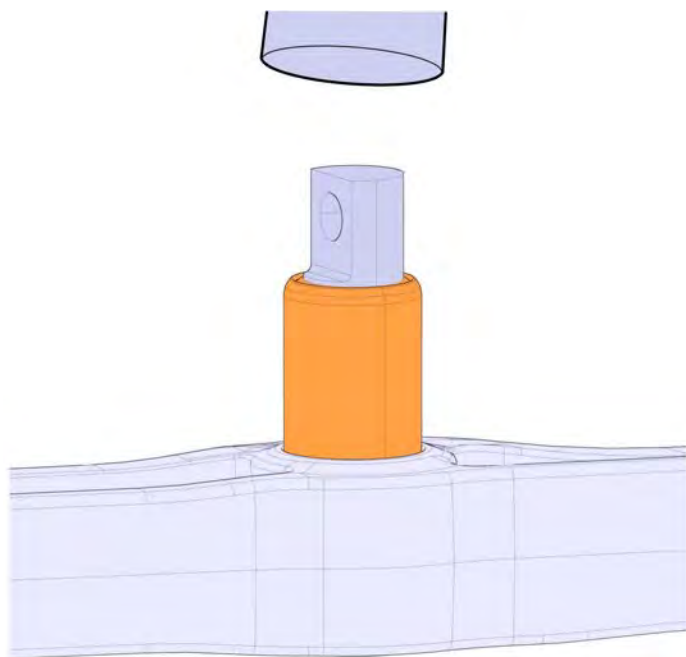
- 4 Push directly on the D-Pin Removal Tool until the D-Pin bushing is pressed out of the support beam bore.
- 5 Clean the support beam bore with a wire wheel.
- 6 Inspect the inner diameter of the D-Pin bore on the support beam, check for any damage to the support beam bore. If the support beam bore is damaged, U-beam assembly replacement is required, see the U-Beam Installation Section in this publication.
- 7 Lubricate the support beam D-Pin bore and the D-Pin bushing outer sleeve with chassis grease, see Figure 5.



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Fig. 5

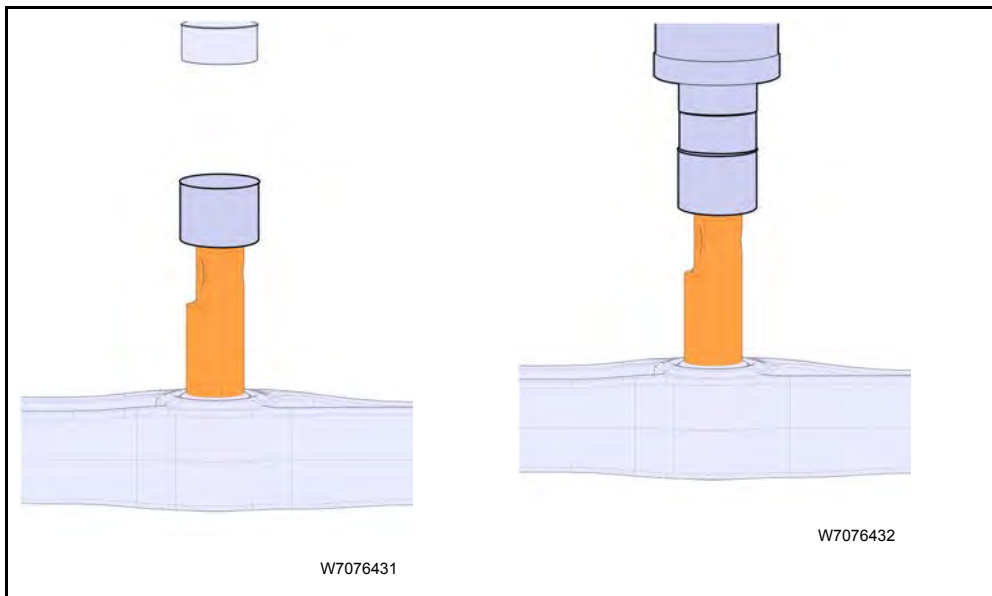
- 8 Line up the new D-Pin bushing with the clocking line that was put on the support beam, see Figure 6.



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Fig. 6

- 9 Install the D-Pin bushing installation tool and press in the new D-Pin bushing until the outer metal sleeve is centered in the support beam assembly ± 2 mm (0.01 in), see figures below.



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- 10 Repeat the page 6 D-PIN INSTALLATION for the remaining D-Pin and proceed to page 12 U-BEAM INSTALLATION section.

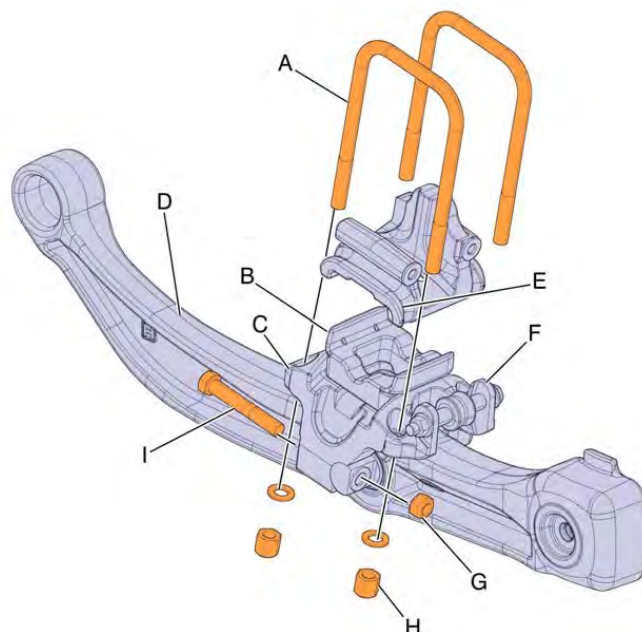
U-BEAM INSTALLATION



WARNING

The weight of the U-beam assembly is approximately 102 kg (225 lb). Care should be taken at removal and installation to prevent personal injury or damage to components.

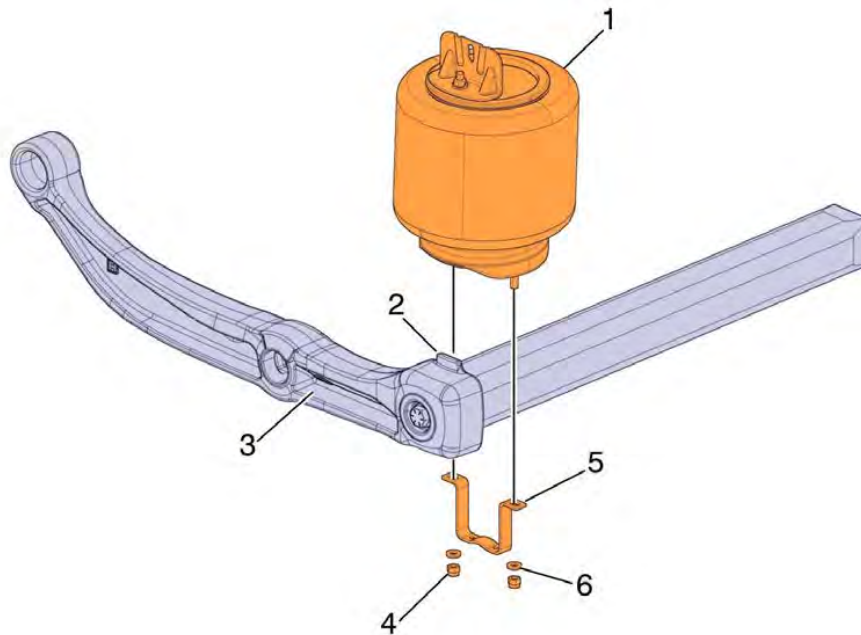
- 1 Position the new or re-bushed U-beam assembly under the vehicle.
- 2 Install the support beams into the frame hangers.
- 3 Verify the correct QUIK-ALIGN collar (eccentric/concentric) is in the correct location.
- 4 Install QUIK-ALIGN connection with new fasteners and snug to 68–136 Nm (50-100 ft-lb) torque. **DO NOT** tighten at this time. The final torque must be done after **DRIVE AXLE ALIGNMENT ADJUSTMENT PROCEDURE** is complete (see page 28).
- 5 Position the support beam and cross tube assembly on a floor jack equipped with a 102 mm (4 in.) support plate.
- 6 Raise the support beam and cross tube assembly until the D-Pin engages in the bottom cap.
- 7 Install the new D-Pin fasteners, installing them from front to back, see Figure 7.



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Fig. 7

- A U-bolt
 - B Axle Spacer (if equipped)
 - C Bottom Cap
 - D U-beam Assembly
 - E Top Pad
 - F Lower Shock Mounting Hole
 - G 3/4" D-pin Lock nut (Tightening Torque 275–325 ft-lb)
 - H 3/4" U-bolt Locknut
 - I Orientation fo 3/4" D-pin Bolt is front to back
- 8 Snug the D-Pin fasteners to 50-70 foot pounds torque. **DO NOT** tighten at this time. The final torque will be done after the **TORQUE ROD / TOP PAD ASSEMBLY** replacement is complete (see page 15).
 - 9 Install the air springs between the frame and cross tube. Ensure the slot in the bottom of the air spring engages the "beam notch" on the top of the beam, see Figure 8.
 - 10 Using **HAND TOOLS** only, install the lower mounting fasteners and tighten to 89–133 Nm (20-30 ft-lb) torque.



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Fig. 8

- 1 Air Spring Assembly
- 2 Beam Notch
- 3 U-beam Assembly
- 4 1/2" Locknut (Tightening Torque 27-41 Nm (20-30 ft-lb))
- 5 Lower Mounting Bracket
- 6 Washer

11 Repeat U-beam Assembly installation for the remaining drive axles.

Note: Axle Alignment is required when a new U-beam or re-bushed U-beam assembly is installed.

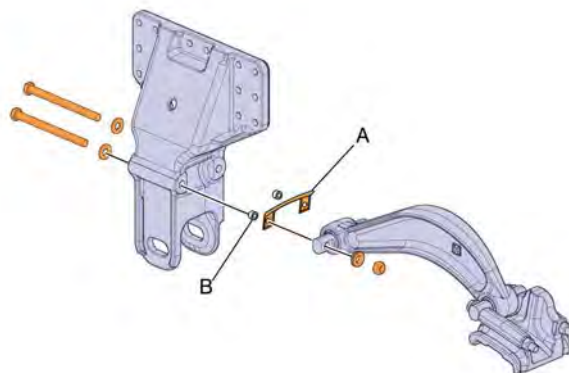
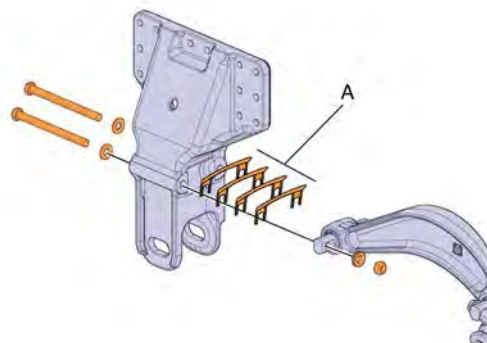
12 Proceed to the following page 15 **TORQUE ROD / TOP PAD ASSEMBLY** Section.

TORQUE ROD / TOP PAD ASSEMBLY

TORQUE ROD TO TOP PAD ASSEMBLY

CURRENT

NEW



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A: Open-ended Shims

B: Spacers

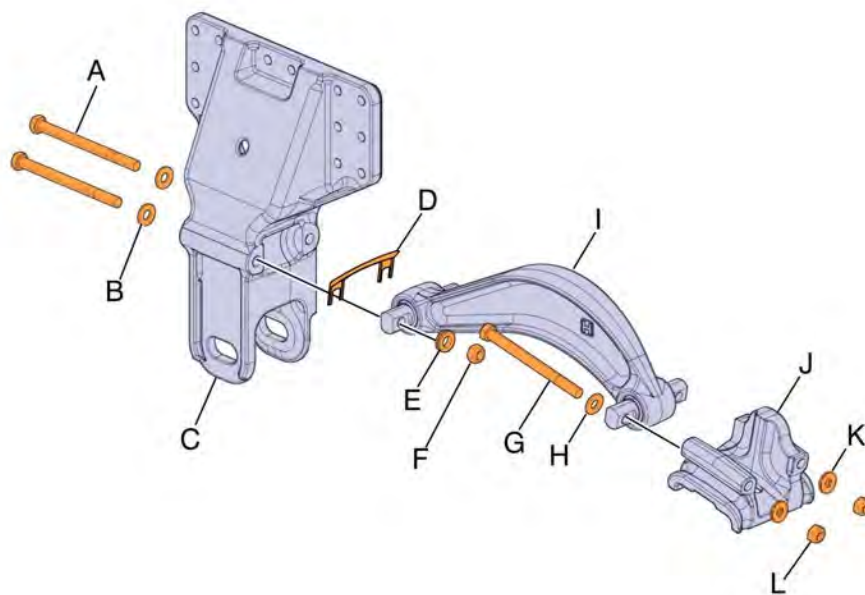
REMOVAL

Note: It is recommended that you replace one Torque Rod / Top Pad Assembly at a time.

- 1 Chock the front axle wheels.
- 2 Support the frame at ride height.
- 3 Raise the axle being serviced just enough to remove the wheels and support the axle.
- 4 Disconnect the height control valve(s) linkage assembly from the height control valve arm(s), see vehicle manufacturer's instructions.
- 5 Lower the leveling valve arm(s) to exhaust the air in the air springs and deflate the rear suspension, see vehicle manufacturer's instructions.
- 6 Use a floor jack to support the axle pinion angle. Place the jack under the front of the carrier.
- 7 It is recommended that one side of the axle be replaced at a time to help preserve the axle position.

Note: Begin replacement at the left front connection, then complete the right front, then the left rear and finally the right rear.

8 Remove the fasteners from the frame hanger to torque rod connection, see Figure 9.



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Fig. 9

- A Bolt
- B Washer
- C Frame Hanger
- D Shim (if required)
- E Washer
- F Locknut
- G Bolt
- H 5/8" Washer
- I Longitudinal Torque Rod
- J Top Pad
- K 5/8" Washer
- L 5/8" Locknut (Tightening Torque 712-780 Nm (525–575 ft-lb))

- 9 Support the U-beam assembly on a floor jack equipped with a 102 mm (4 in.) support plate.

Note: Due to certain pinion angle configurations, the removal or loosening of the D-Pin bolts may be necessary to access the U-bolt fasteners.

- 10 Remove the U-bolt and fasteners from the clamp group and discard.

- 11 Remove the torque rod/top pad assembly.

- If bottom cap replacement **IS NOT** required, proceed to page 21 **SHOCK REPLACEMENT** Section.
- If bottom cap replacement **IS REQUIRED** follow page 18 **BOTTOM CAP REPLACEMENT** provided.

BOTTOM CAP REPLACEMENT

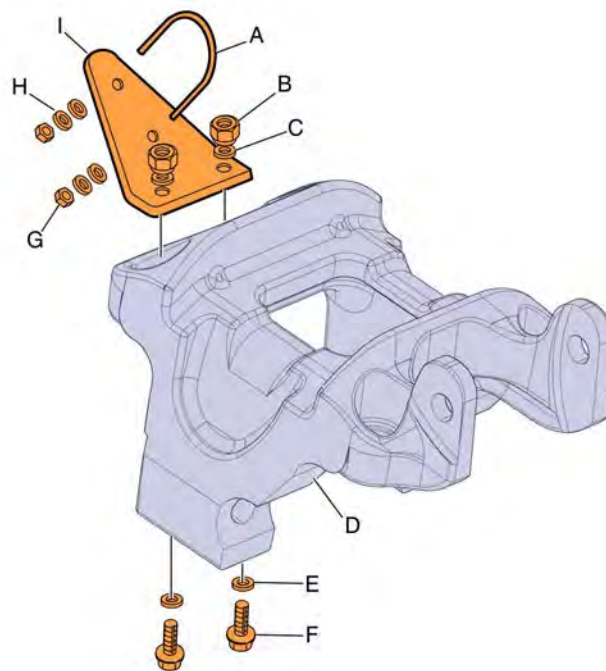
It is recommended that you replace one bottom cap at a time.

Note: It is recommended that you replace one bottom cap at a time.

Note: To help the re-assembly mark the position of the lower Height Control Valve linkage bracket if removal of the bracket is necessary.

- 1 Remove the lower shock absorber mounting fastener and height control valve bracket (if equipped).
- 2 Pivot the lower shock mount out of the bottom cap.

3



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Fig. 10

- A S-cam U-bolt
- B S-cam Support Bracket 3/8" Locknuts Tightening Torque 41–54 Nm (30–40 ft-lb)
- C 3/8" Washer
- D Bottom cap
- E 3/8" Washer
- F 3/8" Hex bolt
- G S-cam U-bolt 5/16" Locknuts Tightening Torque 27–41 Nm (20–30 ft-lb)
- H 5/16" Washer
- I S-cam support bracket

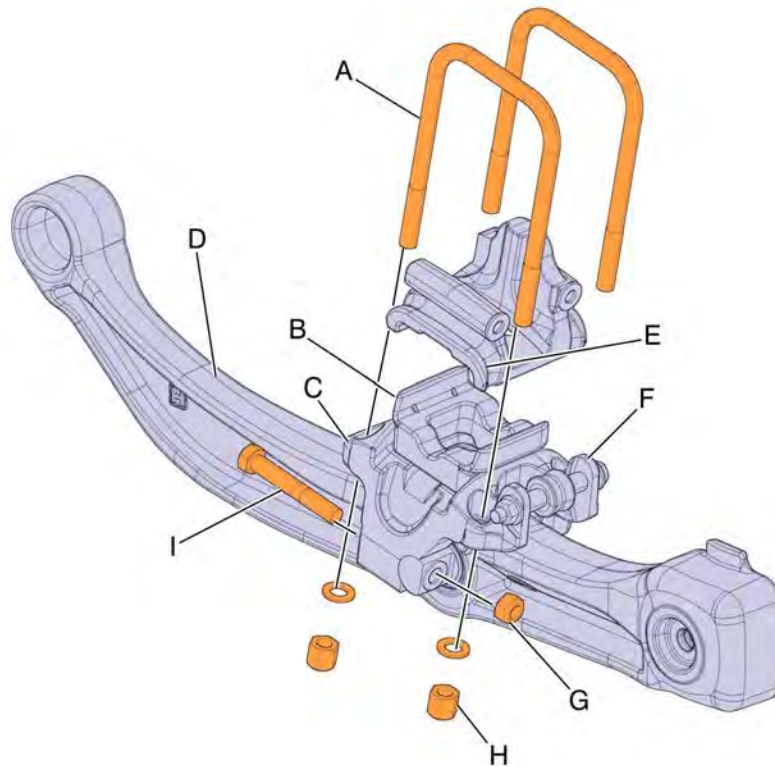
Remove the S-cam support bracket fasteners and support bracket (if equipped), see Figure 10.

- 4 Remove the old D-pin fasteners on both sides of the axle and discard or remove the new D-Pin fastener and set aside.
- 5 Remove the U-bolts and fasteners from the clamp group and discard, see Figure 11.

Note: It may be necessary to loosen the U-bolts (DO NOT remove) on the opposite side to gain enough clearance to remove the bottom cap.

- 6 Raise the axle corner just enough to remove the bottom cap.
- 7 Remove the bottom cap.

8



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Fig. 11

- | | |
|---|---|
| A | U-bolt |
| B | Axle spacer, if equipped |
| C | Bottom cap |
| D | U-beam assembly |
| E | Top pad |
| F | Lower shock mounting hole |
| G | 3/4" D-pin Locknut Tightening Torque 373-441 Nm (275-325 ft-lb) |
| H | 3/4" U-bolt Locknuts Tightening Torque 475-542 Nm (350-400 ft-lb) |
| I | Orientation of 3/4" D-pin bolt is front to back |

Install the new bottom cap on the axle in the proper direction, with the lower shock mounting holes facing the rear of the vehicle, see Figure 11.

- 9 Install the S-cam support bracket and fasteners (if equipped). DO NOT tighten at this time.

Note: It may be necessary to squeeze the U-bolts slightly to facilitate installation through the bottom cap.

- 10 Install the new D-Pin fasteners and snug the fasteners to 68–95 Nm (50-70 ft-lb), **DO NOT** tighten at this time.
- 11 Lower the axle corner back down on the axle support.

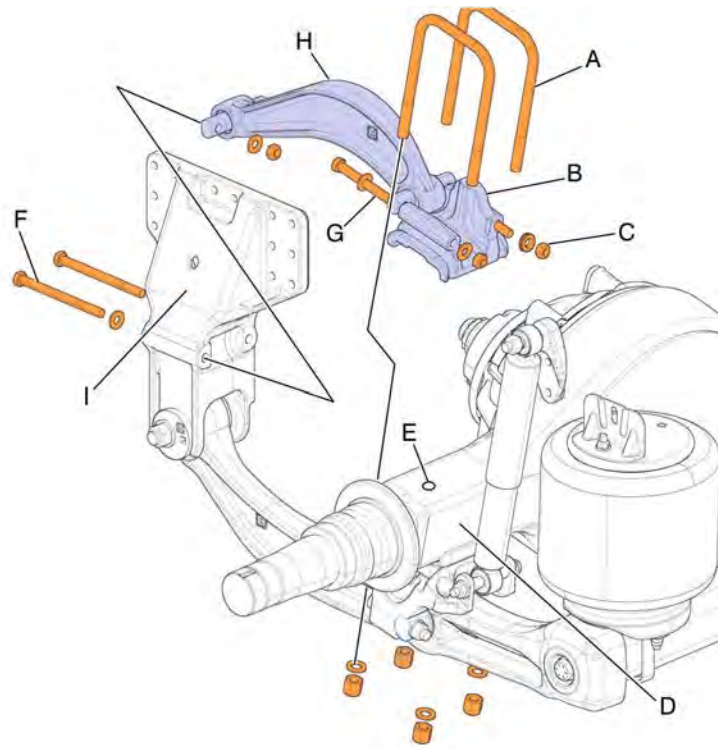
SHOCK ABSORBER REPLACEMENT

Note: To help the re-assembly mark the position of the lower Height Control Valve linkage bracket if removal of the bracket is necessary.

- 1 Remove the lower shock absorber and/or the upper shock absorber mounting fasteners.
- 2 Slide the old shock absorber out and off the mounting brackets.
- 3 Position the new shock absorber on the upper mounting bracket and in the lower mounting bracket.
- 4 Install a new upper and lower shock absorber fasteners with the height control valve linkage bracket (if removed).
- 5 Torque the shock absorber fastener to 237-271 Nm (175-200 ft-lb).
- 6 Torque the lower shock absorber fastener to 271-305 Nm (200-225 ft-lb).

TORQUE ROD / TOP PAD ASSEMBLY INSTALLATION

- 1 Install the top pad / torque rod assembly on the top of the axle making sure to engaging the dowel pin. Care should be taken to ensure the bump stop is mounted to the inboard side of the suspension, see Figure 12.



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Fig. 12

- | | |
|---|--|
| A | U-bolts |
| B | Top pad inboard ear |
| C | 5/8" Locknut, Tightening Torque 712-780 Nm (525-575 ft-lb) |
| D | Axle |
| E | Dowel Pin |
| F | Torque rod to frame hanger hex bolt |
| G | Torque rod to frame hanger hex bolt |
| H | Longitudinal torque rod |
| I | Frame hanger |

- 2 Install new U-bolts and fastener and snug to 68 Nm (50 ft-lb). **DO NOT** tighten at this time.
- 3 Verify that the U-bolts are seated properly in the channels of the top pad, see Figure 12.

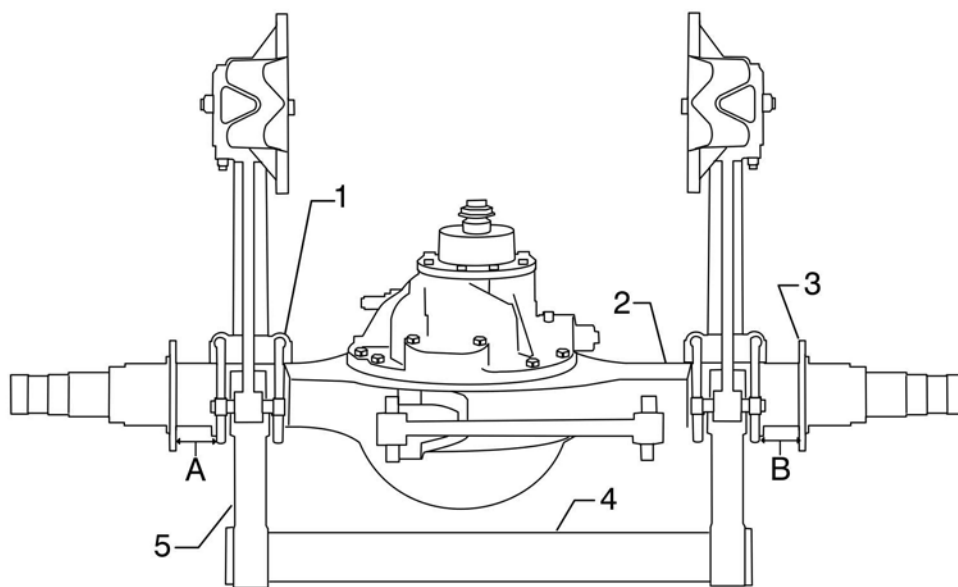
- 4 Install the new fastener at the frame hanger to torque rod connection. Snug the fasteners to 68–95 Nm (50-70 ft-lb). DO NOT tighten at this time, see Figure 12.

Note: DO NOT install shims or spacers included in the kit at this time. This will be done in the page 30 **PINION ANGLE ADJUSTMENT PROCEDURE** Section.

- 5 Repeat the page 22 **REPLACING TORQUE ROD / TOP PAD ASSEMBLY** for the remaining torque rod top locations.
- 6 Once all the **TORQUE ROD / TOP PAD ASSEMBLIES** and if required the bottom caps, have been replace proceed to the following **ADJUSTMENT** Section.

ADJUSTMENT

- 1 Center the bottom cap on the support beam.
- 2 Measure from the lower bottom cap to the brake flange on both sides of the axle.
Measurement should be the same for both sides of the axle.
- 3



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Fig. 13

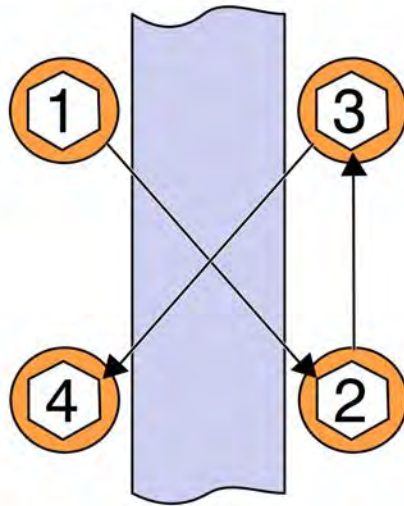
- | | |
|---|-----------------------|
| 1 | Bottom cap assembly |
| 2 | Axle |
| 3 | Brake flange |
| 4 | Cross brace |
| 5 | Support beam assembly |

Measure the lower bottom cap inboard legs to beam clearance. The measurement should be minimum of 2 mm (0.1 in).

Note: Prior to tightening the U-bolts for the final torque, ensure the cross tube, support beam, and the bottom cap assembly are centered on the axle ($a = b \pm 1/8"$), see Figure 13.

- 4 Adjust the lower bottom caps to an equal distance to the brake flange while maintaining the 2 mm (0.1 in) lower bottom cap to beam clearance.

- 5 If removed or loosened, install and torque the new 0.75 in. D-Pin bolts to 373-441 Nm (275-325 ft-lb).
- 6 Verify the bottom cap is still centered in the support beam after adjustment prior to tightening.
- 7 Tighten the S-cam support bracket and fasteners (if equipped). Torque the 0.375 in. locknuts to 41-54 Nm (30-40 ft-lb). Torque the 0.3125 in. locknuts to 27-41 Nm (20-30 ft-lb).
- 8



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Fig. 14

Tighten the U-bolt fasteners, evenly in 68 Nm (50 ft-lb) increments using the proper pattern to achieve uniform bolt tension, see Figure 14.

Note: Align the lower axle seats before tightening the U-bolts to final torque. Per the specification, is not to be more than 3 mm (0.125 in.) difference total from side to side. Measure from bottom of axle seat over to the brake spider. Measure in the same area on other side.

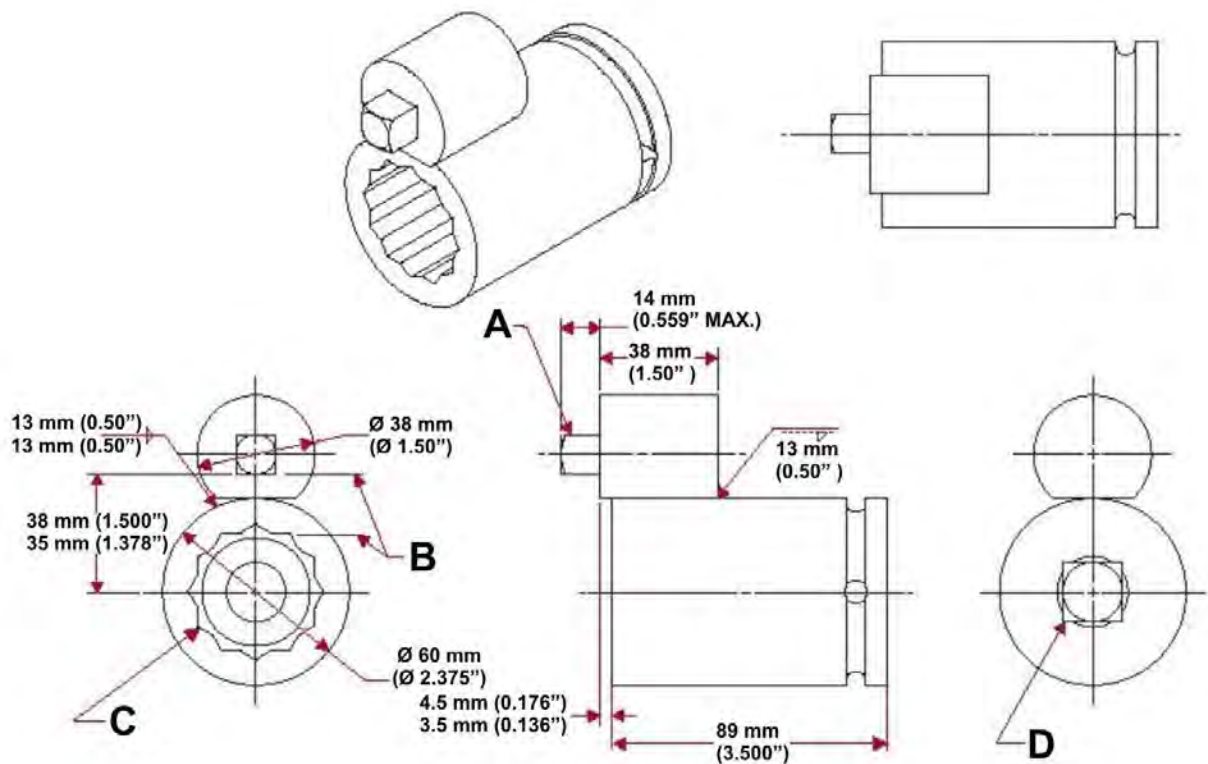
- 9 Inflate the suspension by connecting the height control valve linkage to the height control valve arm, see vehicle manufacturer's instructions, and remove the frame support(s).
- 10 Proceed to the following page 26 **QUICK-ALIGN ADJUSTMENT** Section.

QUIK-ALIGN ADJUSTMENT

QUIK-ALIGN socket tool, OTC 1767, or a locally fabricated tool, see Figure 15

QUIK-ALIGN SOCKET TOOL

Hendrickson PRIMAAX EX QUIK-ALIGN Socket Tool is available from the Owatonna Tool Corporation (Owatonna Tool No. 1767, website: www.otctools.com) or a shop made tool can be made from the drawing shown. Hendrickson does not supply QUIK-ALIGN tooling.
Material: Optional per customer discretion, Grade 80 or better case harden per SAE requirements.



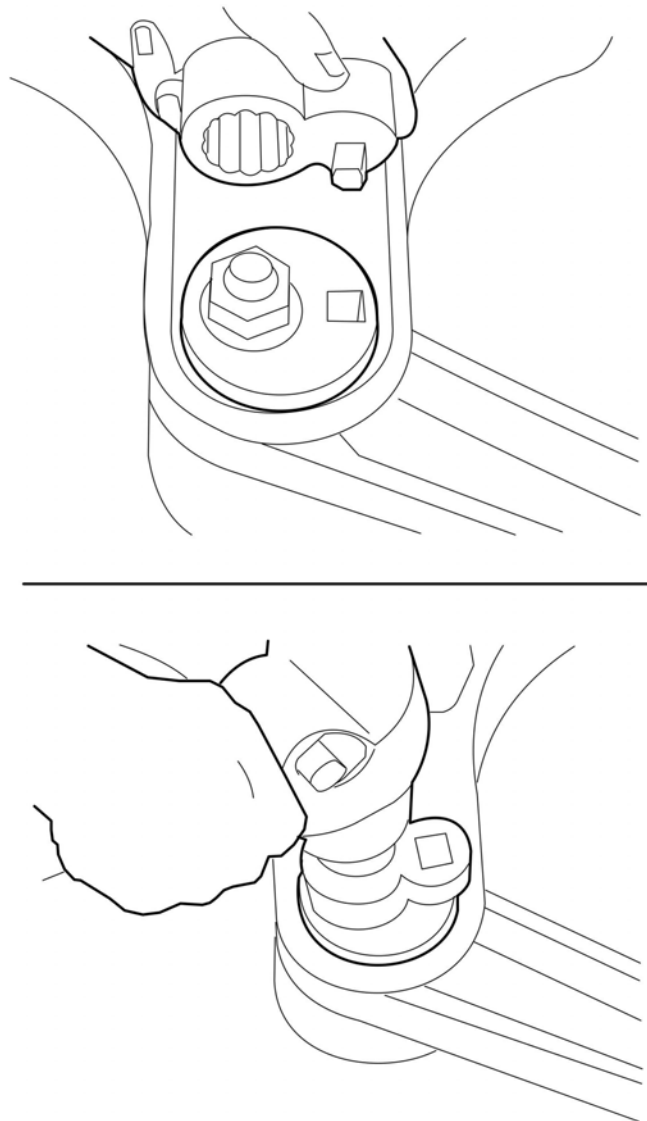
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Fig. 15

- | | |
|---|-------------------------------|
| A | 0.5 in. Square drive |
| B | Surfaces must be parallel |
| C | 1.50" 12 Point Socket Profile |
| D | 0.75 in. Square drive |

ADJUSTMENT TO MOVE SUPPORT BEAM TO THE FULL FORWARD POSITION

- 1 Use a QUIK-ALIGN socket tool, OTC 1767 or use a ½" drive breaker bar to rotate the QUIK-ALIGN collars to the beam full forward position, see Figure 16.



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Fig. 16

- 2 Rotate the eccentric collar so the square drive is pointing towards the rear of the vehicle. The support beam is moved towards the front of the vehicle relative to the frame hanger.
- 3 Snug the QUIK-ALIGN pivot bolt to 68 Nm (50 ft-lb).
- 4 After all the hangers have the QUIK-ALIGN's oriented in the beam full forward position, proceed to the following page 28 **SET VEHICLE TO RIDE HEIGHT** Section.

SET VEHICLE TO RIDE HEIGHT

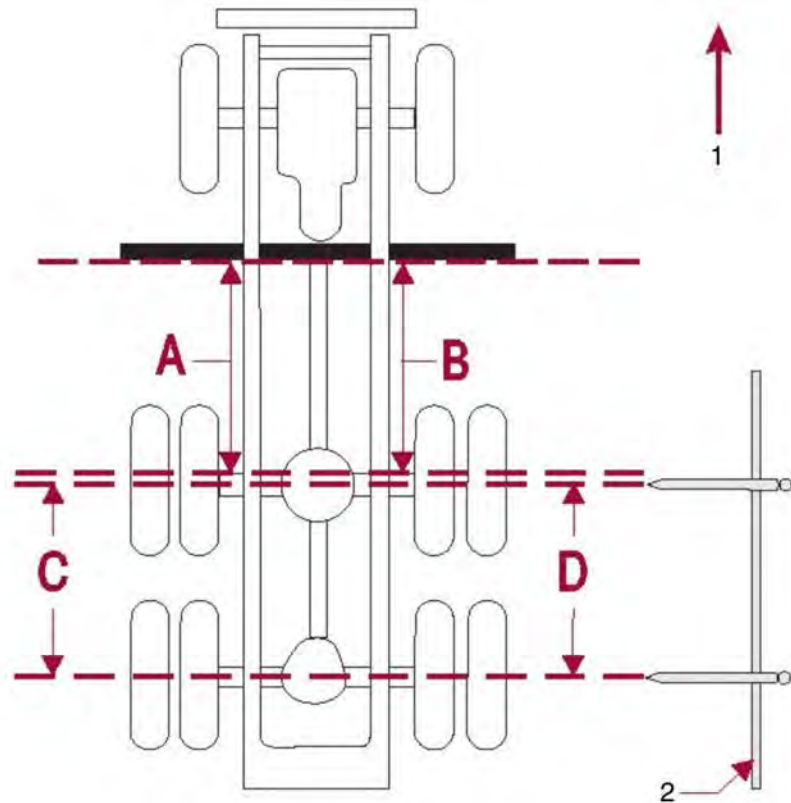
- 1 Verify and maintain the air system at full operating pressure.
- 2 Inflate the suspension by connecting the height control valve linkage to the height control valve arm. (See vehicle manufacturer's instructions).
- 3 Verify the air springs inflate uniformly without binding.
- 4 Relax the suspension by slowly moving the vehicle back and forth several times in a straight line without using the brakes. This will slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead.
- 5 DO NOT set the parking brake. Chock the front wheels of the vehicle.
- 6 Ensure all drive axle tires are the same size and properly inflated.
- 7 Verify proper ride height, use Volvo Height Gauge 21170897 or see the vehicle manufacturer's instructions.
- 8 Proceed to page 28 **DRIVE AXLE ALIGNMENT INSPECTION PROCEDURE**.

DRIVE AXLE ALIGNMENT INSPECTION PROCEDURE

Proper alignment is essential for maximum ride quality, performance, and tire service life, the recommended alignment procedure is described below. This procedure should be performed any time the QUIK-ALIGN connection is loosened or removed.

- 1 Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components before proceeding with the alignment process.
- 2 Verify suspension lateral alignment.
- 3 If alignment equipment is available; proceed to the page 28 **DRIVE AXLE ALIGNMENT ADJUSTMENT PROCEDURE** Section.

4



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Fig. 17

- 1 Front
- 2 Trammel bar

If axle alignment equipment is not available, using "C" clamps, securely clamp a 2 m (6 ft) piece of STRAIGHT bar stock or angle iron across the lower frame flange as shown in Figure 17. Select a location for the angle iron as far forward of the drive axle as possible where components will not interfere.

- 5 Accurately square the straight edge to the frame using a carpenter's square.
- 6 Using a measuring tape, measure from the straight edge to the forward face of the front drive axle arms at the centerline on both sides of the vehicle as shown in Figure 17, measurements A and B.
- 7 Calculate the difference between measurements A and B.

- If the front drive axle is within vehicle manufacturer's specifications, proceed to check the rear drive axle (see next step).
- If alignment of the front drive axle **IS NOT** within the vehicle manufacturer's specifications, then the alignment of this axle **MUST** be corrected **PRIOR** to measuring the rear drive axle alignment. Proceed to the following page 30 **DRIVE AXLE ALIGNMENT ADJUSTMENT PROCEDURE** Section.

- 8 Using a trammel bar, measure the distance from the spindle center of the front drive axle to the spindle center of the rear drive axle on both sides of the vehicle; see Figure 17, measurements C and D.
- 9 Calculate the difference between measurements C and D.

- If the measurements are within the vehicle manufacturer's specifications, then the rear drive axle alignment is acceptable. Proceed to the page 30 **PINION ANGLE ADJUSTMENT PROCEDURE** Section.
- If alignment of the rear drive axle **IS NOT** within the vehicle manufacturer's specifications, then the alignment of this axle **MUST** be corrected **PRIOR** to checking the drive axle pinion angles. Proceed to the following page 30 **DRIVE AXLE ALIGNMENT ADJUSTMENT PROCEDURE** Section.

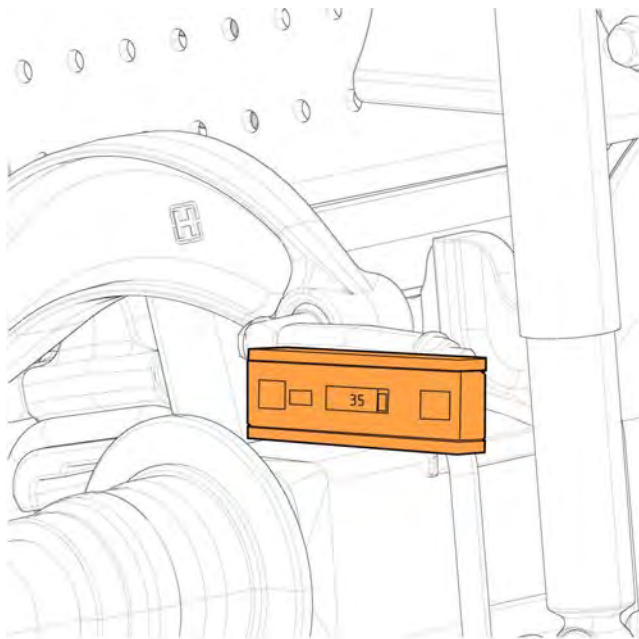
- 10 Recheck all measurements to confirm adjustments. Repeat Steps 6 through 9 until the correct alignment is achieved.

DRIVE AXLE ALIGNMENT ADJUSTMENT PROCEDURE

- 1 Chock the front axle wheels.
- 2 Do Not set the parking brake.
- 3 Ensure all frame hanger to torque rod fasteners are loosely installed.
- 4 Using the measurements from the page 30 **DRIVE AXLE ALIGNMENT INSPECTION PROCEDURE** or the alignment equipment, determine which QUIK-ALIGN collar will need adjusting to correct the axle alignment.
- 5 Use a QUIK-ALIGN socket tool, OTC 1767 or use a ½" drive breaker bar to rotate the QUIK-ALIGN eccentric collar to align the axle, see Figure 16.
- 6 Verify the drive axle alignment meets vehicle manufacturer's specifications.
- 7 Once the correct axle alignment is achieved, use a calibrated torque wrench to tighten the 1 in. QUIK-ALIGN locknuts to 711-780 Nm (525-575 ft-lb).
- 8 Once the correct axle alignment is achieved on all drive axles, proceed to following page 30 **PINION ANGLE ADJUSTMENT PROCEDURE** Section.

PINION ANGLE ADJUSTMENT PROCEDURE

- 1 Verify the suspension is at the proper ride height, see page 28 **SET VEHICLE TO RIDE HEIGHT** Section.
- 2 Install a digital protractor or equivalent on the axle housing as shown in Figure 18.



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- 3 If the pinion angle measurement is not within the vehicle manufacturer's specification use a floor jack or hoist under the axle to set the proper pinion angle.
- 4 Fill in any gap at the frame hanger to torque rod connection with closed-end shim(s) or a spacer.

Note: Each shim added/removed will increase/decrease pinion angle by 0.5°.

- To **increase** the pinion angle install shim(s).
- If the spacer installed is too large replace it with a spacer that can be freely inserted, and then fill in any gap with closed-end shim(s).
- If more than 3 close-end shims are needed at any one frame hanger to torque rod connection, replace the installed shims and spacer with a spacer that can be freely inserted, and then fill in any gap with closed-end shim(s).

- 5 Depending on final axle alignment different shim/spacer thickness might be required at each individual wheel end.

- Shim/spacer thickness must be equal on both fasteners of any one wheel end. Available spacers and shims in Volvo Service Kit No. 21951871 are listed below:

DESCRIPTION	PART NUMBER	Included in KIT Number	QUANTITY
3.04 mm Shim	70240-001	60961-652	12
1.52 mm Shim	70240-002		
4.0 mm Spacer	67057-001	60961-653	4
8.0 mm Spacer	67057-002		
12.0 mm Spacer	67057-003		
16.0 mm Spacer	67057-004	49176-039	

- Fasteners provided in Volvo Service Kit No. 21951871 for the frame hanger / torque rod connection are:

DESCRIPTION	PART NUMBER	KIT NUMBER	QUANTITY
8.0" Long, 5/8"-11 UNC Hex Bolt	32043-016	49176-032	4
9.0" Long, 5/8"-11 UNC Hex Bolt	32043-024	49176-039	4

- Adjust the pinion angle to within the range specified by the vehicle manufacturer.
- When the pinion angle measurement is within the vehicle manufacturer's specification and any gap has been properly filled. Tighten the frame hanger to torque rod fasteners to 258-312 Nm (190-230 ft-lb) and ensure there are a least 3 threads protruding past the locknut after specified torque is achieved.
- Repeat the, page 30 **PINION ANGLE ADJUSTMENT PROCEDURE** for the remaining axle.
- When the pinion angle measurements on all drive axles are within the vehicle manufacturers specifications: Verify all affected fasteners have been tightened with a torque wrench and verify all fasteners have sufficient threads extending beyond the locknut.

Reimbursement

This repair is covered by an authorized Service Program. Reimbursement is obtained via the normal claim handling process.	
Claim Type (used only when uploading from the Dealer Bus. Sys.)	B
Recall Status	
Vehicle inspected, repair not required	1- Inspected OK
Vehicle repaired per instruction	2- Modified per instruction
Labor Code	
Primary Labor Code	72201-0-02 5.9 hrs.
Time to take charge and determine campaign status	17003-0-01 0.3 hrs.
Causal Part	21951871
Authorization Number	SP722001
Expiration Date	30 OCT 2013

Note: Take Charge Time is not included in the Labor Code for this operation. Take charge may be eligible but can only be used once per repair visit. If vehicle is having other warranty repairs performed, take charge should be charged to the warranty repair, otherwise take charge can be charged to this service program.