Asia Pacific Region Only

TECHNICAL BULLETIN

PRIMAAX® EX SUSPENSION MAINTENANCE MANUAL

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HENDRICKSON
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SECTION 1 INTRODUCTION

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of PRIMAAX® EX extreme heavy-duty rear suspension systems.

NOTE: Use only Hendrickson Genuine parts for servicing this suspension system. Parts lists are available from the vehicle manufacturer and from the Hendrickson website.

It is important to read and understand the entire technical procedure prior to performing any maintenance, service, repair, or rebuild of this product. The information in this publication contains safety information, product specifications, features, proper maintenance, service, repair and rebuild instructions for PRIMAAX EX rear suspension.

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Check the Hendrickson Asia Pacific website at www.hendrickson.com.au for the latest available publication.

SECTION 2 PRODUCT DESCRIPTION

PRIMAAX® EX is a severe-duty vocational air suspension that uses advanced weight-saving technology to meet the rigorous demands of vocational, severe-service, and heavy-haul applications. This system features a robust structural design with optimised suspension geometry for exceptional stability, handling and ride.

PRIMAAX EX adjusts to variations in load and road conditions for optimal ride and performance. This low-maintenance design delivers greater stability for improved control on and off the job site.

SPECIFICATIONS

PRIMAAX EX is approved for vocational and heavy-haul vehicle applications including, but not limited to truck, tractor, dump, front and rear discharge mixers, logging, crane mounted, platform, fire / rescue, specialty and vehicles equipped with outriggers.

All applications must comply with applicable Hendrickson specifications and must also be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration. Contact Hendrickson and the respective vehicle manufacturer for approval of additional applications.

Application Table PRIMAAX EX

Category	232	262	462	522	692	782
Capacity	10,500 kg	11,500 kg	21,000 kg	23,500 kg	31,000 kg	35,000 kg
Axle Configuration	Single	Single	Tandem	Tandem	Tridem	Tridem
GCM Approval	Contact Vehicle OEM					
Axle Travel	150 mm					
Ground Clearance	270 mm					
Lift Axles	Approved					
Engine Torque Restrictions	No Limit					

Document Links

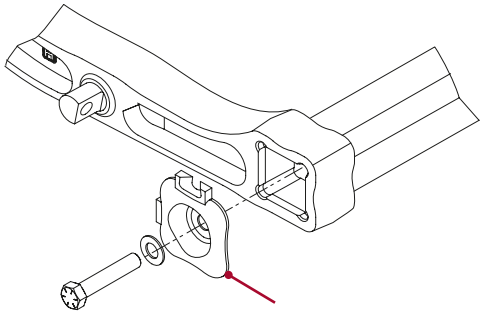
This document includes links that can be utilised when viewed electronically. Links within the document are identified by black underlined text, whereas links to external websites are identified by blue underlined text.

SUSPENSION IDENTIFICATION

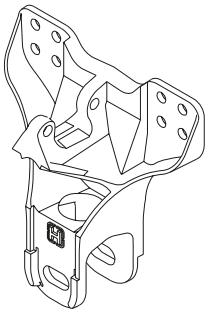
Refer to these notes to assist with the identification of the PRIMAAX® or PRIMAAX EX model fitted. Production of the upgraded PRIMAAX EX suspension began in late 2009.

PRIMAAX Generation Identification

PRIMAAX Gen II (Up to November 2009)

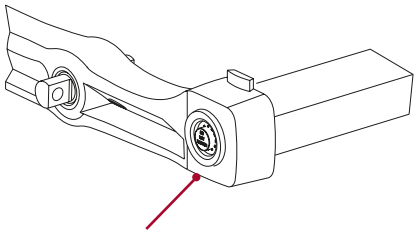


PRIMAAX Gen II detachable end cap

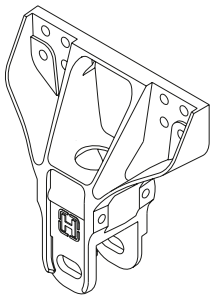


PRIMAAX Gen II frame hanger

PRIMAAX EX



PRIMAAX EX integrated end cap



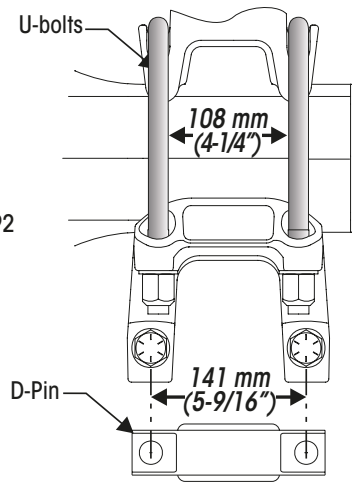
PRIMAAX EX frame hanger *

PRIMAAX EX can be distinguished from earlier suspension generations by an enhanced integrated end cap that does not need regular retorquing. It also has a hanger that is visibly different, which positions the longitudinal torque rod parallel to the support beam and improves suspension geometry and vehicle dynamics.

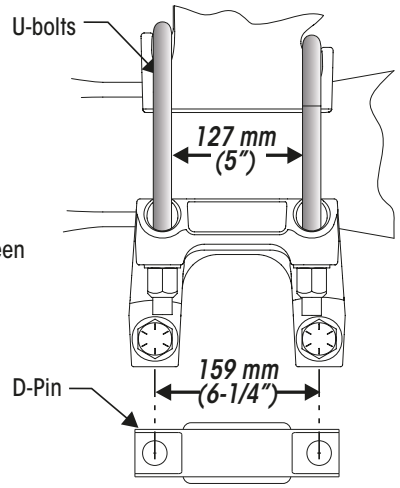
*** NOTE**: Some vehicles fitted with PRIMAAX EX use fabricated hangers to make room for extended range fuel tanks.

PRIMAAX Suspension Rating Identification

PRIMAAX 230/460 and PRIMAAX EX 232/462/692 have 108 mm (4-1/4") between the U-bolts.



PRIMAAX EX 262/522/782 have 127 mm (5") between the U-bolts.



Standard PRIMAAX and PRIMAAX EX suspension U-bolts are 108 mm (4-1/4") apart and the D-Pin holes are 141 mm (5-9/16") from centre to centre. Higher capacity PRIMAAX EX 262/522/782 suspensions have 127 mm (5") between the U-bolts and D-Pin holes are 159 mm (6-1/4") from centre to centre.

Pivot Hardware Identification

PRIMAAX® EX and PRIMAAX use two distinct size QUIK-ALIGN® pivot connection hardware, 1" and 1¼". Kenworth® trucks between 2011 and late 2017 were usually fitted with larger 1¼" hardware. However, it is also possible for other makes, models and trucks built outside these dates to use the 1¼" pivot hardware, and conversely for the standard 1" to be fitted within that date range. Therefore, it is important to physically measure the pivot connection hardware before ordering any related parts.

Standard QUIK-ALIGN pivot bolts have a 1" – 14 UNF thread. They can be identified by the 38 mm (1-1/2") bolt head.

Torque specification is 750 Nm.

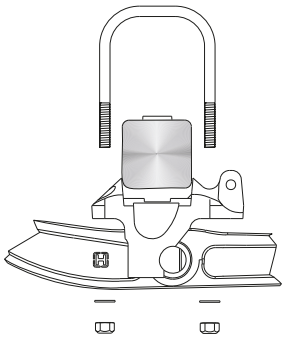
Larger QUIK-ALIGN pivot bolts have a 1¼" – 12 UNF thread. They can be identified by the 47 mm (1-7/8") bolt head.

Torque specification is 1760 Nm.

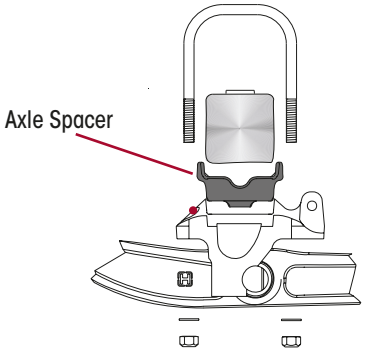
For more information about identification and torque methods refer to the QUIK-ALIGN notes in "Torque Settings" on page 66.

Ride Height Identification

Vehicle ride height can best be found by referring to the applicable identification label. The most common ride heights are 8½ and 10 inch. The main identifiable difference between the two is that the 8½ inch ride height uses a spacer to drop the support beam relative to the axle.

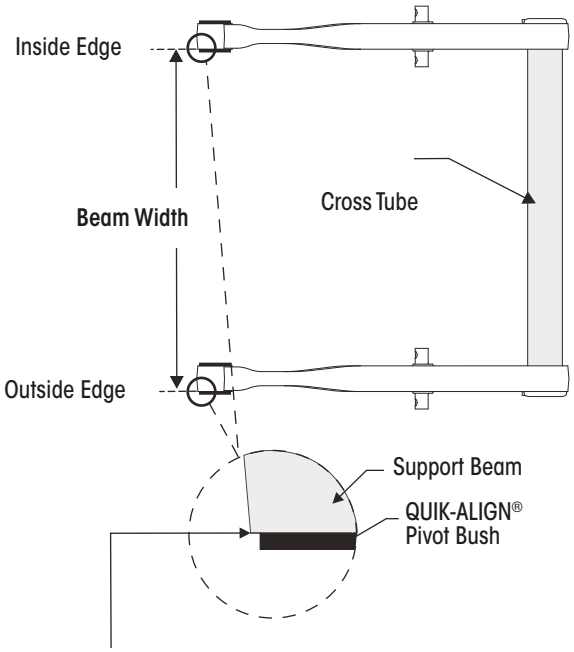


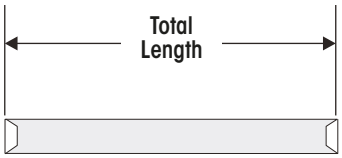
10 Inch (254 mm) Ride Height



8½ Inch (216 mm) Ride Height with Axle Spacer

Beam Width & Cross Tube Measurement





Cross tube length can only be accurately measured after it has been disassembled from the U-beam. However, disassembly is not normally recommended.

Note: Disassembly may be needed if the complete beam is being replaced and there is doubt about which beam to purchase.

Figure 1: Beam Width & Cross Tube Measurement

Beam width can be checked while still installed on the vehicle by measuring from the inside edge of the support beam to outside edge of the support beam.

Frame Width Measurement

Measurement of the frame width dimension is from outside of chassis to outside of chassis. If the vehicle is fitted with hanger spacer plates (between chassis and frame hanger) be sure to include this thickness in your total measurement.

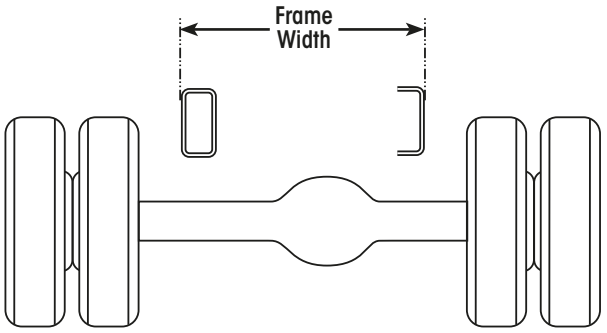


Figure 2: Frame Width Measurement

For example:

- Frame 852 mm + Spacer plate (2 x 6 mm) = 864mm.

NOTE: Measurements must be taken at both the front and rear hangers.

SECTION 3 IMPORTANT SAFETY NOTICES

Proper maintenance, service and repair are important to the reliable operation of the suspension. The procedures recommended by Hendrickson and described in this technical publication are methods of performing such maintenance, service and repair.

This technical publication should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service or repair may damage the vehicle, cause personal injury, render the vehicle unsafe in operation, or void the manufacturer's warranty.

Failure to follow the safety precautions in this manual can result in personal injury and/or property damage. Carefully read and understand all safety related information within this publication, on all decals and in all such materials provided by the vehicle manufacturer before conducting any maintenance, service or repair.

Explanation of Signal Words

Hazard signal words (such as Danger, Warning or Caution) appear in various locations throughout this publication. Information accented by one of these signal words must be observed at all times.

Additional notes are utilised to emphasise areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of safety signal words as they appear throughout the publication.

⚠ This is the safety alert symbol, which is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ **DANGER**: Indicates an imminently hazardous situation, which if not avoided, will result in serious injury or death.

⚠ **WARNING**: Indicates a potential hazardous situation which, if not avoided, can result in serious injury or death.

⚠ **CAUTION**: Indicates a potential hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTE: An operating procedure, practice condition, etc. which is essential to emphasise.

SERVICE HINT: A helpful suggestion that will make the servicing being performed a little easier and/or faster.

Particular service operations may require the use of special tools designed for specific purposes. These special tools can be found in "SECTION 9 Special Tools" on page 68 of this publication.

General Service Notes

Before commencing work, you must read, understand and comply with:

- All instructions and procedures.
- All signal word (Caution, Warning and Danger) statements to help avoid personal injury or property damage.
- Company's maintenance, service, installation and diagnostic practices.
- Vehicle manufacturer's safety instructions when working on the vehicle.
- Vehicle manufacturer's instructions for recommended practices not described in this manual.
- Local precautionary and OH&S regulations.

During Service

- Work must be carried out by trained personnel.
- Use recommended tools only.
- Before releasing vehicle back into service, perform operational checks and test the truck to make sure systems and components are working correctly.

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Check for the latest version of this technical manual at www.hendrickson.com.au.

SAFETY PRECAUTIONS

⚠ WARNING: LOAD CAPACITY

Adhere to the published capacity ratings for the suspension. Add-on axle attachments and other load transferring devices, such as liftable axles, can increase the suspension load above its rated and approved capacities, which can result in component damage and adverse vehicle handling, possibly causing personal injury or property damage.

⚠ WARNING: FASTENERS

Discard used fasteners. Always use new fasteners to complete a repair. Failure to do so could result in failure of the part, or mating components, adverse vehicle handling, personal injury, or property damage.

Loose or over torqued fasteners can cause component damage, adverse vehicle handling, property damage, or severe personal injury. Maintain correct torque value at all times. Check torque values on a regular basis as specified, using a regularly calibrated torque wrench. Torque values specified in this technical publication are for Hendrickson supplied fasteners only. If non-Hendrickson fasteners are used, follow torque specification listed in the vehicle manufacturer's service manual.

⚠ WARNING: QUIK-ALIGN FASTENERS

Discard used QUIK-ALIGN fasteners. Always use new QUIK-ALIGN fasteners to complete a repair. Failure to do so could result in failure of the part, or mating components, adverse vehicle handling, personal injury, or property damage.

Do not assemble QUIK-ALIGN joint without the proper fasteners. Use only H-coated fasteners to sustain proper clamp force. Failure to do so can cause adverse vehicle handling, property damage or personal injury and void warranty. Ensure that the QUIK-ALIGN fastener's torque values are sustained as recommended in the torque specifications section of this publication. Failure to do so can cause adverse vehicle handling resulting in personal injury or property damage. Follow vehicle manufacturer's fastener orientation when performing any maintenance, service or repair.

⚠ WARNING: MODIFYING COMPONENTS

Do not modify or rework parts without authorisation from Hendrickson. Do not substitute replacement components not authorised by Hendrickson. Use of modified, reworked, substitute or replacement parts not authorised by Hendrickson may not meet specifications, and can result in failure of the part, adverse vehicle handling, possible personal injury or property damage, and will void any applicable warranties. Use only Hendrickson authorised replacement parts.

⚠ WARNING: PROCEDURES & TOOLS

A technician using a service procedure or tool which has not been recommended by Hendrickson must first satisfy himself that neither his safety nor the vehicle's safety will be jeopardised by the method or tool selected. Individuals deviating in any manner from the instructions provided will assume all risks of consequential personal injury or damage to equipment involved.

⚠ WARNING: TORCH/WELDING

Do not use a cutting torch to remove any fasteners. The use of heat on suspension components will adversely affect the strength of these parts. A component damaged in this manner can result in the adverse vehicle handling and possible personal injury or property damage.

Exercise extreme care when handling or performing maintenance in the area of the support beam. Do not connect arc welding ground line to the support beam. Do not strike an arc with the electrode on the support beam. Do not use heat near the support beam assembly. Do not nick or gouge the support beam. Such improper actions can damage the support beam assembly and cause adverse vehicle handling and possible personal injury or property damage.

⚠ WARNING: WORK SITE DUMPING

When the truck/trailer body/boom/and or attachment is lifted it is mandatory to completely exhaust the air from the suspension system to help provide stability when lifted. Failure to do so can result in adverse vehicle handling, roll-over, or vehicle instability, possibly causing severe personal injury, property damage, or death. Follow the vehicle manufacturer's operating instructions for maintaining proper stability.

⚠ WARNING: SHOCK ABSORBERS

The shock absorbers are the rebound travel stops for the suspension. Anytime the axle on a PRIMAAX EX suspension is suspended it is mandatory that the shock absorbers remain connected. Failure to do so can cause the air springs to separate from the piston and result in premature air spring failure. Replacement of shock absorbers with non-Hendrickson parts can alter the rebound travel of the suspension.

⚠ WARNING: TRANSVERSE RODS

PRIMAAX EX suspensions incorporate transverse rods for vehicle stability. If these components are disconnected or are non-functional, the vehicle should not be operated. Failure to do so can result in adverse vehicle handling, possible tyre contact with the frame, premature component damage, or severe personal injury.

⚠ WARNING: SUPPORT VEHICLE BEFORE SERVICING

Place the vehicle on a level floor and chock the wheels to prevent the vehicle from moving or rolling. Do not work around or under a raised vehicle supported by only a floor jack or other lifting device. Always support a raised vehicle with rigid safety stands. Failure to do so can cause serious personal injury or damage to equipment.

⚠ WARNING: PERSONAL PROTECTIVE EQUIPMENT

Always wear proper eye protection and other required personal protective equipment to help prevent personal injury when performing vehicle maintenance, repair or service.

⚠ WARNING: PARTS CLEANING

Solvent cleaners can be flammable, poisonous and cause burns. To help avoid serious personal injury, carefully follow the manufacturer's product instructions and guidelines and the following procedures:

1. Wear proper eye protection.
2. Wear clothing that protects your skin.
3. Work in a well-ventilated area.
4. Do not use petrol or solvents that contain petrol. Petrol can cause explosions.
5. Hot solution tanks or alkaline solutions must be used correctly. Follow the manufacturer's recommended instructions and guidelines carefully to help prevent personal accident or injury.

Do not use hot solution tanks or water and alkaline solutions to clean ground or polished parts. Doing so will damage the parts and void warranty.

⚠ WARNING: AIR SPRING LOWER MOUNTING STUDS

If the air spring is being removed for an alternate repair, it is mandatory to lubricate the lower air spring fasteners with penetrating oil and remove with hand tools to prevent damage to the lower air spring mounting stud. Failure to do so can cause component damage and void warranty.

⚠ WARNING: AIR SPRING PRESSURE RETENTION

Some vehicle applications, such as vehicles equipped with outriggers, retain some air pressure in the air springs at all times. Prior to performing any maintenance, service, or repair of the suspension, verify each air spring is completely deflated. Failure to do so could result serious property damage and/or severe personal injury.

Failure to press the air spring against the underside of the frame while tightening the upper air spring bracket can result in component damage and personal injury or property damage.

⚠ WARNING: AIR SPRING INFLATION & DEFLATION

Prior to disassembly of the suspension, air spring assemblies must be deflated. Unrestricted air spring assemblies can violently shift. Do not inflate air spring assemblies when they are unrestricted. Air spring assemblies must be restricted by suspension or other adequate structure. Do not inflate beyond pressures recommended by air spring manufacturer, contact Hendrickson technical services for details. Improper use or over inflation may cause air spring assemblies to burst, causing property damage and/or severe personal injury.

Prior to and during deflation and inflation of the air suspension system, ensure all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

⚠ WARNING: AIR SPRING INFLATION

Inflate the suspension slowly and make sure the rubber bladder of the air spring inflates uniformly and is not binding. Failure to do so can cause damage to the air spring and/or mounting brackets and void warranty.

⚠ WARNING: CROSS TUBE & U-BEAM ASSEMBLY

When separating the U-beam assembly, protect the cross tube by placing a piece of plywood against cross tube or cardboard around the cross tube. Carefully dislodge the cross tube from the support beam with a long handled sledgehammer.

By applying blunt force on the support beam directly in front of the inboard top corner joint. All blunt force must be applied flush to the thickest part of the support beam. Refer Figure 3. Failure to strike the support beam squarely may result in component damage, premature failure and void warranty.

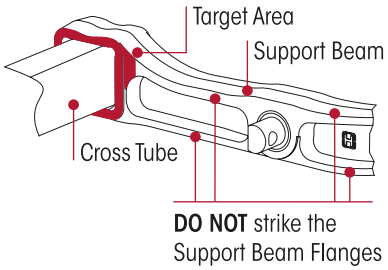


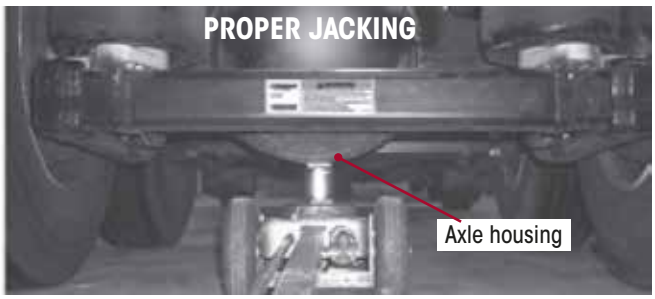
Figure 3: Separating Cross Tube

⚠ WARNING: CROSS TUBE

Improper jacking methods can cause structural damage (see safety decal) and result in adverse vehicle handling, severe personal injury or death and will void warranty.

- Replace any safety decals that are faded, torn, missing, illegible, or otherwise damaged. Contact Hendrickson to order replacement labels.
- Do not use the suspension cross tube as a jacking point to raise the vehicle. Refer box below.
- Refer to vehicle manufacturer for proper jacking instructions.

Do not use the suspension cross tube as a jacking point to raise the vehicle.



Refer to vehicle manufacturer for proper jacking instructions.

⚠ WARNING: PERSONAL PROTECTIVE EQUIPMENT

Suitable personal protective equipment (PPE) must be in good condition and worn at appropriate times. This applies even if the task is only brief, because this is often when injuries occur.

However, PPE should be regarded only as a secondary safety measure because it will not compensate for unsafe work practices. If there are safer or better workplace procedures, then these should be adopted.

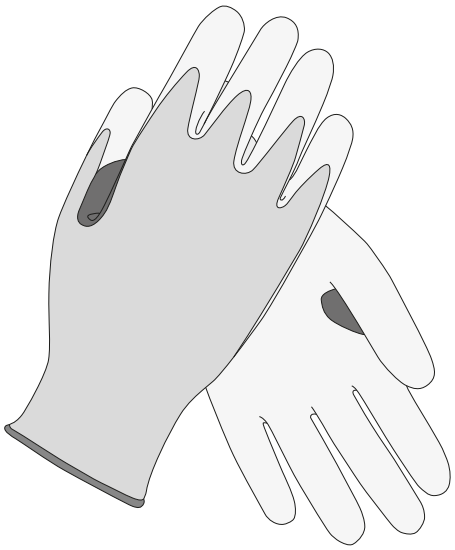


Figure 4: Protective gloves are essential

Ensure the PPE is:

- Suitable for the type of work
- Correct size and fit
- Properly stored and maintained

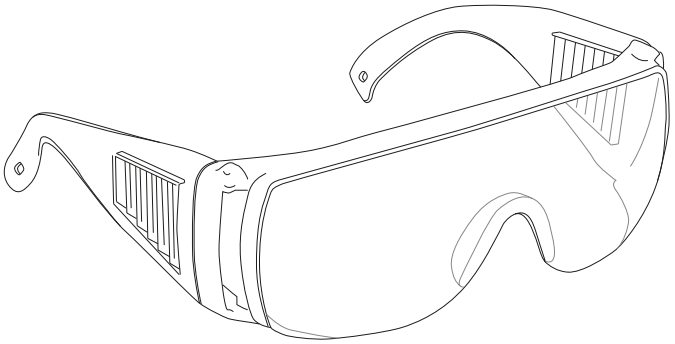


Figure 5: Wear safety glasses

SECTION 4 PREVENTIVE MAINTENANCE

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the suspension system and component parts function to their highest efficiency.

Hendrickson recommends PRIMAAX® EX extreme heavy-duty rear suspensions be inspected at pre-delivery, within the first 4,500 kilometres of service and at the regular preventive maintenance intervals. Off-highway and severe service operating conditions may require more frequent inspections than on-highway service operation.

Refer to vehicle manufacturer's applicable publications for other preventive maintenance requirements.

NOTE: Torque values shown in this publication apply only if Hendrickson supplied fasteners are used. If non-Hendrickson fasteners are used, follow the torque specification listed in the vehicle manufacturer's service manual.

CRITICAL AREAS OF INSPECTION

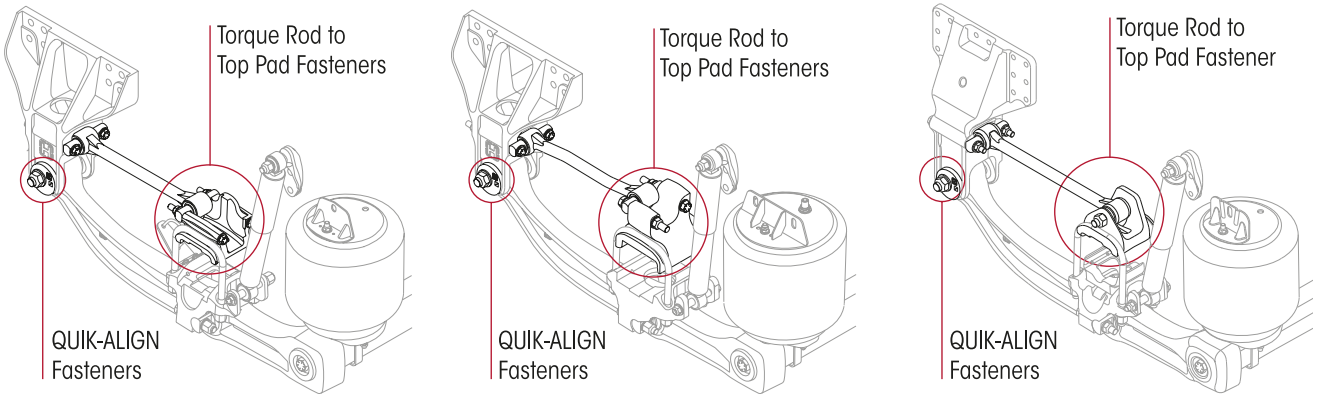
- Air springs.
- U-beam assembly, cross tube, support beam and end cap.
- Clamp group, including top pad, U-bolts and lock nuts.
- QUIK-ALIGN® connections.

OTHER AREAS OF INSPECTION

- Air supply and fittings.
- All fasteners.
- Tyre wear.
- Frame hanger bracket.
- Height control valve and air lines.
- S-cam support tube bracket.
- Shock absorbers.
- Transverse and longitudinal torque rods.
- Signifies performance critical components.

RECOMMENDED INSPECTION INTERVALS	Pre-Delivery Inspection	First In-Service Inspection	Maintenance Inspection	Preventative Maintenance
Visual inspection for proper assembly and function. Check for all of the following and replace components as necessary: • Signs of unusual movement, loose or missing components • Signs of abrasive or adverse contact with other components • Damaged, or cracked parts • Improper suspension function or alignment	Within the first 500 km	Within the first 4,500 km	OFF-HIGHWAY every 6 months/ 1200 hours or 40,000 km [1] ON-HIGHWAY every 12-months or 80,000 km [1]	Every 12 months/ 2400 hours [1]
Visually inspect the overall condition of and for any signs of damage to: • U-beam assembly • Air springs and air lines				
Inspect fasteners for proper torque as recommended in "Torque Settings" on page 66: • QUIK-ALIGN® fasteners and Torque rod to top pad fasteners • Clamp group U-bolt fasteners				
Verify the lateral alignment of the drive axles are within the vehicle manufacturer's tolerances				
Verify ride height. Refer to "Ride Height" on page 23				

[1] Servicing interval should be based on time or distance, whichever occurs first.



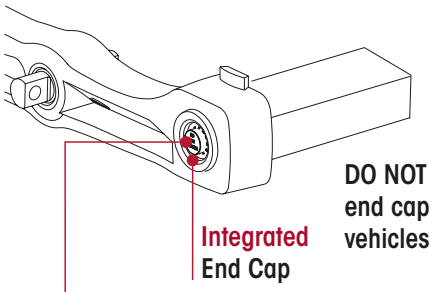
PRIMAAX EX 232, 462, 692 Standard Mounting

PRIMAAX EX 232, 462, 692 Alternative Mounting

PRIMAAX EX 262, 522, 782 Standard Mounting

Figure 20: Top Pad Fasteners

Integrated End Cap



DO NOT re-torque the integrated end cap on PRIMAAX® EX vehicles built AFTER March 2009.

Integrated End Cap DO NOT re-torque.
Tamper Resistant Cap attached to integrated end cap bolts with SIKAFLEX 221 sealant applied around the cap.

Figure 21: Integrated End Cap

Clamp Group Fasteners

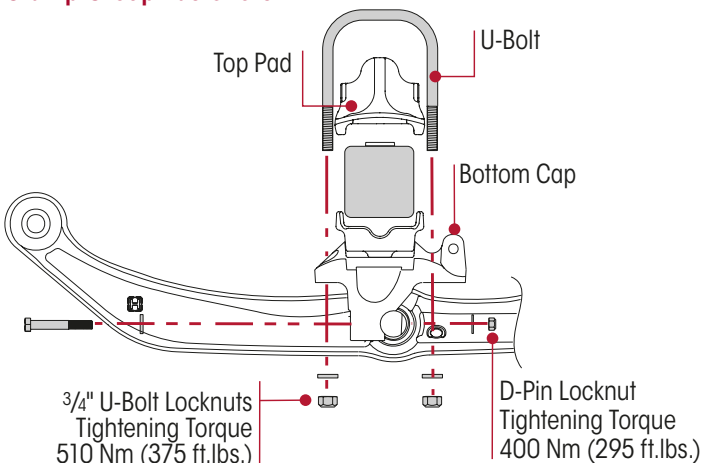


Figure 22: Clamp Group Fasteners

COMPONENT INSPECTION

IMPORTANT: Replace all worn or damaged parts that are noticed during inspection.

- **AIR SPRINGS** — Visually inspect the outer surface of the air spring for chafing, uneven wear, cracks or any signs of component damage. Ensure that the upper bead plate is tight against the underside of the frame. Refer to "Air Springs" on page 15. Check for any lateral slippage at the lower air spring bracket. Slippage of 3 mm in either direction is acceptable. Verify all mounting hardware have the proper torque values maintained.
- **AIR SUPPLY** (Pneumatic components) — The air supply to the system plays a large role in the air springs' performance. Inspect, clean and replace, if necessary, any support products to the air springs, valves, regulators and air lines. Refer to "Air Fitting Inspection" on page 19 if an air leak is suspected.
- **FASTENERS** — Visually inspect for any loose or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to a torque value within the specified torque range. Refer to "Torque Settings" on page 66 for recommended torque requirements. Use a calibrated torque wrench to check torque in a tightening direction. As soon as the fastener starts to move, record the torque and correct the torque if necessary.
- **TYRE WEAR** — Visually inspect the tyres for wear patterns that may indicate suspension damage or misalignment.
- **CLAMP GROUP** — Visually inspect for any loose or damaged fasteners. Verify the U-bolt locknuts have the proper torque values maintained. Refer to "U-Bolt Locknuts" on page 15.
- **CROSS TUBE** — Visually inspect for cracks, damage, metal shavings, or looseness at the beam connection.
- **SUPPORT BEAM ASSEMBLY** — Visually inspect the overall condition of the support beam for dents, gouges or other damage on the outer edges of the beam flanges. Visually inspect the D-pin bushes for tearing or extreme bulging. Check for any metal-to-metal contact in the bushed joints.
- **FRAME HANGER BRACKET** — Visually inspect for any signs of loose fasteners, movement, or dam- age. Verify the frame attaching fasteners have the proper torque values maintained. See the vehicle manufacturer for proper torque specifications.
- **QUIK-ALIGN CONNECTION** — Visually inspect the connection for signs of looseness or movement. Visually inspect the bush for wear. Verify the connections have the proper torque values maintained. Refer to "Torque Settings" on page 66 for recommended torque requirements. See QUIK-ALIGN Fastener Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to installing the QUIK-ALIGN connection.
- **SHOCK ABSORBERS** — Visually inspect for any signs of dents or leakage. Misting is not considered a leak. Refer to "Shock Absorber Inspection" on page 20.
- **TORQUE RODS** (longitudinal and transverse) — All torque rods must be inspected for looseness, torn or shredded rubber and for proper fastener torque. If there is metal-to-metal contact in the bush joint, this is a sign of excessive bush wear, and the torque rod needs to be serviced. Refer to "Longitudinal & Transverse Torque Rods" on page 18.
- **TOP PAD/TORQUE ROD CONNECTION** — Visually inspect the connection for signs of movement or damage. Use a lever check to help assess movement in this joint, see to "Longitudinal & Transverse Torque Rods" on page 18 for proper inspection. Verify the top pad/longitudinal torque rod connections have the proper torque values maintained. Refer to "Torque Settings" on page 66 for recommended torque requirements.
- **HEIGHT CONTROL VALVE & AIR LINES** — Check the suspension air system for air leaks. Check all air lines for proper routing. Check for chafing or pinched air lines. Check the height control valve linkage for damage or interference with peripheral components. Refer also to "Air Fitting Inspection" on page 19.
- **WEAR & DAMAGE** — Visually inspect all parts of the suspension for wear and damage. Look for bent or cracked parts.
- **S-CAM SUPPORT TUBE BRACKET** (If equipped) — Visually inspect the bracket for damage and check for any loose or damaged fasteners.

Refer to the vehicle manufacturer's applicable publications for other preventive maintenance requirements.

AIR SPRINGS

Air springs should be cleaned and closely inspected at least on an annual basis, depending on driving conditions.

1. Raise the suspension to expose the bottom of the air spring bellows by disconnecting the height control valve linkage and moving the lever.

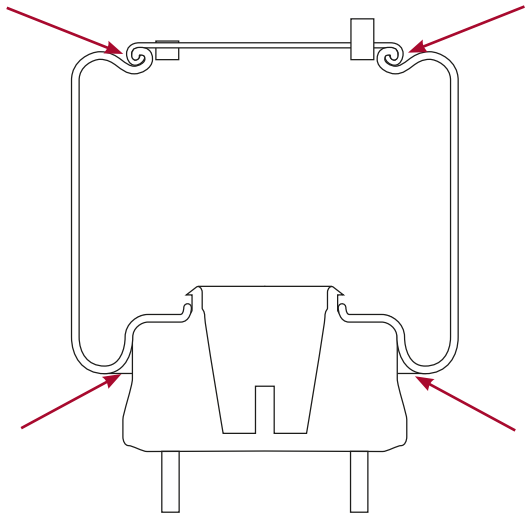


Figure 6: Clean bellows or grit & grime to prevent abrasive wear

2. Thoroughly clean the top bead and bottom of the bellows of any dust and grime that may have built up using soapy water. The soapy water will also bubble up and provide an indication of any air leaks.

IMPORTANT: Do not use any detergents that contain ammonia because this may trigger embrittlement of any brass fittings, which will eventually cause the fittings to crack and fail.

3. Check the bellows for any cracks, deformities, cuts or abrasion that may cause the air spring to fail.

4. Check that there is sufficient clearance around the air spring to prevent air lines or other components from rubbing on the bellows.

U-BOLT LOCKNUTS

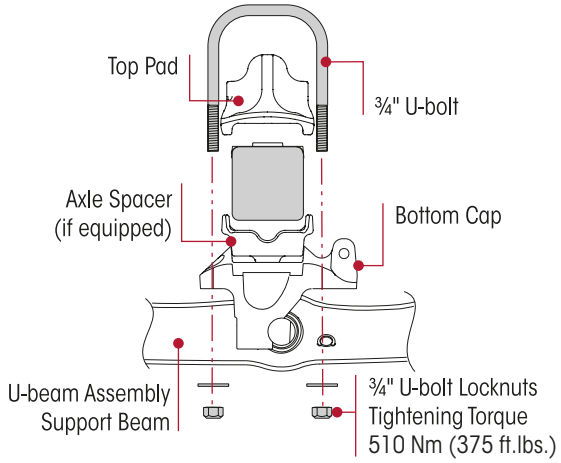


Figure 7: U-Bolt Torque

1. U-bolt locknuts must be torqued to specification at preparation for delivery. Refer Figure 7.

2. U-bolt locknuts must be re-torqued at of before 4,500 km.

3. Thereafter, inspect and re-torque at least every 50,000 km, 12 months or according to the vehicle manufacturer's recommendation, whichever comes first. Off-highway and severe service operating conditions may require more frequent inspections than on-highway service operation.

SERVICE HINT: Due to certain pinion angle configurations, the removal of the D-Pin bolts may be necessary to access the U-bolt locknuts.

⚠ **WARNING**: It is important that the U-bolt clamp group connection be properly aligned and have the proper torque values maintained. Metal surfaces can work and wear against other related clamp group components if not properly aligned or properly tightened to maintain the proper clamp force. Failure to do so can cause premature component wear, possible separation of the clamp group, causing adverse vehicle handling, property damage, or personal injury.

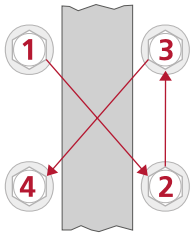


Figure 8: U-Bolt Locknut Tightening Sequence

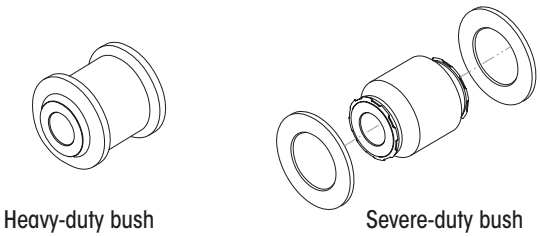
4. Tighten the U-bolt locknuts evenly in 70 Nm increments to 510 Nm torque in the proper pattern to achieve uniform bolt tension. Refer Figure 8.

NOTE: U-bolt clamp group hardware for the PRIMAAX EX suspensions are 3/4"-16 UNF Grade C locknuts and 3/4"-16 UNF Grade 8 U-bolts which are phosphate and oil coated.

PIVOT BUSH & D-PIN BUSH INSPECTION

⚠ **WARNING**: The pivot bush and the D-pin bush are critical components of the PRIMAAX EX suspensions. If these components appear damaged or worn, they must be replaced. Failure to replace worn or damaged components can result in the deformation of parts, loss of clamp force, bolt failure, loss of the axle's alignment, adverse vehicle handling, property damage or personal injury.

There are two levels of pivot bush inspections for the PRIMAAX EX suspensions. The pivot bush can be visually inspected by looking at the outer rubber flange(s) of the bush. If the visual inspection warrants, a physical inspection can be conducted in which disassembly is required.



Heavy-duty bush Severe-duty bush

Figure 9: Heavy- & Severe-duty Pivot Bush Differences

PRIMAAX suspensions may be fitted with either standard single piece heavy-duty bushes or three piece severe-duty bushes. The severe-duty bushes have separate polyethylene thrust washers. Inspection principles remain the same, but these differences will have to be considered when inspecting and assessing bush serviceability. Refer Figure 9.

PIVOT BUSH VISUAL INSPECTION

To perform pivot bush visual inspection, it is not necessary to disassemble the pivot bush connection. If the pivot bush rubber flange(s) are intact and there are no signs of metal to metal contact the bush does not require replacement.

- The support beam is designed with the pivot bush centred in the support beam end hub. If the pivot bush is not centred in the end hub, it is an indication that the pivot bush could be worn, and a pivot bush physical inspection is required.

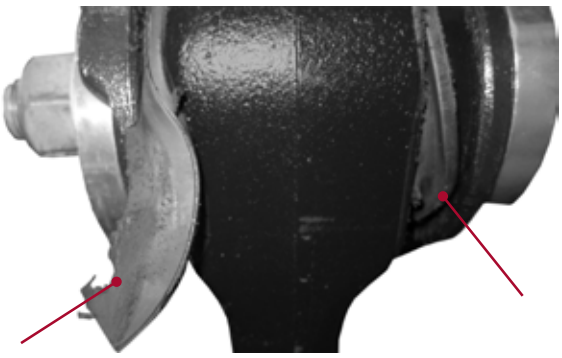


Figure 10: Torn Rubber

Figure 11: Disconnected Rubber Flange

- If the pivot bush shows signs of torn, separated or disconnected rubber, this could be a result of axle misalignment. If this condition is evident, a pivot bush physical inspection is required. Refer Figure 10 and Figure 11.

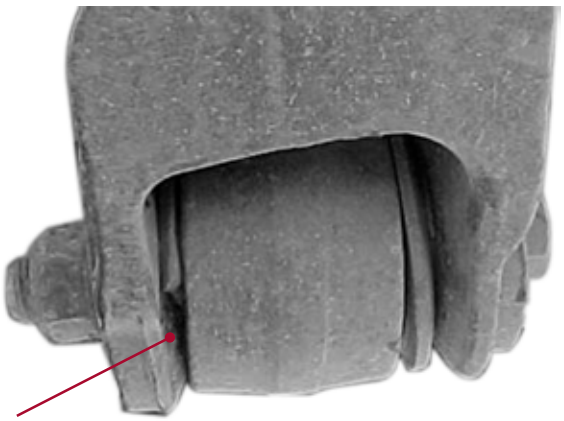


Figure 12: Missing Rubber Flange

- If the outer rubber flange(s) is missing, or there are shards of rubber visible, this could be a result of axle misalignment. If this condition is evident, pivot bush replacement is required. Refer Figure 12.

PIVOT BUSH PHYSICAL INSPECTION

1. Remove the U-beam assembly, refer to U-beam Assembly in the Component Replacement of this publication.
2. After removal, inspect the pivot bush connection, examine the pivot bush inner metal area.

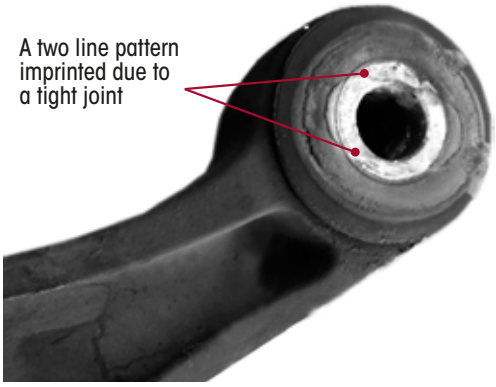


Figure 13: Joint in Good Condition

3. No replacement is needed if the bush exhibits a tight joint. (Refer Figure 13.) An imprinted two-line wear pattern on the bush inner metal indicates the pivot bush is securely clamped in the frame hanger.

Figure 14: Hanger Damage Due to Loose Joint

Figure 15: Hanger Damage Due to Loose Joint

Figure 16: Pivot Bush Damage Due to Loose Joint

4. Inspect pivot bush, replacement is necessary if any indications of the following are apparent. Signs of rust, distorted, separated or torn rubber, elongated or damaged bore. This could be a result of axle misalignment or loose fasteners. Refer Figure 14, Figure 15 and Figure 16.
5. Inspect the inside of the frame hanger legs and the QUIK-ALIGN collars. If any of the following are present, the pivot bush and one or more of the mating components may require replacement:

- Evidence of wear marks on the inside of the frame hanger legs indicating metal to metal contact or movement.
- The snout of the QUIK-ALIGN concentric or eccentric collar is elongated or damaged.

6. Check the suspension alignment and adjust if necessary. Refer to "Alignment Adjustment Instructions" on page 28.

D-PIN BUSH VISUAL INSPECTION

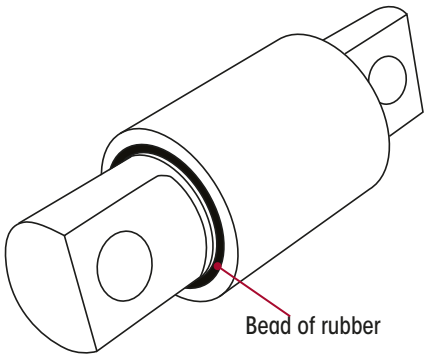


Figure 17: Acceptable D-Pin

It is not necessary to disassemble the D-Pin connection to perform a D-Pin visual inspection. The D-Pin bush is designed with a layer of rubber in the bush, it is acceptable to see a bead of rubber protruding from the bush. Refer Figure 17.

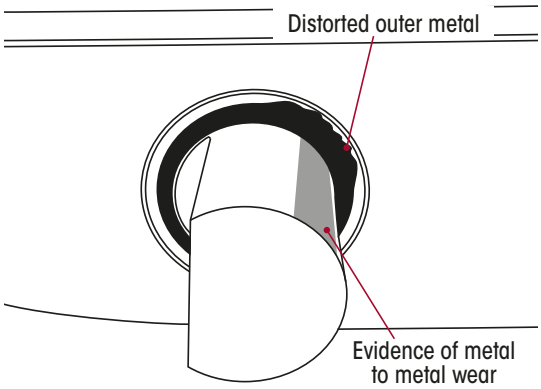


Figure 18: Unacceptable D-Pin

D-Pin bush replacement is required only when:

- Metal to metal contact wear marks on the D-pin outer metal are evident. Refer Figure 18.
- D-pin outer metal is distorted. Refer Figure 18.

LONGITUDINAL & TRANSVERSE TORQUE RODS

INSPECTION

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

⚠ **WARNING**: PRIMAAX EX suspensions incorporate transverse rods for vehicle stability. If these components are disconnected or are non-functional the vehicle should not be operated. Failure to do so can result in adverse vehicle handling and possible tyre contact with the frame. Operating a vehicle with non-functional transverse torque rods can result in adverse vehicle handling, severe personal injury and premature component damage.

Visually inspect torque rod bushes for torn or shredded rubber, inspect for bent, cracked, or broken torque rods and for end hubs with an elongated oval shape. Any of these conditions will require component replacement.

Torque rod looseness inspection is necessary per one of the following methods below.

- Method 1 — for tractor applications only with brakes applied, slowly rock the empty vehicle with power while a mechanic visually checks for movement at both ends.
- Method 2 — with the vehicle shut down, a lever check can be made with a long pry bar placed under each rod end and pressure applied.

TORQUE ROD LENGTH

Longitudinal torque rod length is determined by the truck manufacturer for optimum driveline angles. The longitudinal torque rods along with the bottom caps maintain these angles and control acceleration and brake forces, refer to the "Pinion Angle Adjustment" on page 30.

Transverse rod length is also determined by the vehicle manufacturer to centre the axles under the frame.

- If the lateral alignment of the axles is incorrect, it may be necessary to shim the transverse torque rod at the straddle mount end. Shims can be installed between the transverse torque rod and the transverse torque rod frame bracket or between the transverse torque rod and axle tower bracket. Refer to vehicle manufacturer for proper shim location; also see "Axle Lateral Alignment" on page 25.

- The transverse torque rods also control axle walk-out during cornering. The mounting brackets at the axle housing end of the torque rods are furnished and welded into position on the axle housings by the axle or vehicle manufacturer.

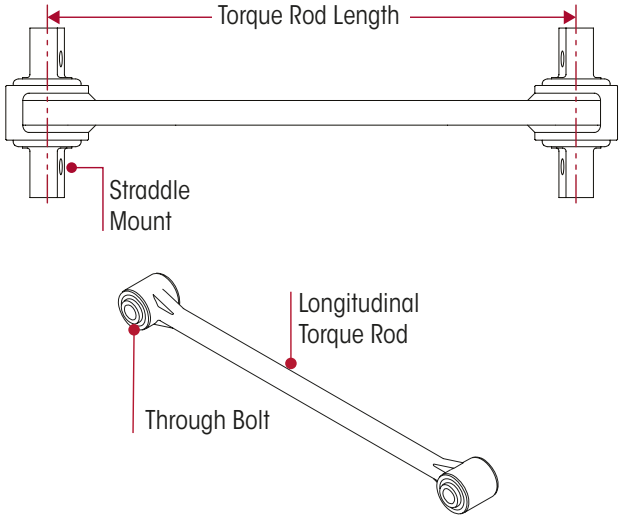


Figure 19: Torque Rod Identification

Transverse and longitudinal torque rods have attaching ends designated as straddle mount, tapered stud, or through bolt as shown in Figure 19. Most can be replaced by pressing out the worn torque rod bush and installing a replacement bush, others require complete torque rod assembly replacement.

NOTE: Some torque rods assemblies on drum brake equipped vehicles have an Axial Retention Feature (ARF). The rods have curled end hubs and are not re-bushable. This feature provides superior bush retention in the torque rod end hub. The entire torque rod assembly must be replaced. Refer to the relevant spare part bulletin for more details.

NOTE: Some vehicles use vehicle manufacturer specific torque rods that are different in design to Hendrickson torque rods.

AIR FITTING INSPECTION

1. If an air leak is suspected, begin by building up the air system to normal operating pressure.
2. Spray all nylon tube air fittings with a suitable foaming detergent solution to detect the leak location.

IMPORTANT: Do not use any detergents that contain ammonia because this may trigger embrittlement of brass fittings, which will eventually cause the fittings to crack and fail.

NOTE: Air lines and fittings may be inspected for leaks using a foaming solution. The height control valve, however, cannot be inspected using this method. All height control valves have an allowable leakage rate.

3. If an air leak is located, ensure the tubing end is clean and in good condition and the end is cut square. Check to see if the tubing is binding, bent or being pulled upon.
4. Visually inspect the air fitting O-ring seals for signs of damage or contamination.

NOTE: Haldex height control valves exhaust air through a port at the shaft. The valves may continue to exhaust air past the shaft for several minutes after a vehicle has stopped until the vehicle height stabilises. This is a normal operating function of the height control valve and does not indicate that the valve is faulty. Refer Figure 29.

SHOCK ABSORBER INSPECTION

Low-friction suspensions, such as air, have dramatically changed the shock absorber's role and characteristics. Shock absorbers perform a critical role in dampening suspension oscillation. Properly functioning shock absorbers can help reduce the wear of more expensive suspension components, such as air springs, while assisting in the reduction of tyre wear. Shock absorbers also prevent oscillations that can damage road surfaces. Additionally, shock absorbers limit axle rebound and prevent air spring separation on air spring systems.

Like most other suspension components, a program of regular scheduled inspections and preventative maintenance for shock absorbers, will avoid unscheduled downtime and reduce overall maintenance costs.

Shock Absorber Misting and Leaking

Misting shock absorbers are often misdiagnosed as failures. Shock absorber rod seals rely on a thin film of oil to keep the seal lubricated and in good condition. As the shock absorber extends, some of the hot oil coating the piston rod evaporates before condensing in the cooler outside air onto the shock absorber body.

This forms an oily film on the outside of the shock absorber body. Over time, this film will collect dust and grime, which will often coat the entire body of the shock absorber. Misting is a perfectly normal and necessary function of the shock absorber. The fluid that disperses through the seal area helps to lubricate and prolong the life of the seal.

Mechanics may find it difficult to differentiate between a misting shock absorber and leaking shock absorber that needs replacing. The examples shown below can be helpful in determining shock absorber serviceability.

Truck and trailer shock absorbers have reservoirs that may contain up to a litre of oil. A typical heavy vehicle shock absorber would have to lose more than 10% of its oil volume before damping performance will be affected.

Shock Absorber Misting and Leaking Examples

Light Misting

Light oil film on upper shock body

Medium Misting

Medium oil film on upper half of the shock body

Heavy Misting

Heavy oil film extending to the bottom of the shock body

No action required. Do not remove shock absorber.

Leaking

Oil leak path lines visible on the shock body.

Action required. Replace shock absorber.

Shock absorber upper seals may leak because of extreme wear, contamination, or a defect. A leaking shock absorber will show clear signs of fluid leaking in streams from the upper seal, which may drip from the shock absorber.

If you are unsure about the condition, then raise the chassis to fully extend the shock absorber. The entire shock absorber body may then be inspected without removing it from the suspension.

Visual Inspection

In addition to looking for oil leaks, there are other shock absorber checks that must be carried out regularly.

- Check the mount bolts for tightness and security.
- Check for broken upper or lower mounts.
- Check the mounting bushes for wear or deterioration.
- Check for broken or damaged dust shields.
- Check the shock body to see if it is severely dented.

A loose mounting bolt will usually leave witness marks around the mounting bolt washer from the relative movement between the parts.

Fitting the wrong shock absorber, an incorrect ride height setting, or adverse operating conditions without jounce limiting will often cause a broken mount or even internal shock damage.

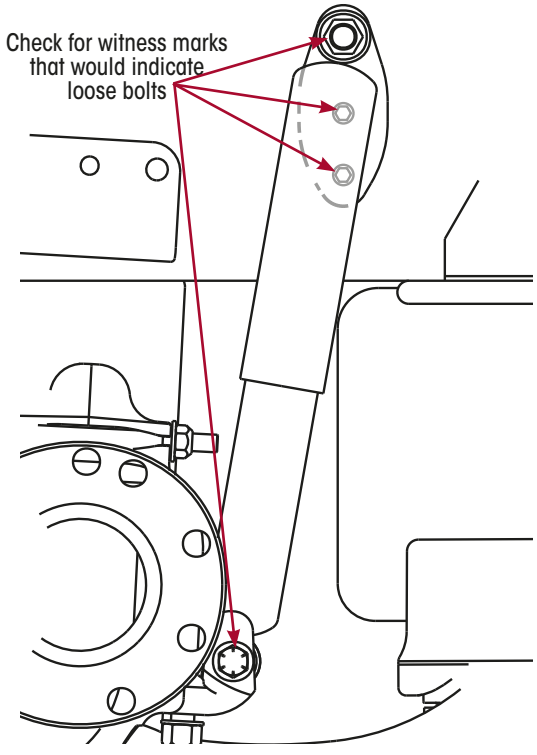


Figure 23: Check for Movement Witness Marks

NOTICE: Wipe any built up oil and dust from the shock absorber body after inspection. This will allow you to complete a clearer assessment of shock absorber condition at the next inspection.

Heat Testing Shock Absorbers

Shock absorbers function at temperatures ranging from ambient to 175 degrees C. A shock absorber's role is to dampen suspension movement by transforming kinetic energy into heat and then dissipating it via the oil. As a result, the shock absorber should be at least slightly warm to touch after normal use, depending on driving conditions.

If ride deterioration is experienced and there is suspicion that a shock absorber has failed internally, which is visually undetectable, perform the following shock absorber heat test:

⚠ **WARNING**: Shock absorbers can reach temperatures sufficient to burn your skin if driven over corrugated roads. Therefore, it is best to check the shock temperature with an infrared thermometer. However, with a little care the temperature can be checked quite simply with the back of your hand. Do not touch the shock absorber if there appears to be excessive heat with your hand near it.

1. Operate the vehicle at moderate speeds for at least fifteen minutes.
2. Within a few minutes of driving the vehicle, check the temperature of the metal frame near the shock absorbers to establish a reference ambient temperature.
3. Check the temperature of each shock absorber on the body below the dust cover or tube. Temperature checks must be carried out quickly, within a few minutes of driving the vehicle.
4. All shock absorbers should be warmer than the vehicle frame. Any shock absorber that is noticeably cooler than the corresponding one on the other side of the axle may have failed. A differing temperature on any axle warrants removal and further examination of the cooler shock absorber.
5. To inspect for an internal failure, remove and shake the suspected shock absorber. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock absorber has an internal failure and requires replacement. A shock that presents no resistance when stroked will have lost all oil or have some other mechanical issue.

Checking Shock Absorbers by Hand

Removing shock absorbers to check their movement by hand is not a generally recommended procedure.

Heavy vehicle shock absorbers are difficult to check accurately by hand. Different shock absorbers have differing rates of movement depending on design. It is also not possible to move a heavy vehicle shock absorber by hand with the same force that is exerted on it when fitted to the vehicle. This means that oil flow around the shock piston will be different when checked by hand to that when fitted to the vehicle.

If the shock has been removed from the vehicle, it should be possible to extend and compress the shock to check for resistance to movement. A shock absorber that has leaked sufficient fluid will have little to no resistance or have inconsistent movement as it is compressed and extended.

All Hendrickson shock absorbers are double acting. They will commonly compress a little easier than on rebound. However, the damping rates will depend on the manufacturer and intended suspension application.

⚠ **CAUTION**: Do not lift the truck chassis without the shock absorbers in place. If shock absorbers are not in place, overextension of the air springs may occur, which will damage them.

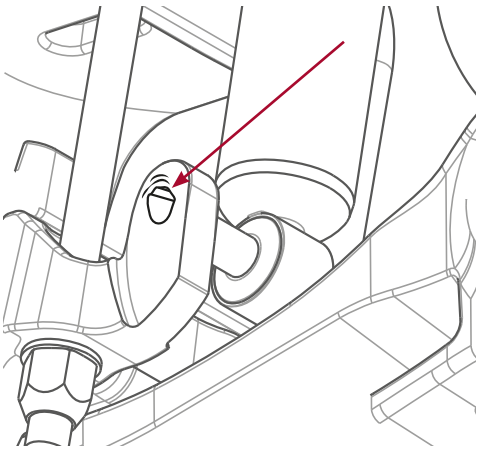


Figure 24: Inspecting Shock Bushes & Mounts

Damage to mounting holes by a loose shock absorber bolt must be replaced or repaired. Otherwise, it may cause the new shock absorber to also come loose. Refer Figure 24.

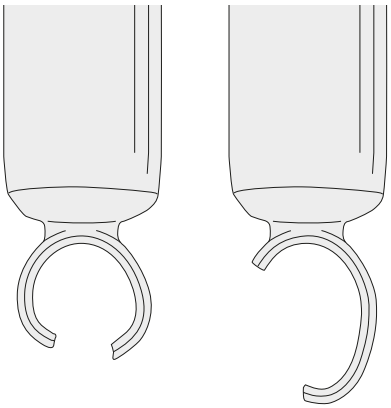


Figure 25: Checking for Damaged Mountings

Incorrect ride height, fitting the wrong shock absorber or deteriorated shocker bushes can damage shock absorber mounts. Refer Figure 25.

SECTION 5 ALIGNMENT & ADJUSTMENTS

RIDE HEIGHT

Hendrickson recommends a single height control valve for most tandem and single axle suspensions.

Some vehicles may be equipped with non-Hendrickson supplied height control valve(s). When servicing a suspension with non-Hendrickson height control valves, refer to the vehicle manufacturer's instructions for ride height inspection and adjustment.

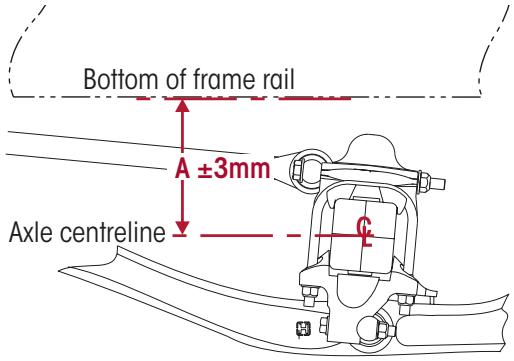


Figure 26: Ride Height Measurement (within ± 3 mm)

NOTICE: All ride heights to be taken on the axle attached to the height control valve(s). Ride height is measured from the underside of the frame to the axle centreline. Refer Figure 26.

Simple Ride Height Check

It is not always easy to determine the centre of the axle when measuring ride height, which is measured from the centre of the axle that has the height control valve. An alternative way of checking the height on a vehicle is by measuring the distance of the axle centreline above floor level, and then subtracting that from the height of the underside of the chassis frame rail above the floor.

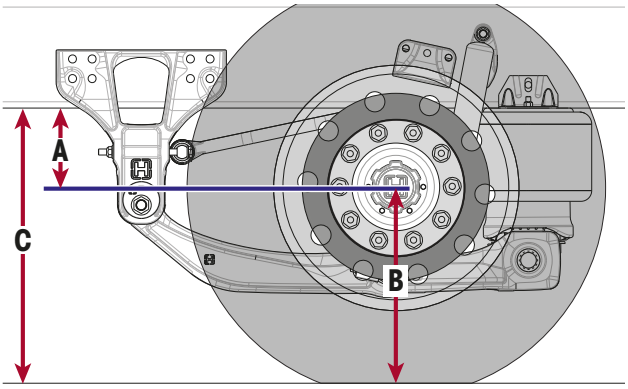


Figure 27: Simple Ride Height Check

First ensure that the tyre pressures are even and correct. Then measure and record the height of the hubcap centre above the floor (**B**). Subtract this distance from the height of the underside of the chassis frame rail above the floor (**C**) to find the ride height (**A**). Refer Figure 27.

C – B = Ride Height A

For example, a truck may have a centre of hubcap to floor measurement (**B**) of 500 mm and underside of chassis frame rail to floor (**C**) of 754 mm. 754 minus 500 corresponds to a ride height (**A**) of 254 mm.

Check and Adjustment

SERVICE HINT: **Dual HCV** – When inspecting or setting ride height on a lightly loaded dual HCV vehicle, such as a bobtail tractor, equipped with dual height control valves, it is necessary to have a load on the vehicle. Loading the vehicle to its normal operating condition, such as a tractor with a loaded trailer, increases ride height setting accuracy.

1. Drive the vehicle onto a level surface.
2. Free and centre all suspension joints by slowly moving vehicle back and forth several times without using the brakes. When coming to a complete stop, make sure the brakes are released. End with all wheels positioned straight ahead. Try to roll to a stop without the brakes being used. Do not set the parking brake.
3. Chock front wheels of the vehicle.
4. When checking or adjusting ride height, verify and maintain the vehicle's air system at full operating pressure.

SERVICE HINT: It is important to cycle height control valves completely before and after any ride height adjustments and then allow the suspension to rise to ride height. The cycling helps to make the adjustment more accurate.

⚠ **WARNING**: Prior to and during deflation and inflation of the air suspension system, ensure that all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

⚠ **WARNING**: Some vehicle applications, such as vehicles equipped with outriggers, always retain some air pressure in the air springs. Prior to performing any maintenance, service, or repair of the suspension, verify each air

spring is completely deflated. Failure to do so could result serious property damage and/or severe personal injury. See additional Cautions and Warnings in the "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.

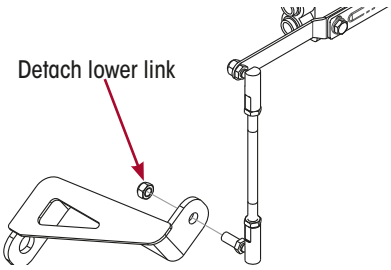


Figure 28: Detach HCV Link to Move Control Arm

5. Lower suspension and then inflate to ride height by using one of the following methods:
   a. If the vehicle is equipped with a suspension dump system in the cab, dump some suspension air system by using the cab dump valve control. Allow the suspension system to inflate back to ride height.
   b. If the vehicle is not equipped with a suspension dump system, disconnect the height control valve arm(s) and lower to vent some suspension air pressure. Re-attach the height control valve linkage(s) to the height control valve arm(s). Allow the suspension system to inflate. Refer Figure 28.

NOTICE: All ride heights are measured on the axle attached to the height control valve(s). Ride height is measured from the underside of the frame to the axle centreline. Refer Figure 26 and "Simple Ride Height Check" on page 23 .

SERVICE HINT: The most accurate way to measure ride height is by dropping it down and allowing it to rise to the set height.

6. Measure the suspension ride height. Measure the distance from the underside of the frame rail to the axle centreline. Refer Figure 26 or Figure 27.

NOTICE: Vehicles equipped with dual height control valves must have the ride height measured at each height control valve location.

7. Compare the measured ride height dimensions to the ride height specification for the vehicle.
   a. If ride height is correct then height control valve adjustment is not required. Ensure all fasteners and locknuts are tightened and restore vehicle to operating condition.
   b. If ride height is not correct then height control valve adjustment is required. Continue with the following adjustment steps.
8. Loosen the HCV control rod locknuts.
   - Lengthen the rod to raise the ride height.
   - Shorten the rod to lower the ride height.
9. Detach control rod(s) and lower arms to release air and lower suspension.
10. Reattach control rod(s) and allow suspension to return to ride height.
11. Measure ride height and compare to specification. Continue to adjust rod length(s) and check height by lowering and restoring height until specification is reached. For dual HCV this procedure will need to be conducted equally for both height control valves. If fitted with an adjustable lever, use this for fine adjustments.
12. Once the correct ride height is confirmed, ensure lever fine adjustment bolt is tightened to 3 Nm, the link rod nuts to 10 Nm and the rod locknuts are tightened to 10 Nm. Refer "Haldex HCV Torque Specifications" on page 66.
13. Restore vehicle to normal operating condition.

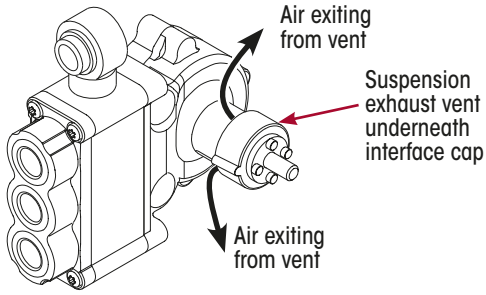


Figure 29: Suspension Exhaust Vent Under Interface Cap

IMPORTANT: Height control valves will often continue to exhaust air from the exhaust, located under the interface cap, for several minutes after a vehicle has stopped. This is a normal operating function of the HCV as the vehicle stabilises, hence, does not indicate an HCV is leaking or faulty. Refer Figure 29.

AXLE LATERAL ALIGNMENT

1. Relax the suspension by slowly moving the vehicle back and forth several times in a straight line without using the brakes. This will remove any stress and tension on the suspension. Finish with all wheels positioned straight ahead.

2. Do not set the parking brake. Chock the front wheels of the vehicle.

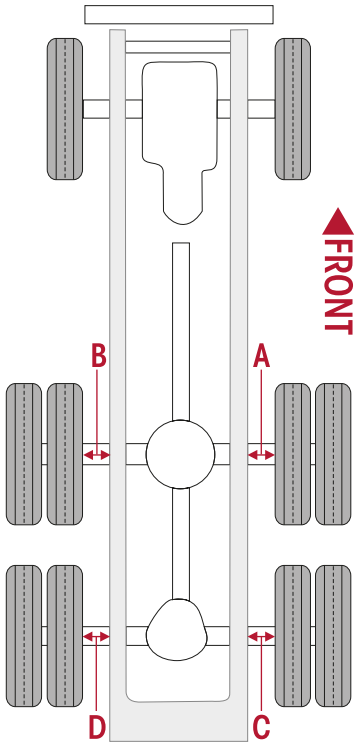


Figure 30: Checking Tandem Axle Lateral Alignment

3. Measure from the outside of the frame rail to the rim flange of the inner wheel. Record the measurement A and B. Refer Figure 30.

4. Measure the same distance on the opposite side of the same axle. Record the measurement C and D.

NOTE: Before making any adjustments to axle lateral alignment ensure the alignment issue is not caused by the way the axle is mounted to the U-beam. If the axle is not centred on the U-beam, it will cause alignment issues. Compare the distances between the brake flange and the bottom cap assembly, as shown in "U-beam and bottom cap assembly" on page 58.

5. Verify the axle lateral alignment is within the vehicle manufacturer's specifications. (This is usually around 3 mm.) Adding or removing shims that are located between the transverse torque rod and the frame rail will normally correct the axle lateral alignment.

SERVICE HINT: A general rule of thumb is to use a torque rod shim with a thickness that is half of the difference between the two measurements.

EXAMPLE: If the axle lateral alignment difference (as measured in steps 2 and 3) is out of specification by 6 mm, remove or install a 3 mm torque rod shim between the transverse torque rod and frame rail as needed.

For more details about checking torque rods, refer to "Longitudinal & Transverse Torque Rods" on page 18 in Preventive Maintenance Section of this publication.

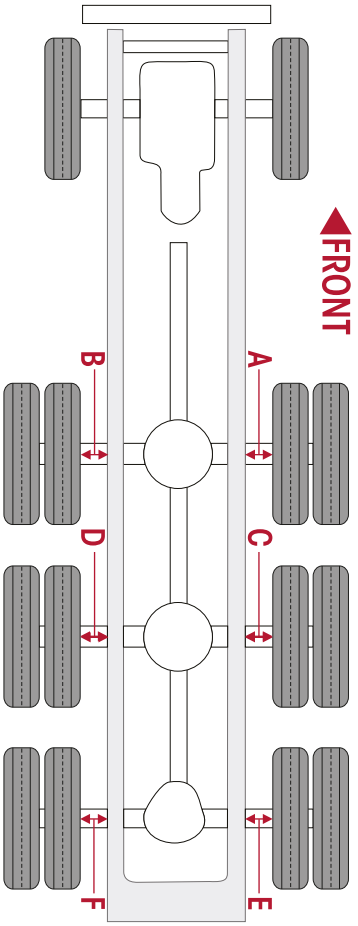


Figure 31: Checking Triaxle Lateral Alignment

6. If there are more axles, follow the same steps to measure, record and correct these. Refer measurement E and F in Figure 31.

NOTE: Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts. Washers are not necessary when flanged fasteners are used.

DRIVE AXLE ALIGNMENT

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

NOTICE: The first drive axle should be the first axle aligned. Auxiliary axles, second and third drive axles should then be aligned to the first drive axle.

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 remove any stress and tension on the suspension. Finish 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. Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components before proceeding with the alignment process.
6. Ensure all drive axle tyres are the same size.
7. Check, and correct if necessary, that the vehicle is at the specified ride height. Refer to "Ride Height" on page 23.

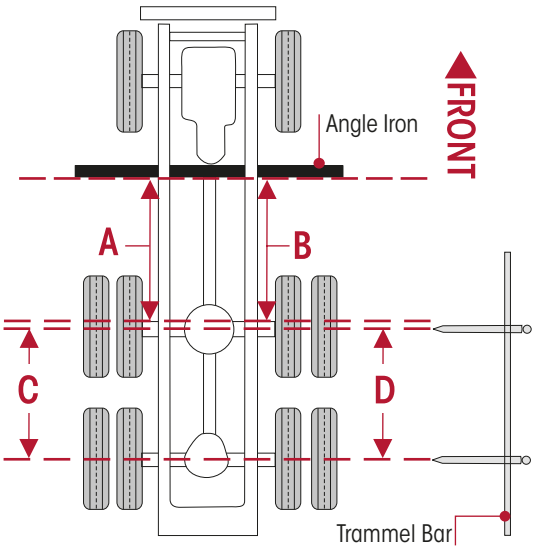


Figure 32: Two Drive Axle Alignment

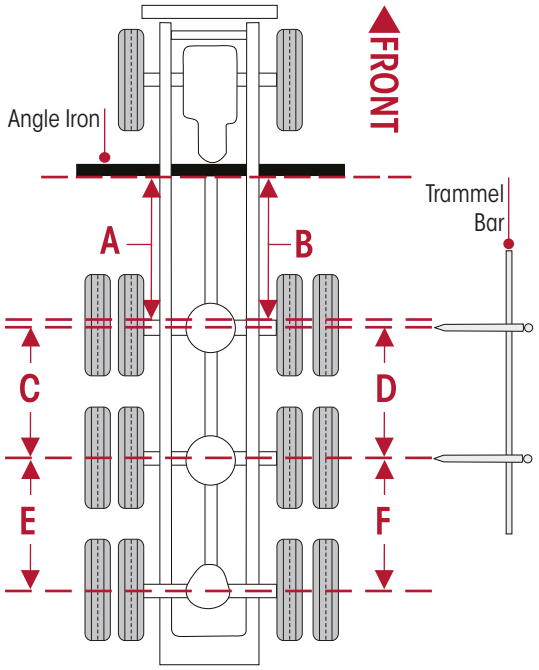


Figure 33: Three Drive Axle Alignment

NOTE: Electronic laser alignment equipment is the preferred alignment method as it is more accurate than using a tape measure and angle iron. The following steps using tape measures are provided as an alternative should electronic alignment equipment not be available.

8. If axle alignment equipment is not available, using C-clamps, securely clamp a 2-metre length of straight bar stock or angle iron across the lower frame flange as shown in Figure 32 and Figure 33. Select a location for the angle iron as far forward of the drive axle as possible where components will not interfere.

NOTE: The first drive axle is the axle that should be aligned first. Auxiliary (pusher) axles should not be used as the primary alignment axle. Other axles, second, third, tag and pusher axles, should then be aligned to the first drive axle.

9. Accurately square the straight edge to the frame using an engineer's square.
10. Using a measuring tape, measure from the straight edge to the forward face of the front drive axle arms at the centreline on both sides of the vehicle, refer A and B as shown in Figure 32 and Figure 33.
11. Calculate the difference between measurements A and B.
    a. If the front drive axle is within vehicle manufacturer's specifications, proceed to check the rear drive axle(s) (Step 12).

b. If alignment of the front drive axle is not within the vehicle manufacturer's specifications, then the alignment of this axle must be corrected before measuring the rear drive axle alignment (Step 12). Correct the alignment of this axle by following the "Alignment Adjustment Instructions" on page 28.

NOTE: Since the remaining axle(s) will be aligned relative to the front drive axle, it is essential that the front drive axle is aligned within the vehicle manufacturer's specifications prior to the alignment of the remaining drive axle(s).

12. Using a trammel bar, measure the distance from the spindle centre of the front drive axle to the spindle centre of the second drive axle on both sides of the vehicle, refer C and D as shown in Figure 32 and Figure 33.
13. Calculate the difference between measurements C and D.
    a. If the measurements are within the vehicle manufacturer's specifications, then the rear drive axle alignment is acceptable. Proceed to check the pinion angles of the drive axles (Step 15).
    b. If alignment of the rear drive axle is not within the vehicle manufacturer's specifications, then t this must be corrected before checking the drive axle pinion angles. Correct the alignment of this axle by following the "Alignment Adjustment Instructions" on page 28.
14. Repeat Steps 12 and 13 for any remaining axle(s). For a triaxle this will be measurements E and F in Figure 33. Be sure all remaining drive and auxiliary axles are aligned relative to the front drive axle.

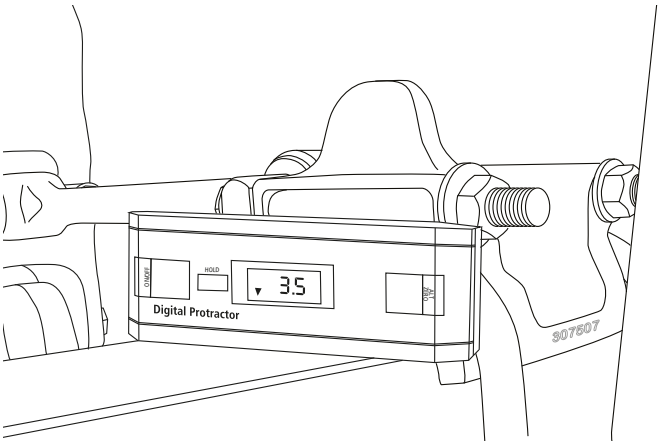


Figure 34: Check Pinion Angle at Axle Housing

15. After all drive axles are aligned, check the pinion angle of each drive axle with a digital protractor. Refer Figure 34. Refer to the vehicle manufacturer specifications for the required pinion angles.
    a. If all pinion angles are within the vehicle manufacturer's specifications, then proceed to Step 16.
    b. If any pinion angle is out of the vehicle manufacturer's specifications it must be corrected. Follow the correct Pinion Angle Adjustment Suspension Procedure for the PRIMAAX EX suspension model and ride height.
16. Recheck measurements to confirm adjustments. Repeat Steps 10 through 15 until the correct alignment and pinion angles are achieved.
17. When all drive axle alignments and pinion angles are within the vehicle manufacturer's specifications then the alignment procedure is complete.

AXLE PINION ANGLE

Drive axle pinion angles are established by the vehicle manufacturer. The suspension bottom caps are machined to specific angles to meet the vehicle manufacturer's specified requirements. If it is necessary to fine tune the pinion angle see "Pinion Angle Adjustment" on page 30.

To check the pinion angle, verify first that the suspension is at the proper ride height (see "Ride Height" on page 23), place a digital protractor on the axle housing as shown in Figure 34. Verify the pinion angle is within the range specified by the vehicle manufacturer.

ALIGNMENT ADJUSTMENT INSTRUCTIONS

SERVICE HINT: The eccentric collars (with the square drive feature) are located on the outboard side of the frame hangers with the concentric collars on the inboard side. The total range of fore or aft axle adjustment is 25 mm ±12 mm.

SERVICE HINT: A suspension equipped with eccentric QUIK-ALIGN® collars on both sides of an axle can be adjusted on both sides. A suspension equipped with an eccentric QUIK-ALIGN collar on only one side of the axle can be adjusted only on the side that has the eccentric QUIK-ALIGN collar. Contact the vehicle manufacturer for specifications.

⚠ **WARNING**: Discard used QUIK-ALIGN fasteners. Always use new QUIK-ALIGN fasteners to complete a repair. Failure to do so could result in failure of the part, or mating components, adverse vehicle handling, personal injury, or property damage.

Do not assemble QUIK-ALIGN joint without the proper fasteners. Use only H-coated fasteners to sustain proper clamp force. Failure to do so can cause adverse vehicle handling, property damage or personal injury and void warranty. Ensure that the QUIK-ALIGN fastener's torque values are sustained as recommended in the torque specifications section of this publication. Failure to do so can cause adverse vehicle handling resulting in personal injury or property damage. Follow vehicle manufacturer's fastener orientation when performing any maintenance, service or repair.

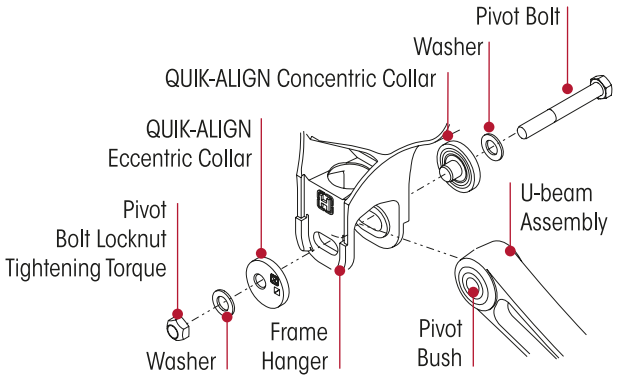


Figure 35: Standard QUIK-ALIGN Pivot Assembly

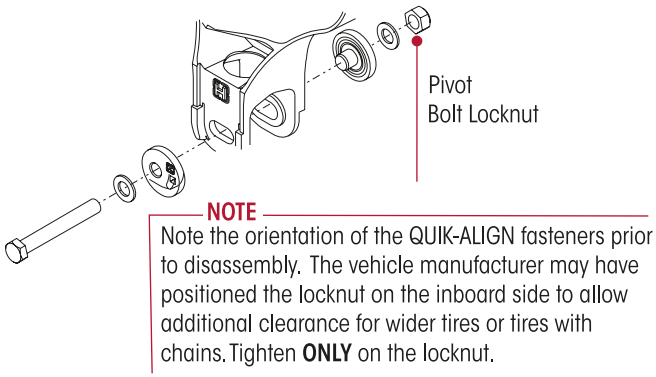


Figure 36: Alternate QUIK-ALIGN Pivot Assembly

1. Support the frame at ride height.

⚠ **WARNING**: Prior to and during deflation and inflation of the air suspension system, ensure that all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

2. See additional Air Spring Warnings and Instructions in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the suspension system.

3. Dump all air from rear suspension using the dump button in the cabin. If the vehicle does not have a dump feature, disconnect the height control linkage assembly from the height control valve arm and lower the arm to exhaust the air in the air springs and deflate the rear suspension or refer to vehicle manufacturer's instructions.

⚠ **WARNING**: Some vehicle applications, such as vehicles equipped with outriggers, retain some air pressure in the air springs at all times. Prior to performing any repairs, verify each air spring is completely deflated. Failure to do so could result serious property damage and/or severe personal injury.

4. Using the measurements from the Drive Axle Alignment Inspection Procedure, Step 11, determine which QUIK-ALIGN collar will need adjusting to correct the axle alignment.

SERVICE HINT: If the axle can be adjusted on both sides, begin the adjustment on the side that is furthest out of specification.

NOTE: Use a new QUIK-ALIGN pivot bolt kit for any axle alignment or disassembly of the QUIK-ALIGN connection. This will help ensure that the proper clamp load is applied to the connection and help prevent the joint to slip in service.

5. On the side being adjusted, remove the old fastener and replace it with a new QUIK-ALIGN fastener. Snug the QUIK-ALIGN fastener to around 100 Nm. Do not tighten to torque at this time. This will hold the eccentric flanged collar in place against the frame hanger face, and within the adjustment guide, but loose enough to permit the eccentric flanged collar to rotate freely.
6. Inflate the suspension with the dump button in the cabin, by connecting the height control valve linkage to the height control valve arm or by following vehicle manufacturer's instructions. Verify the air springs inflate uniformly without binding.
7. Verify correct ride height.

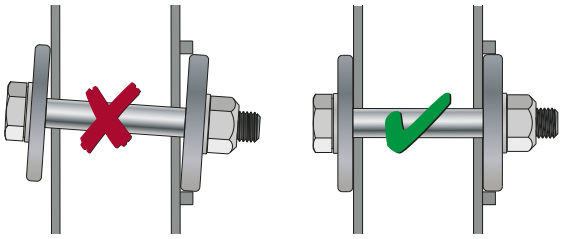


Figure 37: Ensure QUIK-ALIGN Pivot Bolt Correctly Positioned

NOTE: When adjusting the alignment of an axle, the fasteners connecting the longitudinal torque rod to the frame hanger, above the QUIK-ALIGN collar being adjusted, must be loose at the frame hanger. This will allow the longitudinal torque rod to move freely with the axle while the alignment is adjusted. Failure to do so will result in bush pre-load in all rubber connections on that side of the axle, shortening component life.

Ensure the pivot moves evenly when rotating the eccentric for alignment. The eccentric collar must be properly positioned against the axle and the pivot bolt must at right angles to the suspension arm. Refer Figure 37.

8. On the side of the axle being adjusted, loosen the fasteners connecting the longitudinal torque rod to the frame hanger. Remove any existing shims from this connection. Leave connection loose at this time.

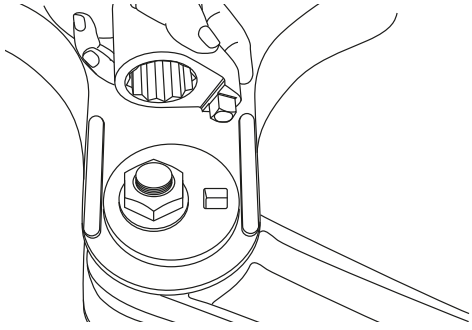


Figure 38: Attach QUIK-ALIGN Socket Tool

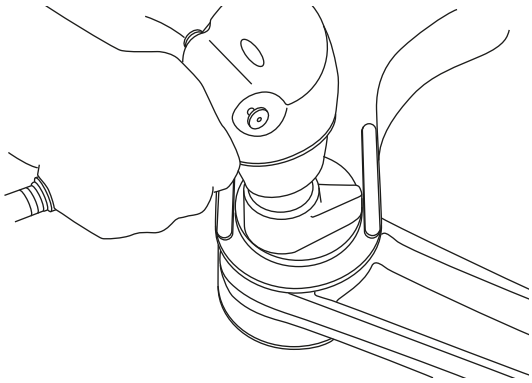


Figure 39: Rotate QUIK-ALIGN Eccentric Collar with Impact Gun

9. Use a QUIK-ALIGN socket tool and impact gun or a 1/2" square drive breaker bar to rotate the QUIK-ALIGN eccentric collar to align the axle. Refer to Figure 38 and Figure 39.
10. Once the correct axle alignment is achieved, use a calibrated torque wrench to tighten the standard 1" QUIK-ALIGN bolts, with a 38 mm (1-1/2") bolt head, to 750 Nm. Tighten the larger 1¼" QUIK-ALIGN bolts, with a 47 mm (1-7/8") bolt head, to 1760 Nm. For more details about bolt identification and tightening torques refer to "Torque Settings" on page 66.
11. Fill any gap between the frame hanger and longitudinal torque rod with shims.

NOTE: Two to three shims may be used for the torque rods. If the gap is larger than that, Hendrickson recommends that hardened washers or spacers be used instead, to ensure a stable fixture.

12. Tighten the longitudinal torque rod fasteners to the proper specification. For more details see "Torque Settings" on page 66.
13. Re-check the ride height and the axle alignment to verify they are within the vehicle manufacturer's specifications. See "Ride Height" on page 23 and "Drive Axle Alignment" on page 26.
14. Return to the Drive Axle Alignment Inspection Procedure, Step 12, for the remaining drive axles.

PINION ANGLE ADJUSTMENT

Adjustment Of 1.5 Degrees or Less

NOTE: When correcting the pinion angle of an axle the correction must be in equal amounts on both sides of the axle. However, the total number of shims per side may differ due to axle alignment.

SERVICE HINT: A general rule of thumb is, 3 mm change in the shim pack thickness will increase or decrease the pinion angle by ½ degree.

1. Loosen the fasteners connecting the longitudinal torque rods to the frame hangers.

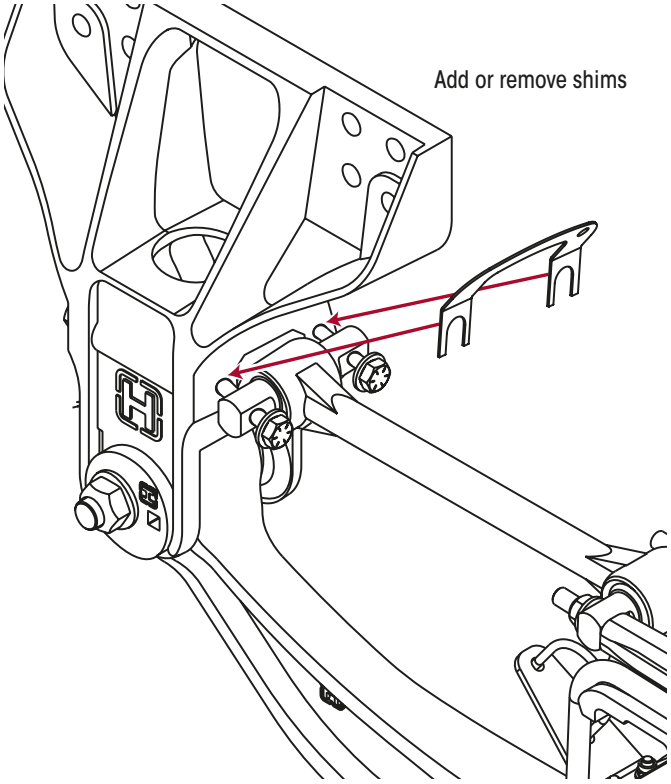


Figure 40: Add or remove shims as required to adjust pinion angle

2. Install or remove shims as required in equal amounts to both sides of the axle to achieve the proper pinion angle. Refer Figure 40. Basically, install shims to increase the pinion angle and remove shims to decrease the pinion angle.
3. Tighten the longitudinal torque rod fasteners to the proper specification. For more information refer to "Torque Settings" on page 66.
4. Re-check the pinion angle and verify it is within the vehicle manufacturer's specifications.

Adjustment Of More Than 1.5 Degrees

If an adjustment of more than 1.5 degrees is required, it will be necessary to replace the bottom cap with a bottom cap that will achieve the desired pinion angle. After replacement of the bottom cap perform the drive axle alignment procedure. See the relevant parts list for the vehicle make, model and specifications.

Each bottom cap is stamped with identification numbers on the lower machined surface. The stamped number structure varies depending on suspension type.

232/462/692

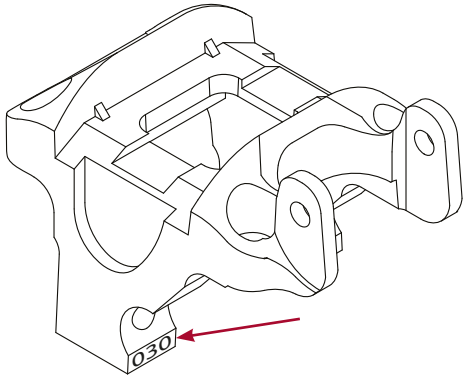


Figure 41: Bottom Cap Identification 232/462/692

The last three digits of part number correspond to the angle divided by ten. For example, the stamped number ***030*** means that it is designed for 3.0 degrees.

262/522/782

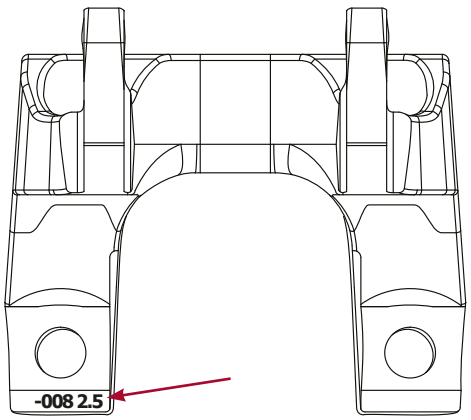


Figure 42: Bottom Cap Identification 262/522/782

The last three digits of the part number is followed by the angle. For example, the stamped number ***008 2.5*** denotes a part number with a suffix of 008, which has an angle of 2.5 degrees.

SECTION 6 COMPONENT REPLACEMENT

Fasteners

When servicing a vehicle, Hendrickson recommends replacing all removed fasteners with new equivalent fasteners. Maintain correct torque values at all times. Check torque values as specified. For more details and information refer to "Torque Settings" on page 66. If non-Hendrickson fasteners are used follow torque specifications listed in the vehicle manufacturer's service manual.

AIR SPRING

Disassembly

1. Chock the wheels.
2. Support the frame.
3. Disconnect the height control valve's height control valve arm(s) from the rubber grommet.

⚠ **WARNING**: Prior to and during deflation and inflation of the air suspension system, ensure that all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

4. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.

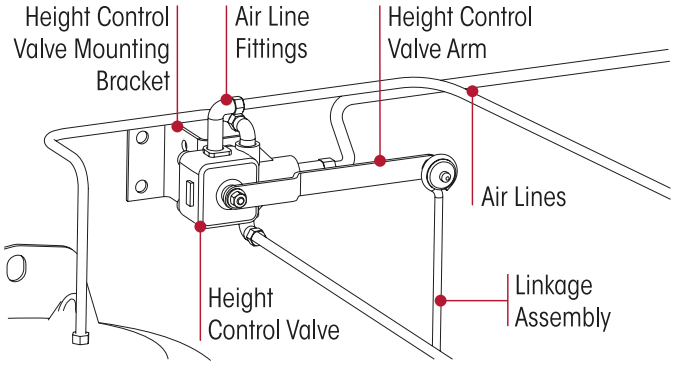


Figure 43: Height Control Valve Assembly

5. Exhaust all air from the air springs and deflate the rear suspension by using the dump button or disconnect and lower the height control valve arm(s). Refer Figure 43.

⚠ **WARNING**: Some vehicle applications, such as vehicles equipped with outriggers, retain some air pressure in the air springs at all times. Prior to performing any maintenance, service, or repair of the suspension, verify each air spring is completely deflated. Failure to do so could result serious property damage and/or severe personal injury.

6. Remove the air line from the air spring.

⚠ **WARNING**: If the air spring is being removed for an alternate repair, it is mandatory to lubricate the lower air spring fasteners with penetrating oil and remove with hand tools to prevent damage to the lower air spring mounting stud. Failure to do so can cause component damage and void warranty.

7. Clean and lubricate the lower mounting fasteners with penetrating oil and then remove fasteners from the air springs using hand tools only.
8. Remove the lower air spring mounting bracket from the cross tube.
9. Remove the fasteners and gusset (if equipped) from the upper air spring mounting bracket and the frame. Discard fasteners.
10. Remove the air spring.

Assembly

1. Inspect the mounting surfaces and lower air spring mounting bracket for any damage, replace if necessary.

⚠ **WARNING**: Failure to press the air spring against the underside of the frame while tightening the upper air spring bracket can result in component damage and personal injury or property damage.

2. Hold the upper air spring bracket tight against the frame flange. Attach gusset (if equipped) and tighten the upper air spring mounting fastener per original equipment manufacturer's specifications.

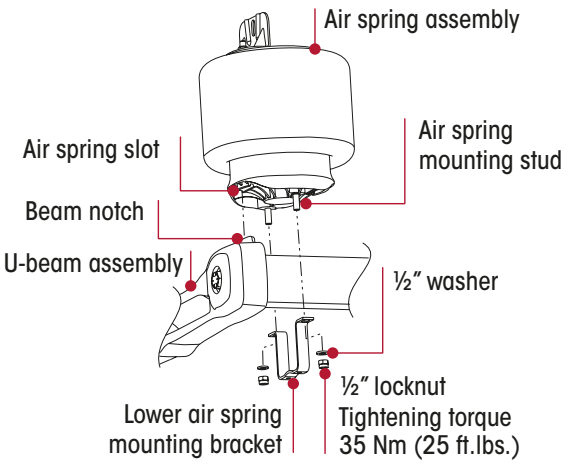


Figure 44: PRIMAAX® EX Air Spring – Integrated End Cap

3. Install the air spring between the frame and the cross tube. Ensure the air spring slot in the bottom of the air spring engages the beam notch on the top of the support beam. Refer Figure 44.
4. Install the lower air spring mounting bracket around the cross tube, engaging the mounting air spring studs.
5. Using hand tools only, install the lower mounting fasteners and tighten to 35 Nm torque.
6. Install the air line fitting to the air spring using a suitable thread sealant (such as Loctite 567).
7. Connect the air line to the air spring.
8. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.
9. Re-inflate the suspension slowly and verify that the air spring bladder inflates uniformly without binding.
10. If disconnected, reattach the height control linkage assembly to the height control valve arm.
11. Remove the frame supports.
12. Remove the wheel chocks.
13. Verify proper ride height adjustment. Refer to "Ride Height" on page 23 of this publication.

HEIGHT CONTROL VALVE

General mounting recommendations for truck height control valves are:

- **TANDEM** – Mount on the forward drive axle of the suspension group.
- **TRIAXLE** – Mount on the centre drive axle of the suspension group.

Disassembly

1. Ensure vehicle is unloaded and parked on a stable level surface.
2. If vehicle has liftable auxiliary axles installed ensure they are properly supported or have been lowered.

⚠ **WARNING**: Prior to and during deflation and inflation of the air suspension system, ensure that all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

3. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.

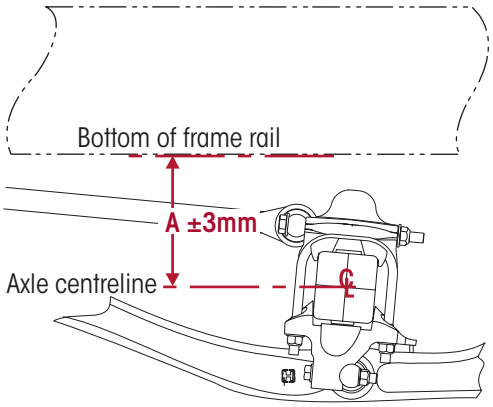


Figure 45: Ride Height Measurement (within ± 3 mm)

4. Find the vehicle manufacturer's ride height specification. This can be obtained from the vehicle manufacturer, vehicle handbook or suspension label. If these are unavailable, current vehicle ride height may be used as a reference. Ride height is measured from the underside of the chassis frame rail to the centre of the axle that has the height control valve attached. Check the height at each HCV location if equipped with dual height control valves. Refer to "Simple Ride Height Check" on page 23 and Figure 45.

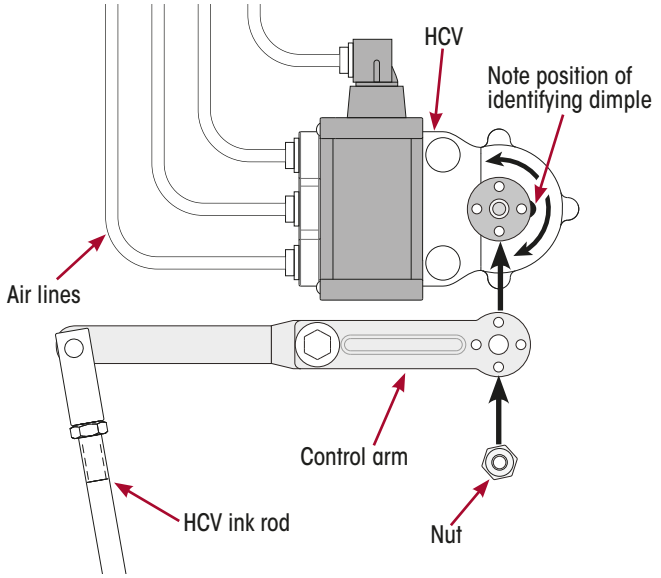


Figure 46: Component Assembly, Location & Orientation

5. Find and carefully note the orientation and position of the height control valve, air lines, arm and the identifying dimple on the HCV shaft. Photos taken with a mobile phone may be used a handy reference. Refer Figure 46 and Figure 49.

⚠ **WARNING**: Some vehicle applications, such as vehicles equipped with outriggers, retain some air pressure in the air springs at all times. Prior to performing any maintenance, service, or repair of the suspension, verify each air spring is completely deflated. Failure to do so could result serious property damage and/or severe personal injury.

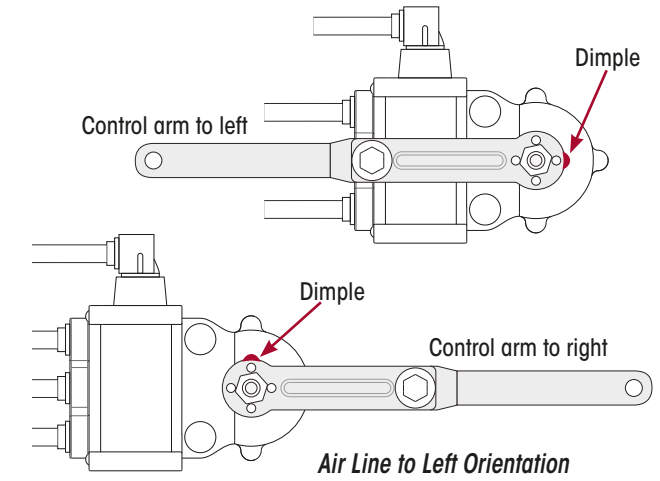
6. Disconnect and remove the link rod assembly.

7. Lower the height control valve control arm below horizontal and exhaust any air in the suspension system.

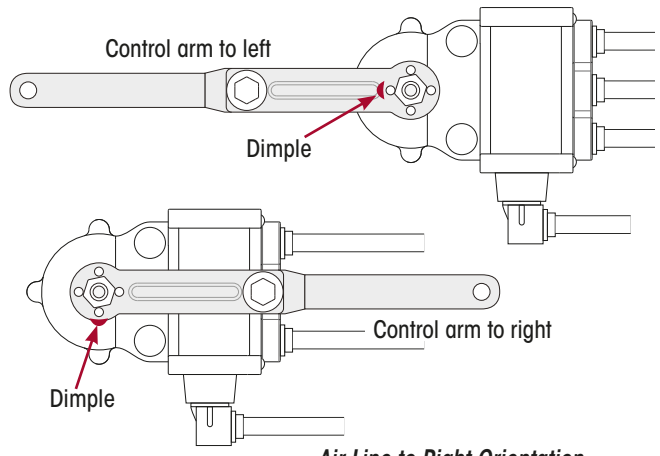
8. Disconnect all lines from the valve and remove.

Assembly

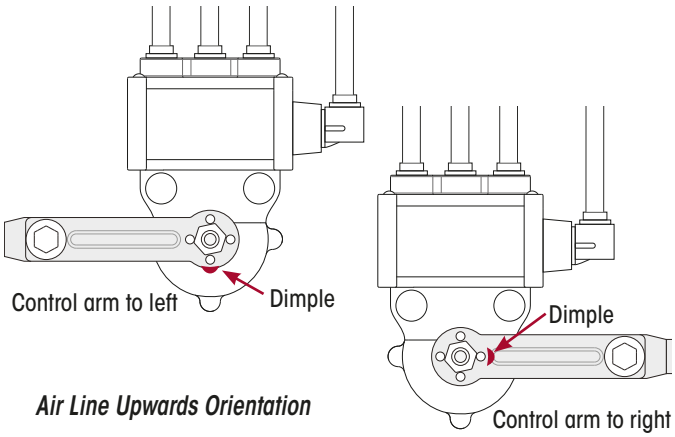
IMPORTANT: The HCV will not function correctly if the orientation is set incorrectly.



Air Line to Left Orientation



Air Line to Right Orientation



Air Line Upwards Orientation

Figure 47: Valve & Arm Orientation with Identifying Dimple

1. Refer to manufacturer's instructions or to the notes made before removing the previous HCV. The HCV may be installed in a vertical or horizontal position with

the control arm in either left- or right-hand position. Determine the correct HCV dimple, control arm position and orientation for the vehicle. Refer Figure 47.

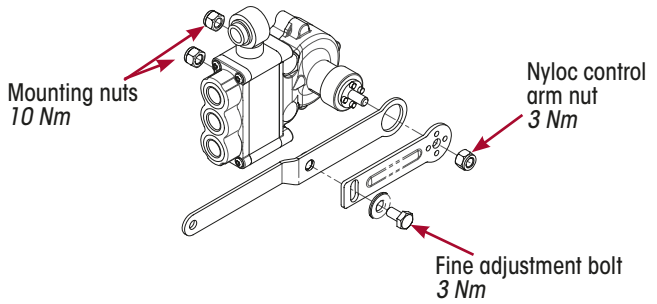


Figure 48: Height Control Valve Assembly Torque

2. Fasten the control arm to the height control valve shaft making sure the alignment identifier dimple on the cap is in the proper position for valve orientation. Apply a thread locking compound to the shaft thread and tighten the Nyloc nut to 3 Nm. Refer Figure 47, Figure 48 and "Haldex HCV Torque Specifications" on page 66.
3. Rotate the control arm fully 3-5 times in both clockwise and anticlockwise directions to remove any adverse effects of storage.
4. For the metric HCV, if possible, install the air fittings to the valve prior to mounting to the vehicle. It is recommended that new air fittings with pre-applied sealing compound be used. If not available, use a small drop of oil or thread sealant compound. Use small amounts of sealant on threads only. Do not use Teflon tape or pipe sealing compound. The imperial HCV includes integral push to connect fittings.
5. Check that the link rod fits into the HCV arm-mounting hole. Enlarge hole in control arm if required.
6. If the height control valve has an adjustable arm, assemble the arm in the centre position and torque adjustment bolt to 3 Nm. Refer Figure 48 and "Haldex HCV Torque Specifications" on page 66.
7. Assemble the height control valve to the mounting bracket with the nuts provided. Torque to 10 Nm.
8. Mount the height control valve to the vehicle. The valve should be mounted as close to level as possible. If necessary, replace any worn or bent hardware such as mounting brackets, nuts, bolts or linkage.

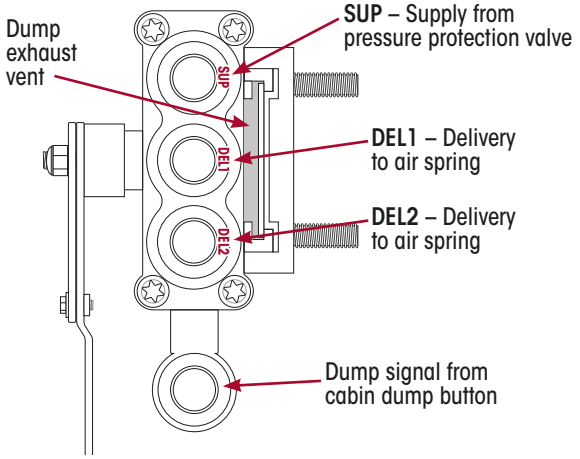


Figure 49: HCV Air Line Connections & Dump Vent

9. Connect air lines. Refer also to "SECTION 7 Plumbing Diagrams" on page 63.
   a. Connect the air supply from the tank to the HCV "SUP" supply port. (Older valves may show it as "Supply.")
   b. The HCV has two delivery ports to the suspension air springs. Connect an air spring air line to either "DEL1" or "DEL2" delivery port. Refer Figure 49. If only one delivery port is to be used the other port must be plugged. (Older valves may show them as "SUSP1" and "SUSP2".)

NOTICE: See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.

10. Charge the air supply system.

⚠ **CAUTION**: Do not over inflate air springs once full suspension extension has been reached. Damage to shock absorbers, air springs or even personal injury may occur.

11. Assess HCV operation and installation by moving the control arm up to around 20 degrees above horizontal. Air pressure should begin inflating the air springs. Take care to ensure air springs are not over inflated.
12. Check the following items if the air springs do not inflate:
    - Air supply pressure is over 550 kPa (80 psi.) and sufficient to open the pressure protection valve.
    - Air lines are connected to the correct HCV port positions. Also check air lines are not blocked or kinked.
    - The dump switch has been activated.
    - Confirm control arm and alignment dimple are in their correct positions.

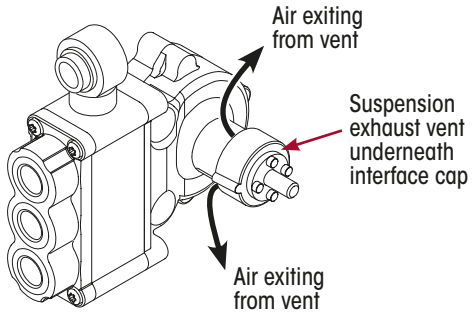


Figure 50: Suspension Exhaust Vent Under Interface Cap

13. Rotate control arm downwards to around 20 degrees below horizontal. The air spring should now begin deflating through the HCV exhaust port, which is underneath the interface cap. Refer Figure 50. This is different from the dump air vent, which is under a cover on the rear of the valve. Refer Figure 49.

14. Use the height control valve to move the suspension to correct ride height.

15. Check that the link is the right length by fitting it into the mounting holes top and bottom. Adjust rod length if necessary.

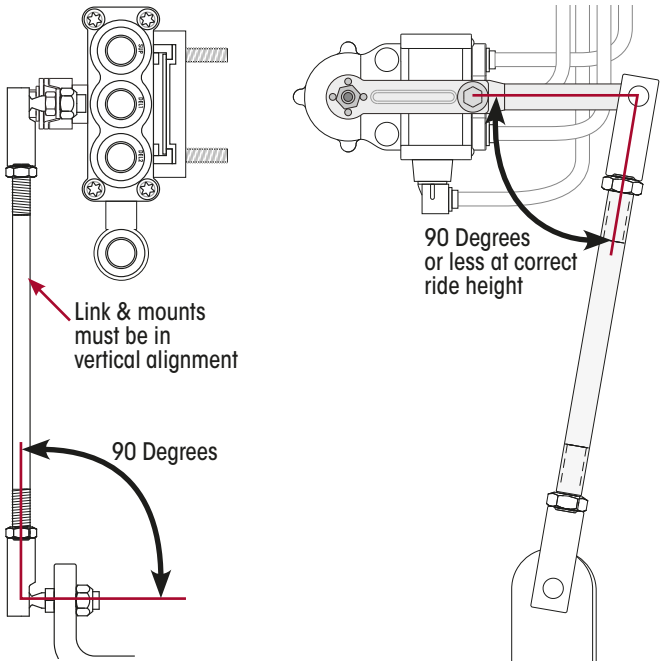


Figure 51: Check Link Mounting and Alignment

16. Check the linkage for interference and installed angle at ride height. Refer Figure 51.

17. It is important check linkage movement at full extension, especially if this is a new installation, . With the link attached to the HCV arm but not at the bottom, move the arm up to fully inflate air springs. Connect the arm at the bottom. Check that the control arm cannot rotate past vertical during suspension movement. If control arm can rotate past vertical, the HCV position will need to be relocated.

18. With link attached, allow the height control valve to bring vehicle down to ride height.

SERVICE HINT: The most accurate way to measure ride height is by dropping it down and allowing it to rise to the set height.

19. Check correct ride height setting by disconnecting the rod, at ride height, and lowering the arm for about 15 seconds to lower the suspension. Reconnect rod and measure ride height once the ride height has stabilised.

NOTICE: Ride height is measured from the underside of the chassis frame rail to the centre of the axle that has the height control valve attached. If equipped with dual height control valves, check the height at each HCV location.

20. If fitted with an adjustable lever, use this for fine adjustments. Otherwise, adjust the link rod assembly to obtain correct vehicle in ride height. Loosen rod lock nuts and turn the rod to either lengthen or shorten the rod.

21. Disconnect rod to lower suspension for 15 seconds before reconnecting and allowing suspension to stabilise. Repeat measurement and adjustment procedure until the correct ride height has been reached. If dual HCV, repeat adjustment process for both height control valves.

22. Once the correct ride height is confirmed, ensure lever adjustment bolt is tightened to 3 Nm and the link rod nuts and locknuts are tightened to 10. Refer Figure 48 and "Haldex HCV Torque Specifications" on page 66.

23. Spray all air connections and fittings for leaks with a suitable foaming agent and verify all air fittings and fasteners are tight and no leaks are present.

IMPORTANT: Height control valves will often continue to exhaust air from the exhaust, located under the interface cap, for several minutes after a vehicle has stopped. This is a normal operating function of the HCV as the vehicle stabilises, hence, does not indicate an HCV is leaking or faulty. Refer Figure 50.

24. Verify proper ride height adjustment. Refer to "Ride Height" on page 23 of this publication.

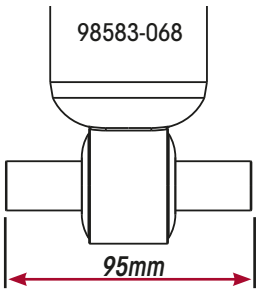
25. Remove the wheel chocks.

SHOCK ABSORBER

IMPORTANT: Torquing the lower shock bolt with the incorrect shock installed will result in fracture of the bottom cap casting because there is a 5mm difference in dimensions for different capacity suspension ratings.

PRIMAAX EX 232/462/692
Shock Absorber Stamped Number
- 98583-032 early
- 98583-068 current
- 70807-001 current

With 95mm lower bush tube



PRIMAAX EX 262/522/782
Shock Absorber Stamped Number
- 98583-067 early
- 98583-069 current
- 70807-002 current

With 100mm lower bush tube

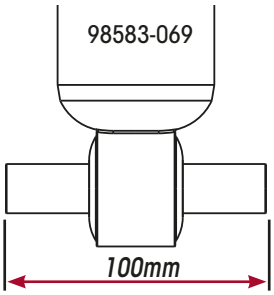


Figure 52: Shock Absorber Identification

Shock absorbers must match the rated suspension to avoid damage to the bottom axle cap casting. Refer to Figure 52 for shock identification dimensions and stamped numbers.

Disassembly

1. Chock the wheels of the vehicle.

NOTE: If removal of the height control valve linkage bracket is necessary for shock absorber replacement, mark the position of the linkage bracket to facilitate reinstallation.

2. Remove and discard the lower shock absorber mounting fasteners and, if necessary, the height control valve linkage bracket.
3. Remove and discard the upper shock absorber mounting fasteners.
4. Slide the shock absorber out of the upper mounting brackets.
5. Inspect the shock absorber mounting brackets and hardware for damage or wear. Replace if necessary.

Assembly

1. Install the upper shock absorber mounting bracket (if removed).
2. Install the shock absorber into the upper mounting bracket.
3. Install the upper shock absorber mounting fasteners.

⚠**CAUTION**: On the suspension models using the cast upper shock bracket (part no. 67463-002) the upper shock bolt must be indexed into the recessed hex bore of the upper shock mounting bracket for proper fastener installation. Failure to do so can cause the shock fasteners to become loose and cause premature component damage.

4. Slide the lower shock absorber mount into the bottom cap.
5. Install the lower shock absorber mounting fasteners and height control valve linkage bracket (if removed)

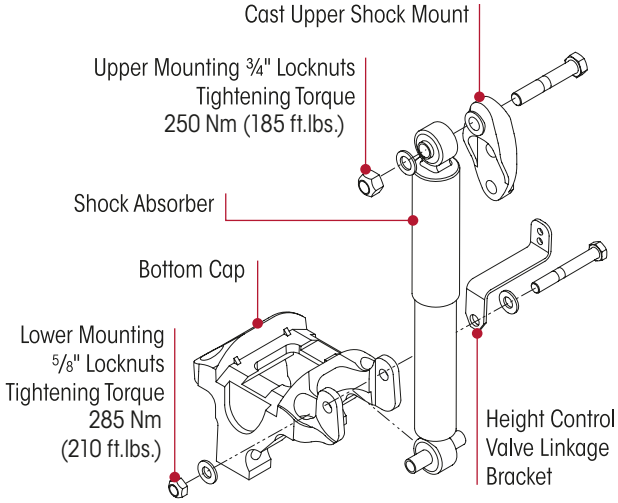


Figure 53: Shock Absorber Mounting

6. Tighten the upper shock absorber mounting locknut to 250 Nm torque. Refer Figure 53. See also "Torque Settings" on page 66.
7. Tighten the lower shock absorber mounting locknut to 285 Nm torque.
8. If the height control valve linkage bracket was removed, verify the vehicle ride height. Refer to the "Ride Height" on page 23 of this publication.
9. Remove the wheel chocks.

TRANSVERSE TORQUE ROD

⚠ **WARNING**: PRIMAAX EX suspensions incorporate transverse torque rods for vehicle stability. If these components are disconnected or are non-functional the vehicle should not be operated. Failure to do so can result in adverse vehicle handling and possible tyre contact with the frame or the suspension.

NOTE: Some torque rod assemblies equipped on the PRIMAAX EX suspension have an Axial Retention Feature (ARF) with curled end hubs that are not re-bushable. The entire torque rod assembly must be replaced. ARF provides superior bush retention in the torque rod end hub. Refer to the relevant parts list for more information.

NOTE: Some vehicle manufacturers employ their own torque rods. These torque rods may have unique design characteristics and bushes, which could require different service techniques. Refer to the relevant parts list for more information.

Disassembly

1. Chock the wheels of the vehicle.

SERVICE HINT: Note the quantity and location of shims removed to maintain the lateral alignment of the axle during assembly. Refer to "Axle Lateral Alignment" on page 25.

2. Remove and discard the torque rod mounting fasteners.

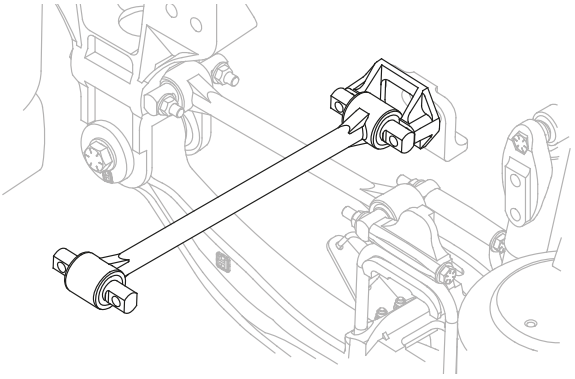


Figure 54: Transverse Torque Rod

3. Remove the transverse torque rod.
4. Inspect the mounting surfaces for any wear or damage. Repair or replace as necessary.

Assembly

1. Install the transverse torque rod.
2. Install the mounting fasteners and any shims that were removed.

NOTE: Hendrickson recommends using Grade 8 bolts and Grade C locknuts for all torque rod attachments.

3. Prior to tightening, ensure that the vehicle is at the proper ride height. Tighten all fasteners to the required torque specification. Refer to original equipment manufacturer for specifications.
4. Check the lateral alignment. If not within vehicle manufacturer's specified range, a lateral alignment is necessary. Refer "Axle Lateral Alignment" on page 25 of this publication.
5. Remove the wheel chocks.

LONGITUDINAL TORQUE ROD

NOTE: Drum brake torque rod assemblies on the PRIMAAX EX suspension have an Axial Retention Feature (ARF) with curled end hubs that are not re-bushable. The entire torque rod assembly must be replaced. ARF provides superior bush retention in the torque rod end hub. Refer to the relevant parts list for more information.

Disassembly

1. Chock the wheels of the vehicle.

SERVICE HINT: Note the quantity of shims removed to maintain the correct pinion angle of the axle at assembly. Refer to "Drive Axle Alignment" on page 26.

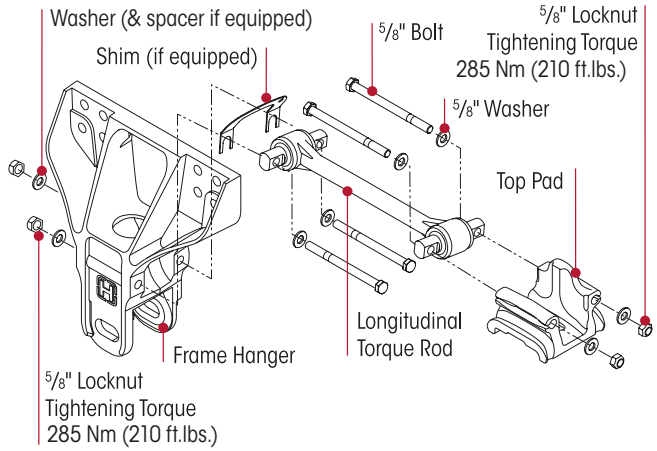


Figure 55: Longitudinal Torque Rod Components (Standard)

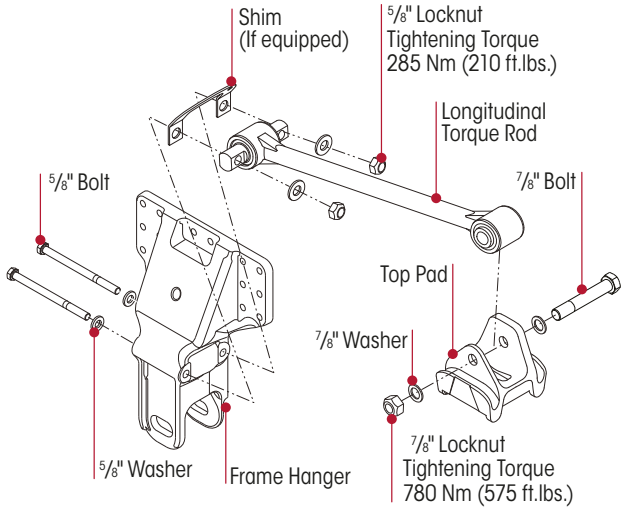


Figure 56: Longitudinal Torque Rod Components (Alternative)

2. Remove and discard the fasteners that connect the longitudinal torque rod to frame hanger. Carefully note the location of any shims or spacers. Refer Figure 55 and Figure 56.
3. Remove and discard the fasteners that connect the longitudinal torque rod to top pad.
4. Remove the longitudinal torque rod.
5. Inspect the mounting surfaces for any wear or damage, replace if necessary.

Assembly

1. Install the longitudinal torque rod.
2. Install the fasteners and any shims or spacers that were removed. Refer Figure 55 and Figure 56.

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

NOTE: It is mandatory to have the vehicle at proper ride height prior to tightening the ¾" straddle bush and the 7/8" top pad through bolt locknuts to torque specifications.

3. Tighten all fasteners to the required specification. See "Torque Settings" on page 66.

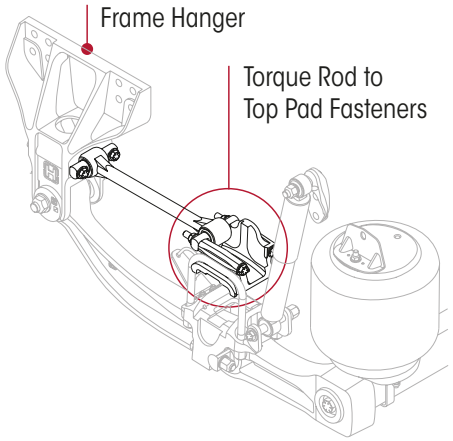


Figure 57: PRIMAAX EX 232, 462 & 692 (Standard)

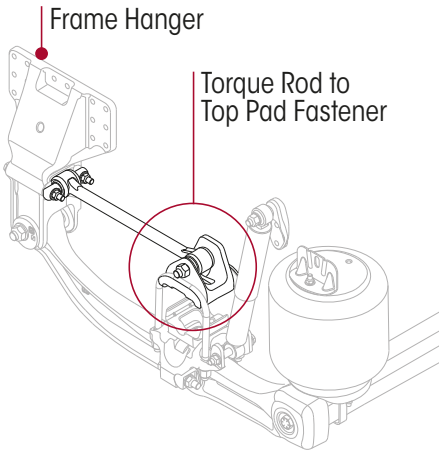


Figure 58: PRIMAAX EX 232, 462 & 692 (Alternative)

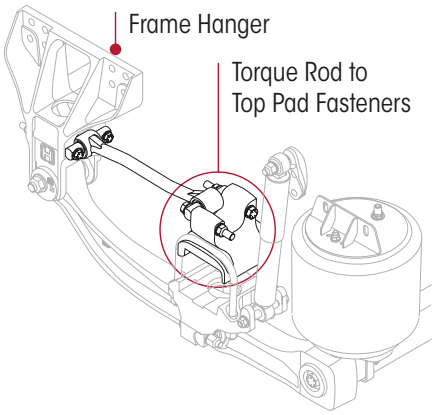


Figure 59: PRIMAAX EX 262, 522 & 782

4. When assembly is complete check the drive axle pinion angles. Refer to "Axle Lateral Alignment" on page 25 of this publication.
5. Remove the wheel chocks.

TORQUE ROD BUSH

NOTE: Drum brake torque rod assemblies on the PRIMAAX EX suspension have an Axial Retention Feature (ARF) with curled end hubs that are not re-bushable. The entire torque rod assembly must be replaced. ARF provides superior bush retention in the torque rod end hub. Refer to the relevant parts list for more information.

You will need:

- A vertical shop press with a capacity of at least 9 tonne (10 tons).
- A receiving, installation and funnel tool. Refer to "SECTION 9 Special Tools" on page 68 for details of the 50 mm Torque Rod Re-Bush Tool, as well as shop made tool specifications.

Disassembly

Figure 60: Torque Rod Length Measurement

⚠**CAUTION**: Do not use heat or use a cutting torch to remove the bushes from the torque rod. The use of heat will adversely affect the strength of the torque rod; heat can change the material properties. A component damaged in this manner can result in the adverse vehicle handling, possible personal injury or property damage and void warranty.

SERVICE HINT: When servicing a straddle mount bar pin type bush assembly, mark the clocking position of the straddle mount bar pin flats on the torque rod end hub before disassembly. This clocking mark will serve as a guide when installing the new bush assembly so the original clocking position can be retained.

1. Remove the torque rod as detailed "Transverse Torque Rod" on page 37 or "Longitudinal Torque Rod" on page 38 in this section.

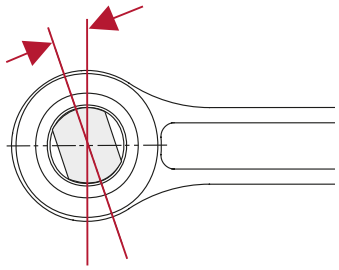


Figure 61: Mark Clocking Position of Bar Pin Flats

2. Mark the clocking position of the bush assembly bar pin flats with a paint stick on the torque rod end hub. Clocking varies for different model configurations. Refer Figure 61.

3. Place the torque rod into the press. Support the torque rod end on the receiving tool with the end of the torque rod centred on the tool. Be sure the torque rod is squarely supported on the press bed.

4. Push directly on the inner metal of the bush assembly until the bush assembly clears the torque rod end tube.

5. Clean and inspect the inner diameter of the torque rod ends.

Assembly

NOTE: Do not use a petroleum or soap base lubricant. Such lubricants can cause adverse reactions with the bush, such as deterioration of the rubber, causing premature failure.

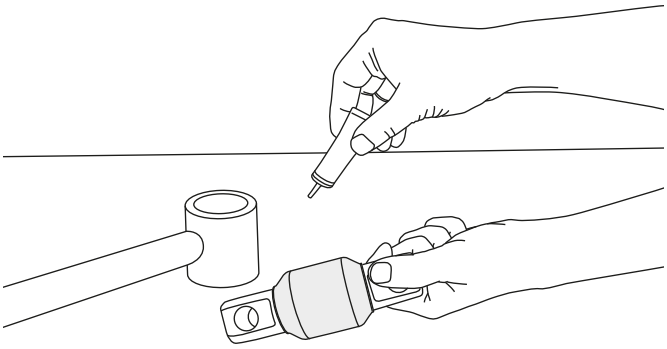


Figure 62: Lubricate Rod & Bush with Assembly Lubricant

1. Lubricate the inner diameter of the torque rod end hub and the new rubber bush with temporary assembly lubricant, such as P-80. Refer Figure 62.

2. Support the torque rod end tube on the receiving tool with the end tube of the torque rod centred on the receiving tool.

NOTE: When replacing a straddle mount bar pin type bush assembly, verify the correct clocking position of the straddle mount bar pin flats prior to installing the bush assembly in the torque rod end hub.

3. Centre the new bush assembly on the torque rod end hub. When installing a straddle mount type bush assembly, verify the bush assembly's bar pin flats are clocked correctly.

4. Press directly on the inner metal of the bush assembly. The rubber bushes of the bar pin must be centred within the torque rod end tubes.

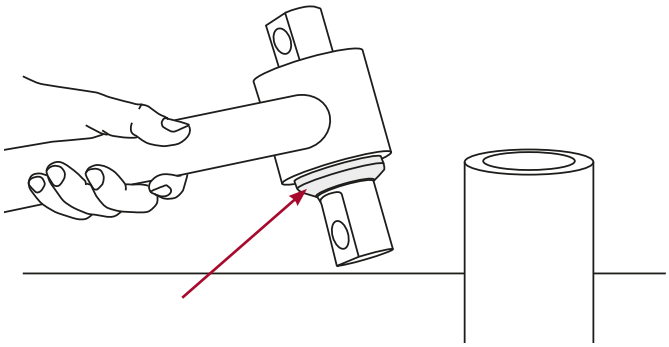


Figure 63: Overshoot Final Bush Position

5. When pressing in the new bushes overshoot the desired final position by approximately 5 mm (3/16"). Refer Figure 63.

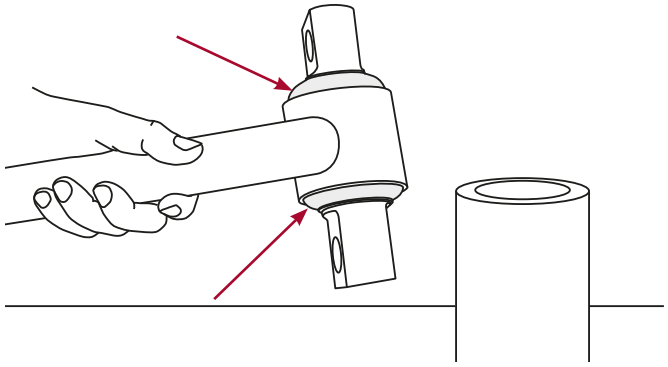


Figure 64: Final Centred Bush Position

6. Press the inner metal of the bush assembly again from opposite side to centre the bush and inner metal within the torque rod end tube. Refer Figure 64.

7. Wipe off excess lubricant. Allow the P-80 assembly lubricant to dry for at least one hour before operating vehicle.

8. Install the torque rod assembly as detailed in this section.

⚠**CAUTION**: If the torque rod assembly is not allowed the allotted time for the lubricant to dissipate, the bush may slide from the torque rod end tube. The bush will then need to be removed and a new bush re-installed.

U-BEAM ASSEMBLY

The PRIMAAX EX U-beam assembly can be removed from the vehicle without removing the axle. The frame must be secured at ride height and the axle slightly raised before components are removed as detailed in the following steps.

Disassembly

1. Chock the front wheels.
2. Support the frame at ride height.
3. Raise and support the axle being serviced. Remove the wheels.

⚠ **WARNING**: Prior to and during deflation and inflation of the air suspension system, ensure that all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

⚠ **WARNING**: Some vehicle applications, such as vehicles equipped with outriggers, retain some pressure in the air springs at all times. Prior to performing any maintenance, service, or repair of the suspension, verify each air spring is completely deflated. Failure to do so could result in serious property damage and/or severe personal injury.

4. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.
5. Disconnect the height control valve linkage assembly from the height control valve arm(s). Refer to the vehicle manufacturer's instructions.
6. Lower the height control valve arm(s) to exhaust the air in the air springs and deflate the rear suspension.

⚠ **WARNING**: If the air spring is being removed for an alternate repair, it is mandatory to lubricate the lower air spring fasteners with penetrating oil and remove with hand tools to prevent damage to the lower air spring mounting stud. Failure to do so can cause component damage and void warranty.

7. Lubricate the lower mounting fasteners of the air springs with penetrating oil. This will help prevent the air spring mounting studs from breaking during the removal process.
8. Remove and discard the lower mounting fasteners from the air springs using hand tools only.

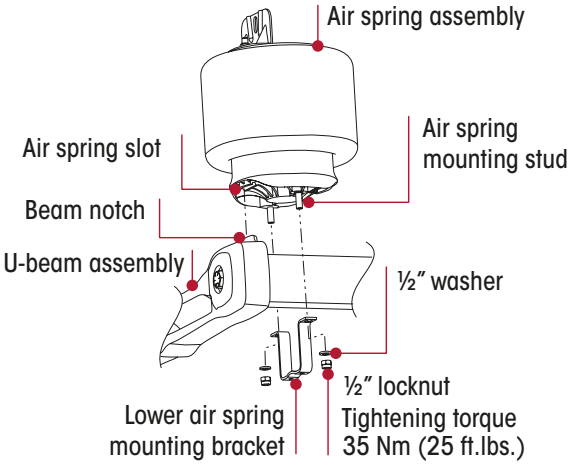


Figure 65: PRIMAAX EX Air Spring – Integrated End Cap

9. Remove both the lower air spring mounting brackets to disconnect both air springs from the cross tube. Refer Figure 65.

⚠ **WARNING**: It is mandatory to use a floor jack equipped with a contact plate at least 100 mm wide to support the U-beam assembly at the cross tube to facilitate safe lowering and raising of the U-beam assembly. Do not use a bottle jack. A bottle jack does not have enough contact area and can be unstable. Failure to do so can cause component damage or result in personal injury.

10. Install a floor jack with a 100 mm or more contact plate to support the U-beam assembly at the cross tube.

SERVICE HINT: Each frame hanger will have a pair of QUIK-ALIGN® collars. Note which type of collar is removed from which frame hanger location to assist the assembly process. Any eccentric (with the square drive feature) QUIK-ALIGN collar should be mounted on the outboard side of the frame hanger. Axle thrust angles can only be corrected on frame hangers equipped with eccentric QUIK-ALIGN collars.

11. Mark the position of the QUIK-ALIGN square drive in relationship to the frame hanger prior to loosening the QUIK-ALIGN connection. This will facilitate the axle alignment process after the repair is complete.
12. Loosen both the QUIK-ALIGN fasteners, do not remove at this time.
13. Remove and discard D-pin fasteners on both sides of the suspension.

SERVICE HINT: It may be necessary to rotate the QUIK-ALIGN eccentric collars to allow the full disengagement of the D-pins into the bottom caps.

SERVICE HINT: 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 100 kg. Care should be taken at removal and installation to prevent personal injury or damage to components.

14. Lower the floor jack and pivot the U-beam assembly down.
15. Remove and discard the QUIK-ALIGN fasteners.
16. Remove QUIK-ALIGN eccentric and concentric collars.

NOTE: It may be necessary to use a pry bar to push the U-beam assembly out of the frame hangers.

17. Remove the U-beam assembly from the hangers.
18. Remove the U-beam assembly from the vehicle.
19. Inspect the U-beam assembly for any damage or wear and replace as necessary.

Assembly

1. Clean the QUIK-ALIGN slots in the hangers and collars of any dirt and debris and inspect for any wear or damage. Replace as necessary.
2. Prior to installing the U-beam assembly, verify the clamp group is tightened to the proper torque. Refer to "Torque Settings" on page 66.

⚠ **WARNING**: The weight of the U-beam assembly is approximately 100 kg. Care should be taken at removal and installation to prevent personal injury or damage to components.

3. Install the U-beam assembly into the frame hangers.

⚠ **WARNING**: Discard used QUIK-ALIGN fasteners. Always use new QUIK-ALIGN fasteners to complete a repair. Failure to do so could result in failure of the part, or mating components, adverse vehicle handling, personal injury, or property damage.

⚠ **WARNING**: Do not assemble QUIK-ALIGN joint without the proper fasteners. Use only H-coated fasteners to sustain proper clamp force. Failure to do so can cause adverse vehicle handling, property damage or personal injury and void warranty. Ensure that the QUIK-ALIGN fastener's torque values are sustained as recommended in the torque specifications section of this publication. Failure to do so can cause adverse vehicle handling resulting in personal injury or property damage. Follow vehicle manufacturer's fastener orientation when performing any maintenance, service or repair.

NOTE: Use a new QUIK-ALIGN pivot bolt kit for any axle alignment or disassembly of the QUIK-ALIGN connection. This will help ensure that the proper clamp load is applied to the connection and help prevent the joint to slip in service.

4. Verify the correct QUIK-ALIGN collar (eccentric/concentric) is in the correct location as noted in the disassembly procedure.
5. Install QUIK-ALIGN connection with new Hendrickson fasteners and snug to about around 100 Nm torque. Do not tighten at this time. The final torque must be done after the alignment is complete.
6. Position the U-beam assembly on a floor jack with a contact plate of at least 100 mm.

7. Raise the U-beam assembly until the D-pins engage in the bottom cap.

SERVICE HINT: It may be necessary to rotate the QUIK-ALIGN eccentric collars to allow the full engagement of the D-pins into the bottom caps.

SERVICE HINT: It may be necessary to raise or lower the front of the differential to allow the D-pins to engage in the bottom cap. Use a drift pin if necessary to align the D-pins with the bottom cap.

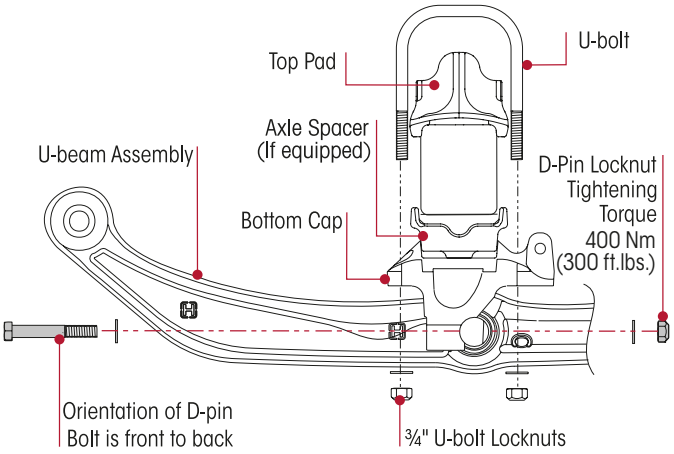


Figure 66: D-Pin Bolt Installation

8. Install the D-pin fasteners from front to back. Refer Figure 66.

9. Remove the floor jack supporting the U-beam assembly.

10. Tighten D-Pin fasteners to 400 Nm torque.

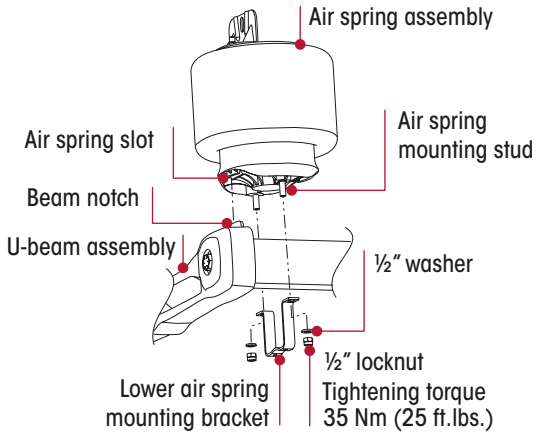


Figure 67: PRIMAAX EX Air Spring – Integrated End Cap

11. Install the air spring between the frame and the cross tube. Ensure the air spring slot in the bottom of the air spring engages the beam notch on the top of the support beam. Refer Figure 67.

12. Install the lower air spring mounting bracket around the cross tube, engaging the mounting air spring studs.

13. Using hand tools install the lower mounting fasteners and tighten to 35 Nm torque.

14. Install the wheels and remove axle support.

15. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.

16. Connect the linkage to the height control valve arm(s) to inflate the suspension. Refer to the vehicle manufacturer's instructions.

17. Remove frame support(s).

18. Remove the wheel chocks.

NOTE: Alignment and QUIK-ALIGN final torque is necessary anytime the U-beam assembly is removed.

19. Check the alignment and adjust if necessary. Refer to "Drive Axle Alignment" on page 26.

20. Once the correct axle alignment is achieved, use a calibrated torque wrench to tighten the standard 1" QUIK-ALIGN bolts, with a 38 mm (1-1/2") bolt head, to 750 Nm. Tighten the larger 1¼" QUIK-ALIGN bolts, with a 47 mm (1-7/8") bolt head, to 1760 Nm. Refer to "Torque Settings" on page 66 for more details about bolt identification and tightening torques.

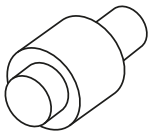
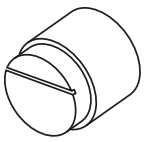
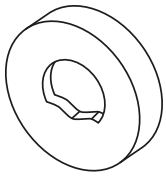
D-PIN BUSH

D-PIN METHOD A – Using Tools 66086-204 & 66086-202

NOTE: This is the preferred method of D-pin replacement because it does not require disassembly of the U-beam assembly. The tools required can also be used for servicing pivot bushes and other suspension components if used with the correct adapters.

You will need:

- Hendrickson tool part numbers 66086-204 and 66086-202 (OTC 4247 & 4246), refer to "SECTION 9 Special Tools" on page 68 of this publication.

575164 Saddle	575163 Adapter Pin	576421 D-pin Adapter	575167 Alignment Tool
			
	Removal	Removal	Removal
Installation		Installation	Installation

Disassembly

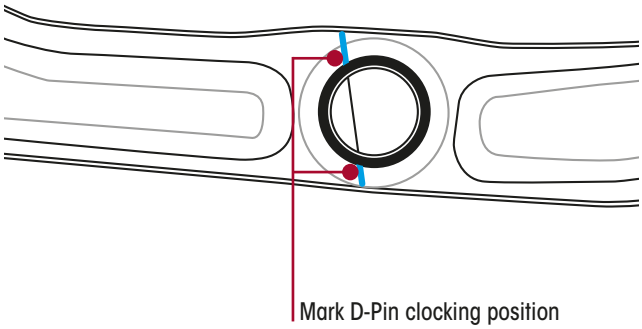


Figure 68: Mark Original D-Pin Clocking Position (Angle)

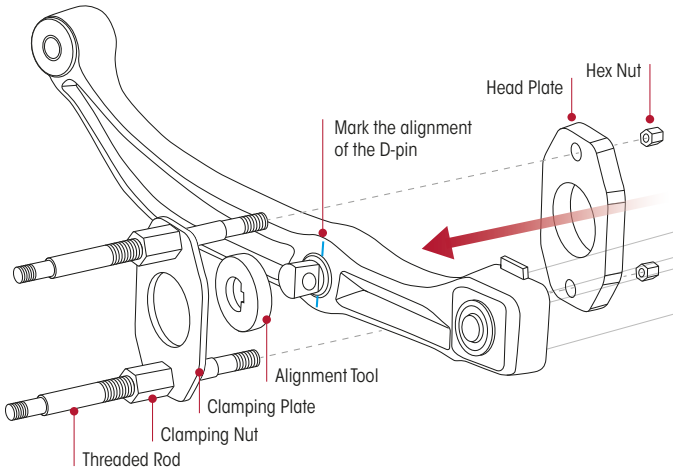


Figure 69: Install Alignment Tool & Clamping Plate

1. Mark the support beam to show the alignment of the existing D-pin. Install the alignment tool over the D-pin and place the clamping plate over the alignment tool. Refer Figure 69 and Figure 68.
2. Assemble the clamping nuts to the threaded rods.
3. Insert a threaded rod through the upper holes in the clamping plate and the head plate. Install a hex nut on the threaded rod, but do not tighten at this time.
4. Insert a threaded rod through the lower holes in the clamping plate and the head plate. Install a hex nut on the threaded rod, but do not tighten at this time.

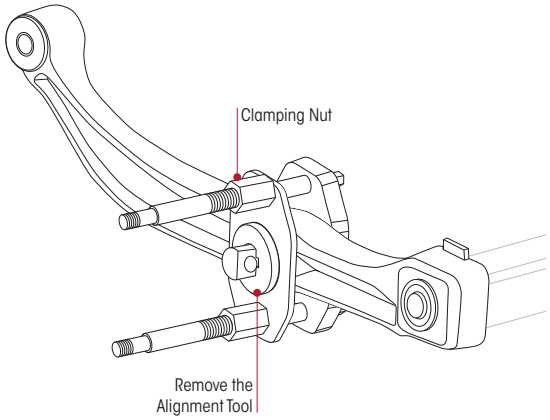


Figure 70: Tighten Nuts & Remove Alignment Tool

5. Tighten the clamping nuts to the clamping plate. Refer Figure 70.
6. Remove the alignment tool.

⚠ **WARNING**: To prevent personal injury, the cylinder must be fully threaded into the cylinder mounting plate.

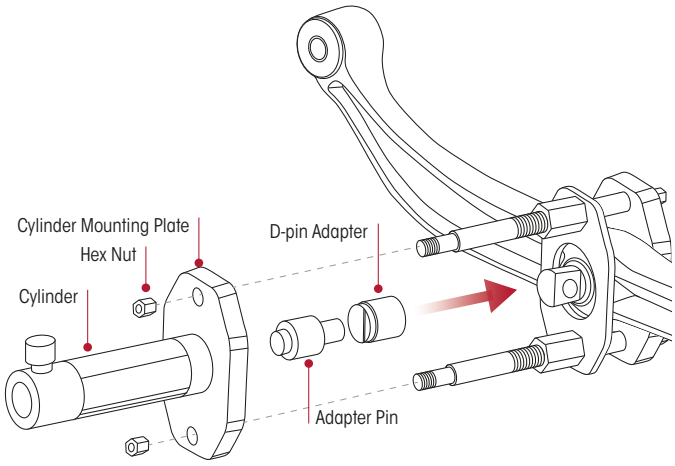


Figure 71: Attach Cylinder to Mounting Plate

7. Thread the cylinder into the cylinder mounting plate. Refer Figure 71.
8. Install the cylinder mounting plate onto the end of the threaded rods. Adjust the clamping nuts as needed to fit the threaded rods through the holes in the cylinder mounting plate. Assemble the hex nuts on the threaded rods. Tighten the hex nuts on both ends of the threaded rods.
9. Place the D-pin adapter over the D-pin.
10. Insert the adapter pin into the head of the cylinder.
11. Prepare the hydraulic pump for use by following the instructions provided with the pump regarding connection, venting, priming and operation.

⚠ **WARNING**: To prevent personal injury, pump capacity must not exceed 700 bar (10,000 psi).

12. Connect the hydraulic hose from the hydraulic pump to the cylinder.
13. Operate the pump to extend the cylinder piston and apply pressure to push the D-pin out of the support beam.

⚠ **WARNING**: To prevent personal injury from possible breakage under pressure, do not stand in the vicinity of the tool while the D-pin is being extracted. It is especially important to not stand in the direction of the hydraulic force.

Assembly

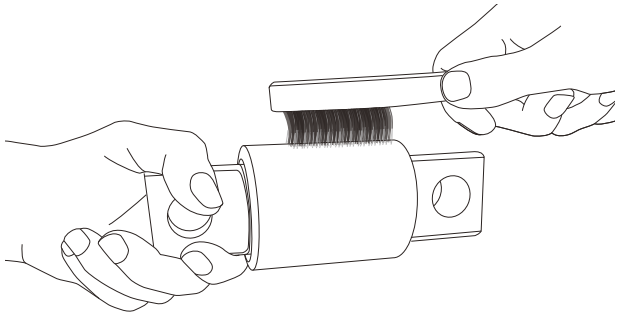


Figure 72: Lubricate D-Pin Bush

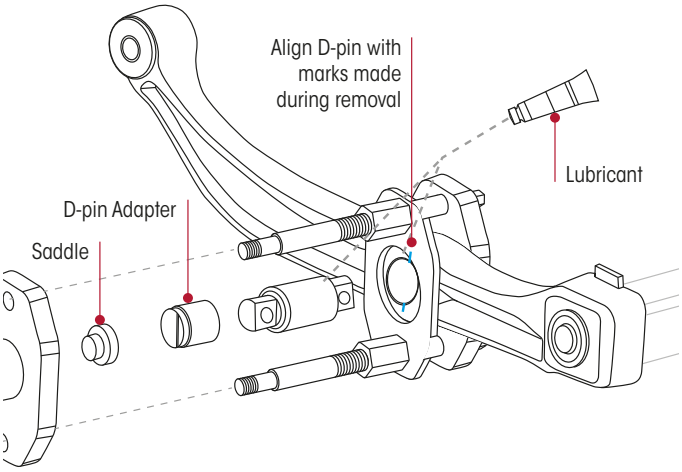


Figure 73: Lubricate Arm, Insert & Align Saddle & D-Pin

1. Clean and lubricate the entire surface of the inside diameter of the support arm and D-pin outer metal sleeve with chassis grease. Refer Figure 72 and Figure 73.
2. Insert the saddle into the head of the cylinder.
3. Assemble the new D-pin and the D-pin adapter as shown. Align the line in the D-pin adapter with the alignment marks made during the removal procedure.
4. Operate the pump to extend the cylinder piston and apply enough pressure to hold the tool and components. Check the alignment of the D-pin. The centreline of the D-pin must be aligned with the centreline of the inside diameter of the support beam.

⚠ **WARNING**: To prevent personal injury, pump capacity must not exceed 700 bar (10,000 psi).

5. Operate the pump to apply pressure to install the D-pin completely into the support beam.

⚠ **WARNING**: To prevent personal injury from possible breakage under pressure, do not stand in the vicinity of the tool while the D-pin is being installed. It is especially important to not stand in the direction of the hydraulic force.

D-PIN METHOD B – Using a shop press

NOTE: This is not a preferred method, because it requires physical handling of the heavy (around 100kg) U-beam assembly in order to mount the beam into the press. If possible, use Method A on page 44.

You will need:

- A vertical shop press with a capacity of at least 9 tonne (10 tons).
- Shop made D-Pin Removal, Installation and Receiving Tools. Refer to "SECTION 9 Special Tools" on page 68 of this publication.

Disassembly

1. Remove the U-beam assembly. Follow U-beam Assembly removal procedure under "U-Beam Assembly" on page 41.

⚠ **WARNING**: The weight of the U-beam assembly is approximately 100 kg. Care should be taken when replacing U-beam bushes to prevent personal injury or damage to components.

2. Inspect all components for any damage or wear and replace as necessary.
3. Place the U-beam in a shop press on top of a receiving tool with both ends of the support beam squarely supported on the press bed. The other side of the U-beam must be supported over or under the press area, depending on press design.

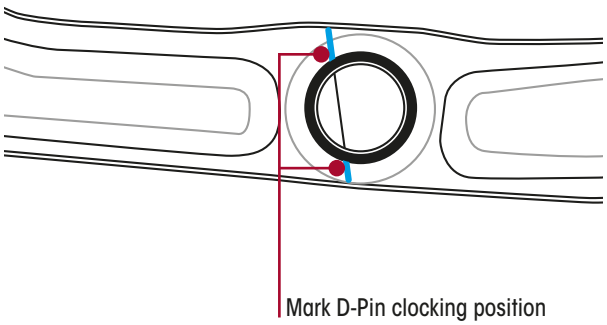


Figure 74: Mark Original D-Pin Clocking Position (Angle)

4. Mark the clocking position of the D-pin bush on the support beam with a paint stick. Refer Figure 74.

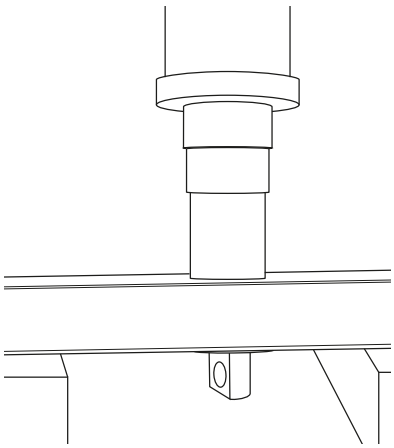


Figure 75: Removal Tool Centred On D-Pin

5. Install the D-Pin removal tool centred on the D-Pin bush. Refer Figure 75.
6. Push directly on the D-pin removal tool until the D-Pin bush is pressed out of the support beam bore.
7. Clean the support beam bore with a wire wheel. Inspect the inner diameter of the D-Pin bore on the support beam, check for any damage to the support beam bore, replace as necessary.

Assembly

1. Place the support beam in a shop press on the receiving tool with the bevelled edge of the D-Pin bore facing up. Both ends of the support beam must be supported squarely on the press bed. The other side of the U-beam must be supported over or under the press area, depending on press design.

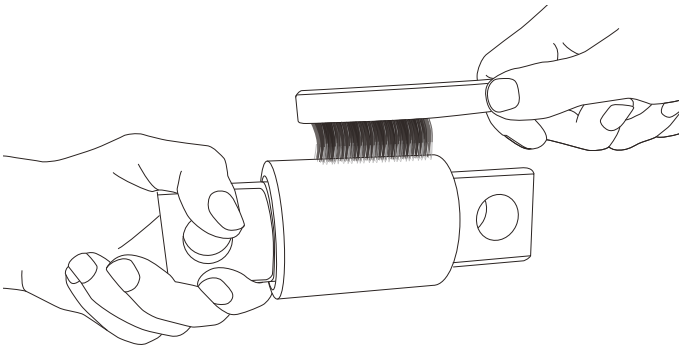


Figure 76: Lubricate D-Pin Bush

2. Lubricate the support beam D-Pin bore and the D-Pin bush metal retaining sleeve with chassis grease. Refer Figure 76.

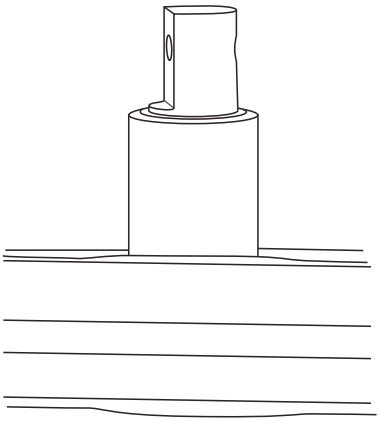
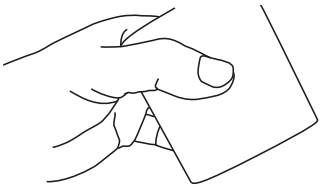


Figure 77: Set D-Pin Clocking Position (Angle) to Marks

3. Line up the D-Pin bush with the clocking line that was put on the support beam prior to the removal of the D-Pin bush. Refer Figure 77.



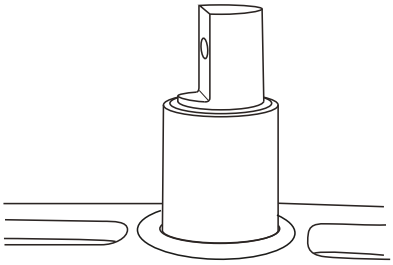


Figure 78: Assemble Installation Tool

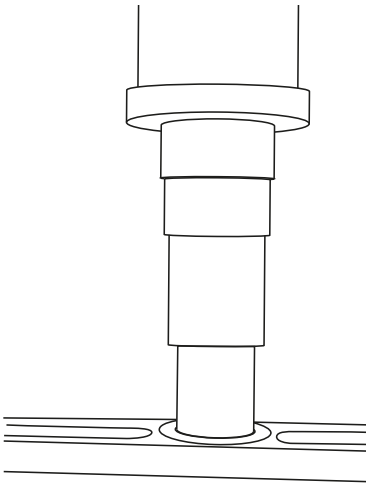


Figure 79: Press Until Outer Metal Sleeve is Centred

4. Install the D-Pin bush installation tool and press in the new D-Pin bush until the outer metal sleeve is centred in the support beam assembly. Refer to Figure 78 and Figure 79.
5. Repeat the replacement process for other D-pin bush on the other side.

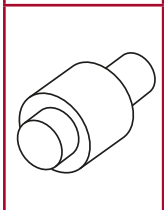
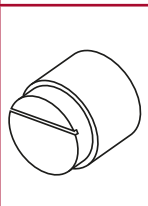
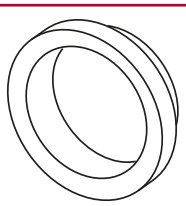
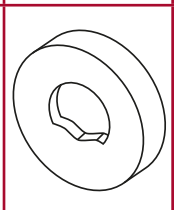
NOTE: If the service also requires the replacement of the QUIK-ALIGN pivot bush, refer to "QUIK-ALIGN Pivot Bush" on page 48 in this section.

6. Reinstall U-beam assembly as shown in U-beam "Assembly" on page 42.

QUIK-ALIGN PIVOT BUSH

Pivot Bush METHOD A – Using Tools 66086-204 & 66086-202

You will need Hendrickson tools 66086-204 & 66086-202 (OTC 4247 & 4246), refer to "SECTION 9 Special Tools" on page 68 of this publication

575163 Adapter Pin	576421 D-pin Adapter	575165 Bush Support	575167 Alignment Tool
			
Removal Installation	Removal	Removal Installation	Removal Installation

Disassembly

1. If fitted, remove severe-duty polyethylene thrust washers.

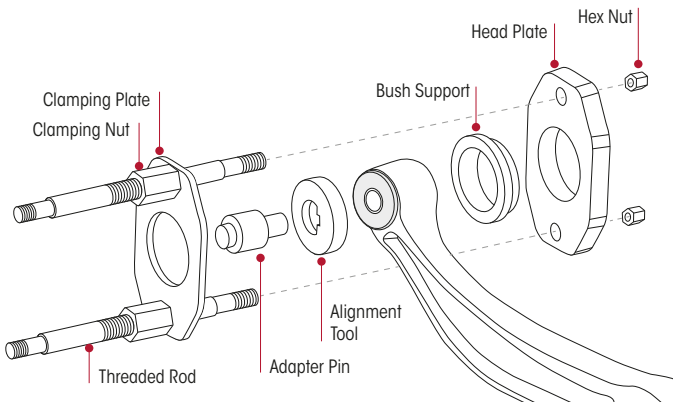


Figure 80: Assemble Clamping Plate

2. Insert the adapter pin through the alignment tool and into the pivot bush hole as shown in Figure 80.
3. Insert the bush support over the pivot bush.
4. Assemble the clamping nuts to the threaded rods.
5. Insert a threaded rod through the upper holes in the clamping plate and the head plate while positioning the head plate over the bush support. Install a hex nut on the threaded rod, but do not tighten at this time.
6. Insert a threaded rod through the lower holes in the clamping plate and the head plate. Install a hex nut on the threaded rod, but do not tighten at this time.

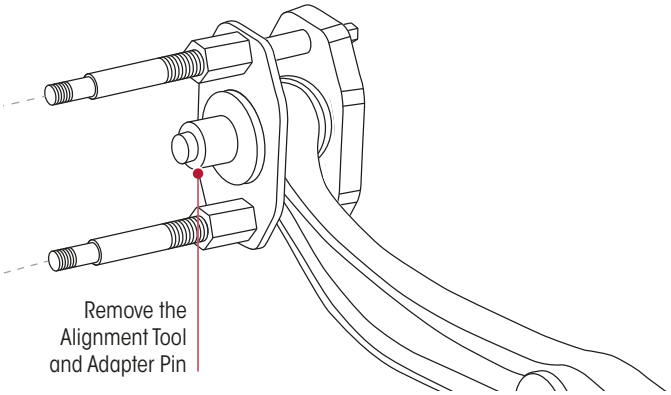


Figure 81: Remove Alignment Tool & Adapter Pin

7. Tighten the clamping nuts to the clamping plate. Refer Figure 81.
8. Remove the alignment tool and adapter pin.

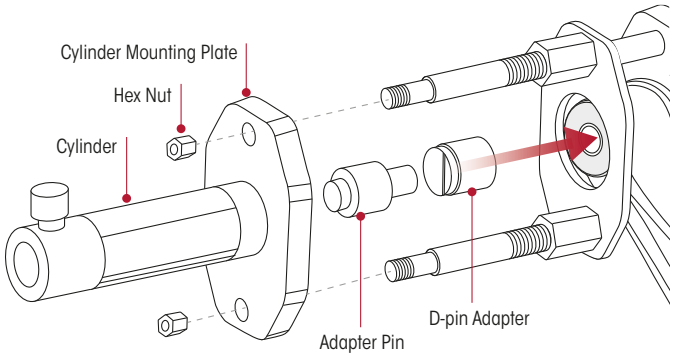


Figure 82: Attached Cylinder to Mounting Plate

9. Thread the cylinder into the cylinder mounting plate. Refer Figure 82.

⚠ **WARNING**: To prevent personal injury, the cylinder must be fully threaded into the cylinder mounting plate.

10. Install the cylinder mounting plate onto the end of the threaded rods. Adjust the clamping nuts as needed to fit the threaded rods through the holes in the cylinder mounting plate. Assemble the hex nuts on the threaded rods. Tighten the hex nuts on both ends of the threaded rods.
11. Hold the D-pin adapter over the pivot bush until contact is made with the adapter pin.
12. Insert the adapter pin into the head of the cylinder.

⚠ **WARNING**: To prevent personal injury, pump capacity must not exceed 700 bar (10,000 psi).

13. Prepare the hydraulic pump for use by following the instructions provided with the pump regarding connection, venting, priming and operation.

⚠ **WARNING**: To prevent personal injury from possible breakage under pressure, do not stand in the vicinity of the tool while the pivot bush is being extracted. It is especially important to not stand in the direction of the hydraulic force.

14. Connect the hydraulic hose from the hydraulic pump to the cylinder.

15. Operate the pump to extend the cylinder piston and apply pressure to push the pivot bush out of the support beam.

Assembly

1. Thoroughly clean the inside of the beam eye.

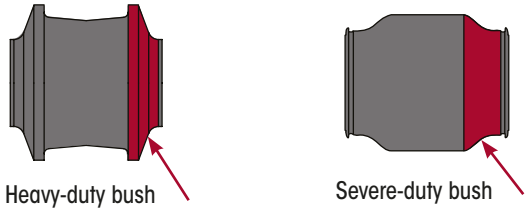


Figure 83: Lubricate Pivot Bush Leading Face

2. Using a suitable assembly lubricant, such as P-80, lubricate outside of pivot bush and if installing the heavy-duty bush also lubricate the inside of the beam eye. Refer Figure 83.

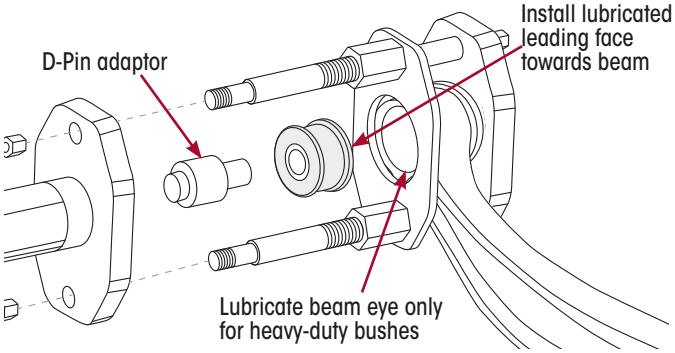


Figure 84: Adaptor & Bush Placement

3. Insert the adapter pin into the head of the cylinder.

4. Place the pivot bush on the end of the adapter pin as shown in Figure 84.

5. Assemble tool and operate the pump to extend the cylinder piston and apply enough pressure to hold the tool and components. Check the alignment of the pivot bush.

⚠ **WARNING**: To prevent personal injury, pump capacity must not exceed 700 bar (10,000 psi).

6. Operate the pump to apply pressure to install the pivot bush completely into the support beam.

⚠ **WARNING**: To prevent personal injury from possible breakage under pressure, do not stand in the vicinity of the tool while the pivot bush is being installed. It is especially important to not stand in the direction of the hydraulic force.

7. Ensure the pivot bush is centred within the support beam eye. It may be best to over-shoot desired final position slightly and press again from the opposite side to centre the bush within the support beam eye, if necessary.

8. Repeat bush replacement procedures for the other side of the U-beam assembly:

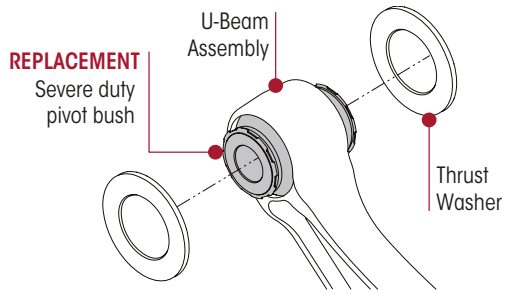


Figure 85: Severe-duty Pivot Bush Thrust Washer Assembly

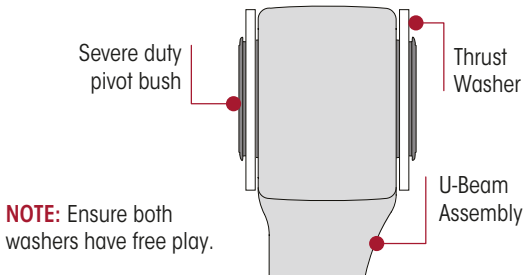


Figure 86: Severe-duty Pivot Bush Thrust Washer Check

9. Severe-duty Pivot Bushes – Snap the thrust washers onto the bush, (refer Figure 85) and ensure there is free play on both washers (refer Figure 86). If one washer does not seat properly or is very snug use a dead blow hammer to centre the bush. If a dead blow hammer is not sufficient, you may need to use the assembly tools to correctly centre the bush.

10. Reassemble and install the U-beam assembly per Steps 5 to 30 of D-Pin "Assembly" on page 46.

11. Allow the lubricant four (4) hours to dissipate before fully operating the vehicle.

Pivot Bush METHOD B – Using Tool No. 66086-203

SERVICE HINT: Use QUIK-ALIGN Pivot Bush Tool No. 66086-203 to help with the installation and removal of the QUIK-ALIGN pivot bush for PRIMAAX EX suspensions.

⚠ **WARNING**: A technician using a service procedure or tool which has not been recommended by Hendrickson must first satisfy himself that neither his safety nor the vehicle's safety will be jeopardised by the method or tool selected. Individuals deviating in any manner from the instructions provided will assume all risks of consequential personal injury or damage to equipment involved.

NOTE: When replacing a pivot bush, it is recommended to replace both pivot bushes on the U-beam assembly.

To replace the QUIK-ALIGN pivot bush using this method you will need:

- QUIK-ALIGN pivot bush service tool (#*66086-203*)
- 3/4" Impact gun (some 1/2" impact guns may work)

NOTE: Apply S-21337 extreme pressure lubricant (or NLGI #2–EP chassis grease) to each face of the thrust washers and to the drive screw that will engage through the receiving cylinder. Refer Figure 87.

Disassembly

1. Remove the U-beam assembly from the vehicle per the "U-Beam Assembly" on page 41.
2. After removal, place U-beam assembly on the floor or suitable work area.
3. Remove and discard thrust washers (if equipped) and any loose rubber or debris from the existing pivot bush.
4. Apply NLGI #2–EP (Extreme Pressure) chassis lubricant to each face of the thrust washers and to the drive screw that will engage through the receiving cylinder. Refer Figure 87.
5. Install the pivot bush tool as shown in Figure 87.

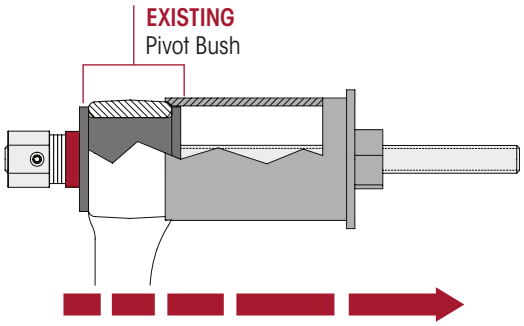


Figure 88: Tool Configuration BEFORE Removal

6. Snug the threaded drive screw to hold the thrust washers, spacer, U-beam assembly with the existing pivot bush and the receiving cylinder in place. Refer Figure 88.

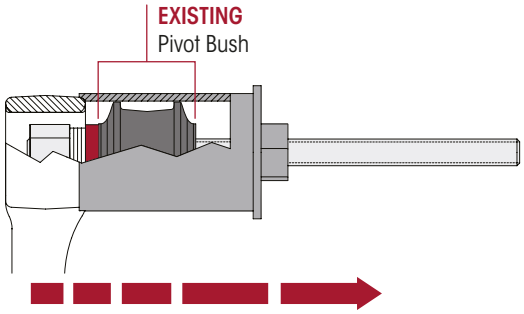


Figure 89: Tool Configuration AFTER Removal

7. Using a ¾" impact wrench, rotate the drive screw in a continuous motion without stopping until the pivot bush is removed from the end hub. The existing pivot bush will enter into the receiving cylinder. Refer Figure 89.
8. Remove and discard pivot bush.

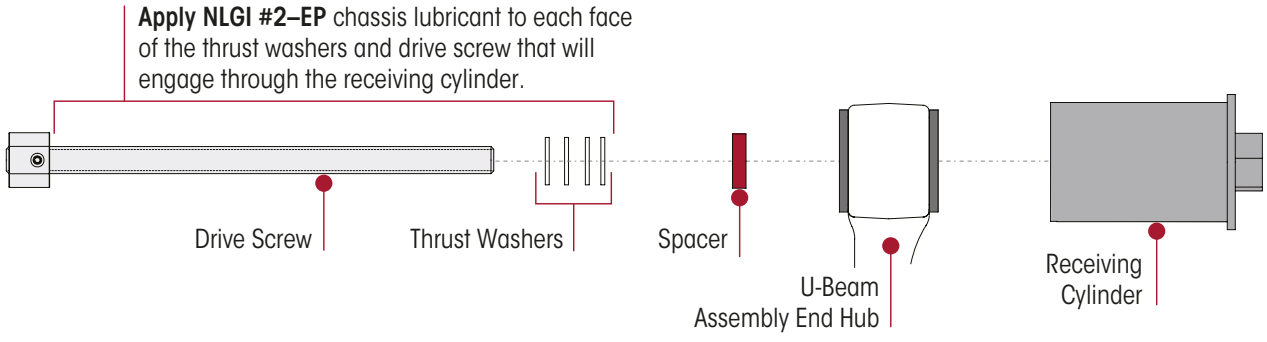


Figure 87: Assembly of Pivot Bush Tool Part

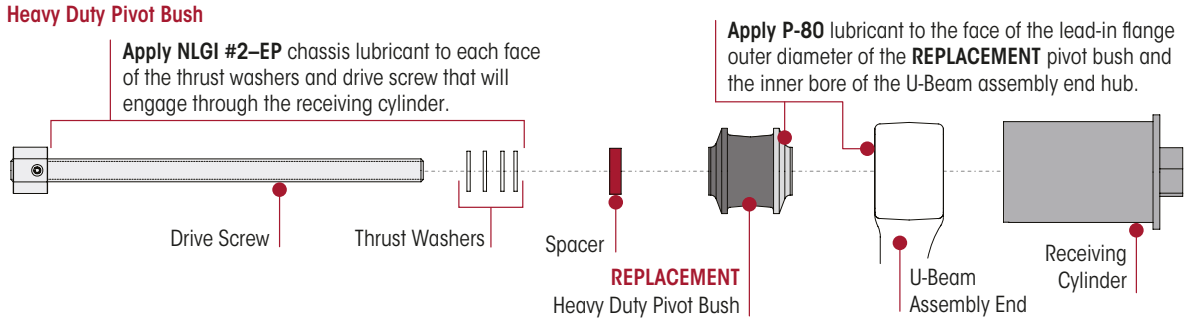


Figure 90: Heavy-duty Pivot Bush Tool Assembly

• **Heavy-duty Pivot Bush** – Apply P-80 to the face of the lead-in flange, to the outer diameter of the replacement pivot bush and to the inner diameter of the U-beam assembly end opening. Refer Figure 90.

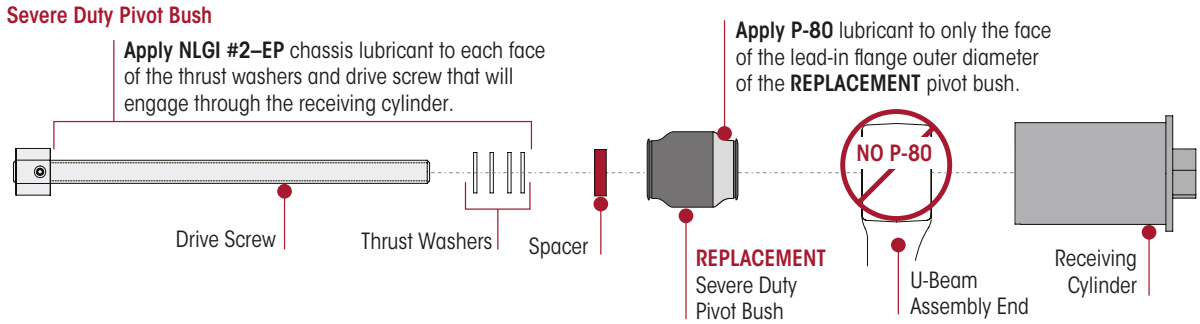


Figure 91: Severe-duty Pivot Bush Assembly

• **Severe-duty Pivot Bush** – Apply P-80 to the face of the lead-in flange and to the outer diameter of the severe-duty pivot bush. Do not apply to U-beam end opening. Refer Figure 91.

9. Inspect the inner bore of the U-beam assembly and remove any loose debris or rubber residue from the pivot bush mating surface.

Assembly

1. Thoroughly clean the inner diameter of the U-beam assembly with a solvent cleaner, such as brake cleaner.
2. Apply NLGI #2–EP (Extreme Pressure) chassis lubricant to each face of the thrust washers and to the drive screw that will engage through the receiving cylinder.

NOTE: Do not use petroleum or soap based lubricants on the pivot bush rubber, which may cause an adverse reaction with the bush material, such as deterioration.

3. Assemble replacement bush and tool onto U-beam and apply P-80 lubricant as shown in Figure 90 and Figure 91.

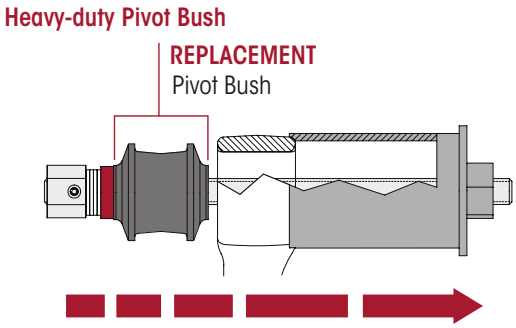


Figure 92: Heavy-duty Bush & Tool BEFORE Installation

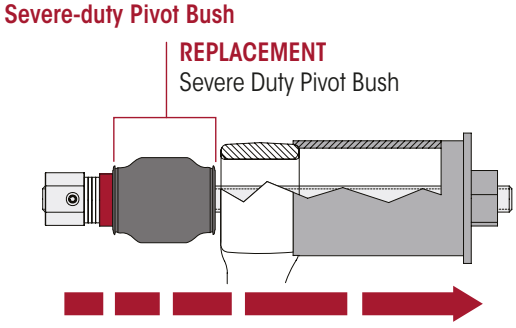


Figure 93: Severe-duty Bush & Tool BEFORE Installation

4. Snug the threaded drive screw to hold the thrust

washers, spacer, bush and U-beam assembly with the receiving cylinder in place. Refer Figure 92 and Figure 93.

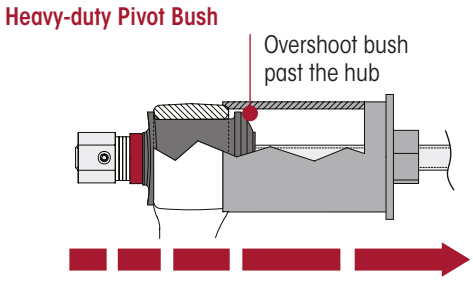


Figure 94: Heavy-duty Bush Tool Configuration AFTER overshoot

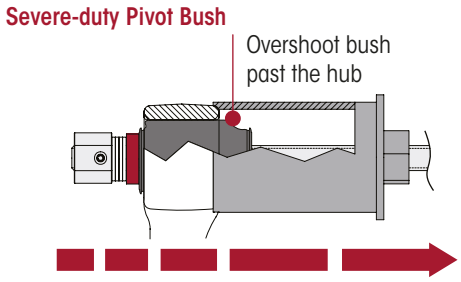


Figure 95: Severe-duty Bush Tool Configuration AFTER overshoot

5. Using a ¾" impact wrench, rotate the drive screw in a continuous motion without stopping until the pivot bush is seated in the hub and slightly overshoots the opposite end of the hub. It is necessary to overshoot the desired final position. Refer Figure 94 and Figure 95.

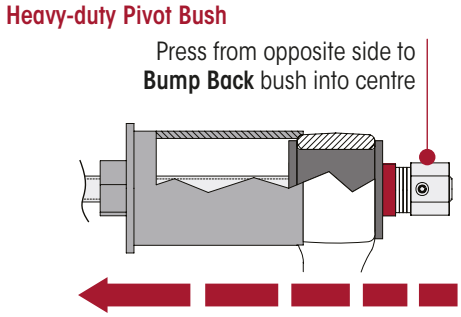


Figure 96: Heavy-duty Bush Tool Configuration AFTER Bump Back

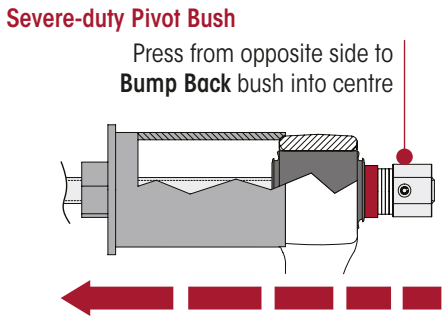


Figure 97: Severe-duty Bush Tool Configuration AFTER Bump Back

6. Remove and reverse the installation tool, then from opposite side of the hub press the pivot bush again to centre the bush within the beam end hub. Centre the pivot bush to help prevent bulging and bush preload. This is known as the "Bump Back" procedure. Refer Figure 96 and Figure 97.

SERVICE HINT If the severe-duty pivot bush pops out of the opposite end of the end hub during installation, less P-80 lubricant is required. Repeat the installation procedure ensure only a light amount of lubricant is on the bush itself.

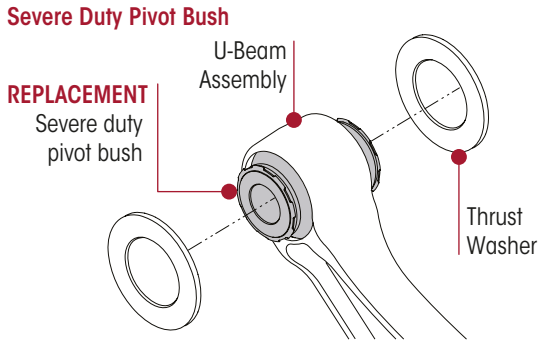


Figure 98: Severe-duty Pivot Bush Thrust Washer Assembly

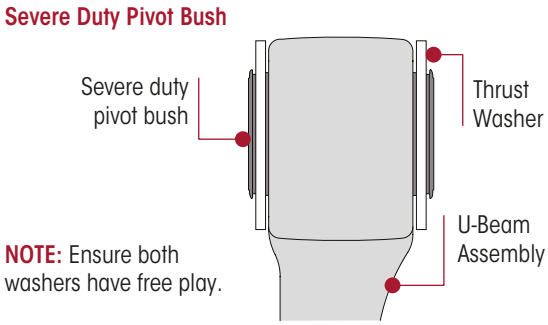


Figure 99: Severe-duty Pivot Bush Thrust Washer Check

7. Severe-duty Pivot Bushes – Snap the thrust washers onto the bush, (refer Figure 98) and ensure there is free play on both washers (refer Figure 99). If one washer does not seat properly or is very snug use a dead blow hammer to centre the bush. If a dead blow hammer is not sufficient, the installation tool must be used to perform a secondary "Bump Back" procedure to centre the bush. Refer Figure 97.
8. Repeat bush replacement procedures for the other side of the U-beam assembly:
9. Allow the lubricant four (4) hours to dissipate before fully operating the vehicle.
10. Install the U-beam assembly by following procedure detailed in U-Beam "Assembly" on page 42.

Pivot Bush METHOD C – Using a shop press

NOTE: This is not a preferred method, because it requires physical handling of the heavy (around 100kg) U-beam assembly in order to mount the beam into the press. If possible, use either Method A on page 48 or Method B on page 50.

You will need:

- A vertical shop press with a capacity of at least 9 tonne (10 tons).
- Shop made QUIK-ALIGN pivot bush installer, remover and receiver tools. See "SECTION 9 Special Tools" on page 68 of this publication.

Disassembly

1. Remove the U-beam assembly from the vehicle as detailed in "U-Beam Assembly" on page 41.
2. If fitted, remove severe-duty thrust washers.

⚠ **WARNING**: The weight of the U-beam assembly is approximately 100 kg. Care should be taken when replacing U-beam bushes to prevent personal injury or damage to components.

3. Inspect all components for any damage or wear and replace as necessary.
4. Place the U-beam in a shop press on top of a receiving tool with both ends of the support beam squarely supported on the press bed. The other side of the U-beam must be supported over or under the press area, depending on press design.

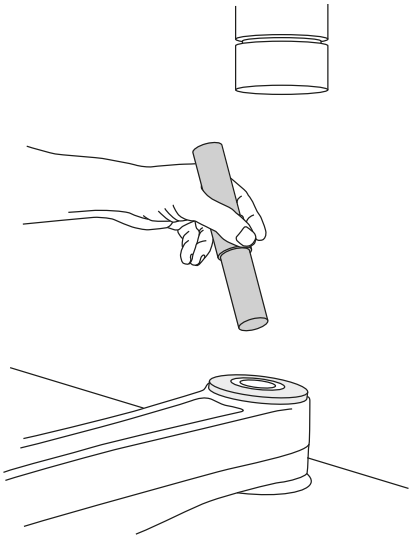


Figure 100: Fit Removal Tool

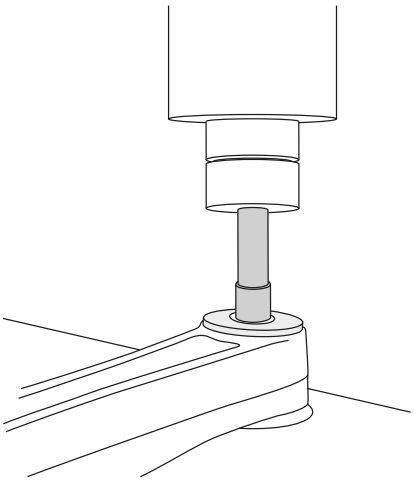


Figure 101: Press Bush Out of Beam

5. Centre the pivot bush remover tool on the inner sleeve and press out the old bush, (these bushes are not cartridge type bushes, they do not have outer metal sleeves). Refer Figure 100 and Figure 101.
6. Clean and inspect the inner diameter of the support beam eye.

Assembly

NOTE: Do not use petroleum or soap base lubricant, it can cause an adverse reaction with the bush material, such as deterioration.

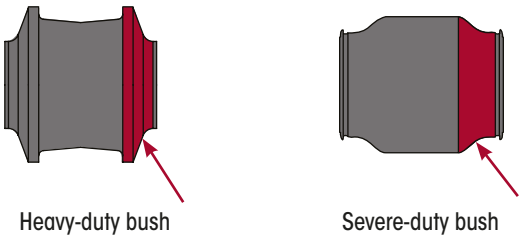


Figure 102: Lubricate Pivot Bush Leading Face

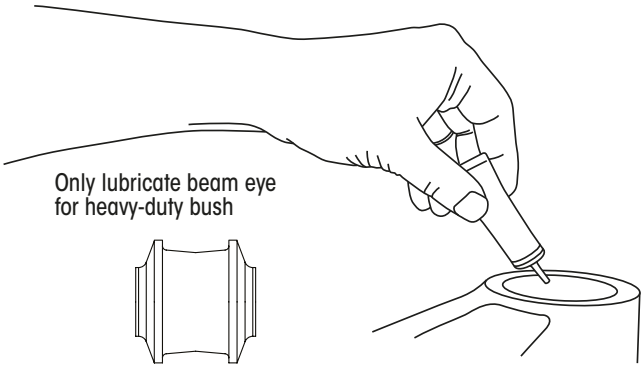


Figure 103: Lubricate Beam – Only for Heavy-duty Bush

1. Lubricate the leading face of bush with a suitable temporary assembly lubricant, such as P-80. Apply lubricant to the beam eye only for heavy duty bushes.

Do not apply any lubricant to the beam when installing the severe-duty bush. Refer Figure 102 and Figure 103.

2. Position the support beam on the pivot bush receiver tool with the support beam eye centred on the receiver tool.
3. Ensure the support beam is squarely supported on the press bed.

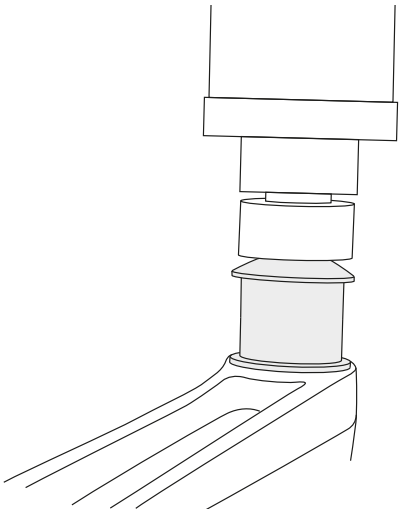


Figure 104: Assemble Pivot Bush Installer

4. Place the pivot bush installer tool centred on the pivot bush with the lubricated leading face towards the beam. Refer Figure 104.
5. Press in the new pivot bush. Ensure the pivot bush is centred within the support beam eye. When pressing in the new bushes, over-shoot desired final position slightly as it will spring back. Press again from the opposite side to centre the bush within the support beam eye bore, if necessary.
6. Repeat bush replacement procedures for the other side of the U-beam assembly:

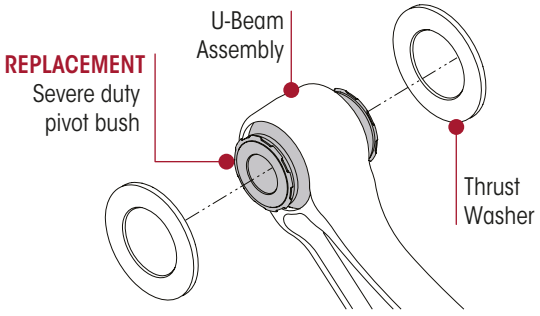


Figure 105: Severe-duty Pivot Bush Thrust Washer Assembly

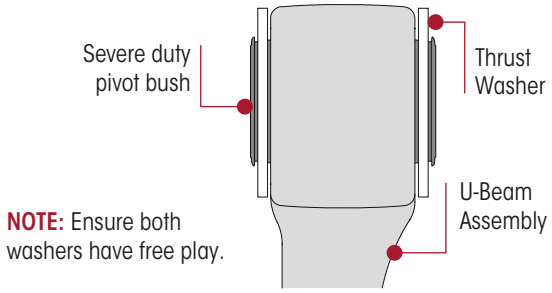


Figure 106: Severe-duty Pivot Bush Thrust Washer Check

7. Severe-duty Pivot Bushes – Snap the thrust washers onto the bush, (refer Figure 105) and ensure there is free play on both washers (refer Figure 106). If one washer does not seat properly or is very snug use a dead blow hammer to centre the bush. If a dead blow hammer is not sufficient, use the press to centre the bush.
8. If the service also requires the replacement of the D-pin bushes, refer to "D-Pin Bush" on page 44 in this section.
9. Reinstall U-beam assembly as shown in U-beam "Assembly" on page 42.
10. Allow the lubricant four (4) hours to dissipate before fully operating the vehicle.

TOP PAD

Disassembly

1. Chock the front wheels.
2. Support the frame at ride height.
3. Disconnect the height control valve linkage assembly from the height control valve arm(s) by sliding the rubber grommet off the stud on the height control valve arm.

⚠ **WARNING**: Prior to and during deflation and inflation of the air suspension system, ensure that all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

4. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.

⚠ **WARNING**: Some vehicle applications, such as vehicles equipped with outriggers, retain some air pressure in the air springs at all times. Prior to performing any maintenance, service, or repair of the suspension, verify each air spring is completely deflated. Failure to do so could result serious property damage and/or severe personal injury.

5. Lower the height control valve arm(s) to exhaust the air in the air springs and deflate the rear suspension.

SERVICE HINT: Note the quantity of shims removed to maintain the correct pinion angle of the axle at assembly. Refer to "Drive Axle Alignment" on page 26.

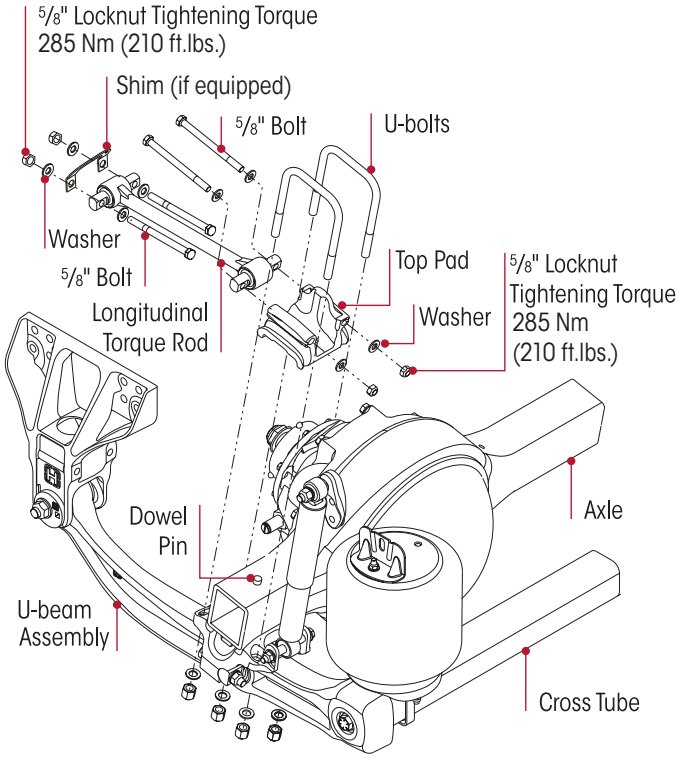


Figure 107: Shim & Spacer Locations & Discard Fasteners (Standard)

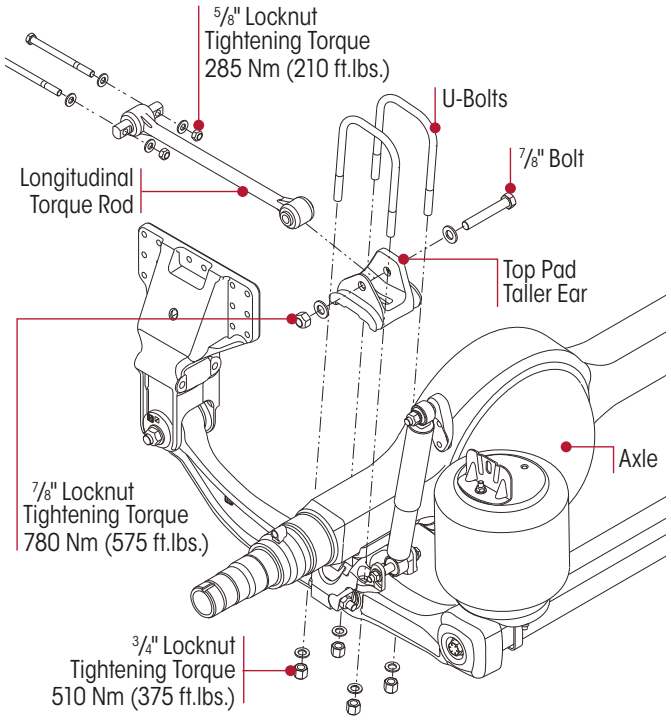


Figure 108: Shim & Spacer Locations & Discard Fasteners (Alternate)

6. Remove and discard the fasteners from the longitudinal torque rod to top pad joint. Note the position of any shims or spacers (if equipped). Refer Figure 107 and Figure 108.

NOTE: Due to certain pinion angle configurations, the removal of the D-Pin bolts may be necessary to

access the U-bolt locknuts. Support axle assembly if needed.

7. Support the U-beam assembly with a floor jack that is equipped with a contact plate at least 100 mm wide.
8. Remove and discard the U-bolt fasteners from the clamp group.
9. Remove the top pad.
10. Inspect the top pad and the axle housing for any cracks or damage. Replace if necessary.

Assembly

NOTE: PRIMAAX EX suspensions may be equipped with top pads, axle spacers and bottom caps that are contoured to fit the axle housing on the axle's short arm side. Ensure the correct parts are installed at each location. Refer to Bottom Cap Selection Guides in the relevant Hendrickson Parts List.

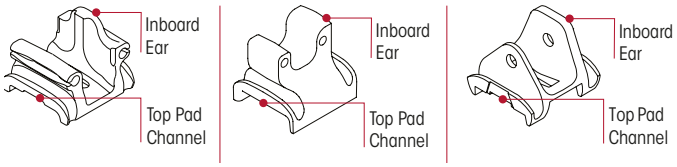


Figure 109: Top Pad Variation

1. Install the top pad on the top of the axle engaging the dowel pin. Care should be taken to ensure the taller ear of the top pad is mounted to the inboard side of the suspension. The top pad varies with different models and may appear different. Refer Figure 109.
2. Install the new U-bolts, washers and locknuts.

NOTE: Current Hendrickson truck suspension systems U-bolt locknuts for the PRIMAAX EX suspension are 3/4"-16 Grade C and are phosphate and oil coated.

3. Verify that the U-bolts are seated properly in the top pad channels. Refer Figure 109.

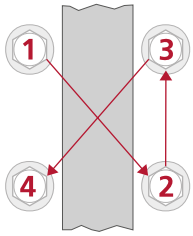


Figure 110: Tighten U-Bolts Evenly

4. Tighten the U-bolt locknuts evenly 70 Nm increments in the proper pattern to achieve uniform bolt tension. Refer Figure 110.
5. Tap the top of the U-bolts with a dead blow mallet and retighten to the proper torque. Do not exceed specified torque on U-bolt locknuts. Tighten the 3/4" locknuts evenly to 510 Nm torque.

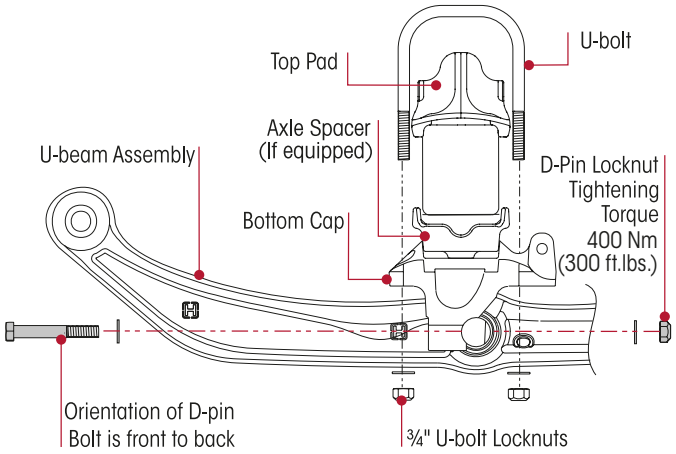


Figure 111: Tighten D-Pin Fasteners (if loosened)

6. Tighten the D-Pin fasteners to 400 Nm torque if loosened or removed during disassembly. Refer Figure 111.
7. Remove the support from the U-beam assembly.
8. Install the fasteners on the longitudinal torque rod. Do not tighten at this time.
9. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.
10. Connect the height control valve linkage rod(s) to the height control valve arm(s) to inflate the suspension.
11. Remove the frame stands.

NOTE: It is mandatory to have the vehicle at proper ride height prior to tightening the 7/8" top pad through bolt locknut to torque specifications.

12. Tighten the longitudinal torque rod fasteners to the required specification. Refer to "Torque Settings" on page 66.
13. Remove the wheel chocks.

BOTTOM CAP & AXLE SPACER (IF EQUIPPED)

NOTE: It is not necessary to loosen the QUIK-ALIGN connection to service the bottom cap and axle spacer, therefore alignment is preserved during service. If the QUIK-ALIGN connection is loosened during service, alignment is required after service is completed.

Disassembly

1. Chock the wheels of the axle.
2. Raise the frame of the vehicle to remove the load from the suspension. Support the frame.
3. Raise and support the axle being serviced. Remove the wheel assemblies.
4. Disconnect the height control linkage assembly from the height control valve arm by sliding the rubber grommet off the height control valve arm's stud.

⚠ **WARNING**: Prior to and during deflation and inflation of the air suspension system, ensure that all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

5. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.

⚠ **WARNING**: Some vehicle applications, such as vehicles equipped with outriggers, retain some air pressure in the air springs at all times. Prior to performing any maintenance, service, or repair of the suspension, verify each air spring is completely deflated. Failure to do so could result serious property damage and/or severe personal injury.

6. Lower the height control valve arm(s) to exhaust the air in the air springs and deflate the rear suspension.
7. Clean and lubricate the lower mounting fasteners of the air springs with penetrating oil. This will help prevent the air spring mounting studs from breaking during the removal process.

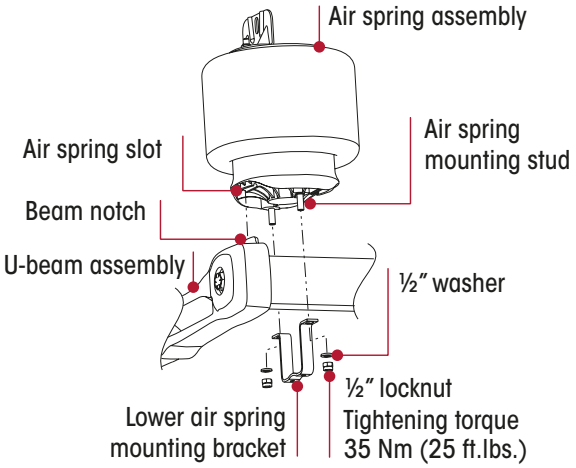


Figure 112: PRIMAAX EX Air Spring – Integrated End Cap

8. Remove the lower mounting fasteners from the air springs using hand tools only. Refer Figure 112.

⚠ **WARNING**: It is mandatory to use a floor jack equipped with a 100 mm (minimum) contact plate to support the U-beam assembly at the cross tube to facilitate safe lowering and raising of the U-beam assembly. Do not use a bottle jack. A bottle jack does not have enough contact area and can be unstable. Failure to do so can cause component damage or result in personal injury.

9. Support the U-beam assembly at the cross tube with a floor jack that is equipped with a contact plate at least 100 mm wide.

⚠ **WARNING**: The weight of the U-beam assembly is approximately 100 kg. Care should be taken at removal and installation to prevent personal injury or damage to components.

10. Remove the D-Pin fasteners from both sides of the support beam.
11. Raise the front of the differential to facilitate removal of the D-Pins from the bottom caps.
12. Lower the floor jack to pivot the U-beam assembly down from the bottom caps.
13. Remove the lower shock absorber mounting fasteners. Pivot the lower shock mount out of the bottom cap.

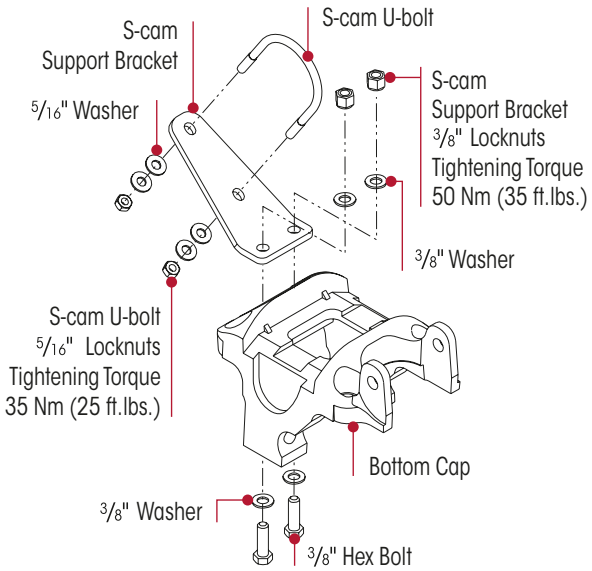


Figure 113: Remove S-Cam Fasteners

14. Remove the S-cam support bracket fasteners and support bracket (if equipped). Refer Figure 113.

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

16. Remove the bottom cap and inspect for damage or wear. Replace as necessary.

Assembly

NOTE: PRIMAAX EX suspensions may be equipped with top pads, axle spacers and bottom caps that are contoured to fit the axle housing on the axle's short arm side. Ensure the correct parts are installed at each location, refer to the Bottom Cap Selection Guides in the relevant Hendrickson parts list.

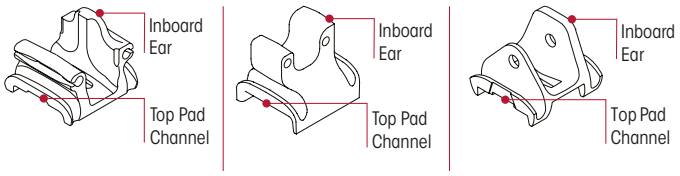


Figure 114: Top Pad Variation

1. Install the top pad (if removed) on the top of the axle engaging the dowel pin. Care should be taken to ensure the taller ear of the top pad is mounted to the inboard side of the suspension. Refer Figure 114.

2. Install the bottom cap and axle spacer (if equipped) on the axle in the proper direction, with the lower shock mounting holes facing the rear of the vehicle.

3. Install the new U-bolts. Verify that the U-bolts are seated properly in the top pad channels and through the bottom cap.

NOTE: Current Hendrickson truck Suspension Systems U-bolt locknuts for the PRIMAAX EX suspension are 3/4"-16 Grade C and are phosphate and oil coated.

4. Install the U-bolt 3/4" washers and the locknuts.

⚠**CAUTION**: Prior to tightening the U-bolts to the final torque, ensure the U-beam assembly and the bottom cap assembly are centred on the axle (A = B ± 3 mm). Failure to do so could cause premature component wear or cause uneven load distribution.

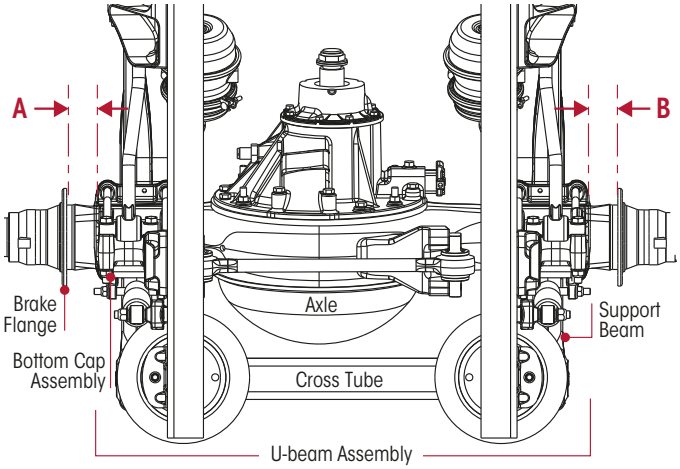


Figure 115: Centre U-Beam Assembly on Axle – Top View

5. Centre the U-beam assembly and the bottom cap assembly on the axle (A = B ± 3 mm). Refer Figure 115.

SERVICE HINT: It may be necessary to raise the front of the differential to allow the D-Pins to engage the bottom cap.

6. Raise the U-beam assembly until the D-Pins engage in the bottom cap.

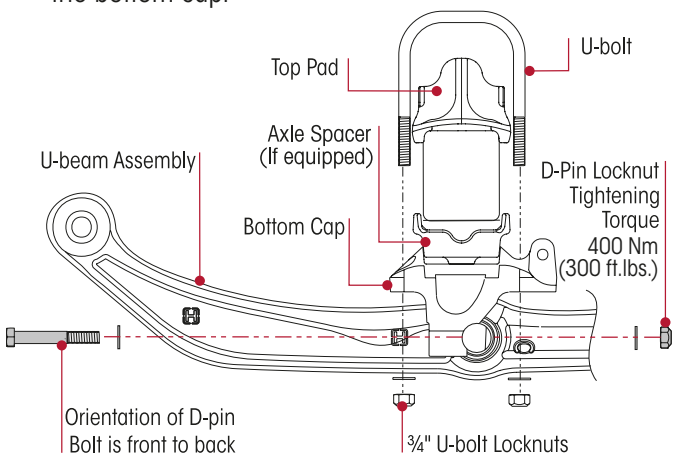


Figure 116: Install D-Pin Fasteners

7. Install the D-Pin fasteners with the bolt heads on the forward side of the bottom cap. Refer Figure 116.

8. Lower the front differential to allow the full engagement of the D-Pins into the bottom caps.
9. Prior to tightening the D-pin fasteners, verify the bottom cap is centred over the support beam.
10. Tighten the D-Pin fasteners to 400 Nm torque.

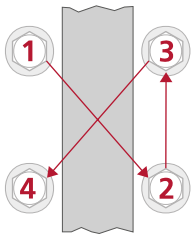


Figure 117: Tighten U-Bolts Evenly

11. Tighten the U-bolt locknuts evenly in 70 Nm increments in the proper pattern to achieve uniform bolt tension. Refer Figure 117.
12. Tap the top of the U-bolts with a dead blow mallet and re-tighten to the proper torque. Do not exceed the specified tightening torque specified on the U-bolt locknuts. Tighten the 3/4″ lock-nuts to 510 Nm torque.
13. Pivot the shock back into the lower shock mount and install the lower shock absorber mounting fasteners. Tighten the 5/8″ locknuts to 285 Nm torque.

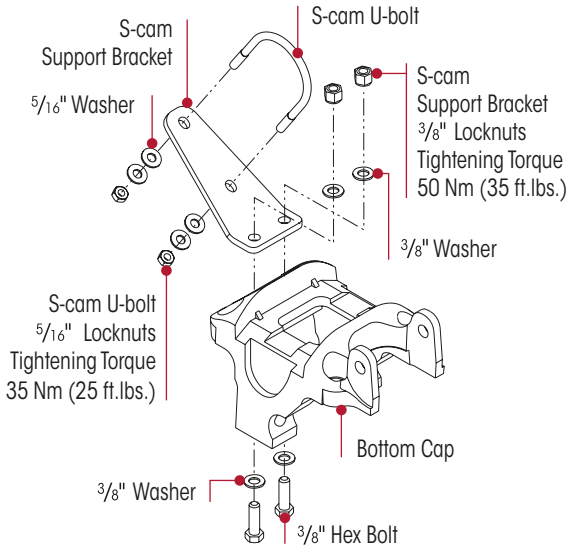


Figure 118: Install & Tighten S-Cam Fasteners

14. Install the S-cam support bracket and fasteners (if equipped). Tighten the 3/8″ locknuts to 50 Nm torque. Tighten the 5/16″ locknuts to 35 Nm torque. Refer Figure 118.

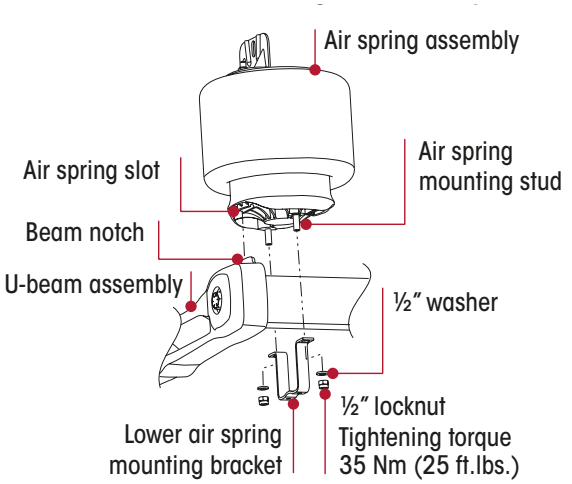


Figure 119: PRIMAAX EX Air Spring – Integrated End Cap

15. Install the air spring between the frame and the cross tube. Ensure the air spring slot in the bottom of the air spring engages the beam notch on the top of the support beam. Refer Figure 119.
16. Install the lower air spring mounting bracket around the cross tube, engaging the mounting air spring studs.
17. Install the lower mounting fasteners and tighten to 35 Nm torque.
18. Install the wheel assemblies (if removed).
19. Remove the jack stands and lower the frame of vehicle.
20. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.
21. Connect the height control valve linkage(s) to the height control valve arm(s) to inflate the suspension.
22. Remove the wheel chocks.

S-CAM SUPPORT BRACKET (IF EQUIPPED)

Disassembly

1. Chock the wheels.
2. Remove the S-cam U-bolt fasteners.
3. Remove the S-cam U-bolt from the bracket and the S-cam housing.
4. Remove the fasteners connecting the S-cam support bracket from the bottom cap.
5. Remove the bracket and inspect components for wear or damage. Replace as necessary.

Assembly

1. Install the bracket on top of the bottom cap.

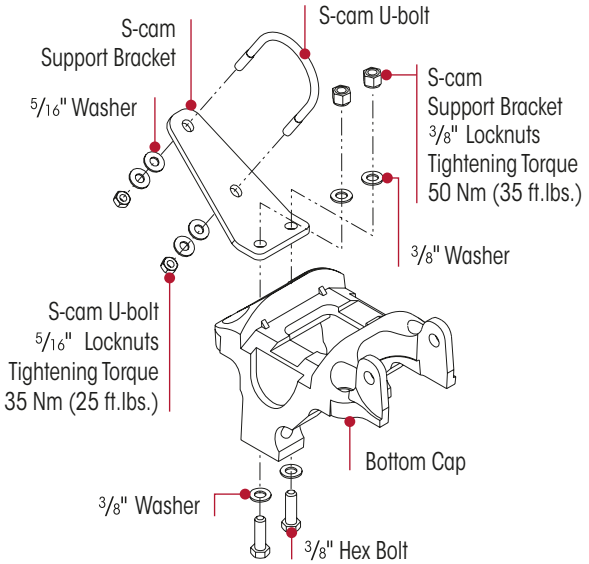


Figure 120: Install & Tighten S-Cam Fasteners

2. Install the S-cam 3/8" bolts, washers and locknuts must be installed with the bolt heads on the under- side of the bottom cap. Refer Figure 120. Tighten the locknuts to 50 Nm torque.

SERVICE HINT: S-cam 3⁄8" bolts must be installed with the bolt heads on the underside of the bottom cap to prevent interference between the support beam and the bolt fasteners during articulation.

3. Install the U-bolt around the S-cam housing and through the S-cam support bracket.
4. Install the 5⁄16" washers and locknuts. Tighten the locknuts to 35 Nm torque.
5. Remove the wheel chocks.

AXLE STOPS

Disassembly

1. Chock the wheels.
2. Remove the fasteners connecting the axle stop to the frame.
3. Remove the axle stop.
4. Inspect the frame rail mounting surfaces for any cracks or damage.

Assembly

1. Install the axle stop on the frame.
2. Install new mounting fasteners.
3. Tighten axle stop fasteners to the vehicle manufacturer's torque specifications.
4. Install any items removed.
5. Remove the wheel chocks.

FRAME HANGER

⚠ **WARNING**: This procedure to replace a frame hanger, is done with the remaining frame hangers connected to the frame and it is also necessary that the support beams and the longitudinal torque rods are attached to the remaining frame hangers. Failure to do so could cause the axle to shift resulting in possible damage to components or personal injury.

SERVICE HINT: Increasing the pinion angle may facilitate the disassembly/assembly of the frame hanger. To increase the pinion angle, place a floor jack under the axle pinion and raise slightly. This will increase the pinion angle slightly easing disassembly/assembly.

Disassembly

1. Chock the front wheels.
2. Support the frame.
3. Disconnect the height control valve arm(s) from the rubber grommet.

⚠ **WARNING**: Prior to and during deflation and inflation of the air suspension system, ensure that all personnel and equipment are clear from under the vehicle and around the service area, failure to do so can cause serious personal injury, death, or property damage.

4. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.

⚠ **WARNING**: Some vehicle applications, such as vehicles equipped with outriggers, retain some air pressure in the air springs at all times. Prior to performing any maintenance, service, or repair of the suspension, verify each air spring is completely deflated. Failure to do so could result serious property damage and/or severe personal injury.

5. Lower the height control valve arm(s) to exhaust the air in the air springs and deflate the rear suspension.

SERVICE HINT: Each frame hanger will have a pair of QUIK-ALIGN collars. Any eccentric (with the square drive feature) QUIK-ALIGN collar should be mounted on the outboard side of the frame hanger. Axle thrust angles can only be corrected on frame hangers equipped with eccentric QUIK-ALIGN collars.

SERVICE HINT: Mark the position of the QUIK-ALIGN square drive in relationship to the frame hanger with a paint stick prior to loosening the QUIK-ALIGN connection. This will facilitate the axle alignment process after the repair is complete.

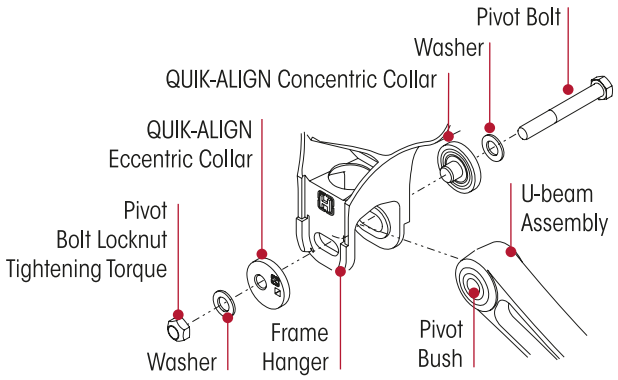


Figure 121: QUIK-ALIGN Bolt Configuration

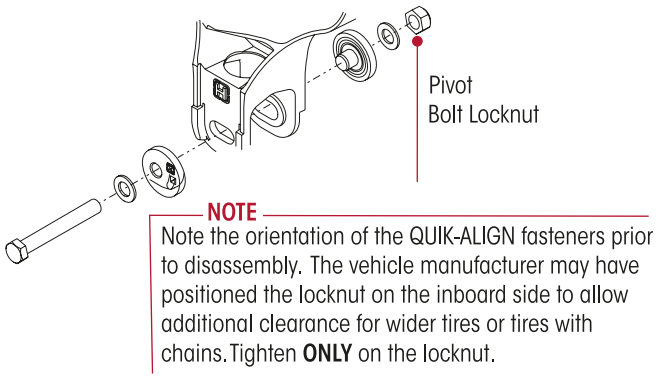


Figure 122: Alternative QUIK-ALIGN Bolt Configuration

6. Remove the QUIK-ALIGN fasteners and collars, and note the orientation of the fasteners. Refer Figure 121 and Figure 122. Discard the fasteners. The collars may be reused if they are not damaged.

SERVICE HINT: Note the quantity of longitudinal shims removed to maintain the correct pinion angle of the axle at assembly. Refer to "Drive Axle Alignment" on page 26.

7. Remove the fasteners and shim (if equipped) that attach the longitudinal torque rod to the frame hanger.
8. Remove the fasteners that attach the frame hanger to the vehicle per vehicle manufacturer's specifications.
9. Remove the frame hanger.
10. Inspect mounting surface for any damage or wear.

11. Inspect the QUIK-ALIGN pivot bush and torque rod bushes for wear or damage, replace as necessary.

Assembly

1. Slide the new frame hanger over the support beam QUIK-ALIGN bush.
2. Install the new fasteners that attach the frame hanger to the vehicle and tighten per the vehicle manufacturer's specifications.

⚠ **WARNING**: Discard used QUIK-ALIGN fasteners. Always use new QUIK-ALIGN fasteners to complete a repair. Failure to do so could result in failure of the part, or mating components, adverse vehicle handling, personal injury, or property damage.

Do not assemble QUIK-ALIGN joint without the proper fasteners. Use only H-coated fasteners to sustain proper clamp force. Failure to do so can cause adverse vehicle handling, property damage or personal injury and void warranty. Ensure that the QUIK-ALIGN fastener's torque values are sustained as recommended in the torque specifications section of this publication. Failure to do so can cause adverse vehicle handling resulting in personal injury or property damage. Follow vehicle manufacturer's fastener orientation when performing any maintenance, service or repair.

NOTE: Use a new QUIK-ALIGN pivot bolt kit for any axle alignment or disassembly of the QUIK-ALIGN connection. This will help ensure that the proper clamp load is applied to the connection and help prevent the joint to slip in service.

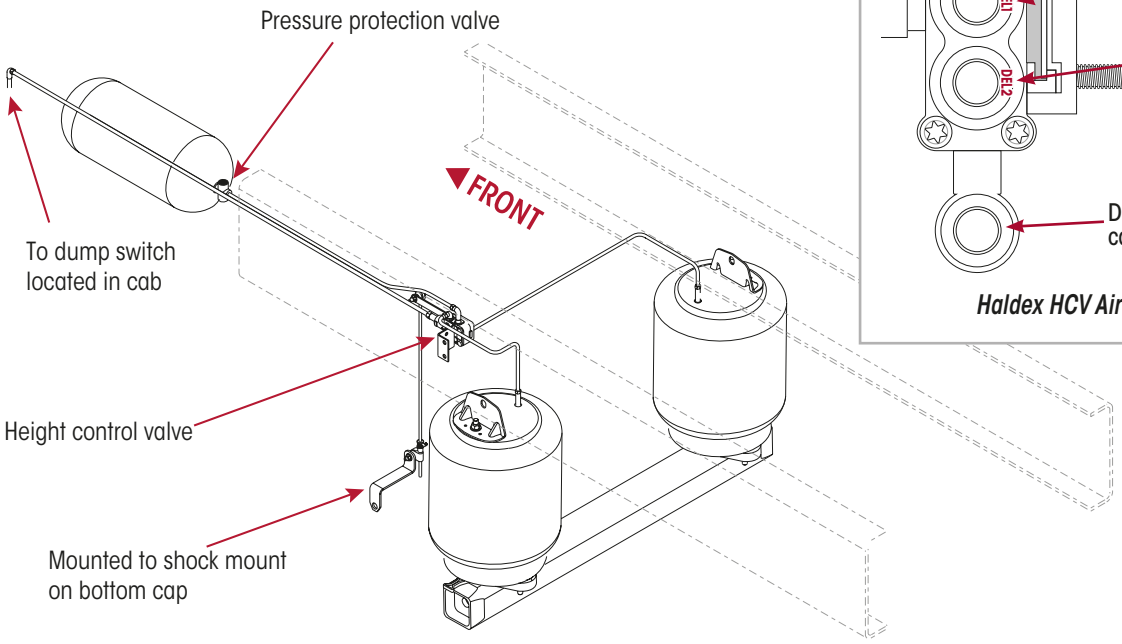
3. Install the QUIK-ALIGN collars and the new mounting hardware that attach the support beam to the frame hanger. Refer Figure 121 and Figure 122. Verify that the nose of each QUIK-ALIGN collar is installed correctly into pivot bush sleeve, and the flanged side is flat against the frame hanger face within the alignment guides. Snug QUIK-ALIGN locknuts to around 100 Nm torque. Do not tighten at this time.
4. Install the torque rod mounting fasteners and reinstall any shims that were removed during disassembly. Tighten the fasteners to the proper specification, see "Torque Settings" on page 66.
5. See additional Air Spring Cautions and Warnings in "SECTION 3 Important Safety Notices" on page 7 prior to deflating or inflating the air system.
6. Connect the height control valve linkage rod(s) to the height control valve arm(s) to inflate the suspension properly.
7. Remove frame supports(s).
8. Verify that the axle is in proper alignment, see "Drive Axle Alignment" on page 26.

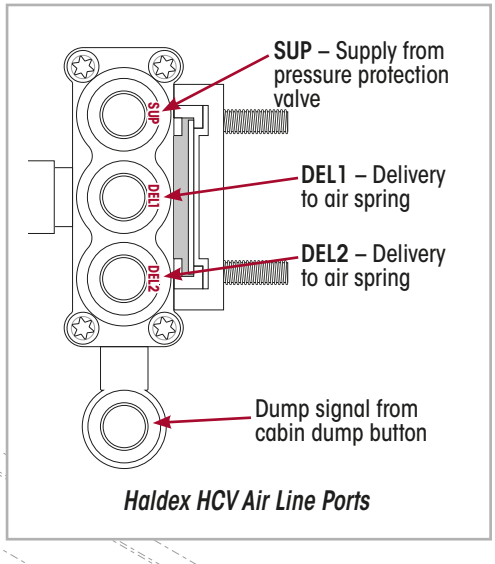
NOTE: It is mandatory to have the vehicle at proper ride height prior to tightening the QUIK-ALIGN locknuts to torque specifications.

9. Once the correct axle alignment is verified, use a calibrated torque wrench to tighten the standard 1" QUIK-ALIGN bolts, with a 38 mm (1-1/2") bolt head, to 750 Nm. Tighten the larger 1¼" QUIK-ALIGN bolts, with a 47 mm (1-7/8") bolt head, to 1760 Nm. For more details about bolt identification and tightening torques refer to "Torque Settings" on page 66 .
10. Verify the correct pinion angle on the axle per original equipment manufacturer's specifications. Adjust as necessary per "Drive Axle Alignment" on page 26 of this publication.
11. Remove the chocks from the front wheels.

SECTION 7 PLUMBING DIAGRAMS

Single – Single Height Control Valve* Example

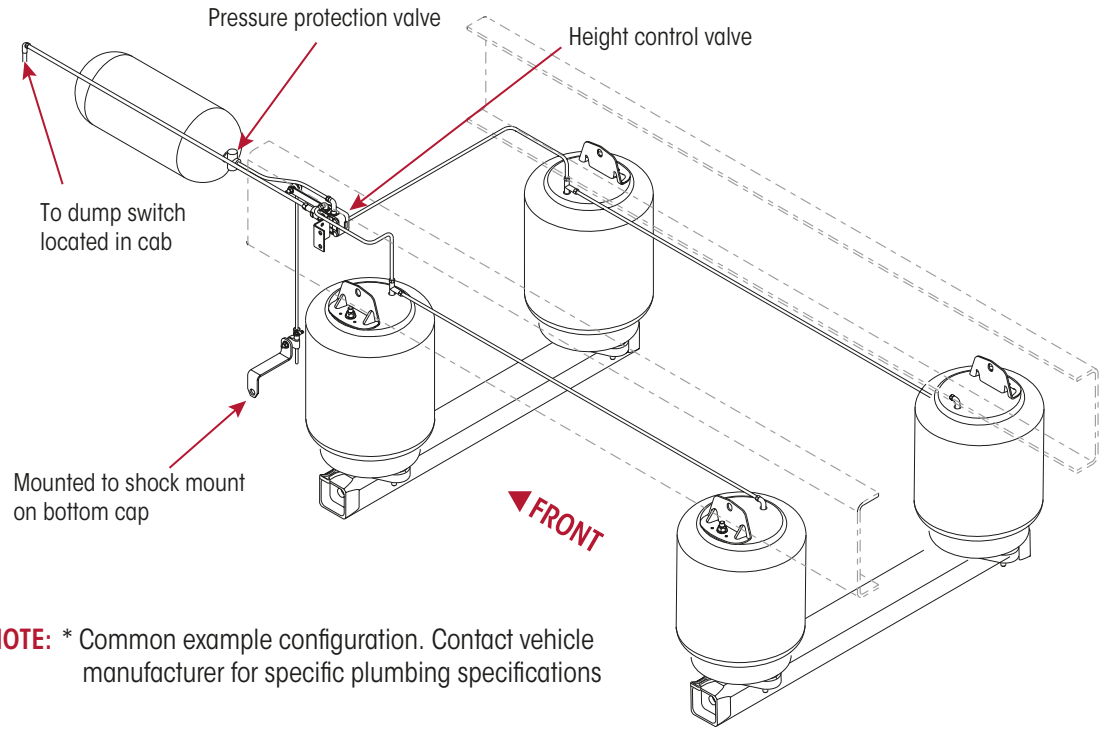




Haldex HCV Air Line Ports

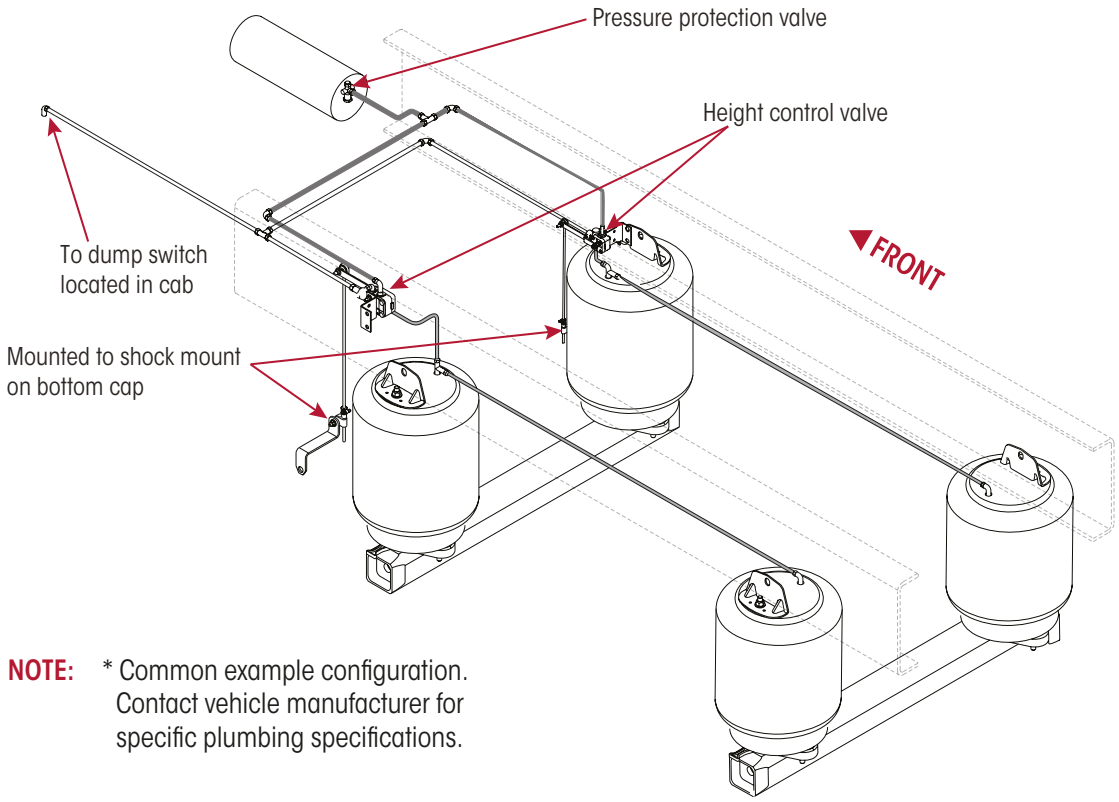
NOTE: * Common example configuration. Contact vehicle manufacturer for specific plumbing specifications

Tandem – Single Height Control Valve* Example



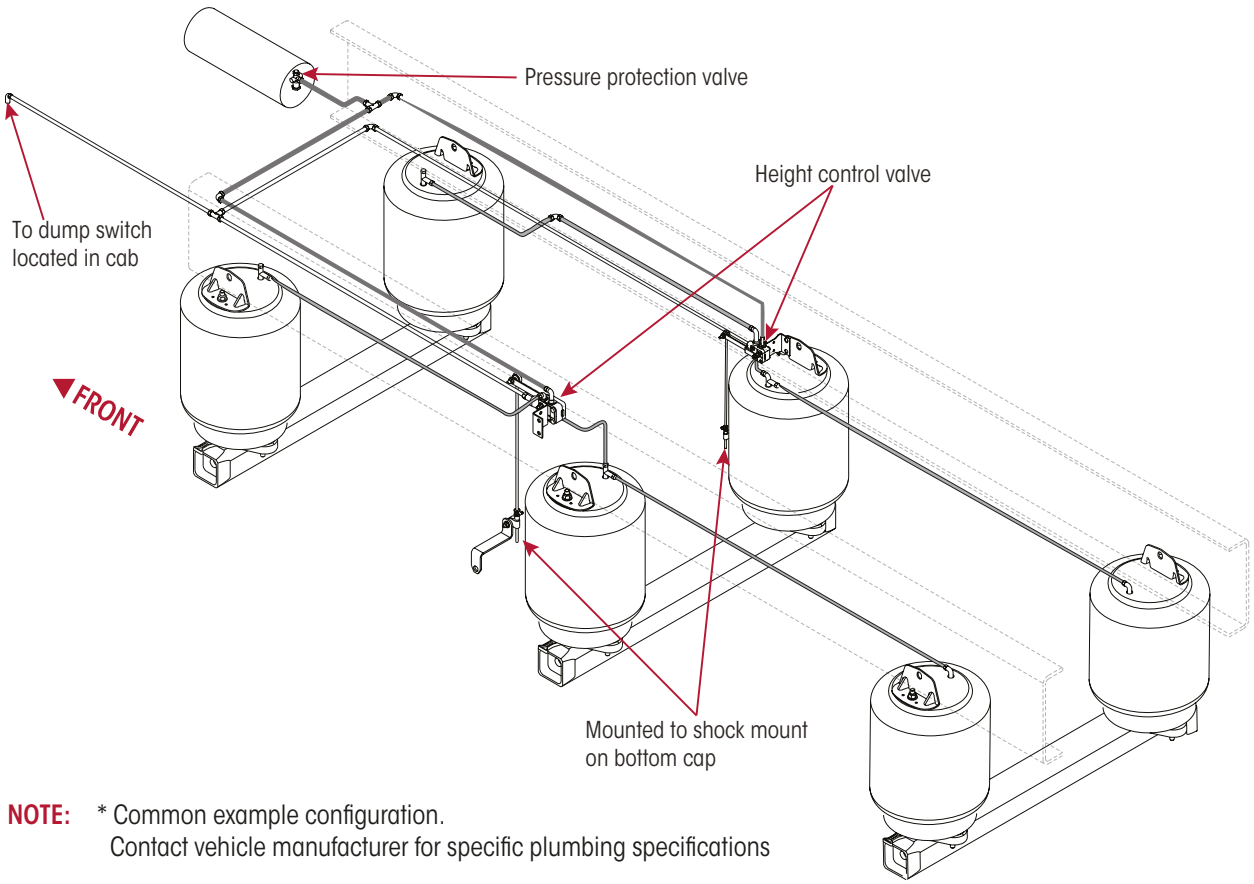
NOTE: * Common example configuration. Contact vehicle manufacturer for specific plumbing specifications

Tandem – Dual Height Control Valve* Example



NOTE: * Common example configuration. Contact vehicle manufacturer for specific plumbing specifications.

Triaxle – Dual Height Control Valve* Example



NOTE: * Common example configuration.
Contact vehicle manufacturer for specific plumbing specifications

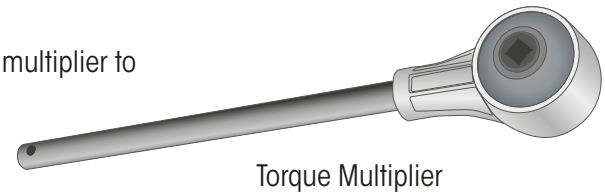
SECTION 8 TORQUE SPECIFICATIONS

1¼" QUIK-ALIGN BOLT TORQUE

There are two possible methods for achieving the correct torque on the larger 1¼" QUIK-ALIGN pivot bolt, with the 47 mm bolt head. They are a single-step high-torque or a torque-turn method. Either method may be used for assembly, depending on the equipment you have available. However, checking bolt torque in service requires using a torque multiplier and a calibrated torque wrench to check the absolute torque of 1760 Nm.

Refer to the instructions provided by the manufacturer of your torque multiplier to ensure accurate QUIK-ALIGN fastener torque.

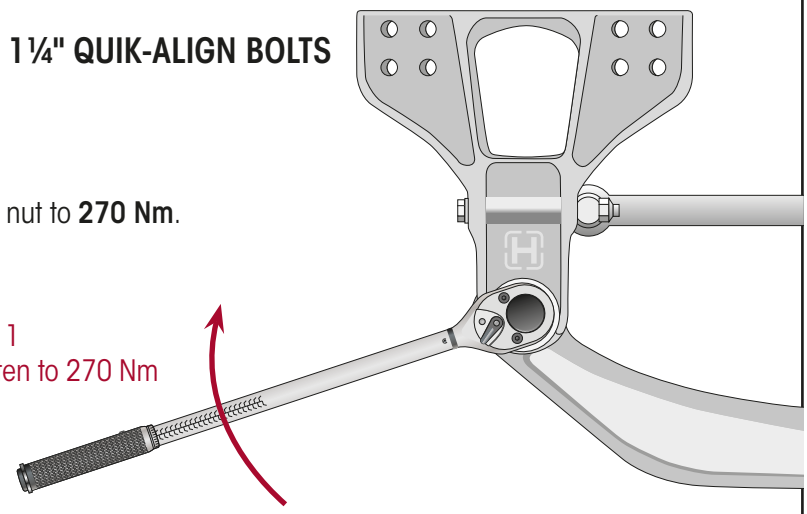
NOTE: Align suspension before applying the final torque to the QUIK-ALIGN fastener.



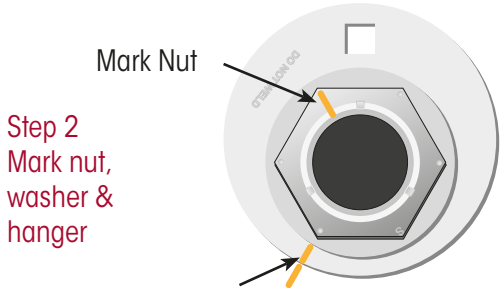
Torque Multiplier

TORQUE–TURN TECHNIQUE FOR LARGER 1¼" QUIK-ALIGN BOLTS

1/ Hold the bolt head and torque the QUIK-ALIGN nut to **270 Nm**.

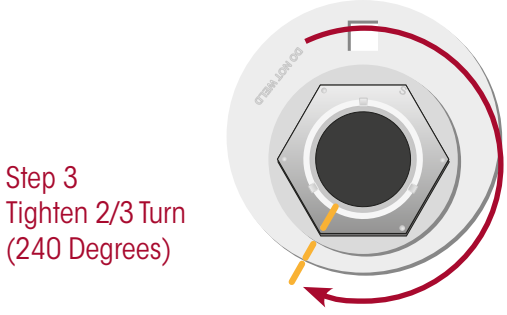


2/ Mark one corner of the nut. Count four corners clockwise (240 degrees), mark the QUIK-ALIGN eccentric washer at that corner and extend that mark onto the hanger.

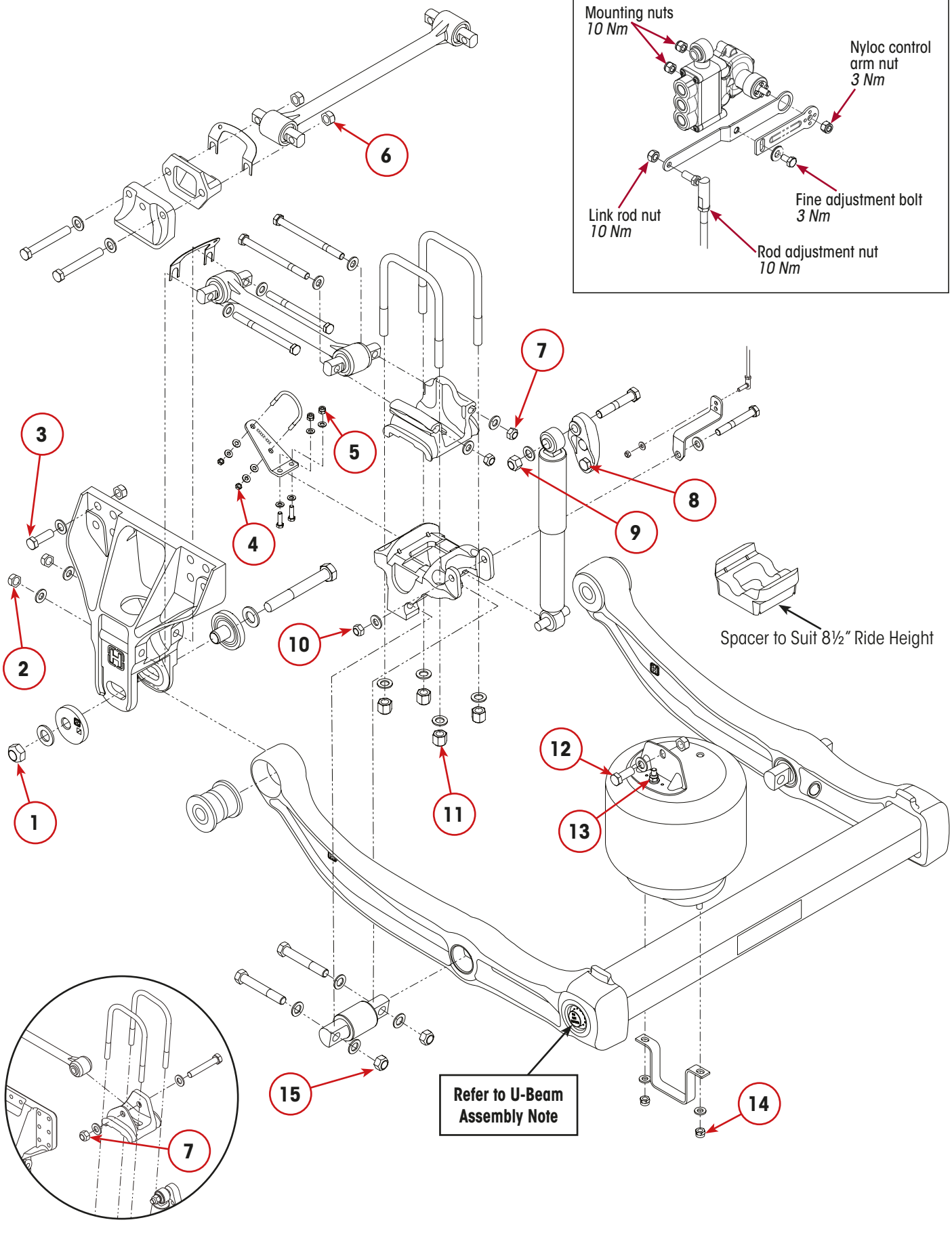


Mark Washer at 4th corner clockwise

3/ Tighten the nut **2/3** of a turn (**240 degrees**) until the marks align. Check the marks on the QUIK-ALIGN washer and hanger to ensure that the eccentric washer has not moved.



TORQUE SETTINGS



TORQUE NOTE

Torque values listed here apply only to Hendrickson OEM fasteners. Contact the vehicle manufacturer for torque specifications associated with fasteners not supplied by Hendrickson.

Item	Component	Thread	Torque	
			Nm	ft. lbs.
1	U-Beam Assembly to QUIK-ALIGN® Bush **38 mm** (1-1/2") Bolt Head. Refer to QUIK-ALIGN Notes below.	1"–14 UNF	750	550
	U-Beam Assembly to QUIK-ALIGN Bush **47 mm** (1-7/8") Bolt Head. Refer to QUIK-ALIGN Notes below and "1¼" QUIK-ALIGN Bolt Torque" on page 65..	1-1/4"–12 UNF	1760	1300
2	Longitudinal Torque Rod to Frame Hanger	5/8"–11 UNC	285	210
3	Frame Hanger to Frame	3/4"–10 UNC	505	372
4	S-Cam Support Bracket U-Bolt Locknut	5/16"–18 UNC	35	25
5	S-Cam Support Bracket to Bottom Cap	3/8"–16 UNC	50	35
6	Axle Stop & Transverse Torque Rod to Frame	5/8"–11 UNC	285	210
7	Longitudinal Torque Rod to Top Pad – Standard – 232/462/692	5/8"–11 UNC	285	210
	Longitudinal Torque Rod to Top Pad – Standard – 262/522/782	3/4"–16 UNF	400	295
	Longitudinal Torque Rod to Top Pad – Through-Bolt Type (See Inset)	7/8"–14 UNF	780	575
8	Upper Shock Bracket to Frame	5/8"–11 UNC	285	210
9	Upper Shock Absorber to Shock Bracket	3/4"–10 UNC	250	185
10	Lower Shock Absorber to Bottom Cap	5/8"–11 UNC	285	210
11	U-Bolt Locknut	3/4"–16 UNF	510	375
12	Air Spring Bracket to Frame	5/8"–11 UNC	285	210
13	Air Spring Assembly to Upper Frame Bracket	1/2"–13 UNC	35	25
14	Air Spring Assembly to Lower Air Spring Mounting Bracket	1/2"–13 UNC	35	25
15	U-Beam Assembly to Centre D-Pin Bush	3/4"–16 UNF or 7/8"–14 UNF	400	295

QUIK-ALIGN® NOTES

Some vehicles may be fitted with a larger 1-1/4" QUIK-ALIGN® bolt that must be torqued to 1760 Nm. This includes Kenworth vehicles built between 2011 and 2017. This differs from the standard 1" bolt, which needs a final torque of 750 Nm. Use the bolt head size to determine QUIK-ALIGN bolt type. See "Pivot Hardware Identification" on page 5 and also "1¼" QUIK-ALIGN Bolt Torque" on page 65.

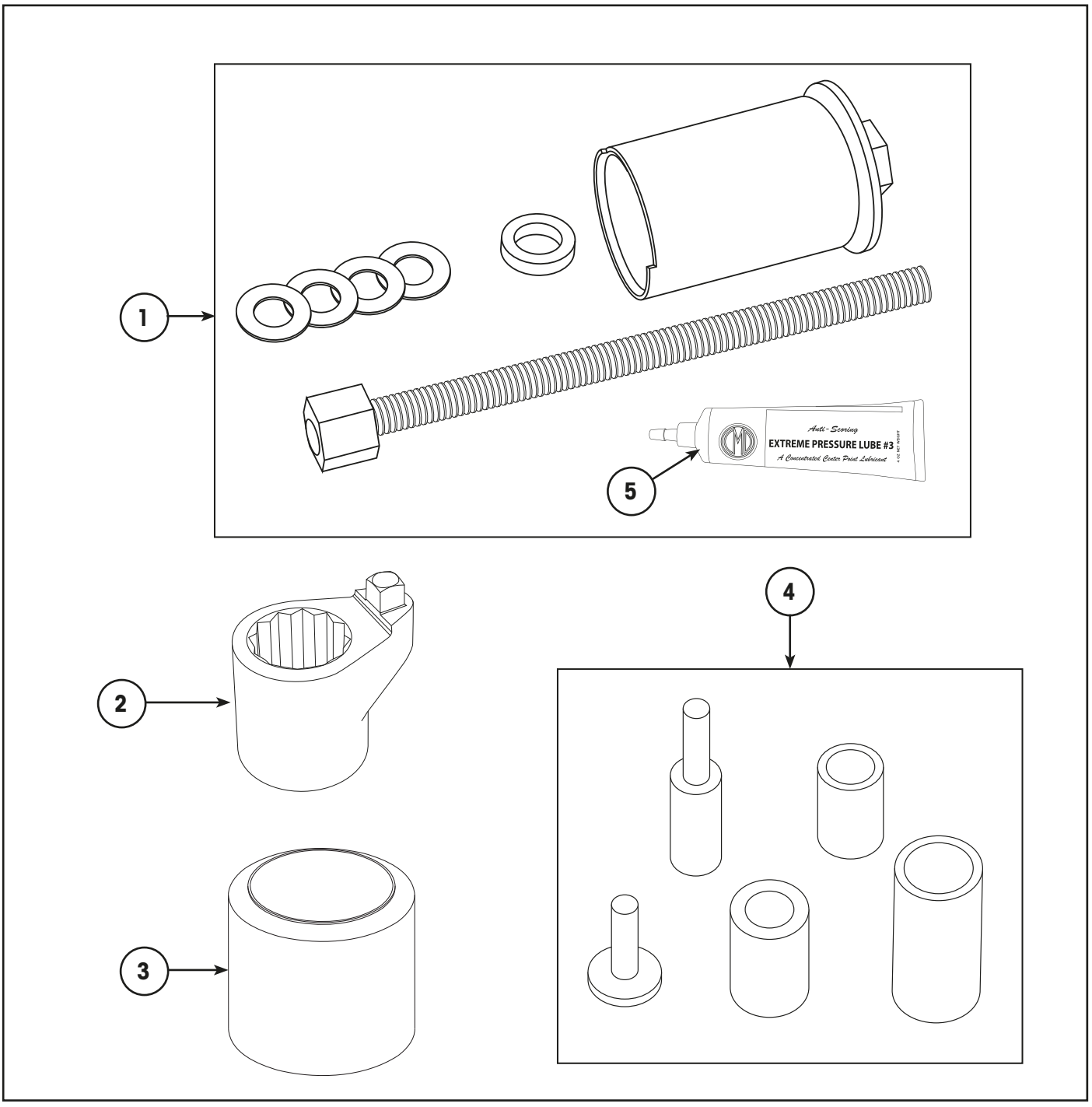
In service the 1" bolt can be used in place of the 1-1/4" bolt. However, be sure to use the right amount of torque for the bolt size.

If replacing the pivot bush for use with the larger 1-1/4" QUIK-ALIGN bolt, verify that the bolt passes freely through the inner metal sleeve of the new bush. If it does not, then the bush inner sleeve must be reamed to a diameter of 31.75 mm (1-1/4") and then rechecked for clearance.

U-BEAM ASSEMBLY NOTE

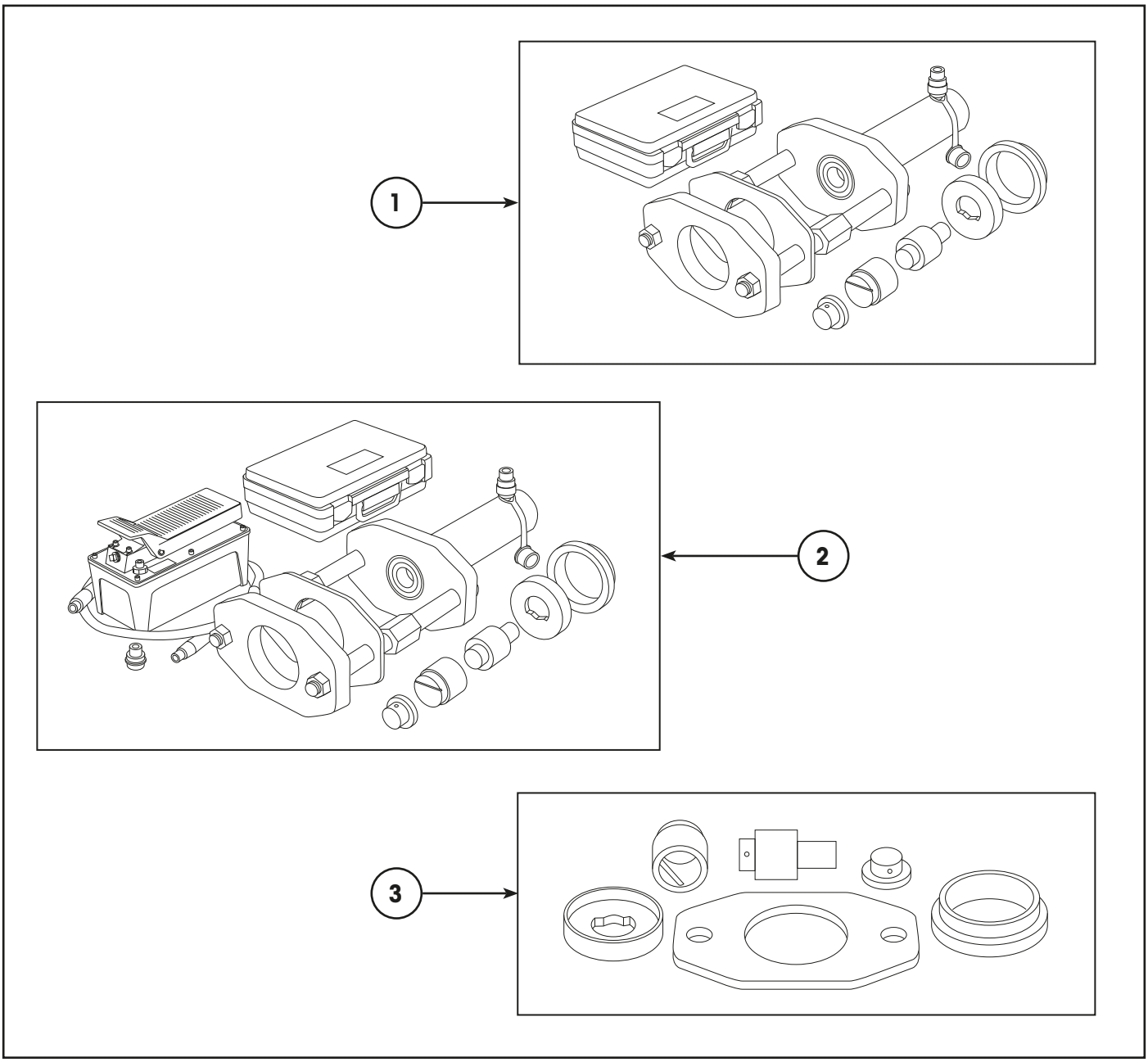
Vehicles built after March 2009 have integrated end caps that do not require re-torque. The bolt heads are covered with tamper resistant caps. Vehicles built prior to this date do not have tamper resistant caps and require a torque of 745 Nm applied at regular service intervals.

SECTION 9 SPECIAL TOOLS



Item	Part Number	Description	Notes
1	66086-203	PRIMAAX® QUIK-ALIGN® Pivot Bush Tool	The simplest and most cost effective way of replacing pivot bushes. Enables 'in situ' replacement of the QUIK-ALIGN bushes. Includes extreme pressure lubricant for tool thread.
2	66086-200	Alignment Socket	To enable QUIK-ALIGN pivot axle alignment
3	98596-020-P	Torque Rod Re-Bush Tool	Suits 50 mm torque rod bushes.
4	97328-000	D-Pin & QUIK-ALIGN Hydraulic Press Tools	For use with U-beam assembly removed.
5	S-21337	Extreme Pressure Lubricant	For use with bush tool thread, item 1.

Special Tools

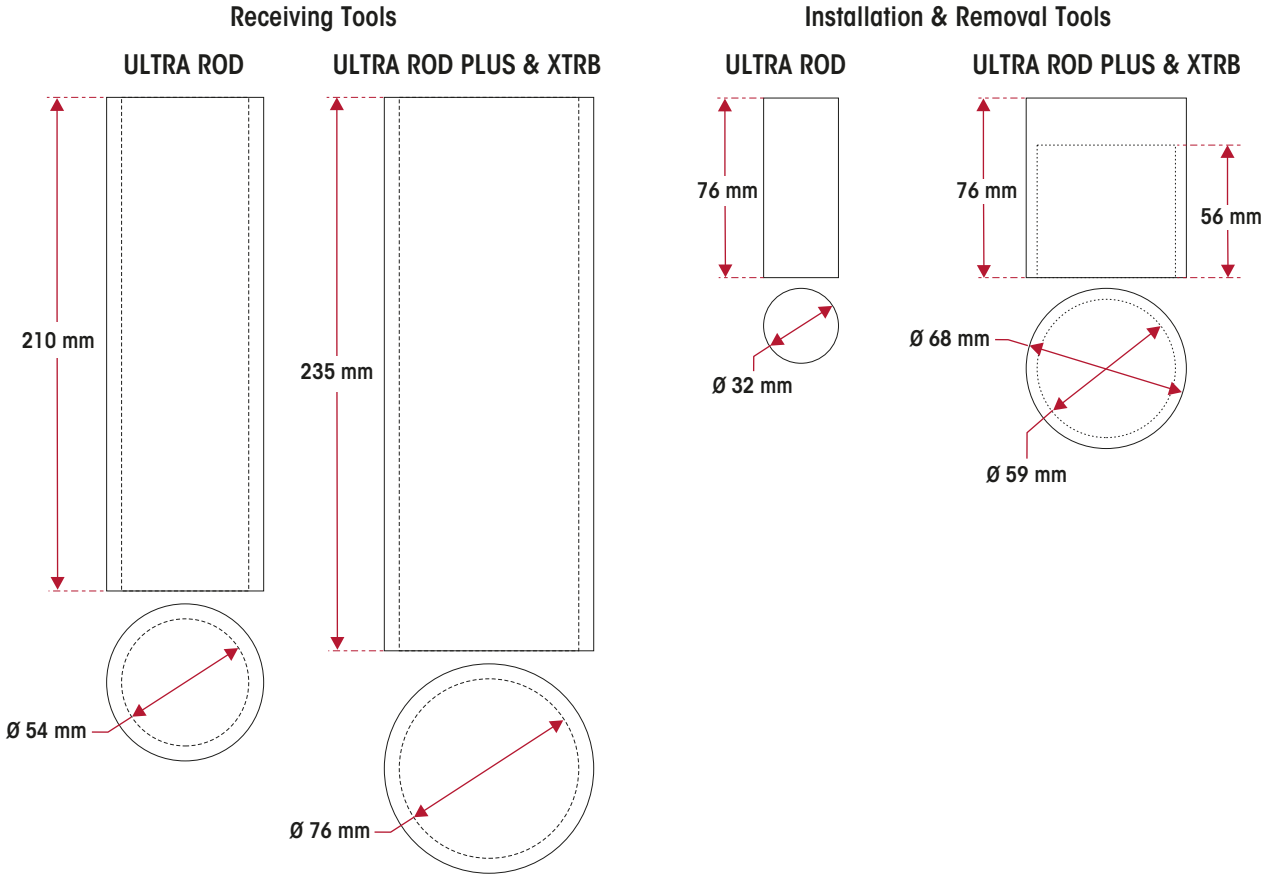


Item	Part Number	Description	Notes
1	66086-202	Rear Suspension Bush Tool Kit.	OTC 4246. Quickly and easily removes and installs Pivot and D-Pin Bushes for PRIMAAX® EX and COMFORT AIR™ suspensions. Includes adapters to align tool with the suspension to ensure proper bush installation. Mounting system designed so that tool does not need to be held during operation. Includes an OTC 4106A 23 tonne (25-ton) high-force cylinder. Requires the addition of the hydraulic pump, which is included in item 2, 66086-204.
2	66086-204	Rear Suspension Bush Master Kit with Pump.	OTC 4247. Complete 66086-202 kit with the addition of an OTC 2510A air/hydraulic pump to make bush service faster and easier.
3	66086-205	Rear Suspension Adapter Kit	OTC 4254. Adapter kit to convert OTC kits 4274 and 4275 for use with Pivot and D-Pin Bushes on PRIMAAX EX, COMFORT AIR suspensions.

Shop Fabricated Tools

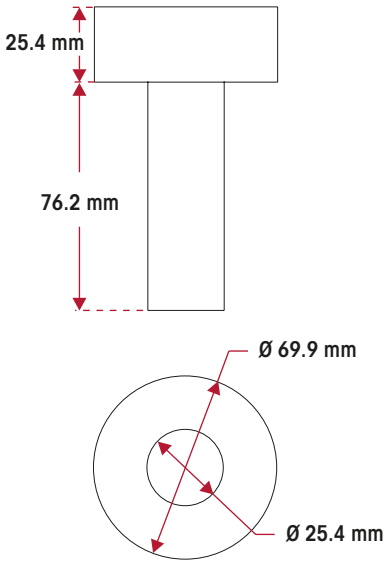
To assist with replacement of toque rod bushes, QUIK-ALIGN pivot bushes and D-pins it is possible to fabricate suitable tools to use with a press. Refer to the appropriate drawings for the applicable tools required. These tools are made from cold rolled steel or equivalent. The drawings are for reference only, because Hendrickson does not supply these tools.

TORQUE ROD BUSH TOOLS

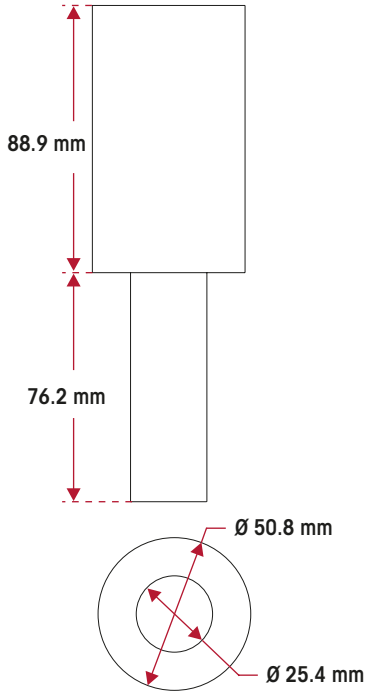


QUIK-ALIGN TOOLS

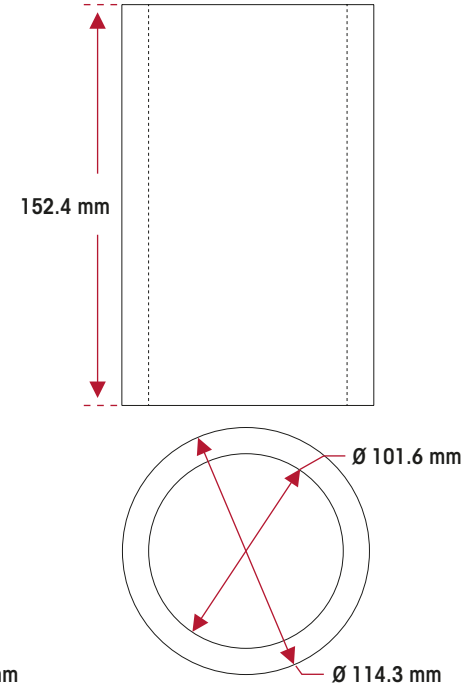
Pivot Bush Installer



Pivot Bush Remover

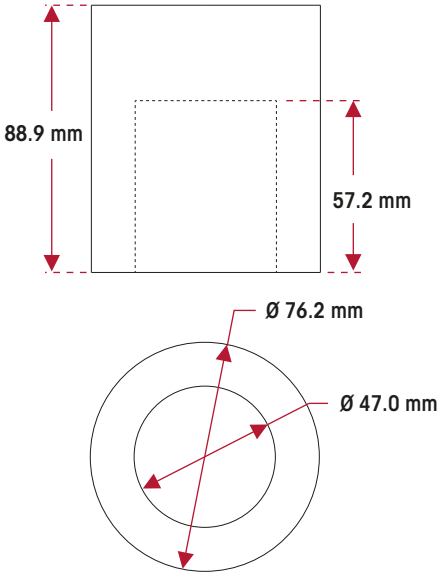


Pivot Bush Receiver

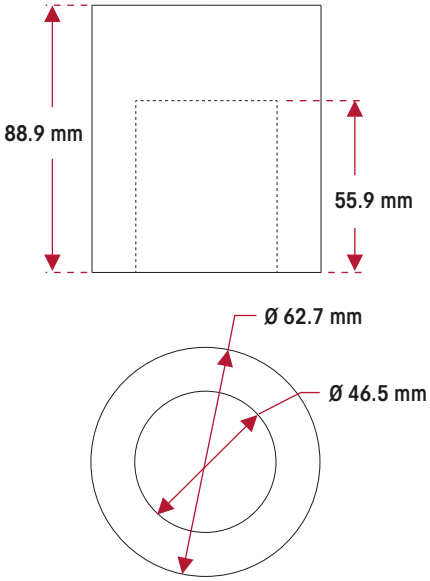


D-PIN TOOLS

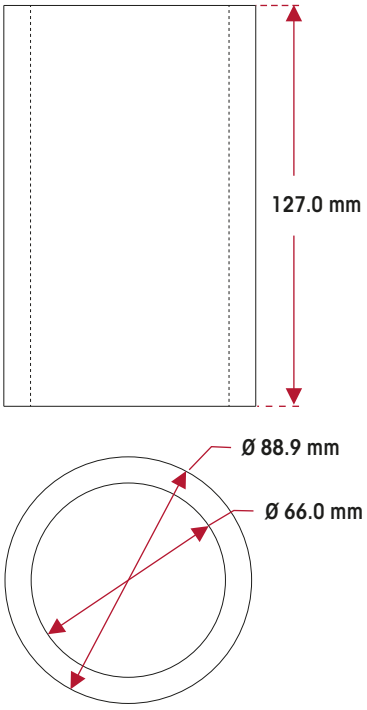
Installer



Remover



Receiver



SECTION 10 TROUBLESHOOTING GUIDE

CONDITION	POSSIBLE CAUSE	CORRECTION
Suspension has harsh or bumpy ride	Air spring not inflated to specification or damaged	Repair air system and check ride height. Refer to "Ride Height" on page 23.
	Ride height set incorrectly	Adjust ride height to proper setting. Refer to "Ride Height" on page 23.
	Suspension is overloaded	Redistribute load to correct weight.
	Broken support beam	Replace broken U-beam assembly.
Irregular tyre wear	Incorrect tyre inflation pressure	Correct tyre pressure per vehicle manufacturer and tyre manufacturer specifications.
	Incorrect alignment	Correct the alignment. Refer to "Alignment Adjustment Instructions" on page 28.
	Worn QUIK-ALIGN® bush	Replace QUIK-ALIGN bush.
	Loose QUIK-ALIGN attachment	Replace QUIK-ALIGN connection and check vehicle alignment. Adjust if necessary. Check frame hanger for wear around QUIK-ALIGN plates and replace if necessary.
	Worn torque rod bushes	Replace torque rod bushes as necessary.
Excessive driveline vibration	Incorrect pinion angle(s)	Adjust pinion angle(s), refer to the vehicle manufacturer for specifications.
	Loose QUIK-ALIGN attachment	Replace QUIK-ALIGN connection and check vehicle alignment. Adjust if necessary. Check frame hanger for wear around QUIK-ALIGN plates and replace if necessary.
	Ride height set incorrectly	Adjust ride height to proper setting. Refer to "Ride Height" on page 23.
	Broken support beam	Replace U-beam assembly.
Suspension is noisy	Loose QUIK-ALIGN attachment	Replace QUIK-ALIGN connection and check vehicle alignment. Adjust if necessary. Check frame hanger for wear around QUIK-ALIGN plates and replace if necessary.
	Loose U-bolts	Tighten U-bolts to specifications. Refer to "U-Bolt Locknuts" on page 15.
	Loose end caps (if equipped)	Inspect end caps and the support beam to cross tube connection for damage. Repair as necessary, re-torque end cap to specification. For more details refer to "Torque Settings" on page 66.
	Worn bushes	Replace bushes as necessary.

CONDITION	POSSIBLE CAUSE	CORRECTION
Vehicle bouncing excessively	Damaged or leaking shock absorber	Replace shock absorber.
	Ride height set incorrectly	Adjust ride height to proper setting. Refer to "Ride Height" on page 23.
Vehicle leaning	Air spring not inflated to specification or damaged	Repair air system and check ride height. Refer to "Ride Height" on page 23.
	Load not centred	Redistribute the load.
	Frame twisted	Straighten the frame per vehicle manufacturer's guidelines.
	Broken support beam	Replace broken U-beam assembly.
	Axle housing bent or broken	Replace axle housing per vehicle manufacturer guidelines and align vehicle.
	Loose U-bolts	Tighten U-bolts to specifications. Refer to "U-Bolt Locknuts" on page 15.
	Front suspension	Inspect and repair front suspension.
Suspension will not reach ride height	Suspension is overloaded	Redistribute load to correct weight.
	Air Spring leaking or damaged	Replace air spring.
	Leak in air system	Inspect air fittings, refer to "Air Fitting Inspection" on page 19. If necessary, repair air system and check ride height. Refer to "Ride Height" on page 23.
	Air line obstructed or improperly connected	Repair air system and check ride height. Refer to "Ride Height" on page 23.
	HCV dump port activated	Check HCV dump port for proper connection and function.
Air springs deflate when parked	Leak in air system	Inspect air fittings, refer to "Air Fitting Inspection" on page 19. If necessary, repair air system and check ride height. Refer to "Ride Height" on page 23.
	Malfunctioning Height Control Valve	Refer to inspection procedure under "Ride Height" on page 23. Replace height control valve as necessary.
Excessive frame slope	Ride height set incorrectly	Adjust the ride height to proper setting. Refer to "Ride Height" on page 23.
	Suspension is overloaded	Redistribute load to correct weight.

Revisions Table

DATE	REV	PAGE	DESCRIPTION
Oct-2021	B	67	Add 3/4" latitudinal torque rod torque.
Oct-2021	B	49 to 55	Add severe-duty pivot bush procedures, ECN 11878.
Oct-2021	B	23, 24, 32 to 35	Update and expand ride height setting and height control valve.
Oct-2021	B	All	Revisions and adjustments throughout.
Sep-2023	C	23, 33	Clarify HCV installation.
Sep-2023	C	36	Add shock identification,
Sep-2023	C	67	Clarify some bolt threads and QUIK-ALIGN torque.
Feb-2025	D	12	Update service schedule.

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors.
All applications must comply with applicable Hendrickson specifications and must be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration.
Contact Hendrickson for additional details regarding specifications, applications, capacities, and operation, service and maintenance instructions.

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