Australia & New Zealand Regions Only

TECHNICAL BULLETIN

TOUGHLIFT™ FMT MAINTENANCE MANUAL

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HENDRICKSON
The World Rides On Us™

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INTRODUCTION

The maximum load that an axle can carry is defined by legislation that varies between locality, state and country. The main reason behind this maximum axle load is to prevent damage to roadways. Lift axles enable vehicles to carry greater loads by sharing the load across more axles and can be lifted off the road when not required. Lifting an axle that is no longer required has a number of benefits such as improved fuel consumption, reduced tyre wear and reduced road surface wear.

If the TOUGHLIFT axle and suspension is fitted with a Hendrickson lift axle control valve (LACV), then it will most likely be an Auto/Auto valve. This means that it will lift and lower automatically, without any need for the driver to intervene. An optional Manual/Auto valve is also available, which requires the driver to manually raise the axle after unloading.

The Auto/Auto LACV includes an override valve that allows the driver or vehicle technician to lower the axle whenever necessary. Lowering the axle ensures that it does not move whilst any work is being carried out, which could cause damage or even injure someone. The instructions included in this technical bulletin are for the Hendrickson supplied Auto/Auto valve. Follow the component manufacturer's instructions, if the axle is fitted with any other LACV.

Australian Design Rule 43/04 (2006) states that the `prescribed transition mass' for dual tyre axles going from two to three axles is 13 tonnes. This requirement must be complied with and therefore cannot be set at a higher setting. Adjusting the lift Axle Control Valve settings may prevent proper lift axle operation and render the vehicle non-compliant.

NOTICE: Diagrams used in this bulletin are representational only. Actual product may vary depending on truck options and specifications.

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.

IMPORTANT SAFETY NOTICES

Proper maintenance, service, and repair is important for the reliable operation of the suspension.

All safety-related information should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper servicing may damage the vehicle, cause personal injury, render it unsafe for operation, or void 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.

SAFETY PRECAUTIONS

⚠ **WARNING**: Lift Axle Rapid Movement

Lift axle rapid movement can cause severe personal injury or death. The lift axle is operated by an automatic lift axle control system and may cause the axle to automatically lift or lower under different conditions.

Read, understand, and comply with all applicable operating instructions and safety information provided by the vehicle manufacturer. Ensure all personnel are clear of the lift axle before and during vehicle loading and lift axle activation up or down.

⚠ **WARNING**: Air Springs

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 severe personal injury, death, or property damage.

Exhaust all pressure in lift axle air springs and vehicle air system before working on or around lift axle. Failure to do so can cause severe personal injury or death.

⚠ **WARNING**: Improper Jacking Method

Improper jacking method can cause structural damage and result in adverse vehicle handling, severe personal injury or death. Refer to vehicle manufacturer for proper jacking instructions.

⚠ **WARNING**: Personnel Protective Equipment

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

MAINTENANCE & INSPECTION

DAILY / PRE-TRIP DRIVER INSPECTION

Daily (and before each trip) inspect all lift axle components for proper operating condition and proper installation to the truck frame.

This essential Daily / Pre-trip Operator Inspection must also include a visual inspection of all wheel hub seals and hub cap gaskets for leaks, inspection of all lift and ride air-springs for wear, and inspection of all tyres for proper inflation and abnormal wear patterns.

Identify and repair / replace any loose, damaged or improperly installed components. Refer to the items noted in blue on the "Service Schedule" on page 5.

GENERAL INSPECTION

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

Fasteners

Inspect for any loose or damaged fasteners on the entire lift axle suspension. Make sure all fasteners are tightened to the specified torque. Refer to the "Torque Specifications" on page 28 if fasteners are supplied by Hendrickson. For non-Hendrickson fasteners, refer to the vehicle manufacturer. Use a calibrated torque wrench to check torque of each fastener. Correct the torque if necessary. Replace any worn or damaged fasteners.

Air springs

Visually Inspect suspension for any debris rubbing against air springs or signs of chaffing. Clear debris and/or replace air springs with genuine parts as necessary. For more details refer to "Air Springs" on page 13.

NOTE: Service intervals are only recommendations for vehicles operating 100% on sealed highways. The duration between service intervals will need to be reduced for vehicles operating on second class roads, off-highway and or harsher applications and operational conditions.

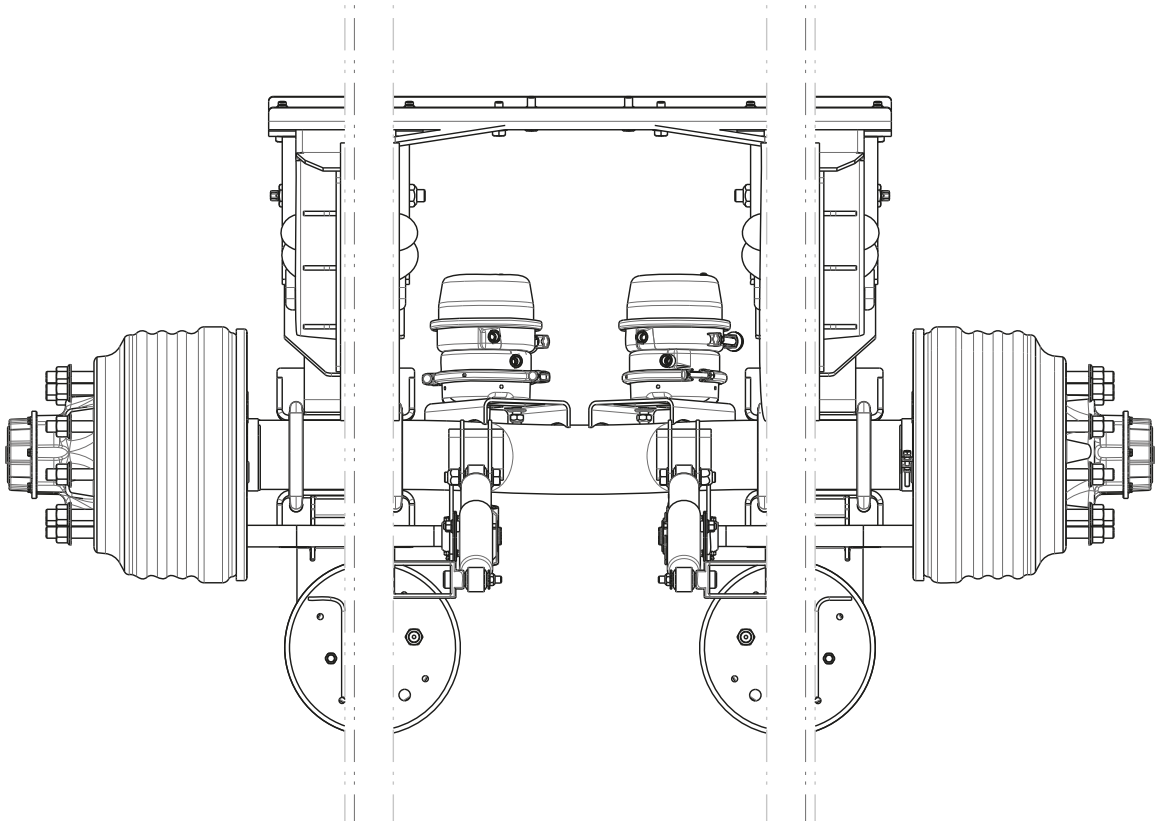


Figure 1: **TOUGHLIFT™ FMT Axle**

SERVICE SCHEDULE

NOTE: All suspension fasteners, including shock absorber mounting, QUIK-ALIGN® pivot bolts and axle U-bolts, must have torque checked at pre-delivery and at the first service.

Item No.	Description	Driver Daily	Quarterly or 45,000 km	6 Monthly or 90,000 km	Yearly or 180,000 km
1	Check loose, missing or damaged fasteners, shock absorbers, air springs and hub caps.	X	X	X	X
2	Check tyres for unusual wear patterns that may indicate suspension damage or misalignment.	X	X	X	X
3	Check for obvious leaks from hubs and shock absorbers.	X	X	X	X
4	Check for any apparent loose, faulty or broken suspension components.	X	X	X	X
5	Inspect all brake chambers, dust shields, suspension hangers, trailing arms & axle beams for security, damage & leaks.		X	X	X
6	Visually inspect/correct all air springs for security, cracks, leakage, damage, pinching & chafing.		X	X	X
7	Visually inspect/correct TRI-FUNCTIONAL™ pivot bushes and wear washers for damage. Refer to page 8.		X	X	X
8	Visually inspect/correct all shock absorbers, bushes and mounts for security, leaks & damage. Refer to page 10.		X	X	X
9	Check/correct suspension ride height.		X	X	X
10a	*Drum Brakes* – Check slack adjusters for free & applied stroke. Check brake lining wear through inspection openings. Grease all S-Cam tubes & slack adjusters using NLGI #2 grease, with brakes released. Refer to Hendrickson technical bulletin 97117-161.		X	X	X
10b	*Disc Brakes* – Check pad lining wear. Visually check rotor & callipers for condition, wear or cracks, including brake pad retaining springs.		X	X	X
11a	*Drum Brakes* – Inspect brake shoes, linings, rollers, springs and drums for cracks, wear and correct operation. Check/correct all brake camshafts & bushes for excessive axial & radial end play. Refer to Hendrickson technical bulletin 97117-161.			X	X
11b	*Disc Brakes* – Check brake pads for regular wear. Inspect brake rotor for runout, wear or cracks. Check brake calliper guide pin bearing play. Inspect retainer bar, springs, end caps & check adjuster operation.			X	X
12	Raise all axles and rotate all wheel hubs to ensure free, smooth and quiet rotation as detailed in "Smooth & Quiet Rotation Check" on page 21.			X	X
13	Visually inspect all welded connections for signs of cracking and/or deterioration on all frame attachments, trailing arms to axle, trailing arm pivot bush tubes, hanger brackets, all suspension mounting points, brake booster mounting brackets, shock absorber mounting brackets and all pivoting and clamping connections.				X
14	Inspect HXL5 hubs as shown in Hendrickson bulletin 97117-250. Conventional hubs should be serviced & repacked annually.				X
15	Check all suspension bolts, U-bolts and nuts for tightness. Repair/tighten as necessary. Refer to page 28.				X

NOTE: Other than the Driver Daily Checks, the above service work should be performed by qualified technicians in conjunction with the truck manufacturer's recommendations and guidelines, along with all recommended workshop OH&S procedures.

LIFT AXLE CONTROL VALVES

OPERATION

The Hendrickson TOUGHLIFT™ FMT axles may be fitted with a Hendrickson Auto/Auto lift axle control valve. These Auto/Auto valves are completely automatic in function and do not require intervention by drivers in normal operation.

If the axle is fitted with an LACV, which is not a Hendrickson Auto/Auto valve, then refer to the component manufacturer's instructions.

In certain situations, such as when changing a wheel or during vehicle maintenance, the lift axle must be dropped by operating the manual override valve located in the control box. This will ensure to axle does not move unexpectedly, which may cause component damage or even injury.

Audible Warning

An audible warning will be heard from the lift axle control box during automatic lowering of the axle.

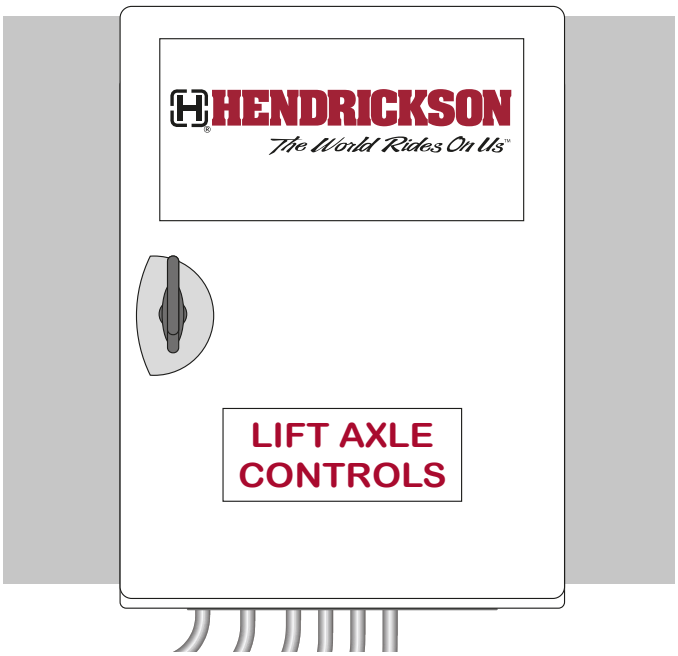
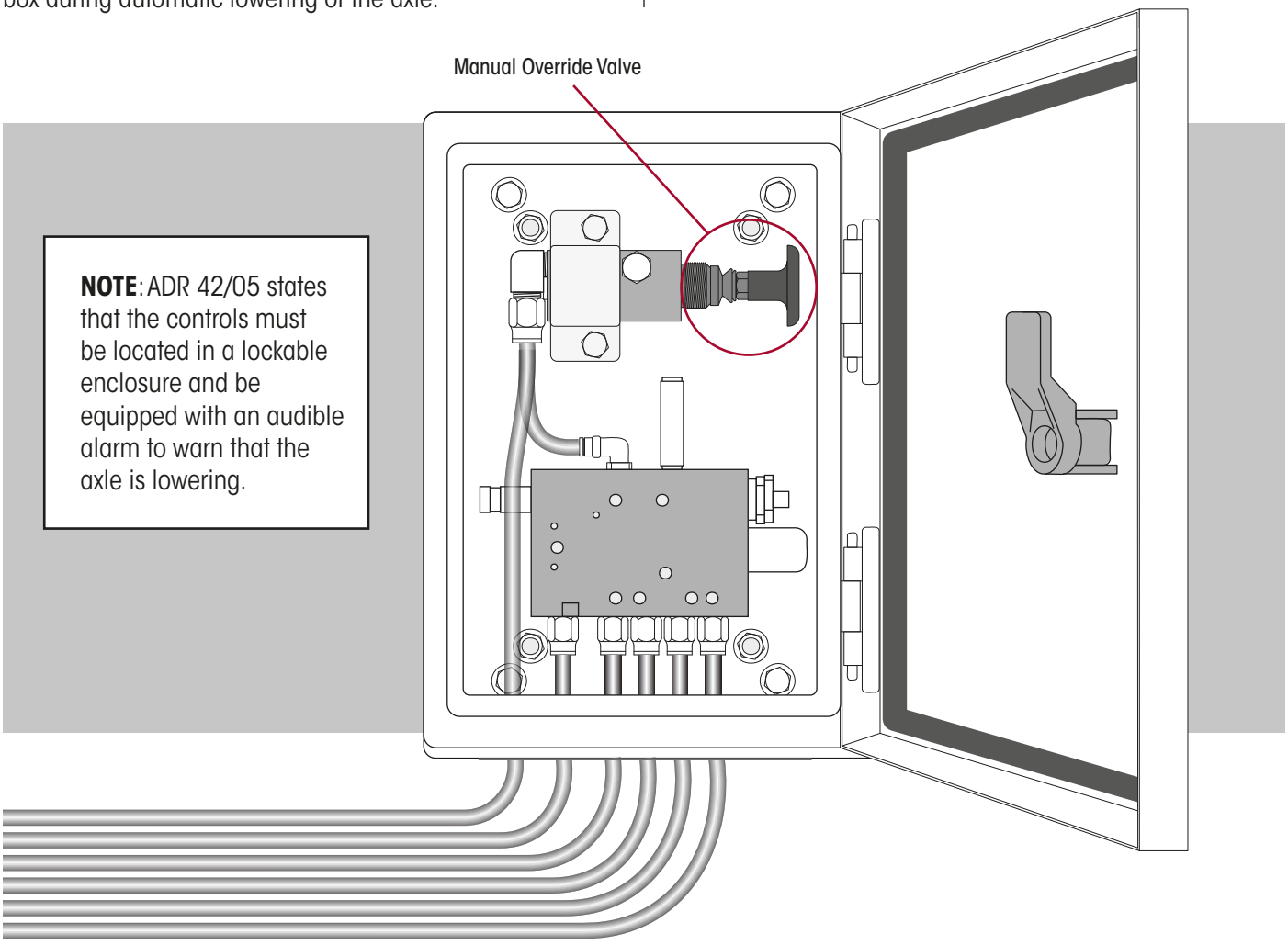


Figure 2: Lift Axle Control Box



NOTE: ADR 42/05 states that the controls must be located in a lockable enclosure and be equipped with an audible alarm to warn that the axle is lowering.

Figure 3: Lift Axle Control Manual Override Valve

MANUAL OVERRIDE

1. Chock any wheels of axles that will not be involved in repair, ensure the area around the lift axle is clear and that there is no likelihood of damage or danger to others when the axle moves.
2. With the parking brake applied, start engine, and allow it to idle until the vehicle air system pressure has reached the compressor cut-out (usually 830 kPa or 120 psi).

⚠ **CAUTION**: The use of hearing protection is recommended, along with protective eyewear to prevent injury by flying debris caused by the release of compressed air.

3. Insert enclosure key (Figure 4) into control box cover and turn to open.
4. Pull out the manual override valve, which will lower the lift axle.

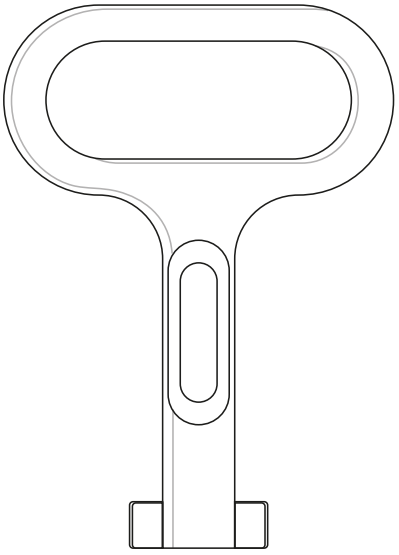


Figure 4: **Enclosure Key**

RESTORE AXLE OPERATION

Normal automatic axle operation may be restored after repairs or service is completed.

NOTE: The axle may not lift immediately when restoring operation if there is sufficient load on the axles.

1. With the parking brake applied, start engine, and allow it to idle until the vehicle air system pressure has reached the compressor cut-out (usually 830 kPa or 120 psi).

⚠ **CAUTION**: The use of hearing protection is recommended, along with protective eyewear to prevent injury by flying debris caused by the release of compressed air.

2. Open control box and push in the manual override valve.
3. Close control box cover, remove key and store in a practical location.
4. Remove any chocks from the wheels.

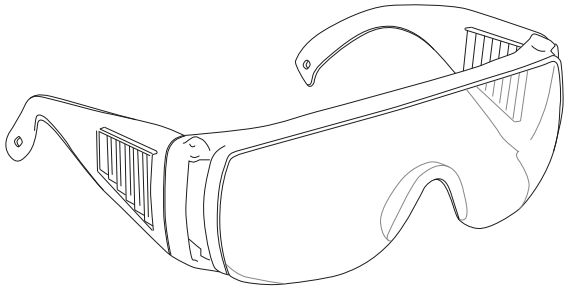


Figure 5: **Wear Safety Glasses When Using Compressed Air**

PIVOT BUSH INSPECTION

The pivot bush should be inspected during routine inspection of other truck suspension bushes. Depending on the age of the suspension, the used bush may experience various states of fatigue that could include surface cracks or cracks forming between voids. However, the pivot bush may still have many years of service life remaining.

NOTICE: Under no circumstances should a shaker table or extended iron pry bar be used as a method to determine the functionality or serviceability of a TRI-FUNCTIONAL™ Bush (TFB™). A shaker table will merely demonstrate the ability of the TFB to absorb the primary road forces, whilst an iron bar may compress the TFB at the void area where it is designed to move. Refer Figure 6.

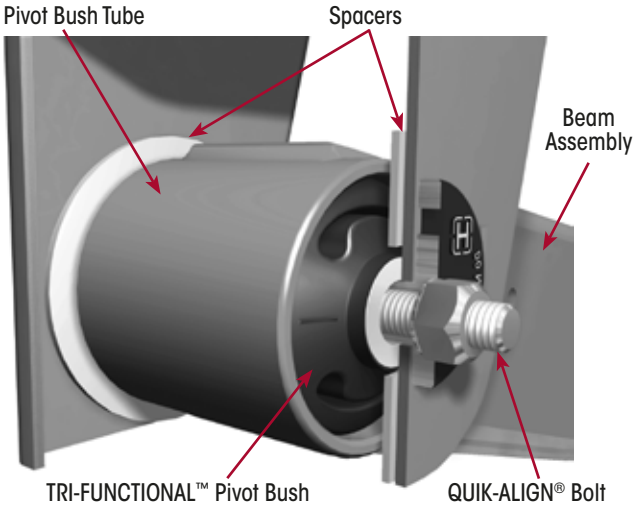


Figure 6: **Pivot Bush Assembly**

NOTES:

- Check the bush for movement with a large metal bar is not a true gauge of bush serviceability, because the TRI-FUNCTIONAL bush is designed to 'give' in service.
- Mechanical testing devices, such as shaker tables, cannot be used to check TRI-FUNCTIONAL bushes due to their inherent elasticity.

The pivot bush can be inspected from underneath the truck without disassembling the pivot connection. With the truck wheels chocked and the truck properly supported, look up at the bush tube and inspect the side of the tube that offers more access, or in other words, has the larger gap between the bush tube and the frame bracket. Use a screwdriver to push the bush tube spacer against the frame bracket and out of the way so a portion of the pivot bush can be seen. Use a torch to illuminate and inspect the end of the pivot bush. Refer Figure 7.

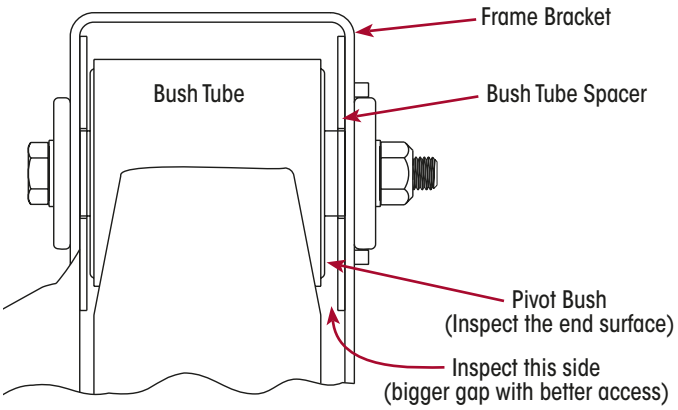


Figure 7: **TRI-FUNCTIONAL Pivot Bush Visual Inspection**

During this inspection, look specifically at the bush voids (the "cavities" or "holes" in the end of the rubber bush material). In most cases, it will not be possible to clearly see both top and bottom voids, but enough of the bush can be seen to make an evaluation. By design, the bush voids will be at the 12-o'clock and 6-o'clock positions (±5 degrees) when the suspension is at the designed ride height.

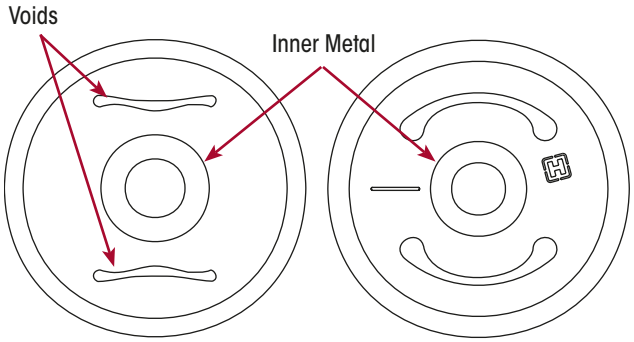


Figure 8: **Newly Installed Bush**

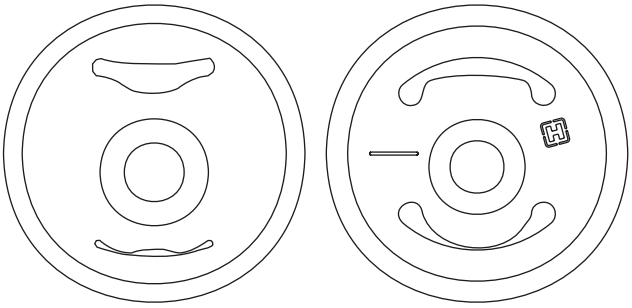


Figure 9: **Normal Appearance of an In-service Bush**

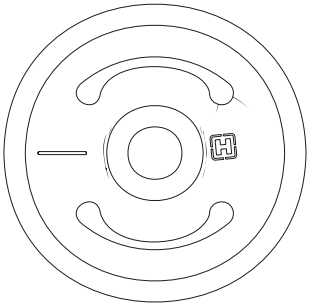


Figure 10: **Serviceable Used Bush**

The pivot bushes will typically settle in the vertical direction upon suspension installation. It is normal for the voids to have this settled appearance due to cargo and truck weight loading the bush. Refer Figure 9 and Figure 10.

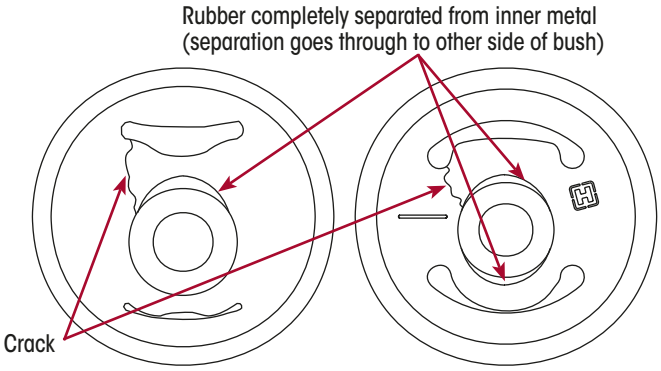


Figure 11: **Bush in Need of Replacement (Cracks)**

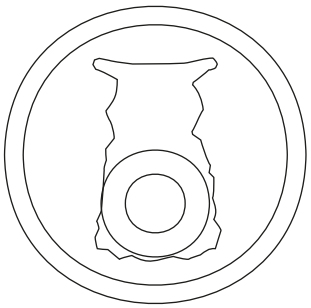


Figure 12: **Bush in Need of Replacement (Inner Metal Separation)**

However, cracks in the rubber extending between the void and the bush's inner metal or an excessive amount of vertical movement can indicate that the bush may need to be replaced. Refer Figure 11 and Figure 12.

If you do not see an excessive amount of vertical movement (based upon your normal application and experience) or cracks in the rubber extending between the void and the bush's inner metal, then no further inspection is required at this time. The bushes are in a serviceable condition.

The appearance of smeared blackened rubber or hanging strands of rubber around the bush tube edges or bush tube spacers is a sign the bush is heating up and melting. The source is likely to be continuous rapid vibration induced into the bush through the beam. It is usually caused by an imbalanced wheel end on the same side as the affected bush. A wheel end can be out of balance due to a number of reasons that will require further inspections for diagnosis. These reasons may include issues with the tyre(s), improper assembly, dropped or out-of-round drum, mud or debris collected on the rim and non-functioning shock absorber.

REPLACEMENT

TRI-FUNCTIONAL™ bush replacement procedures are detailed in Hendrickson technical publication L427. Please refer to this document for further details service and replacement of the bush and bush tube spacers.

SPACER INSPECTION

Visually verify that the bush tube spacers are intact and that they are not missing, cut, worn through or otherwise deteriorated. Due to the pivoting motion inherent with this connection, some bush tube spacer wear is expected.

Bush tube spacer "cupping", where the bush tube spacer forms around the bush tube and resembles a shallow dish, is also normal. If you see these conditions, then no further inspection is required at this time. The bush tube spacers are in serviceable condition.

However bush tube spacer "wear through", where the bush tube spacer is completely missing or has been cut or worn-through, is considered abnormal. If these conditions exist, a closer, more detailed inspection is required to prevent more serious or costly problems and to prolong the life of the suspension. For more details refer to Pivot Bush Inspection manual, 97117-135.

SHOCK ABSORBERS

INSPECTION

Shock absorbers absorb energy to prevent suspension oscillation. They convert the kinetic energy from body movement and wheel vibrations into heat. Movement of oil within a shock absorber is restricted by calibrated valves. This dampens relative movement between the body and suspension. The resultant heat is absorbed by the oil and released by the shock body into the surrounding air.

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 example images below can be helpful in determining shock absorber serviceability.

Heavy-duty 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 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.

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.

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 mount bushes for wear or deterioration.
- Check for broken or damaged dust shield.
- Check the shock body to see if it is bent or dented.

A loose mounting bolt will usually leave witness marks around the mounting bolt washer from the relative movement between the parts. Refer Figure 13.

Fitting the wrong shock absorber or incorrect ride height will often cause a broken mount or even internal shock damage.

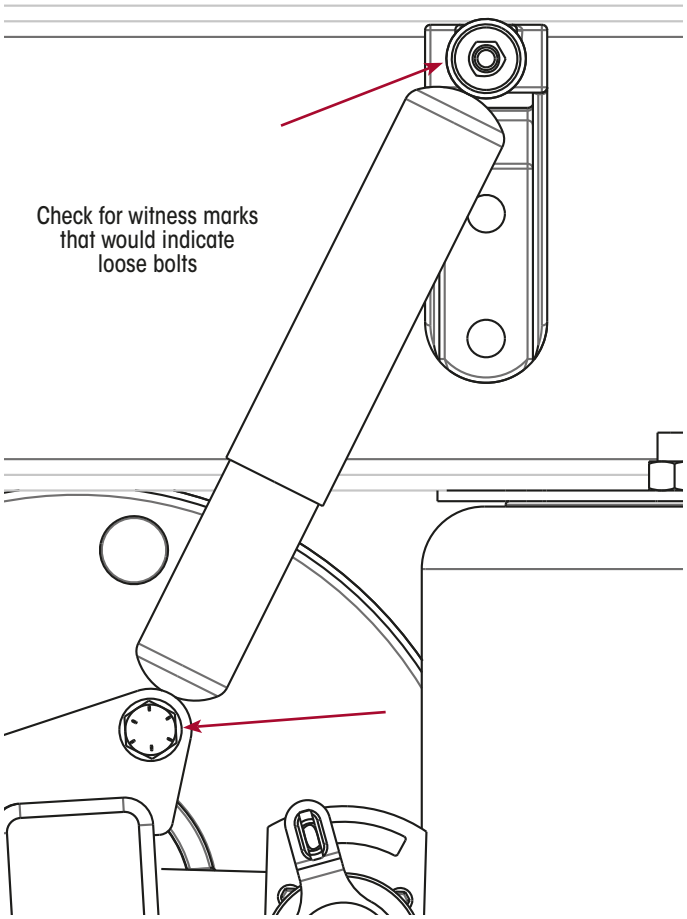


Figure 13: **Check for Movement Witness Marks at Mounting Points**

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 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:

⚠ **CAUTION**: Shock absorbers can reach temperatures sufficient to burn your skin after being driven over corrugated roads. Therefore, it is usually 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.

⚠ **CAUTION**: Do not lift the truck without the shock absorbers in place. If shock absorbers are not in place, overextension of the air springs will occur. Damage may occur to the overextended air springs.

Checking 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 is 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. A truck shock absorber will commonly compress a little easier than on rebound. A trailer shock absorber will usually be firm on both compression and rebound strokes. However, this depends on the manufacturer and intended suspension application.

Mounting Inspection

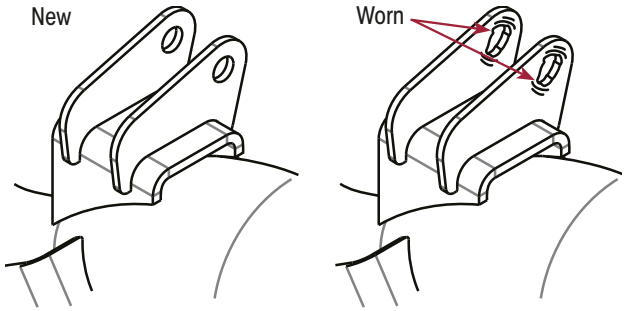


Figure 14: **Inspect Shock Absorber Mounting**

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 14.

Incorrect ride height, fitting the wrong shock absorber and deteriorated shocker bushes can cause damage to shock absorber mountings.

REPLACEMENT

Disassembly

1. Chock the wheels of the vehicle.
2. Remove and discard the upper and lower shock absorber mounting fasteners.
3. Slide the shock absorber out of the upper mounting brackets.
4. Inspect the shock absorber mounting brackets and hardware for damage or wear. Replace if necessary.

Assembly

IMPORTANT: Shock bolts must only be tightened and torqued at the specified vehicle suspension ride height.

1. Install the shock absorber into the upper and lower mounting brackets.
2. Install new shock absorber mounting fasteners.

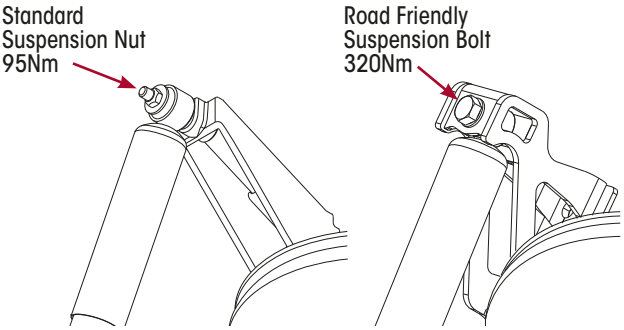


Figure 15: **Upper Shock Absorber Fastener**

3. Tighten the upper shock absorber mount to the specified torque. Vehicles with a standard Suspension mounting locknut must be torqued to 95 Nm. Vehicles with a Road Friendly suspension upper mount bolt must be torqued to 320 Nm. Refer Figure 15 and "Torque Specifications" on page 28.
4. Tighten the lower shock absorber bolt to 320 Nm of torque.
5. Remove the wheel chocks.

AIR SPRINGS

INSPECTION

Air springs will last almost indefinitely in most applications. However, air springs will fail quickly when rubbed, scuffed, or punctured.

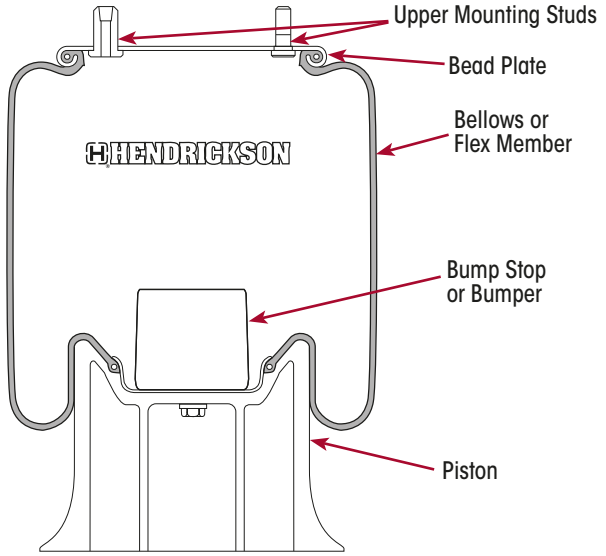


Figure 16: **Check condition of air spring components for serviceability**

Look for chafing or any signs of component damage. Ensure that the upper bead plate is tight against the mounting bracket. Replace all worn or damaged parts. Refer Figure 16.

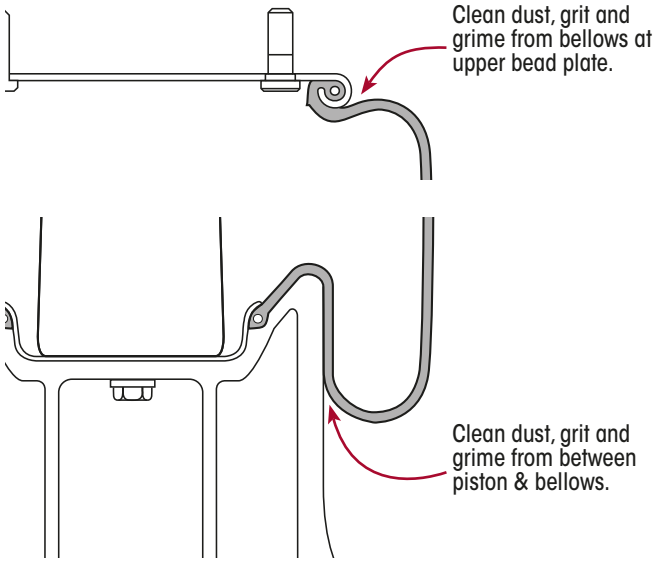


Figure 17: **Clean around air spring bellows**

Air springs should be cleaned regularly of dirt and dust that may build up on the bellows, around the upper bead plate and the piston. This could eventually wear through the rubber bellows and potentially result in early failure. Similarly, lift air springs require cleaning around the bellows and bead plates. Refer Figure 17.

AIR SPRING REPLACEMENT

Disassembly

1. Chock the wheels.
2. Support the frame.
3. Follow manufacturer's recommended procedure to exhaust all air from vehicle suspension system.

⚠**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. Remove the air line from the air spring.
5. Clean and lubricate the lower mounting fasteners with penetrating oil and then remove fasteners from the air springs using hand tools only.
6. Remove the mounting nuts from the upper air spring.
7. Remove the air spring.

Assembly

1. Inspect the mounting surfaces for any damage, replace if necessary.
2. Install the air spring between the frame and beam.
3. Hold the upper air spring tight against the mounting bracket. Tighten the upper air spring mounting nuts to 70 Nm torque.
4. Using hand tools only, install the lower mounting fasteners and tighten to 40 Nm torque.
5. Install the air line fitting to the air spring using a suitable thread sealant (such as Loctite 567).
6. Connect the air line to the air spring.
7. Return air supply to air suspension and allow suspension to slowly inflate.
8. Verify that the air spring bladder inflates uniformly without binding and check for leaks.
9. Remove the frame supports.
10. Remove the wheel chocks.
11. Verify proper ride height adjustment.

LIFT AIR SPRING REPLACEMENT

Disassembly

1. Chock the wheels.
2. Support the frame.
3. Follow manufacturer's recommended procedure to exhaust all air from vehicle suspension system.

⚠**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. Remove the air line from the lift air spring.

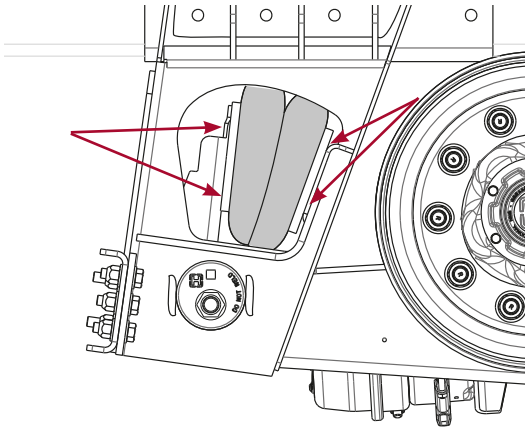


Figure 18: **Access lift air spring bolts with axle lowered**

5. Remove the mounting bolts from lift air spring. Refer Figure 18.

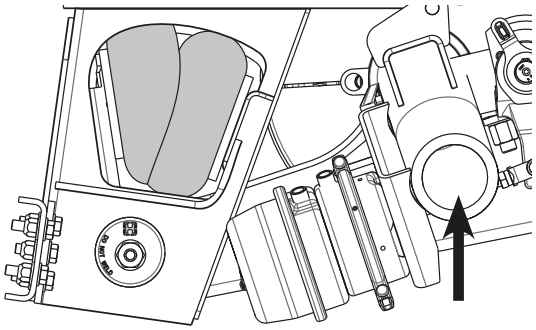


Figure 19: **Raise axle to remove lift air spring**

6. Raise axle and support with stands. Refer Figure 19.
7. Remove the lift air spring.
8. Remove air fitting.
9. Inspect the mounting surfaces for any damage, replace if necessary.

Assembly

1. Install air fitting.
2. Slide lift air spring between the hanger and beam with air fitting facing up.
3. Lower axle assembly.
4. Install mounting bolts and tighten to 35 Nm of torque.
5. Connect the air line to the lift air spring.
6. Return air supply to air suspension and allow axle to lift.
7. Check for air leaks.
8. Remove the frame supports.
9. Remove the wheel chocks.

SUSPENSION HANGERS

INSPECTION

Suspensions hangers should be a maintenance free component. However, this depends to a large degree on whether trucks are serviced correctly, including regular inspections by drivers and maintenance technicians. Inspection by a technician should include checking of the pivot bolt torque at least once every year.

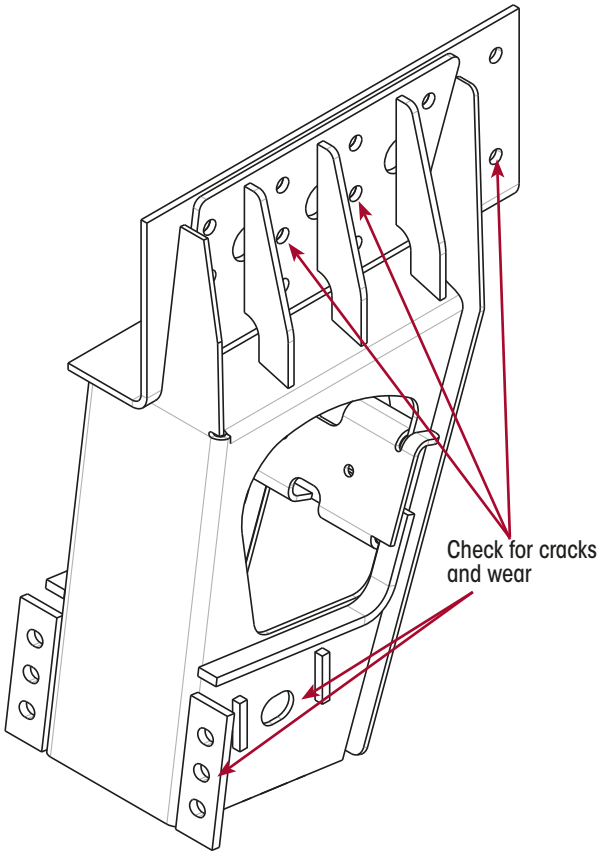


Figure 20: **Check Hanger for Signs of Movement, Wear & Cracks**

Checking the QUIK-ALIGN® pivot bolt torque will make up for any possible give or movement in the pivot connections before they cause any serious problems. The pivot connections should be checked regularly for any signs of movement that would indicate a loose connection. Hangers should also be checked for stress cracks that may occur due to severe driving conditions, poor servicing or due to failure of other suspension components. Refer Figure 20.

If left unchecked pivot connections can move around, wearing away and damaging the components. The TFB, QUIK-ALIGN hardware and wear washers can be replaced relatively easily.

REPLACEMENT

⚠**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 axle is supported to ensure that no damage occurs to air springs or other components.

Disassembly

1. Chock the wheels.
2. Support the frame.
3. Follow manufacturer's recommended procedure to exhaust all air from vehicle suspension system.

⚠**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. Remove the air line from the lift air spring.
5. Remove the mounting bolts from lift air spring.
6. Raise axle and support with stands.
7. Remove the lift air spring.
8. Remove fasteners from the crossmember and remove crossmember.

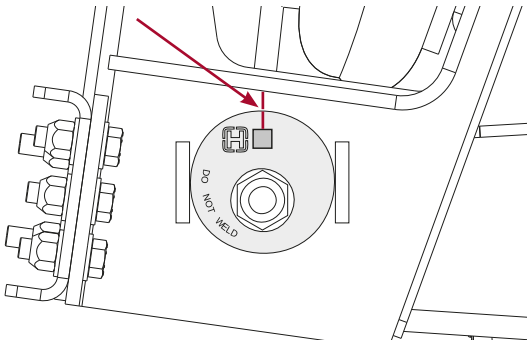


Figure 21: **Mark position of QUIK-ALIGN square drive**

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. Refer Figure 21.

9. Remove the QUIK-ALIGN fasteners and collars. Discard the fasteners. The collars may be reused if they are not damaged.

⚠**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.

10. Remove the fasteners that attach the frame hanger to the vehicle per vehicle manufacturer's specifications.
11. Remove the frame hanger.
12. Inspect mounting surface for any damage or wear.
13. Inspect the pivot bush (TFB) and spacers for wear or damage, replace as necessary.

Assembly

1. Tape pivot spacers into position.
2. Slide the new frame hanger over the pivot bush.
3. Install the new fasteners that attach the frame hanger to the vehicle and tighten per the vehicle manufacturer's specifications.
4. Hold crossmember in place and install fasteners. Tighten to 215 Nm torque.

⚠**WARNING**: Do not assemble QUIK-ALIGN joint without the proper fasteners. Failure to do so can cause adverse vehicle handling, property damage or personal injury and void warranty. Follow vehicle manufacturer's fastener orientation when performing any maintenance, service or repair.

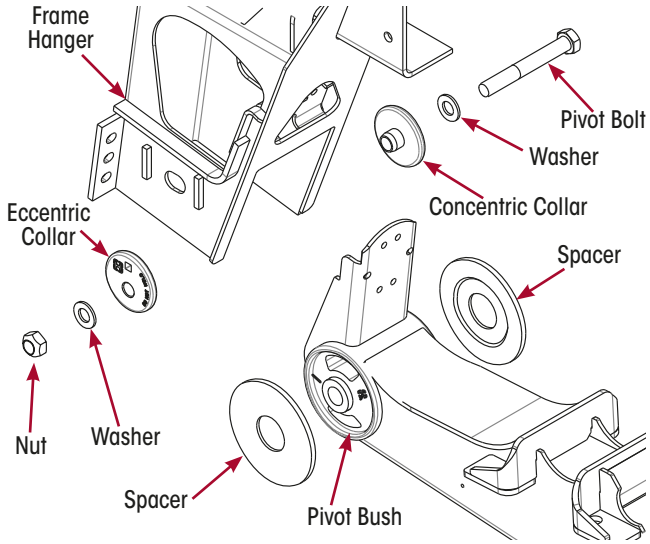


Figure 22: **QUIK-ALIGN® Bolt Configuration**

5. Install the QUIK-ALIGN collars and the new mounting hardware that attach the support beam to the frame hanger. 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. Refer Figure 22.

SERVICE HINT: Each frame hanger will have a pair of QUIK-ALIGN collars, a concentric and an eccentric collar. The eccentric QUIK-ALIGN collars (the ones with the square drive feature) should be mounted on the outboard side of the frame hanger.

6. Slide lift air spring between the hanger and beam with air fitting facing up.
7. Lower axle assembly.
8. Install mounting bolts and tighten to 35 Nm of torque.
9. Connect the air line to the lift air spring.
10. Return air supply to air suspension and allow axle to lift.
11. Check for air leaks.
12. Remove frame supports.
13. Verify that the axle is in proper alignment, see "Tyres & Axle Alignment" on page 17.

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

14. Once the correct axle alignment is verified, tighten the QUIK-ALIGN bolts until the Torx head shears off, which should be at around 800 Nm. See also "Torque Specifications" on page 28.
15. Remove the chocks from the front wheels.

TYRES & AXLE ALIGNMENT

ALIGNMENT

Due to their design, camber and toe-in do not normally affect tyre wear on Hendrickson axles. Neither of these two specifications are adjustable and will generally only be out of specification if there is a problem with the axle.

Thrust Angle

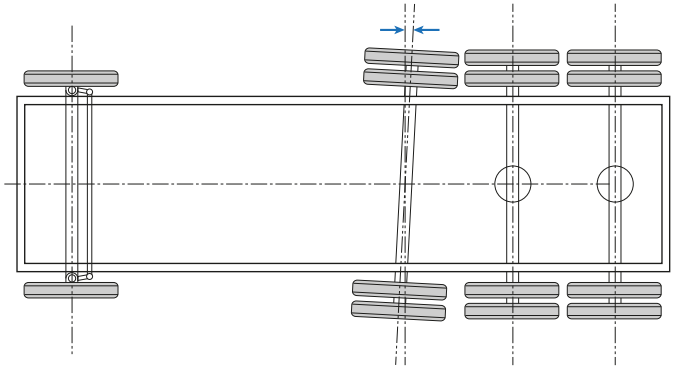


Figure 23: **Axle Thrust Angle**

The thrust angle of each axle is the most important wheel alignment angle for Hendrickson axles. Variations in thrust angle between axles on the same truck form a scrub angle. Refer Figure 23.

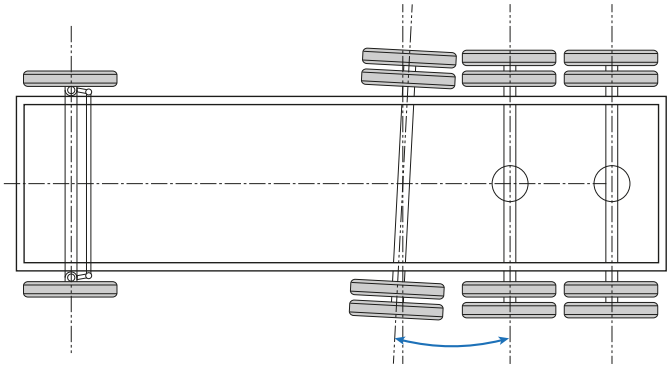


Figure 24: **Axle Scrub Angle**

Scrub Angle is the difference in thrust angles between axles. As the name suggests, scrub angles do cause tyres to scrub and wear due to each axle attempting to follow a different direction as they travel down the road. Refer Figure 24.

Alignment Check

There are a number of checks that need to be carried out before carrying out axle alignment checks.

1. Only check truck alignment in an unladen state.
2. Check the wheels for runout and correct if necessary.
3. Settle suspension by moving truck backward and forward in a straight line and leave parked on a hard level surface.
4. Chock at least a couple of wheels.
5. Release the parking brake.
6. Set ride height to the designed ride height.

Laser alignment equipment allows for greater repeatable alignment accuracy.

The method employed measuring axle alignment will vary depending on which equipment is used. Refer to the equipment manufacturer's guidelines when carrying out the alignment.

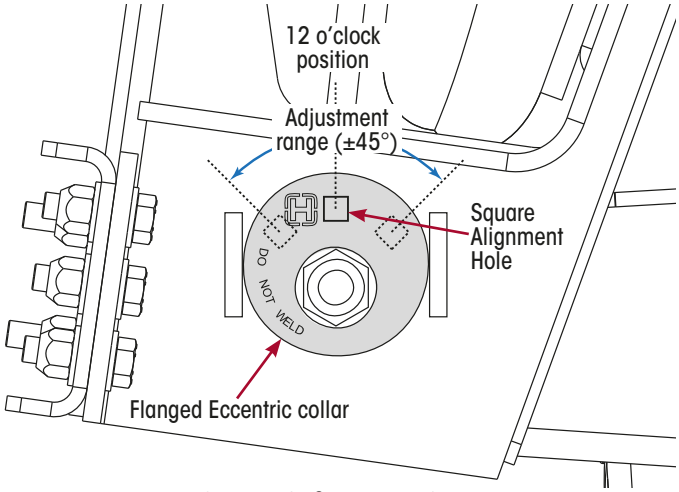


Figure 25: **QUIK-ALIGN® Eccentric Collar Positions**

NOTICE: It is good practice to carry out axle alignment by rotating the eccentric QUIK-ALIGN® collars on both left and right sides (one forward and the other backwards). This ensures that the axle remains centred. Simply moving the QUIK-ALIGN collar on one side may result in an axle that is excessively forward or rearward, which may result in further problems, such as a wheel rubbing on a mudguard. Refer Figure 25.

NOTICE: New QUIK-ALIGN hardware must be used when adjust axle alignment to ensure a reliable assembly.

Axle Alignment Guidelines

The following are guidelines that may assist with servicing and maintenance. Always refer to the appropriate vehicle manufacturer specifications for correct wheel alignment specifications.

Element	Range Guideline (From/To)		Tolerance
Camber (Positive)	10 minutes (0.17°)	30 minutes (0.5°)	±0°10′ (0.17°)
Thrust Angle	0.5 mm / metre to left	1 mm / metre to right	

NOTE: After successfully carrying out an axle alignment, tighten the QUIK-ALIGN pivot bolts until the Torx head shears off. This helps ensure the torque has been correctly set to 800 Nm. The pivot bolt torque should be re-checked after 1,500 km to ensure correct clamping load on the pivot connection. (Refer to "Special Tools" on page 26 for details of the Torx head socket.)

WHEEL ENDS

INSPECTION

Wheel end inspection and maintenance is described in Hendrickson technical publication 97117-250. Please refer to this document for further details regarding maintenance, service and inspection.

Keep in mind that truck use and operating conditions vary greatly depending on vocation (type of work performed). Therefore, truck wheel end inspection and routine maintenance must be tailored for each vocational use. Off-highway use, dirt, dust, grain, corrosive substances, temperature and humidity extremes will all have an impact on maintenance and inspection interval requirements.

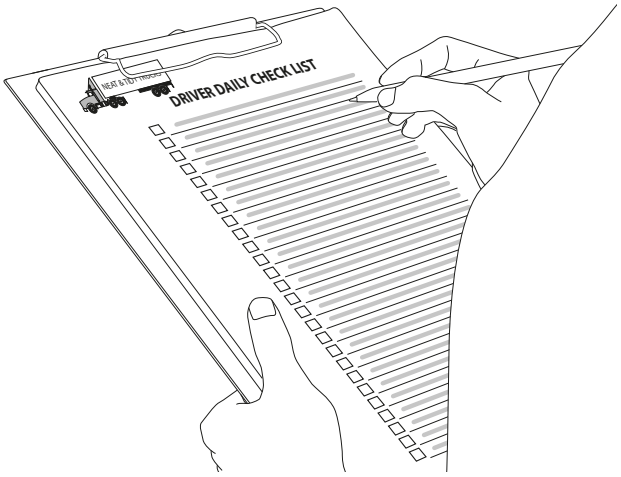


Figure 26: **Pre and post trip check lists are essential**

Operator/Driver Inspection

Hendrickson Asia Pacific recommended that the vehicle operator perform daily pre-trip and post-trip inspections of the wheel ends as an essential part of the routine preventative maintenance schedule.

Pre-Trip Inspection

With the vehicle parked on level ground and with the park brake applied, walk around the vehicle and visually inspect each wheel end assembly for any evidence of the following defects:

1. The presence of lubricant around the brake components, hubcap or on the inside of the wheel.
2. Loose, damaged or missing hubcaps.
3. Loose, damaged or missing fasteners.

If any of the above conditions are found, take the truck out of service until the item can be repaired.

Post-Trip Inspection

Post trip inspection should be performed immediately after parking the vehicle (i.e. with the vehicle on level ground and with the park brake applied), walk around the vehicle and visually inspect each wheel end assembly for the following items:

1. The presence of lubricant around the brake components, hubcap or on the inside of the wheel.
2. Loose, damaged or missing hubcaps.
3. Loose, damaged or missing fasteners.
4. Excessive hub temperature. (Refer Notice below.)

NOTICE: The most effective and safest way to check hub temperatures is with an infrared thermometer. Exact temperatures will vary depending on conditions but should be consistent across all the axles. However, the relative temperatures can also be checked simply by carefully placing the back of the hand against each hubcap. Do not touch hub if significant radiant heat indicates that the temperature is likely to burn.

Temperatures should be reasonably consistent across all wheel ends. If an individual hub exhibits a significantly higher temperature in comparison to others on the truck, a detailed inspection of the affected hub is required.

If any of the above conditions are found, the vehicle should be placed out of service until the item can be repaired.

Figure 27: **If possible use an infrared thermometer**

Maintenance Inspection

At regular intervals, the hub assemblies should be checked for seal leaks and smooth rotation. In addition to the intervals listed below, thorough inspections should be done at each brake reline, since the wheel end will be dismantled enough to easily make these inspections. Inspect wheel studs, clean hub/wheel mating surfaces and drum/wheel pilots whenever brake drums are removed. In addition to the inspection at brake service, always maintain current shop preventative maintenance as well as pre and post-trip inspection practices.

Every Month

Visually inspect the back of hub and hubcap for hub seal and gasket leakage.

Every Three Months

Visually inspect the back of hub and hubcap for hub seal and gasket leakage. Carry out "Smooth & Quiet Rotation Check" on page 21.

Every Twelve Months

Some wheel ends, notably those with standard lithium grease or those used in dusty off-highway conditions, require regular rebuilding every year. If required by product or application, remove and disassemble the hub assemblies. Clean and inspect all components, replace as required. Replace seal and repack bearings with fresh lubricant. For further details refer to Hendrickson technical publication 97117-250.

SERVICE & MAINTENANCE

There are two different wheel end systems that are normally fitted to TOUGHLIFT axles. They are standard service with a three-piece spindle nut or the extended life HXL5® with a PRECISION240® nut system and semi-fluid grease.

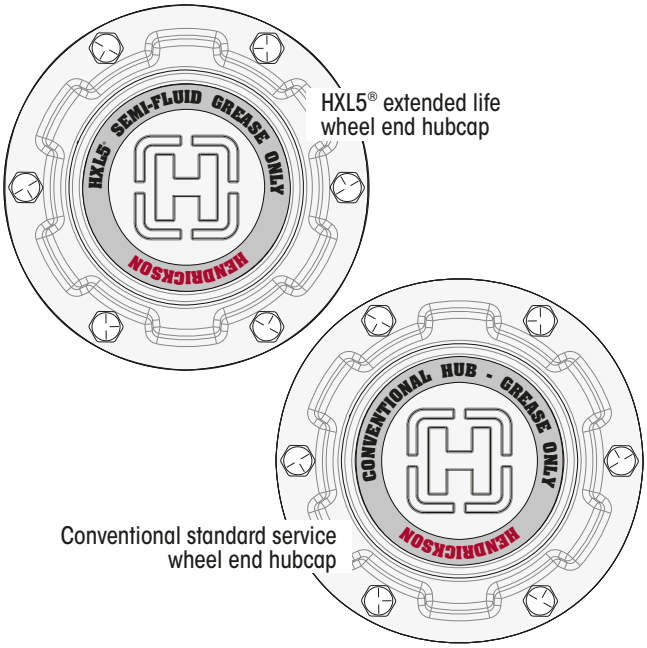


Figure 28: **Hubcap Identification Labels**

Hendrickson hubcaps are fitted with an identification label to assist service and parts identification. Refer Figure 28.

If these labels are damaged or missing, removing the hubcap will assist with identification.

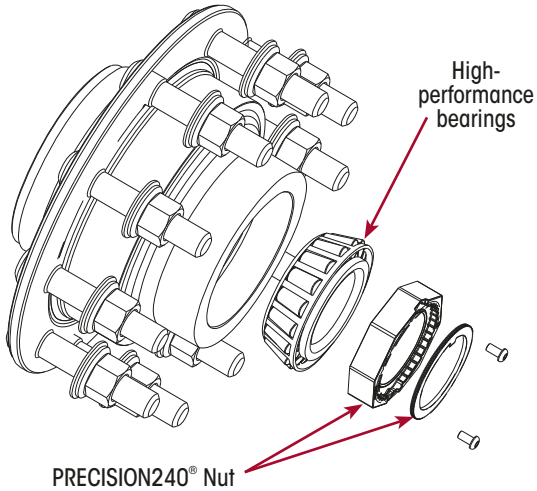


Figure 29: **HXL5® Extended Life Wheel End System**

Removing the HXL5 hubcap will reveal a Hendrickson two-piece PRECISION nut system, with two locking screws, along with red semi-fluid grease. Refer Figure 29.

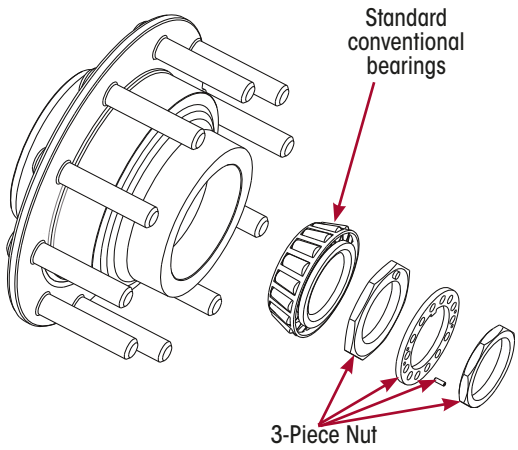


Figure 30: **Conventional Wheel End with 3-Piece Nut System**

Removing the standard service conventional hubcap will reveal a basic three-piece nut system with one grub screw. Refer Figure 30.

NOTICE: Wheel end identification, service, inspection, maintenance and replacement procedures are detailed in Hendrickson technical publication 97117-250. Please refer to this document for further details regarding maintenance, service and inspection.

SMOOTH & QUIET ROTATION CHECK

Many factors can affect smoothness of rotation. Primary causes include:

- Bearing degradation
- Damaged hub seal
- Moisture ingress
- Unwanted debris

NOTICE: A reasonable assessment can be performed without removing tyres and rims. However, this procedure is best performed with hub only.

1. Ensure truck is safe to work on.
2. Back off brake adjustment to ensure there is no brake drag.

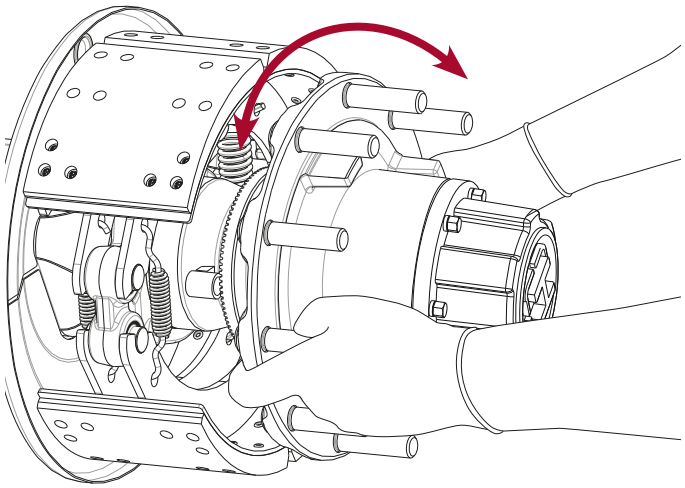


Figure 31: **Check hub for smooth rotation**

3. While maintaining physical contact, slowly rotate hub in both directions at least five revolutions. Refer Figure 31.
4. During rotation, ensure smooth and quiet rotation. Bearings should move smoothly. Feel for any resistance in movement. Any debris in bearings should be felt as it moves over the rollers. If rotation feels normal, return to previous procedure or reassemble and restore trailer to normal operation. If rotation sounds noisy, refer to Hendrickson technical publication 97117-250.

IMPORTANT: If rotation feels rough, sounds noisy, or does not rotate freely. Take corrective action. Do not place the vehicle back into service.

LIFT AXLE CONTROL VALVE

LACV SYSTEM

NOTICE: Comprehensive information regarding Lift Axle Control Valve (LACV) operation, adjustment, installation, and fault diagnosis is detailed in Lift Axle Control Valve Installation & Calibration Manual, 97117-187.

Several different lift axle control systems are available. However, the following information relates purely to trucks fitted with a Hendrickson Auto/Auto LACV, which will lift and lower the axle automatically depending on load. Refer to the component manufacturer instructions for any other type of LACV.

All lift axle control valves have a manual override function that overrides LACV operation and drops the axle permanently. This prevents the axle from raising or lowering at times when it could be unsuitable or dangerous (such as during service).

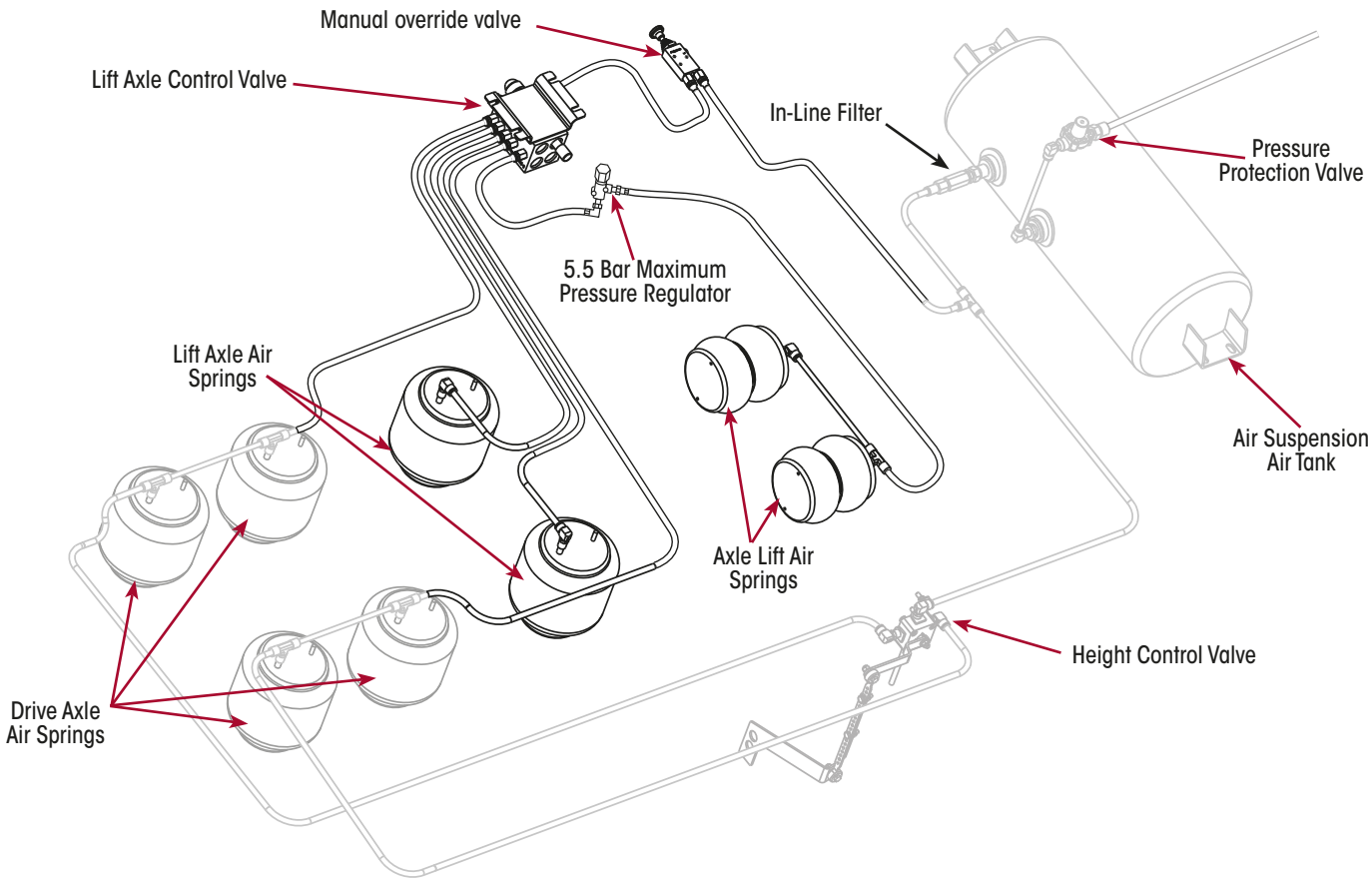
Air suspension systems should have their own dedicated air tank to ensure sufficient pressure is available for all operations. A pressure protection valve must be fitted between the brake and suspension tanks. This valve must be set to between 4.5 to 5.8 bar (65 to 84 psi). This ensures that there is sufficient pressure available to the braking system if there is a major air pressure leak in the suspension system.

The pressure in an air suspension is directly proportional to the load carried. Suspension design, air spring bellows operational diameter and positioning all influence the pressure and load relationship.

Hendrickson lift axle systems are normally calibrated on installation and do not usually require recalibration.

NOTICE: The axle lift air springs should be protected by a pressure regulator to prevent over-pressuring, which may cause severe damage. Hendrickson lift axle control valves include an over-pressure regulator that is set to 5.5 bar (80 psi).

Figure 32: **Typical Lift Axle Control Valve Layout**



LACV INSPECTION

Lift axle control valves (LACV) rely on atmospheric air vents for correct operation of the internal valving. It is therefore vital to valve operation that the enclosures be free of water, dust and dirt. Additionally, the fine valve tolerances require an air supply that is free of any moisture, dust or other contaminants.

Inspection

LACV operation should be checked and have the components inspected at regular intervals. There are no components that require regular maintenance, lubrication, or adjustment. However, a clean dry air supply is essential to LACV operation, and so it is important that the vehicle air supply dryer is inspected and replaced at regular recommended intervals.

⚠ **CAUTION**: Appropriate PPE, including safety glasses, hearing protection and gloves must be worn when working on or operating the LACV.

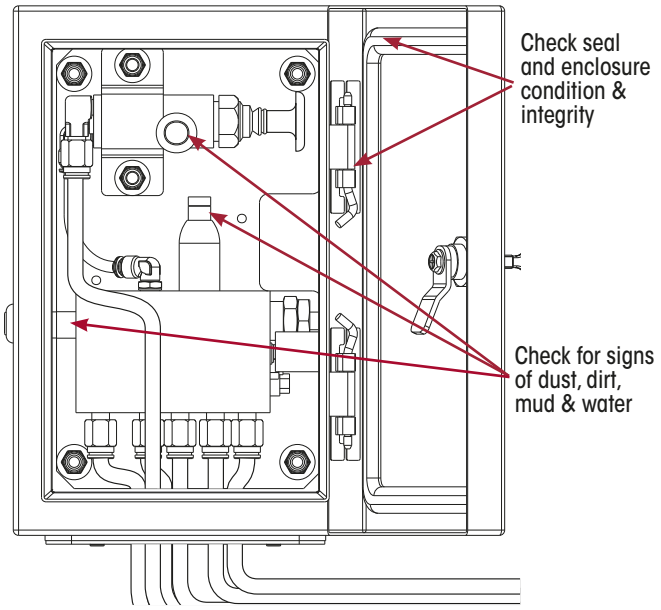


Figure 33: **Inspect LACV & Enclosure**

Check the following items, after ensuring the trailer is unladen, wheels chocked, connected to a suitable air supply and clear of any people or equipment that could come into contact with axle movement.

1. The lift axle should be in its raised position when the trailer is unladen.
2. Open enclosure door and pull out the manual override valve. The axle should lower.

⚠ **CAUTION**: The manual override valve must be pulled out, even if the axle is already lowered due to a fault in the LACV system, to prevent inadvertent movement during repair.

3. Check that the enclosure is clear of dirt and moisture. If necessary, vacuum or blow out dirt. Refer Figure 33.
4. Check the door seal and enclosure to ensure they are clean and in good condition.
5. Check hose connections for air leaks in both raised and lowered conditions.
6. Inspect axle lift air springs for dirt build up and condition of bellows.
7. Check lift air springs for secure mounting.
8. Check suspension mounting, connections and pivot components to ensure they are stable and in good condition.
9. Repair or replace any issues or components as necessary to return system to correct operating condition.
10. When check is complete, push in manual override, lock LACV enclosure and return to trailer to operating condition.

LACV Fault Diagnosis

NOTE: Refer also to the "LACV Troubleshooting Guide" on page 25 to assist in determining fault causes.

The most common issue faced by LACV are contamination, either from internal or external sources. So, first check for contamination before trying to recalibrate the unit. If the valves are sticking because of moisture, corrosion or dust ingress, then recalibration will simply be a waste of time. See box "Calibration Check" on page 24.

1. Check for signs of fine dust, dirt, mud or moisture build up in and around the LACV. Damage caused by contamination through the vents is irreparable. The cause of the contamination will need to be identified and rectified, and the LACV will need to be replaced.
2. Release pressure to the LACV.

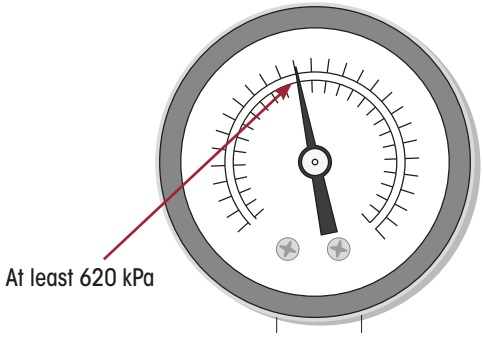


Figure 34: **Test Pressure to HCV**

3. Install a pressure gauge into the line going to the HCV

and ensure that it is getting at least 620 kPa (90 psi). This is because air supply to the air springs is after the brake pressure protection valve and may not always be the same as system pressure. Refer Figure 34.

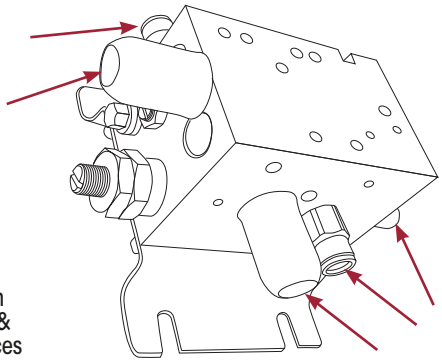


Figure 35: **Check for Signs of Contamination**

4. Release pressure again and remove hoses from LACV and inspect for signs of moisture, dirt, dust or sludge. Damage caused by internal contamination is irreparable. The cause of the contamination will need to be identified and rectified, and the LACV will need to be replaced. Refer Figure 35.
5. If the LACV is operating at the wrong moment, and there are no signs of contamination and the pressures are correct, then it could be that the valve needs recalibration. Determine the required pressures by referring to the trailer manufacturer or to Lift Axle Control Valve Manual, 97117-187.
6. Attempt to carry out calibration by referring to Lift Axle Control Valve Manual, 97117-187. If the valve is still not operating as expected, then replace the LACV. Ensure the new unit is calibrated to suit the trailer before restoring vehicle to active service.

Calibration Check

The calibration of these lift axle control valves will not change significantly over time. If the LACV is not working as expected, then it is unlikely to be rectified by a simple adjustment. This does not mean that the calibration should never be checked. However, if checking calibration, it is vital that it is only carried out with the use of air pressure regulator and pressure gauges as shown in Lift Axle Control Valve Manual, 97117-187. Simply moving the adjustment settings in the hope that it will start operating can cause two problems.

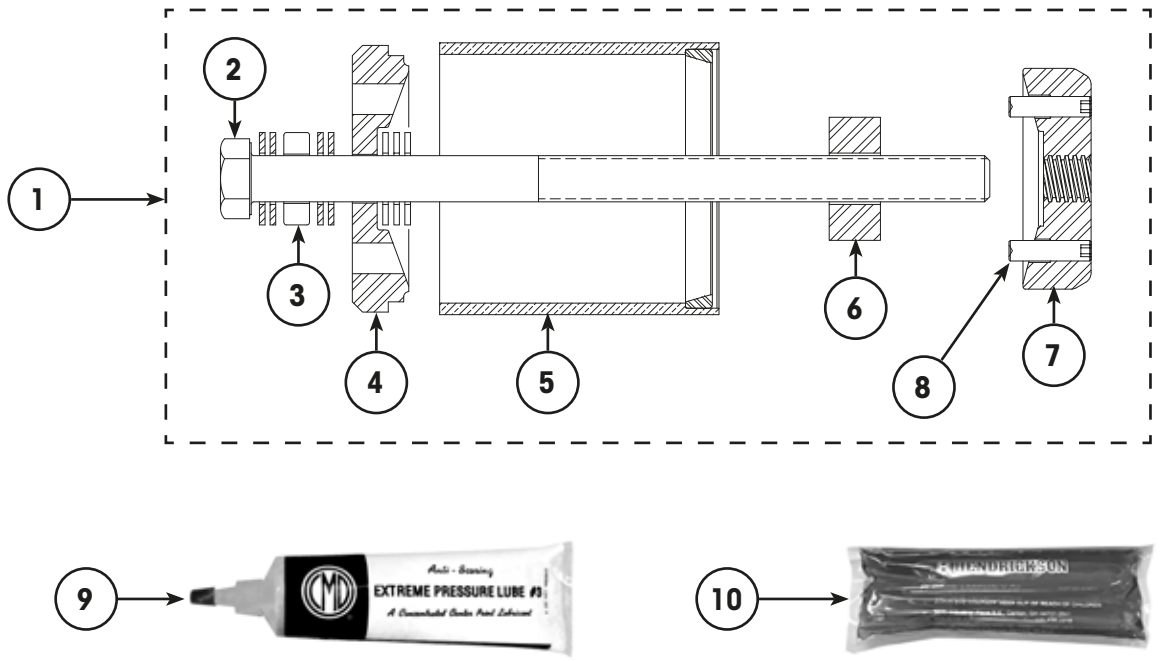
- Firstly, you will waste considerable time with little likelihood of success.
- Secondly, the axle may stay raised when the remaining axles are over their legal mass limit. This would breach road regulations and may result in the issuing of a penalty notice.

LACV TROUBLESHOOTING GUIDE

Problem	Possible Cause	Correction
Automatic lift or manual override does not function *	Lift axle control valve contaminated due to moisture in vehicle air supply or control box filled with dust or water.	Clean air supply system. Repair or fit air supply drier and/or filters. Replace lift axle control valve. Replace control box if cracked, damaged or seals have deteriorated. Refer "LACV Fault Diagnosis" on page 23.
	Kinked, pinched, or broken air line between LACV and lift air springs or between LACV and supply tank.	Inspect and replace pinched, kinked or broken air lines.
	Supply air pressure insufficient to operate lift mechanism.	Verify that there is a minimum of 690 kPa (100 psi) at the lift axle control valve. Use a calibrated gauge at port 1.
	Air kit control panel not properly plumbed.	Confirm that the air kit control panel is plumbed per the engineering installation diagram. Refer LACV Manual, 97117-187.
	Unladen weight exceeds suspension transition mass.	Check unladen vehicle mass using vehicle scales or weighbridge. Check for cause of extra weight. This may be due to additional body work, extra reinforcement attached, or a build-up of waste cement around the chassis on mixers.
Slow lift or lower times	Lift axle control valve contaminated due to moisture in vehicle air supply or control box filled with dust or water.	Clean air supply system. Repair or fit air supply drier and/or filters. Replace lift axle control valve. Replace control box if cracked, damaged or seals have deteriorated. Refer "LACV Fault Diagnosis" on page 23
	Insufficient air flow or volume being delivered to lift axle control valve or air springs.	Find restriction and repair. This will usually be from an air line that is kinked or clamped between two components.
Air leaks	Leaking from an air line fitting.	Remove the air line and reinstall confirming the line is fully seated. If problem persists, cut off a short section of line and reinstall to confirm a clean cut that will interface properly with the fitting.
	Leaking from the lift axle control valve.	Control valve sealing surfaces may be damaged due to external contamination. Determine source of contamination, rectify source and replace valve assembly. Refer "LACV Fault Diagnosis" on page 23
	Leaking from the override valve.	Valve sealing surfaces may be damaged due to external contamination. Determine source of contamination, rectify source and replace valve.
	Leaking from an air spring.	Air spring that are leaking from bellows or bead plate areas must be replaced to ensure continued operation.
Lift air springs damaged	Pressure limiting regulator set to incorrect pressure.	Check pressure setting to ensure it is no higher than 5.5 bar (80 psi).
	Pressure limiting regulator not installed.	Check for installation of pressure limiting regulator.
	LACV valves jammed or hoses routed incorrectly	Check hose routing. Check LACV operation and replace if necessary.

***** Lift axle control valve calibration does not change substantially with time. If the LACV is not operating correctly, then it is unlikely to be corrected with a simple adjustment. Refer "LACV Fault Diagnosis" on page 23 and "Calibration Check" on page 24.

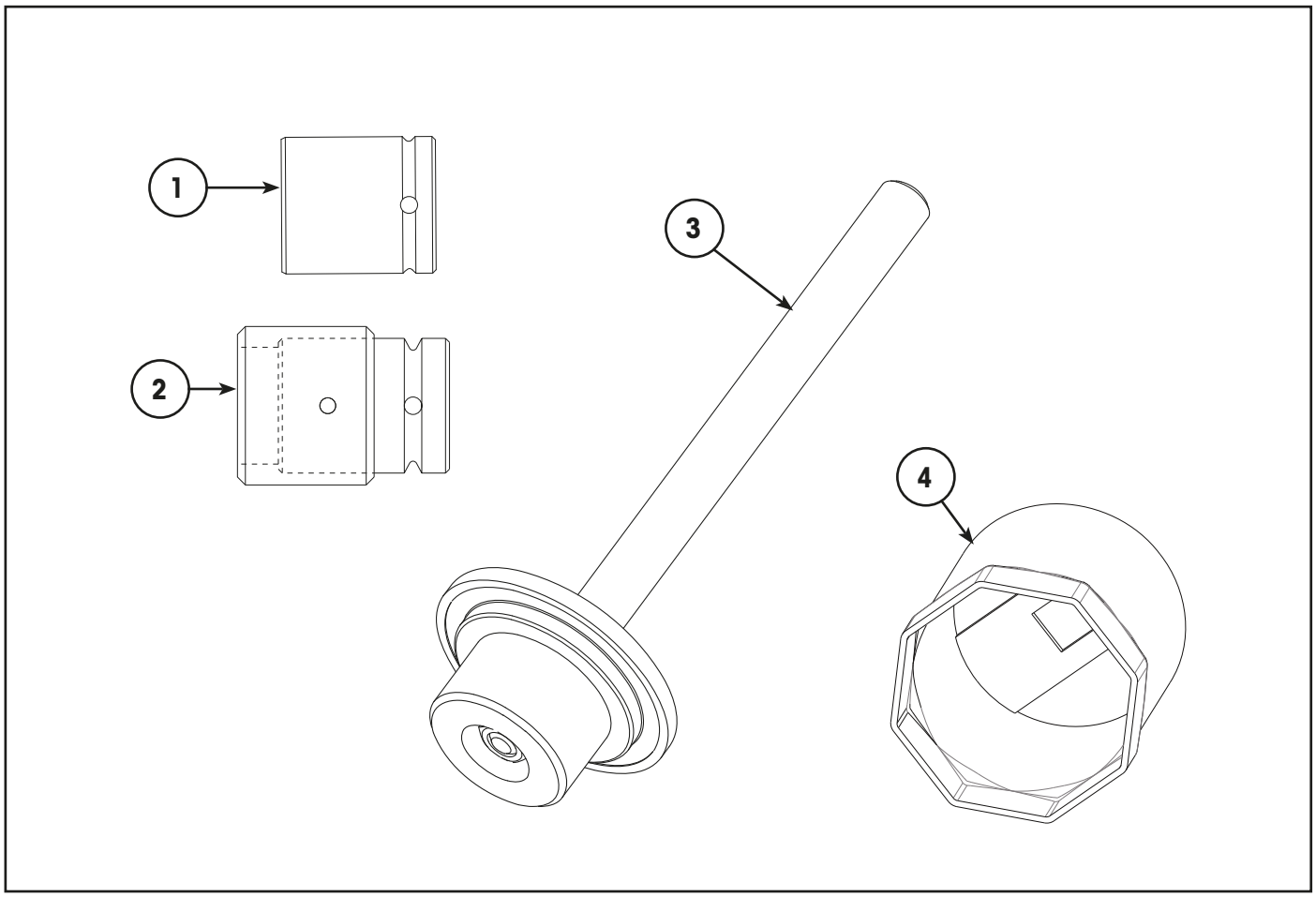
SPECIAL TOOLS



Item	Part Number	Description	Qty	Notes
1	S-21307A	Tool Kit - Wide 6" TRI-FUNCTIONAL™ Bush	1	
2	S-21308	Bolt, Acme Thread – 18 Inch for Wide 6"	1	Included in item 1.
3	98762-001	Bearing, Thrust – TFB™ Tool All	1	
4	S-21312	Plate, Front – TFB Tool Wide 6"	1	
5	S-21313	Tube, Transition – TFB Tool Wide 6"	1	
6	S-21314	Spacer, Removal – TFB Tool All	1	
7	S-21309	Plate, Rear Drive – TFB Tool Wide 6"	1	
8	SA-2800-4	Set Screw – 1/2-13 x 4" – Removal only.	2	
	SA-2800-7	Set Screw – 1/2-13 x 2" – Installation only.	2	
9	S-21337	Grease, Extreme Pressure	1	Refer to Note below. Essential for use with tool on installation. Included in item 1.
10	A-14011	Lube Pack - TRI-FUNCTIONAL Bush	1	To lubricate bushes on installation.

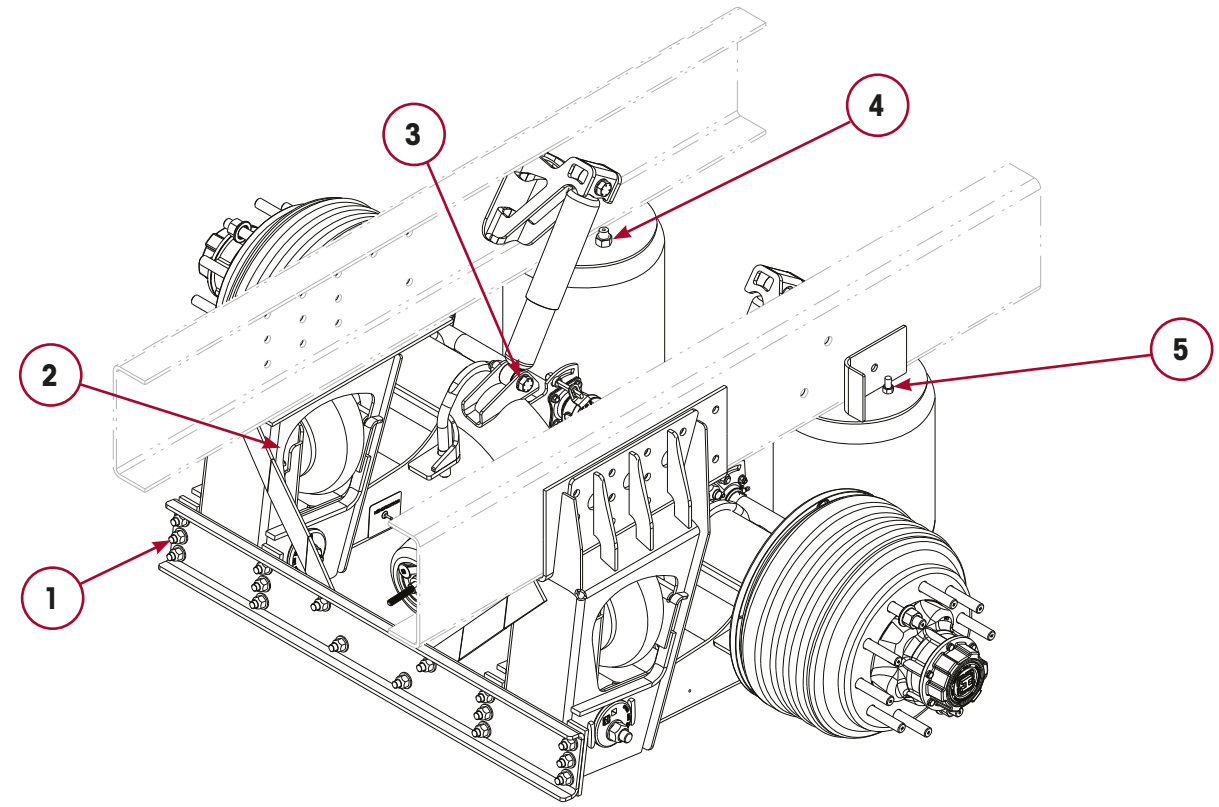
NOTE: The TRI-FUNCTIONAL™ tool kits are supplied with one tube of extreme pressure grease. It is essential to use this grease on the tool thread to avoid thread form damage. Do not apply this grease to the bushes.

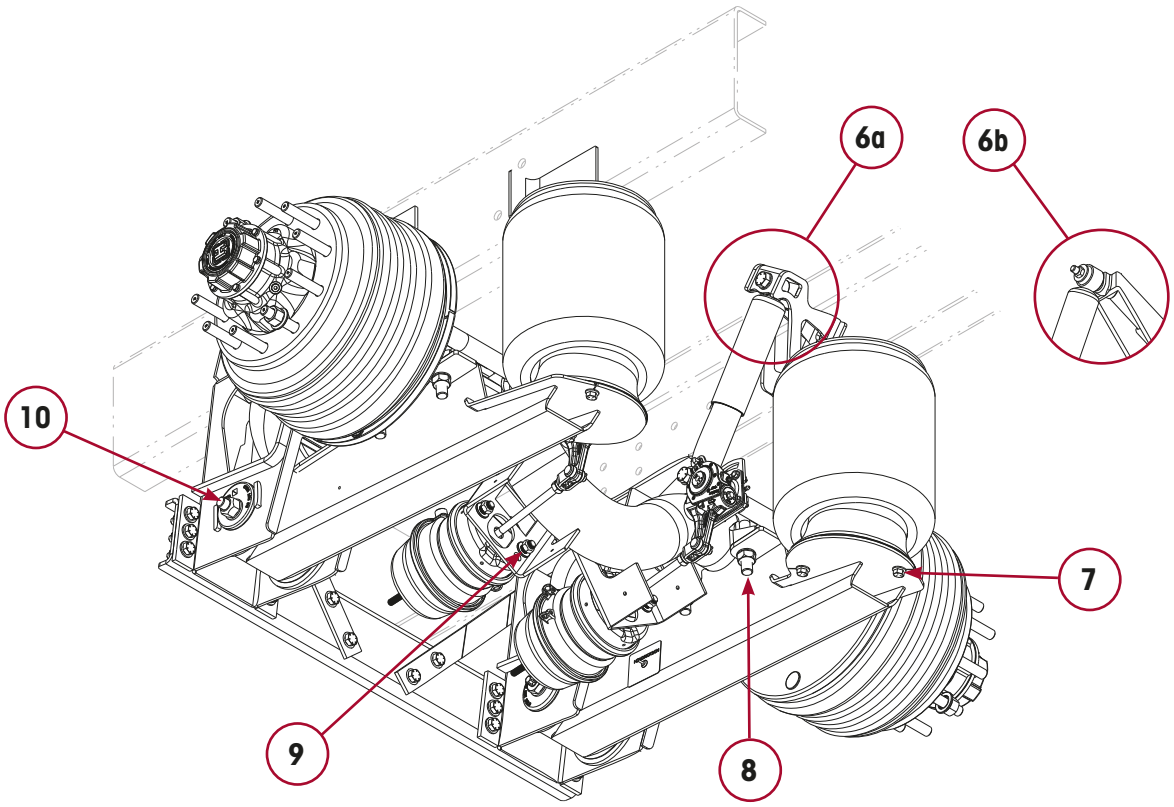
SPECIAL TOOLS



Item	Part Number	Description	Qty	Notes
1	S-24303	Hendrickson E20 Torx Socket	3/4 inch	Cost effective tool for occasional use (not recommended for use in high-volume production).
	S-24536	Hendrickson E20 Torx Socket	1 inch	For medium-duty use (dealers, repair facilities, etc.) or for those with one-inch drive air tools.
2	S-25119	Hendrickson E20 Torx Socket With Sleeve	1 inch	Ideal for high-volume truck and trailer production environments or manufacturing facilities.
3	S-32121-1	Hub Mounted Seal Insertion Tool – HN	1	Suits hub mounted HN seal.
4	S-32120-1	Socket, HN Spindle Nut – 3-13/16 Inch	1	Suits HN 3-piece inner nut.
	S-32120-2	Socket, HN Spindle Nut – 3-1/4 Inch	1	Suits HN 3-piece outer nut.

TORQUE SPECIFICATIONS





FASTENERS

When servicing a vehicle, Hendrickson recommends replacing all removed fasteners with new equivalent fasteners. Always maintain correct torque values as specified. If non-Hendrickson fasteners are used, follow the torque specifications listed in the vehicle manufacturer's service manual.

TORQUE SPECIFICATION TABLE

Item	Description	Size	Torque	
			Nm	ft. lbs.
1	Crossmember Bolt	5/8"-18 UNF	215	160
2	Lift Air Spring Bolt	3/8"-16 UNC	35	25
3	Shock Absorber Lower Bolt	3/4"-10 UNC	320	235
4	Air Spring Upper Nut	3/4"-16 UNF	135	100
5	Air Spring Upper Nut	1/2"-13 UNC	70	50
6a	Shock Absorber Upper Bolt – Road Friendly Suspension	3/4"-10 UNC	320	235
6b	Shock Absorber Upper Nut – Standard Suspension	5/8"-11 UNC	95	70
7	Air Spring Lower Bolt	1/2"-13 UNC	40	30
8	Axle U-Bolt	7/8"-14 UNF	710	520
9	Brake Chamber Nut	5/8"-11 UNC	150	110
10	QUIK-ALIGN® Pivot Bolt	7/8"-9 UNC	800*	590*

* Shear bolts are used for QUIK-ALIGN® pivot bolts. Tighten until the TORX head shears off on initial assembly. Subsequent rechecking must be carried out with a calibrated torque wrench. These bolts must be replaced whenever they are removed. For more details regarding shear head bolts refer to Hendrickson Technical Bulletin 97117-251, which is available on the www.hendrickson.com.au website.

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

Revisions Table

DATE	REV	PAGE	DESCRIPTION
Nov-2023	B	8, 9	Remove TFB function & spacer images.
Nov-2023	B	12, 28, 29	Add road friendly suspension shock torque.
Nov-2023	B	18	Amend general wheel alignment specifications.
Nov-2023	B	22-25	Replace LACV operational diagrams & adjustment with inspection and diagnosis.
Nov-2023	B	27	Update socket numbers, ECN 11969.
Nov-2023	B	29	Amend air spring upper nut torque, ECN 11787.
Nov-2023	B	All	Minor formatting and textual refinements.
Feb-2025	C	4,18,19	Minor textual amendments.

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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