Technical Publication

TRR
Rear Suspension System

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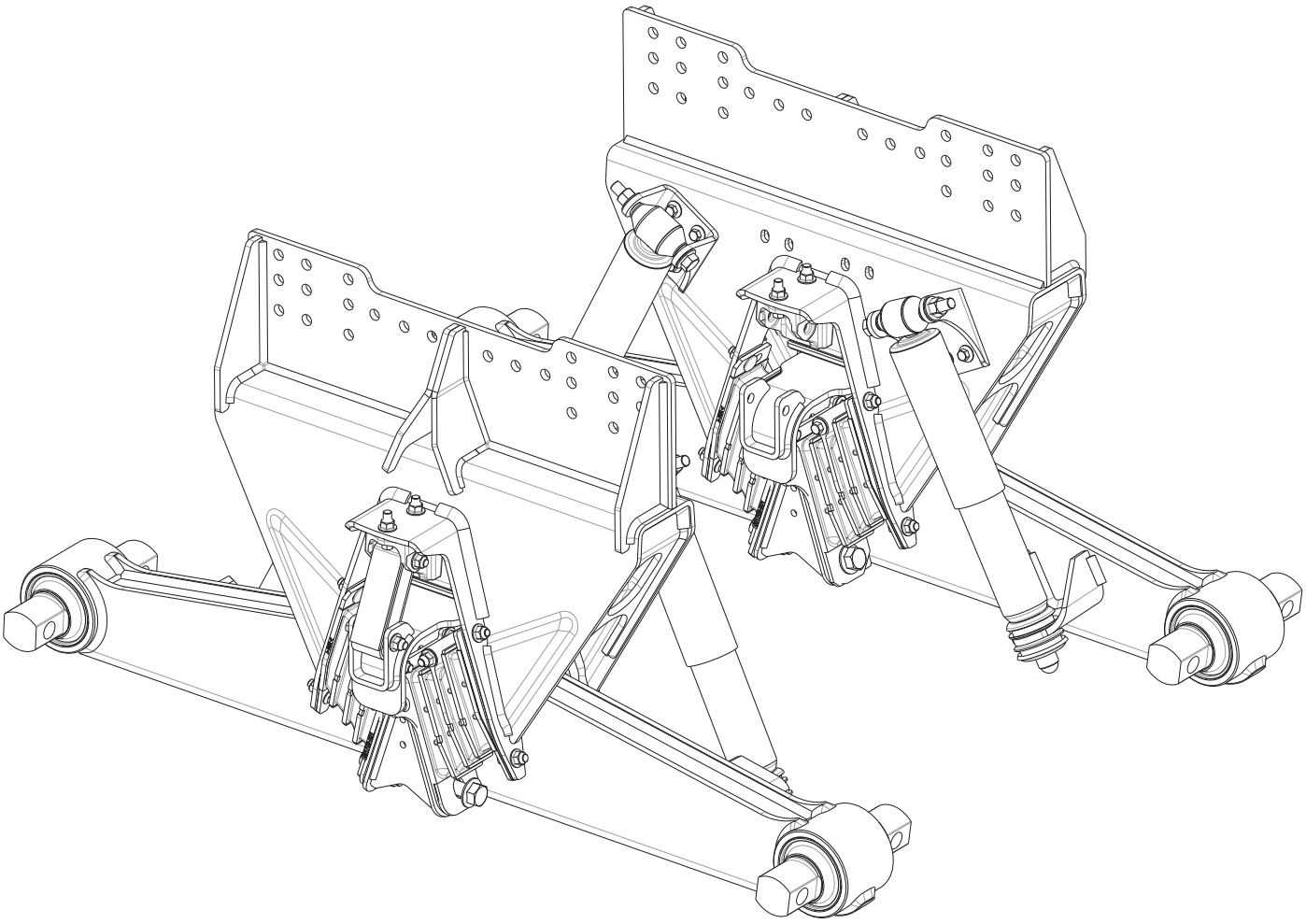

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INTRODUCTION

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of the W&C TRR rear suspension system.

NOTE The images shown are general in nature only and may not be an exact representation of the suspension being serviced.

It is important to read and understand this entire technical publication 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 TRR suspension system.

W&C reserves the right to make changes and improvements to its products and publications at any time. The latest revision of this publication is available online at the Hendrickson www.hendrickson.com.au website.

W&C recommend using only genuine W&C parts for servicing this suspension system to ensure design integrity.

PRODUCT DESCRIPTION

Advanced engineering design methods and experience gathered over years of experience led to the TRR, a rugged, yet lightweight rubber rear suspension that saves weight over competitive suspensions for greater payloads and route consolidation.

Suspension weight is reduced for greater payloads and improved durability through innovative design, higher strength materials and advanced manufacturing methods.

Major Components

- **Equalising beam** – Formed and robotically-welded equalising beam provides a narrow profile for weight savings, distributes load equally between both axles for improved traction, lowers the centre of gravity to increase stability, and establishes a solid axle connection for improved handling.
- **Bar pin end connection** – Rugged axle connection that extends bush life, and allows easy axle alignment and serviceability.
- **Progressive load spring** – Engaged for a smooth ride and additional stability.
- **Rubber tie-bar bolster springs** – The unique design works with the progressive load spring to deliver enhanced empty ride quality and loaded stability.

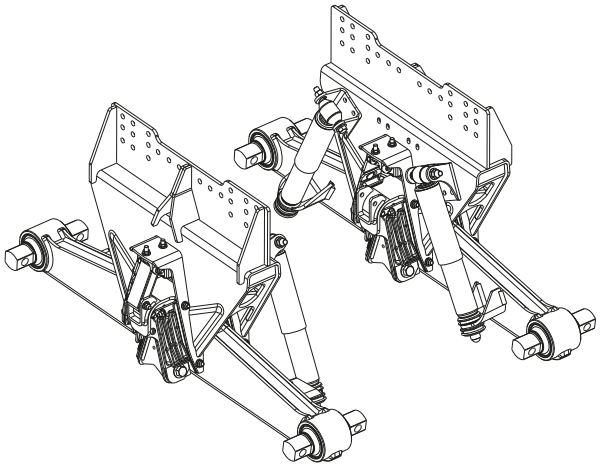


Figure 1: W&C TRR Rear Suspension

W&C TRR SPECIFICATIONS

Description	Specification
Suspension Weight[1] (1350 mm beam length)	373.4 Kilograms
Suspension Rating	26 Metric Tons
Gross Combination Weight (GCW) Approval	36 Metric Tons
Diagonal Articulation[2]	161 Millimetres
Ride Heights (loaded)[3]	271 Millimetres
Axle Spacing[4]	1,350 Millimetres

1. Suspension weight does not include V-torque rods and axle brackets.
2. Suspension articulation may exceed vehicle's capability and may be limited by vehicle manufacturer; vehicle manufacturer installed axle stops may restrict suspension's articulation.
3. W&C-TRR ride height measurements are taken from the centreline of the axle to the bottom of the truck chassis rail.
4. Contact W&C for availability of beam lengths.

W&C approves the use of the W&C-TRR suspension in tractors and straight trucks in the following vocational truck applications: dump, concrete mixer, refuse, logging, and crane / boom platform. All such applications must comply with applicable W&C specifications and must also be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration.

Contact W&C and the respective vehicle manufacturer for approval of additional applications.

IMPORTANT SAFETY NOTICES

Proper maintenance, service and repair are important to the reliable operation of the suspension. The procedures recommended by W&C 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.

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.

EXPLANATION OF SIGNAL WORDS

Hazard "Signal Words" (Danger-Warning-Caution) appear in various locations throughout this publication. Information accented by one of these signal words must be observed to help minimise the risk of personal injury to service personnel, or possibility of improper service methods which may damage the vehicle or render it unsafe.

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

Additional 'Notes' or 'Service Hints' are utilised to emphasise areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these signal words as they appear throughout the publication.

⚠ **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 death or serious injury.

⚠ **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 service being performed a little easier and/or faster.

Also note that particular service operations may require the use of special tools designed for specific purposes. These special tools can be found in the Special Tools Section of this publication.

SAFETY PRECAUTIONS

⚠ 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 parts, 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 values

at all times. Check torque values on a regular basis as specified, using a torque wrench that is regularly calibrated. Torque values specified in this technical publication are for W&C supplied fasteners only. If non-W&C fasteners are used, follow torque specification listed in the vehicle manufacturer's service manual.

⚠ WARNING: LOAD CAPACITY

Adhere to the published capacity ratings for the suspension. Add-on axle attachments and other load transferring devices 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: MODIFYING COMPONENTS

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

⚠ 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 equalising beam. Do not connect arc welding ground line to the equalising beam. Do not strike an arc with the electrode on the equalising beam and axle. Do not use heat near the equalising beam assembly. Do not nick or gouge the equalising beam. Such improper actions can damage the equalising beam assembly; and can cause adverse vehicle handling and possible personal injury or property damage.

⚠ 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.

⚠ CAUTION: PROCEDURES AND TOOLS

A technician using a service procedure or tool which has not been recommended by W&C must first satisfy themselves that neither their 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: SUPPORT VEHICLE PRIOR TO 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.

⚠ CAUTION: IMPROPER VEHICLE LIFT OR SUPPORT

Improper vehicle lift or support methods can cause damage to the suspension tie-bar bolster springs and may void any warranty coverage. Do not lift or support the vehicle at only one of the two rear drive axles. When lifting or supporting the vehicle using the drive axles, ensure both drive axles are lifted and supported together. Read, understand and comply with any additional vehicle lift and support instructions provided by the vehicle manufacturer or lift equipment manufacturer.

⚠ WARNING: V-TORQUE RODS

For vehicle stability the TRR suspension incorporates V-torque rods supplied by vehicle manufacturer. 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.

⚠ 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 explode.
5. Acidic solutions cannot be used on aluminium components.
6. 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 cause damage to the parts and void warranty.

SPECIAL TOOLS

Special tools are required to replace the bar pin style end bushes.

Installation and removal tools are available from OTC tools. To find out more visit www.otctool.com

A receiver tube is also required for bush removal. This tool can be fabricated in-house from a appropriate grade steel to the dimensions shown in the diagram.

Bush Installation Tools

Use these tools with the beam removed from the truck, and in conjunction with OTC No. 51100 press plate and a 100-tonne hydraulic shop press.

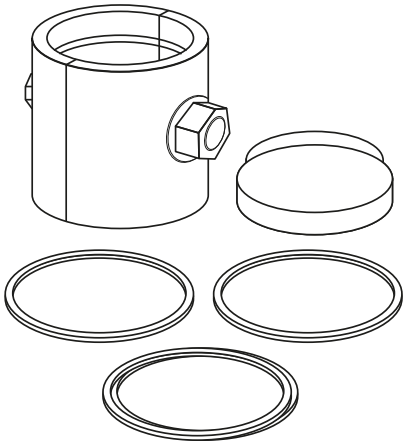


Figure 2: Bar Pin Adapter Set

Bar Pin Adapter Set

- W&C Part No. ***066086-103***
- OTC Part No. ***1757***

Bush Removal Tools

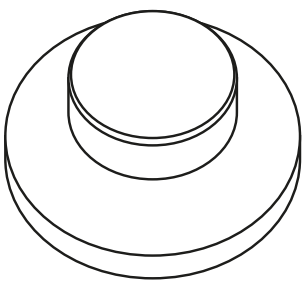


Figure 3: Press Adapter

Press Adapter

- W&C Part No. ***066086-104***
- OTC Part No. ***206457***

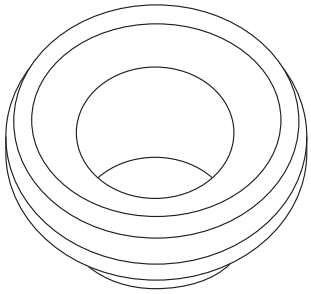


Figure 4: Removing Adapter

Removing Adapter

- W&C Part No. ***066086-105***
- OTC Part No. ***302030***

Shop Fabricated Removal Tool

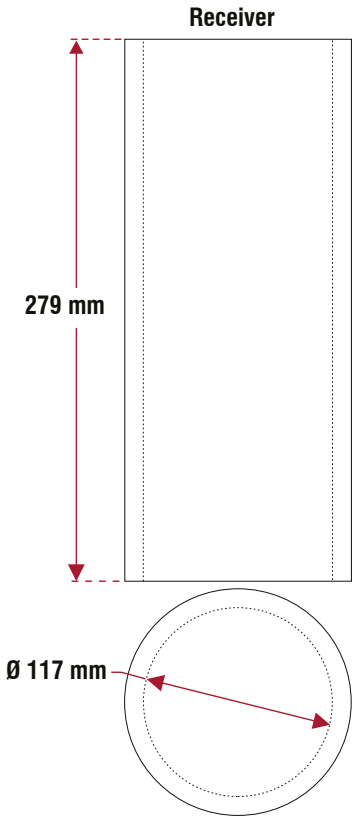


Figure 5: Shop Fabricated Tool

A tool to these dimensions should be manufactured to use with the shop press and OTC tools to facilitate bar pin style end bush replacement.

PREVENTIVE MAINTENANCE

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the W&C-TRR suspension system and component parts function to their highest efficiency. Look and replace any bent, cracked, worn or damaged parts. Refer to "Table 1: Recommended Inspection Intervals" for recommended service inspection intervals.

W&C RECOMMENDED INSPECTION INTERVALS

Inspection	Pre-Delivery Inspection	First In-Service Inspection	Preventive Maintenance
Visually inspect suspension for proper assembly and function. Inspect fasteners for proper torque as recommended in the "Torque Specifications" on page 24 with special attention to the following suspension connections: • Saddle to equalising beam • Equalising beam end • Bolster springs to frame hanger • Load spring rebound bracket to frame hanger	Within the first 500 Kilometres	Within the first 2,000 Kilometres	Every 12 months
Visually inspect for proper assembly and function. Check for all 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, bent or cracked parts			
Inspect progressive load springs, rebound straps, tie-bar bolster springs and shock absorbers (if fitted).			Every 3 months
Verify the lateral alignment of axles are within the vehicle manufacturer's tolerances.			Every 12 months

Table 1: Recommended Inspection Intervals

COMPONENT INSPECTION

Following the appropriate inspection procedures is important to help ensure the proper maintenance and operation of the W&C-TRR suspension system and component parts. Look for and replace worn, damaged, bent or cracked parts.

- Equalising Beam Assembly — Check the overall condition of the equalising beam for dents or other damage. Check for any metal-to-metal contact in the equalising beam end connections. Refer "Equalising Beam End Connection" on page 10.
- Fasteners — Look 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 recommended torque specifications for W&C supplied fasteners in "Torque Specifications" on page 24 of this publication. For fasteners not supplied by W&C, refer the vehicle manufacturer. Use a calibrated torque wrench to check torque.

NOTE W&C recommends the use of Class 10.9 bolts, and Class 10 locknuts. Washers are not necessary when flanged fasteners are used.

- Frame Hangers / Saddle — Look for any signs of wear and damage. Check all attaching fasteners for proper torque. Visually inspect for signs of movement on the frame rail or damage. Inspect the area around the gussets for cracks.
- Wear & Damage — Inspect all parts of the suspension for wear and damage. Look for bent or cracked parts.
- Progressive Load Spring, Tie-bar Bolster Spring & Rebound Strap, Shock Absorber — Refer "Progressive Load Spring", "Tie-Bar Bolster Springs", "Rebound Straps" and "Shock Absorbers" (if fitted) inspection in this section.

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

Progressive Load Spring

A visual inspection of the progressive load spring is required every three months.

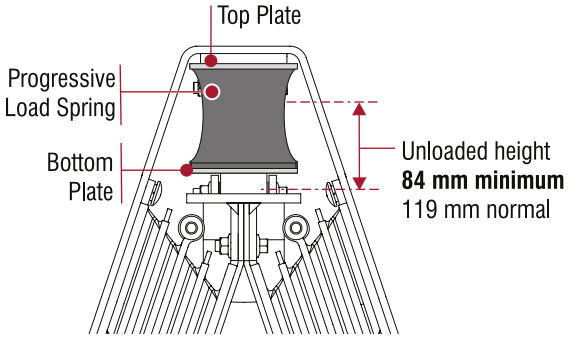


Figure 6: Progressive Load Spring Inspection

Progressive load spring — If the progressive load spring is:

- Visual damage, replace as outlined in "Progressive Load Spring" on page 16.
- With the vehicle in the unloaded condition, measure the height of the progressive load spring from the top plate to the bottom plate, refer Figure 6. Normal height is 119 mm, if the measurement height is 84 mm or less, replace as outlined in "Progressive Load Spring" on page 16.

Tie-Bar Bolster Springs

Inspect the tie-bar bolster springs every 3 months, refer Figure 7. Actual tie-bar bolster spring service condition and performance may vary depending upon suspension and vehicle configuration, operation, service and other factors.

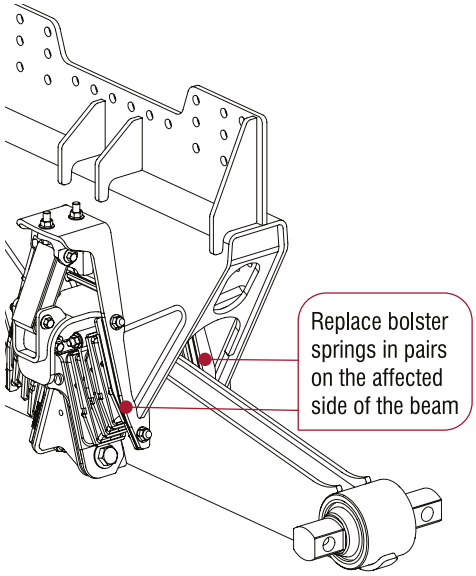


Figure 7: Tie-Bar Bolster Spring Inspection

Inspection

The following inspection guidelines are intended to assist vehicle operators and maintenance personnel in examining the tie-bar bolster springs and determining when replacements may be needed.

In the event one tie-bar bolster spring on one side of the equalising beam shows signs of damage or excessive wear, W&C recommends that both bolster springs installed on that equalising beam be replaced, refer Figure 7. When the bolster springs are replaced on one side only, the vehicle may lean slightly.

The new bolster springs will return the vehicle to its original condition and will also tend to settle to some degree. The following procedure is recommended for proper inspection.

1. Chock the front wheels to prevent movement of the vehicle during inspection of the suspension.
2. Raise rear of vehicle between approximately 100 mm and 125 mm (just prior of lifting the rear wheels off ground) and support with stands.
3. Inspect all tie-bar bolster springs using the following criteria. If cuts, splits, or bonding separation are detected in the rubber, measure the depth of the damaged area using a machinist scale to determine if replacement is required.
    - Bent, burred or overhanging edges of the tie-bar bolster spring metal plates may occur due to mishandling in service. If the rubber is not trapped, and there are no sharp metal edges in contact with the free surface of the rubber, this condition is acceptable.
    - Creases formed by folding of the rubber surface under load are acceptable. These creases appear as stripes on the surface, polished by wear or covered with tacky rubber.
    - Minor oil and grease contamination in the rubber due to vehicle operation is acceptable. A slight change in shape of the rubber due to permanent set should not be mistaken for oil and grease contamination. Certain softening of the rubber surface is acceptable. However, unacceptable swelling due to contamination will require tie-bar bolster spring replacement. In the unloaded condition, if the bolster spring rubber is swollen beyond the edge of the metal plates, then tie-bar bolster spring replacement is necessary.

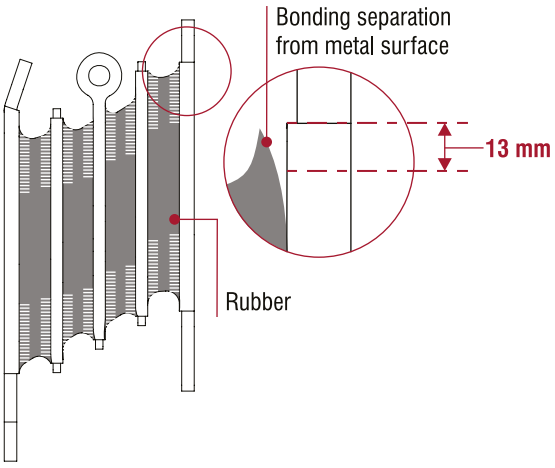


Figure 8: Inspect for Splits or Separation

- Cuts or Splits in the rubber of over 25 mm in length and an average depth of 10 mm are not acceptable and require tie-bar bolster spring replacement. In particular, look for signs of cuts or splits in the rubber at points indicated in Figure 8 as "///////".
- Bonding separation of the rubber from a bonded metal surface to a depth of up to 13 mm is acceptable. If any bonding separation is more than 13 mm deep, both bolster springs should be replaced on the affected side of the vehicle (refer Figure 8). An unloaded bolster spring may be inspected for any bonding separation by measuring at points indicated in Figure 8 as "///////". Any thin film or other residual rubber material on the metal plates resulting from the moulding process may be ignored during inspection.

Rebound Straps

The rebound straps assist in preventing overextension of the tie-bar bolster springs during vehicle operation. If the rebound strap is torn, frayed or not intact, replace as outlined in "Rebound Strap" on page 14.

Axle Bracket

The axle brackets are furnished and welded into position by the vehicle or axle manufacturer.

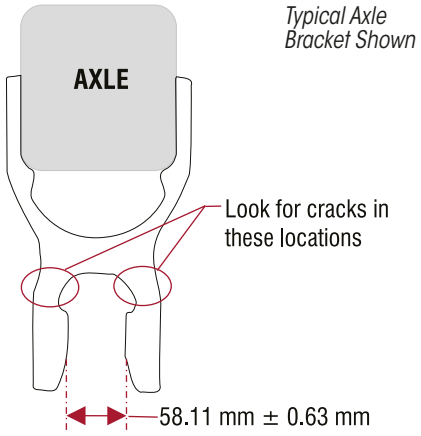


Figure 9: Axle Bracket Side View

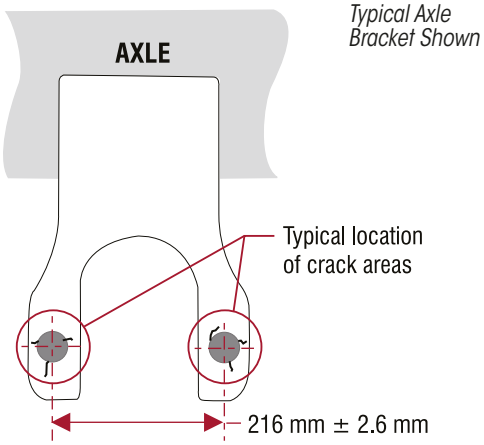


Figure 10: Axle Bracket Front/Rear View

- Visual Inspection — When inspecting the equalising beam end connection also inspect the axle brackets for damage or cracks, refer Figure 9. Any axle bracket that is found damaged or cracked must be repaired or replaced.
- Physical Inspection — When an equalising beam is removed for repair, or an inspection of the equalising beam end connection reveals movement:
  - Inspect the axle brackets for damage or cracks in the locations shown in Figure 9 and Figure 10. Any axle bracket that is found damaged or cracked must be repaired or replaced.
  - Measure the distance between the axle bracket legs for correct width, refer to Figure 9 and Figure 10 for measurement location and dimensions. An axle bracket outside of the measurement range must be repaired or replaced.

Consult the vehicle manufacturer for inspection, component repair and replacement instructions.

Equalising Beam End Connection

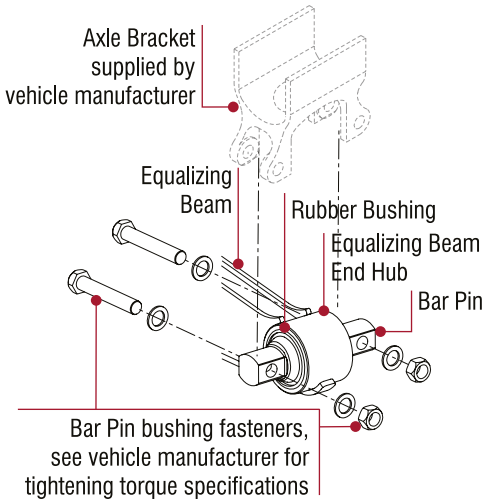


Figure 11: Equalising Beam End Connection

The equalising beam end connection for the W&C-TRR is a bar pin style rubber bush, refer Figure 11.

An inspection of the equalising beam end connection is necessary when a vehicle is in the shop for major repair work or every six months, whichever comes first.

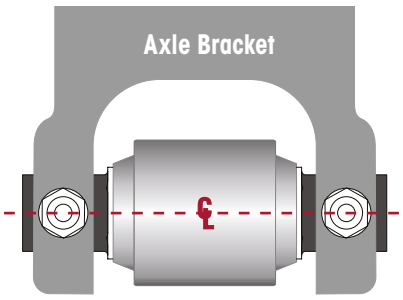
NOTE The equalising beam end connections require that the fasteners are tightened to torque specifications to maintain the clamp load of the axle bracket legs to the bar pin. All bush motion is accommodated by rubber deflection. Refer to "Torque Specifications" on page 24.

Visual Inspection

1. Chock the wheels.
2. Visually inspect the equalising beam end connection for signs of excessive wear or looseness.

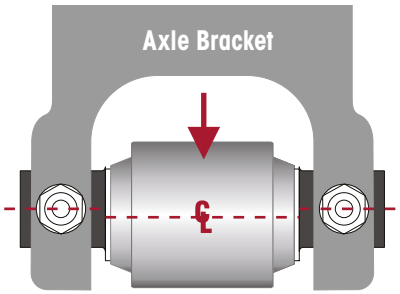
SERVICE HINT: An equalising beam end connection that is visibly cleaner than the other connections may indicate a loose connection.

- Look for worn, frayed or distorted rubber in the bar pin beam end bush.
- Look for the equalising beam to be lower in the axle bracket, refer Figure 12 and Figure 13.
- If the bar pin beam end bush is visually offset a floor jack test should be performed, refer to the Physical Inspection.



A **GOOD** bush will result in the equalising beam end hub appearing to be **centred** with the centreline of the bar pin in the axle bracket

Figure 12: A Good Equalising Beam Bush



A **WORN** bush will result in the equalising beam end hub appearing to be **offset/below** with the centreline of the bar pin in the axle bracket

Figure 13: A Worn Equalising Beam Bush

Physical Inspection

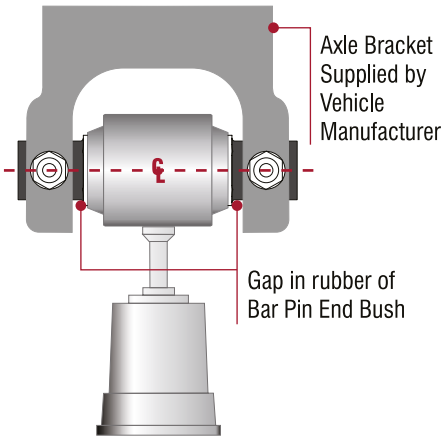


Figure 14: Bush Physical Inspection

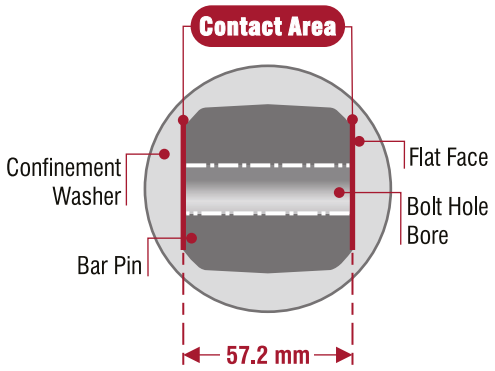
NOTE The gap at each side of the visible rubber on the lower part of the bar pin end bush is normal, refer Figure 14, it is not an indication to replace the bush. All rubber end bushes are in compression with the load bearing on the top side, the lower side of the rubber is slightly relieved, allowing the rubber to move inward, and a gap appears.

⚠ **WARNING**: If bar pin end bush movement or looseness is noted in the equalising beam end hub, do not operate the vehicle. Replace the rubber end bushes and all connecting parts. The above condition can result in costly repair, downtime, possible separation of components, adverse vehicle handling, property damage, or personal injury.

1. If bar pin movement or looseness is detected in the equalising beam end hub, do not operate the vehicle. Check and record torque values, as received, for each beam end fastener.
2. Correct torque values as required making sure all fasteners are tightened within the vehicle manufacturer's specifications.
3. Recheck the equalising beam end connections for signs of looseness.
4. If bar pin looseness is still detected in the equalising beam end hub, do not operate the vehicle. One or more components will require replacement. For details refer "Equalising beam" on page 18 or "Bar Pin End Bushes" on page 19.

Bar Pin End Bush

Visual Inspection



If bar pin measurement is **less than 57.2 mm**, replacement is required.

Figure 15: Bar Pin End Bush Visual Inspection

An indication that the bar pin end bush requires replacement is when one or more of the following conditions apply:

- If the contact area, refer Figure 15 (the flat face area where bar pin contacts the axle bracket) reveal signs of excessive wear. A bar pin thickness measurement of less than 57.2 mm.
- If bar pin bolt holes bores reveal signs of elongation or wear, refer Figure 15.

V-Torque Rods

NOTE V-torque rods are not supplied by W&C but are a required component. W&C is not responsible for components supplied by the vehicle manufacturer. For assistance with inspection, maintenance and rebuild instructions on these components refer vehicle manufacturer.

For vehicle stability the TRR suspension incorporates V-torque rods supplied by vehicle manufacturer. 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.

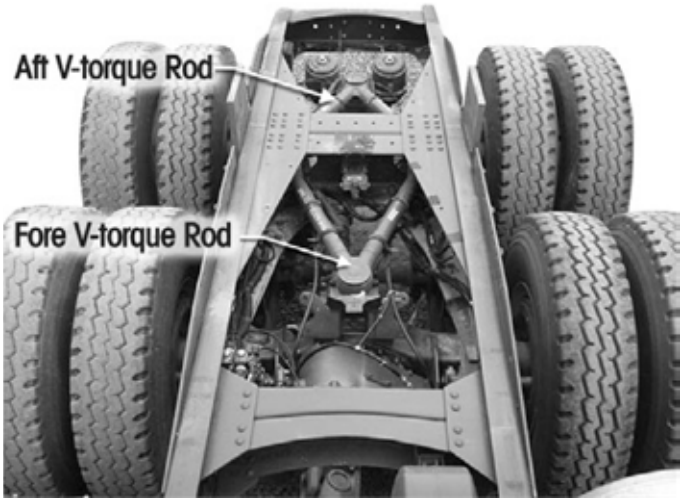


Figure 16: V-Torque Rods

The W&C-TRR suspension is equipped by the vehicle manufacturer with V-torque rods that control axle movement during braking, accelerating, and cornering, refer Figure 16. The mounting brackets at the axle ends of the V-torque rods are furnished as part of the axle housings by the vehicle manufacturer or the axle manufacturer. The length of the V-torque rods is determined by the vehicle manufacturer for optimum drive line angles.

The frame rail ends are bolted into the brackets supplied by the vehicle manufacturer.

The V-torque rods must be connected and in good working condition when operating the vehicle. Consult the vehicle manufacturer for inspection, component repair or replacement instructions.

Shock Absorbers
(If fitted)

Leaks

Figure 17: Misting Versus Leaking

Look for oil or fluid leaking from the shock absorber body. Over time a normally operating shock absorber will release a mist of oil that may collect dust and grime. A misting shock absorber does not need replacement. Wipe any built up oil and dust from the shock absorber body after inspection, which will allow a clearer assessment at the next service inspection.

However, any signs of wet or running leakage means the shock absorber needs replacement. Refer Figure 17.

Physical Damage

Check for dents, cracks, or corrosion on the shock absorber housing and mounting points.

Bushes & Mounts

Inspect rubber bushes for wear, cracks, or looseness.

ALIGNMENT & ADJUSTMENTS

DRIVE AXLE ALIGNMENT

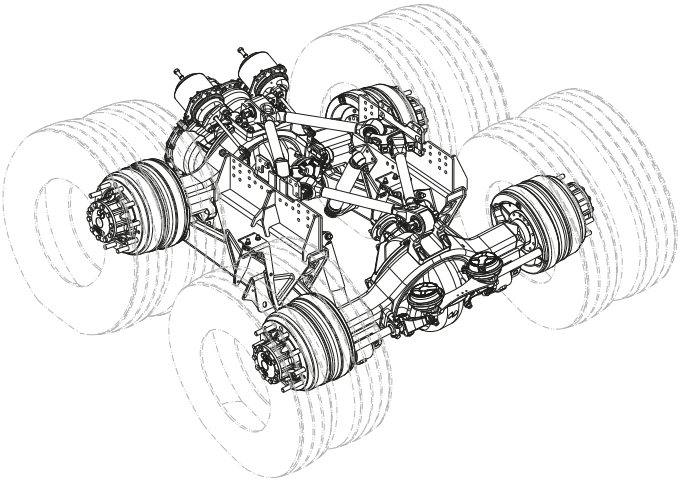


Figure 18: Drive Axle Alignment

- The primary control for alignment is the location of the frame hanger assemblies as installed on the frame rails by the vehicle manufacturer, and the location of the axle brackets on the axles as installed by the axle or vehicle manufacturer. No alignment adjustment is available, refer to the vehicle manufacturer with any questions regarding lateral alignment.
- Axle centring and pinion angles are controlled by the V-torque rods. Design, layout, and installation responsibility belongs to the vehicle manufacturer. Contact the vehicle manufacturer if there are issues relating to axle centring or pinion angles.
- Ride height is controlled by the design of the suspension. No adjustment is possible. However, wear of the progressive load spring may result in slightly lower ride height over time. Replacement of worn progressive load springs should restore ride height to original specifications.

COMPONENT REPLACEMENT

FASTENERS

W&C recommends that when servicing a vehicle, replace all the removed fasteners with new equivalent fasteners. Always maintain correct torque values. Check torque values as specified. Refer to "Torque Specifications" on page 24 of this publication. If non-W&C fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual.

NOTE W&C recommends the use of Class10.9 bolts, and Class 10 locknuts. Washers are not necessary when flanged fasteners are used.

FRAME HANGER

Disassembly

1. Chock the front wheels of the vehicle.
2. Remove upper rebound strap fasteners.

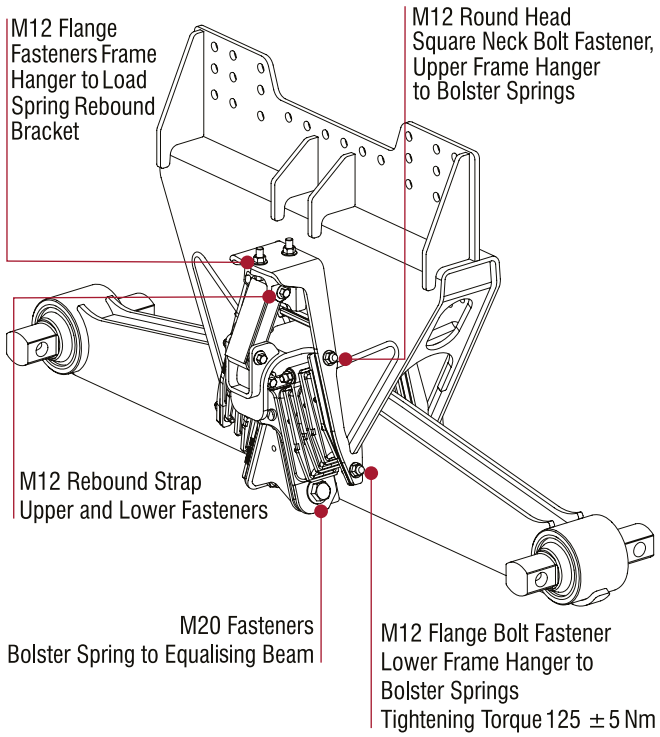


Figure 19: Frame Hanger Fasteners

3. Remove the M12 fasteners from the frame hanger to the tie-bar bolster springs, refer Figure 19.
4. Remove M12 fasteners from frame hanger to load spring rebound bracket, refer Figure 19.
5. Raise the frame enough to allow a gap between the tie-bar bolster springs and the frame hanger.
6. Remove the frame fasteners, refer manufacturer's guidelines.

⚠ **WARNING**: The weight of the frame hanger is approximately 52 kilograms. Care should be taken at removal and installation to prevent personal injury or damage to components.

7. Remove the frame hanger.

Assembly

1. Mount the new frame hanger to the frame rail, refer vehicle manufacturer's recommended torque specification for proper torque values.
2. Completely lower the vehicle.

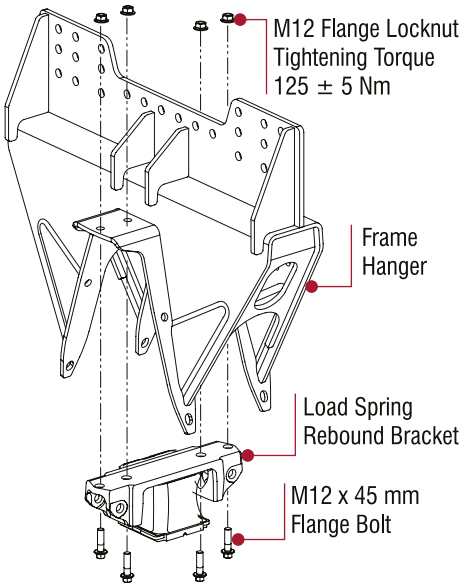


Figure 20: Hanger to Load Spring Fasteners

3. Install the M12 fasteners into the load spring rebound bracket and frame hanger. Tighten to ***125 Nm*** torque, refer Figure 20.

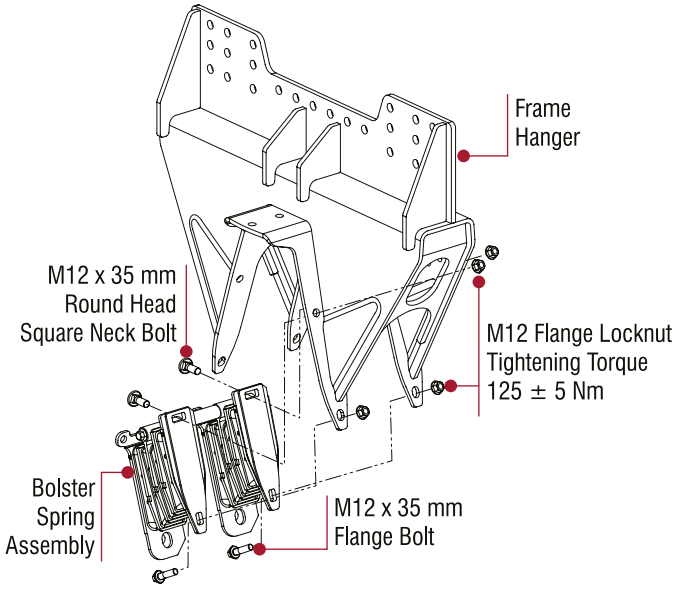


Figure 21: Hanger to Bolster Spring Fasteners

4. Install the tie-bar bolster spring assembly to frame hanger and tighten to ***125 Nm*** torque, refer Figure 21.
5. Install the upper rebound strap fastener and tighten to ***125 Nm*** torque, refer Figure 21.
6. Remove wheel chocks.

REBOUND STRAP

Disassembly

1. Chock the front wheels of the vehicle.

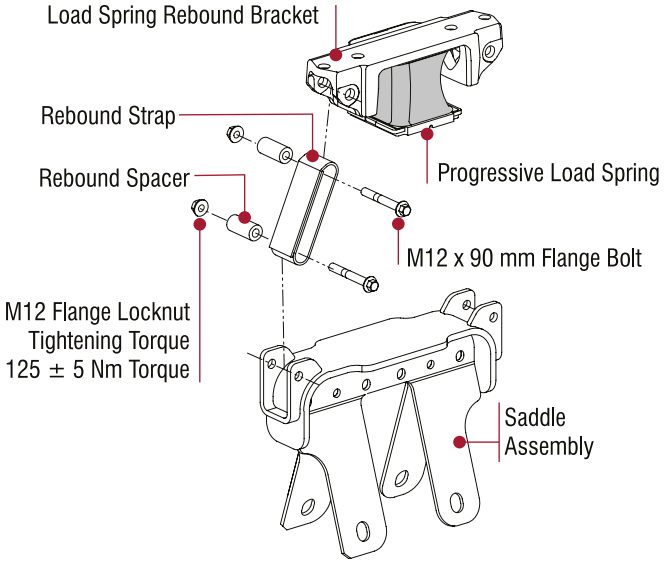


Figure 22: Rebound Strap Assembly

2. Remove and discard the M12 upper and lower rebound strap M12 fasteners and spacers, refer Figure 22.
3. Slide the rebound strap out of the saddle assembly.
4. Remove and discard rebound strap.

Assembly

⚠ **CAUTION**: The rebound strap must be installed with the sewn area facing away from the saddle and equalising beam. Failure to do so will result in premature wear of the rebound strap.

1. Slide the rebound spacer through ***lower*** rebound strap loop.

NOTE Ensure the sewn area on rebound strap is facing away from the saddle and equalising beam.

2. Install the M12 fasteners into the saddle assembly.
3. Tighten the M12 fastener to ***125 Nm*** torque, refer Figure 22.
4. Slide the rebound spacer through the ***upper*** rebound strap loop.
5. Install the M12 fasteners into the load spring rebound bracket.
6. Tighten the M12 fastener to ***125 Nm*** torque, refer Figure 22.
7. Remove the wheel chocks.

TIE-BAR BOLSTER SPRINGS

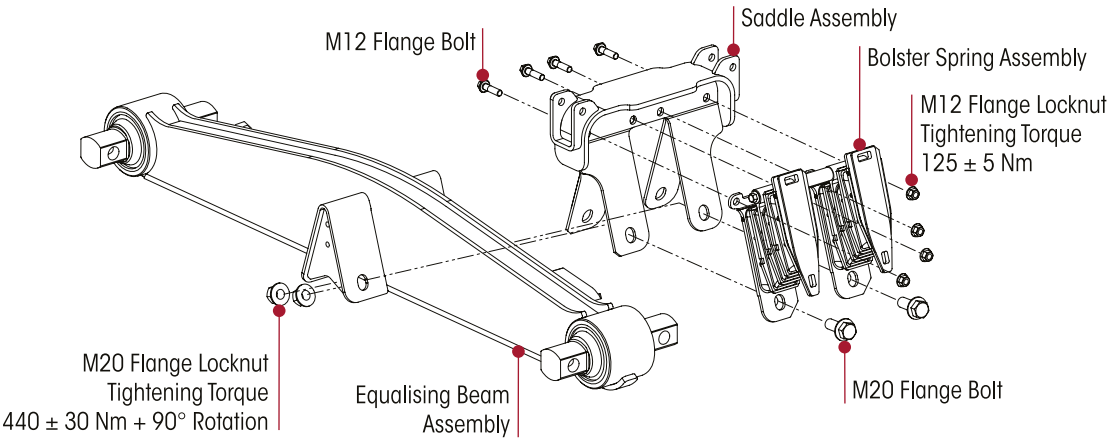


Figure 23: Saddle and Bolster Springs

Disassembly

1. Chock the front wheels of the vehicle.
2. Remove upper rebound strap fasteners.

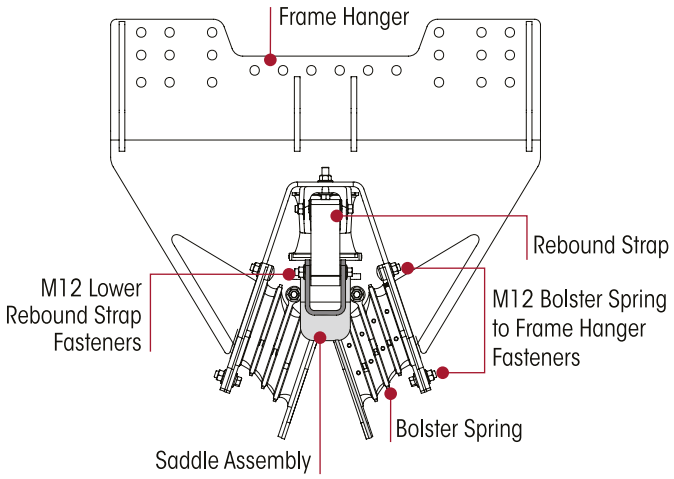


Figure 24: Hanger to Tie Bar Bolster Springs

3. Remove the M12 fasteners from the frame hanger to the tie-bar bolster springs, refer Figure 24.
4. Remove the tie-bar bolt and spacer.
5. Raise the rear of the vehicle frame to clear the tie-bar bolster springs from the equalising beam. Support the vehicle frame at this height with safety stands.
6. Remove the upper M12 fasteners that connect the tie-bar bolster springs to the saddle assembly, refer Figure 23.
7. Remove the lower M20 fasteners connecting the tie-bar bolster springs to the equalising beam, refer Figure 23.
8. Remove the tie-bar bolster springs, refer Figure 23.

Assembly

1. Loosely install the M12 fasteners connecting the tie-bar bolsters to the saddle assembly.
2. Mount the bolster spring top plate spacer and tie- bar bolster springs to the frame hanger and loosely install upper fasteners. Do not tighten at this time.

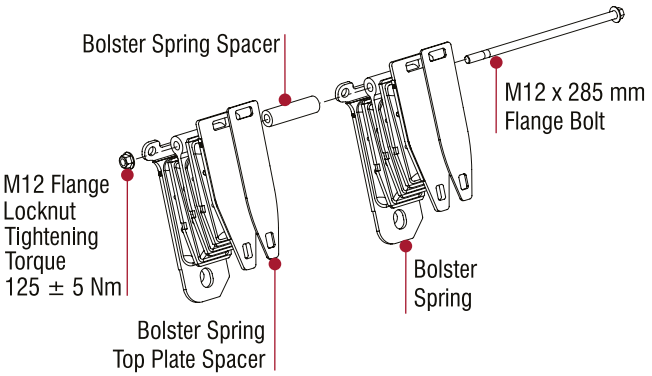


Figure 25: Bolster Spring Spacers

3. Install the tie-bar bolt from the outboard side and install spacer. Tighten fasteners to *125 Nm* torque, refer Figure 25.
4. Tighten the upper tie-bar bolster spring fasteners to the frame hanger to *125 Nm* torque, refer Figure 21.
5. Lower the vehicle.
6. Install the lower tie-bar M20 fasteners to the equalising beam and tighten to *440 Nm + 90°* rotation torque, refer Figure 23
7. Tighten the tie-bar bolster springs M12 fasteners to the saddle to *125 Nm* torque, refer Figure 23.
8. Install the upper rebound strap fasteners and spacer. Tighten fasteners to *125 Nm* torque.
9. Remove wheel chocks.

PROGRESSIVE LOAD SPRING

SERVICE HINT: Tyre removal is not necessary for the replacement of the load spring.

Disassembly

1. Chock the front wheels of the vehicle.
2. Remove the M12 upper rebound strap fasteners and spacers.
3. Raise the vehicle until the suspension is fully extended with the tyres completely off the ground. Support the frame at this height with safety stands.
4. Remove M12 fasteners from frame hanger to progressive load spring assembly.

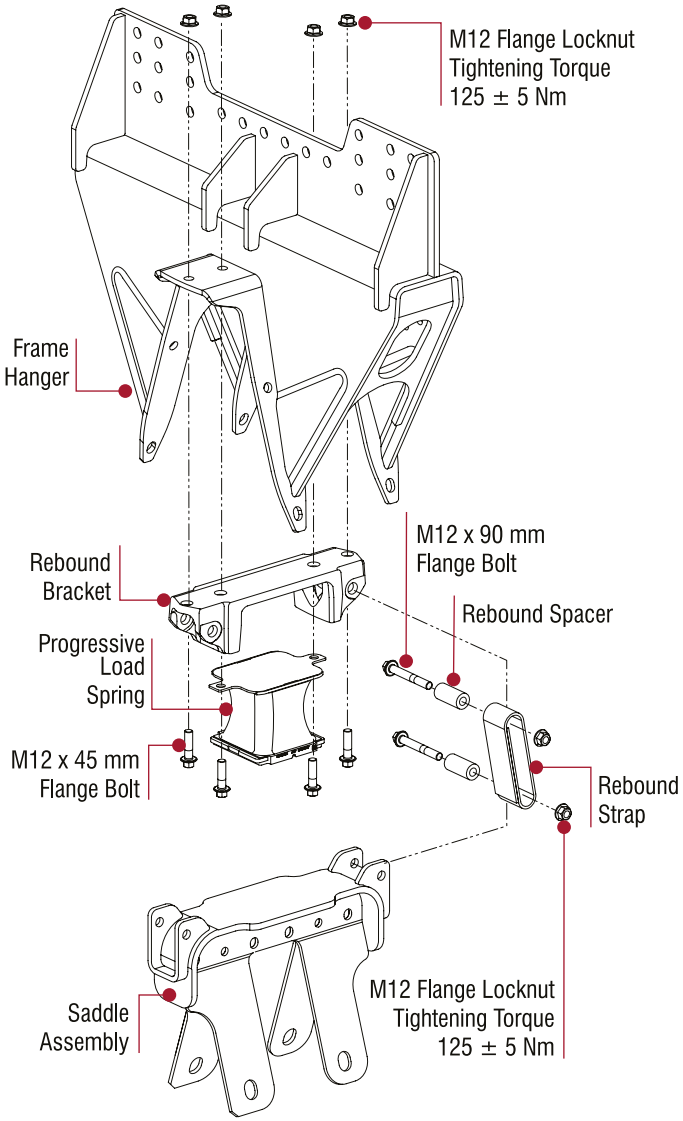


Figure 26: Progressive Load Spring Assembly

5. Remove the progressive load spring from the load spring rebound bracket, refer Figure 26.

Assembly

1. Install the new progressive load spring to the load spring rebound bracket.
2. Attach the new progressive load spring assembly and connect to the frame hanger. Tighten to ***125 Nm*** torque, refer Figure 26.
3. Lower the frame.
4. Install upper rebound strap, M12 fasteners and spacers to the load spring rebound bracket. Tighten to ***125 Nm*** torque, refer Figure 26.
5. Remove the wheel chocks.

SADDLE ASSEMBLY

Disassembly

1. Chock the front wheels of the vehicle.

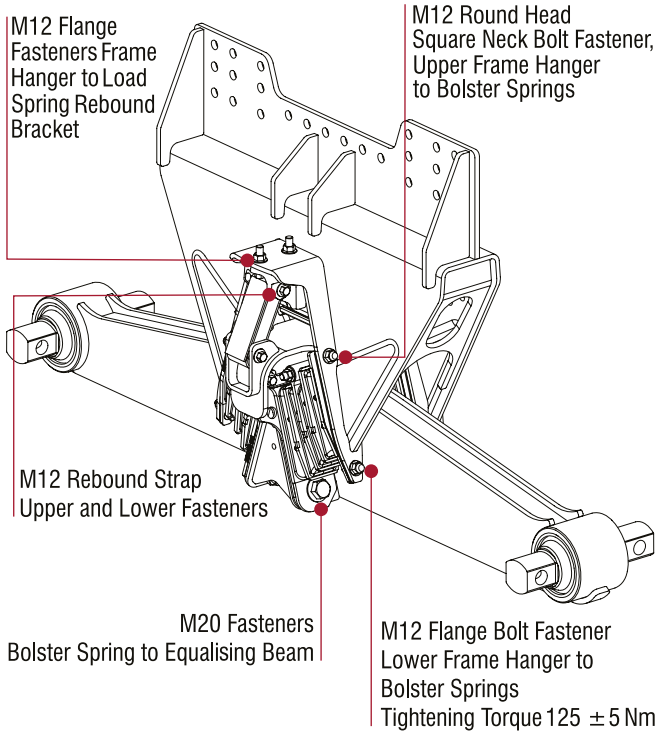


Figure 27: Saddle Assembly

2. Remove the M12 fasteners from the frame hanger to the tie-bar bolster springs, refer Figure 27.
3. Remove the M12 fasteners from frame hanger to load spring rebound bracket, refer Figure 27.
4. Remove the lower fastener and spacer from the rebound straps, refer Figure 27.
5. Remove the tie-bar bolt and spacer.
6. Raise the rear of the vehicle enough to clear the frame hanger from the equalising beam. Support the vehicle at this height with safety stands.
7. Slide the progressive load spring assembly out of the saddle assembly.
8. Remove the M12 fasteners connecting the tie-bar bolster springs to the saddle assembly.
9. Remove M20 fasteners connecting the tie-bar bolster springs to the equalising beam, refer Figure 27.
10. Remove the bolster springs.
11. Remove the saddle assembly.

Assembly

1. Place the saddle assembly on the equalising beam.
2. Position the tie-bar bolster springs to the saddle assembly.
3. Install the M12 and M20 fasteners and hand tighten. Do not tighten at this time, refer Figure 27.
4. Install the tie-bar bolster springs, refer "Tie-Bar Bolster Springs" on page 15.

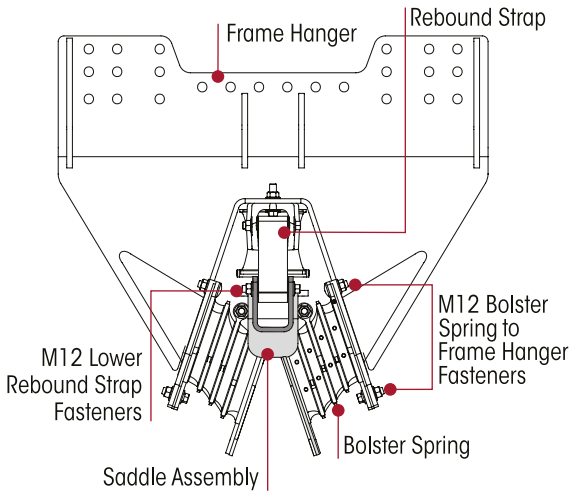


Figure 28: Hanger to Tie Bar Bolster Springs

5. Install the progressive load spring assembly to the frame hanger and tighten fasteners to ***125 Nm*** torque.
6. Lower the vehicle.
7. Install upper tie-bar bolster springs fasteners to the frame hanger. Tighten fasteners to ***125 Nm*** torque, refer Figure 28.
8. Install the M12 lower rebound strap fasteners and spacer into the saddle assembly, refer Figure 28.
9. Tighten the lower rebound strap fasteners to ***125 Nm*** torque.
10. Remove the wheel chocks.

EQUALISING BEAM

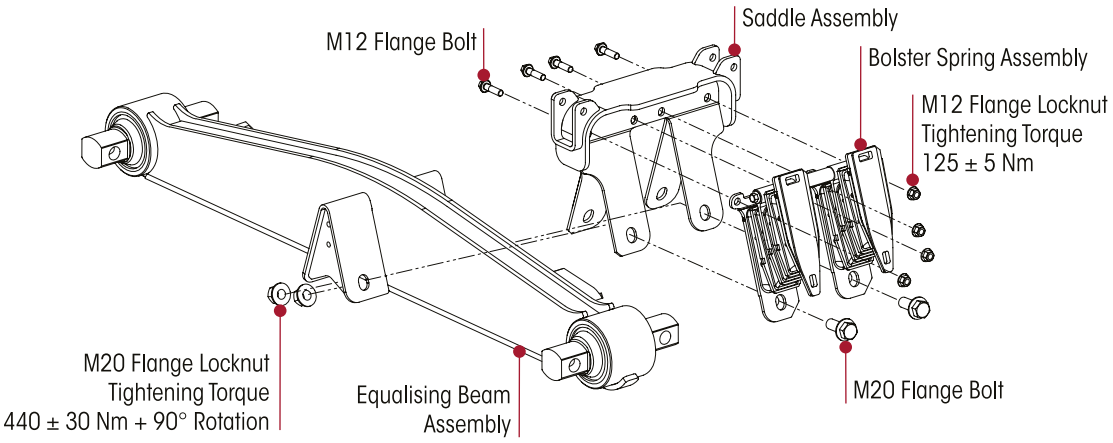


Figure 29: Saddle and Bolster Springs

Disassembly

1. Chock the front wheels of the vehicle.
2. If both equalising beams need replacement repeat Steps 3 through 7 for removal of the opposing equalising beam after the first equalising beam is installed.
3. Remove lower tie-bar bolster spring M20 fasteners on both equalising beams.
4. Raise and support frame with safety stands.

⚠ **WARNING**: The weight of the equalising beam assembly is approximately 62.2 kilograms. Prior to removing the bar pin bolts from the equalising beam, support the end of the equalising beam to prevent from dropping. Care should be taken at removal and installation to prevent personal injury or damage to components.

5. Support the equalising beam being serviced.
6. Remove and discard bar pin fasteners that connect the end bush bar pin to the axle bracket.
7. Lower the equalising beam from the axle brackets and remove from vehicle.

Assembly

NOTE All W&C-TRR equalising beams are manufactured with the bar pin flats perpendicular to the equalising beam's axis. It is not necessary to adjust the bar pins to the same pinion angle as prior to disassembly. The rubber in the bushes will gradually allow the bar pins to adapt to the pinion angles of the drive axles. This is a normal function of the bar pin bushes.

SERVICE HINT: Installing the front bar pins prior to the rear bar pins will ease in the installation of the equalising beam.

⚠ **WARNING**: The weight of the equalising beam assembly is approximately 62.2 kilograms. Care should be taken at removal and installation to prevent personal injury or damage to components.

1. Mount the equalising beam into the front drive axle bracket.
2. Chock the rear drive axle wheels to prevent movement while installing the rear bar pin into the axle bracket.
3. Support the current axle position of the rear axle pinion with a jack to assist with the installation of the rear bar pin.
4. Disconnect the rear V-torque rod from the torque rod axle bracket.

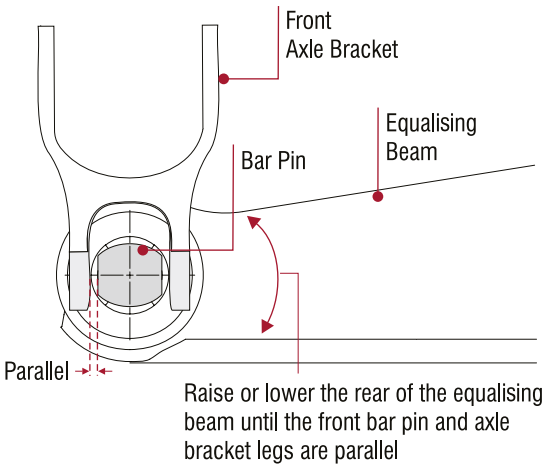


Figure 30: Front Equalising Beam Axle Bracket

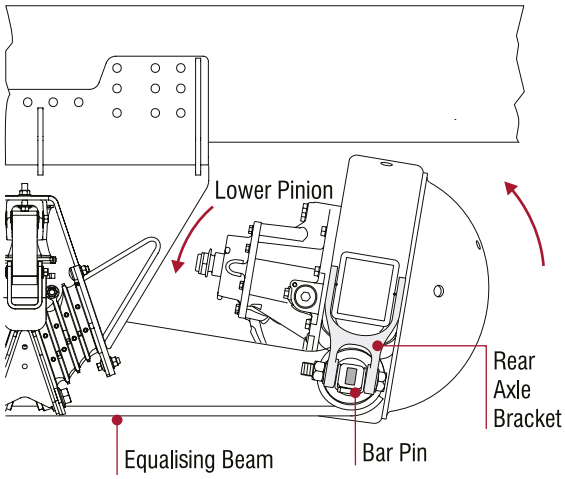


Figure 31: Rear Equalising Beam Axle Bracket

5. Lower the rear drive pinion until the axle bracket legs are parallel to the rear bar pin flats, refer Figure 30 and Figure 31.
6. Mount the equalising beam into the REAR drive axle brackets.
7. Install new bar pin fasteners. Do not tighten at this time.
8. Install the rear V-torque rod to the torque rod axle bracket. Tighten the fasteners to the vehicle manufacturer's specifications.
9. Tighten the bar pin fasteners to vehicle manufacturer's specification.
10. Lower the vehicle.
11. Install the M20 fasteners connecting bolster to the equalising beam and tighten to *440 Nm + 90°* rotation torque, refer Figure 29.
12. Remove wheel chocks.

BAR PIN END BUSHES

NOTE: You will need a shop press with a capacity of at least 45 metric tonnes, an end bush kit, and bar pin special tools. Refer to Special Tools Section of this publication.

⚠ **WARNING**: When removing and installing bushes in the equalising beams, follow the procedures outlined in this publication. Do not use a cutting torch to remove the bush outer metals pressed in the beam bores or fasteners. Welding, torching or attaching material to the equalising beam must never be performed. The use of heat can adversely affect the strength of the equalising beams.

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

NOTE W&C recommends the use of Class 10.9 bolts, hardened washers, and Class 10 locknuts. Hardened washers are not necessary when flange head fasteners are used.

Bush Removal

1. Remove the equalising beam from vehicle as detailed in the Equalising Beam Disassembly instructions in this section.
2. Place the equalising beam in the shop press with the beam end hub squarely supported on the receiving tool.

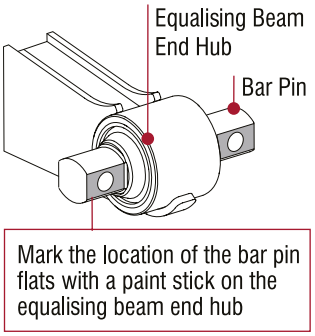


Figure 32: Marking End Bush Position

3. Prior to removal, note the orientation of the bar pin flats, refer Figure 32. Mark orientation on the equalising beam with a paint stick.

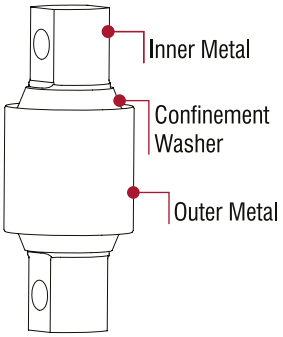


Figure 33: End Bush Assembly

4. Press on the end bush inner metal, refer Figure 33, of the end bush until the inner metal is flush with the top of the beam end hub. This will dislodge the confinement washer and move the bush rubber away from the outer metal of the bush so the removal tool can be installed.

5. Centre the end bush removal tool directly on the bush's outer metal (refer Figure 33) and press the bush out of the beam end hub.

6. After removing the equalising beam end bushes, clean and inspect each beam end hub bore.

End Hub Preparation and Inspection

Do not re-bush or otherwise use an equalising beam that has been damaged.

⚠ **WARNING**: Failure to replace an equalising beam that has been damaged from bush removal can result in the failure of that beam, leading to adverse vehicle handling and possible personal injury or property damage.

When installing bar pin end bushes the following steps will minimise the chance of damaging a new bar pin end bush:

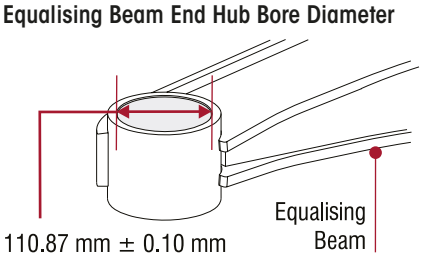


Figure 34: Beam End Dimensions

1. Clean the equalising beam end hub bores with emery cloth or hone, removing any nicks or metal build-up from bush removal.

2. Measure the equalising beam end hub bore inner diameter and the bush outside diameter. If components are not within the specified range, replacement is required.

   - The W&C specification for the equalising beam end hub bore diameter is 110 .97 mm to 110 .77 mm, refer Figure 34.

End Bush Installation

SERVICE HINT: The equalising beam bore may have a more substantial lead chamfer at one end of the bore than the other. Take advantage of the larger chamfer by pressing in the new end bush from this end.

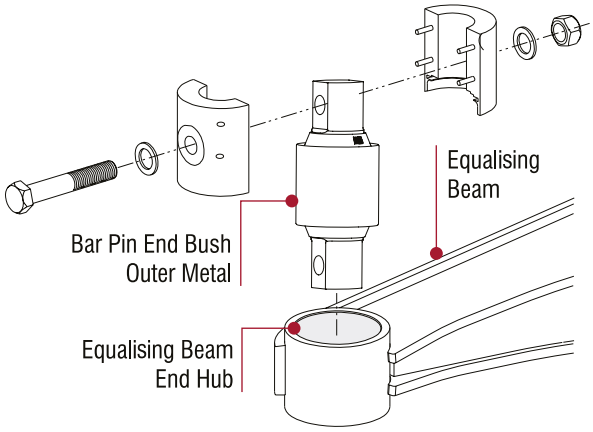


Figure 35: End Bush Assembly

1. Place the equalising beam in a shop press with the end hub, refer Figure 35, squarely supported on the receiving tool.

2. Install the end bush installation tool (refer to Special Tools Section of this publication) on the new end bush as shown in Figure 35. Tighten the through bolt until the two halves of the tool meet.

3. Lubricate the inside diameter of the equalising beam end hub and the bar pin end bush's outer metal with a heavy layer of NLGI #2 – EP (Extreme Pressure) lithium base grease, refer Figure 35.

4. Position the bar pin end bush and installation tool on the equalising beam end hub. Verify the end bush is in line with the alignment mark made prior to removal.

NOTE The end bush must be square with the equalising beam end hub before pressing the end bush into the beam. End bushes pressed in at an angle will damage the end bush and the equalising beam.

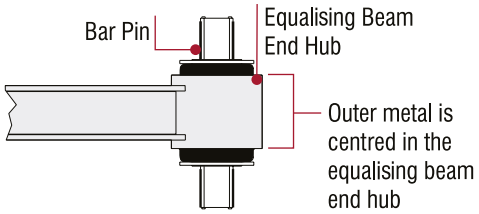


Figure 36: Centred Bush in Beam End

5. Verify the end bush's outer metal is aligned with the end hub. Equalising beam and end bush damage will result if the bushes are pressed in at an angle.

⚠ **CAUTION**: Care must be taken during the installation of the bush. Do not push on the inner metal of the bush, doing so will cause damage to the bush and void warranty.

6. Install the end bush into the end hub by pressing on the installation tool until the installation tool contacts the end hub. This will centre the bush in the end hub, refer Figure 36.

7. Install the equalising beam assembly into vehicle as detailed in Equalising Beam assembly instructions in this section.

SHOCK ABSORBERS (if fitted)

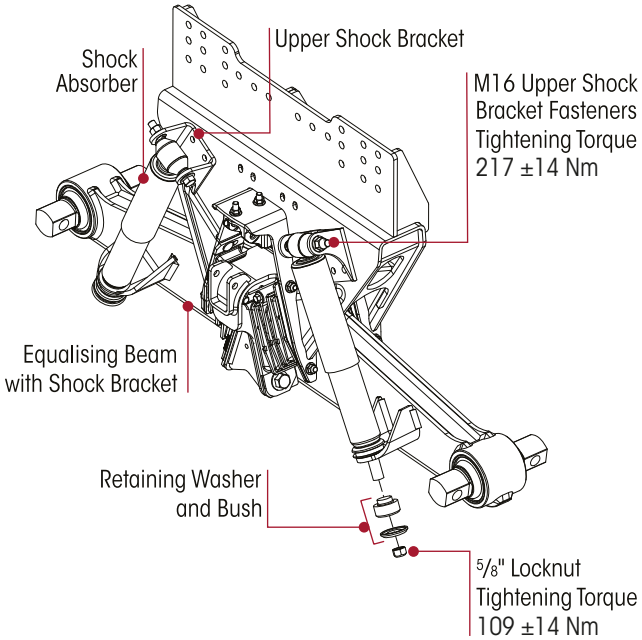


Figure 37: Shock Absorber Assembly

Disassembly

1. Chock the front wheels of the vehicle.
2. Remove the lower shock absorber nylon locknut, retainer washer and rubber bush from the shock absorber stud, refer Figure 37.
3. Remove the upper shock fasteners from the upper shock bracket, refer Figure 37.
4. Remove shock absorber.
5. Inspect shock absorber mountings for damage or wear that may allow shock to come loose in service.

Assembly

1. Mount the shock absorber in the upper shock bracket and install fasteners but do not fully tighten yet.
2. Hold upper shock absorber bolt with spanner and tighten nut to *217 ±14 Nm* torque, refer Figure 37.
3. Locate the shock absorber stud in the lower shock bracket and install the rubber bush, retainer washer and nylon locknut.
4. Hold shock body by hand and tighten lower mounting nut to *109 ±14 Nm* torque, refer Figure 37.
5. Remove the wheel chocks.

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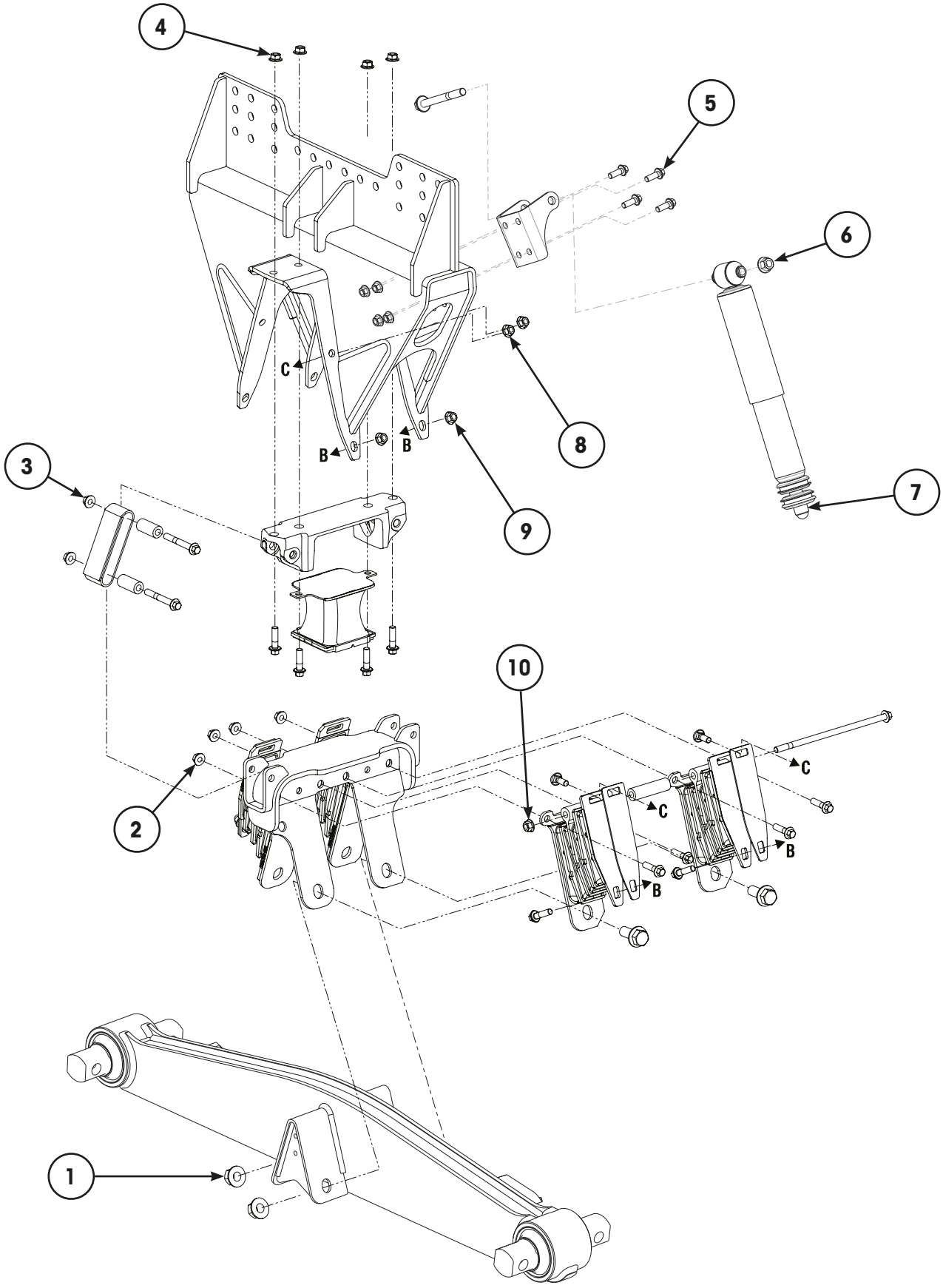
TRR TROUBLESHOOTING GUIDE

The following troubleshooting table may assist technicians in determining cause of ride quality and other suspension issues. It does not negate the need for thorough inspection and diagnostic procedures.

Condition	Possible Cause	Correction
Suspension has harsh or bumpy ride	Damaged progressive load spring	Replace progressive load spring
	Damaged tie-bar bolster springs assembly	Replace tie-bar bolster springs assembly
Vehicle leans	Damaged progressive load spring	Replace progressive load spring
	Damaged tie-bar bolster springs assembly	Replace tie-bar bolster springs assembly
Irregular tyre wear	Bent axle	Replace axle housing
Bulged tie-bar bolster springs	Suspension is overloaded	Redistribute load to correct weight and replace bolster springs
	Worn progressive load spring	Replace progressive load spring and replace bolster springs
	Axles not centred	Centre axles under frame rails and replace bolster springs
Loose saddle assembly fasteners	Suspension is overloaded	Redistribute load to correct weight
	Frequent hard stop/start	Increase fasteners inspection intervals
		Review driving habits to reduce frequency of hard stop/start
Outboard frame bracket cracked	Suspension is overloaded	Redistribute load to correct weight
Saddle leg to equalising beam contact	Axles not centred	Centre axles under frame rails

TORQUE SPECIFICATIONS



TORQUE SPECIFICATIONS

Item	Component	Thread	Quantity	Torque Value
1	Tie-bar Bolster Spring to Equalising Beam	M20	8	440 Nm + 90° rotation or 755 Nm
2	Tie-bar Bolster Spring to Saddle Assembly	M12	8	125 Nm
3	Saddle Assembly to Rebound Strap	M12	4	125 Nm
4	Frame Hanger to Progressive Load Spring Rebound Bracket	M12	8	125 Nm
5	Shock Absorber Bracket (if fitted)	M12	16	125 Nm
6	Upper Shock Absorber Bolt (if fitted)	M16	4	217 ±14 Nm
7	Lower Shock Absorber Nut (if fitted)	5/8"	4	109 ±14 Nm
8	Frame Hanger to Upper Tie-bar Bolster Spring	M12	8	125 Nm
9	Frame Hanger to Lower Tie-bar Bolster Spring	M12	8	125 Nm
10	Tie-bar Bolster Spring	M12	4	125 Nm

NOTES: • Torque values listed above apply only if W&C supplied fasteners are used. If non-W&C fasteners are used, follow torque specification listed in vehicle manufacturer's service manual.

• Frame fasteners and Bar Pin Bush fasteners are supplied and installed by the truck manufacturer.

• Shock absorbers are optional and are not required for all applications.

Revisions Table

DATE	REV	PAGE	DESCRIPTION
Dec-2025	A	All	Create new document to suit W&C TRR suspension.

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

Contact W&C Korea at +82 31 434 1730 or email jrpark@hendrickson-intl.com for additional information.

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