

TECHNICAL PROCEDURE

ULTIMAAX® Rear Suspension for Tata Motors Limited

SUBJECT: Service Instructions

LIT NO: 17730-293

REFERENCE THSL LIT. NO: MRU3000001

DATE: May 2021

REVISION: B

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SECTION 1

Introduction

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair, and rebuild of the ULTIMAAX® Rear Rubber Suspension System as originally equipped on vehicles manufactured by Tata Motors Limited.

NOTE

Use only genuine parts supplied by Tata Motors Limited (TML) or Tata AutoComp Hendrickson Suspensions Private Limited (THSL) for servicing this suspension system.

It is important to read and understand the entire Technical Procedure publication prior to performing any maintenance, service, repair, or rebuild of this product. The information in this publication contains parts lists, safety information, product specifications, features, proper maintenance, service, repair and rebuild instructions for ULTIMAAX suspensions.

Tata AutoComp Hendrickson Suspensions Private Limited (THSL) reserves the right to make changes and improvements to its products and publications at any time. Contact THSL Tech Services for information on the latest version of this manual at +91 21 35670670 or e-mail: service@tacohendrickson.com.

The latest revision of this publication is available online at www.tacohendrickson.com

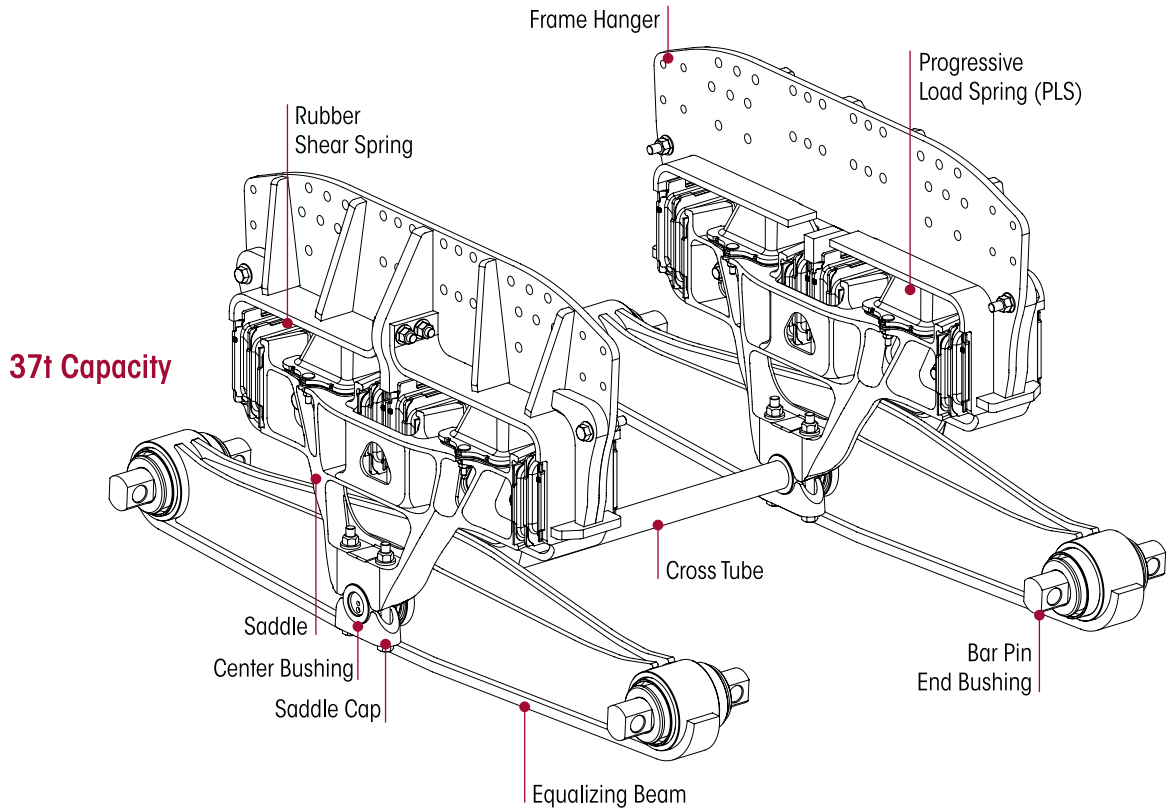
SECTION 2

Product Description

ULTIMAAX® is an advanced severe-duty rear rubber suspension designed to balance outstanding durability, empty ride quality, loaded stability and mobility. Through its unique design, the system offers premium ride quality in both empty and loaded conditions, with increasing stability as the load increases. Rubber shear springs carry a majority of the vertical load in the empty condition, resulting in a soft ride. As the load increases, the progressive load springs deflect more to carry a greater portion of the load, increasing the stiffness of the suspension without causing an abrupt change in ride characteristics. The ULTIMAAX system is capable of extremely high articulation for demanding job-site or off-highway conditions. When loaded, it delivers up to 350 mm of diagonal wheel articulation.

- **Equalizing beam** — Formed and robotically welded to provide a narrow profile for weight savings. Distributes load equally between axles to improve maneuverability, stability and handling. Offers up to 350 mm of diagonal articulation for outstanding mobility and traction. Increases ground clearance with flat bottom design. Lowers the center of gravity to increase stability.
- **Saddle** — Triangular geometry provides structure and durability. Lightweight design helps to increase payload, while offering a considerable weight savings versus competitive suspensions.
- **Frame hangers** — Optimized design to balance durability and weight savings. Fabricated to offer flexibility with multiple truck configurations.
- **Rubber shear springs** — Primary springs in unloaded condition, providing superb ride quality. React to longitudinal loads during braking and accelerating for minimal displacement.
- **Progressive load springs (PLS)** — Designed to balance empty ride quality and loaded stability. Stiffness of progressive load spring increases as load increases, providing a unique balance of empty ride quality and loaded stability.

FIGURE 2-1



ULTIMAAX® SPECIFICATIONS

	37t
Suspension Rating - Maximum Continuous Load Rating	37,000 kg
Gross Vehicle Weight (GVW) Approval	Per TML ¹
Gross Combination Weight (GCW) Approval	Per TML ¹
Diagonal Articulation²	Up to 350 mm
Lift Axles	Approved
Ride Height	236 mm
Axle Spacing	1,350 mm

ULTIMAAX is approved for use on TML tipper applications. All such applications must comply with applicable specifications and must also be approved by Tata AutoComp Hendrickson Suspensions Private Limited (THSL) with the vehicle in its original, as-built configuration. Contact THSL and TML for approval of additional applications.

1. Suspension must be paired with appropriate axle rating.
2. Suspension articulation may exceed vehicle’s capability and may be limited by TML; TML installed axle stops may restrict suspension’s articulation.

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors.

SECTION 3 Important Safety Notice

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

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

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

■ EXPLANATION OF SIGNAL WORDS

Hazard "Signal Words" (Danger • Warning • Caution) appear in various locations throughout this publication. Information accented by one of these signal words must be observed to help minimize 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 utilized to emphasize 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.



INDICATES AN IMMINENTLY HAZARDOUS SITUATION, WHICH IF NOT AVOIDED, WILL RESULT IN SERIOUS INJURY OR DEATH.



INDICATES A POTENTIAL HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN SERIOUS INJURY OR DEATH.



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 emphasize.

SERVICE HINT

A helpful suggestion that will make the servicing 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 in this publication.



The torque symbol alerts you to tighten the fasteners to a specific torque value, refer to the Torque Specifications Section in 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 COMPONENTS, ADVERSE VEHICLE HANDLING, PERSONAL INJURY, OR PROPERTY DAMAGE.

LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUE AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED, USING A REGULARLY CALIBRATED TORQUE WRENCH. TORQUE VALUES SPECIFIED IN THIS TECHNICAL PUBLICATION ARE FOR THSL SUPPLIED FASTENERS ONLY. IF NON-THSL FASTENERS ARE USED, FOLLOW TORQUE SPECIFICATION LISTED IN THE VEHICLE MANUFACTURER'S SERVICE MANUAL.

WARNING

TORCH/WELDING

DO NOT USE A CUTTING TORCH TO REMOVE ANY COMPONENTS. THE USE OF HEAT ON SUSPENSION COMPONENTS WILL ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

EXERCISE EXTREME CARE WHEN HANDLING OR PERFORMING MAINTENANCE IN THE AREA OF THE EQUALIZING BEAM. DO NOT CONNECT ARC WELDING GROUND LINE TO THE EQUALIZING BEAM. DO NOT STRIKE AN ARC WITH THE ELECTRODE ON THE EQUALIZING BEAM AND AXLE. DO NOT USE HEAT NEAR THE EQUALIZING BEAM ASSEMBLY. DO NOT NICK OR GOUGE THE EQUALIZING BEAM. SUCH IMPROPER ACTIONS CAN DAMAGE THE EQUALIZING BEAM ASSEMBLY AND CAUSE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

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 AUTHORIZATION FROM THSL. DO NOT USE SUBSTITUTE OR REPLACEMENT COMPONENTS NOT AUTHORIZED BY THSL. USE OF MODIFIED, REWORKED, SUBSTITUTE OR REPLACEMENT PARTS NOT AUTHORIZED BY THSL MAY NOT MEET THSL'S SPECIFICATIONS, AND CAN RESULT IN FAILURE OF THE PART, ADVERSE VEHICLE HANDLING, AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE AND WILL VOID WARRANTY. USE ONLY THSL AUTHORIZED REPLACEMENT PARTS.

WARNING

PERSONAL PROTECTIVE EQUIPMENT

ALWAYS WEAR PROPER EYE, HEAD, HAND AND FOOT PROTECTION AND OTHER PERSONAL PROTECTIVE EQUIPMENT AS RECOMMENDED PER JOB SITE 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 THSL MUST FIRST SATISFY HIMSELF THAT NEITHER HIS SAFETY NOR THE VEHICLE'S SAFETY WILL BE JEOPARDIZED 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 THE 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.

WARNING

A-FRAME (V-TORQUE) ROD ASSEMBLY

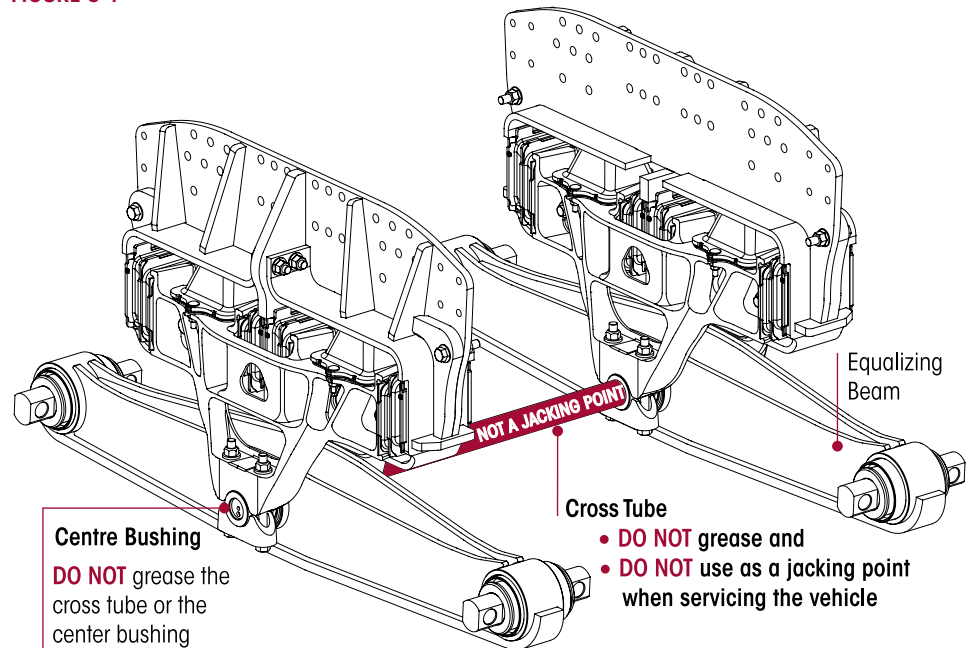
THE ULTIMAAX SUSPENSION INCORPORATES V-TORQUE RODS FOR VEHICLE STABILITY. THE V-TORQUE ROD ASSEMBLY IS A REQUIRED COMPONENT SUPPLIED BY THE VEHICLE MANUFACTURER. OPERATING THE VEHICLE WITH DISCONNECTED OR NON-FUNCTIONAL A-FRAME CAN RESULT IN ADVERSE VEHICLE HANDLING AND POSSIBLE TIRE CONTACT WITH THE FRAME, CONSULT SERVICE MANUAL FOR MORE INFORMATION.

WARNING

IMPROPER JACKING METHOD

IMPROPER JACKING METHODS CAN CAUSE STRUCTURAL DAMAGE WHICH CAN CAUSE ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR SEVERE PERSONAL INJURY.

FIGURE 3-1



- DO NOT USE THE SUSPENSION CROSS TUBE, BAR PIN BUSHING OR AXLE BRACKET AS A JACKING POINT, SEE FIGURES 3-1 AND 3-3, CONSULT SERVICE MANUAL FOR PROPER JACKING INSTRUCTIONS.
- ACCEPTABLE LIFTING POINTS FOR A VEHICLE INCLUDE BUT ARE NOT LIMITED TO: THE AXLE, EQUALIZING BEAM (SEE FIGURE 3-2), AND THE VEHICLE FRAME RAIL. REFER TO THE VEHICLE SERVICE MANUAL FOR PROPER JACKING INSTRUCTIONS.
- RECOMMENDED: A 30 TON 2 STAGE BOTTLE JACK IS SUFFICIENT TO FIT UNDER THE EQUALIZING BEAM, WITH A CLOSED HEIGHT OF 185 MM AND OPEN HEIGHT OF 290 MM, SEE FIGURE 3-2.

FIGURE 3-2

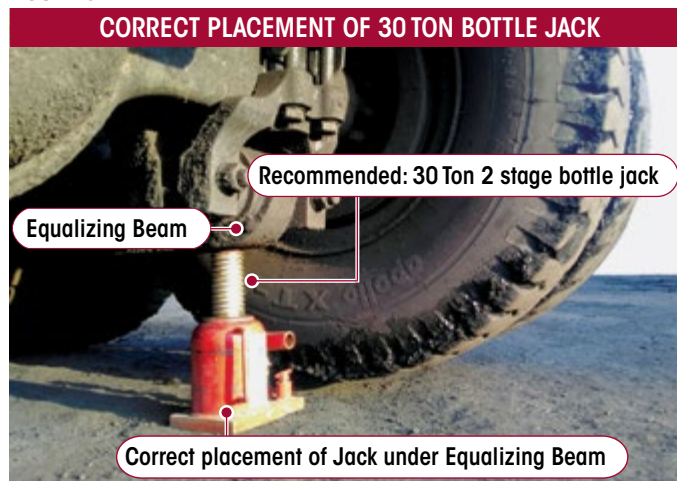
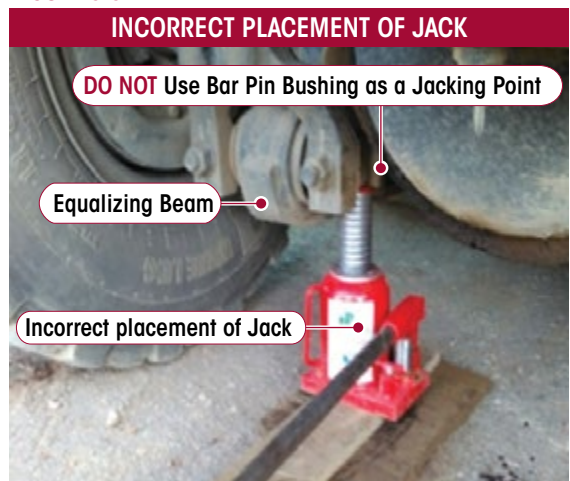
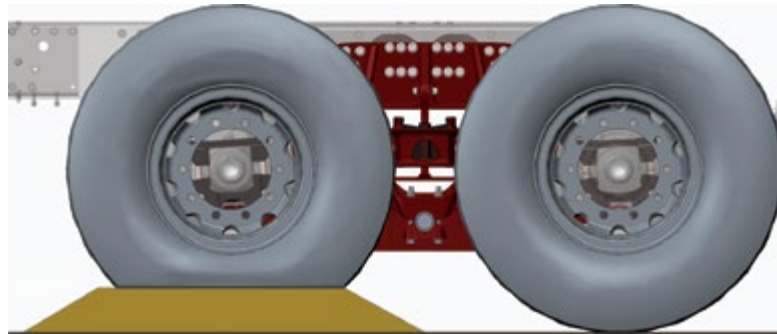


FIGURE 3-3



- IF ADDITIONAL CLEARANCE IS NECESSARY, SUCH AS IF TWO TIRES ARE DEFLATED ON THE SAME SIDE OF THE VEHICLE, CAREFULLY DRIVE THE WHEELS OVER A RIGID BLOCK OR PLY OR A SECURE SPACER TO RAISE THE VEHICLE TO PROVIDE SUFFICIENT LIFTING CLEARANCE UNDER THE AXLE OR EQUALIZING BEAM, SEE FIGURE 3-4.

FIGURE 3-4



WARNING

PARTS CLEANING USING SOLVENT CLEANERS

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:

- WEAR PROPER EYE PROTECTION.
- WEAR CLOTHING THAT PROTECTS YOUR SKIN.
- WORK IN A WELL-VENTILATED AREA.
- 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.

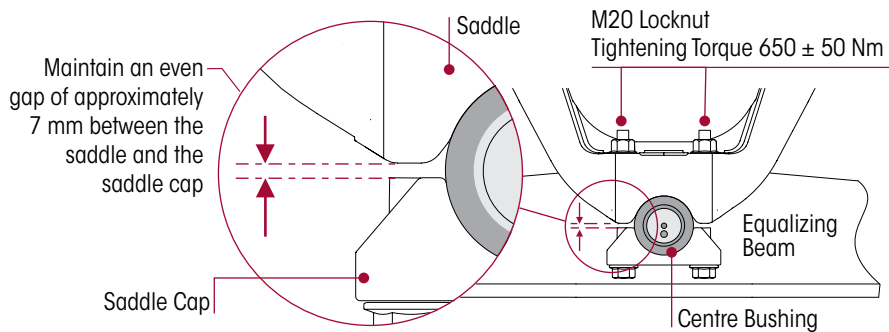
TO CLEAN GROUND OR POLISHED PARTS DO NOT USE HOT SOLUTION TANKS OR WATER ALKALINE SOLUTIONS. DOING SO WILL CAUSE DAMAGE TO THE PARTS.

CAUTION

SADDLE CONNECTION

A SADDLE IS ATTACHED TO THE CENTRE BUSHING OF EACH EQUALIZING BEAM WITH TWO (2) SADDLE CAPS. EACH SADDLE CAP USES TWO (2) BOLTS TO CLAMP THE CENTRE BUSHING INNER METAL TO THE SADDLE. EACH SADDLE CAP MUST BE INSTALLED SO THAT THERE IS AN EVEN GAP OF APPROXIMATELY 7 MM BETWEEN THE SADDLE CAPS AND THE BASE OF THE SADDLE LEGS AS SHOWN IN FIGURE 3-5. IF EACH SADDLE CAP IS NOT INSTALLED EVENLY THE SADDLE LEGS COULD BECOME DEFORMED, RESULTING IN BENT BOLTS OR DAMAGED SADDLES.

FIGURE 3-5



KEY NO.	THSL PART NO.	TML PART NO	DESCRIPTION	VEHICLE QUANTITY
1	11CX068Z00 11CX069Z00	2207 3240 0134 5021 3240 0104	Frame Hanger For Model No. LPK2518 / LPK2523 / LPK3118 (888 mm Chassis) For Model No. PRIMA LPK2523 / PRIMA LPK3123 (850 mm Chassis)	2
	03AX005C09	2207 3299 0103	Shear and Progressive Load Spring Service Kit, One Side, Includes Key Nos. 2-6, 8-9, 11-12, 26	
	03AX006C09	2207 3299 0104	Shear Spring Kit, One Side, Includes Key Nos. 2, 4-5, 8-9, 11-12, 26	
2			*Shear Spring	8
	03AX003C09	2207 3299 0101	Progressive Load Spring Service Kit, One Side, Includes Key Nos. 3-6	
3			*Progressive Load Spring (90Mm)	2
4			*M10 X 1.5-6G X 35 Round Head Square Neck Bolt	4
5			*M10 X 1.5 Flange Locknut	4
6			*Spacer Progressive Load Spring	4
7	95CX249C01	2207 3240 3724	Saddle Assembly	4
8			*M20 x 1.5 x 75 mm Flange Bolt	8
9			*M20 x 1.5 Flange Locknut	8
10	31CX204C01	2207 3240 3731	Saddle Cap	4
	03AX004C09	2207 3299 0102	Saddle Cap Fastener Service Kit, One Side, Includes Key Nos. 11-12	
11			*M20 x 1.5 x 185 mm Flange Bolt	8
12			*M20 x 1.5 Locknut	8
	03AX010C09	2207 3299 0107	Cross Tube Service Kit and End Plug, One Beam, Includes Key No. 13, and End Plug	
13			*Cross Tube - 1156 mm	1
	03AX009C09	2207 3299 0106	Equalizing Beam Bushings Service Kit, One Beam, Includes Key Nos. 11-12, 15-18	
14	24AX029C01	2207 3240 0136	Equalizing Beam Assembly 1350 mm, Includes Key Nos. 15-16	2
15	86CX046Z00	2207 3240 0142	***Centre Bushing	2
	03AX007C09	2207 3299 0105	*** Bar Pin End Bushing Service Kit, One Wheel End, Includes Key Nos. 11-12, 16-18	
16			*Bar Pin End Bushing	4
17			*Confinement Washer	8
18			*Axle Bracket Alignment Shims - 3 mm	8
19	31CL255C01 31CR255C01 31CL256C01 31CR256C01	2207 3240 3711 2207 3240 3712 2207 3240 3713 2207 3240 3714	**Bottom Axle Bracket Front Left Hand Front Right Hand Rear Left Hand Rear Right Hand	4
20	31CX202C01	2207 3240 0137	**Axle Bracket Top Pad	4
21	95CX244C01	2207 3240 4801	**Split Dowel	
22	91CX135C01	2207 3240 0216	**M24 x 3 x 190 mm Flange Hex Bolt	
23	94CX100C01	5006 3240 6502	** M24 x 3 CL 10.9 Huck Spin-Nut	
24	91CX124C01	2207 3240 3213	**M24 x 3 x 205 mm Flange Hex Bolt	
25			**A-frame (V-Torque Rod) Assembly	
26			P-80 / Pril Original Lubricant (soap water)	As Req.
27			Loctite 290 (Green), 10 ml - one per End Bushing	4

NOTES: * Item included in assembly / service kit only, part not sold separately.

** Not supplied by THSL although it is a required component. Shown for reference only. For assistance with maintenance and rebuild instructions on these components consult service manual.

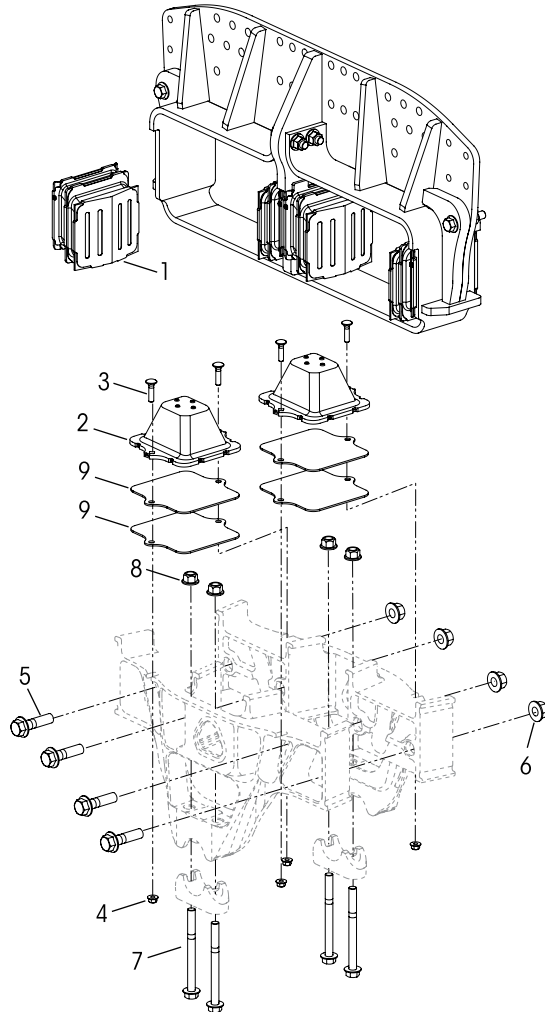
*** To complete component replacement service requires a Saddle Cap Fastener Kit No. 03AX004C09.

Hendrickson **Literature No. 48422-627** – ULTIMAAX Gauge Card is used to measure progressive load spring (PLS) height in the unloaded condition.

ULTIMAAX Service Kits

Service Kit No.
THSL 03AX005C09
TML 2207 3299 0103

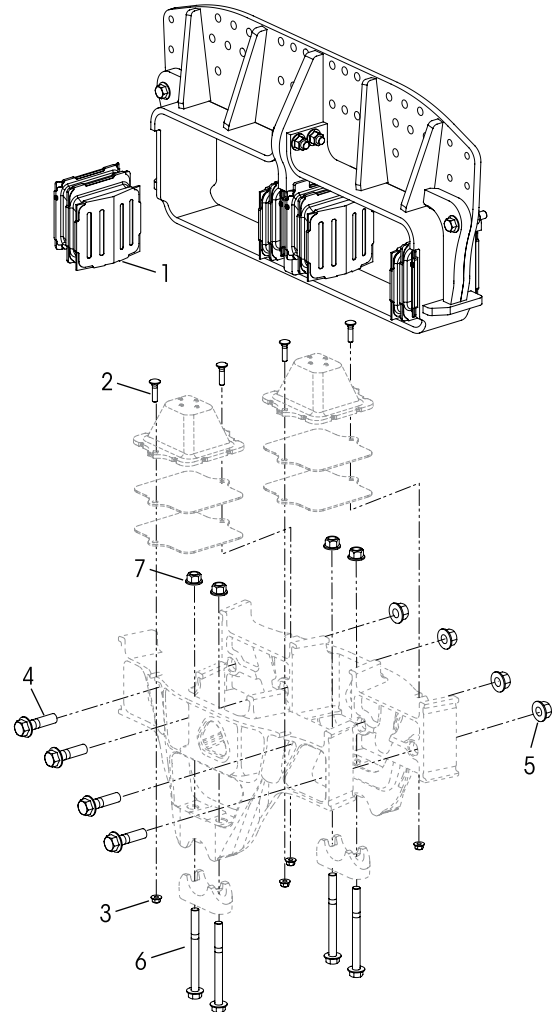
Shear and Progressive Load Spring
One Side



KEY NO.	PART NO.	DESCRIPTION	QTY.
1		*Shear Spring	4
2		*Progressive Load Spring	2
3		*M10 x 1.5-6g x 35 mm Round Head Square Neck Bolt	4
4		*M10 x 1.5 Flange Locknut	4
5		*M20 x 1.5 x 75 mm Flange Bolt	4
6		*M20 x 1.5 Flange Locknut	4
7		*M20 x 1.5 x 185 mm Flange Bolt	4
8		*M20 x 1.5 Flange Locknut	4
9		*Spacer	4
10		P-80 / Pril Lubricant (soap water)	As Req.

Service Kit No.
THSL 03AX006C09
TML 2207 3299 0104

Shear Spring
One Side



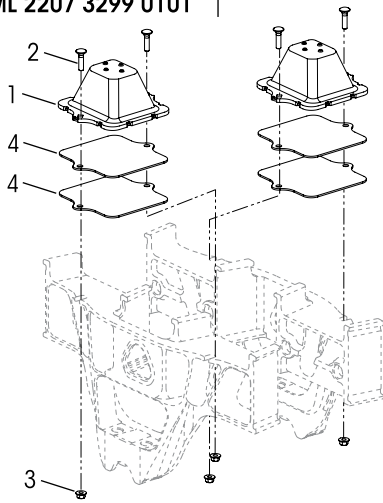
KEY NO.	PART NO.	DESCRIPTION	QTY.
1		*Shear Spring	4
2		*M10 x 1.5-6g x 35 mm Round Head Square Neck Bolt	4
3		*M10 x 1.5 Flange Locknut	4
4		*M20 x 1.5 x 75 mm Flange Bolt	4
5		*M20 x 1.5 Flange Locknut	4
6		*M20 x 1.5 x 185 mm Flange Bolt	4
7		*M20 x 1.5 Flange Locknut	4
8		P-80 / Pril Lubricant (soap water)	As Req.

NOTES * Item included in assembly / service kit only, part not sold separately.

ULTIMAAX Service Kits

Service Kit No.
THSL 03AX003C09
TML 2207 3299 0101

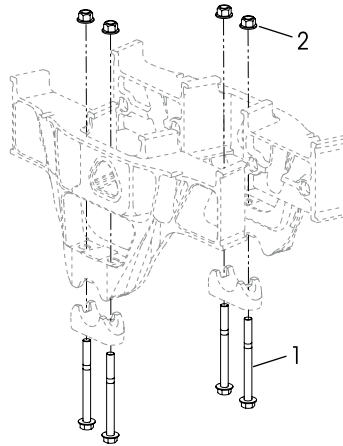
Progressive Load Spring
 One Side



KEY NO.	PART NO.	DESCRIPTION	QTY.
1		*Progressive Load Spring	2
2		*M10 x 1.5-6g x 35 mm Round Head Square Neck Bolt	4
3		*M10 x 1.5 Flange Locknut	4
4		*Spacer	4

Service Kit No.
THSL 03AX004C09
TML 2207 3299 0102

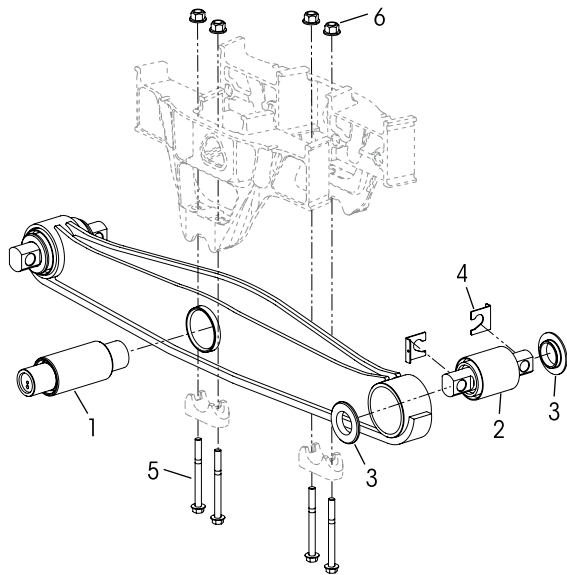
Saddle Cap Fasteners
 One Side



KEY NO.	PART NO.	DESCRIPTION	QTY.
1		*M20 x 1.5 x 185 mm Flange Bolt	4
2		*M20 x 1.5 Flange Locknut	4

Service Kit No.
THSL 03AX009C09
TML 2207 3299 0106

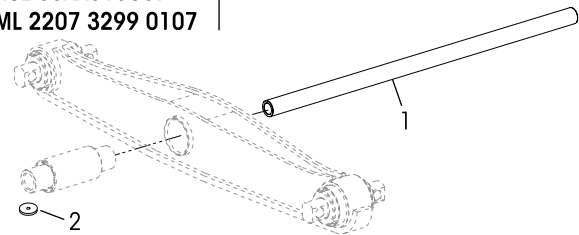
Equalizing Beam Bushings
 One Beam



KEY NO.	PART NO.	DESCRIPTION	QTY.
1		*Centre Bushing	1
2		*Bar Pin End Bushing	2
3		*Confinement Washer	4
4		*Axle Bracket Alignment Shims - 3 mm	4
5		*M20 x 1.5 x 185 mm Flange Bolt	4
6		*M20 x 1.5 Flange Locknut	4

Service Kit No.
THSL 03AX010C09
TML 2207 3299 0107

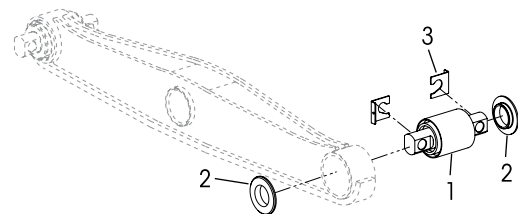
Cross Tube and End Plug
 One Beam



KEY NO.	PART NO.	DESCRIPTION	QTY.
1		*Cross Tube - 1156 mm	1
2		*End Plug	1

Service Kit No.
THSL 03AX007C09
TML 2207 3299 0105

Bar Pin End Bushing
 One Wheel End



KEY NO.	PART NO.	DESCRIPTION	QTY.
1		*Bar Pin End Bushing	1
2		*Confinement Washer	2
3		*Axle Bracket Alignment Shims - 3 mm	2

To complete service replacement this will require the Saddle Cap Fastener Kit No. 03AX004C09 (THSL) • 2207 3299 0102 (TML).

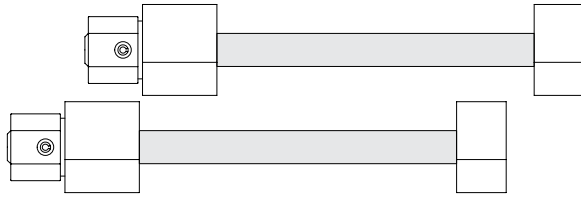
NOTES * Item included in assembly / service kit only, part not sold separately.

SECTION 5 Special Tools

SADDLE ASSEMBLY TOOLS

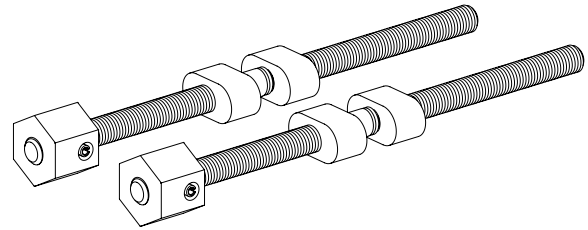
INSTALLATION TOOL

THSL Part No. TRU3000011
TML Part No. 5064 5890 3207



REMOVAL TOOL

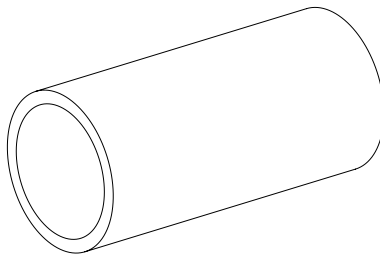
THSL Part No. TRU3000016
TML Part No. 5064 5890 3208



CENTRE BUSHING TOOLS

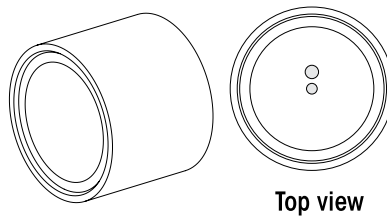
RECEIVING TOOL

THSL Part No. TRU3040015
TML Part No. 5064 5890 3202



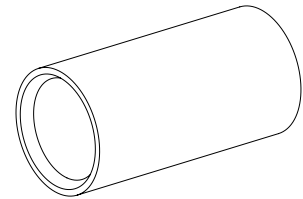
INSTALLATION TOOL

THSL Part No. TRU3040010
TML Part No. 5064 5890 3201



REMOVAL TOOL

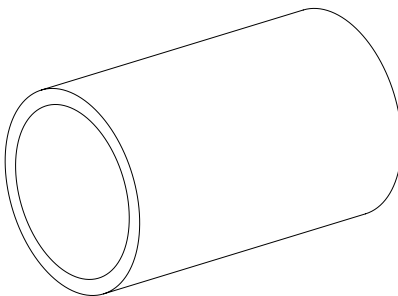
THSL Part No. TRU3040013
TML Part No. 5064 5890 3203



END BUSHING TOOLS

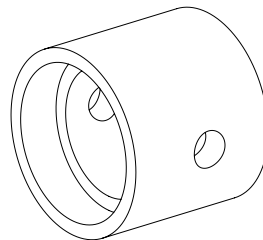
RECEIVING TOOL

THSL Part No. TRU3040014
TML Part No. 5064 5890 3205



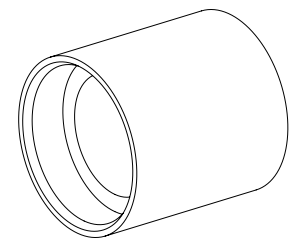
INSTALLATION TOOL

THSL Part No. TRU3040009
TML Part No. 5064 5890 3204



REMOVAL TOOL

THSL Part No. TRU3040012
TML Part No. 5064 5890 3206



SECTION 6 Preventive Maintenance

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the suspension system and component parts. The recommendation is that the ULTIMAAX heavy-duty rear suspension be inspected at pre-delivery, the first in-service inspection and regular preventive maintenance intervals. Off-highway and severe-service operating conditions may require more frequent inspections than on-highway service operation. Inspection must include the following items and other components referenced in this section.

NOTE Torque values shown in this publication apply only when THSL supplied fasteners are used. If non-THSL fasteners are used, follow the torque specification listed in the vehicle service manual.

THSL RECOMMENDED INSPECTION INTERVALS	PRE-DELIVERY	FIRST IN-SERVICE	PREVENTIVE MAINTENANCE
Inspect progressive load springs (PLS), Page 14	Prior to delivery to customer	Within the first 500 hours	Not to exceed 3 Months / 500 Hours
Inspect equalizing beam end connections Page 15, shear springs Page 18, and A-frame (V-torque rod) Page 20			Not to exceed 6 Months / 1,500 Hours
Visually inspect for proper assembly and function. Check for all of the following and replace components as necessary: <ul style="list-style-type: none"> • Signs of unusual movement, loose or missing components • Signs of abrasive or adverse contact with other components (example: brake lines, wheel wells, frame hangers, etc.) • Damaged, or cracked parts • Proper suspension function, alignment 			Every 12 Months / 2,000 Hours
Inspect fasteners for proper torque as recommended in the Torque Specification Section of this publication with special attention to the following suspension connections: <ul style="list-style-type: none"> • Equalizing beam end connections • Equalizing beam centre bushing • Saddle cap connection • Frame hanger to frame rail connection per vehicle manufacturer's specifications 			
Verify the alignment of axles are within the vehicle manufacturer's tolerances			

COMPONENT INSPECTION

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the ULTIMAAX heavy-duty rear suspension system and component parts. Look for and replace worn or damaged parts.

- **A-frame (V-torque rod)** — The A-frame must be connected and in good condition as defined by vehicle service manual when operating the vehicle.
- **Cross tube** — Clean the cross tube and inspect it for cracks or excessive wear 8" to 10" from each end where it enters into the equalizing beam center bushings. Use a straight edge to check the straightness of the cross tube. If there doubt as to fracture, wear or straightness, replacement is necessary.

- **Equalizing beam assembly** — Check the overall condition of the equalizing beam for dents, dings, or other damage. If more than half of the thickness of the equalizing beam plate is damaged (top and side plate: if less than 6.5 mm), (bottom plate: if less than 10 mm), replacement is necessary. Measure the plate thickness using a measuring tape or calipers. Use a straight edge to inspect the straightness of the equalizing beam bottom plate, an equalizing beam requires replacement if bent to 20 mm or more. Check the beam end connections for tearing or if bulge is larger the outer diameter of the equalizing beam end hub, refer to Beam End Connection Inspection in this section.
- **Fasteners** — Look for any loose, missing or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to a torque value within the specified torque range. See recommended torque specifications for THSL supplied fasteners in the Torque Specification Section in this publication. For fasteners not supplied by THSL, consult vehicle service manual. Use a calibrated torque wrench to check torque in the tightening direction. Correct the torque if necessary.

NOTE It is recommended to use Class 10.9 bolts and locknuts and hardened washers. Hardened washers are not necessary when flange head fasteners are used.

NOTE Torque values shown in this publication apply only when THSL supplied fasteners are used. If non THSL fasteners are used, follow the torque specification listed in the vehicle service manual.

- **Saddle cap fasteners** — Inspect the locknuts for proper torque to prevent wear of the beam centre bushing into the saddle, see recommended torque specifications in the Torque Specification Section in this publication.
- **Wear and damage** — Inspect all parts of the suspension for wear and damage, replace as necessary.

Consult vehicle’s service manual applicable publications for other preventive maintenance requirements.

PROGRESSIVE LOAD SPRINGS (PLS)

SERVICE HINT Use ULTIMAAX Gauge Card Literature Nos. 48422-627, Figure 6-1, to measure the progressive load spring (PLS) height.

Visually inspect the progressive load springs at regular preventive maintenance intervals. The following points are for guidance and intended to assist personnel in determining when progressive load spring component requires replacement, refer to the Component Replacement Section in this publication.

NOTE The ULTIMAAX suspension progressive load springs must be replaced in pairs (left side pairs or right side pairs or rear position pairs or front position pairs), even if only one PLS shows unacceptable conditions. Replacement of only one PLS can cause uneven wear, and premature wear of the new PLS.

INSPECTION

Inspection of the progressive load spring is always done with the vehicle in the **UNLOADED** condition.

The height of a new progressive load spring is **82 mm**, see Figure 6-3. The progressive load spring requires replacement as outlined in the Component Replacement Section in this publication if:

- The height is below **64 mm** (Red Zone shown in gauge card, see Figure 6-1)
- A bent or cracked mounting base as shown in Figure 6-2
- Any cuts or splits in the rubber are over **50 mm in length** and an average **depth of 13 mm**, a certain amount of gradual breakup of the rubber surface is normal. The most probable areas for potential cuts, splits, or wear are shown in Figure 6-3 as “/////”.

FIGURE 6-1



- The **bonding separation depth** of the rubber from the mounting base (see Figure 6-3) is more than 13 mm
- Creases formed by folding of the rubber surface under load are acceptable. These appear as stripes on the surface, polished by wear or covered with tacky (sticky) rubber, see Figure 6-4.

FIGURE 6-2
PROGRESSIVE LOAD SPRING - Failed Appearance



FIGURE 6-3

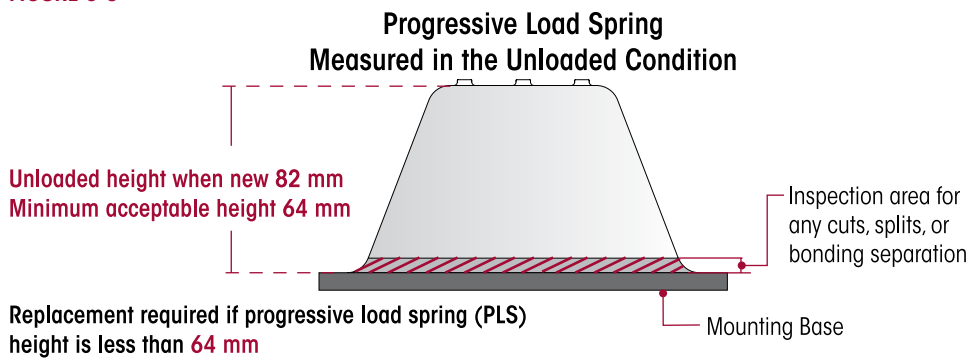
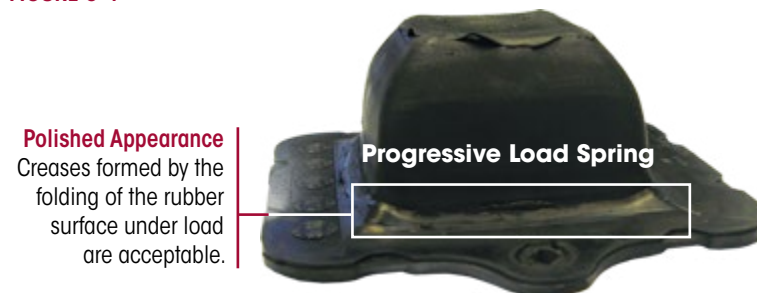


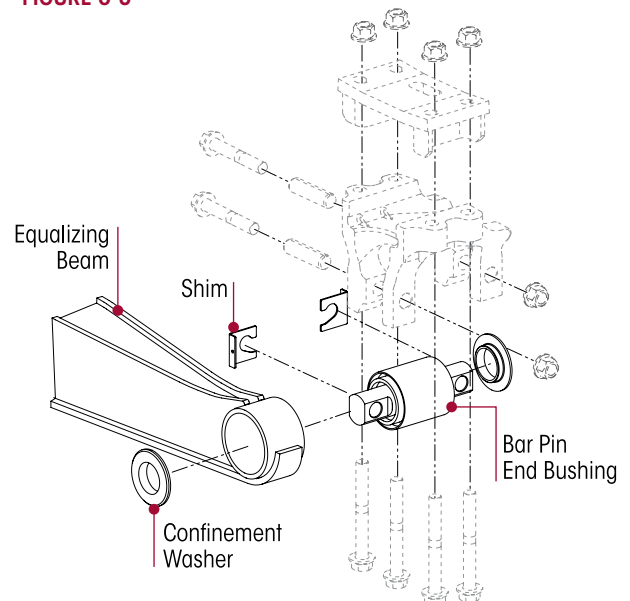
FIGURE 6-4



BEAM END CONNECTION

The equalizing beam end bushing for the ULTIMAAX is a bar pin style rubber bushing, see Figure 6-5. An inspection of the beam end connection is necessary when a vehicle is in the shop for major repair work and at regular preventive maintenance intervals.

FIGURE 6-5



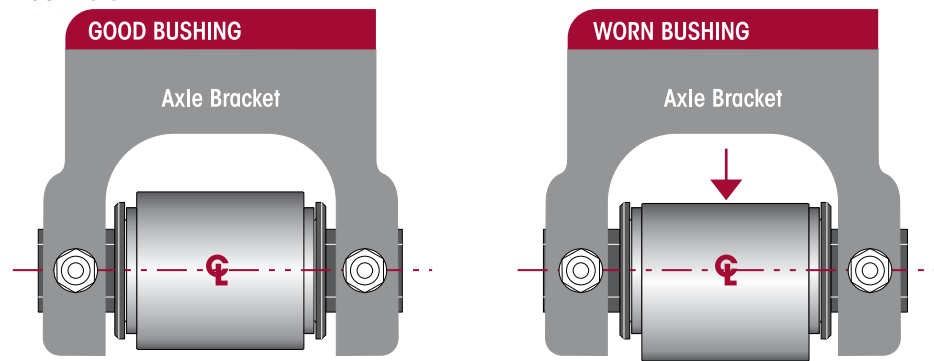
NOTE

The equalizing beam end connection requires that the fasteners be tightened to torque specifications to maintain clamp load of the axle bracket legs to the bar pin. All bushing motion is accommodated by rubber deflection. Tighten the beam end fasteners, consult vehicle service manual for specifications.

VISUAL INSPECTION

1. Visually inspect equalizing beam end connection components for signs of any excessive movement or wear such as frayed, distorted rubber in the beam end bushing, see Figure 6-6.
2. Replacement is necessary if any signs of excessive wear or looseness are noted. If an equalizing beam end connection:
 - Is visibly cleaner than the other connections, this may indicate a loose connection.
 - If the equalizing beams are lower in the axle bracket as shown in Figure 6-6, a jack test should be performed see Physical Inspection in this Section.

FIGURE 6-6



A **GOOD** bushing will result in the equalizing beam end hub appearing to be **centered** with the centerline of the bar pin in the axle bracket

A **WORN** bushing will result in the equalizing beam end hub appearing to be **offset/below** the centerline of the bar pin in the axle bracket

PHYSICAL INSPECTION (Disassembly Required)

1. Chock the wheels.
2. Place a jack under each beam end as shown in Figure 6-7.
3. Raise the jack to check for movement in the connection or rubber components.
4. In severe applications, bar pin end bushing to confinement washer contact is acceptable, see Figure 6-8.



IF BAR PIN MOVEMENT OR LOOSENESS IS NOTED IN ANY OF THE EQUALIZING BEAM END HUBS, DO NOT CONTINUE TO OPERATE THE VEHICLE IN SERVICE, SAFELY TRANSPORT THE VEHICLE TO THE NEAREST REPAIR FACILITY. REPLACE THE RUBBER END BUSHINGS AND ALL CONNECTING PARTS IF NECESSARY. THE ABOVE CONDITION CAN RESULT IN COSTLY REPAIR, DOWNTIME, SEPARATION OF COMPONENTS, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR PERSONAL INJURY.

FIGURE 6-7

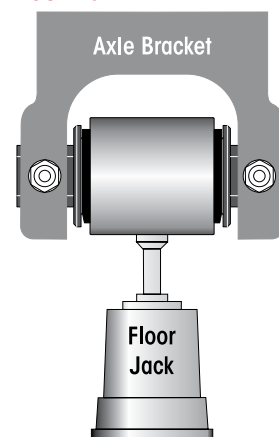
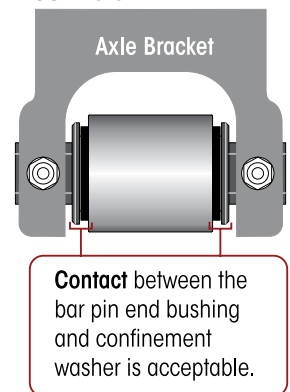


FIGURE 6-8



5. If bar pin movement or looseness is detected in any equalizing beam end hubs, **DO NOT** continue to operate the vehicle in service, safely transport the vehicle to the nearest repair facility. Check and record torque values as received for each beam end fastener.
6. Correct torque values as required, ensure all fasteners are tightened as specified in the Torque Specifications Section in this publication.

NOTE

An equalizing beam end connection, which is visibly cleaner than the other connections, may indicate a loose connection.

7. Recheck equalizing beam end connections for signs of looseness. If bar pin looseness is still detected in the equalizing beam end hub, **DO NOT** continue to operate the vehicle in service, safely transport the vehicle to the nearest repair facility. One or more components will require replacement; refer to the Component Replacement Section in this publication.
8. Remove wheel chocks.

CENTRE BUSHING

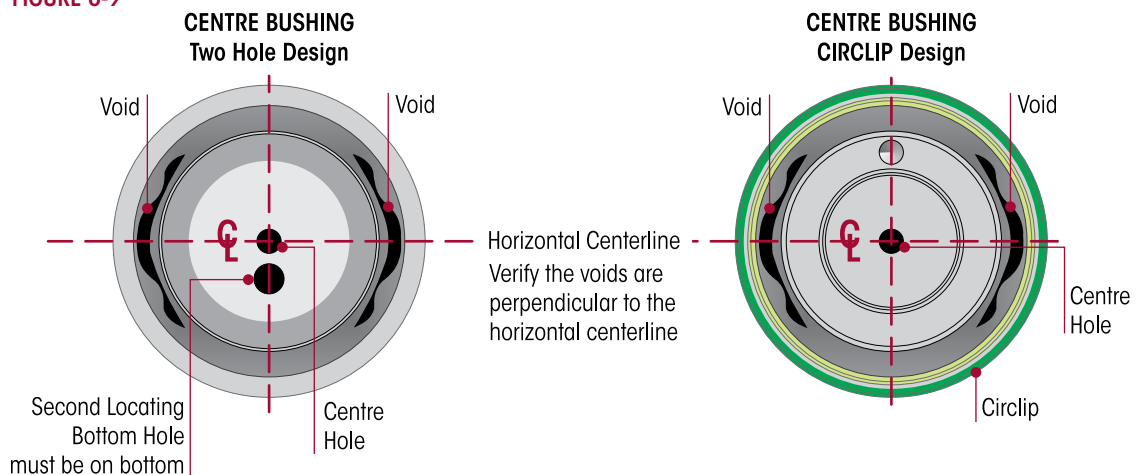
VISUAL INSPECTION

An inspection of the centre bushing is necessary when a vehicle is in the shop for major repair work and at regular preventive maintenance intervals.

NOTE ULTIMAAX centre bushing is designed with voids at front and rear, see Figure 6-9. These voids **ARE NOT** an indication of wear.

1. Visually inspect the centre bushing for signs of movement or excessive wear such as frayed, bulging or distorted rubber in the centre bushing.
2. Replacement is necessary if any:
 - Metal to metal contact is visible.
 - Signs that the bushing inner metal is not centered within the bushing.
 - Equalizing beam to saddle contact.

FIGURE 6-9



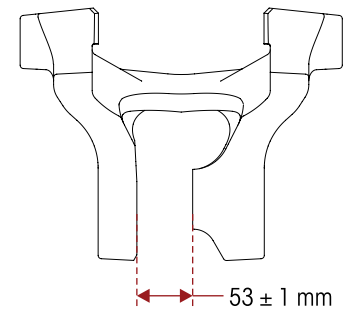
AXLE BRACKETS

The axle brackets for the ULTIMAAX suspension are not supplied by THSL, although it is a required component. THSL is not responsible for components supplied by the vehicle manufacturer.

PHYSICAL INSPECTION (Disassembly Required)

- Whenever an equalizing beam is removed for repair, measure the distance between the axle bracket legs for correct width dimension, see Figure 6-10
- For additional maintenance, replacement, and rebuild instructions consult the vehicle service manual for instructions.

FIGURE 6-10



SHEAR SPRING

VISUAL INSPECTION

Inspection of the shear spring is always done with the vehicle in the **UNLOADED** condition.

- Bent or burred edges on the rate plates extending beyond the rubber are acceptable provided the rubber can freely expand during vehicle operation, see Figure 6-11.
- Creases formed by folding of the rubber surface under load are acceptable. These appear as stripes on the surface, polished by wear or covered with tacky (sticky) rubber, see Figure 6-12.

FIGURE 6-11

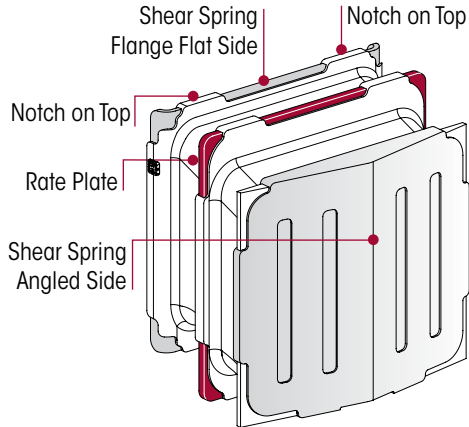
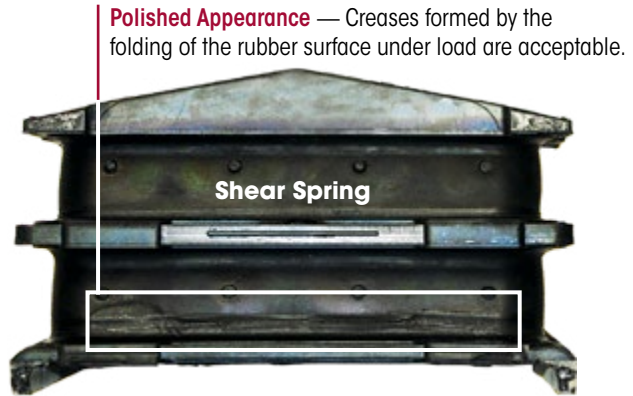


FIGURE 6-12



Polished Appearance — Creases formed by the folding of the rubber surface under load are acceptable.

- Bonding separation of the rubber from any of the bonded rate plate surfaces to a maximum depth of approximately 50 mm is acceptable, see Figure 6-13. If the bonding separation depth is 50 mm or more, the shear springs require replacement.
- A certain amount of gradual breakup of the rubber surface is acceptable. Use a feeler gauge to measure cuts or splits in the rubber. If the measurement is over a depth of 50 mm, then the shear springs require replacement, see Figures 6-14 and 6-15.

FIGURE 6-13

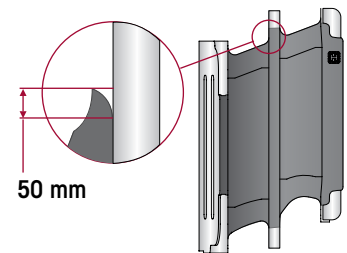


FIGURE 6-14

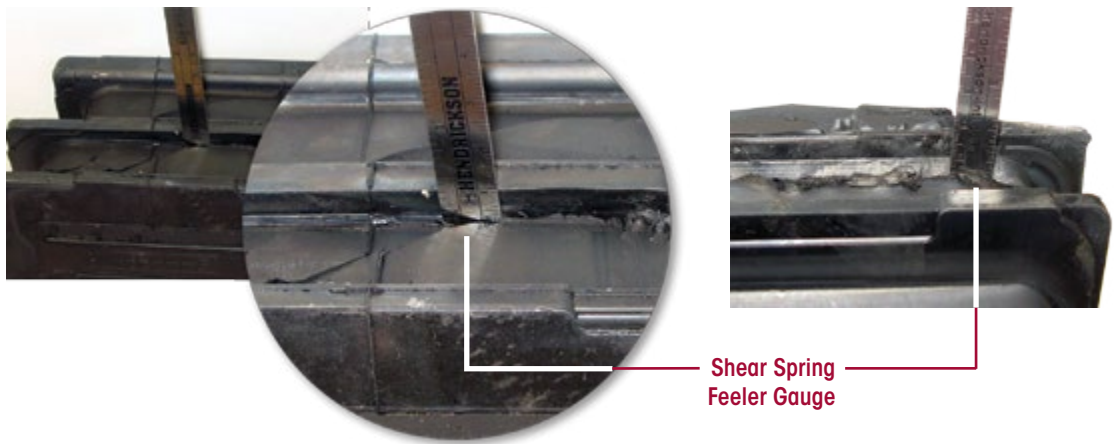
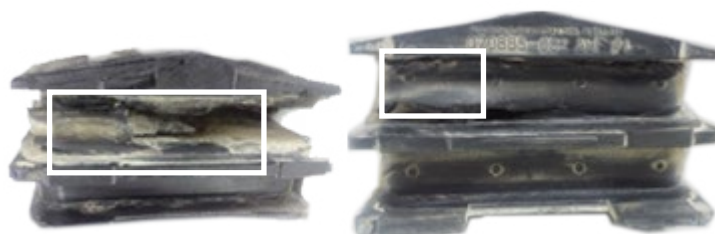


FIGURE 6-15

Shear Spring - Failed Appearance



SADDLE CONNECTION

VISUAL INSPECTION

Inspect for any signs of movement or looseness and ensure:

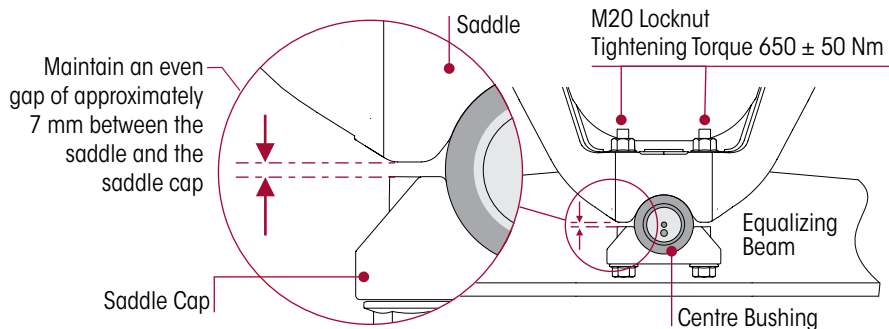
- Each saddle is centered on each equalizing beam centre bushing.
- Centre bushing inner metal is full seated to the saddle.
- Saddle cap bolts are tightened to proper torque as specified in Figure 6-16.

NOTE

Tightening the saddle cap bolt fasteners properly will help prevent wear of mating components, such as: the beam centre bushing, saddle, and saddle cap.

Saddle cap fasteners — While tightening the saddle cap bolt fasteners maintain an even gap between the saddle and saddle cap of approximately 7 mm, see Figure 6-16.

FIGURE 6-16



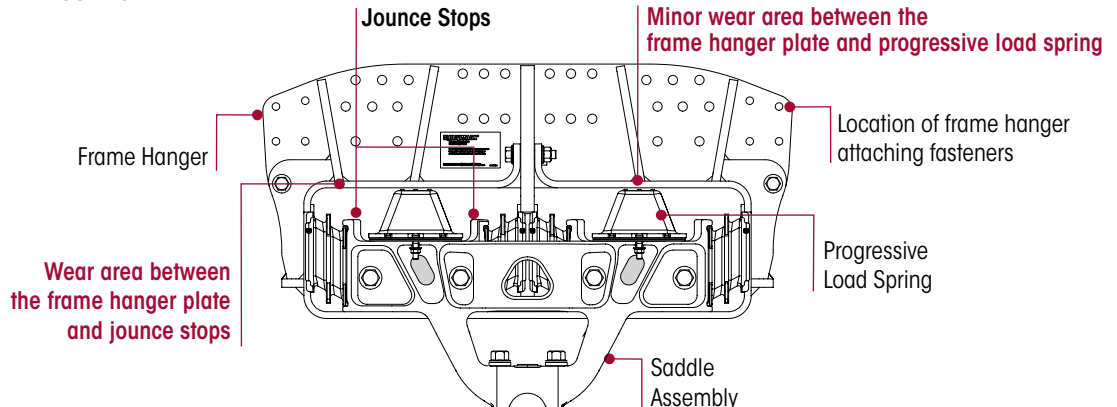
FRAME HANGER ASSEMBLY

The following points are for guidance and intended to assist personnel in determining when frame hanger assembly maintenance is necessary.

VISUAL INSPECTION

- Inspect the frame hanger for any damage, cracks or signs of adverse or abrasive contact with other components. Some minor wear will be evident where the progressive load spring contacts the frame hanger assembly. If more than half the thickness (6.5 mm) of the frame hanger plate is damaged or cracked, replace the frame hanger assembly.
- Look for wear in the frame hanger cavity due to contact with the jounce stop, if more than half the thickness (6.5 mm) of the frame hanger plate is worn or damaged, replace the frame hanger. Measure the thickness using measuring tape or calipers.
- Inspect frame hanger attaching fasteners and frame hanger assembly for signs of looseness or movement. Re-tighten any loose fasteners to the vehicle service manual's specified torque. Components damaged by loose fasteners must be replaced, refer to vehicle service manual.

FIGURE 6-17



CROSS TUBE

The ULTIMAAX cross tube connects the two (2) equalizing beams through the equalizing beam's centre bushings. The cross tube has clearance to float side-to-side in the centre bushings. The length of the cross tube will allow side-to-side movement of approximately 60 mm. For this reason, the cross tube **may appear polished** or missing paint at each end where it enters into the centre bushings. This is normal.



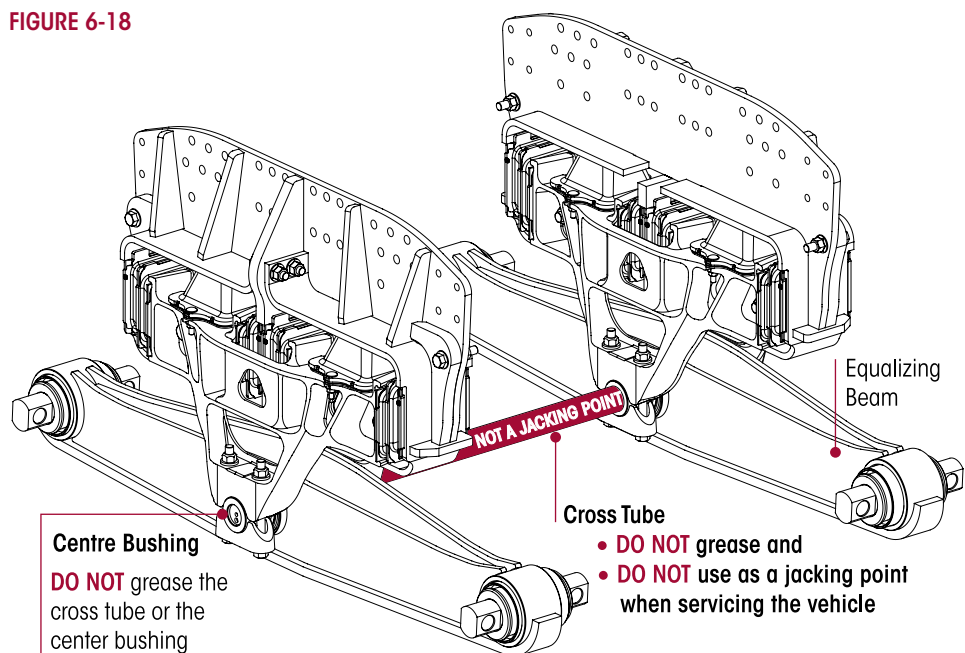
WARNING

IMPROPER JACKING METHODS CAN CAUSE STRUCTURAL DAMAGE WHICH CAN CAUSE ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR SEVERE PERSONAL INJURY.

- **DO NOT USE THE SUSPENSION CROSS TUBE AS A JACKING POINT**, REFER TO VEHICLE SERVICE MANUAL FOR PROPER JACKING INSTRUCTIONS.
- ACCEPTABLE LIFTING POINTS FOR A VEHICLE INCLUDE BUT ARE NOT LIMITED TO: THE AXLE, EQUALIZING BEAM, AND THE VEHICLE FRAME RAIL. REFER TO THE VEHICLE SERVICE MANUAL FOR PROPER JACKING INSTRUCTIONS.

DO NOT grease or lubricate the cross tube or the centre bushing. **DO NOT** use the cross tube as a jacking point, see Figure 6-18.

FIGURE 6-18



VISUAL INSPECTION

- Inspect the overall condition of the cross tube for dents, dings, or is bent 20 mm or more, replace as necessary.

NOTE

A bent cross tube may cause misalignment of the axles, which may cause abnormal tire wear.

- Use a straight edge to inspect the straightness of the cross tube, replace as necessary.
- A cross tube requires replacement if bent to 20 mm or more, possibly due to hitting an object. A bent cross tube may cause misalignment of the axles, and must be replaced immediately to eliminate abnormal tire wear.

A-FRAME (V-TORQUE ROD)



WARNING

THE ULTIMAAX SUSPENSION INCORPORATES A-FRAME (V-TORQUE ROD) FOR VEHICLE STABILITY. OPERATING THE VEHICLE WITH DISCONNECTED OR NON-FUNCTIONAL A-FRAME CAN RESULT IN ADVERSE VEHICLE HANDLING AND POSSIBLE TIRE CONTACT WITH THE FRAME, CONTACT THE VEHICLE SERVICE MANUAL FOR MORE INFORMATION.

The A-frame (V-Torque Rod) assembly for ULTIMAAX 371 is not supplied by THSL, although it is a required component. THSL is not responsible for components supplied by the vehicle manufacturer. For assistance with inspection, maintenance and rebuild instructions on these components, refer to vehicle service manual.

SECTION 7

Alignment & Adjustments

AXLE ALIGNMENT

- **The primary control for axle alignment** is the location of the frame hanger assemblies on the frame rail as installed by the vehicle manufacturer, and the location of the axle brackets on the axles as installed by the axle manufacturer or vehicle manufacturer.
- **Axle centering and pinion angles** are controlled by the A-frame (V-Torque Rod).
- **Ride height** is controlled by the design of the suspension frame hanger. No adjustment is possible.

AXLE LATERAL ALIGNMENT

Lateral alignment with an A-frame (V-Torque rod) is non-adjustable.

DRIVE AXLE ALIGNMENT

INSPECTION PROCEDURE

Proper alignment is essential for maximum ride quality, performance, and tire service life. The following recommended alignment procedure should be performed if excessive or irregular tire wear is observed.

NOTE

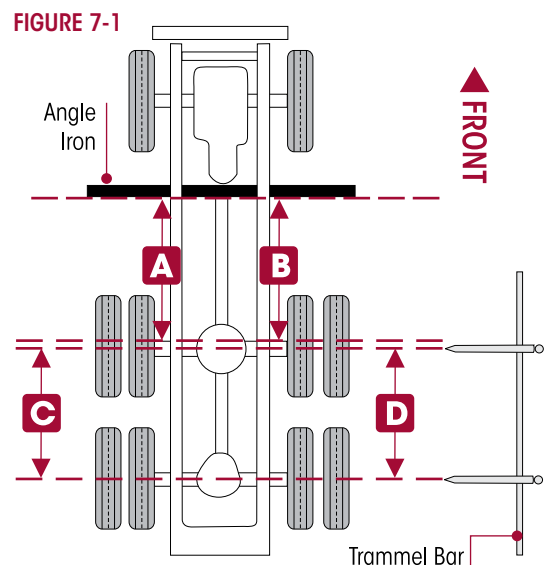
Computerized alignment equipment is the preferred method of measuring alignment, follow the vehicle manufacturer's specifications. To calculate the shim thickness required, the target offset must be converted to thrust angle, see alignment equipment manufacturer for procedures.

NOTE

Proper vehicle alignment can only be achieved when all axles are aligned to the vehicle's centerline and the steering axle's caster, camber and toe-in settings are within specifications. If, however, axle alignment equipment is not available the alignment of the drive axles may be checked by performing the following steps.

1. Use a work bay with a level, flat surface.
2. Relax the suspension by slowly moving the vehicle back and forth several times in a straight line without using the brakes. This will slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead.
3. **DO NOT** set the parking brake. Chock the front wheels of the vehicle.

4. Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components before proceeding with the alignment process.
5. Ensure all drive axle tires are the same size and inflated to the tire pressure specifications set by the vehicle manufacturer.
6. Accurately square the bar stock or angle iron to the frame using a carpenter's square.
7. Securely clamp a six-foot piece of STRAIGHT bar stock or angle iron across the lower frame flange as shown in Figure 7-1. Select a location for the bar stock or angle iron as far forward of the drive axle as possible where components will not interfere.



8. Using a measuring tape, measure from the straight edge to the forward face of the front drive axle arms on both sides of the vehicle as shown in Figure 7-1, **A** and **B**.
9. Calculate the difference between measurements **A** and **B**.
 - a. If the front drive axle is within vehicle manufacturer's specifications, proceed to check the rear drive axle (Step 11).
 - b. If alignment of the front drive axle **IS NOT** within the vehicle manufacturer's specifications, then the alignment of this axle **MUST** be corrected **BEFORE** measuring the rear drive axle alignment (Step 11).
 - c. Correct the alignment of this axle by following the bar pin alignment instructions.

NOTE

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

10. Using a trammel bar, measure the distance from the spindle centre of the front drive axle to the spindle centre of the rear drive axle on both sides of the vehicle; see Figure 7-1, **C** and **D**.
11. Calculate the difference between measurements **C** and **D**.
 - a. If the measurements are within the vehicle manual's specifications, then the rear drive axle alignment is acceptable.
 - b. If alignment of the rear drive axle **IS NOT** within the vehicle manual's specifications, then the alignment of this axle **MUST** be corrected.
 - c. Correct the alignment of this axle by following the bar pin alignment instructions.
12. Recheck measurements to confirm adjustments. Repeat Steps 9 through 12 until the correct alignment is achieved.
13. When all drive axle alignments are within the vehicle manual's specifications then the alignment procedure is complete.

BAR PIN (REAR AXLE SKEWNESS)

The alignment feature consists of specially designed, tightly tolerance steel shims which fill the 3 mm total gap between the bushing's bar pin and the axle bracket legs. The gap must be filled by placing the shims on the bushing assembly as shown in Figure 7-2. **DO NOT** use multiple shims in any one location.



EACH EQUALIZING BEAM END BUSHING HAS ONE (1) INBOARD AND ONE (1) OUTBOARD ALIGNMENT SHIM, FOR A TOTAL OF FOUR (4) SETS OF TWO (2) ALIGNMENT SHIMS PER SUSPENSION. EACH SET OF TWO ALIGNMENT SHIMS FOR A PARTICULAR BEAM END BUSHING MUST BE INSTALLED IN THE SAME ORIENTATION ON THE FRONT/REAR OF THE EQUALIZING BEAM, SHIM ORIENTATION MAY DIFFER FOR EACH BEAM END BUSHING, SEE FIGURES 7-2 AND 7-3. USE ONLY GENUINE THSL ALIGNMENT SHIMS TO ALIGN THE SUSPENSION, DO NOT USE STANDARD WASHERS. FAILURE TO FOLLOW THESE WARNINGS MAY RESULT IN THE FRACTURE OF EITHER THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 7-2

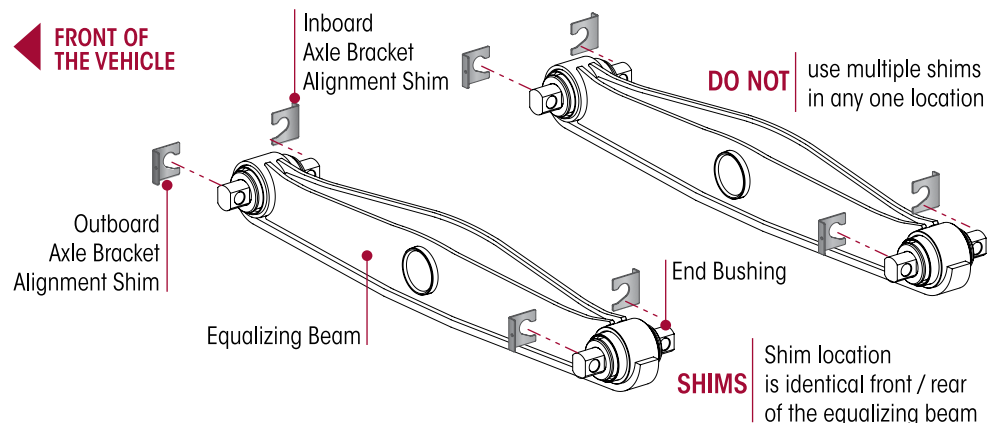
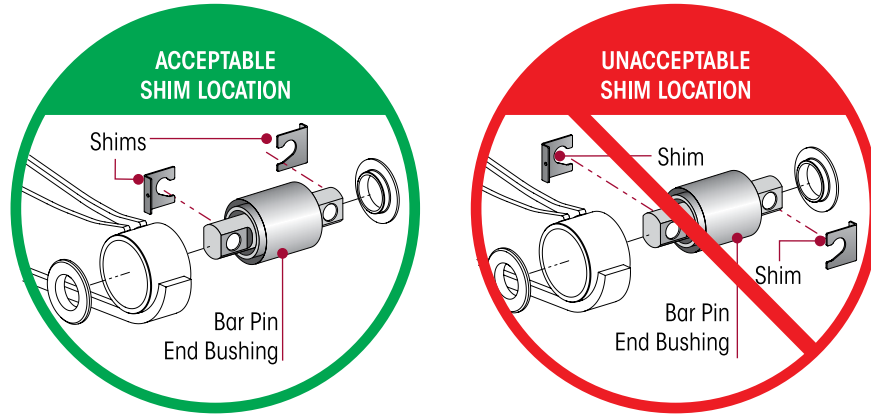


FIGURE 7-3



ALIGNMENT ADJUSTMENT

NOTE

Computerized alignment equipment is the preferred method of measuring alignment. To calculate the shim thickness required, the target offset must be converted to thrust angle, see alignment equipment manufacturer for procedures.

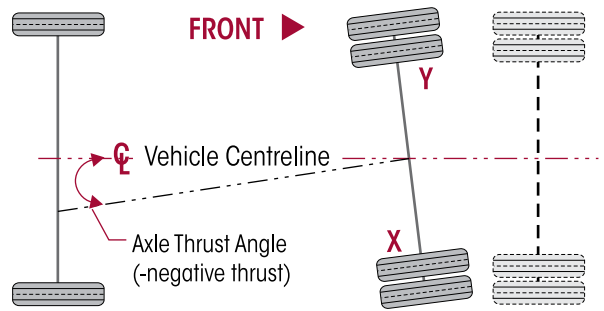
If alignment of the drive axles is required, as determined by an alignment inspection procedure, the following steps will need to be performed.

1. Determine direction of axle thrust angle. Figure 7-4 illustrates the forward drive axle with a thrust angle to the left (-negative thrust).

SERVICE HINT

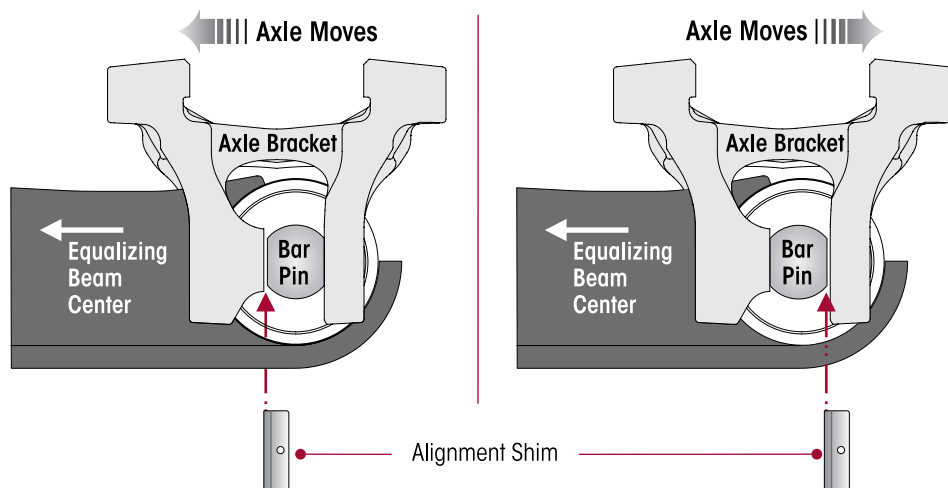
Axle movement is in the same direction as the increased shim thickness, see Figure 7-5.

FIGURE 7-4



2. To determine where to adjust shim thickness use measurement **A** and **B** for front drive axle or **C** and **D** for rear drive axle, see Figure 7-1.

FIGURE 7-5



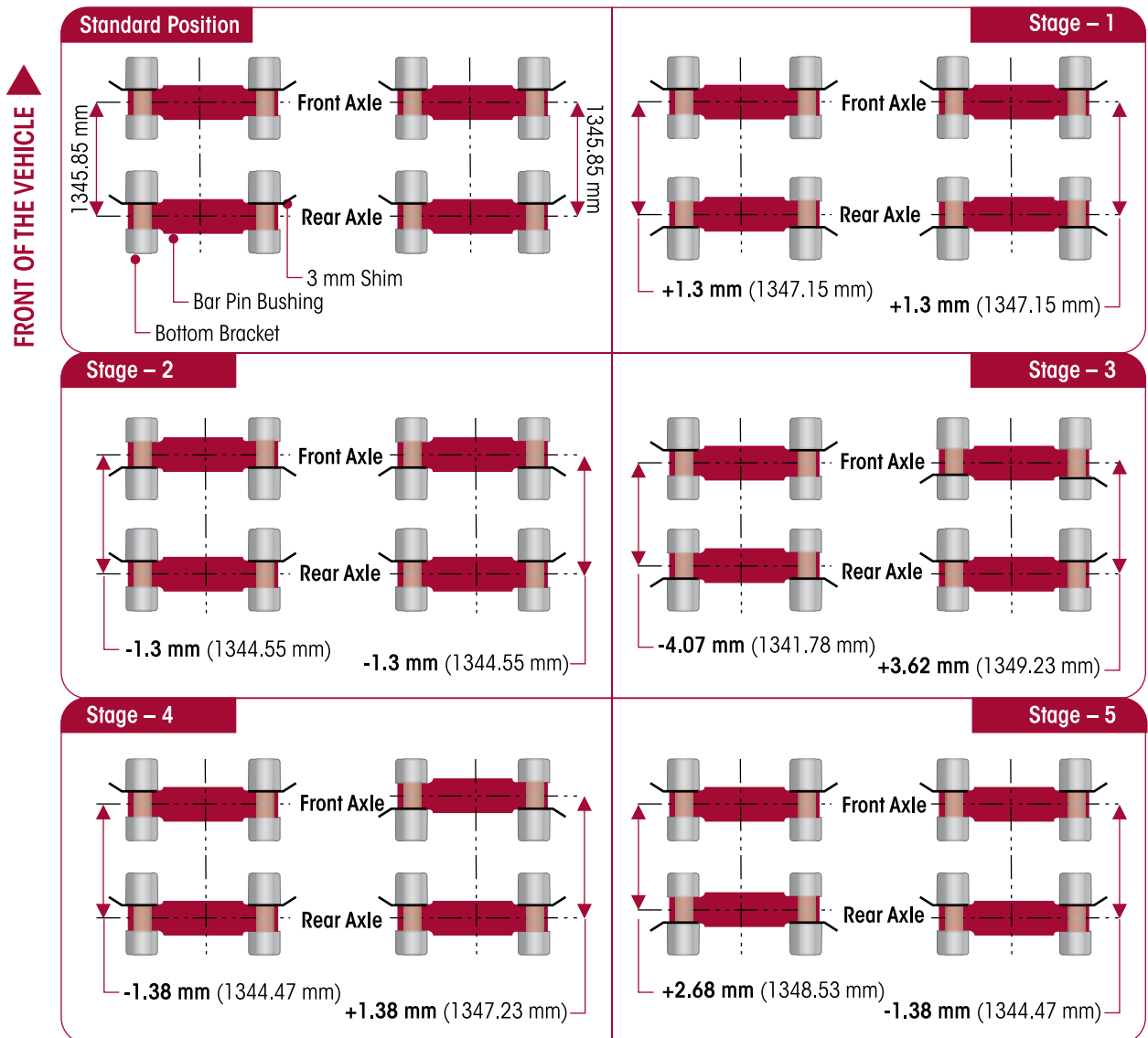
SERVICE HINT

Axle adjustment will be on the side of the bar pin where shim thickness is increased. For example, to correct the axle thrust angle illustrated in Figure 7-4, shim thickness will need to be increased at the front of the bar pin (**Location X**) and/or the rear of the bar pin (**Location Y**), see Figure 7-6.

3. Chock the wheels of the front axles to prevent vehicle movement during service.
4. Raise the frame of the vehicle to remove the load from the suspension. Support the frame at this height with safety stands.

5. Support the equalizing beam and remove the fasteners from the end bushing where the bar pin alignment shim adjustment is being made.
6. Adjust shim thickness to move the axle in the desired direction, see Figures 7-5 and 7-6.
7. Install new end bushing fasteners and tighten, refer to vehicle service manual for specifications.
8. Remove support and lower the vehicle.
9. Verify the axle's alignments are within the vehicle manufacturer's tolerance.
10. Set brakes and remove wheel chocks.

FIGURE 7-6



SECTION 8 Component Replacement

FASTENERS

When servicing an ULTIMAAX suspension, it is recommended to replace all removed fasteners with new equivalent fasteners. Maintain correct torque values at all times. Check torque values as specified, see Torque Specifications Section of this publication. If non-THSL fasteners are used, follow torque specifications listed in the vehicle service manual.

NOTE

Torque values shown in this publication apply only if THSL supplied fasteners are used. If non-THSL fasteners are used, follow the torque specification listed in the vehicle service manual.

SHEAR SPRING OR FRAME HANGER ASSEMBLY OR SADDLE ASSEMBLY

YOU WILL NEED:

- Saddle Assembly Tools, see Special Tools Section in this publication:
Installation Tool - THSL Part No. TRU3000016 / TML Part No. 5064 5890 3208
Removal Tool - THSL Part No. TRU3000011 / TML Part No. 5064 5890 3207

DISASSEMBLY

1. Chock the front wheels of the vehicle.
2. Raise and support the drive axles with safety stands.
3. Remove the drive tires from the side of the vehicle being serviced.
4. Remove and discard the M20 saddle cap fasteners that attach the saddle assembly to the centre bushing, see Figure 8-1.
5. Raise the vehicle's frame just enough to create a 13 mm gap between the saddle assembly and centre bushing. Support the vehicle's frame at this height with safety stands.
6. Remove the progressive load spring M10 fasteners and discard, see Figure 8-2.
7. Apply NLGI #2-EP (Extreme Pressure) chassis lubricant to the threaded rod of the Saddle Assembly Removal Tool (THSL Part No. TRU3000016, TML Part No. 5064 5890 3208), see Figure 8-3.
8. Install both saddle assembly removal tool on each end of one saddle assembly, rotate the threaded rod blocking nuts until each are oriented properly into the saddle assembly openings, see Figures 8-2 and 8-4.
9. Remove the progressive load springs.

FIGURE 8-1

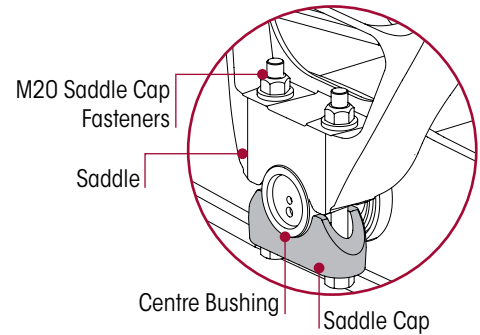


FIGURE 8-2

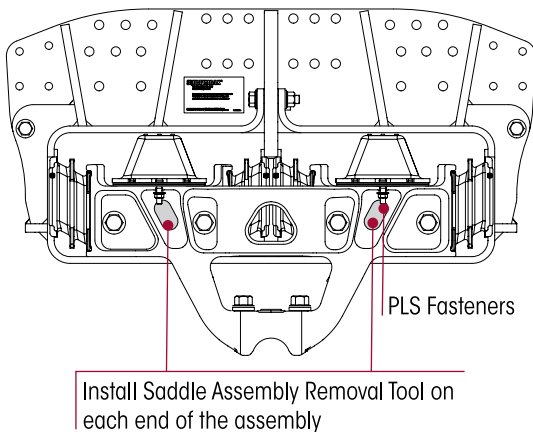


FIGURE 8-3

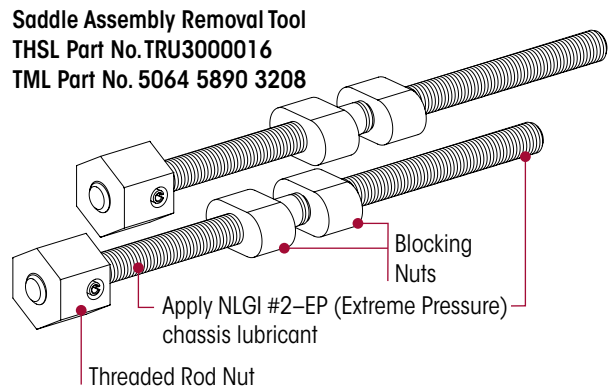
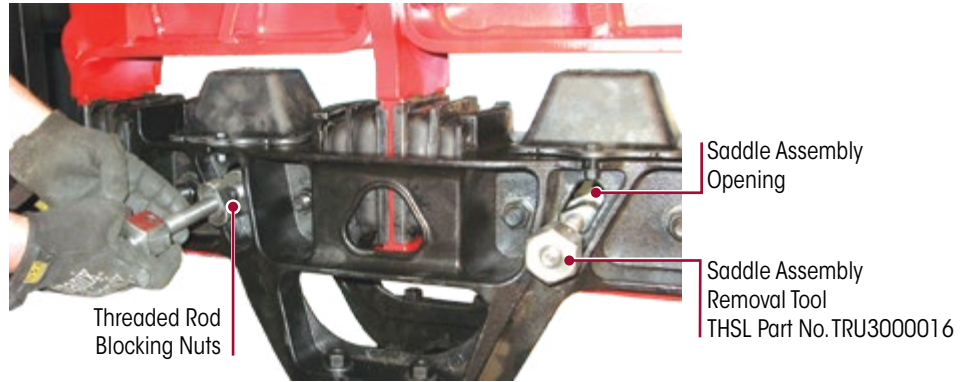


FIGURE 8-4



SERVICE HINT

Use a mechanism to attach to the frame to aid in holding the saddle up while performing procedure (such as a strap or rope) attached to each saddle half and the frame or the vehicle body to secure the saddle halves during removal.

10. Hand tighten the saddle assembly removal tool.

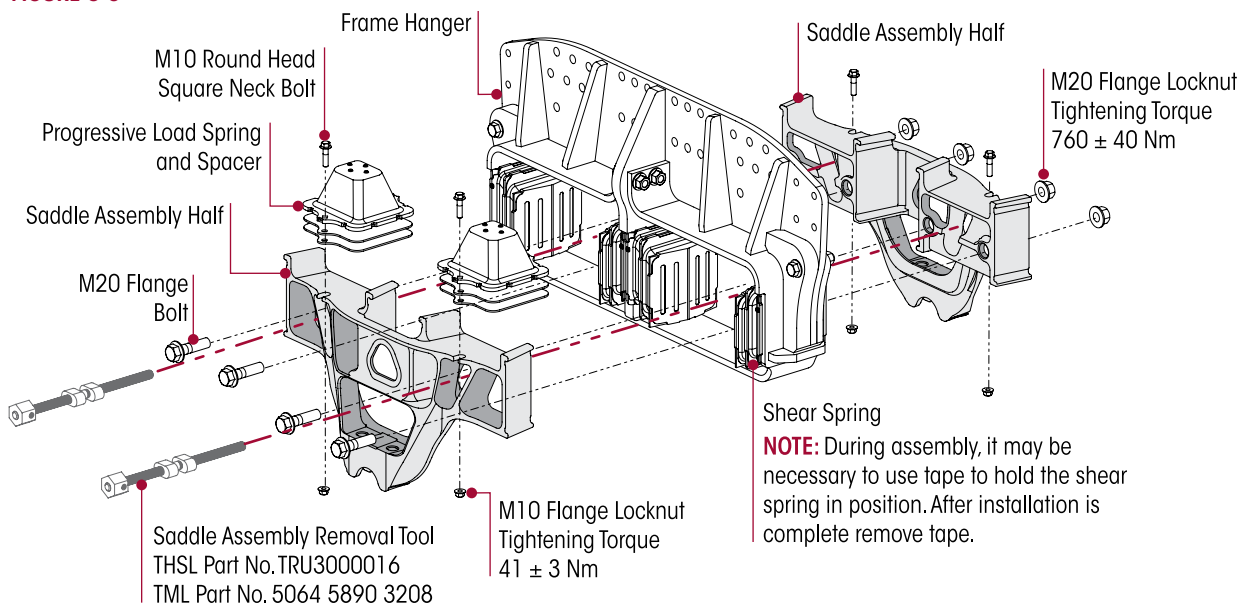
NOTE

The shear springs in each frame hanger are compressed when installed.

11. Remove and discard the M20 saddle assembly fasteners, see Figure 8-5.

12. To separate the two saddle halves, evenly rotate the threaded rod nut to tighten the saddle assembly removal tool, see Figure 8-5.

FIGURE 8-5



13. Remove the saddle halves and / or shear springs for replacement.



EACH FRAME HANGER ASSEMBLY WEIGHS APPROXIMATELY 155 KILOGRAMS, USE APPROPRIATE LIFTING DEVICES TO REMOVE OR INSTALL THE FRAME HANGER ASSEMBLY. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENT.

14. If replacement of the frame hanger is necessary, remove the frame fasteners as detailed in the vehicle service manual. Remove the frame hanger.

ASSEMBLY

1. If installing a new frame hanger continue to Step 2. If installing or servicing the shear springs or saddle assembly, proceed to Step 3.



EACH FRAME HANGER ASSEMBLY WEIGHS APPROXIMATELY 155 KILOGRAMS, USE APPROPRIATE LIFTING DEVICES TO REMOVE OR INSTALL THE FRAME HANGER ASSEMBLY. FAILURE TO DO SO CAN RESULT IN DAMAGE TO THE VEHICLE OR PERSONAL INJURY.

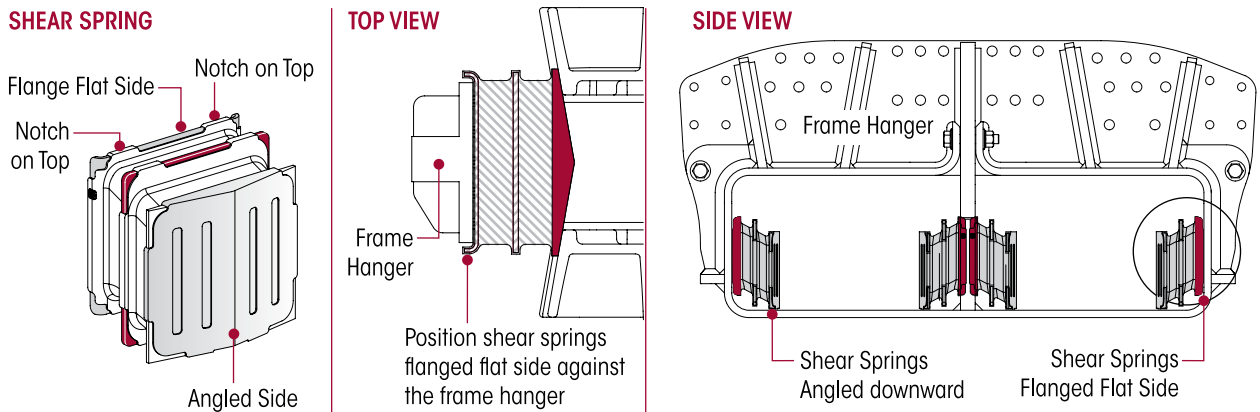
- Position the frame hanger assembly against the frame rail. Install fastener's per the vehicle service manual.

SERVICE HINT

During assembly, it may be necessary to use tape to hold the shear springs in position. After installation is complete remove tape.

- Position the shear springs with the flanged flat side with the notch on top against the frame hanger and the shear spring angled downward, see Figure 8-6.

FIGURE 8-6
SHEAR SPRING



- Apply P-80 / Pril Original (soap water) or equivalent lubricant to the shear spring's angled face and to the mating face of the saddle halves, see Figure 8-7.
- Apply NLGI #2-EP (Extreme Pressure) chassis lubricant to the threaded rod of the Saddle Assembly Installation Tool (THSL Part No. TRU3000011, TML Part No. 5064 5890 3207), see Figure 8-8.

FIGURE 8-7
Saddle Assembly Installation Tool
THSL Part No. TRU3000011
TML Part No. 5064 5890 3207

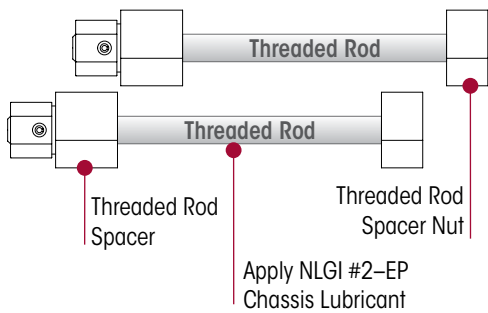
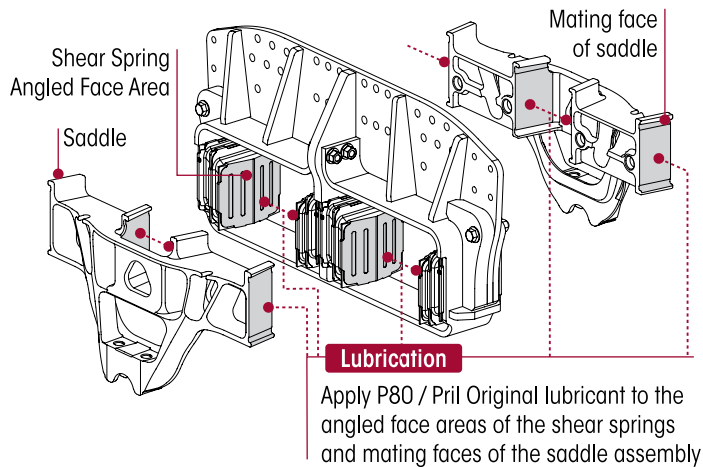


FIGURE 8-8



SERVICE HINT

Use a mechanism to attach to the frame to aid in holding the saddle up while performing procedure. Such as a strap or rope attached to each saddle half and the frame or the vehicle body to secure the saddle halves during installation, or have an additional service technician assist to help align the saddle halves properly.

- Position the inner saddle half into the frame hanger along with the shear springs, outer saddle half, see Figure 8-9.

NOTE

The threaded rod spacer and spacer nut are designed and orientated to fit into the saddle assembly openings.

- On both sides of each saddle assembly, rotate the threaded rod spacers and spacer nuts of the assembly tool until each are oriented properly into the saddle assembly openings, see Figure 8-10.
- Bring both saddle halves together with the saddle assembly installation tool. Evenly tighten the saddle assembly installation tool until both saddle halves are seated against each other.

9. Install the new M20 saddle assembly fasteners. Tighten in the proper sequence shown in Figure 8-11 to 760 ± 40 Nm torque.

FIGURE 8-9

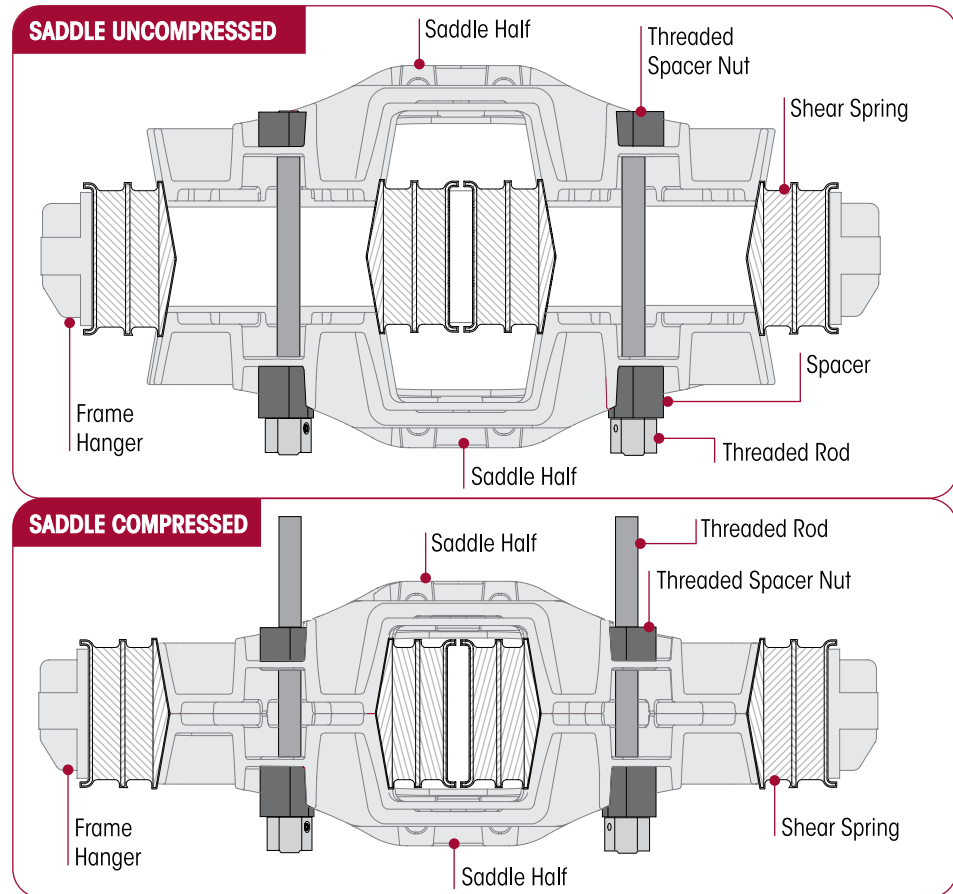


FIGURE 8-10

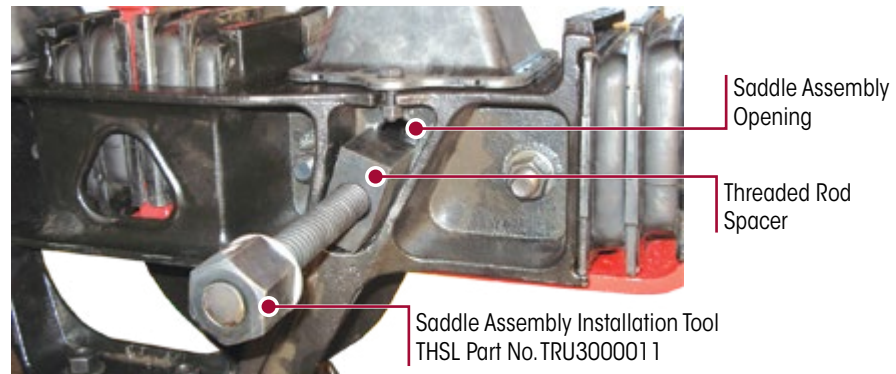
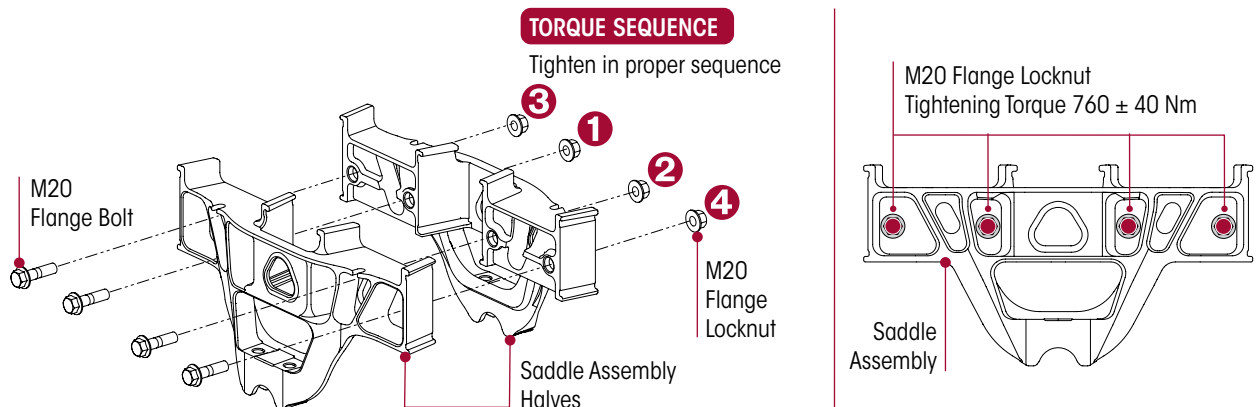
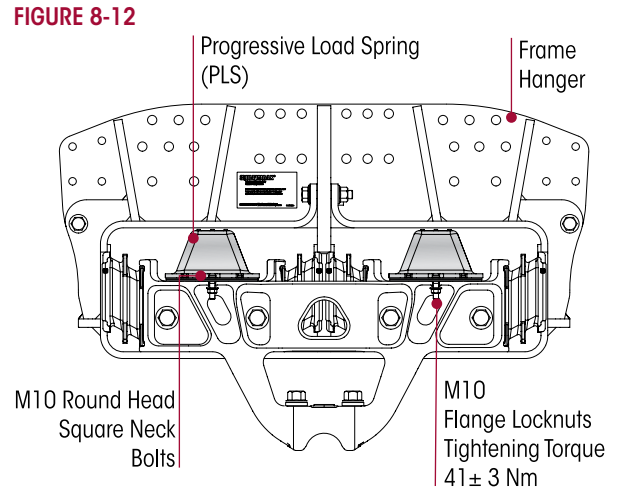


FIGURE 8-11



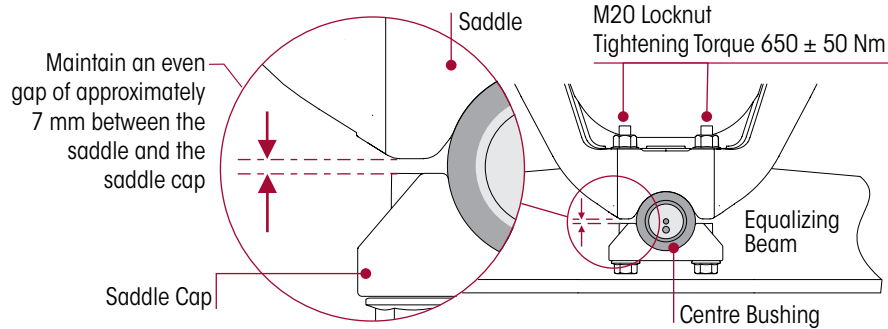
10. Remove temporary tape from the shear springs if used during assembly.
11. Remove the saddle assembly installation tool.
12. Install the progressive load springs.
13. Install the progressive load spring M10 fasteners. Tighten to 41 ± 3 Nm torque, see Figure 8-12.
14. Remove the frame supports and lower the frame of the vehicle being careful to engage the saddles on the equalizing beam's centre bushings.



CAUTION

A SADDLE IS ATTACHED TO THE CENTRE BUSHING OF EACH EQUALIZING BEAM WITH TWO (2) SADDLE CAPS. EACH SADDLE CAP USES TWO (2) BOLTS TO CLAMP THE CENTRE BUSHING INNER METAL TO THE SADDLE. EACH SADDLE CAP MUST BE INSTALLED SO THAT THERE IS AN EVEN GAP OF APPROXIMATELY 7 MM BETWEEN THE SADDLE CAPS AND THE BASE OF THE SADDLE LEGS (FIGURE 8-13). IF EACH SADDLE CAP IS NOT INSTALLED EVENLY THE SADDLE LEGS (FIGURE 8-14) COULD BECOME DEFORMED, RESULTING IN BENT BOLTS OR DAMAGED SADDLES.

FIGURE 8-13

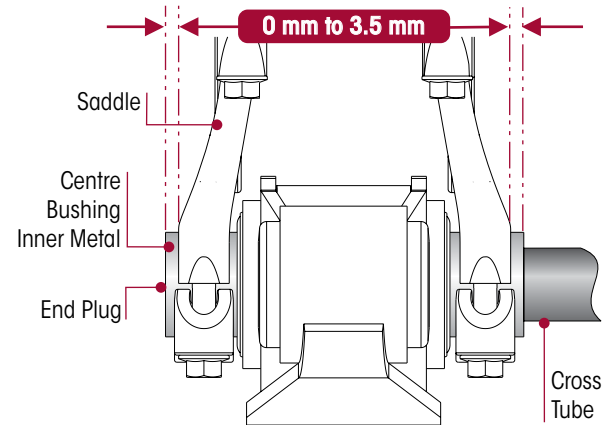


15. Center the saddle on the equalizing beam centre bushing, see Figure 8-14.

NOTE

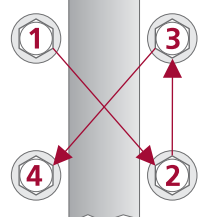
While tightening the saddle cap bolt fasteners maintain an even gap between the saddle and saddle cap of approximately 7 mm, see Figure 8-13. Tightening the saddle cap bolt fasteners properly will help prevent wear of mating components, such as: the beam centre bushing, saddle, and saddle cap.

FIGURE 8-14



16. Install the saddle cap and fasteners. Tighten evenly in several steps to 650 ± 50 Nm torque in the proper sequence to achieve uniform bolt tension, see Figure 8-15.
17. Install the tires.
18. Remove the supports from the axles and lower the vehicle onto the ground.
19. Remove the wheel chocks.

FIGURE 8-15



PROGRESSIVE LOAD SPRING

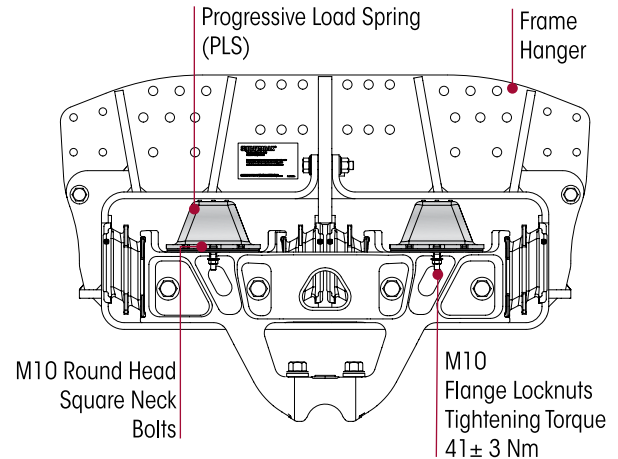
NOTE

The ULTIMAAX suspension progressive load springs must be replaced in pairs (left side pairs or right side pairs or rear position pairs or front position pairs), even if only one PLS shows unacceptable conditions. Replacement of only one PLS can cause uneven wear, and premature wear of the new PLS.

DISASSEMBLY

1. Chock the front wheels of the vehicle.
2. Raise the vehicle's frame until the saddle assembly contacts the bottom of the frame hanger assembly. Support the vehicle's frame at this height with safety stands.
3. Remove and discard the four M10 flange fasteners that attach the progressive load springs to the saddle assembly, see Figure 8-16.
4. Remove the progressive load springs from the frame hanger assembly.

FIGURE 8-16



ASSEMBLY

1. Install the progressive load springs into the frame hanger assembly.
2. Install the four M10 round head square neck bolts that attach the progressive load springs to the saddle assembly. The flange bolts **must** be installed with the locknuts facing downward as shown in Figure 8-16.
3. Tighten the progressive load spring M10 flange locknuts to 41 ± 3 Nm torque.
4. Remove the frame safety stands and lower the vehicle.
5. Remove the wheel chocks.

EQUALIZING BEAM

DISASSEMBLY

1. Chock the wheels of the steer axle.
2. Raise and support the drive axles with safety stands.
3. Remove the tires.
4. Support the axle flange of the drive axles to prevent axle movement during service.
5. Remove the saddle cap bolts, both inboard and outboard from each equalizing beam
6. Remove the saddle caps, see Figure 8-17.
7. Raise the vehicle's frame just enough to create a 13 mm gap between the saddles and the centre bushings. Support the vehicle's frame at this height.

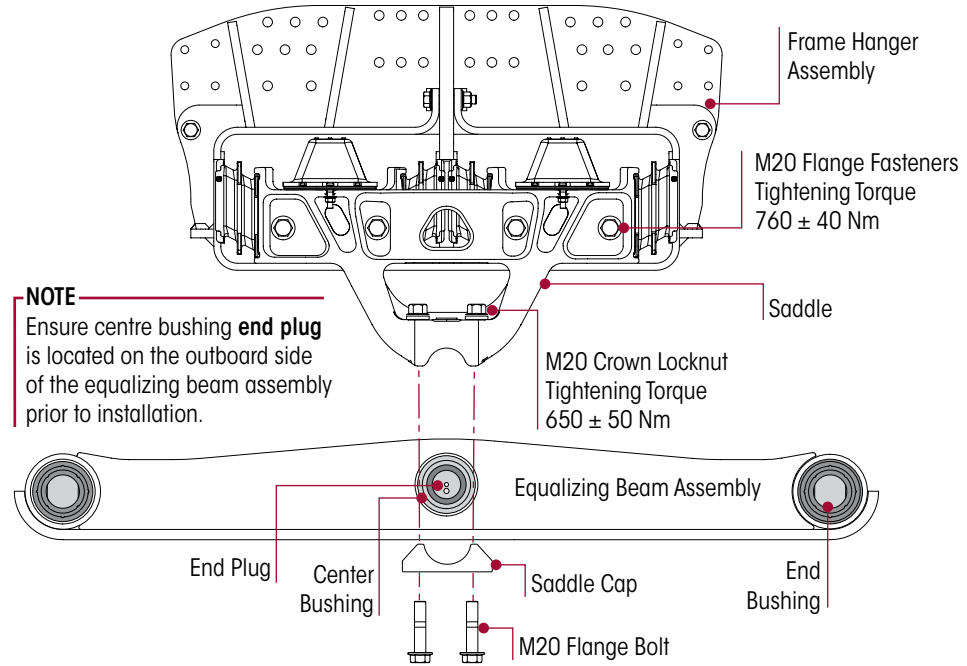


WARNING

THE WEIGHT OF EACH EQUALIZING BEAM ASSEMBLY IS APPROXIMATELY 120 KILOGRAMS. PRIOR TO REMOVING THE END BUSHING BOLTS FROM THE EQUALIZING BEAM, SUPPORT THE END OF THE EQUALIZING BEAM TO PREVENT IT FROM DROPPING. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

8. Support the equalizing beams under the centre bushing with floor jacks.

FIGURE 8-17

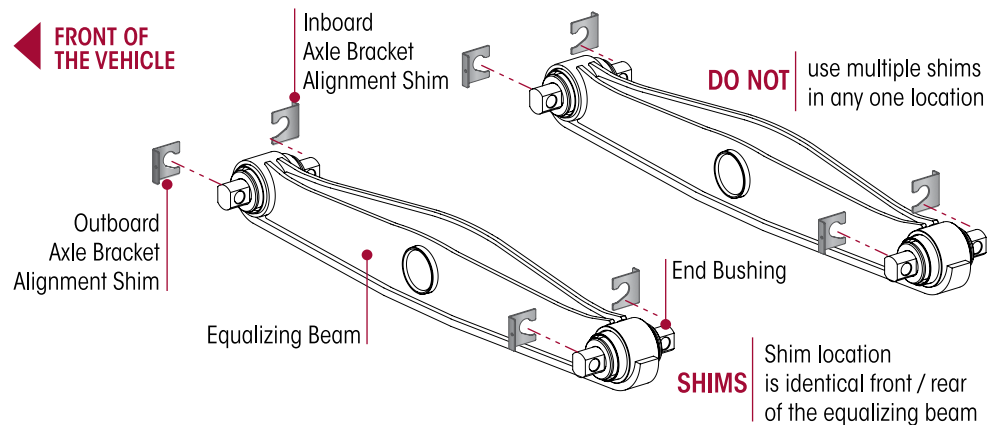


NOTE

Prior to disassembly of the equalizing beam bar pin fasteners, note the orientation of the axle bracket alignment shims. It is required that the axle bracket alignment shims are installed in the same orientation and location as removed to preserve the existing vehicle alignment, see Figure 8-18. Improper vehicle alignment can increase tire wear.

9. Prior to disassembly, note the orientation and location of the axle bracket alignment shims to preserve the existing vehicle alignment, see Figure 8-18. Reminder: **DO NOT** use multiple shims in any one location.

FIGURE 8-18



10. Remove and discard the end bushing fasteners.

SERVICE HINT

The centre bushing will allow the cross tube and the equalizing beam being serviced to angle downward once the equalizing beam end fasteners are removed.

11. Slowly lower the floor jacks and remove the equalizing beams from the axle brackets.
12. Remove confinement washers from the end bushings.
13. Slide the equalizing beams off the cross tube and out from under the vehicle.

ASSEMBLY

1. Position the equalizing beams under the axles with floor jacks.

SERVICE HINT

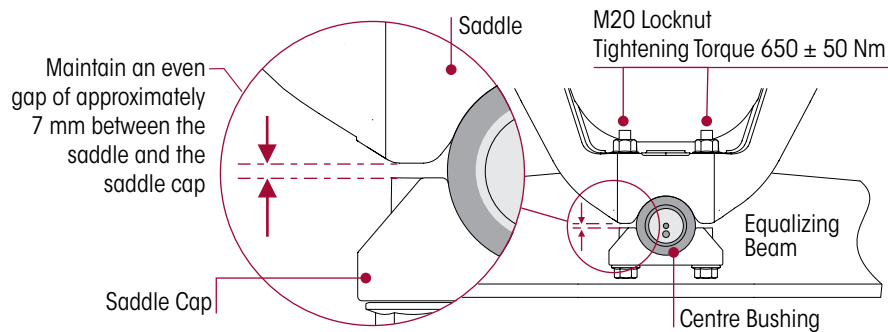
Ensure the equalizing beam centre bushing end plug is located on the outboard side of the equalizing beam, see Figure 8-17.

2. Install the cross tube into the centre bushing of the equalizing beams.
3. Position the confinement washers on both sides of each end bushings.
4. Using floor jacks, slowly raise the equalizing beams into the axle brackets. Ensure each end bushing correctly engage its respective axle bracket.
5. Install the axle bracket alignment shims in the same orientation and location as removed to preserve the existing vehicle alignment. Improper vehicle alignment can increase tire wear, see Figure 8-18.
6. Install and tighten new equalizing beam end fasteners, consult vehicle service manual for torque specifications.
7. Remove the frame safety stands and lower the frame of the vehicle while engaging the saddles on the centre bushings of each equalizing beam.

CAUTION

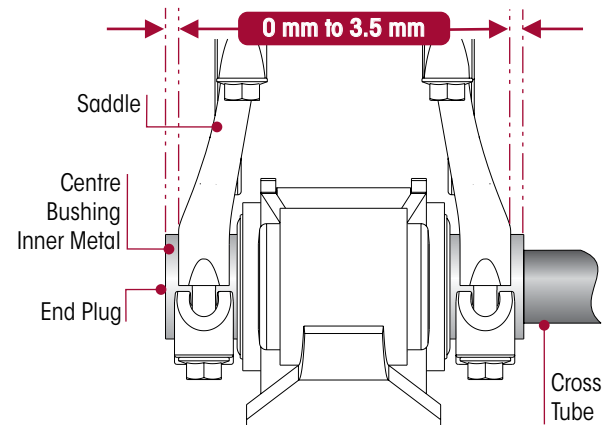
A SADDLE IS ATTACHED TO THE CENTRE BUSHING OF EACH EQUALIZING BEAM WITH TWO (2) SADDLE CAPS. EACH SADDLE CAP USES TWO (2) BOLTS TO CLAMP THE CENTRE BUSHING INNER METAL TO THE SADDLE. EACH SADDLE CAP MUST BE INSTALLED SO THAT THERE IS AN EVEN GAP BETWEEN THE SADDLE CAPS AND THE BASE OF THE SADDLE LEGS OF APPROXIMATELY 7 MM AS SHOWN IN FIGURE 8-19. IF EACH SADDLE CAP IS NOT INSTALLED EVENLY THE SADDLE LEGS COULD BECOME DEFORMED, RESULTING IN BENT BOLTS OR DAMAGED SADDLES.

FIGURE 8-19



8. Center the saddle on the equalizing beam centre bushing, see Figure 8-20.

FIGURE 8-20

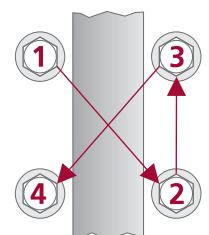


NOTE

While tightening the saddle cap bolt fasteners maintain an even gap between the saddle and saddle cap of approximately 7 mm, see Figure 8-19. Tightening the saddle cap bolt fasteners properly will help prevent wear of mating components, such as: the beam centre bushing, saddle, and saddle cap.

9. Install the saddle cap and fasteners. Tighten evenly in several steps to 650 ± 50 Nm torque in the proper sequence to achieve uniform bolt tension, see Figure 8-21.
10. Install the tires.
11. Remove the axle supports and lower the vehicle onto the ground.
12. Remove the wheel chocks.

FIGURE 8-21



TOP PAD AND AXLE BRACKET

The top pad and axle bracket on ULTIMAAX equalizing beam are not supplied by THSL, although it is a required component. THSL is not responsible for components supplied by the vehicle manufacturer. For assistance with inspection, maintenance and rebuild instructions on these components, refer to vehicle manufacturer’s instructions.

CENTRE BUSHING

YOU WILL NEED

- Vertical shop press with a capacity of at least 90 metric tonnes.
- Centre bushing, see Parts List Section in this publication and Centre Bushing Tools, see Special Tools Section in this publication.

	THSL Part No.	TML Part No.
Centre Bushing	86CX046C01	2207 3240 0142
Receiving tool	TRU3040015	5064 5890 3202
Installation tool	TRU3040010	5064 5890 3201
Removal tool	TRU3040013	5064 5890 3203

DISASSEMBLY

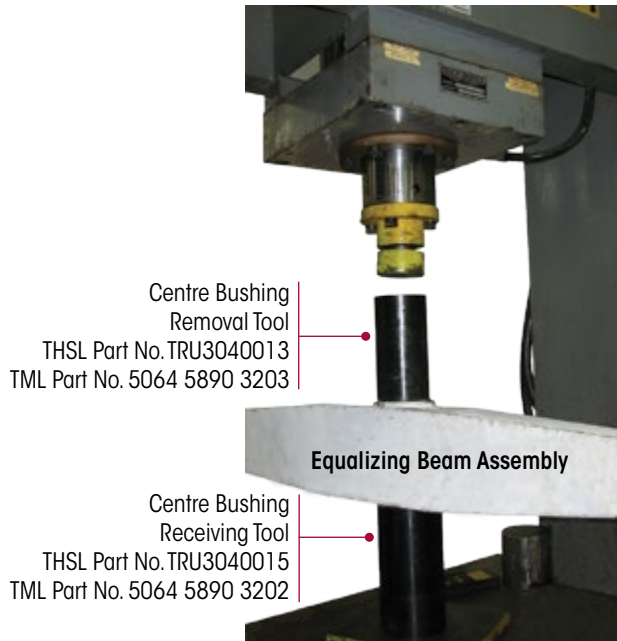
1. Remove the equalizing beam assembly from the vehicle. Follow the equalizing beam disassembly procedure in this section.



WARNING

DO NOT USE A CUTTING TORCH TO REMOVE ANY FASTENERS OR BUSHINGS. THE USE OF HEAT ON SUSPENSION COMPONENTS WILL ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 8-22



2. Place the equalizing beam assembly in a shop press with the centre hub firmly supported on the receiving tool or on the press, see Figure 8-22.
 - THSL Part No. TRU3040015
TML Part No. 5064 5890 3202
3. Install the centre bushing removal tool as shown in Figure 8-22, ensure it is centered on the centre bushing.
 - THSL Part No. TRU3040013
TML Part No. 5064 5890 3203
4. Push directly on centre bushing removal tool until the centre bushing is pressed out of the equalizing beam bore.
5. Inspect the beam bore.

INSPECTION

After removing the centre bushing, thoroughly inspect the beam bore. If damaged, replace with a new equalizing beam. **DO NOT** attempt to replace the centre bushing, rework the beam bore, or use an equalizing beam that has been damaged.



WARNING

FAILURE TO REPLACE AN EQUALIZING BEAM THAT HAS BEEN DAMAGED FROM BUSHING REMOVAL CAN RESULT IN THE FAILURE OF THAT BEAM, LEADING TO ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

When installing new centre bushings the following steps will help minimize the chance of damaging a new bushing:

1. Clean the bore of the equalizing beam with emery cloth or ball hone, removing any nicks or metal buildup from bushing removal.

2. Measure the **inside diameter** of the equalizing beam centre bore. The specification for the inside diameter of the equalizing beam centre bore on a new ULTIMAAX equalizing beam is: 98.7 mm ± 0.2 mm
3. Calculate the mean of any two measurements 90° apart in the same plane, see Figure 8-23. If the mean is not within the specified range, replacement of the equalizing beam is required.

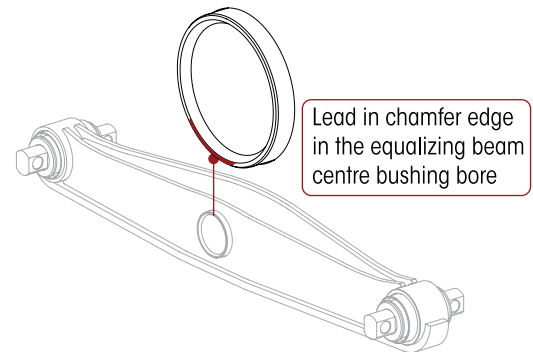
ASSEMBLY

1. The equalizing beam bore may have a more substantial lead in chamfer at one end of the bore than the other, see Figure 8-24. Take advantage of the larger chamfer by pressing in the new bushing from this end.

FIGURE 8-23



FIGURE 8-24



2. Place the equalizing beam in a shop press on the receiving tool or press. Support the beam squarely at the bore area to avoid distortion of the equalizing beam bore or bending of the equalizing beam.
3. Lubricate the equalizing beam bore and the equalizing beam centre bushing outer metal sleeve with an NLGI#2-EP (Extreme Pressure) grease, see Figure 8-25.

FIGURE 8-25



NOTE

The centre bushing must be square with the equalizing beam end hub prior to pressing the centre bushing into the equalizing beam. A centre bushing pressed at an angle will damage the centre bushing and the equalizing beam and will cause replacement of the centre bushing and/or the equalizing beam.



ALWAYS USE THE CENTRE BUSHING OUTER METAL FOR PRESSING OPERATIONS. PRESSING ON THE CENTRE BUSHING'S INNER METAL WILL CAUSE DAMAGE TO THE CENTRE BUSHING AND REQUIRE CENTRE BUSHING REPLACEMENT.

NOTE

The ULTIMAAX centre bushing has voids that must be positioned horizontally front and back, see Figure 8-26.

4. Install the centre bushing installation tool making sure the centre bushing voids are positioned horizontally front and back and press in the new centre bushing until the outer metal sleeve is centered in the equalizing beam bore, see Figures 8-26 through 8-30.
5. Wipe off excess grease from around the installed centre bushing.
6. Install the equalizing beam assembly to the vehicle. Follow the equalizing beam installation procedure in this section.

FIGURE 8-26

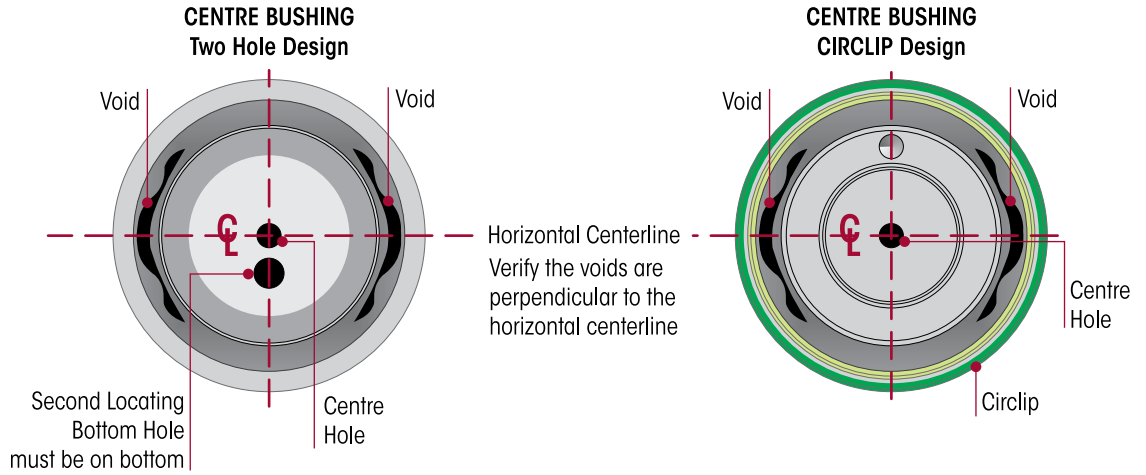


FIGURE 8-27

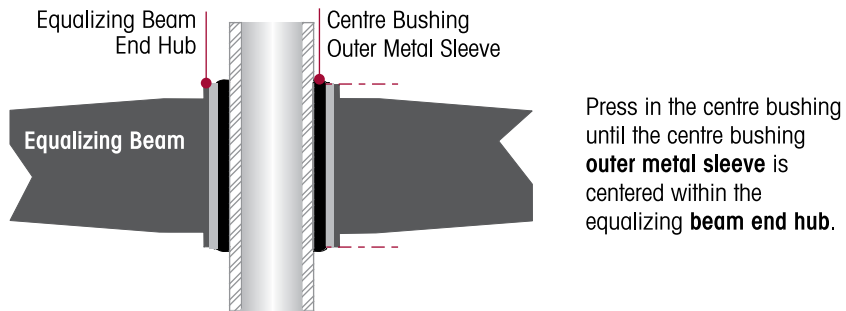


FIGURE 8-28

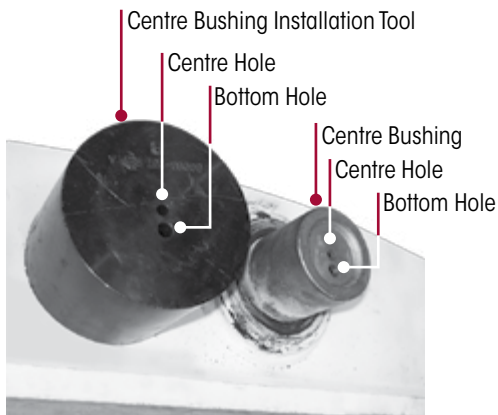


FIGURE 8-30

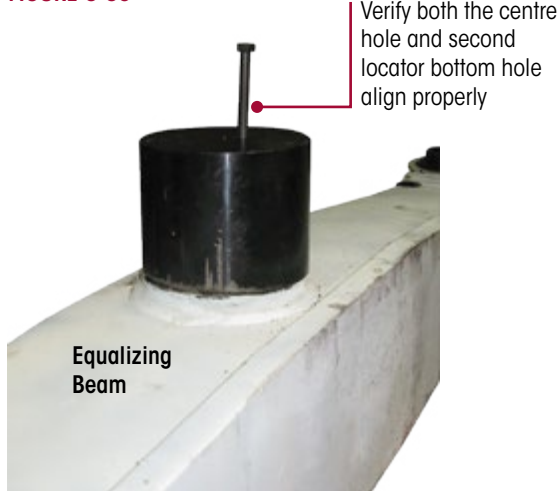
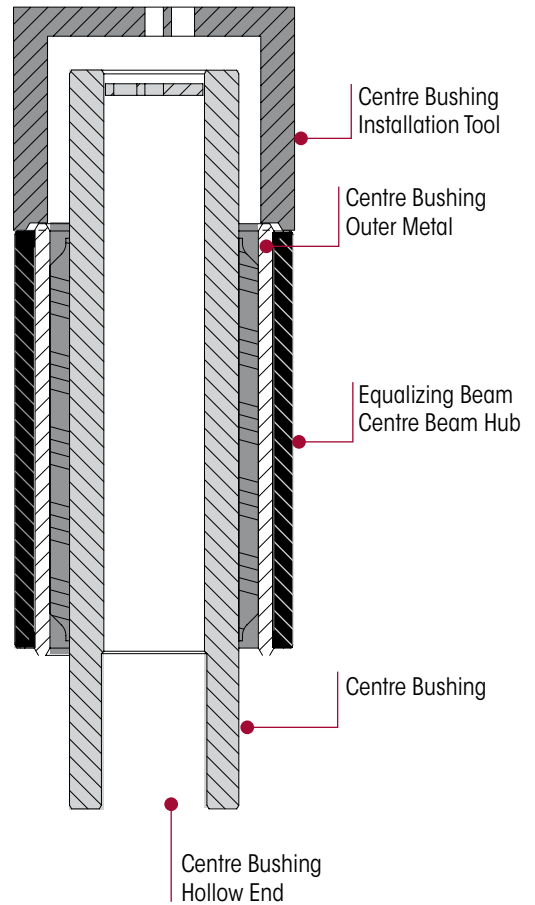


FIGURE 8-29



BAR PIN END BUSHINGS

You will need:

- A shop press with a capacity of at least 90 metric tonnes
- End bushing kit, see Parts List Section in this publication and Bar Pin End Bushing Tools, refer to the Special Tools Section in this publication

	THSL PART NO.	TML PART NO.
End Bushing Kit	03AX007C09	2207 3299 0105
Receiving tool	TRU3040014	5064 5890 3205
Installation tool	TRU3040009	5064 5890 3204
Removal tool	TRU3040012	5064 5890 3206

DISASSEMBLY



WARNING

WHEN SERVICING THE BUSHINGS IN THE EQUALIZING BEAMS, FOLLOW THE PROCEDURES OUTLINED IN THIS PUBLICATION. DO NOT USE A CUTTING TORCH TO REMOVE THE BUSHING OUTER METALS PRESSED IN THE BEAM BORES OR FASTENERS. WELDING, TORCHING OR ATTACHING MATERIAL TO THE EQUALIZING BEAM MUST NEVER BE PERFORMED. THE USE OF HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE EQUALIZING BEAMS AND CAN CAUSE DAMAGE TO THE EQUALIZING BEAM ASSEMBLY, ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.



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

It is recommended to use of Class 10.9 bolts, hardened washers, and Class 10 locknuts. Hardened washers are not necessary when flange head fasteners are used.

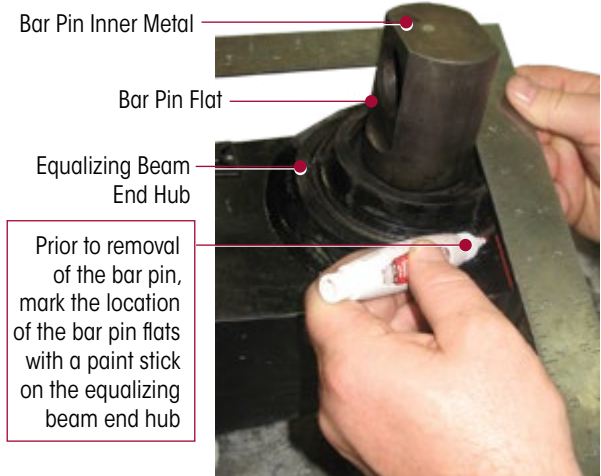
NOTE

Whenever an equalizing beam is removed for repair, measure the distance between the axle bracket legs for correct width. Refer to the Preventive Maintenance Section of this publication.

1. Remove the equalizing beam from vehicle per instructions in the Equalizing Beam Disassembly found in this section.
2. Place the equalizing beam in the shop press with the beam end hub squarely supported on the receiving tool or press bed:
 - THSL Part No. TRU3040014 / TML Part No. 5064 5890 3205

FIGURE 8-31

3. Prior to removal, mark the orientation of the bar pin flats on the equalizing beam with a paint stick, see Figure 8-31.
4. Support the beam end hub with it centered on the receiving tool. Be sure the equalizing beam is squarely supported on the press bed for safety.
5. Press on the end bushing inner metal, see Figure 8-31, of the end bushing until the inner metal is flush with the top of the equalizing beam end hub. This will move the bushing rubber away from the outer metal of the bushing so the removal tool can be installed.
6. Center the bushing removal tool directly on the bushing's outer metal and press the bushing out of the equalizing beam end hub



- THSL Part No. TRU3040012 / TML Part No. 5064 5890 3206

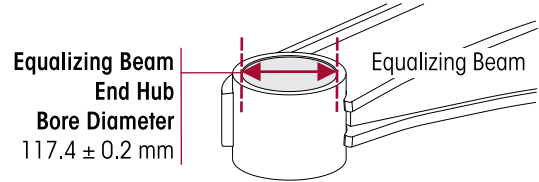
INSPECTION

After removing the bar pin end bushings, thoroughly inspect the beam bores. If the equalizing beam is damaged from end bushing removal, replacement of the equalizing beam is required, replace with a new equalizing beam. **DO NOT** attempt re-bush or use an equalizing beam that has been damaged.



FAILURE TO REPLACE AN EQUALIZING BEAM THAT HAS BEEN DAMAGED FROM BUSHING REMOVAL CAN RESULT IN THE FAILURE OF THAT BEAM, LEADING TO ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 8-32



1. Clean the bores of the equalizing beams with emery cloth or ball hone, removing any nicks or metal buildup from bushing removal.
2. Measure the equalizing beam end hub bore inner diameter. The specification for the equalizing beam end hub bore diameter is: 117.4 mm ± 0.2 mm
3. Calculate the mean of any two measurements 90° apart in the same plane, see Figure 8-32. If the mean is **NOT** within the specified range, replacement of the equalizing beam is required.

ASSEMBLY

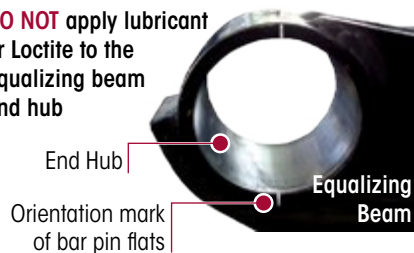
NOTE

Always use the bushing outer metal for pressing operations. Pressing on the bushings inner metal may damage the bushing and require bushing replacement.

1. The equalizing beam bore may have a more substantial lead in chamfer at one end of the bore than the other. Take advantage of the larger chamfer by pressing in the new end bushing from this end.
2. As per the location specified in Figure 8-34, apply Loctite 290 with a brush, **ONLY** to the end bushing that enters the equalizing beam end hub first. **DO NOT** apply Loctite to equalizing beam end hub bore, see Figure 8-33.

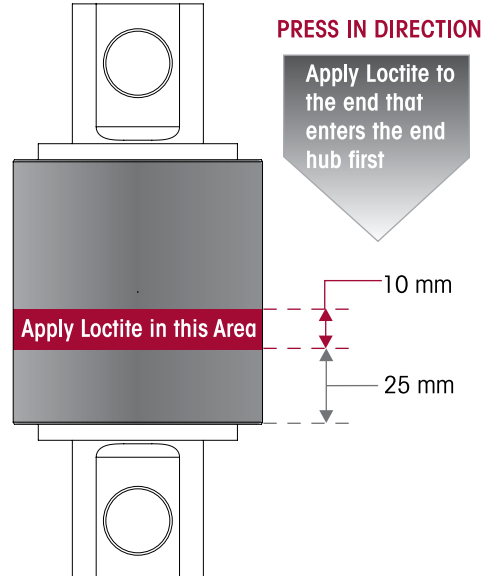
FIGURE 8-33

DO NOT apply lubricant or Loctite to the equalizing beam end hub



3. Place the equalizing beam in a shop press with the end hub, squarely supported on the receiving tool, see Figure 8-35.
 - THSL Part No. TRU3040014 / TML Part No. 5064 5890 3205
4. Ensure the bar pin flat of the end bushing is aligned to the orientation mark made prior to removal as shown in Figure 8-31.

FIGURE 8-34



NOTE

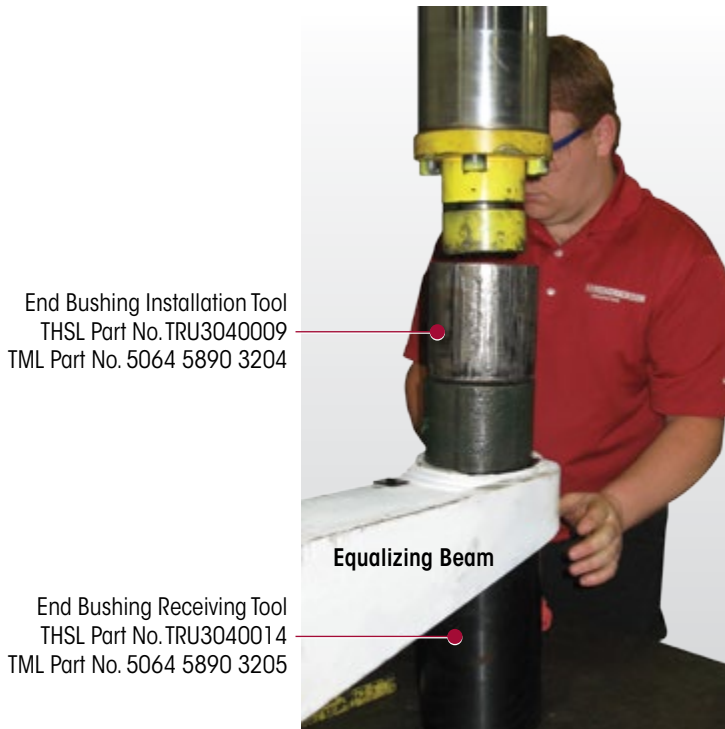
The end bushing must be square with the equalizing beam end hub before pressing the end bushing into the beam. End bushings pressed in at an angle will damage the end bushing and the equalizing beam.



CARE MUST BE TAKEN DURING THE INSTALLATION OF THE BAR PIN END BUSHING. **DO NOT** PUSH ON THE BAR PIN, DOING SO WILL CAUSE DAMAGE TO THE END BUSHING AND WILL REQUIRE NEW END BUSHING REPLACEMENT.

5. Place the end bushing installation tool on the bushing, see Figures 8-35 and 8-36.
 - THSL Part No. TRU3040009 / TML Part No. 5064 5890 3204

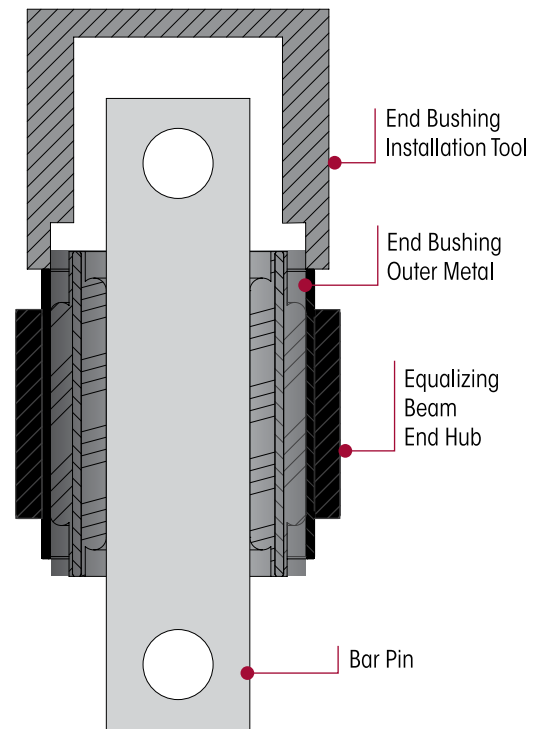
FIGURE 8-35



End Bushing Installation Tool
THSL Part No. TRU3040009
TML Part No. 5064 5890 3204

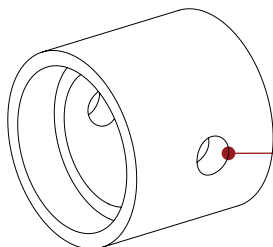
End Bushing Receiving Tool
THSL Part No. TRU3040014
TML Part No. 5064 5890 3205

FIGURE 8-36



6. The through hole in the tool can help align the bar pin flats due to lack of visibility. Place a bolt with enough length to go through the tool and the bar pin hole, see Figure 8-37.
7. With the tools aligned, press in the end bushing, see Figure 8-35.
8. The bushing must be centered within the hub of the equalizing beam, see Figure 8-38.
9. Install the equalizing beam assembly into vehicle as detailed in Equalizing Beam Assembly in this section.

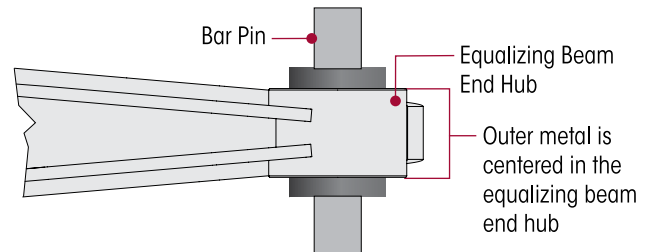
FIGURE 8-37



End Bushing Installation Tool
THSL Part No. TRU3040009
TML Part No. 5064 5890 3204

Through hole can be used to help align the bar pin flats due to lack of visibility. Place a bolt through the tool and bar pin hole.

FIGURE 8-38



CROSS TUBE

A cross tube requires replacement only when it has been bent greater than or equal to 20 mm, possibly due to hitting an object. A bent cross tube may cause misalignment of the axles, and must be replaced immediately to eliminate abnormal tire wear.



IMPROPER JACKING METHODS CAN CAUSE STRUCTURAL DAMAGE WHICH CAN CAUSE ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR SEVERE PERSONAL INJURY.

- DO NOT USE THE SUSPENSION CROSS TUBE AS A JACKING POINT, SEE FIGURE 8-39, CONSULT SERVICE MANUAL FOR PROPER JACKING INSTRUCTIONS.
- ACCEPTABLE LIFTING POINTS FOR A VEHICLE INCLUDE BUT ARE NOT LIMITED TO: THE AXLE, EQUALIZING BEAM, AND THE VEHICLE FRAME RAIL. REFER TO THE VEHICLE SERVICE MANUAL FOR PROPER JACKING INSTRUCTIONS. IF ADDITIONAL CLEARANCE IS NECESSARY, CAREFULLY DRIVE THE WHEELS OVER A SPACER OR A SECURE SPACER TO RAISE THE VEHICLE TO PROVIDE SUFFICIENT LIFTING CLEARANCE UNDER THE AXLE.

Method A Equalizing Beam Removal Method - Follow the steps in the Equalizing Beam Component Replacement procedure in this section.

Within the procedure, after removal of the equalizing beams when the equalizing beams are separated, remove and replace cross tube.

FIGURE 8-39

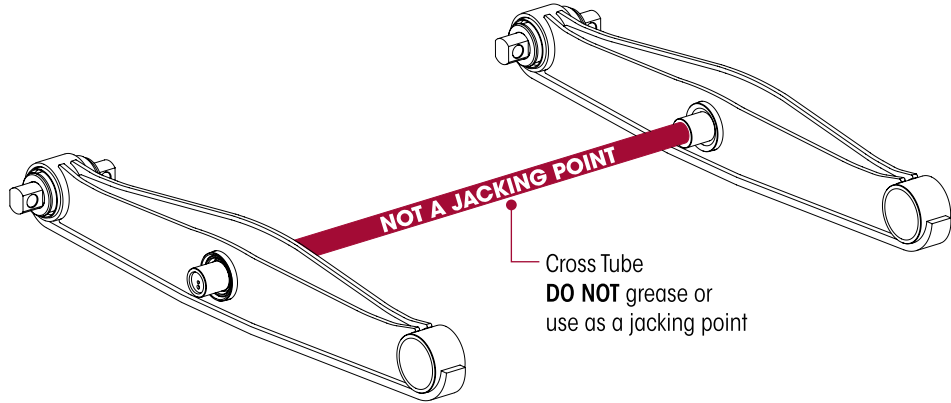


FIGURE 8-40 Hole Saw



Method B Centre Bushing End Plug Removal

You will need:

- Cross Tube Service Kit No. 03AX010C09, see Parts Lists Section
- Cutting torch, welding equipment, hole saw, similar to the one shown in Figure 8-40.

DISASSEMBLY

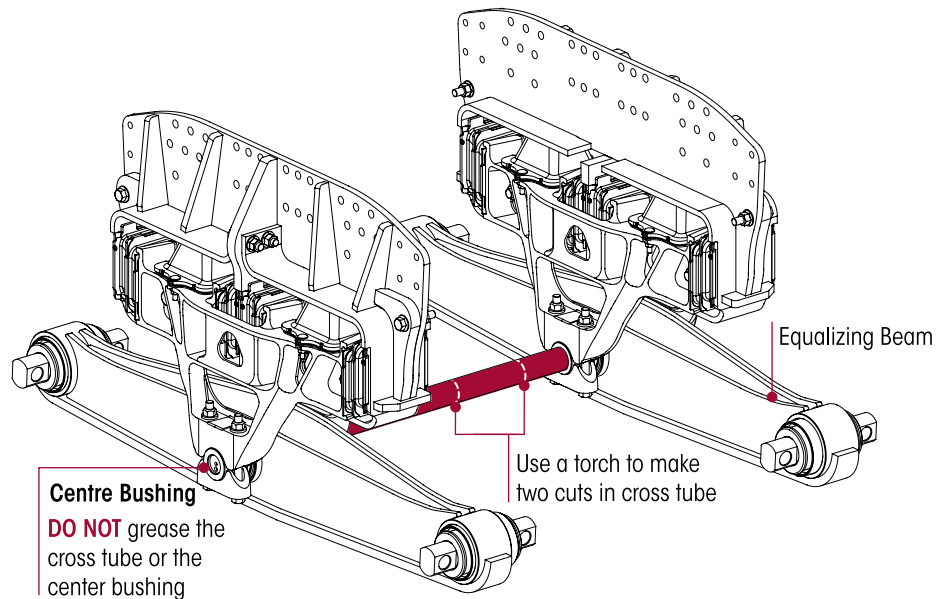
1. Use a work bay with a level surface.
2. Chock the front steer axle wheels.



FOLLOW THE SAFETY GUIDELINES FOR OPERATING THE TORCH. USE CAUTION AS PARTS MAY BE HOT.

3. Use a cutting torch to make two cuts in the cross tube, see Figure 8-41.
4. Remove the cut section of the cross tube and slide the remaining sections out of the centre bushings and discard.
5. Use a 40 mm hole saw and remove only one centre bushing end plug from the suspension.

FIGURE 8-41

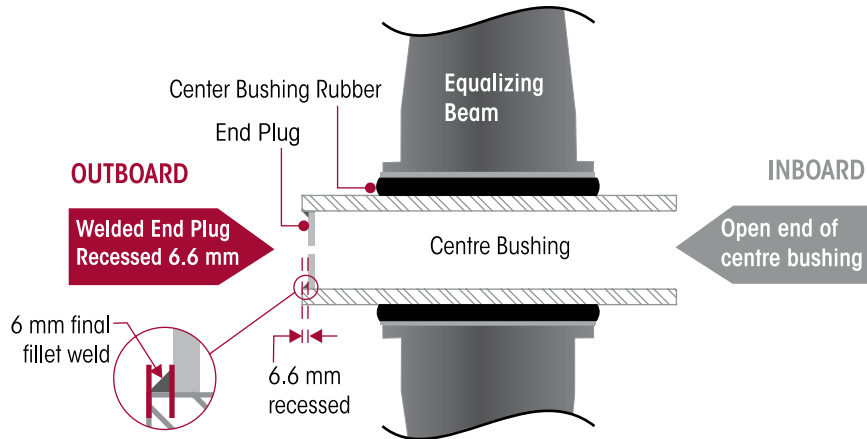


ASSEMBLY

1. Clean the open end of the centre bushing bore to approximately 25 mm depth of weld and debris.
2. From the open centre bushing slide the new cross tube into both centre bushings.

3. It may be necessary to use a floor jack under one or both equalizing beams to align the cross tube.
4. Position the end plug 6.6 mm recessed in the centre bushings and tack weld, see Figure 8-42.
5. Check end plug position, final weld shall be a 6 mm fillet, see Figure 8-42.

FIGURE 8-42



A-FRAME (V-TORQUE ROD)



ULTIMAAX REAR SUSPENSION INCORPORATES A-FRAME (V-TORQUE ROD) FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING AND POSSIBLE TIRE CONTACT WITH THE FRAME. OPERATING A VEHICLE WITH NON-FUNCTIONAL A-FRAME CAN RESULT IN ADVERSE VEHICLE HANDLING, SEVERE PERSONAL INJURY, AND PREMATURE COMPONENT DAMAGE.

A-frame (V-Torque Rod) assembly for ULTIMAAX 37t is not supplied by THSL, although it is a required component. THSL is not responsible for components supplied by the vehicle manufacturer. For assistance with inspection, maintenance and rebuild instructions on these components, refer to vehicle service manual.

SECTION 9 Troubleshooting Guide

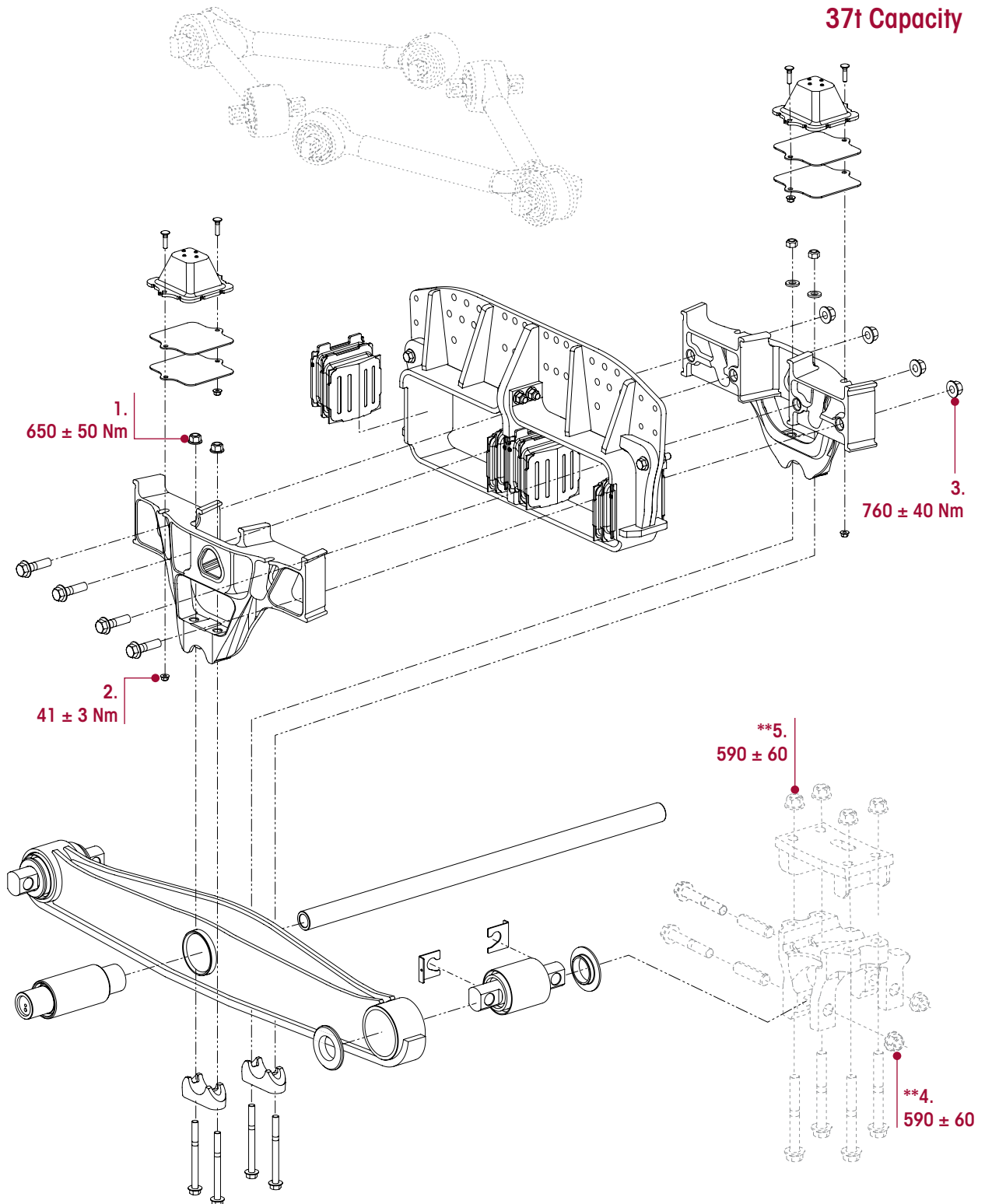
ULTIMAAX

TROUBLESHOOTING GUIDE

CONDITION	POSSIBLE CAUSE	CORRECTION
Suspension has harsh or bumpy ride	Damaged progressive load spring (PLS)	Replace progressive load springs (PLS).
	Damaged shear spring	Replace shear springs.
	Suspension overloaded	Redistribute load or reduce load to correct weight.
Vehicle leans	Damaged PLS	Replace PLS.
	Damaged shear spring	Replace shear springs.
	Weight bias	Redistribute load to correct weight bias so the weight on both sides of the vehicle are the same.
Irregular tire wear	Incorrect axle alignment	Axle alignment is set at the time of vehicle manufacture. Refer to the Alignment and Adjustment Section in this publication.
	Bent cross tube	Replace cross tube.
	Damaged, bent, cracked suspension component	Replace damaged component (equalizing beam, frame hanger, etc.).
Loose or missing suspension fasteners	Suspension is overloaded	Reduce and/or redistribute load to correct weight.
		Replace and/or properly tighten fasteners to the proper torque specification.
	Improper torque or over torque	Increase inspection interval of fastener. Replace and/or properly tighten fasteners to the proper torque specification.
Frame hanger cracked	Suspension is overloaded	Reduce and/or redistribute load to correct weight.
	Worn shear spring or PLS	Replace shear spring or PLS spring.
	Loose or missing suspension fasteners	Ensure fasteners are maintained at torque specification per service manual.
		Replace fasteners and/or properly tighten fasteners to the proper torque specification.
Damaged frame hanger assembly	Replace frame hanger assembly.	
Saddle leg to equalizing beam contact	Damaged, bent, worn, or cracked suspension component(s)	Replace damaged component.
	Cross tube bent or missing	Replace cross tube.
	Saddle cap moving freely	Replace saddle cap and inspect mating components, replace as necessary.
	Saddles are not centered on equalizing beam	Center saddles on the equalizing beam.

SECTION 10 Torque Specifications

THSL RECOMMENDED TORQUE VALUES
PROVIDED IN NEWTON METERS



ULTIMAAX 37t

THSL RECOMMENDED TORQUE SPECIFICATIONS

NO.	COMPONENT	FASTENER		TORQUE VALUE IN NEWTON METERS
		SIZE	*QUANTITY	
1.	Saddle Assembly to Saddle Cap Crown Locknuts	M20	8	650 ± 50
2.	Saddle Assembly to Progressive Load Spring Flange Locknuts	M10	8	41 ± 3
3.	Saddle Assembly Halves Flange Locknuts	M20	8	760 ± 40
4.	**Equalizing Beam to Axle Bracket	M24	8	**590 ± 60
5.	**Axle Bracket to Top Pad	M24	16	**590 ± 60

NOTE: * Quantities shown are per suspension.

** Not supplied by THSL. Torque values shown in this publication apply only if THSL supplied fasteners are used. If non THSL fasteners are used, follow the torque specification listed in the vehicle manufacturer's service manual.

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.

Call Hendrickson at 2066 409937 for additional information.



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17730-293 Rev B 05-21

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