



H TECHNICAL PROCEDURE

AR2™ Rear Walking Beam Air Suspension

SUBJECT: Service Instructions

LIT NO: 17730-241

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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 Hendrickson AR2™ rear air suspension system.

NOTE

Use only Hendrickson Genuine Parts 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 the AR2 suspension.

Hendrickson reserves the right to make changes and improvements to its products and publications at any time. Contact Hendrickson Tech Services for information on the latest version of this manual at 1-866-755-5968 (toll-free U.S. and Canada), 1-630-910-2800 (outside U.S. and Canada) or e-mail: techservices@hendrickson-intl.com.

The latest revision of this publication is also available online at www.hendrickson-intl.com.

SECTION 2

Product Description

AR2 provides versatility for demanding job sites or off-road conditions. When loaded, AR2 delivers up to 14" (356 mm) of diagonal wheel articulation to keep load on all drive wheels. Unloaded articulation varies with vehicle configuration and empty body weight.

NOTE

Information on the AR2 aftermarket conversion kits is in the AR2 Conversion from RT•RTE Section in this publication.

FIGURE 2-1
AR2 for Manitowoc 46K

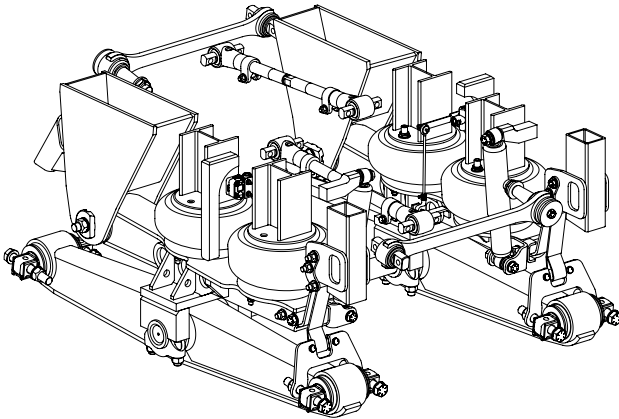
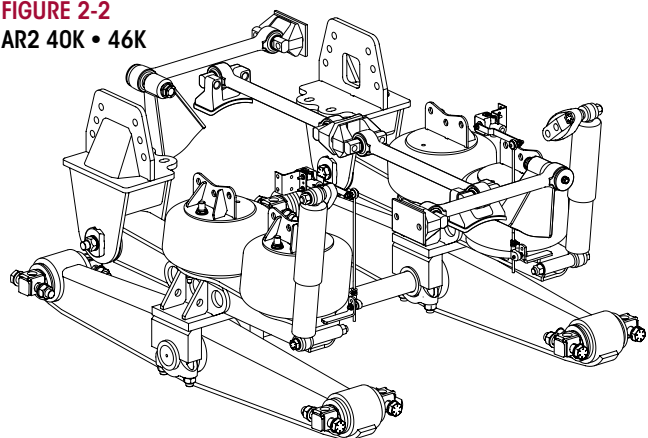


FIGURE 2-2
AR2 40K • 46K





- **Trailing arm / Saddle assembly** — The heavy-duty trailing arm / saddle assembly provides lighter weight, good articulation and optimal ground clearance
- **Large volume air springs** — Rolling lobe design provides variable spring rates to deliver superior ride quality
- **Equalizing beam** — Distributes load equally between both axles for improved maneuverability, stability, and handling. Lowers the center of gravity to increase stability. Establishes a solid axle connection for improved handling.
- **Heavy-duty shock absorbers** — Standard for optimal ride and cargo / body protection
- **Bar pin end connection** — Rugged axle connection extends bushing life and allows easy axle alignment and serviceability
- **Hendrickson rods** — Improve cornering by controlling lateral forces. Transverse rods ensure maximum lateral axle control and straight line suspension stability. Longitudinal rods engineered to optimize resistance to wind up during acceleration and braking.
- **Lightweight frame hanger** — Controls acceleration, braking, and vertical forces for longer hanger and trailing arm life
- **Height control valve** — Maintains proper suspension ride height. Twin height controls for improved leveling.

AR2 PRODUCTION VERSION SPECIFICATIONS

	Manitowoc	40K	46K
Suspension Rating	46,000 lbs.	40,000 lbs.	46,000 lbs.
Gross Vehicle Weight (GVW) Approval ¹	67,500 lbs.	73,000 lbs.	80,000 lbs.
Gross Combination Weight (GCW) Approval	–	160,000 lbs.	190,000 lbs.
Site Travel Rating ²	60,000 lbs.	See Below ⁵	60,000 lbs.
Diagonal Articulation ³	14"		
Ride Heights	16.8"	9.5", 10.5"	
Axle Spacing	54"	52", 54"	
Lift Axle	NA	See Below ⁴	See Below ⁵

AR2 is approved for vocational truck applications such as dump under 18 feet, crane / boom and platform applications. Contact Hendrickson for approval of additional applications.

1. Contact Hendrickson for applications that may exceed GVW approval ratings.
2. Job site travel rating — Operators using vehicles equipped with liftable pusher or tag axles must not exceed published ratings. Ratings are limited to no more than five percent of vehicle operation at speed not to exceed five mph. Liftable pusher or tag axles should only be raised (or unloaded) to improve vehicle maneuverability in off-road use or when vehicle is empty. Site travel ratings are consistent with published axle manufacturer's limitations. Axle and suspension site travel specifications must not be exceeded.
3. Suspension articulation may exceed vehicle's capability and may be limited by vehicle manufacturer; vehicle manufacturer installed axle stops may restrict suspension's articulation.
4. No add-on lift axles approved for 40,000 pound applications.
5. One or more lift axles. Maximum 60,000 pound load suspension for site travel.

SECTION 3

Important Safety Notice

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

This technical publication should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service or repair may damage the vehicle, cause personal injury, render the vehicle unsafe in operation, or void 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 COULD RESULT IN DEATH OR SERIOUS INJURY.



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 of this publication.



The torque symbol alerts you to tighten fasteners to a specified torque value. Refer to Torque Specifications Section of this publication.

■ SAFETY PRECAUTIONS
⚠ WARNING
FASTENERS

DISCARD USED FASTENERS. ALWAYS USE NEW FASTENERS TO COMPLETE A REPAIR. FAILURE TO DO SO COULD RESULT IN FAILURE OF THE PART, OR MATING COMPONENTS, ADVERSE VEHICLE HANDLING, PERSONAL INJURY, OR PROPERTY DAMAGE.

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

⚠ WARNING
BEAM END CONNECTION AND SADDLE CAP FASTENERS

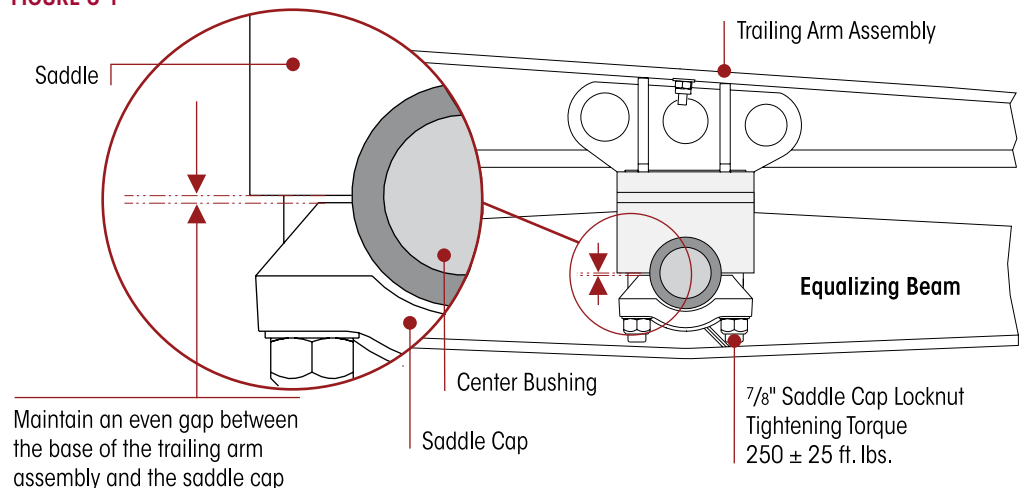
DO NOT ASSEMBLE BEAM END CONNECTION WITHOUT PROPER FASTENERS. HENDRICKSON RECOMMENDS THE USE OF HENDRICKSON FASTENERS TO SUSTAIN PROPER CLAMP FORCE. FAILURE TO DO SO CAN CAUSE ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR PERSONAL INJURY.

ENSURE THAT BEAM END CONNECTION AND SADDLE CAP FASTENERS TORQUE VALUE ARE SUSTAINED AS RECOMMENDED IN THE TORQUE REQUIREMENTS SECTION OF THIS PUBLICATION. FAILURE TO DO SO CAN CAUSE ADVERSE VEHICLE HANDLING RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.

IF BEAM END BUSHING MOVEMENT OR LOOSENESS IS NOTED IN THE EQUALIZING BEAM END HUB, DO NOT OPERATE THE VEHICLE. REPLACE THE END BUSHINGS AND ALL CONNECTING PARTS. THE ABOVE CONDITION CAN RESULT IN COSTLY REPAIR, DOWNTIME, POSSIBLE SEPARATION OF COMPONENTS, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR PERSONAL INJURY.

⚠ CAUTION
TRAILING ARM ASSEMBLY CONNECTION

THE TRAILING ARM ASSEMBLIES ARE ATTACHED TO THE CENTER BUSHINGS OF EACH EQUALIZING BEAM WITH TWO (2) SADDLE CAPS. EACH SADDLE CAP USES TWO (2) STUDS TO CLAMP THE CENTER BUSHING INNER METAL TO THE SADDLE. THE SADDLE CAPS MUST BE INSTALLED AND TIGHTEN SO THAT THERE IS AN EVEN GAP BETWEEN THE SADDLE CAPS AND THE BASE OF THE TRAILING ARM ASSEMBLY AS SHOWN IN FIGURE 3-1. IF THEY ARE NOT INSTALLED PROPERLY, THE TRAILING ARM ASSEMBLIES COULD BECOME DEFORMED, RESULTING IN BENT BOLTS OR ASSEMBLY DAMAGED.

FIGURE 3-1

⚠ WARNING
LONGITUDINAL / TRANSVERSE TORQUE ROD

AR2 SUSPENSION INCORPORATES LONGITUDINAL AND TRANSVERSE TORQUE RODS FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL, THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, ADVERSE VEHICLE HANDLING, POSSIBLE TIRE CONTACT WITH THE FRAME, PREMATURE COMPONENT DAMAGE, OR SEVERE PERSONAL INJURY.

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**PERSONAL PROTECTIVE EQUIPMENT**

ALWAYS WEAR PROPER EYE PROTECTION AND OTHER REQUIRED PERSONAL PROTECTIVE EQUIPMENT TO HELP PREVENT PERSONAL INJURY WHEN PERFORMING VEHICLE MAINTENANCE, REPAIR OR SERVICE.

WARNING**AIR SPRING INFLATION AND DEFLATION**

PRIOR TO DISASSEMBLY OF THE SUSPENSION, AIR SPRING ASSEMBLIES MUST BE DEFLATED. UNRESTRICTED AIR SPRING ASSEMBLIES CAN VIOLENTLY SHIFT. DO NOT INFLATE AIR SPRING ASSEMBLIES WHEN THEY ARE UNRESTRICTED. AIR SPRING ASSEMBLIES MUST BE RESTRICTED BY SUSPENSION OR OTHER ADEQUATE STRUCTURE. DO NOT INFLATE BEYOND PRESSURES RECOMMENDED BY AIR SPRING MANUFACTURER, CONTACT HENDRICKSON TECHNICAL SERVICES FOR DETAILS. IMPROPER USE OR OVER INFLATION MAY CAUSE AIR SPRING ASSEMBLIES TO BURST, CAUSING PROPERTY DAMAGE AND / OR SEVERE PERSONAL INJURY.

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

CAUTION**AIR SPRING INFLATION**

INFLATE THE SUSPENSION SLOWLY AND MAKE SURE THE RUBBER BLADDER OF THE AIR SPRING INFLATES UNIFORMLY AND IS NOT BINDING. FAILURE TO DO SO CAN CAUSE DAMAGE TO THE AIR SPRING AND / OR MOUNTING BRACKETS AND VOID WARRANTY.

CAUTION**AIR SPRING LOWER MOUNTING STUDS**

IF THE AIR SPRING IS BEING REMOVED FOR AN ALTERNATE REPAIR, IT IS MANDATORY TO LUBRICATE THE LOWER AIR SPRING FASTENERS WITH PENETRATING OIL AND REMOVE WITH HAND TOOLS TO PREVENT DAMAGE TO THE LOWER AIR SPRING MOUNTING STUD. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE AND VOID WARRANTY.

WARNING**WORK SITE DUMPING**

WHEN THE TRUCK / TRAILER BODY / BOOM / AND OR ATTACHMENT IS LIFTED IT IS MANDATORY TO COMPLETELY EXHAUST THE AIR FROM THE SUSPENSION SYSTEM TO HELP PROVIDE STABILITY WHEN LIFTED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, ROLL-OVER, OR VEHICLE INSTABILITY, POSSIBLY CAUSING SEVERE PERSONAL INJURY, PROPERTY DAMAGE, OR DEATH. FIRST RAISE ANY AUXILIARY AXLES AND THEN EXHAUST ALL PRESSURE FROM REAR TRACTOR / TRAILER AND TRUCK AIR SUSPENSION SYSTEMS PRIOR TO RAISING THE BODY / BOOM OR ATTACHMENTS. FOLLOW THE VEHICLE MANUFACTURER'S OPERATING INSTRUCTIONS FOR MAINTAINING PROPER STABILITY.

**WARNING****IMPROPER JACKING METHOD**

IMPROPER JACKING METHODS CAN CAUSE STRUCTURAL DAMAGE, AND RESULT IN ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH AND WILL VOID HENDRICKSON'S WARRANTY.

- DO NOT USE THE SUSPENSION CROSS TUBE AS A JACKING POINT TO RAISE THE VEHICLE
- REFER TO THE VEHICLE MANUFACTURER FOR PROPER JACKING INSTRUCTIONS

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

SHOCK ABSORBERS

THE SHOCK ABSORBERS ARE THE REBOUND TRAVEL STOPS FOR THE SUSPENSION. ANYTIME THE AXLE ON AN AR2 SUSPENSION IS SUSPENDED, IT IS MANDATORY THAT THE SHOCK ABSORBERS REMAIN CONNECTED. FAILURE TO DO SO CAN CAUSE THE AIR SPRINGS TO SEPARATE FROM THE PISTON AND RESULT IN PREMATURE AIR SPRING FAILURE AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE. REPLACEMENT OF SHOCK ABSORBERS WITH NON-HENDRICKSON PARTS CAN ALTER THE REBOUND TRAVEL AND THE RIDE QUALITY OF THE SUSPENSION.

WARNING

MODIFYING COMPONENTS

DO NOT MODIFY OR REWORK PARTS WITHOUT AUTHORIZATION FROM HENDRICKSON. DO NOT SUBSTITUTE REPLACEMENT COMPONENTS NOT AUTHORIZED BY HENDRICKSON. USE OF MODIFIED, REWORKED, SUBSTITUTE OR REPLACEMENT PARTS NOT AUTHORIZED BY HENDRICKSON MAY NOT MEET HENDRICKSON'S SPECIFICATIONS, AND CAN RESULT IN FAILURE OF THE PART, ADVERSE VEHICLE HANDLING, POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE, AND WILL VOID ANY APPLICABLE WARRANTIES. USE ONLY HENDRICKSON AUTHORIZED REPLACEMENT PARTS.

CAUTION

PROCEDURES AND TOOLS

A TECHNICIAN USING A SERVICE PROCEDURE OR TOOL WHICH HAS NOT BEEN RECOMMENDED BY HENDRICKSON MUST FIRST SATISFY HIMSELF THAT NEITHER HIS SAFETY NOR THE VEHICLE'S SAFETY WILL BE JEOPARDIZED BY THE METHOD OR TOOL SELECTED. INDIVIDUALS DEVIATING IN ANY MANNER FROM THE INSTRUCTIONS PROVIDED ASSUME ALL RISKS OF CONSEQUENTIAL PERSONAL INJURY OR DAMAGE TO EQUIPMENT INVOLVED.

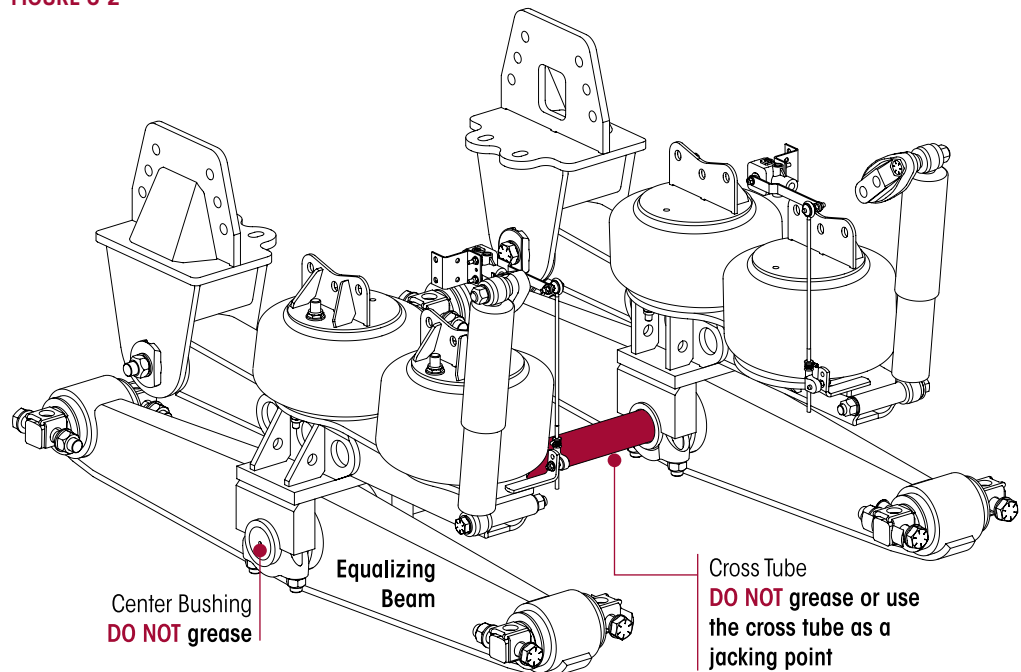
WARNING

IMPROPER JACKING METHOD

IMPROPER JACKING METHODS CAN CAUSE STRUCTURAL DAMAGE WHICH CAN CAUSE ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR SEVERE PERSONAL INJURY AND WILL VOID HENDRICKSON'S WARRANTY.

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

FIGURE 3-2



 **WARNING****TORCH / WELDING**

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

EXERCISE EXTREME CARE WHEN HANDLING OR PERFORMING MAINTENANCE IN THE AREA OF THE 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 CAN CAUSE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

 **WARNING****PARTS CLEANING**

SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS, AND CAUSE BURNS. TO HELP AVOID SERIOUS PERSONAL INJURY, CAREFULLY FOLLOW THE MANUFACTURER'S PRODUCT INSTRUCTIONS AND GUIDELINES AND THE FOLLOWING PROCEDURES:

1. WEAR PROPER EYE PROTECTION.
2. WEAR CLOTHING THAT PROTECTS YOUR SKIN.
3. WORK IN A WELL-VENTILATED AREA.
4. DO NOT USE GASOLINE OR FLAMMABLE SOLVENTS THAT CAN EXPLODE.
5. HOT SOLUTION TANKS OR ALKALINE SOLUTIONS MUST BE USED CORRECTLY. FOLLOW THE MANUFACTURER'S RECOMMENDED INSTRUCTIONS AND GUIDELINES CAREFULLY TO HELP PREVENT PERSONAL ACCIDENT OR INJURY.

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

SECTION 4 Special Tools

BAR PIN STYLE END BUSHING TOOLS

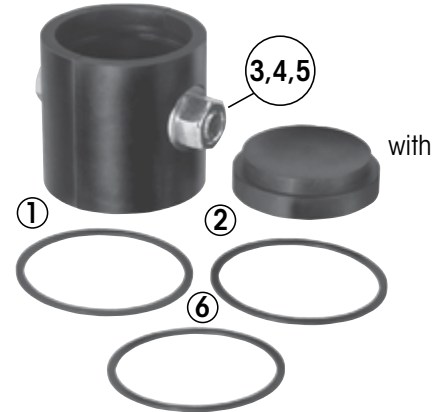
INSTALLATION TOOL

Hendrickson Part No. 66086-103

OTC Part No. 1757 Visit otctools.com

Use with the equalizing beam removed from the truck, and in conjunction OTC No. 51100 press plate and a 100 ton hydraulic shop press.

Part	OTC P/N
1. Installer	520493
2. Cap	219554
3. Cap Screw	520563
4. Washer	11253
5. Hex Nut	10221
6. Shims	302401



REMOVAL TOOLS

Hendrickson Part No. 66086-104

OTC Part No. 206457 Visit otctools.com



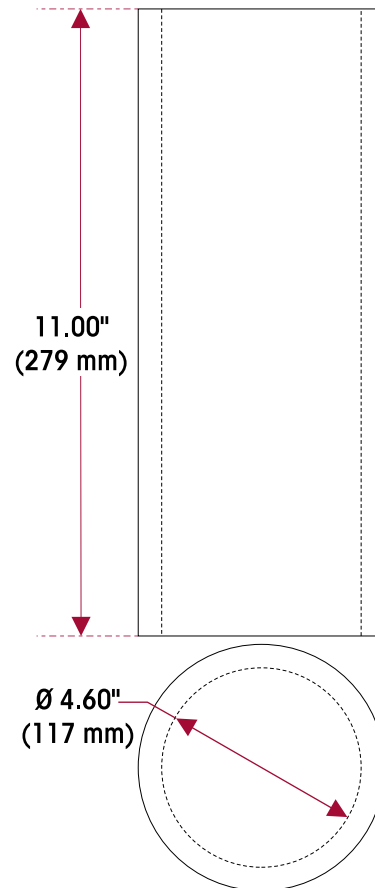
Hendrickson Part No. 66086-105

OTC Part No. 302030 Visit otctools.com



RECEIVING TOOL

This shop made tool is made from cold rolled steel or equivalent. The drawings are for reference only, Hendrickson does not supply this tool.



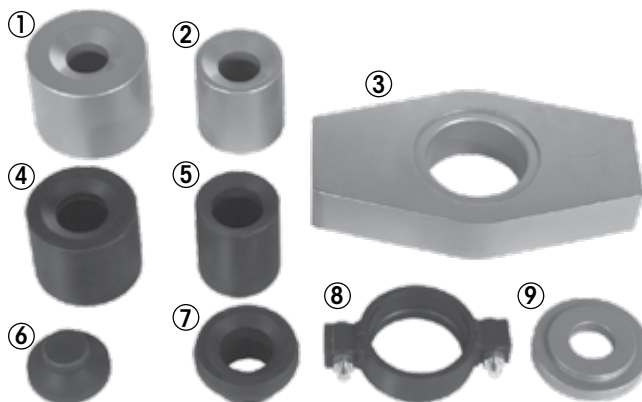
ADAPTER STYLE END BUSHING • CENTER BUSHING • TRAILING ARM BUSHING TOOLS

28K-52K lb. Rubber Bushings

Hendrickson Part No. 66086-102

OTC Part No. 1764 Visit otctools.com

Part	OTC P/N
1. Installer	302026
2. Remover	302027
3. Press Plate	51100
4. Installer	302031
5. Remover	302032
6. Press	206457
7. Remover	302030
8. Installer Clamp	42052
9. Clamp Plate	206459



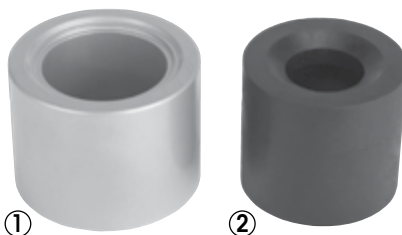
CENTER BUSHING TOOLS

40K lb. Rubber Bushings

Hendrickson Part No. 66086-100

OTC Part No. 1746 Visit otctools.com

Part	OTC P/N
1. Remover	310248
2. Installer	310249



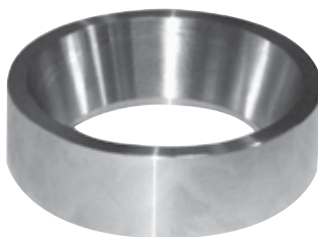
TORQUE ROD BUSHING FUNNEL TOOLS

ULTRA ROD

Hendrickson Part No. 66086-001L

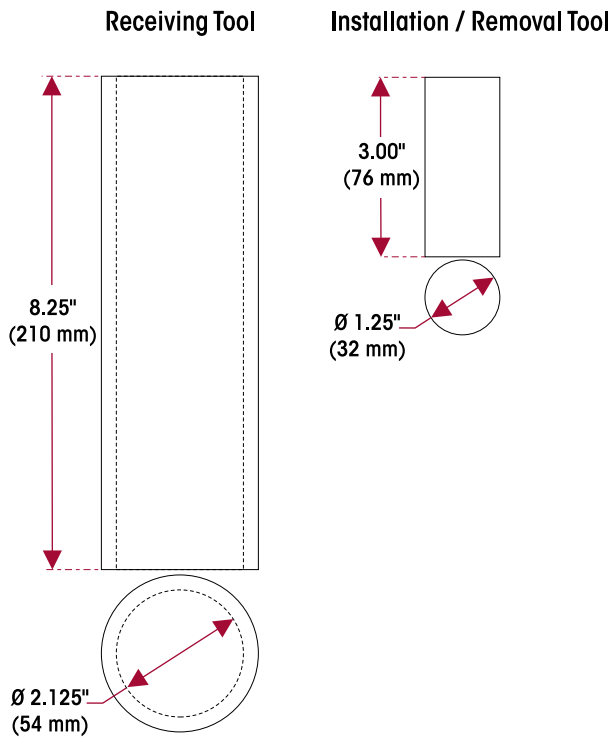
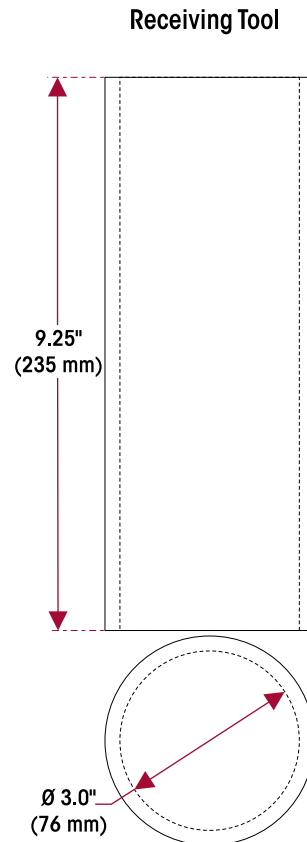
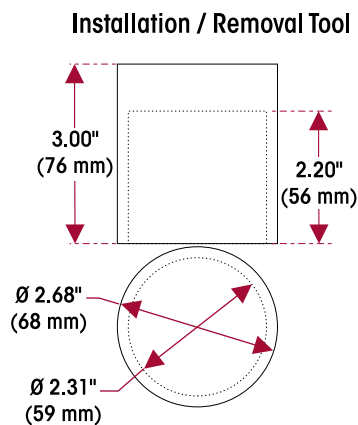
ULTRA ROD PLUS

Hendrickson Part No. 66086-000L



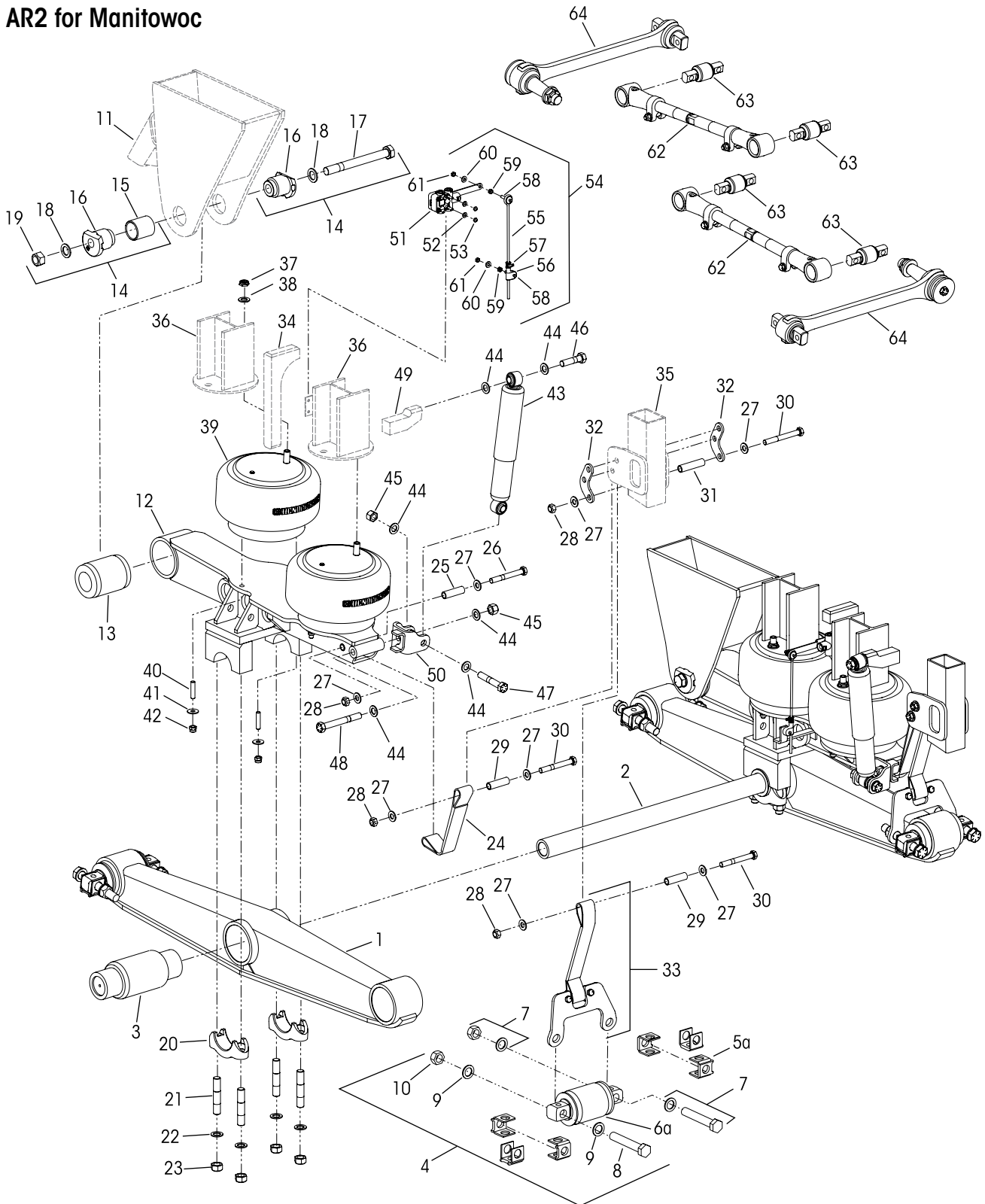
TORQUE ROD BUSHING TOOLS

These shop made tools are designed for the torque rod bushings. Bushing tools are to be made from cold rolled steel or equivalent. Drawing is for reference only. Hendrickson does not supply these tools.

ULTRA ROD BUSHING**ULTRA ROD PLUS AND XTRB BUSHING****XTRB BUSHING**

SECTION 5 Parts Lists

AR2 for Manitowoc





KEY NO.	PART NO.	DESCRIPTION	VEHICLE QTY.	KEY NO.	PART NO.	DESCRIPTION	VEHICLE QTY.
1		Equalizing Beam Assembly <i>See Selection Guide 45745-147</i>	2	30	32043-019	5/8"-11 UNC x 5 1/2" Hex Bolt	6
2	44643-009L	Cross Tube 44 7/8", (If converted from RT•RTE suspension, refer to Lit. No. SP-168 Parts List)	1	31	66100-001	3.6" Rebound Bracket Tube	2
3		Rubber Center Bushing <i>See Table 1 on Page 16</i>	2	32	66099-001	Rebound Strap Support Plate	4
	29483-005L	Welded End Plug		33	66142-001	Equalizing Beam Rebound Strap Assembly	2
	34013-097L	with Loose End Plug		34		****Trailing Arm Stop Bar	2
4		Bar Pin End Bushing Service Kit, One Wheel End		35		****Rebound Strap Bracket and Axle Stop Assembly	2
	34013-324	Shim Type, Includes Key Nos. 5a, 6a, 7		36		****Air Spring Bracket	
Not Shown	34013-332	Rotating Bar Pin, Shim Type, Includes Key Nos. 5a, 6b, 7				Front	2
						Rear Left Hand	1
						Rear Right Hand	1
5		Bar Pin Shim	8	49177-018		Single Upper Air Spring Fasteners Service Kit, Includes Key Nos. 37-38	
a	50131-000	0.25" / 0.12" Standard		37	17700-031	3/4"-16 UNF Nylocknut	4
b	50130-000	0.19" / 0.19" Optional		38	22962-001	3/4" Hardened Washer	4
c	57026-000	0.375" Optional flat shim			34013-328	Single Air Spring and Lower Fasteners Service Kit, Includes Key Nos. 39-42	
6		*Bar Pin End Bushing	4	39	65455-002L	Air Spring	4
a		Shim Type		40	65999-000	1/2"-13 UNC x 2 1/4" Stud, <i>Replaces 65454-000</i>	8
b		Rotating Bar Pin, Shim Type (Not Shown)		41	22962-031	1/2" Hardened Washer	8
7	34013-323	Bar Pin End Bushing Fastener Kit, One Wheel End, Includes Key Nos. 8-10		42	17700-010	1/2"-13 UNC Nylocknut	8
8		*1"-8 UNC x 7" Hex Bolt	8		64178-025	Single Shock Absorber Service Kit with Fasteners, Includes Key Nos. 43-48	
9		*1" Hardened Washer	16	43	60665-020L	Shock Absorber	2
10		*1"-8 UNC Locknut	8	44	22962-001	3/4" Hardened Washer	12
11		Frame Hanger Assembly		45	49842-000	3/4"-10 UNC Locknut	4
		****Left Hand	1	46	50764-005	3/4"-10 UNC x 3" Bolt	2
		****Right Hand	1	47	50764-019	3/4"-10 UNC x 4 1/2" Bolt	2
		Trailing Arm Assembly, Includes Key Nos. 12, 13, 20-23		48	50764-021	3/4"-10 UNC x 6" Bolt	2
	65655-009	Left Hand	1	49		****Upper Shock Bracket	2
	65655-010	Right Hand	1	50		Lower Shock Bracket	
12		Trailing Arm			91704-001	Left Hand	1
		*Left Hand	1		91704-002	Right Hand	1
		*Right Hand	1		59013-000	Height Control Valve Service Kit, One Side Includes Key Nos. 51-53	
	34013-112L	Trailing Arm Bushing Service Kit, One Beam End, Includes Key Nos. 13-14		51	60501-000	Height Control Valve	2
13	29878-001L	Trailing Arm Bushing	2	52		*1/4" Hardened Washer	4
14	21140-053L	Adapter Assembly, Includes Key Nos. 15-19	2	53		*1/4"-20 UNC Locknut	4
15	45289-003	Adapter Tube	2	54		Height Control Valve Linkage Assembly Includes Key Nos. 55-61	
16	45871-000	Trailing Arm Adapter	4		58994-035	Right Hand	1
17	30550-005	1"-14 UNS x 9 3/4" Bolt	2		58994-036	Left Hand	1
18	22962-008	1" Hardened Washer	4	55		*Linkage Extension Rod	2
19	08017-000	1"-14 UNS Locknut	2	56		*Adj. Valve Arm Joint	2
20	58795-000	Saddle Cap	4	57		*Valve Arm Clamp	2
21	06696-000	7/8"-14 UNF Saddle Cap Stud	8	58		*5/16"-18 UNC Stud	4
22	22962-002	7/8" Hardened Washer	8	59		*5/16"-18 UNC Jam Nut	4
23	04842-000	7/8"-14 UNF Locknut	8	60		*5/16" Hardened Washer	4
	34013-330	Trailing Arm Rebound Strap Service Kit, One Side, Includes Key Nos. 24-29		61		*5/16"-18 UNC Locknut	4
24	57878-009	Trailing Arm Rebound Strap	2	62		Adjustable Longitudinal Torque Rod Assembly, Straddle/Straddle, Includes Key No. 63	
25	66091-000	3 7/8" Rebound Strap Tube	2		80918-001	Front	1
	34013-331	Equalizing Beam Rebound Strap Service Kit, One Side, Includes Key Nos. 7, 26-29, 33			80918-002	Rear	1
26	32043-011	5/8"-11 UNC x 5" Hex Bolt	2	63	47691-000	ULTRA ROD Straddle Bushing	4
27	22962-004	5/8" Washer	16	64	8244-0099-590	***TRAAX ROD one-piece Transverse Torque Rod Assembly, Straddle / Taper, 590 mm Length	2
28	47764-000	5/8"-11 UNC Locknut	8	65	70867-001	P-80 - 10 ml (Not Shown)	Per Bushing
29	66100-000	3" Rebound Strap Tube	4				

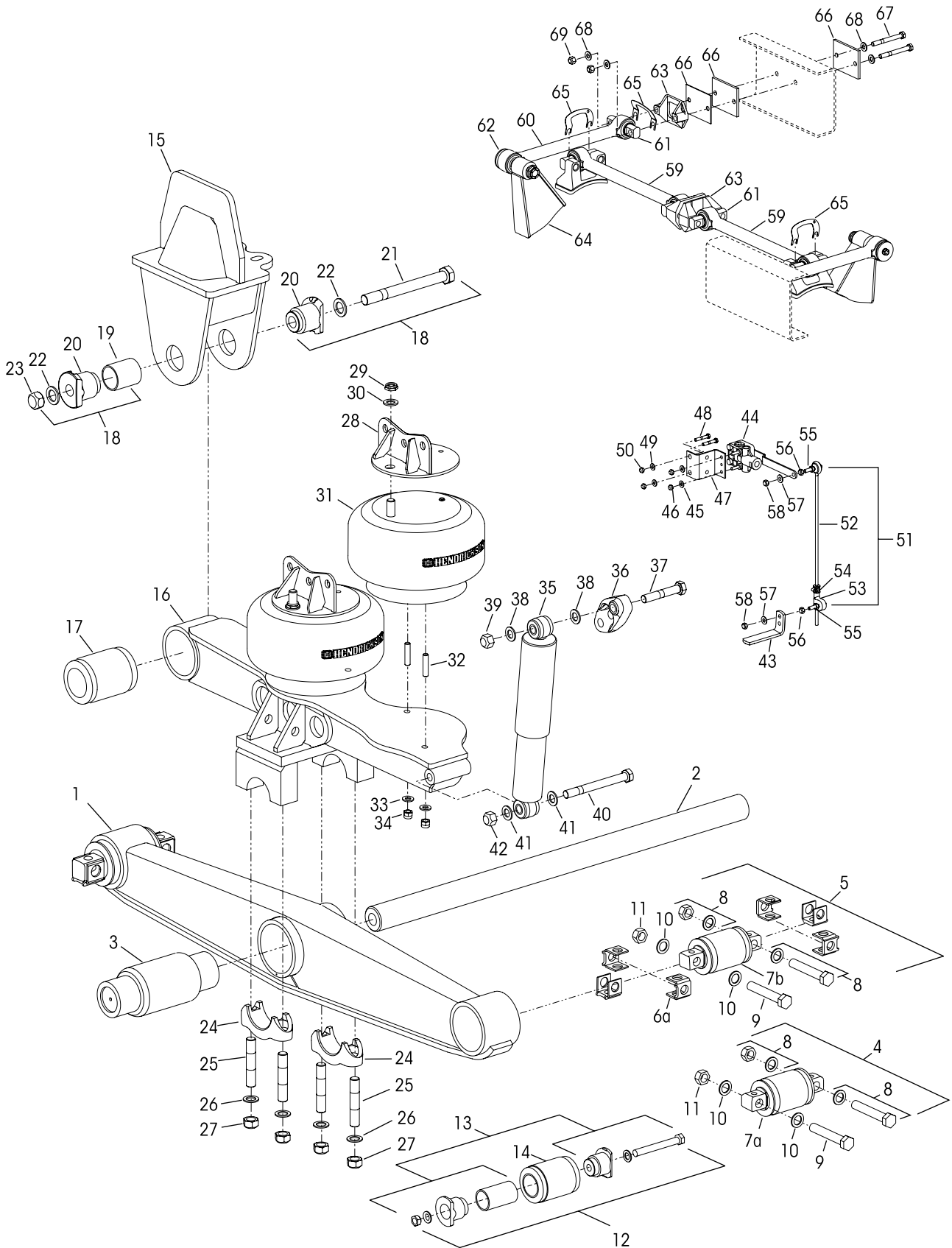
NOTES:* Item included in assembly/kit only, part not sold separately.

** Hendrickson's part number is stamped on the torque rod for identification. Be sure to include the suffix number when ordering, this number indicates torque rod length. Hendrickson's two-piece ULTRA ROD can be used to create the desired length, see literature number 45745-148.

*** Transverse torque rods are mandatory with the AR2 Suspension regardless of axle spacing and require rubber center bushings, see Literature No. 59310-004 and 59310-058 for more information. TRAAX RODS are non-rebushable. The entire torque rod assembly must be replaced.

**** AR2 for Manitowoc welded component per the vehicle manufacturer, illustration for reference only. Contact the vehicle manufacturer for preventive maintenance and service instructions.

AR2 40K • 46K





KEY NO.	PART NO.	DESCRIPTION	VEHICLE QTY.
1		Equalizing Beam Assembly <i>See Selection Guide 45745-147</i>	2
2	44643-009L	Cross Tube 44 ⁷ / ₈ " (If converted from RT•RTE suspension, refer to Lit. No. SP-168 Parts List)	1
3		Rubber Center Bushing <i>See Table 1 on Page 16</i>	2
	49400-000L	40K Welded End Plug	
	49600-000L	40K with Loose End Plug	
	29483-005L	46K Welded End Plug	
	34013-097L	46K with Loose End Plug	
		Bar Pin End Bushing Service Kit, One Wheel End	
4	34013-087L	Non-Shim Type, Includes Key No. 7a, 8	
5	34013-088L	Shim Type, Includes Key Nos. 6a, 7b, 8	
	34013-188L	Rotating Bar Pin (Not Shown), Shim Type, Includes Key Nos. 6a, 7c, 8	
6		Bar Pin Shim	8
a	50131-000	0.25" / 0.12" Standard	
b	50130-000	0.19" / 0.19" Optional	
c	57026-000	0.375" flat shim	
7		*Bar Pin End Bushing	4
a		Non-Shim Type	
b		Shim Type	
c		Rotating Bar Pin, Shim Type (Not Shown)	
8	34013-104	Bar Pin End Bushing Fastener Kit, One Wheel End , Includes Key Nos. 9-11	
9		*1"-8 UNC x 6" Hex Bolt	8
10		*1" Hardened Washer	16
11		*1"-8 UNC Locknut	8
12		End Bushing and Adapter Style Service Kit, One Wheel End	
	34013-049L	40K, Includes Key Nos. 13a, 14	
	34013-073L	46K, Includes Key Nos. 13b, 14	
13		Adapter Style Fastener Service Kit, One Wheel End	
a	45000-007L	40K	
b	21140-034L	46K	
14	45900-000L	Rubber End Bushing	4
15		Frame Hanger Assembly - Blank	
		• Left Hand Frame	1
	65461-001	33.94-34.19" Frame Width	
	65461-003	34.25-34.50" Frame Width	
	65461-005	34.56-34.81" Frame Width	
		• Right Hand Frame (Not Shown)	1
	65461-002	33.94-34.19" Frame Width	
	65461-004	34.25-34.50" Frame Width	
	65461-006	34.56-34.81" Frame Width	
16		Trailing Arm Assembly, Includes Key Nos. 17, 24-27	
		• Left Hand	1
	65655-001	40K - 9 ¹ / ₂ "	
	65655-003	40K - 10 ¹ / ₂ "	
	65655-005	46K - 9 ¹ / ₂ "	
	65655-007	46K - 10 ¹ / ₂ "	
		• Right Hand	1
	65655-002	40K - 9 ¹ / ₂ "	
	65655-004	40K - 10 ¹ / ₂ "	
	65655-006	46K - 9 ¹ / ₂ "	
	65655-008	46K - 10 ¹ / ₂ "	
		Trailing Arm Bushing Service Kit, One Beam End , Includes Key Nos. 17-18	
	34013-111L	40K	
	34013-112L	46K	
17		Trailing Arm Bushing	2
	45900-000L	40K	
	29878-001L	46K	
18	21140-053L	AR2 Adapter Assembly, Includes Key Nos. 19-23	2
19	45289-003	Adapter Tube	2
20	45871-000	Trailing Arm Adapter	4
21	30550-005	1"-14 UNS x 9 ³ / ₄ " Bolt	2

KEY NO.	PART NO.	DESCRIPTION	VEHICLE QTY.
22	22962-008	1" Hardened Washer	4
23	08017-000	1"-14 UNS Locknut	2
24	58795-000	Saddle Cap	4
25	06696-000	⁷ / ₈ "-14 UNF Saddle Cap Stud	8
26	22962-002	⁷ / ₈ " Hardened Washer	8
27	04842-000	⁷ / ₈ "-14 UNF Locknut	8
28		Air Spring Bracket	
	65426-000	Forward	2
	65680-000	Rear	2
	49177-018	Single Upper Air Spring Fasteners Service Kit , Includes Key Nos. 29-30	
29	17700-031	³ / ₄ "-16 UNF Nylocknut	4
30	22962-001	³ / ₄ " Hardened Washer	4
		Single Air Spring and Lower Fasteners Service Kit	
	34013-328	Forward , Includes Key Nos. 31a -34	
	34013-329	Rear , Includes Key Nos. 31b -34	
31		Air Spring	
a	65455-002L	Forward	2
b	65652-002L	Rear	2
32	65999-000	¹ / ₂ "-13 UNC x 2 ¹ / ₄ " Stud, Replaces 65454-000	8
33	22962-031	¹ / ₂ " Hardened Washer, Replaces 22962-011	8
34	17700-010	¹ / ₂ "-13 UNC Nylocknut	8
35	60665-012L	Shock Absorber	2
	50754-013	Single Upper Shock Bracket and Fastener Service Kit , Includes Key Nos. 36-39	2
36	67463-001	Shock Bracket, Replaces 65000-001	2
37	50764-010	³ / ₄ "-10 UNC x 4 ³ / ₄ " Bolt	2
38	22962-001	³ / ₄ " Hardened Washer	4
39	49842-000	³ / ₄ "-10 UNC Locknut	2
40	50764-013	³ / ₄ "-10 UNC x 7 ¹ / ₂ " Bolt	2
41	22962-001	³ / ₄ " Hardened Washer	4
42	49842-000	³ / ₄ "-10 UNC Locknut	2
43	65427-000	Lower Height Control Valve Bracket	2
	57977-000	Height Control Valve Assembly, Includes Key Nos. 44-47	2
44	60501-000	Height Control Valve	2
45		* ¹ / ₄ " Hardened Washer	4
46		* ¹ / ₄ "-20 UNC Locknut	4
47		*Height Control Valve Bracket	2
	57430-004	Height Control Valve Bracket Fastener Service Kit , Includes Key Nos. 48-50	
48	58035-004	³ / ₈ "-16 UNC x 1 ¹ / ₄ " Bolt	4
49	22962-015	³ / ₈ " Hardened Washer	4
50	17700-006	³ / ₈ "-16 UNC Nylocknut	4
51	58994-001	Height Control Valve Linkage Assembly, Includes Key Nos. 52-58	2
52		*Linkage Extension Rod	2
53		*Adj. Valve Arm Joint	2
54		*Valve Arm Clamp	2
55		* ⁵ / ₁₆ "-18 UNC Stud	4
56		* ⁵ / ₁₆ "-18 UNC Jam Nut	4
57		* ⁵ / ₁₆ " Hardened Washer	4
58		* ⁵ / ₁₆ "-18 UNC Locknut	4
59		One-piece Longitudinal Torque Rod Assembly Straddle/Straddle, Specify Length in mm **ULTRA ROD® PLUS™ Includes Key No. 61a	
	72000-XXX	Front	1
	72001-XXX	Rear	1
	82XX-XXXX-XXX	****TRAAX ROD™	2
60		***One-piece Transverse Torque Rod Assembly Straddle/Taper, Specify Length in mm ULTRA ROD PLUS, Includes Key Nos. 61a-62a XTRB, Includes Key Nos. 61b-62b ****TRAAX ROD	2
	72350-XXX		
	92350-XXX		
	82XX-XXXX-XXX		
61		Straddle Bushing	6
a	64400-002L	ULTRA ROD PLUS	
b	66649-002L	XTRB	



KEY NO.	PART NO.	DESCRIPTION	VEHICLE QTY.	KEY NO.	PART NO.	DESCRIPTION	VEHICLE QTY.
62		Taper Bushing	2	65	49689-000L	Torque Rod Shim (As Required)	
a	64400-004L	ULTRA ROD PLUS		66		Torque Rod Back-up Plate	As Req.
b	66649-004L	XTRB			45045-001	1/8" Thickness	
		**Two-Piece Torque Rod Assembly with Bushings Service Kit			45045-002	1/4" Thickness	
	65781-000	ULTRA ROD PLUS Straddle/Taper			45045-003	3/8" Thickness	
	65781-001	XTRB Straddle/Straddle		67	32043-019	5/8"-11 UNC x 5 1/2" Bolt	4
	65781-002	XTRB Straddle/Taper		68	22962-004	5/8" Hardened Flat Washer	8
63	22186-000	Torque Rod Bracket	4	69	47764-000	5/8"-11 UNC Locknut	4
64		Torque Rod Axle Bracket	2		70867-001	P-80 Lubricant - 10 ml (Not Shown)	Per Bushing
	46868-000	For Meritor Axle		70	65202-001	Pressure Protection Valve, <i>See plumbing diagram 1</i>	1
	48042-000	For Dana Axle		71	66029-000	In Cab Air Dump Switch, <i>See plumbing diagram 1</i>	1
				72	48940-000	In Cab Air Switch Plate (Not Shown)	1

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

** Hendrickson's part number is stamped on the torque rod for identification. Be sure to include the suffix number when ordering, this number indicates torque rod length. Hendrickson's two-piece ULTRA ROD PLUS can be used to create the desired length, see literature number 45745-148.

*** Transverse torque rods are mandatory for the AR2 Suspension regardless of axle spacing and require rubber center bushings, see Literature No. 59310-004 and 59310-058 for more information.

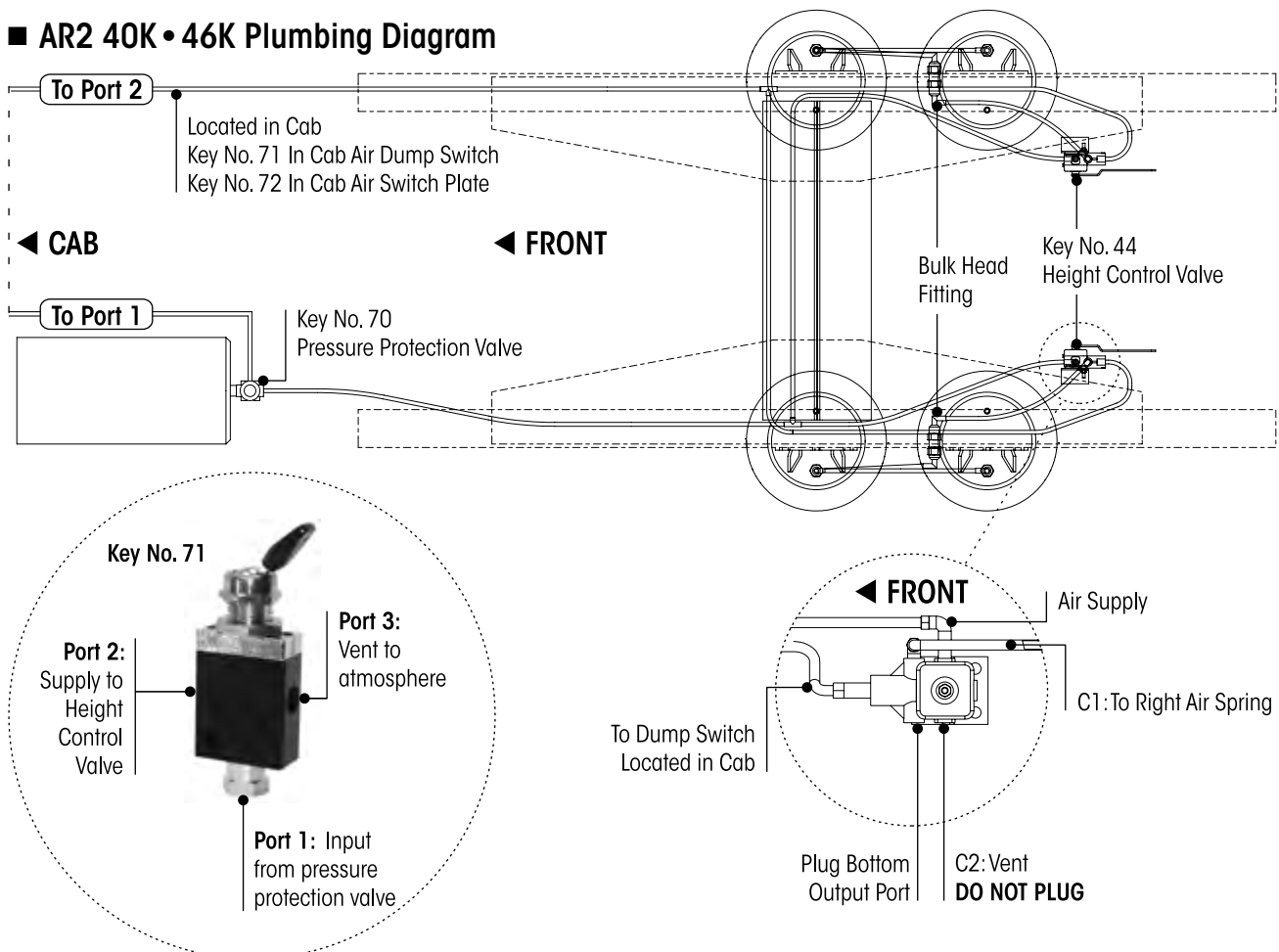
**** TRAAX RODs are non-rebushable. The entire torque rod assembly must be replaced.

Table 1

Key No. 3 Corresponding Center Bushing End Plug for Cross Tube Replacement

Capacity	Rubber Center Bushing	End Plug Part Number
40K	49600-000L • 49400-000L	22281-000
46K	34013-097L • 29483-005L	

AR2 40K • 46K Plumbing Diagram





SECTION 6 Preventive Maintenance

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the AR2 heavy-duty suspension system and components function to their highest efficiency. Look and replace any bent, cracked, worn or damaged parts. Hendrickson recommends the AR2 heavy-duty rear suspension is inspected at pre-delivery, the first 1,000 miles (1,600 kilometers) of service and at the regular preventive maintenance intervals. Off-highway and severe service operating conditions 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 if Hendrickson supplied fasteners are used. If non-Hendrickson fasteners are used, follow the torque specification listed in the vehicle manufacturer's service manual.

HENDRICKSON RECOMMENDED INSPECTION INTERVALS	PRE-DELIVERY / POST CONVERSION INSPECTION	FIRST INSPECTION	PREVENTIVE MAINTENANCE
Visual Inspection 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 • Damaged, or cracked parts 	Within the first 100 miles	Within the first 1,000 miles or 100 Hours	Every 6 months, 1,200 hours, 25,000 miles , whichever comes first
Inspection of fasteners for proper torque as recommended in the Torque Specifications Section of this publication with special attention to the following suspension connections: <ul style="list-style-type: none"> • Frame hanger to trailing arm connection • Equalizing beam end connection • Torque rods • Saddle cap to trailing arm connection 			
Verification of the alignment of axles are within the vehicle manufacturer's tolerances			
Verify proper ride height, refer to the Ride Height in the Alignment & Adjustments Section of this publication			

COMPONENT INSPECTION

NOTE Hendrickson recommends the use of Grade 8 bolts, Grade C locknuts and hardened washers for all suspension component attachments.

- **Wear and damage** — Inspect all parts of the suspension for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts.
- **Air spring** — Look for chafing or any signs of spring or component damage. Ensure that the upper bead plate is tight against the underside of the frame. Replace all worn or damaged parts.

- **Cross tube** — Clean the cross tube and inspect it for cracks or excessive wear 8" to 10" from each end where it enters the equalizing beam center bushings. Use a straight edge to check the straightness of the cross tube. If there is a doubt as to fracture, wear or straightness, replacement is necessary.
- **Shock absorbers** — Look for any signs of dents or leakage. Misting is not considered a leak. See Shock Absorber Inspection in this section.
- **Equalizing beam assembly, end connection and saddle cap fasteners** — Check the overall condition of the equalizing beam for dents, dings, or other damage. Inspect the equalizing beam end connection and saddle cap fasteners for proper torque. The beam end connection must sustain proper clamp force of the axle bracket legs to the bushing inner casting prevent any movement of the beam end connection. See Equalizing Beam End Connection in this section.
- **Fasteners** — Look for any loose or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to a torque value within the specified torque range. See Torque Specifications Section of this publication for recommended torque requirements. Use a calibrated torque wrench to check torque in a tightening direction. As soon as the fastener starts to move, record the torque. Correct the torque if necessary. Replace any worn or damaged fasteners with genuine specified fasteners. For fasteners not supplied by Hendrickson, see vehicle manufacturer.
- **Torque rods** — All torque rods must be inspected every six months for looseness, torn or shredded rubber, bushing walk-out, and for proper fastener torque. If there is metal-to-metal contact in the bushing joint, this is a sign of excessive bushing wear and the bushing needs to be replaced. Inspect torque rods for cracking or bending, replace as necessary.
- **Frame hanger bracket** — Check for any signs of loosening or damage at the pivot connections. Check for cracks, damage, or any signs of looseness at the mounting fasteners. Replace all worn or damaged parts.
- **Height control valve and air lines** — Check the suspension air system for air leaks. Check all air lines for proper routing. Check for chafing or pinched air lines. Check the height control valve linkage for damage or interference with peripheral components. Replace all worn or damaged parts.
- **Trailing arm assembly** — Check the overall condition of the trailing arm for cracks, dents, dings, or other damage on the trailing arm assembly. Check the trailing arm bushings for tearing or extreme bulging. Check for any metal to metal contact in the bushed joints. Replace all worn or damaged parts.
- **Tire wear** — Inspect the tires for wear patterns that may indicate suspension damage or misalignment. Replace all worn or damaged parts.

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

AR2 for Manitowoc – REBOUND STRAPS

The trailing arm rebound straps help prevent the overextension of the air spring during normal vehicle operation. The equalizing beam rebound straps help prevent the overextension of the rear of the equalizing beam and longitudinal torque rods during normal crane vehicle operation. If the rebound strap is torn, frayed or not intact, replace as outlined in the Component Replacement Section of this publication.

BEAM END AXLE BRACKETS

NOTE

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

When an equalizing beam is removed for repair or inspected, check for signs of movement. Also, inspect the axle brackets:

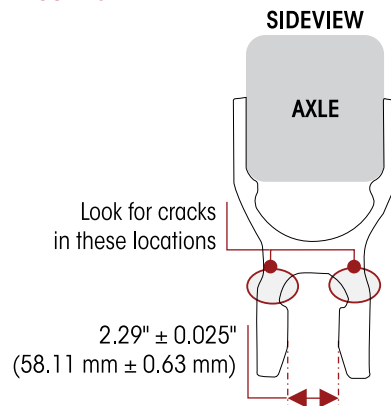
- For damage and / or cracks, see Figures 6-1 and 6-2
- Measure the two dimensions on the axle bracket legs, see Figure 6-2

An axle bracket outside of the measurement range, damaged or cracked must be repaired or replaced. Consult the vehicle manufacturer for inspection, component repair, and replacement instructions.

PHYSICAL INSPECTION

■ Bar Pin Style

1. Inspect the axle brackets for damage or cracks in the locations shown in Figures 6-1 and 6-2. Any axle bracket that is found damaged or cracked must be repaired or replaced.
2. Measure the distance between the axle bracket legs for correct width, refer to Figures 6-1 and 6-2 for measurement location and dimensions. An axle bracket outside of the measurement range must be repaired or replaced.
3. Consult the vehicle manufacturer for inspection, component repair, and replacement instructions.

FIGURE 6-1

NOTE

Typical axle brackets shown

■ Adapter Style

1. Inspect the $2\frac{1}{2}"$ (64 mm) diameter holes in each of the axle bracket legs as shown in Figure 6-3.
2. Remove any burrs or material left there by the old adapters.
3. Use a new adapter as a gauge for fit, being sure it enters the holes from the outside of each bracket leg.

The **A** dimension between the inside surfaces of the axle bracket legs for beam end adapter style, as shown in Figure 6-3 as dimension, must be as in determined in Table 6-1.

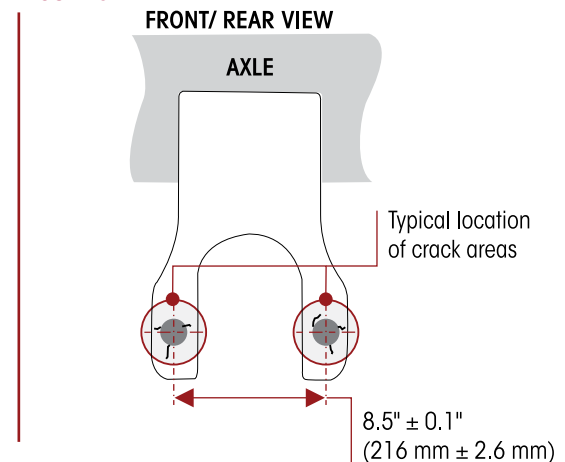
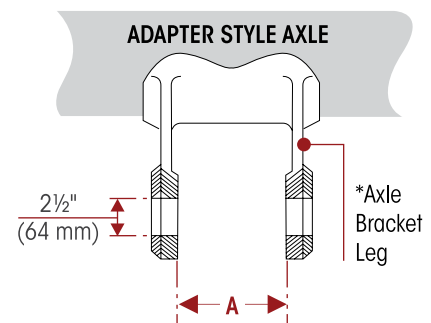
FIGURE 6-2

FIGURE 6-3


TABLE 6-1

Capacity	End Bushing Length	Dimension A
40K • 46K	5¾"	5.765" ± 0.005"

EQUALIZING BEAM END CONNECTION

An inspection of the beam end connections are necessary when a vehicle is in the shop for major repair work or every six months, whichever comes first. Periodic visual inspection by the driver and service personnel is also recommended. Off-highway and severe service operating conditions require more frequent inspections than on-highway service operation.

NOTE

The equalizing beam end connection requires that the fasteners are tightened to torque specifications to maintain the clamp load of the axle bracket legs to the bar pin. All bushing motion is accommodated by rubber deflection.

VISUAL INSPECTION

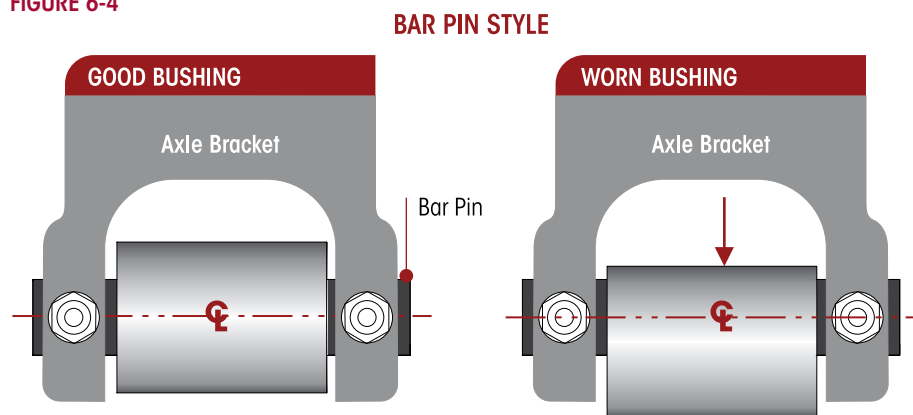
■ Bar Pin Style

1. Chock the wheels.
2. Visually inspect suspension components for signs of movement or excessive wear.
 - Inspect alignment shims in equalizing beam end for looseness. Lightly tap on the alignment shims to see if they can be moved. If movement is detected, tighten fasteners to the proper torque value, see Figure 6-6.
 - Inspect equalizing beam end connection for signs of excessive wear or looseness

SERVICE HINT

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

FIGURE 6-4



A **GOOD** bushing will appear centered with the centerline of the bar pin in the axle bracket and equalizing beam end hub

A **WORN** bushing will appear offset/below the centerline of the bar pin in the axle bracket and equalizing beam end hub

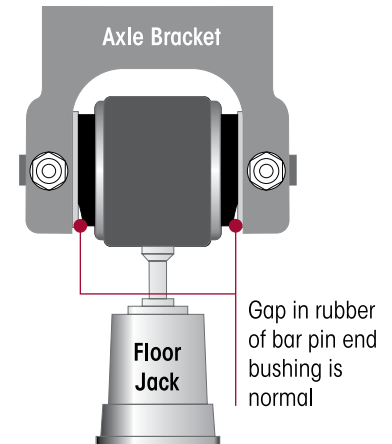
- Look for worn, frayed or distorted rubber in the bar pin beam end bushing, see Figure 6-4
- Look for the equalizing beam to be lower in the beam hanger, see Figure 6-4
- If the bar pin beam end bushing is visually offset a floor jack test should be performed, see Jack Test in this section.

JACK TEST

1. Place a jack under each beam end as shown. Raise the jack to check for movement in the connection or rubber components, see Figure 6-5.

NOTE

The gap at each side of the visible rubber on the lower part of the bar pin end bushing is normal, see Figure 6-5, and is not an indication to replace the bushing. Because all rubber end bushings are in compression, with the load bearing on the top side, the lower side of the rubber is slightly relieved, allowing the rubber to move inward, and a gap appears.

FIGURE 6-5

PHYSICAL INSPECTION
■ Bar Pin Style

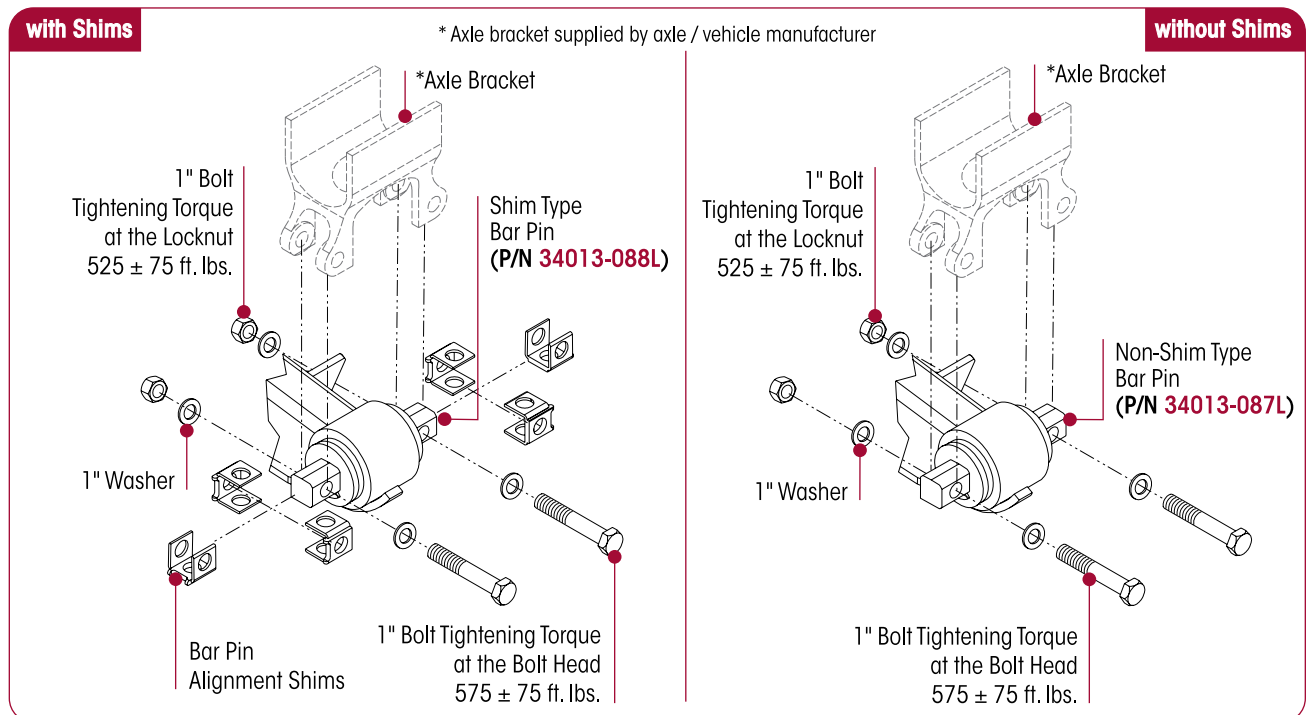
WARNING

IF BAR PIN MOVEMENT OR LOOSENESS IS NOTED IN THE EQUALIZING BEAM END HUB, DO NOT OPERATE THE VEHICLE. REPLACE THE RUBBER END BUSHINGS AND ALL CONNECTING PARTS. THE ABOVE CONDITION CAN RESULT IN COSTLY REPAIR, DOWNTIME, POSSIBLE SEPARATION OF COMPONENTS, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR PERSONAL INJURY.

NOTE

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

2. If bar pin end bushing movement or looseness is detected in the equalizing beam end hub, replace the end bushings and all connecting parts. Refer to the Component Replacement Section of this publication.
3. Check and record torque values for each 1" bar pin fastener, see Figure 6-6. Ensure all fasteners are tightened to the following:
 - At the **locknuts** tighten to 525 ± 75 foot pounds torque
 - At the **bolt head** tighten to 575 ± 75 foot pounds torque

FIGURE 6-6


4. Recheck equalizing beam end connections for signs of looseness.
 - Inspect alignment shims in equalizing beam end for looseness. Lightly tap on the alignment shims to see if they can be moved. If movement is detected, tighten fasteners to the proper torque value, see Figure 6-6.
 - Inspect equalizing beam end connection for signs of excessive wear or looseness
5. If bar pin looseness is still detected in the equalizing beam end hub, **DO NOT** operate the vehicle. One or more components will require replacement, see Component Replacement Section of this publication.

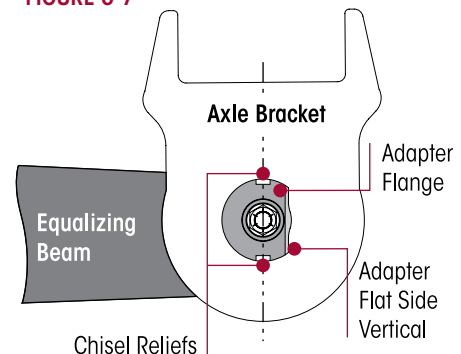
VISUAL INSPECTION

■ Adapter Style

1. Chock the wheels.
2. Visually inspect suspension components for signs of movement or excessive wear.
 - Inspect equalizing beam end connection for signs of excessive wear or looseness
 - Look for worn, frayed or distorted rubber in the beam, see Figure 6-4
 - Look for the equalizing beam to be lower in the axle bracket, see Figure 6-4
 - If it is visually offset a jack test should be performed. Place a jack under each beam end as shown. Raise the jack to check for movement in the connection or rubber components, see Figure 6-5.

3. The beam end adapter style connections have an adapter flange with a flat side for assembly clearance with the axle housing bowl.
 - The flat must be positioned vertically as shown in Figure 6-7. If the flat of the adapter position is incorrect, removal of the fasteners will be necessary to correct position, refer to the Adapter Style End bushings in the Component Replacement Section.

FIGURE 6-7



PHYSICAL INSPECTION

■ Adapter Style



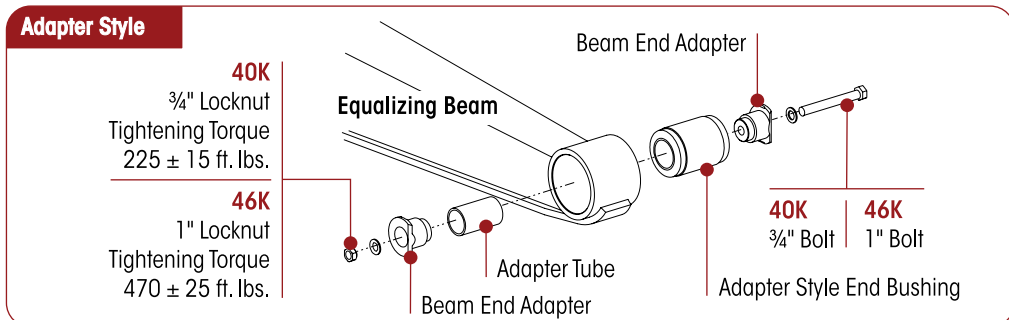
WARNING

IF BUSHING MOVEMENT OR LOOSENESS IS NOTED IN THE EQUALIZING BEAM END HUB, DO NOT OPERATE THE VEHICLE. REPLACE THE RUBBER END BUSHINGS AND ALL CONNECTING PARTS. THE ABOVE CONDITION CAN RESULT IN COSTLY REPAIR, DOWNTIME, POSSIBLE SEPARATION OF COMPONENTS, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR PERSONAL INJURY.

SERVICE HINT

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

FIGURE 6-8



1. If bushing movement or looseness is detected in the equalizing beam end hub, **DO NOT** operate vehicle. Replace the equalizing beam end bushings and all connecting parts. Refer to the Component Replacement Section of this publication.
2. Check and record torque values, see Figure 6-8. Ensure all fasteners are tightened to the following:
 - **40K** — ¾": Locknut, 225 ± 15 foot pounds torque
 - **46K** — 1" Locknut, 470 ± 25 foot pounds torque
3. Recheck equalizing beam end connections for signs of looseness.

BAR PIN END BUSHING

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

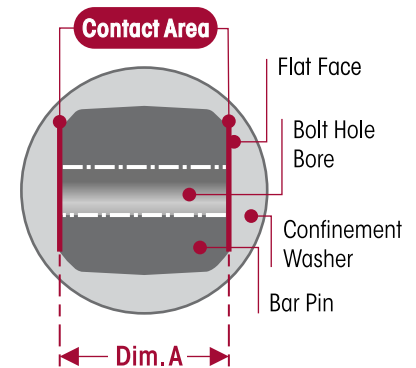
Visual inspection of:

- Contact areas (the flat face areas where bar pin contacts the axle bracket) on the bar pin reveals signs of excessive wear
- The bolt holes in the bar pin reveals signs of elongation or wear, see Figure 6-9

Bar pin replacement is required, see Figure 6-9, if the bar pin thickness measures less than:

- **With shims** — 1.874" (47.59 mm)
- **Without shims** — 2.252" (57.2 mm)

FIGURE 6-9



Dim. A - replacement is required if, bar pin measurement is less than:

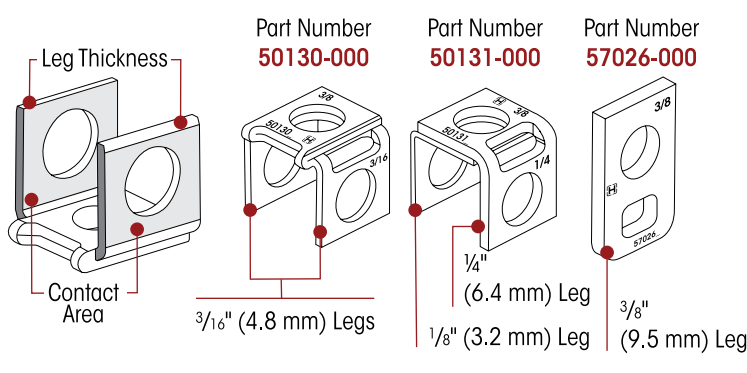
- **With Shims** - 1.874" (47.59 mm)
- **Without Shims** - 2.252" (57.2 mm)

BAR PIN SHIMS

An indication that the bar pin shims require replacement is when one or more of the following conditions apply:

- Visual inspection of contact areas on the shim reveals signs of excessive wear
- The thickness of any single leg on the shim, is less than the measurement shown in Figure 6-10, replacement of bar pin shim is required

FIGURE 6-10



Original Thickness of Shim Leg	Minimum Thickness Required	Part Number
1/8" (3.2 mm)	0.123" (3.1 mm)	50131-000
3/16" (4.8 mm)	0.186" (4.7 mm)	50130-000
1/4" (6.4 mm)	0.248" (6.3 mm)	50131-000
3/8" (9.5 mm)	0.371" (9.4 mm)	57026-000

RUBBER CENTER BUSHING

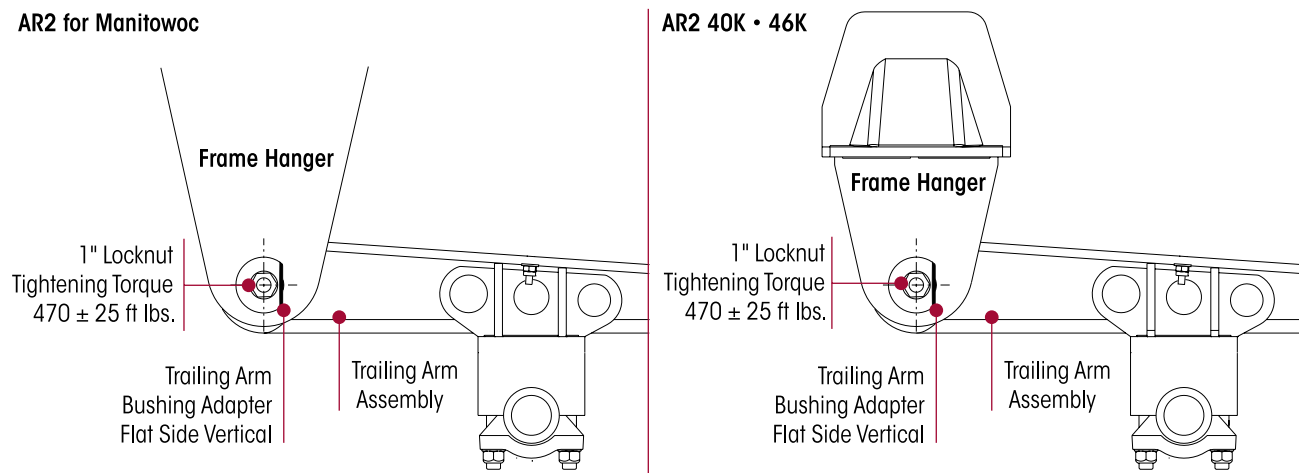
An inspection of the center bushing is necessary when a vehicle is in the shop for major repair work or every twelve months. Look for:

- Any metal to metal contact
- Worn, frayed, or distorted rubber in the center bushing
- The bushing inner metal that is not centered in the bushing
- Any equalizing beam to saddle contact

FRAME HANGER TO TRAILING ARM CONNECTION

If more than half the thickness of the rubber of the trailing arm bushing is diminished replacement is recommended. For trailing arm bushing replacement, refer to the Component Replacement Section in this publication.

FIGURE 6-11



- The flat must be positioned vertically as shown in Figure 6-11. If the flat of the adapter position is incorrect, removal of the fasteners will be necessary to correct position.

PHYSICAL INSPECTION



WARNING

IF TRAILING ARM BUSHING MOVEMENT OR LOOSENESS IS NOTED IN THE TRAILING ARM END HUB, DO NOT OPERATE THE VEHICLE. REPLACE THE RUBBER TRAILING ARM BUSHINGS AND ALL CONNECTING PARTS. THE ABOVE CONDITION CAN RESULT IN COSTLY REPAIR, DOWNTIME, POSSIBLE SEPARATION OF COMPONENTS, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR PERSONAL INJURY.

1. If trailing arm bushing movement or looseness is detected in the trailing arm end hub, **DO NOT** operate the vehicle. Replace the trailing arm bushings and all connecting parts. Refer to the Component Replacement Section of this publication.
2. Check and record torque values, tighten 1" fasteners to 470 ± 25 foot pounds torque, see Figure 6-11.

LONGITUDINAL AND TRANSVERSE TORQUE RODS



WARNING

THE AR2 SUSPENSION INCORPORATES LONGITUDINAL AND TRANSVERSE RODS FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL, THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, ADVERSE VEHICLE HANDLING, POSSIBLE TIRE CONTACT WITH THE FRAME, PREMATURE COMPONENT DAMAGE, OR SEVERE PERSONAL INJURY.

All torque rods need to be inspected for looseness by one of the following methods.

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

Visually inspect torque rod bushings for torn or shredded rubber, inspect for bent, cracked, or broken torque rods and also for end hubs that have an elongated “oval” shape. Any of these conditions require component replacement. If there is metal-to-metal contact, this is a sign of excessive bushing wear and the bushing needs to be replaced.

NOTE

The lengths of the torque rods are determined by the vehicle manufacturer. Refer to vehicle manufacturer’s service instructions for the proper torque rod length.

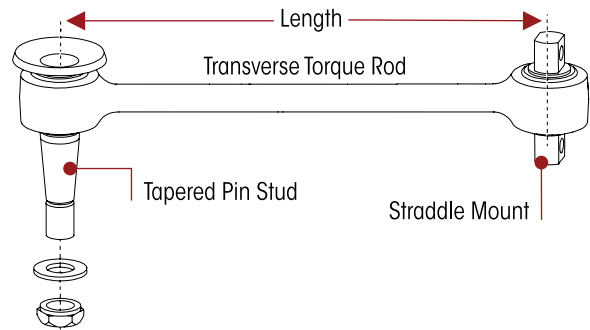
The lengths of these torque rods may be fine-tuned by adding or removing shims at the straddle mount end of the torque rods in order to correct drive line angles or axle centering under the frame. The transverse torque rods center the axles under the frame and control axle walk-out during cornering.

A two-piece torque rod is also available to cut and weld to the desired length, see Hendrickson publication No. 45745-148.

The mounting brackets at the axle ends of the torque rods are furnished and welded into position on the axle housings by the vehicle manufacturer or the axle manufacturer.

FIGURE 6-12

Both types of rods may have torque rod bushings designated “straddle mount” or “tapered stud” as shown in Figure 6-12. Both types can be replaced by pressing out the worn bushing and installing a new genuine Hendrickson bushing. For proper replacement instructions, refer to the Component Replacement Section in this publication.



It is important to check the torque rod fasteners for proper torque values, refer to the Torque Specifications Section in this publication.

NOTE

Hendrickson recommends Grade 8 bolts, hardened flat washer and Grade C locknuts be used for all straddle mount torque rods.

SADDLE CONNECTION

Visually inspect for any signs of movement or looseness. Ensure:

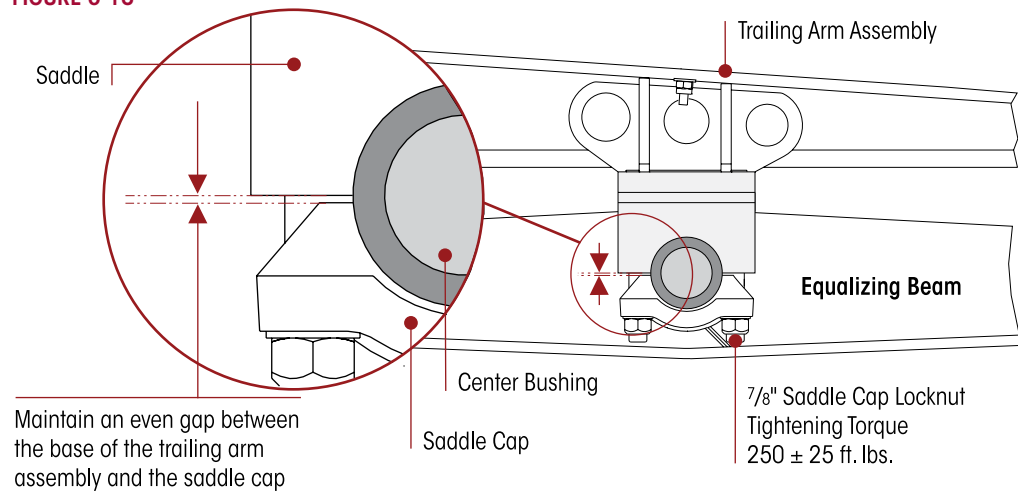
- Each saddle is centered on each equalizing beam center bushing
- The center bushing inner metal is full seated to the saddle
- The saddle cap fasteners are tightened to the proper torque, see Figure 6-13. Saddle cap fasteners have a phosphate oil coating



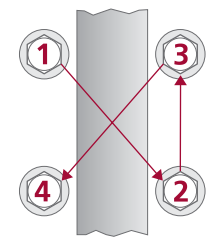
THE TRAILING ARM ASSEMBLIES ARE ATTACHED TO THE CENTER BUSHINGS OF EACH EQUALIZING BEAM WITH TWO (2) SADDLE CAPS. EACH SADDLE CAP USES TWO (2) STUDS TO CLAMP THE CENTER BUSHING INNER METAL TO THE SADDLE. THE SADDLE CAPS MUST BE INSTALLED AND TIGHTEN SO THAT THERE IS AN EVEN GAP BETWEEN THE SADDLE CAPS AND THE BASE OF THE TRAILING ARM ASSEMBLY AS SHOWN IN FIGURE 6-13. IF THEY ARE NOT INSTALLED PROPERLY, THE TRAILING ARM ASSEMBLIES COULD BECOME DEFORMED, RESULTING IN BENT BOLTS OR ASSEMBLY DAMAGED.

WARNING

LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUES AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR INSPECTION INTERVAL.

FIGURE 6-13


1. While tightening the saddle cap stud fasteners maintain an even gap between the saddle assembly base and the saddle cap, see Figure 6-14.
2. Center the saddle on the equalizing beam center bushing.
3. Tighten the **saddle cap fasteners** evenly in 50 foot pounds increments to 250 ± 25 foot pounds torque in the proper sequence to achieve uniform bolt tension as shown in Figure 6-14 until the final torque value is achieved. **DO NOT EXCEED** specified torque on saddle cap fasteners.

FIGURE 6-14

CROSS TUBE
WARNING

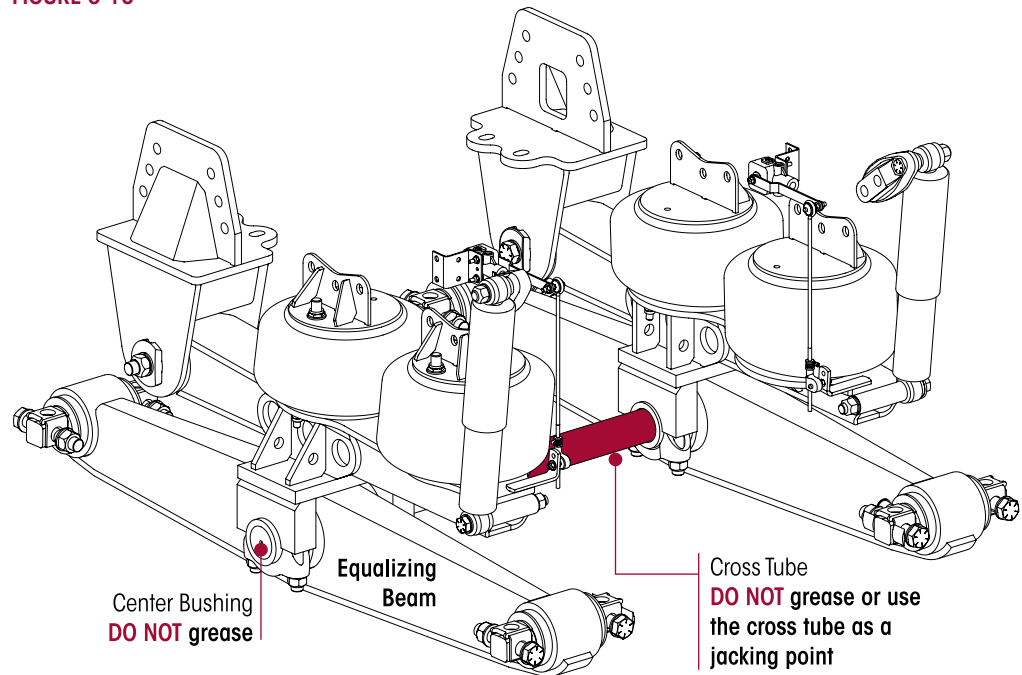
IMPROPER JACKING METHODS CAN CAUSE STRUCTURAL DAMAGE WHICH CAN CAUSE ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR SEVERE PERSONAL INJURY AND WILL VOID HENDRICKSON'S WARRANTY.

- DO NOT USE THE SUSPENSION CROSS TUBE, BAR PIN AXLE BRACKETS AS A JACKING POINT, SEE FIGURE 6-15, REFER TO VEHICLE MANUFACTURER FOR PROPER JACKING INSTRUCTIONS
- ACCEPTABLE LIFTING POINTS FOR A VEHICLE AT THE RATED LOAD INCLUDE BUT NOT LIMITED TO: THE AXLE, EQUALIZING BEAM, AND THE VEHICLE FRAME RAIL. REFER TO THE VEHICLE MANUFACTURER FOR PROPER JACKING INSTRUCTIONS

The AR2 cross tube connects the two (2) equalizing beams through the equalizing beam's center bushings, see Figure 6-15. The cross tube has clearance to float side-to-side in the center bushings.

The length of the cross tube will allow side-to-side movement of approximately 1.9685" (50 mm). For this reason, the cross tube **may appear polished** or have missing paint at each end where it enters into the center bushings, this is normal.

DO NOT grease or lubricate the cross tube or the center bushing and **DO NOT** use the cross tube as a jacking point, see Figure 6-15.

FIGURE 6-15


VISUAL INSPECTION

- 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
- Visually inspect the overall condition of the cross tube for dents, dings, or bent condition, 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

AIR FITTINGS

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

NOTE

Air lines and fittings may be inspected for leaks using a soapy water solution. The height control valve, however, cannot be inspected using this method. All height control valves have an allowable leakage rate. The only acceptable method for inspection of the height control valves is the height control valve test found in this publication.

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

AXLE STOPS

The axle stops are supplied by the vehicle manufacturer.

- Check the axle stop to frame fasteners for proper torque. Follow the vehicle manufacturer's specifications
- Visually inspect for damage or excessive wear. Replace as necessary per the vehicle manufacturer's specifications

SHOCK ABSORBER

NOTE

It is not necessary to replace shock absorbers in pairs if one (1) shock absorber requires replacement.

Hendrickson offers a long service life premium shock absorber for use on AR2 suspensions. If shock absorber replacement is necessary, Hendrickson recommends that original Hendrickson shock absorbers be replaced with identical Hendrickson Genuine parts for servicing. Failure to do so will affect the suspension performance, durability, and will void the warranty.

Inspection of the shock absorber can be performed by doing a heat test, and a visual inspection. For instructions on shock absorber replacement see the Component Replacement Section of this publication.

WARNING

DO NOT GRAB THE SHOCK ABSORBER AS IT COULD POSSIBLY BE HOT AND CAUSE PERSONAL INJURY.

HEAT TEST INSPECTION

1. Drive the vehicle at moderate speeds on rough road for minimum of fifteen (15) minutes.
2. Use an infrared thermometer to check the temperature of the shock absorber. This can also be performed by carefully touching the shock absorber body below the dust cover. Touch the frame to get an ambient reference, see Figure 6-16. A warm shock absorber is acceptable, a cold shock absorber should be replaced.
3. To inspect for an internal failure, remove and shake the suspected shock absorber. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock absorber has an internal failure.

FIGURE 6-16



VISUAL INSPECTION

Look for any of the potential problems shown in Figure 6-17 when doing a visual inspection. Inspect the shock absorbers fully extended. Replace as necessary.

FIGURE 6-17

SHOCK ABSORBER VISUAL INSPECTION - UNACCEPTABLE CONDITIONS



Damaged upper or lower mount



Damaged upper or lower bushing



Damaged dust cover and / or shock body



Bent or dented shock absorber



Improper installation
Example: washer (if equipped installed backwards)

LEAKING VS. MISTING SHOCK VISUAL INSPECTION

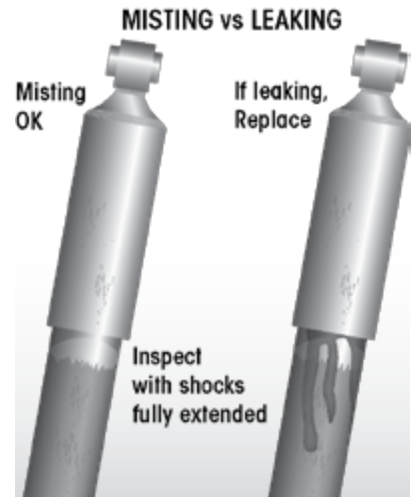
NOTE

The AR2 suspension is equipped with a premium seal on the shock absorber, however this seal will allow for misting to appear on the shock absorber body (misting is not a leak and is considered acceptable).

The inspection must not be conducted after driving in wet weather or a vehicle wash. The shock absorber needs to be free from water. Many shock absorbers are often misdiagnosed as failures. Misting is the process whereby very small amounts of shock absorber fluid evaporate at a high operating temperature through the upper seal of the shock absorber. When the "mist" reaches the cooler outside air, it condenses and forms a film on the outside of the shock absorber body. Misting is perfectly normal and necessary function of the shock absorber. The fluid which evaporates through the seal area helps to lubricate and prolong the life of the seal.

Inspect the shock absorber fully extended. **A shock absorber that is truly leaking** will show signs of fluid **leaking in streams from the upper seal**. These streams can easily be seen, underneath the main body (dust cover) of the shock absorber. Replace as necessary.

FIGURE 6-18



SECTION 7

Alignment & Adjustments

RIDE HEIGHT

The AR2 suspension is equipped with dual height control valves located on the rear of the trailing arm and mounted on the frame or cross member gusset. Refer to the Plumbing Diagram Section of this publication.

INSPECTION

SERVICE HINT

When inspecting or setting ride height on a vehicle, it is recommended to have a load on the vehicle. Loading the vehicle to its normal operating condition increases ride height setting accuracy.

1. Drive the vehicle onto a level surface.
2. Relax the suspension by slowly moving the vehicle back and forth several times in a straight line without using the brakes. This will slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead. Roll to a stop without the brakes being applied. **DO NOT** set the parking brake.
3. Chock front wheels of the vehicle.
4. When checking or adjusting ride height, verify and maintain the vehicle's air system at full operating pressure.

SERVICE HINT

It is very important that the height control valves be cycled completely before and after any ride height adjustments. The cycling of the height control valve will help to make the adjustment more accurate.

WARNING

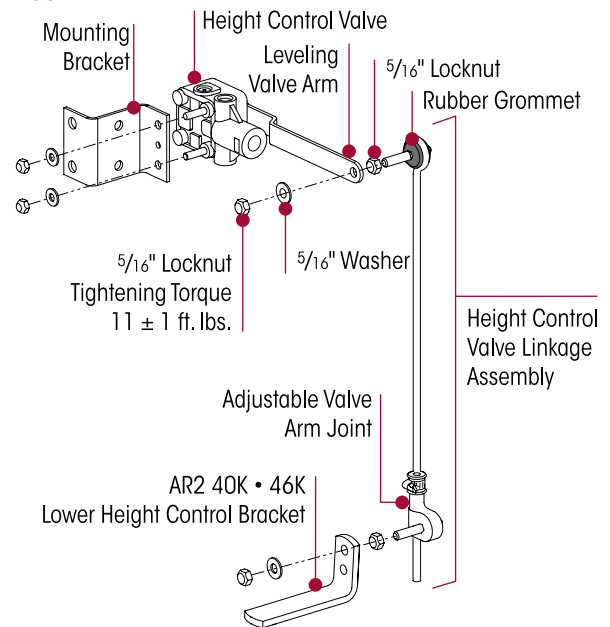
PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

5. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.

WARNING

SOME VEHICLE APPLICATIONS, SUCH AS VEHICLES EQUIPPED WITH OUTRIGGERS, RETAIN SOME AIR PRESSURE IN THE AIR SPRINGS AT ALL TIMES. PRIOR TO PERFORMING ANY MAINTENANCE, SERVICE, OR REPAIR OF THE SUSPENSION, VERIFY EACH AIR SPRING IS COMPLETELY DEFLATED. FAILURE TO DO SO COULD RESULT SERIOUS PROPERTY DAMAGE AND / OR SEVERE PERSONAL INJURY.

FIGURE 7-1



6. **Deflate** the suspension by using one of the following methods, if the vehicle:
 - **Method 1** — is equipped with a suspension dump system in the cab, deflate the suspension air system by using the cab dump valve control
 - **Method 2** — is not equipped with a suspension dump system, detach both the upper rubber grommets of the height control valve linkages from the height control valve arms and exhaust the suspension system air by lowering the height control valve arms, see Figure 7-1
7. **Inflate** the suspension by using one of the following methods, if the vehicle:
 - **Method 1** — is equipped with a suspension dump system in the cab, inflate the suspension air system by using the cab dump valve control. Allow the suspension system to inflate
 - **Method 2** — is not equipped with a suspension dump system, raise the height control valve arms and attach the upper rubber grommets of the height control valve linkage to the height control valve arms. Allow the suspension system to inflate
8. Locate the wheel end where the height control valve is installed.
9. Measure the actual suspension ride height, (Dimension **A**) the distance from the bottom of the frame rail to the axle centerline, see Figure 7-2.
10. Measure the referenced ride height (Dimension **B**) from the top of the of the trailing arm saddle to the centerline of the center bushing, see Figure 7-2.

NOTE

A vehicle equipped with dual height control valves must measure the ride height at each height control valve location.

TABLE 7-1

	Dimension A	Dimension B
Manitowoc	16.8" (426.7 mm)	3 ¹⁵ / ₁₆ " (100 mm)
40K • 46K	9½" (241 mm)	4 ¹⁵ / ₁₆ " (125.4 mm)
	10½" (267 mm)	5 ²³ / ₃₂ " (145.4 mm)

11. Compare the actual (Dimension **A**) ride height to the (Dimension **B**) for your suspension in Table 7-1.
12. If the ride height is **correct**, no further adjustment is necessary. If **incorrect**, then height control valve adjustment is required. Refer to the Adjustment Procedure in this section.

FIGURE 7-2

NOTE
Vehicles equipped with dual height control valves, the ride height must be checked at each height control valve location.

NOTE
Dimension A
Actual ride height is measured from the bottom of frame rail to the axle centerline ± 1/8".
Dimension B
Referenced ride height is measured from the top of the trailing arm saddle to the centerline of the center bushing.

Dimension A	Dimension B
Manitowoc 16.8" (426.7mm) = 3 ¹⁵ / ₁₆ " (100 mm)	
40K • 46K 9½" (241 mm) = 4 ¹⁵ / ₁₆ " (125.4 mm)	
10½" (267 mm) = 5 ²³ / ₃₂ " (145.4 mm)	

ADJUSTMENT PROCEDURE
SERVICE HINT

When inspecting or setting the ride height on a vehicle, it is recommended to have a load on the vehicle. Loading the vehicle to its normal operating condition increases ride height setting accuracy.

1. Drive the vehicle onto a level surface.
2. Relax the suspension by slowly moving the vehicle back and forth several times in a straight line without using the brakes. This will slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead. Roll to a stop without the brakes being applied. **DO NOT** set the parking brake.

3. Chock front wheels of the vehicle.
4. When checking or adjusting ride height, verify and maintain the vehicle's air system at full operating pressure.

SERVICE HINT

It is important that the height control valves be cycled completely before and after any ride height adjustments. The cycling of the height control valves will help to make the adjustment more accurate.

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

WARNING

SOME VEHICLE APPLICATIONS, SUCH AS VEHICLES EQUIPPED WITH OUTRIGGERS, RETAIN SOME AIR PRESSURE IN THE AIR SPRINGS AT ALL TIMES. PRIOR TO PERFORMING ANY MAINTENANCE, SERVICE, OR REPAIR OF THE SUSPENSION, VERIFY EACH AIR SPRING IS COMPLETELY DEFLATED. FAILURE TO DO SO COULD RESULT SERIOUS PROPERTY DAMAGE AND / OR SEVERE PERSONAL INJURY.

5. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
6. Detach the upper rubber grommets of the height control valve linkages from the height control valve arms and exhaust the suspension system air by lowering the height control valve arms.
7. Refill the suspension by raising the height control valve arms by hand, so that the air springs are above the proper ride height.
8. Lower the height control valve arms to exhaust the suspension air system until the suspension is at proper ride height.

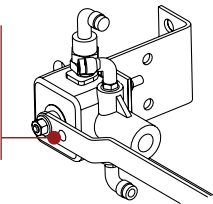
NOTE

Adjustments to one (1) height control valve may affect ride height setting on the other height control valve. Verify ride height is correct at both height control valves whenever an adjustment is made.

9. Use a 1/8" wooden dowel rod (golf tee) to set the neutral position for each height control valve by aligning the hole in the leveling arm with the hole in the height control valve cover, as shown in Figure 7-3. **DO NOT** use a metal rod or nail as this may cause damage to the height control valve.

FIGURE 7-3

To set neutral position, align hole with hole on height control valve cover



10. Steps 7 to 9 might need to be repeated using one (1) height control valve at a time.
11. Correct the adjustable valve arm joints so the rubber grommets can be reconnected to the height control valve arms at the proper height. Check the rubber components for any tearing or damage, replace as necessary.
12. Connect the rubber grommets to the height control valve arms.
13. Tighten the clamps on the adjustable valve arm joints with a screwdriver until securely fastened, see Figure 7-1. Remove the dowel from the height control valves.
14. Verify the ride height is correct by performing the Ride Height Inspection as detailed in this section.

FIGURE 7-4**AXLE PINION ANGLE**

Drive axle pinion angles are established by the vehicle manufacturer. If pinion angle adjustment is required, check for proper angles with the vehicle manufacturer. Pinion angle is set by the longitudinal torque rod length.



TO CHECK THE PINION ANGLE

1. Use a work bay with a level floor.
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. Roll to a stop without the brakes being applied. **DO NOT** set the parking brake.
3. Chock the front wheels of the vehicle.
4. Verify vehicle is at the proper ride height (see Ride Height in this section).
5. Place a digital protractor on the axle housing as shown in Figure 7-4.
6. Check to see if the pinion angle is correct per the vehicle manufacturer's specified range.
7. If necessary, add / remove shims at the longitudinal torque rod connections as required to achieve the proper pinion angle.
8. When the pinion angle is correct tighten all fasteners to the proper torque specifications per the vehicle manufacturer and recheck the pinion angles.
9. Remove wheel chocks.

DRIVE AXLE ALIGNMENT
NOTE

Drive axle alignment with suspensions equipped with adapter style beam or non-shim style end connections **ARE NOT** adjustable.

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, however, computerized axle alignment equipment is not available refer to the following Inspection in this section.

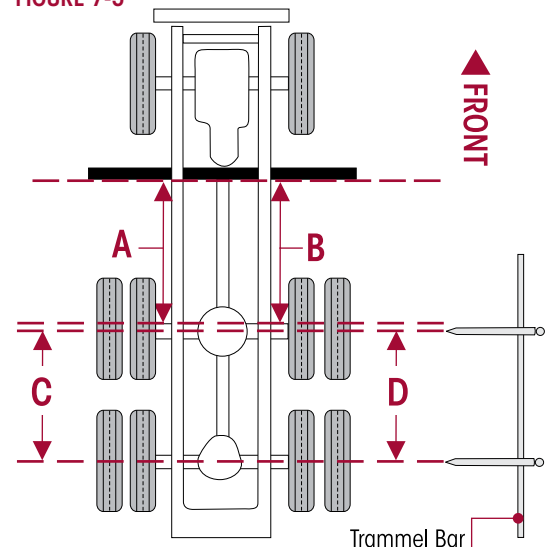
Proper alignment is essential for maximum ride quality, performance, and tire service life. The following recommended alignment procedure as described below, should be performed if excessive or irregular tire wear is observed.

NOTE

Proper vehicle alignment can only be achieved when all axles are aligned to the vehicle's center-line and the steering axle's caster, camber and toe-in settings are within specifications.

INSPECTION

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. This will slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead.
3. **DO NOT** set the parking brake. Chock the front wheels of the vehicle.
4. Verify and maintain the air system at full operating pressure.
5. Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components before proceeding with the alignment process.

FIGURE 7-5




6. Ensure all drive axle tires are at the same size.
7. Securely clamp a six-foot piece of **STRAIGHT** bar stock or angle iron across the lower frame flange as shown in Figure 7-5. 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. Accurately square the bar stock or angle iron to the frame using a carpenter's square.
9. 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 7-5, dimensions **A** and **B**.
10. 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. If the suspension is equipped with bar pin end bushings, correct the alignment of this axle by following the bar pin alignment instructions in this section.

NOTE

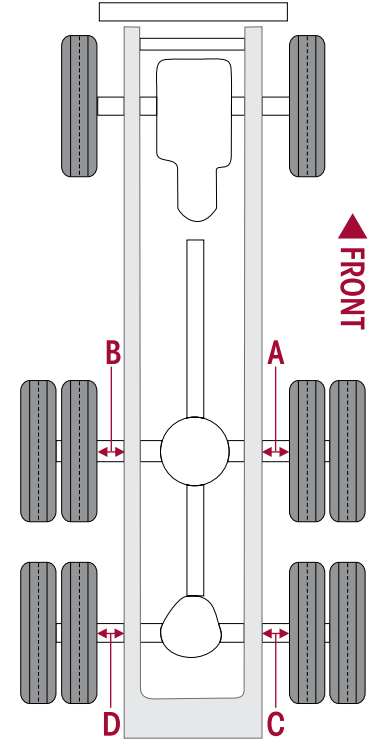
Since the remaining drive axle will be aligned relative to the front drive axle, it is essential that the front drive axle is aligned within the vehicle manufacturer's specifications prior to the alignment of the remaining drive axle.

11. Using a trammel bar, measure the distance from the spindle center of the **front** drive axle to the spindle center of the rear drive axle on both sides of the vehicle; see Figure 7-5, **C** and **D**.
12. Calculate the difference between measurements **C** and **D**.
 - a. If the measurements are within the vehicle manufacturer's specifications, then the **rear** drive axle alignment is acceptable.
 - b. If alignment of the **rear** drive axle **IS NOT** within the vehicle manufacturer's specifications, then the alignment of this axle **MUST** be corrected.
 - c. If the suspension is equipped with bar pin end bushings, correct the alignment of this axle by following the Bar Pin with Shims Alignment instructions in this section.
13. Recheck measurements to confirm adjustments. Repeat Steps 10 through 12 until the correct alignment is achieved.
14. After all drive axles are aligned, check the pinion angle of each drive, refer to the Axle Pinon Angle in this section.

LATERAL ALIGNMENT

1. Use a work bay with a level, flat surface.
2. Drive the vehicle slowly, straight ahead. Try to slacken or loosen the suspension as the vehicle is positioned. End with all wheels positioned straight ahead. Try to roll to a stop without the brakes being used. **DO NOT** set the parking brake.
3. Chock the **FRONT** wheels of the vehicle.
4. Verify and maintain the air system at full operating pressure.
5. Verify the vehicle is at the correct ride height. Correct as necessary. Refer to Ride Height in this section.
6. Verify all suspension components are in good condition. Repair or replace any worn or damaged suspension components before proceeding with the alignment process.
7. Ensure all drive axle tires are the same size.
8. Measure from the outside of the frame rail to the rim flange of the inner tire. Record the measurement **A** and **B**, see Figure 7-6.

9. Measure the same distance on the opposite side of the same axle. Record the measurement **C** and **D**, see Figure 7-6.
10. Verify the lateral alignment is within the vehicle manufacturer's specifications. Adding or removing shims that are located between the transverse torque rod and frame rail will normally correct the lateral alignment.
 - A general rule of thumb is to use a shim with a thickness that is half of the difference between the two measurements

FIGURE 7-6


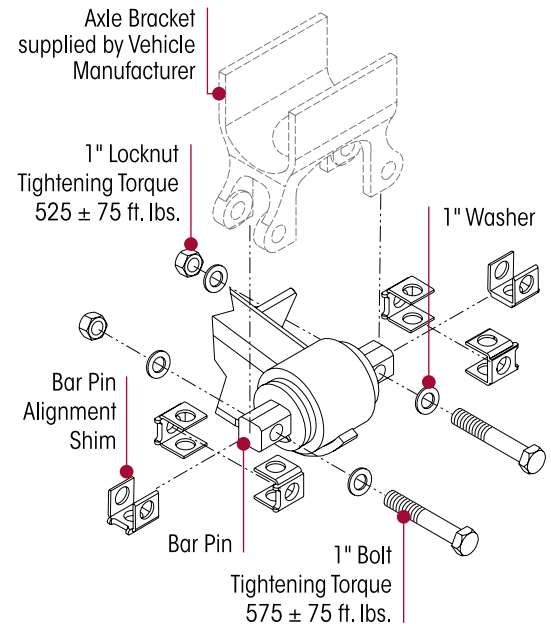
EXAMPLE If the lateral alignment is out of specification by ¼" (6 mm), remove or install a ⅛" (3 mm) shim between the transverse torque rod and frame rail as needed.

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

BAR PIN WITH SHIMS ALIGNMENT

NOTE Drive axle alignment with suspensions equipped with adapter style beam or non-shim style end connections **ARE NON** adjustable.

The alignment feature consists of specially designed, tight tolerance steel shims which fill the ¾" (9.5 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 in one of the positions shown in Figures 7-7 and 7-9. Hendrickson has three (3) shim design options for alignment, see Figure 7-10.

FIGURE 7-7


WARNING

A BAR PIN SHIM MUST BE INSTALLED AT EACH BOLT LOCATION. THE SAME PART NUMBER SHIM IN THE SAME ORIENTATION MUST BE USED AT BOTH BOLT LOCATIONS ON ANY ONE (1) END BUSHING. DO NOT INSTALL OR STACK MORE THAN ONE (1) SHIM AT EACH BOLT LOCATION. USE GENUINE HENDRICKSON BAR PIN SHIMS, DO NOT USE STANDARD WASHERS. FAILURE TO FOLLOW THESE WARNINGS MAY RESULT IN IMPROPER VEHICLE ALIGNMENT, FRACTURE OF THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

ALIGNMENT ADJUSTMENT PROCEDURE

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 7-8 illustrates the forward drive axle with a thrust angle to the left (-) negative thrust.

SERVICE HINT

Axle movement is in the same direction as whichever side of the bar pin receives an increase in shim thickness, see Figure 7-9.

- 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 7-5.

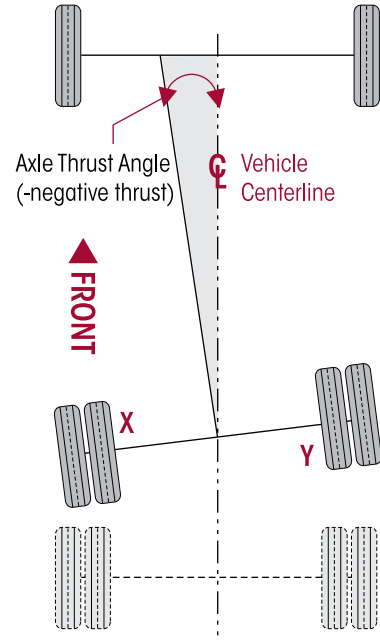
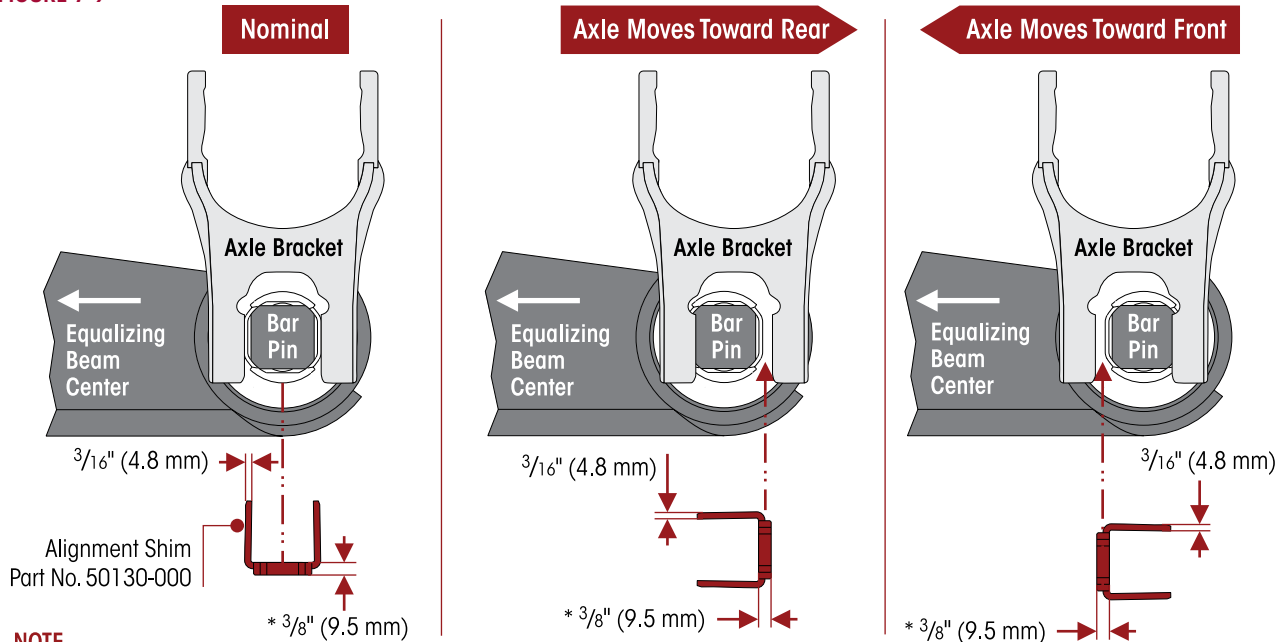
SERVICE HINT

Axle movement 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 7-8, shim thickness will need to be increased at the **BACK** of the bar pin (**Location X**) and / or the **FRONT** of the bar pin (**Location Y**).

WARNING

EACH BAR PIN 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 ALIGNMENT SHIMS ON A BAR PIN END BUSHING FOR A PARTICULAR BEAM END BUSHING MUST BE INSTALLED IN THE SAME ORIENTATION. SHIM ORIENTATION MAY DIFFER FOR EACH BEAM BUSHING. SEE FIGURE 7-7. FAILURE TO FOLLOW THESE WARNINGS MAY RESULT IN THE FRACTURE OF EITHER THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

- Chock the wheels of the front axles to prevent vehicle movement during service.
- Raise the frame of the vehicle to remove the load from the suspension. Support the frame at this height.
- Support the equalizing beam and remove and discard fasteners from the end bushing where the bar pin alignment shim adjustment is being made.
- Adjust shim thickness to move the axle in the desired direction, see Figure 7-9.

FIGURE 7-8**FIGURE 7-9****NOTE**

* Refer to Figure 7-10 for leg and back dimensions on shim Part Nos. 50131-000 and 57026-000

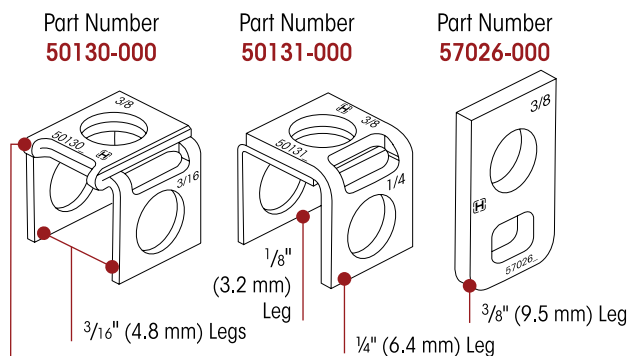
7. Install new end bushing fasteners and tighten to:
 - At the **locknut** to $\boxed{525} \pm 75$ foot pounds torque
 - At the **bolt head** to $\boxed{575} \pm 75$ foot pounds torque
8. Remove support and lower the vehicle.
9. Verify the axle's alignments are within the vehicle manufactures tolerance.
10. Set brakes and remove wheel chocks.

FIGURE 7-10

BAR PIN ALIGNMENT SHIMS

The following service notes will help when performing Hendrickson equalizing beam bar pin alignment

- The standard alignment shims supplied with each suspension (P/N 50130-000) have two $\frac{3}{16}$ " (4.8 mm) legs and a $\frac{3}{8}$ " (9.5 mm) back. Rotating the shim pairs 90° will change the axle alignment in $\pm \frac{3}{16}$ " (4.8 mm) increments.
- If a finer adjustment is required use alignment shim (P/N 50131-000). This alignment shim has one $\frac{1}{8}$ " (3.2 mm) leg, one $\frac{1}{4}$ " (6.4 mm) leg, and a $\frac{3}{8}$ " (9.5 mm) back. A total of $\frac{3}{4}$ " (19 mm) adjustment is achievable to the axle. A $\frac{3}{8}$ " (9.5 mm) flat shim is also available (P/N 57026-000).
- $\frac{1}{16}$ " (1.5 mm) shim thickness increases thrust angle by 0.10°.
- To accomplish a thrust angle adjustment rotate the alignment shims on the bar pin of the end bushing. Axle movement will be in the direction of the shim thickness increase.
- Axle thrust angle may be adjusted at either wheel end on an axle. If insufficient adjustment is available at one wheel end, the opposing wheel end will also need to be adjusted, but in the opposite direction.


NOTE

The folded edge in 50130-000 shim must be positioned away from bushing

Example: The alignment equipment shows the front drive axle to have a 0.40° thrust angle to the left. This will require a $\frac{1}{4}$ " (6.4 mm) shim thickness increase to the front side of the left front equalizing beam end bushing. If there is less than $\frac{1}{4}$ " (6.4 mm) of adjustment available at this location then some of the adjustment will have to be made at the rear of the right front end bushing. In this case a $\frac{1}{8}$ " (3.2 mm) shim thickness increase at the front side of the left front bar pin **AND** a $\frac{1}{8}$ " (3.2 mm) shim thickness increase at the rear side of the right front bar pin will correct the 0.40° thrust angle.

SECTION 8

Component Replacement

FASTENERS

Hendrickson recommends when servicing the vehicle, replace all removed fasteners with new equivalent fasteners. Maintain correct torque values at all times. Check torque values as specified. See Hendrickson's Torque Specifications Section of this publication. If non-Hendrickson fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual.

NOTE

Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts. If flange head bolts and locknuts are not used, then hardened structural washers must be used under bolt heads and locknuts.

AR2 for Manitowoc – Welded Components

The following components for AR2 46K capacity for Manitowoc are welded by the vehicle manufacturer, please refer to the manufacturer for preventive maintenance and service, refer to the Parts List Section in this publication:

- Frame Hanger
- Upper Shock Bracket
- Upper Air Spring Bracket
- Trailing Arm Stop Bar
- Rebound Strap Bracket and Axle Stop Assembly

HEIGHT CONTROL VALVE

DISASSEMBLY

1. Chock the front wheels of vehicle.
2. Disconnect the leveling valve arm(s) from the rubber grommet(s).



PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

3. See Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the suspension system.
4. Lower the leveling valve arm(s) to exhaust the air in the air springs and deflate the rear suspension.
5. Remove the air lines from the height control valve.
6. Remove and discard the locknut fasteners that attach the height control valve to the frame mounting bracket. **DO NOT** back out the studs from the height control valve body. Loosening the studs may cause the height control valve to leak.
7. Remove height control valve, see Figures 8-1 and 8-2.
8. Remove the air fittings from the height control valve.

ASSEMBLY


1. Install the air fittings into the new height control valve using Teflon thread seal.
2. Install the height control valve to the frame mounting bracket by attaching the ¼" washers and locknuts. Tighten to  9 ± 1 foot pounds torque, see Figures 8-1 and 8-2.

FIGURE 8-1
AR2 for Maniwoc

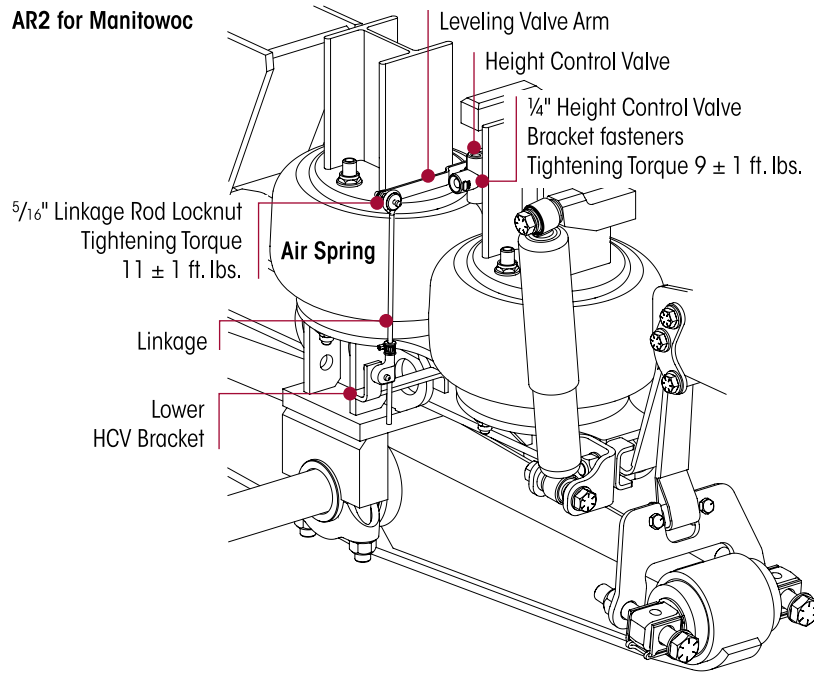
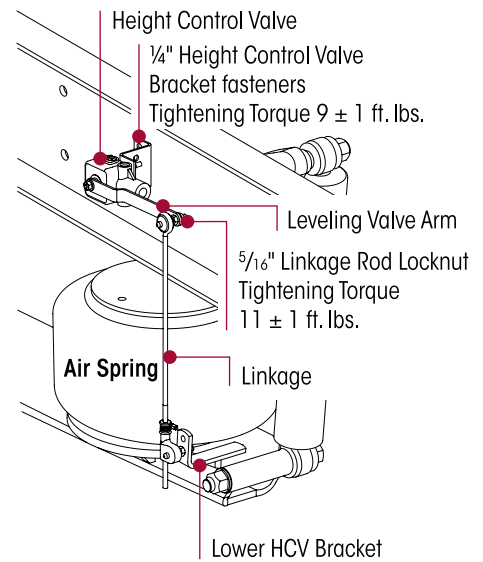


FIGURE 8-2
AR2 40K • 46K



3. Install the air lines to the height control valve. Refer to the Plumbing Diagram Section of this publication.
4. See Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the suspension system.
5. Inflate the suspension by connecting the height control valve linkage(s) to the leveling valve arm(s).
6. Verify the air springs inflate uniformly without binding and that the vehicle air system is at the correct operating air pressure.
7. Verify proper ride height, refer to Ride Height in the Alignment & Adjustments Section of this publication.
8. Remove the wheel chocks.

AIR SPRING

It is not mandatory to replace both air springs on the same trailing arm if one (1) air spring requires replacement.

NOTE

The following component replacement procedure is for one (1) air spring replacement. Duplicate procedure if more than one air spring requires replacement.

DISASSEMBLY

1. Chock the front wheels of the vehicle.
2. Support the frame of the vehicle at ride height.

IMPORTANT NOTE

If the air springs are deflated it will be necessary to raise the frame of the vehicle to an acceptable height to allow for removal of the air spring(s).

3. Disconnect the height control linkage assembly from the leveling valve arm by sliding the rubber grommet from the stud(s).

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

4. See Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the suspension system.
5. Lower the leveling valve arm(s) to exhaust the air in the air springs and deflate the rear suspension.

NOTE

Prior to disassembly of the air spring, note the orientation of the air spring and air spring fittings, see Figures 8-3 and 8-4. It is required that the air spring is installed in the same orientation and location as removed. AR2 40K • 46K has two (2) different air spring for the front and rear.

6. Remove the air lines from the air spring.
7. Remove and discard the lower air spring fasteners.
8. Remove the lower air spring studs located below the trailing arm, see Figures 8-3 and 8-4.
9. Remove and discard the upper air spring fasteners from the upper air spring bracket, see Figures 8-3 and 8-4.
10. Remove the air spring.

INSPECTION

1. Inspect the mounting surfaces on the trailing arm and the upper air spring mounting bracket for cracks or damage. Replace as necessary.

FIGURE 8-3

AR2 for Manitowoc

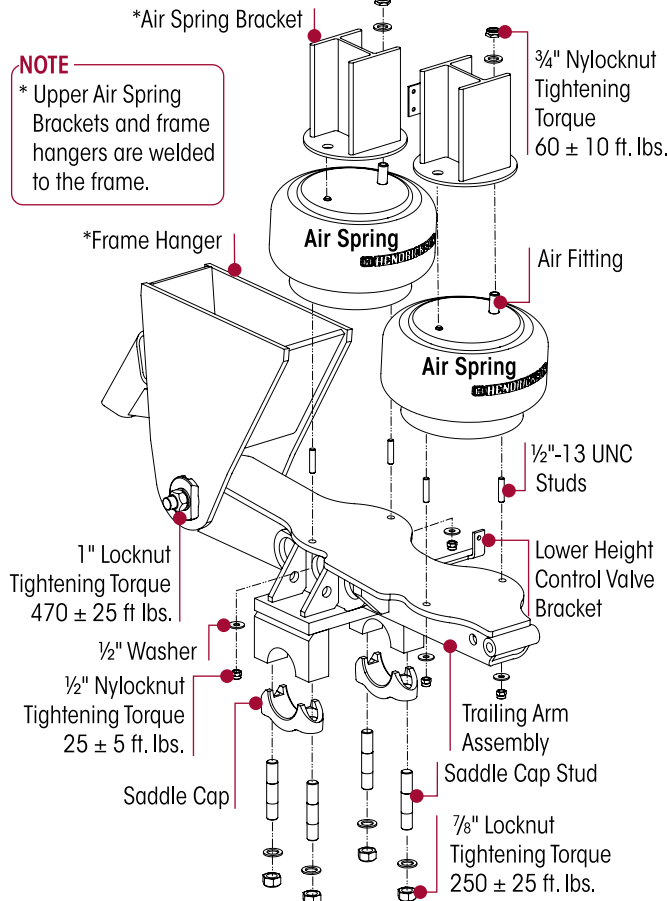
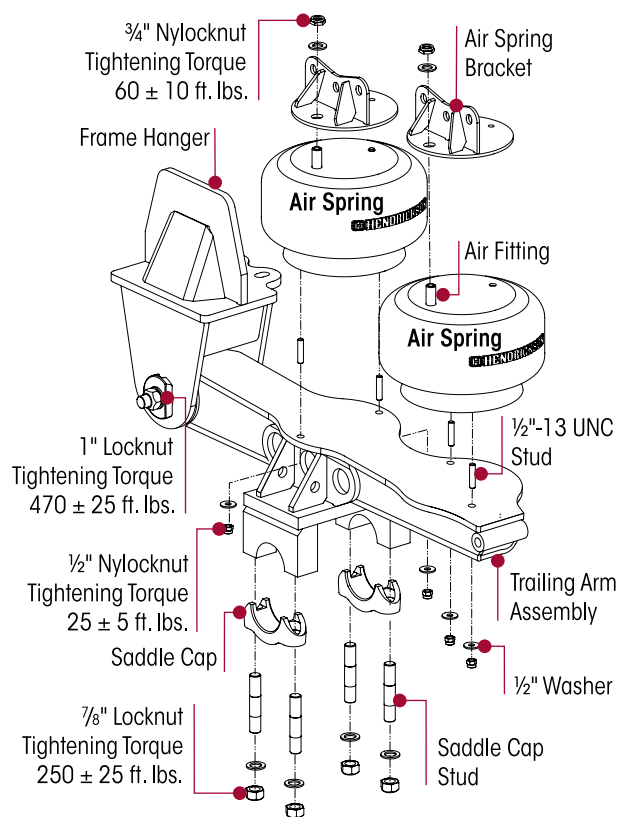


FIGURE 8-4

AR2 40K • 46K



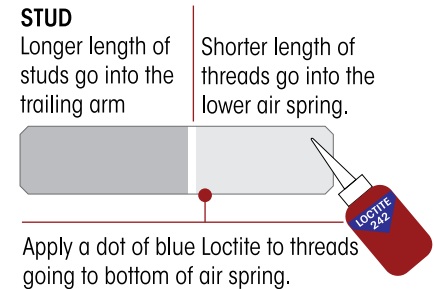
ASSEMBLY

1. On the shorter length of threads of the ½" stud that enters into the lower air spring, apply a dot of blue Loctite 242, see Figure 8-5.
2. Install stud into the bottom of the air spring and tighten to \mathbb{R} 25 ± 5 foot pounds torque.

SERVICE HINT

Depending on the frame height of the vehicle it may be necessary to compress the air spring to facilitate installation into the frame bracket and trailing arm.

3. Install the air spring into upper air spring bracket in the same orientation and location as prior as to removal, see Figures 8-3 and 8-4.
4. Install the lower air spring into the trailing arm assembly by inserting the studs into the trailing arm mounting holes.
5. Install the fasteners that connect the air spring to the trailing arm assembly and tighten the lower air spring locknuts to \mathbb{R} 25 ± 5 foot pounds torque as shown in Figures 8-3 and 8-4.
6. Install the upper air spring fasteners. Tighten the upper air spring locknuts to \mathbb{R} 60 ± 10 foot pounds torque, see Figures 8-3 and 8-4.
7. Install the air fitting to the air spring using Teflon thread seal.
8. Install the air lines to the air springs.
9. Lower the frame of vehicle.
10. See Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the suspension system.
11. Inflate the suspension by connecting the height control valve linkage(s) to the leveling valve arm(s).
12. Verify the air springs inflate uniformly without binding and that the vehicle air system is at the correct operating air pressure.
13. Remove the frame supports.
14. Verify proper ride height, refer to Ride Height in the Alignment & Adjustments Section of this publication.
15. Remove the wheel chocks.

FIGURE 8-5

SHOCK ABSORBER
NOTE

It is not necessary to replace shock absorbers in pairs if only one (1) shock absorber requires replacement.

DISASSEMBLY

1. Prior to disassembly of shock absorber, note the orientation of the fasteners, see Figures 8-6 and 8-7.
2. Remove and discard the upper and lower shock absorber mounting fasteners.
3. Remove the shock absorber.
4. Inspect the shock absorber mounting brackets for damage, replace as necessary.

ASSEMBLY

1. Install the shock absorber, see Figure 8-7.
2. Install the upper shock absorber fasteners, **DO NOT** tighten at this time.

FIGURE 8-6

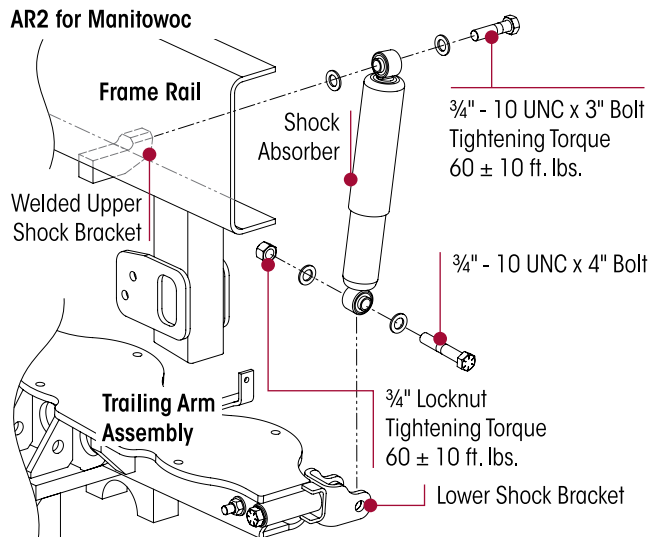
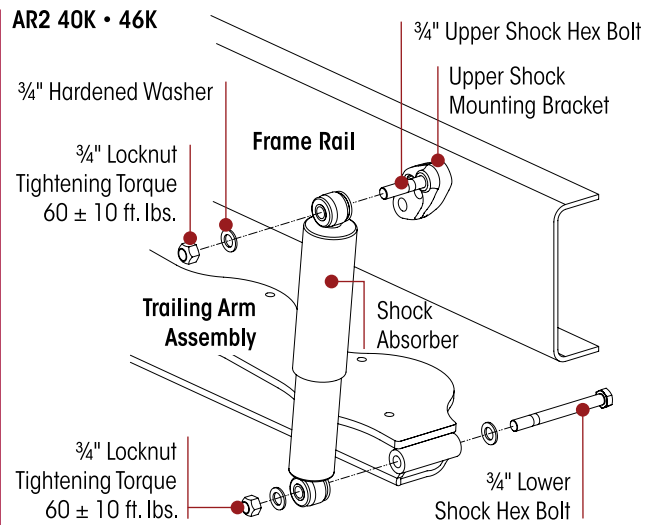


FIGURE 8-7



3. Install lower shock absorber fasteners in the same orientation as removed, see Figures 8-6 and 8-7.
4. Tighten both upper and lower shock absorber locknuts to 60 ± 10 foot pounds torque, see Figures 8-6 and 8-7.

AR2 40K•46K FRAME HANGER

DISASSEMBLY

1. Chock the front wheels.
2. Support the frame of the vehicle at ride height.
3. Raise and support the axles with safety stands.
4. Remove the tire from the side being serviced.



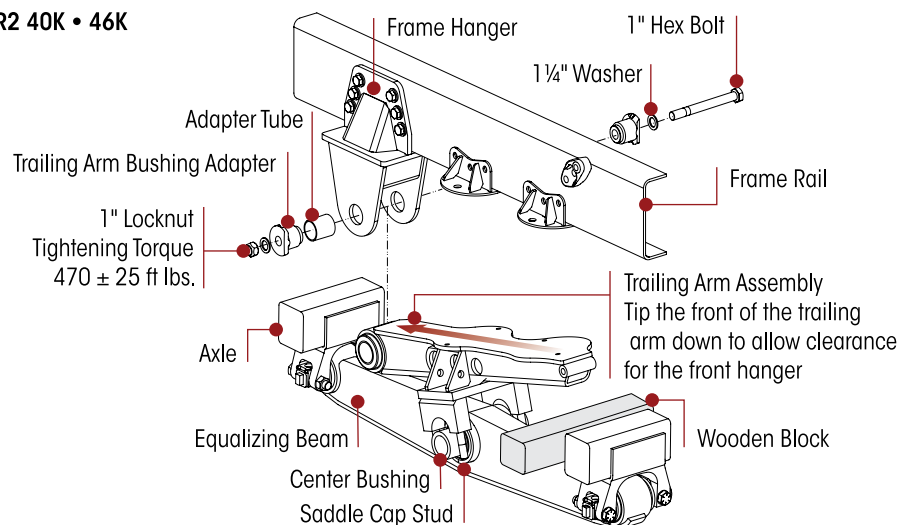
WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

5. See Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the suspension system.

FIGURE 8-8

AR2 40K • 46K



6. Lower the leveling valve arm(s) to exhaust the air in the air springs and deflate the rear suspension.
7. Remove and discard the lower air spring fasteners from the side being serviced.
8. Remove and discard the lower shock absorber fasteners from the side being serviced.
9. Position a wooden block on the equalizing beam close to the rear axle, see Figure 8-8.
10. Remove and discard the trailing arm adapter fasteners from the hanger, see Figure 8-8.
11. Check the trailing arm bushing adapters for damage. If the adapters and the adapter tube require replacement, See Adapter Style End Bushing Component Replacement in this section.
12. If necessary, carefully push the trailing arm out of the frame hanger with a pry bar.
13. Remove and discard the frame hanger fasteners per the vehicle per vehicle manufacturer's specifications.
14. If equipped, remove the frame hanger spacer plate (supplied by vehicle manufacturer).

INSPECTION

1. Inspect the trailing arm bushing for wear or damage, refer to the Preventive Maintenance Section of this publication. Replace as necessary.

ASSEMBLY

1. Drill the frame hanger to match the existing bolt hole pattern of the removed hanger.
2. Fit the horizontal flange of the frame hanger against the bottom horizontal flange of the frame rail flush and tight. Clamp the bottom of the frame hanger to the frame rail flange.



FAILURE TO CLAMP THE FRAME HANGER AGAINST THE UNDERSIDE OF THE FRAME WHILE TIGHTENING THE FRAME BOLTS CAN RESULT IN COMPONENT DAMAGE AND PERSONAL INJURY OR PROPERTY DAMAGE.

3. Install the frame hanger fasteners that attach the frame hanger to the vehicle frame rail and snug the bolts.
4. Install the frame hanger fasteners that attach the frame hanger to the spacer plate and cross member and snug the bolts. **DO NOT** tighten as this time.
5. Tighten all frame hanger fasteners to the vehicle manufacturer's torque specification and remove the clamp.
6. Lower the frame rail to ride height.
7. Position the trailing arm into the new frame hanger.
8. Install the trailing arm bushing fasteners and adapter assembly.
9. Tighten trailing arm bushing locknut to $\boxed{470} \pm 25$ foot pounds torque.
10. Install the lower shock fasteners and tighten to $\boxed{60} \pm 10$ foot pounds torque.
11. Install the lower air spring fasteners and tighten to $\boxed{25} \pm 5$ foot pounds torque.
12. See additional Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the air system.
13. Connect the height control valve linkage rod(s) to the height control valve arm(s) to inflate the suspension properly.
14. Install the tires.
15. Remove the supports from the drive axles and lower the vehicle onto the ground.
16. Remove the wheel chocks.
17. Remove frame supports.

AR2 for Manitowoc – TRAILING ARM REBOUND STRAP

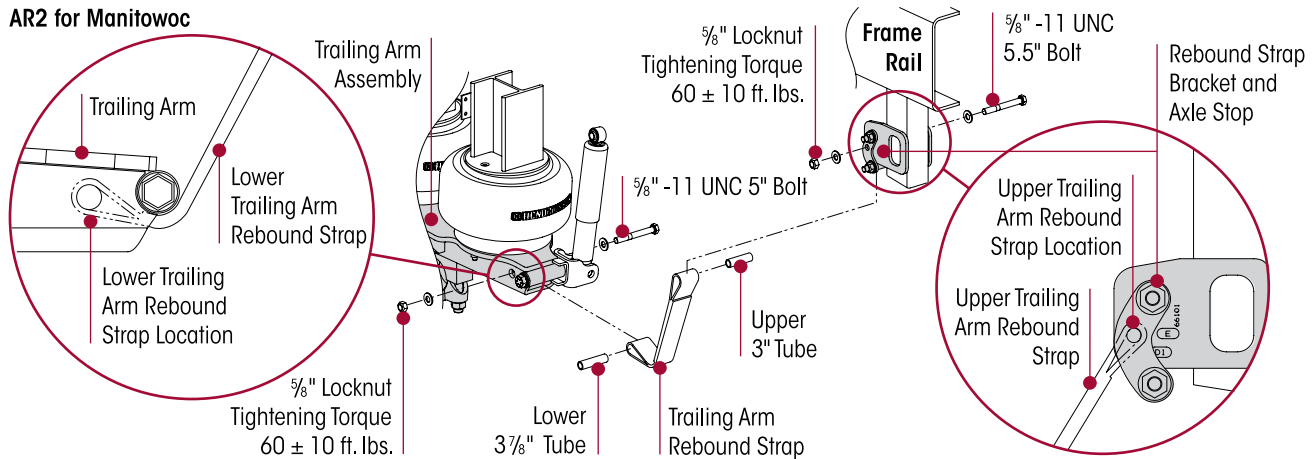
NOTE Hendrickson recommends replacement of both trailing arm rebound straps if only one requires replacement.

DISASSEMBLY

1. Chock the **FRONT** wheels of the vehicle.
2. Remove and discard the trailing arm rebound strap fasteners.
3. Remove and discard the rebound strap and tubes from the trailing arm, see Figure 8-9.

FIGURE 8-9

AR2 for Manitowoc



ASSEMBLY

1. Install the lower 3⁷/₈" tube into the trailing arm rebound strap.
2. Install the lower rebound strap assembly into the trailing arm, see Figure 8-9.
3. Install the 5/8" -11 UNC x 5" bolt through the trailing arm.
4. Tighten the fastener to $\boxed{60} \pm 10$ foot pounds torque, see Figure 8-9.
5. Install the upper 3" tube into the trailing arm rebound strap.
6. Locate the upper rebound strap assembly into the rebound strap bracket and axle stop, see Figure 8-9.
7. Install the 5/8" -11 UNC x 5.5" bolt through the rebound strap bracket and axle stop.
8. Tighten the upper rebound strap fastener to $\boxed{60} \pm 10$ foot pounds torque, see Figure 8-9.
9. Repeat procedure for the other side of the suspension, as necessary.
10. Remove the wheel chocks.

AR2 for Manitowoc – EQUALIZING BEAM REBOUND STRAP

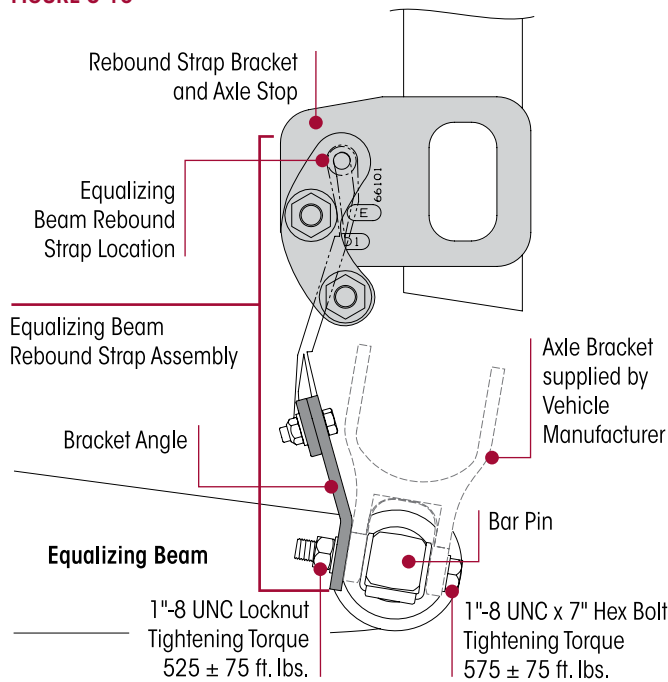
NOTE Hendrickson recommends replacement of both equalizing beam rebounds straps if only one requires replacement.

DISASSEMBLY

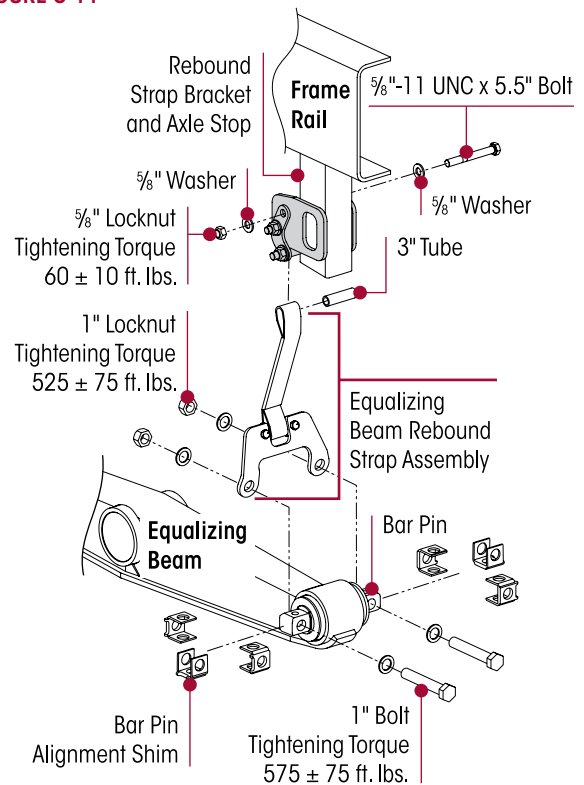
1. Chock the **FRONT** wheels of the vehicle.
2. Raise and support the drive axles with safety stands.

NOTE Prior to disassembly of the equalizing beam rebound strap assembly, note the orientation and location of the lower bracket and the fasteners, see Figure 8-10. It is required that the bracket and fasteners are installed in the same orientation and location as removed. If the bracket is installed improperly it will need to be reinstalled to avoid conflict with the axle bracket leg.

3. Remove and discard the bar pin fasteners from the equalizing beam rebound strap assembly and axle bracket connection, see Figures 8-10 and 8-11. It is **NOT** necessary to remove the bar pin shims.
4. Remove and discard the upper equalizing beam strap fastener, see Figure 8-11.
5. Remove and discard the equalizing beam rebound strap assembly and tube.

FIGURE 8-10

NOTE

Place Equalizing Beam Rebound Strap Bracket Angle facing the center bushing.

FIGURE 8-11

ASSEMBLY

1. Prior to installation of the equalizing beam strap assembly ensure the bracket angle of the lower bracket is in the proper orientation and location. To install properly, position the angle towards the center bushing, see Figure 8-10.
2. Install the lower equalizing beam rebound strap assembly with the axle bracket on the inside face of the bar pin flats, see Figure 8-10.
3. Install the 1" bar pin fasteners.
4. Tighten the bar pin end fasteners to following, see Figures 8-10 and 8-11:
 - At the **locknuts** tighten to 525 ± 75 foot pounds torque
 - At the **bolt head** tighten to 575 ± 75 foot pounds torque
5. Install the upper 3" tube into the equalizing beam rebound strap assembly.
6. Locate the upper equalizing beam strap assembly into the rebound strap bracket and axle stop, see Figure 8-10.
7. Install the 5/8"-11 UNC x 5.5" bolt through the rebound strap bracket and axle stop, see Figure 8-11.
8. Tighten upper equalizing beam fastener to 60 ± 10 foot pounds torque, see Figure 8-11.
9. Repeat procedure for the other side of the suspension, as necessary.
10. Remove the wheel chocks.

TRAILING ARM

DISASSEMBLY

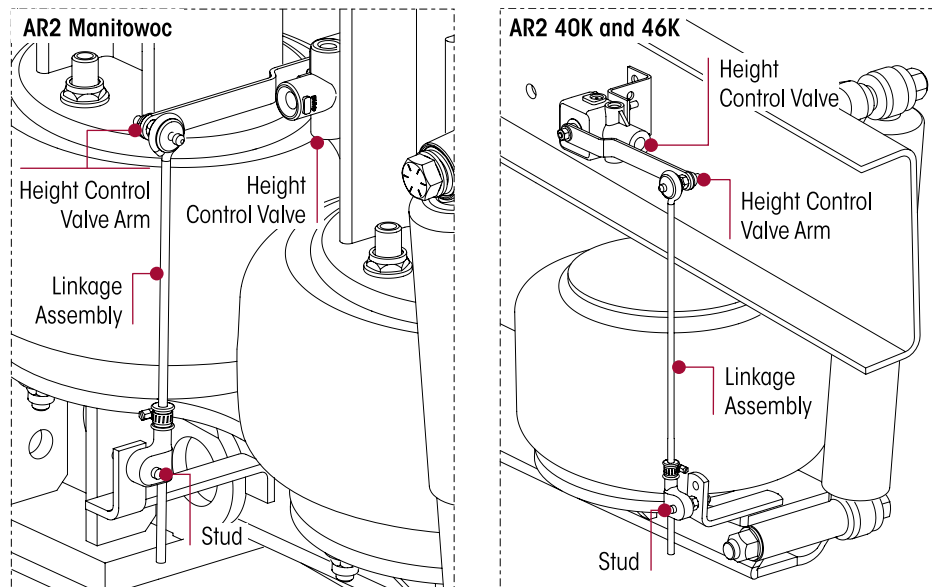
1. Chock the **FRONT** wheels of the vehicle.

WARNING

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

2. See Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the suspension system.
3. Support the frame with frame stands.
4. Disconnect the height control valve lower linkage from the trailing arm, see Figure 8-12.
5. Lower the height control valve arm(s) to exhaust the air from the air springs.

FIGURE 8-12



6. Remove the tires.
7. Lift and support the axles with safety stands.
8. Disconnect the air lines from the air springs.

NOTE

Prior to disassembly of the air spring, note the orientation of the air spring and air spring fittings, see Figures 8-13 and 8-14. It is required that the air spring is installed in the same orientation and location as removed.

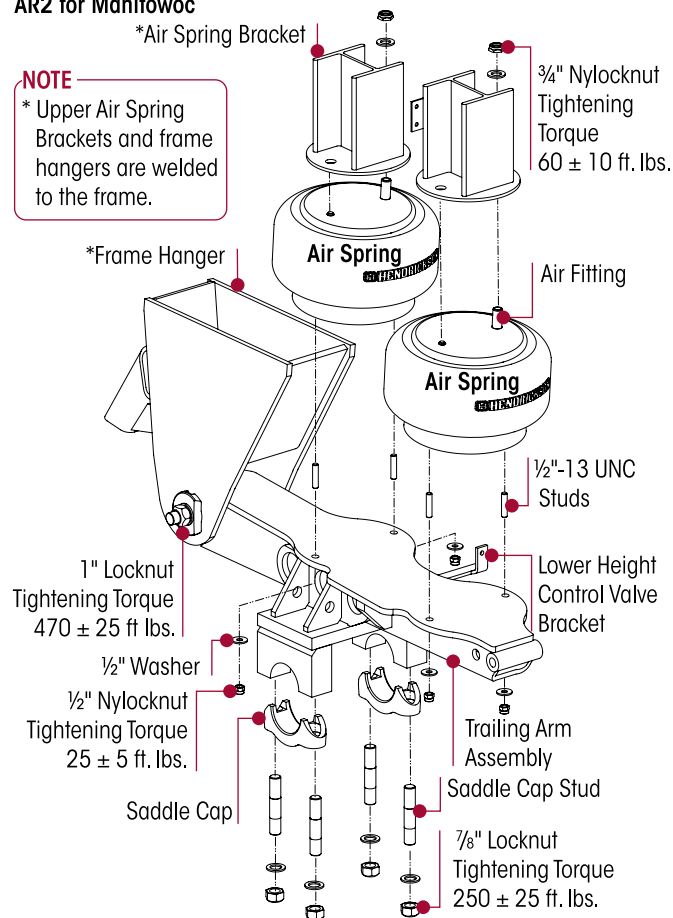
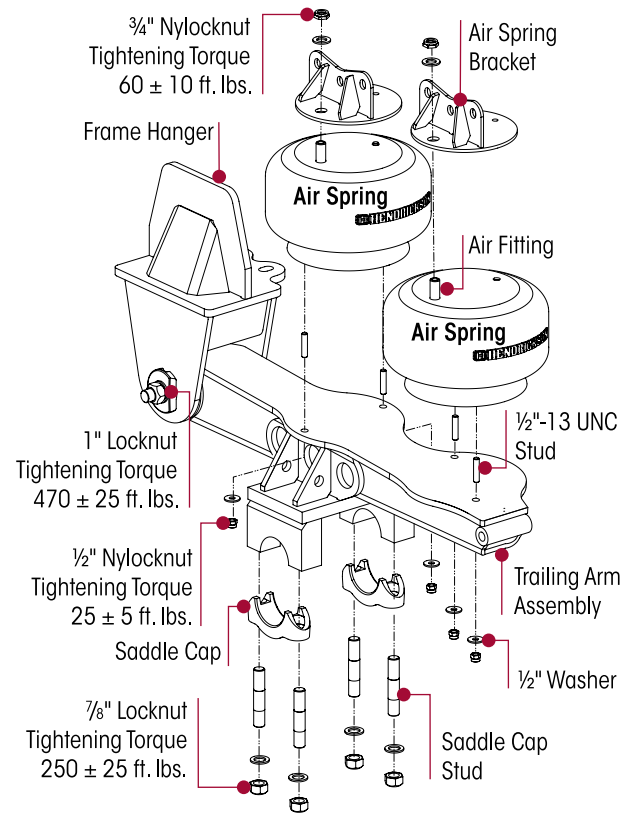
9. Remove and discard upper and lower air spring fasteners, see Figures 8-13 and 8-14.
10. Remove the air springs from the upper air spring brackets. **DO NOT** remove the upper air spring brackets.
11. Remove the saddle cap fasteners, saddle cap studs, and the saddle caps from trailing arm, see Figures 8-13 and 8-14.

FIGURE 8-13
AR2 for Manitowoc

*Air Spring Bracket

NOTE

* Upper Air Spring Brackets and frame hangers are welded to the frame.


FIGURE 8-14
AR2 40K • 46K


12. Remove and discard both upper and lower shock absorber fasteners from the side being serviced.
13. Remove the shock absorber.
14. If equipped with **AR2 for Manitowoc**:
 - a. Remove and discard the lower shock bracket fasteners, see Figure 8-15.
 - b. Remove the lower shock bracket.
 - c. Remove and discard the lower trailing arm rebound strap fasteners.
 - d. Remove the upper equalizing beam rebound strap fasteners from the rebound strap and axle stop assembly. It is not necessary to remove the lower bar pin fasteners.
15. Remove and discard the trailing arm adapter fasteners see Figures 8-16 and 8-17.
16. Remove and discard the saddle cap fasteners and the saddle caps.

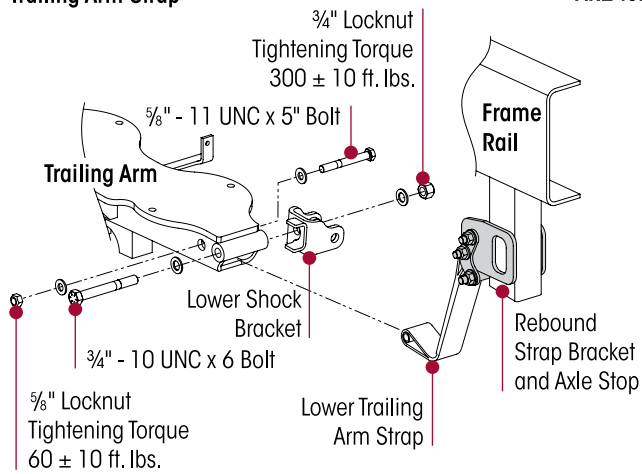
WARNING

THE WEIGHT OF THE TRAILING ARM ASSEMBLY IS APPROXIMATELY 225 POUNDS (102 KILOGRAMS). CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

17. Lift the trailing arm off center bushing and remove from vehicle. If necessary, raise the frame height to provide more clearance.



FIGURE 8-15
Trailing Arm Strap



AR2 for Manitowoc

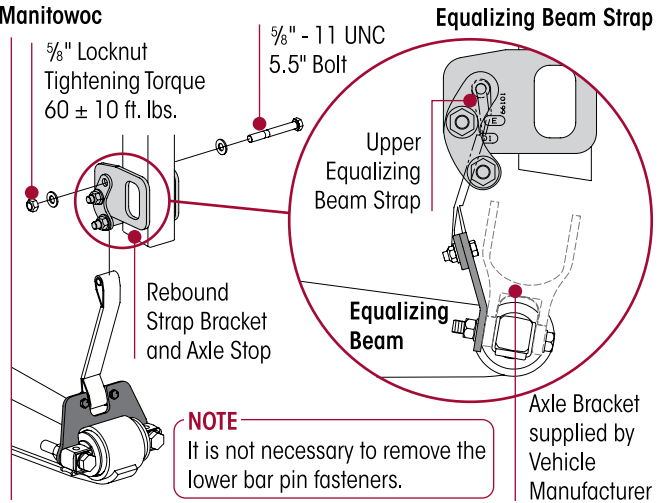


FIGURE 8-16
AR2 for Manitowoc

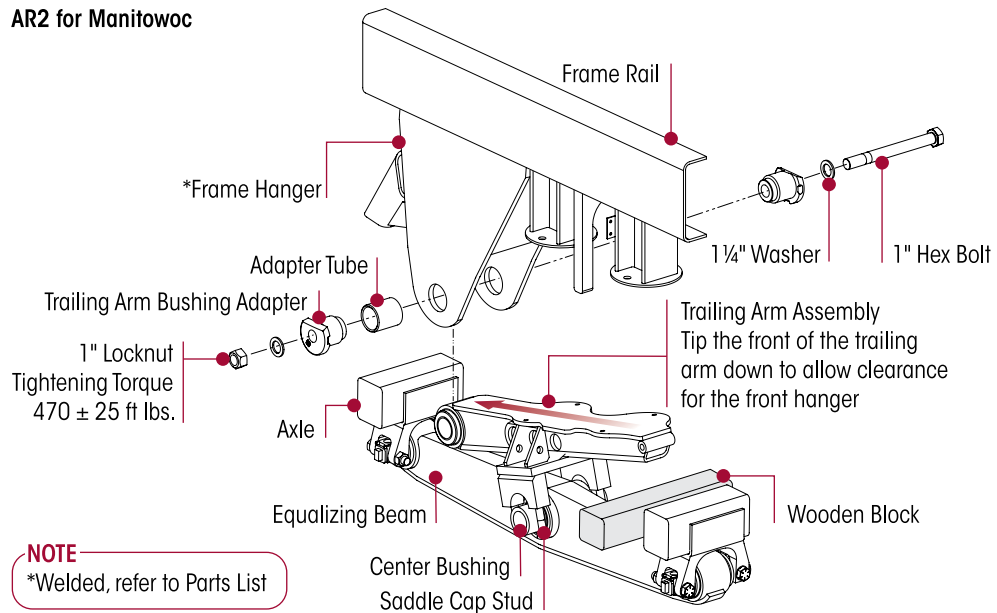
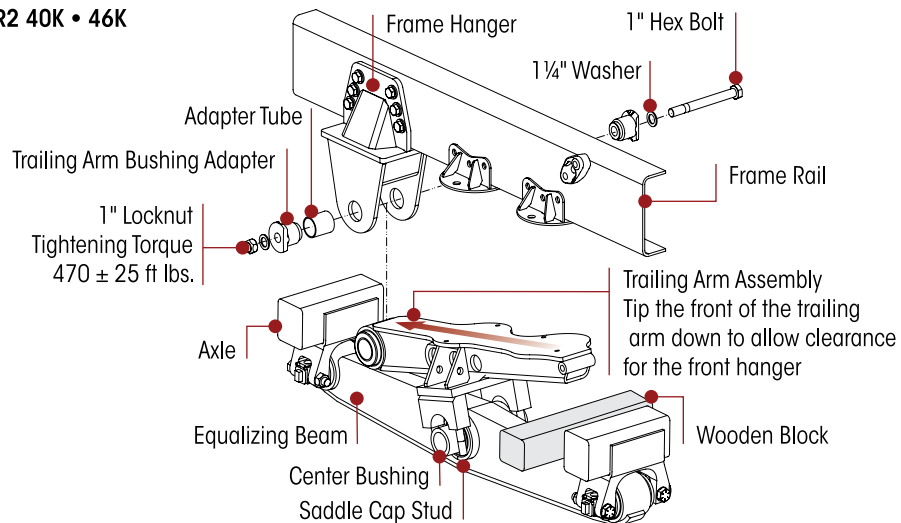


FIGURE 8-17
AR2 40K • 46K



ASSEMBLY

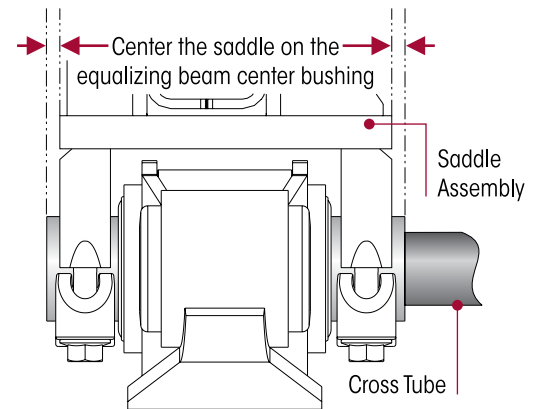

THE WEIGHT OF THE TRAILING ARM ASSEMBLY IS APPROXIMATELY 225 POUNDS (102 KILOGRAMS). CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

1. Raise the frame high enough to allow adequate clearance of trailing arm between the frame and the center bushing.
2. Position the trailing arm between the frame and the equalizing beam center bushing.



THE SADDLE ASSEMBLY IS ATTACHED TO THE CENTER BUSHINGS OF EACH EQUALIZING BEAM WITH TWO (2) SADDLE CAPS. EACH SADDLE CAP USES TWO (2) STUDS TO CLAMP THE CENTER BUSHING INNER METAL TO THE SADDLE. THE SADDLE CAPS MUST BE INSTALLED SO THAT THERE IS AN EVEN GAP BETWEEN THE SADDLE CAPS AND THE BASE OF THE SADDLE ASSEMBLY AS SHOWN IN FIGURE 8-23. IF THEY ARE NOT INSTALLED EVENLY THE SADDLE ASSEMBLY COULD BECOME DEFORMED, RESULTING IN BENT BOLTS OR DAMAGED SADDLE ASSEMBLY.

3. Carefully lower the trailing arm with the saddle seated on the equalizing beam center bushing, see Figures 8-16 and 8-17.
4. Center the saddle on the equalizing beam center bushing, see Figure 8-18.

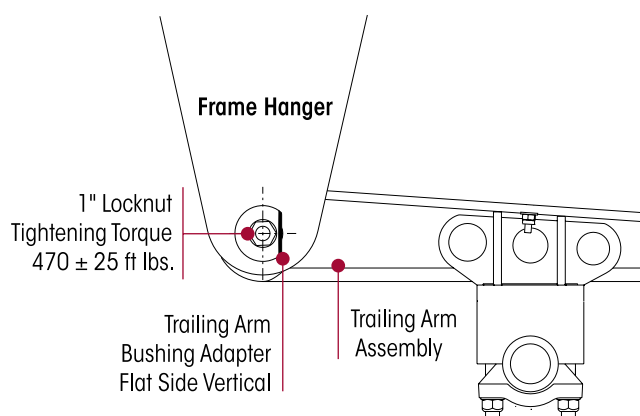
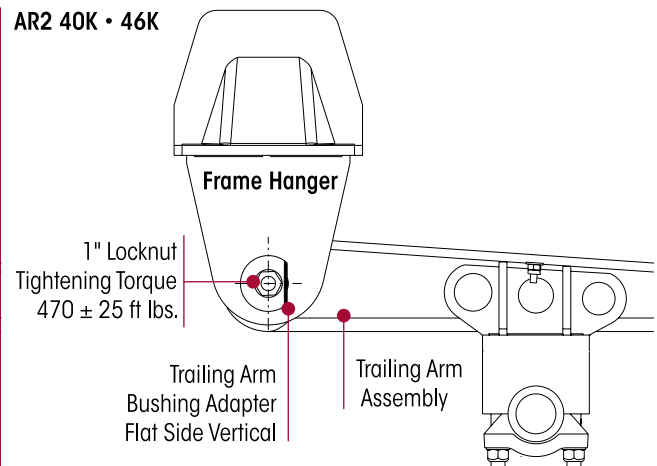
FIGURE 8-18


5. Install the trailing arm saddle caps, see Figure 8-23.
6. Loosely install saddle cap studs and fasteners.
7. Snug evenly, but **DO NOT** tighten at this time.

SERVICE HINT

If needed, tip the front of the trailing arm down to allow clearance for the front hanger. It may be necessary to install a block of wood behind the trailing arm to keep it from tipping backwards, see Figures 8-16 and 8-17.

8. Install the trailing arm into the front frame hanger.

FIGURE 8-19
AR2 for Manitowoc

FIGURE 8-20
AR2 40K • 46K


9. Rotate the bushing adapter so that the adapter flats are vertical, see Figures 8-19 and 8-20. Snug but **DO NOT** tighten at this time.
10. Install the trailing arm adapter fasteners. Snug but **DO NOT** tighten at this time.

FIGURE 8-21

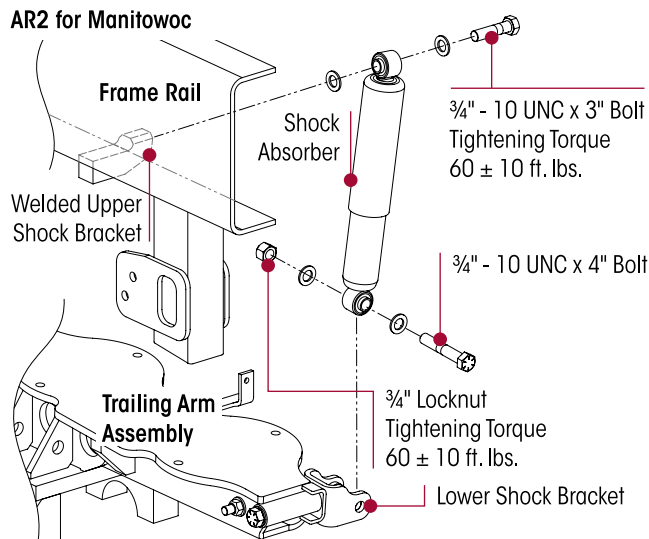
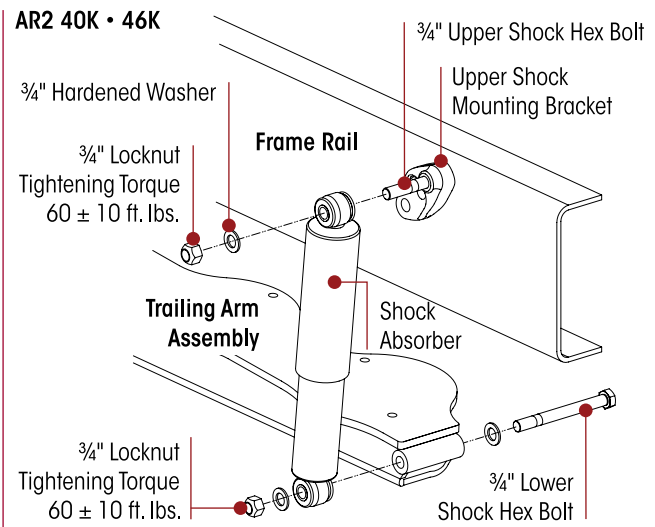
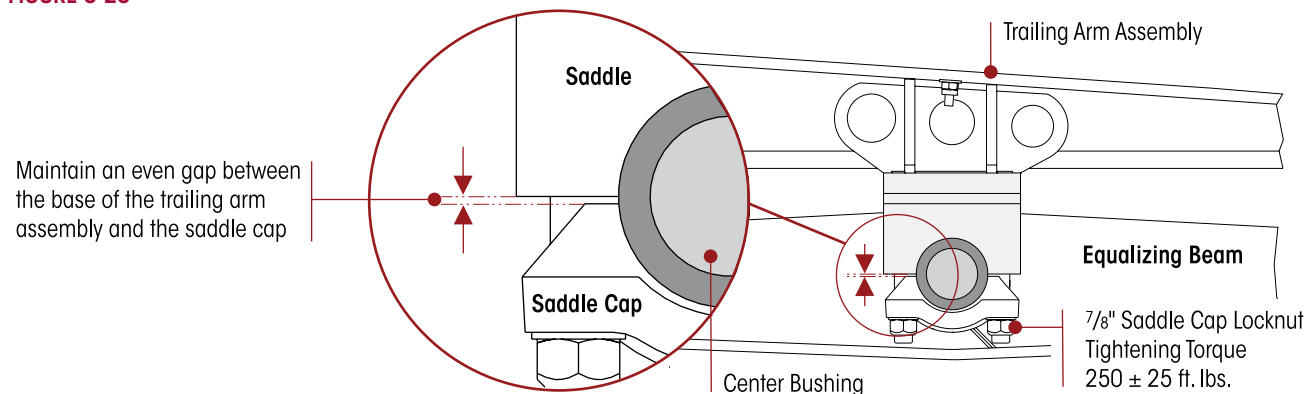


FIGURE 8-22



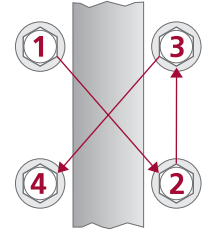
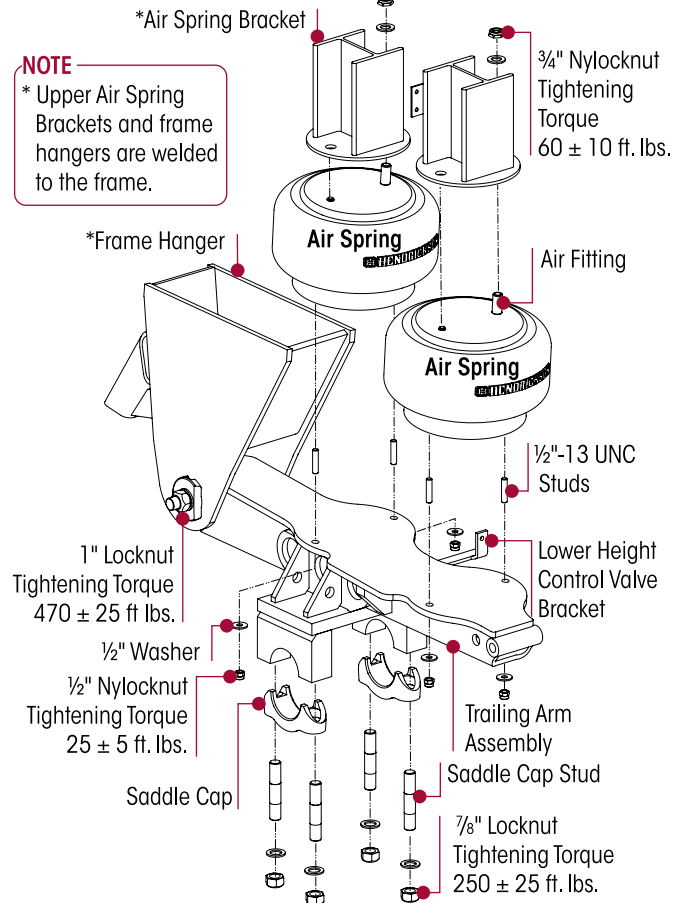
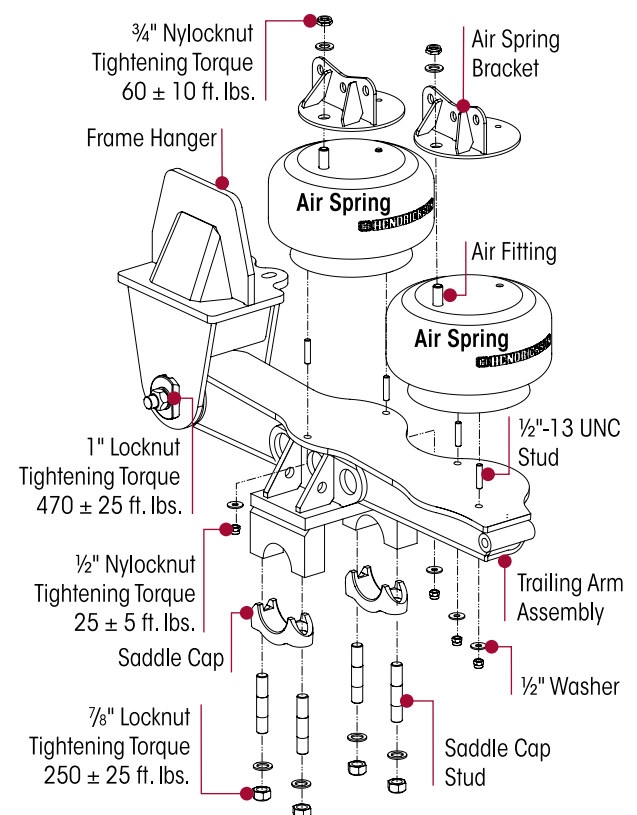
11. If equipped with **AR2 for Manitowoc**, install the lower shock bracket. Tighten fasteners to \mathbb{R} 300 ± 10 foot pounds torque.
12. Install shock absorber, raise or lower frame as necessary.
13. Install shock fasteners, and tighten to \mathbb{R} 60 ± 10 foot pounds torque, see Figures 8-21 and 8-22.
14. If equipped with **AR2 for Manitowoc**:
 - a. Install the lower trailing arm rebound strap to the trailing arm. Tighten rebound strap fastener to \mathbb{R} 60 ± 10 foot pounds torque, see Figure 8-15.
 - b. Install the upper equalizing beam rebound strap fastener. Tighten rebound strap fastener to \mathbb{R} 60 ± 10 foot pounds torque.
15. Install the air springs into upper air spring bracket in the same orientation and location as prior as to removal, see Figures 8-25 and 8-26.
16. Lower frame to proper ride height.
17. Tighten the upper air spring 3/4" locknut to \mathbb{R} 60 ± 10 foot pounds torque and the lower 1/2" locknut to \mathbb{R} 25 ± 5 foot pounds torque.
18. Tighten the saddle cap stud fasteners and maintain an even gap between the saddle assembly base and the saddle cap, see Figure 8-23.

FIGURE 8-23



WARNING LOOSE OR OVER TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUES AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR INSPECTION INTERVAL.

19. Tighten the **saddle cap fasteners** evenly in 50 foot pounds increments in the proper sequence for uniform bolt tension as shown in Figure 8-24 until the final torque value of 250 ± 25 foot pounds torque is achieved. **DO NOT EXCEED** specified torque on saddle cap fasteners.
20. Tighten the trailing arm bushing adapter locknuts to 470 ± 25 foot pounds torque, see Figures 8-25 and 8-26.
21. Remove jack stands and install tires.
22. See Air Spring Cautions and Warnings in the Important Safety Notice Section of this publication prior to deflating or inflating the suspension system.
23. Connect the height control valve linkage(s) to the to the trailing arm(s) to inflate the suspension.
24. Inflate the suspension slowly and verify that the air spring bladder inflates uniformly without binding.
25. Verify proper ride height, refer to Ride Height in the Alignment & Adjustments Section of this publication.
26. Remove the wheel chocks.

FIGURE 8-24

FIGURE 8-25
AR2 for Manitowoc

FIGURE 8-26
AR2 40K • 46K


TRAILING ARM BUSHINGS

You will need:

- A shop press with a capacity of at least 100 tons
- Adapter set tool — (Hendrickson Part No. 66086-102) – Refer to Special Tools Section of this publication for the tools to remove and install the trailing arm bushings
- Receiving tool — The receiving tool is a shop made tool which completely supports the beam hub being serviced and is tall enough to receive the bushing as it is being pressed in or out, see Special Tools Section of this publication

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

Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts. If flange head bolts and locknuts are not used then hardened structural washers must be used under bolt heads and locknuts.

DISASSEMBLY

1. Remove the trailing arm assembly from the vehicle. Follow the Trailing Arm 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 THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

2. Place the trailing arm assembly in a shop press with the equalizing beam center hub firmly supported on the press bed.
3. Install the trailing arm bushing removal tool (Hendrickson Part No. 66086-102) centered on the trailing arm bushing.
4. Push directly on trailing arm bushing removal tool until the trailing arm bushing is pressed out of the trailing arm bore.

INSPECTION

After removing the trailing arm bushings, thoroughly inspect the trailing arm bushing bores. If damaged from trailing arm bushing removal, replace with a new trailing arm. **DO NOT** re-bush or otherwise use trailing arm that has been damaged.

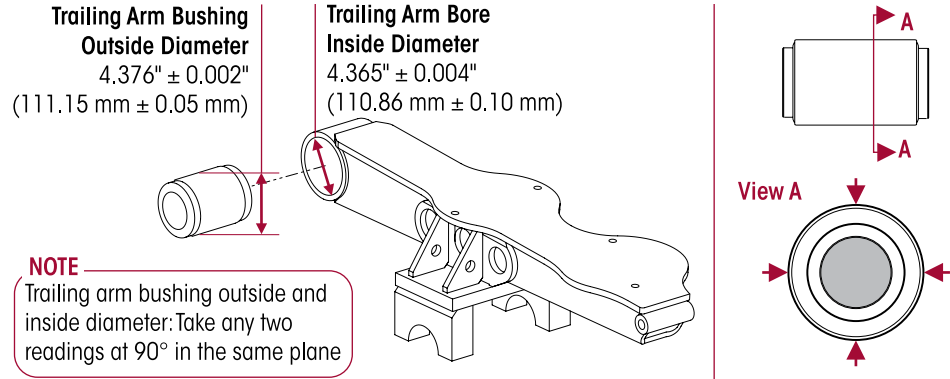
WARNING

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

When installing rubber trailing arm bushings, the following steps will minimize the chance of damaging a new bushing:

1. Clean the bushing bores of the trailing arm with emery cloth, removing any nicks or metal buildup from bushing removal.
2. Measure the inner diameter of the trailing arm's bushing bore and the trailing arm bushing's outer diameter. The specification of the trailing arm's bushing bore on a new AR2 trailing arm:
 - **Inner Diameter** — 4.365" ± 0.004" (110.86 mm ± 0.10 mm)
 - **Outer Diameter** — 4.376" ± 0.002" (111.15 mm ± 0.05 mm)

Each measurement is to be taken as the mean of any two readings at 90° degrees in the same plane, see Figure 8-27. If either component is not within the specified range, replacement is required.

FIGURE 8-27


3. The trailing arm bushing bore may have a more substantial lead chamfer at one end of the bore than the other. Take advantage of the larger chamfer by pressing in the new trailing arm bushing from this end.
4. Support the trailing arm squarely at the bore area to avoid distortion of the trailing arm bushing bore or bending of the trailing arm.
5. Lubricate the outer diameter (O.D.) of the trailing arm bushing and the inner diameter (I.D.) of the trailing arm bushing bore with an NLGI#2 – EP (Extreme Pressure) lithium base grease.
6. Make sure the bushing is square to the trailing arm bore and press the bushing into trailing arm.

ASSEMBLY

1. Place the trailing arm in a shop press on the receiving tool.
2. Support the trailing arm squarely at the bore area to avoid distortion of the trailing arm bushing bore or bending of the trailing arm.
3. Lubricate the trailing arm bushing bore and the trailing arm bushing's outer metal sleeve with an NLGI#2 – EP (Extreme Pressure) lithium base grease.
4. Install the trailing arm bushing installation tool and press in the new trailing arm bushing until the outer metal sleeve is centered in the trailing arm's bushing bore.
5. Install the trailing arm assembly to the vehicle. Follow the trailing arm installation procedure in this section.

EQUALIZING BEAM

SERVICE HINT

It is recommended to remove both equalizing beams and the cross tube as a group even if only one (1) equalizing beam needs service.

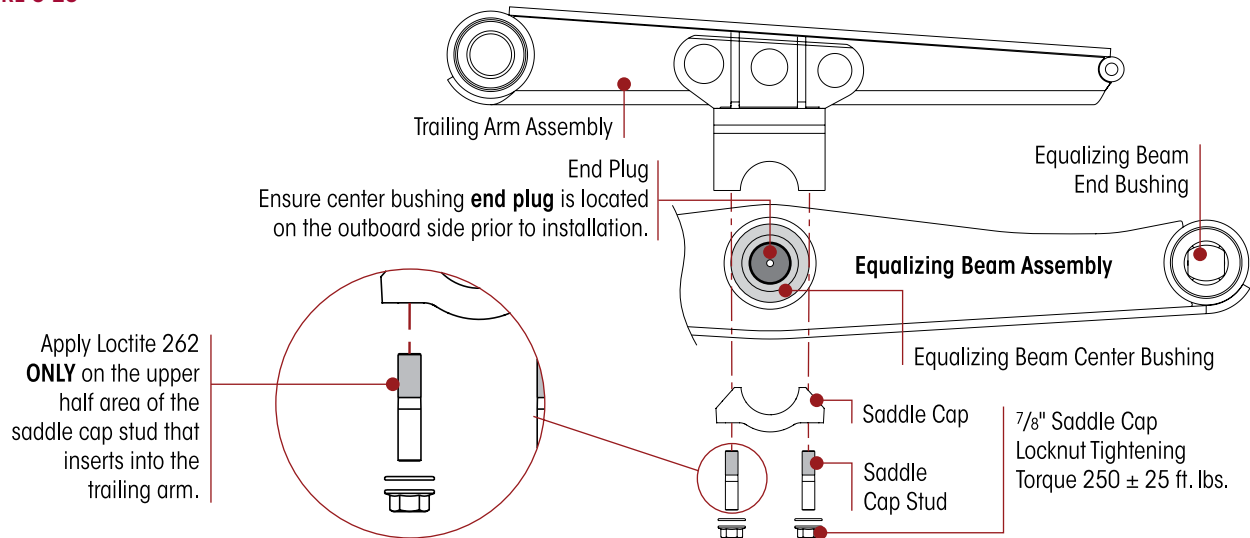
DISASSEMBLY

1. Chock the front wheels of the vehicle.
2. Raise and support the drive axles with safety stands.
3. Remove the tires.
4. Support the pinion angle of the drive axles to prevent axle movement during service.



THE WEIGHT OF THE EQUALIZING BEAM ASSEMBLY IS APPROXIMATELY 155 POUNDS. PRIOR TO REMOVING THE BEAM END FASTENERS FROM THE EQUALIZING BEAM, SUPPORT THE END OF THE EQUALIZING BEAM TO PREVENT FROM DROPPING. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

FIGURE 8-28

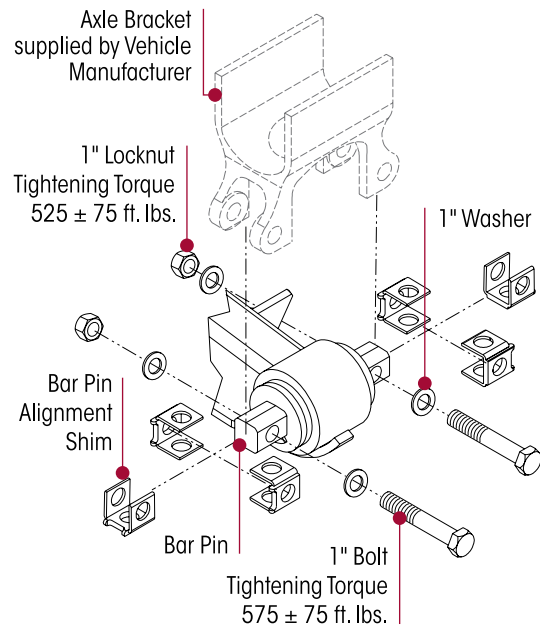


5. Remove the saddle cap fasteners from both the inboard and outboard sides of both equalizing beam's center bushings.
6. Remove the saddle caps, see Figure 8-28.
7. Raise the vehicle's frame just enough to create a 1/2" (13 mm) gap between the saddles and the center bushings. Support the vehicle's frame at this height.
8. Support both equalizing beams with a floor jack.

NOTE

Prior to disassembly of the equalizing beam bar pin fasteners, note the orientation of the bar pin alignment shims, see Figure 8-29. It is required that the bar pin alignment shims are installed in the same orientation and location as removed to preserve the existing vehicle alignment. Improper vehicle alignment can increase tire wear.

FIGURE 8-29



9. Remove and discard beam end attaching fasteners.

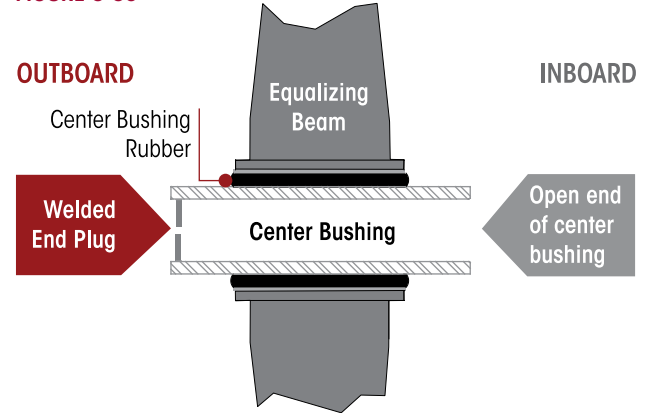
WARNING

PRIOR TO REMOVING BOTH EQUALIZING BEAMS, SUPPORT THE PINION OF EACH DRIVE AXLE. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR ALLOW THE AXLES TO SHIFT MAKING REASSEMBLY MORE DIFFICULT.

10. Slowly lower the floor jacks and remove the equalizing beams from the axle brackets.
11. Slide the equalizing beams off the cross tube and out from under the vehicle.
12. Remove the floor jacks from under the equalizing beams.

ASSEMBLY

1. Position the equalizing beams under the axles and position a floor jack under the center of each of the equalizing beams.
2. Install the cross tube into the center bushing of each equalizing beam.

FIGURE 8-30


3. Ensure the equalizing beam's center bushing end plug is located on the outboard side, see Figure 8-30.
4. The center bushing must have the end plug welded into position when the cross tube is placed into position.

SERVICE HINT

Increasing or decreasing the pinion angle may help align the axle bracket and the equalizing beam end bushings.

5. Using the floor jacks, slowly raise the equalizing beams and cross tube as an assembly into the axle brackets. Ensure that each equalizing beam end bushings correctly engages the axle brackets.

NOTE

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

SERVICE HINT

Installing the front bar pin bushings (if equipped) prior to the rear bar pin bushings will ease in the installation of the equalizing beam.

CAUTION

THE WEIGHT OF THE EQUALIZING BEAM ASSEMBLY IS APPROXIMATELY 155 POUNDS (70 KG). CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

6. If the suspension is equipped with:
 - **Bar Pin Style End Connection** — Refer to Bar Pin Installation in this section
 - **Adapter Style End Connection** — Refer to Hendrickson Publication 17730-190 or contact Hendrickson Tech Services for more information
7. Mount the equalizing beam into the **FRONT** drive axle brackets. **DO NOT** install the alignment shims at this time.
8. Slide four (4) 3/4" bolts through both front axle brackets and the bar pin holes to temporarily support the equalizing beams.
9. Lift the **REAR** of the beam until the front bar pin flats are parallel to the front drive axle bracket legs, see Figure 8-31.

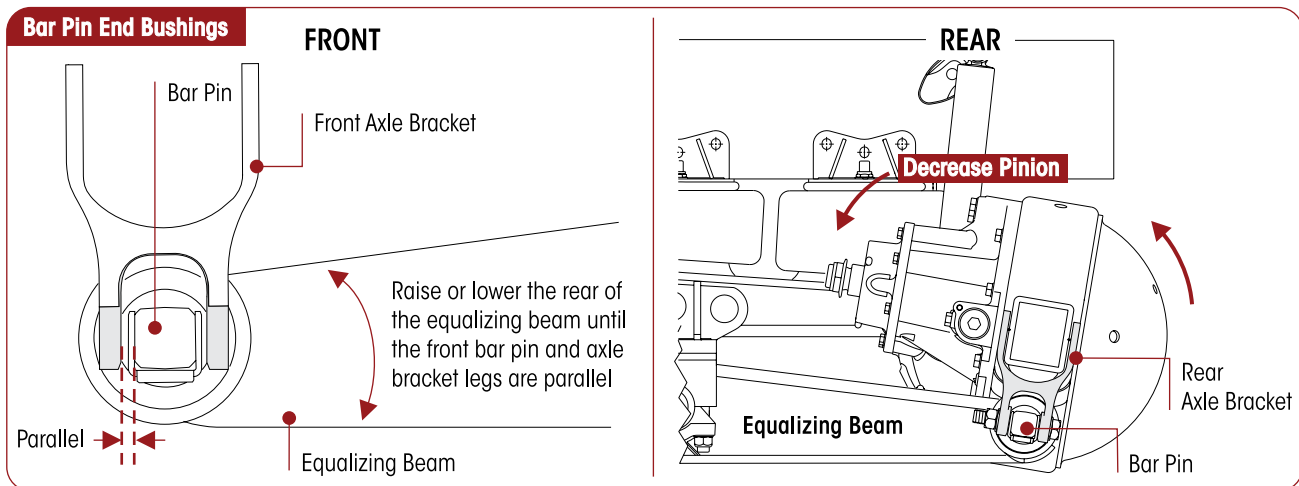
WARNING

A BAR PIN SHIM MUST BE INSTALLED AT EACH BOLT LOCATION. THE SAME PART NUMBER SHIM IN THE SAME ORIENTATION MUST BE USED AT BOTH BOLT LOCATIONS ON ANY ONE (1) END BUSHING. DO NOT INSTALL OR STACK MORE THAN ONE (1) SHIM AT EACH BOLT LOCATION. USE GENUINE HENDRICKSON BAR PIN SHIMS, DO NOT USE STANDARD WASHERS. FAILURE TO FOLLOW THESE WARNINGS MAY RESULT IN IMPROPER VEHICLE ALIGNMENT, FRACTURE OF THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

NOTE

Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts. If flange head bolts and locknuts are not used, then hardened structural washers must be used under bolt heads and locknuts.

FIGURE 8-31


WARNING

THE BAR PIN ALIGNMENT SHIM (PART NO. 50130-000) MUST BE INSTALLED WITH THE FOLDED EDGE FACING AWAY FROM THE BUSHING, SEE FIGURE 8-32. FAILURE TO DO SO MAY RESULT IN SHIM DAMAGE, IMPROPER ALIGNMENT, DAMAGE OR FRACTURE OF THE AXLE BRACKET OR BAR PIN WHICH COULD RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

10. Partially install the **FRONT INBOARD** bar pin alignment shim and verify that the shim is in the same orientation as prior to disassembly, see Figure 8-31.

11. To complete installation of the alignment shim, remove the temporary $\frac{3}{4}$ " bolt from the inboard bar pin hole and complete installation of the inboard alignment shim.

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.

12. Install the new 1" inboard bar pin fasteners. **DO NOT** tighten at this time.

13. Repeat Steps 8 through 10 for the **FRONT OUTBOARD** alignment shim.

14. Chock the **REAR** drive axle wheels to prevent movement while installing the rear bar pin into the axle bracket.

15. Support the current axle position of the rear axle pinion with a jack to assist with the installation of the rear bar pin.

NOTE

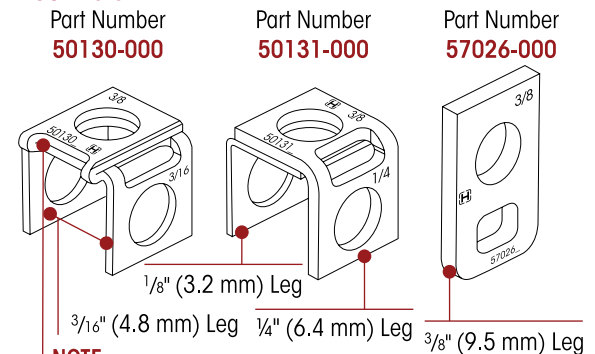
Prior to disassembly of the longitudinal torque rod, note the quantity and orientation of the longitudinal torque rod shims. It is required that the longitudinal torque rod shims are installed in the same orientation and location as removed to preserve the existing pinion angle.

16. Disconnect the **REAR** longitudinal torque rod from the **REAR** axle bracket, see vehicle manufacturer's specifications.

17. Release the rear parking brakes, this will allow the rear axle to rotate without rotating the tires.

18. Lower the rear drive pinion until the rear drive axle bracket legs are parallel to the rear bar pin flats, see Figure 8-31.

FIGURE 8-32



NOTE
Folded edge in 50130-000 shim must be positioned away from bar pin confinement washer

19. Mount the equalizing beam into the **REAR** drive axle brackets. **DO NOT** install the bar pin alignment shims at this time.
20. Slide a 3/4" bolt through all rear axle bracket and the bar pin holes to temporarily support the beams.
21. Partially install the **REAR INBOARD** bar pin alignment shim and verify that the shim is in the same orientation as prior to disassembly, see Figure 8-29.
22. To complete installation of the alignment shim, remove the temporary 3/4" bolt from the inboard bar pin hole and complete installation of the inboard alignment shim.
23. Install new 1" inboard bar pin fasteners. **DO NOT** tighten at this time.
24. Repeat steps 21 through 23 for the **REAR OUTBOARD** bar pin alignment shim.

NOTE

Prior to assembly of the longitudinal torque rod, note the quantity and orientation of the longitudinal torque rod shims. It is required that the longitudinal torque rod shims are installed in the same orientation and location as removed to preserve the existing alignment.

25. Install the longitudinal torque rod and any longitudinal torque rod shims in the same orientation as prior to disassembly. Tighten the fasteners to the vehicle manufacturer's specifications.
26. Re-apply rear parking brake.

NOTE

Prior to assembly of the rear bar pin end bushing fasteners, ensure that all the bar pin shims are installed in the same orientation as prior to disassembly.

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.

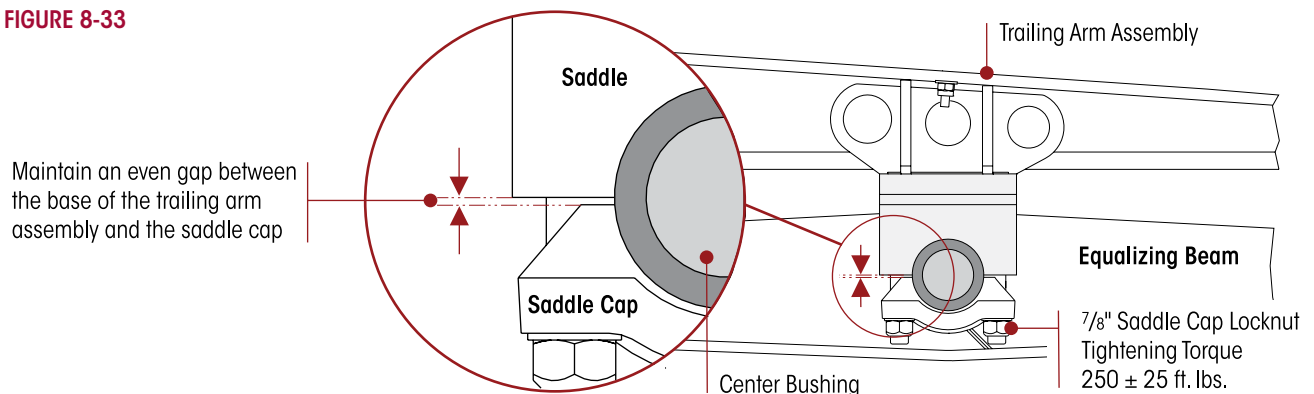
27. Tighten the bar pin end fasteners to:
 - At the **locknuts** tighten to 525 ± 75 foot pounds torque
 - At the **bolt head** tighten to 575 ± 75 foot pounds torque

NOTE

Hendrickson recommends the use of Grade 8 bolts and Grade C locknuts. If flange head bolts and locknuts are not used, then hardened structural washers must be used under bolt heads and locknuts.

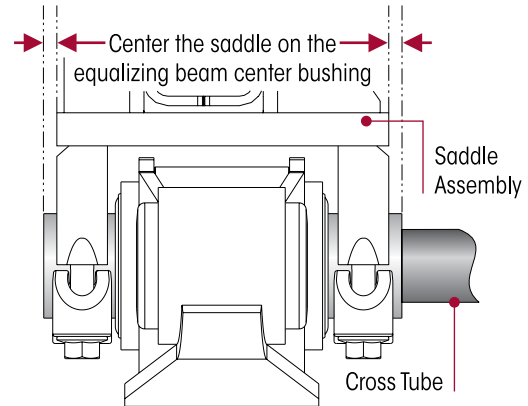
CAUTION

THE TRAILING ARM ASSEMBLIES ARE ATTACHED TO THE CENTER BUSHINGS OF EACH EQUALIZING BEAM WITH TWO (2) SADDLE CAPS. EACH SADDLE CAP USES TWO (2) STUDS TO CLAMP THE CENTER BUSHING INNER METAL TO THE SADDLE. THE SADDLE CAPS MUST BE INSTALLED AND TIGHTEN SO THAT THERE IS AN EVEN GAP BETWEEN THE SADDLE CAPS AND THE BASE OF THE TRAILING ARM ASSEMBLY AS SHOWN IN FIGURE 8-33. IF THEY ARE NOT INSTALLED PROPERLY, THE TRAILING ARM ASSEMBLIES COULD BECOME DEFORMED, RESULTING IN BENT BOLTS OR ASSEMBLY DAMAGED.

FIGURE 8-33


28. Remove the frame supports and lower the frame of the vehicle being careful to engage the trailing arm assembly on the equalizing beam's center bushings.
29. Center the trailing arm assembly on the equalizing beam center bushing, see Figure 8-34.
30. Apply Loctite 262 **ONLY** on the upper half area of the saddle cap stud that inserts into the trailing arm.
31. Tighten the **saddle cap fasteners** evenly in 50 foot pounds increments in the proper sequence for uniform bolt tension as shown in Figure 8-35 until the final torque value of $\boxed{250 \pm 25}$ foot pounds torque is achieved. **DO NOT EXCEED** specified torque on saddle cap fasteners. Maintain an even gap between the trailing arm assembly and saddle cap, see Figure 8-33.

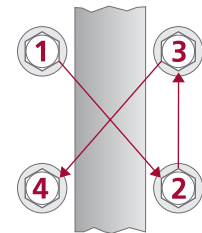
FIGURE 8-34

**NOTE**

Tightening the saddle cap stud fasteners properly will help prevent wear of mating components, beam center bushing, trailing arm assembly, and saddle cap.

32. Install the tires.
33. Remove the supports from the drive axles and lower the vehicle onto the ground.
34. Remove the wheel chocks.

FIGURE 8-35

**CENTER BUSHINGS****You will need:**

- A shop press with a capacity of at least 100 tons
- Center bushing tool — (Hendrickson Part No. 66086-100) – Refer to Special Tools Section of this publication for the tools to remove and install the rubber center bushings
- Receiving tool — The receiving tool is a shop made tool which completely supports the beam hub being serviced and is tall enough to receive the bushing as it is being pressed in or out, refer to the Special Tools Section of this publication

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.

DISASSEMBLY**NOTE**

Whenever an equalizing beam is removed for repair, or inspection of the equalizing beam end connection reveals movement, measure the distance between the axle bracket legs for correct width. Refer to Axle Bracket in Preventive Maintenance Section of this publication for measurement location and proper dimensions. An axle bracket outside of the proper dimensions must be repaired or replaced. Consult the vehicle manufacturer for inspection, component repair and replacement instructions.

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 THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

- Place the equalizing beam assembly in a shop press with the center hub firmly supported on the press bed.

NOTE

Before attempting to remove the beam center bushings, inspect the inside face of each equalizing beam center hub. If the outer metal of the center bushing is worn, the edge may have mushroomed over the face of the beam hub. This material must be removed with a chisel or disc sander before tooling adapters can be positioned for bushing removal.

- Install the center bushing removal tool centered on the center bushing.
- Push directly on center bushing removal tool until the center bushing is pressed out of the equalizing beam bore.

INSPECTION

After removing the center bushings, thoroughly inspect the beam center bushing bore. If damaged from center bushing removal, replace with a new equalizing beam. **DO NOT** re-bush or otherwise 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.

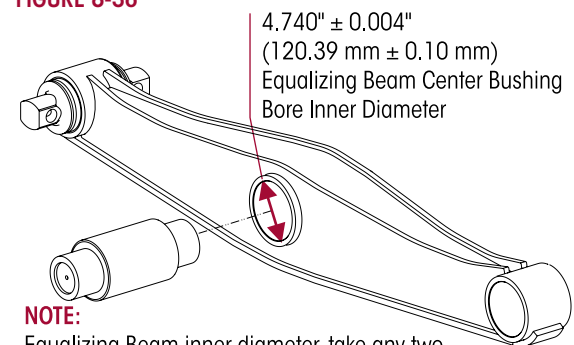
- Measure the inner diameter of the equalizing beam's center bushing bore and the center bushing's outer diameter. The specification of the equalizing beam's center bore on a new AR2 equalizing beam:

- Inner Diameter** — 4.740" ± 0.004" (120.39 mm ± 0.10 mm), see Figure 8-36
- Each measurement is to be taken as the average of any two readings at 90° degrees in the same plane, see Figure 8-36. If component is not within the specified range, replacement is required

ASSEMBLY

When installing rubber center bushings, the following steps will minimize the chance of damaging a new bushing:

- Clean the bores of the equalizing beams with emery cloth, removing any nicks or metal buildup from bushing removal.
- 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 center bushing from this end.
- Place the equalizing beam in a shop press on the receiving tool.
- Support the beam squarely at the bore area to avoid distortion of the beam bore or bending of the beam.
- Lubricate the outer diameter (O.D.) of the center bushing and the inner diameter (I.D.) of the beam bore with NLGI#2 – EP (Extreme Pressure) lithium base grease.

FIGURE 8-36

NOTE:

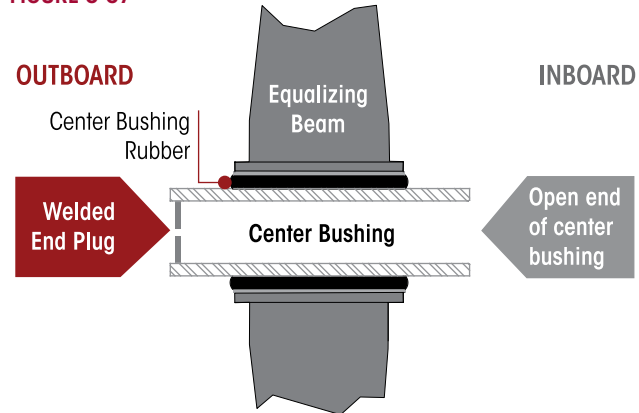
Equalizing Beam inner diameter, take any two readings at 90° in the same plane

6. Ensure the bushing is square to the equalizing beam bore.

7. Install the center bushing installation tool and press in the new center bushing until the outer metal sleeve is centered in the equalizing beam's bore, see Figure 8-37.

8. Install the equalizing beam onto the vehicle, refer to the Equalizing Beam Assembly procedure in this section.

FIGURE 8-37



BAR PIN END BUSHINGS

WARNING

WHEN REMOVING AND INSTALLING 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 EQUALIZING BEAM BORES. 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.

NOTE

Hendrickson bar pin service kits containing alignment shims, (Kit No. 34013-088L) or (Rotating Bar Pin Bushing Kit No. 34013-188) contain all the components required for one (1) equalizing beam end, see Parts List Section of this publication.

You will need:

- A shop press with a capacity of at least 100 tons
- Bar pin style tool — Refer to Special Tools Section of this publication
 - Installation tool — (Hendrickson Part No. 66086-103)
 - Removal tools — (Hendrickson Part No. 66086-104 and 66086-105)

NOTE

The receiving tool completely supports the equalizing beam hub being serviced and is tall enough to receive the bushing as it is being pressed in or out.

- Shop made receiving tool — Refer to the Special Tools Section of this publication

REMOVAL

NOTE

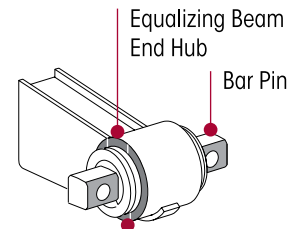
Whenever an equalizing beam is removed for repair, or inspection of the equalizing beam end connection reveals movement, measure the distance between the axle bracket legs for correct width. Refer to Axle Bracket in Preventive Maintenance Section of this publication for measurement location and proper dimensions. An axle bracket outside of the proper dimensions must be repaired or replaced. Consult the vehicle manufacturer for inspection, component repair and replacement instructions.

1. Remove equalizing beam assembly from vehicle as detailed in the Equalizing Beam Disassembly instructions in this section.
2. Place the equalizing beam in the shop press with the beam end hub squarely supported on the press bed.

NOTE

If replacing the bar pin with a rotating bar pin end bushing, it is not necessary to mark the orientation of the bar pin flats.

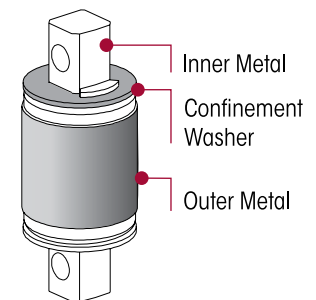
3. Prior to removal, mark the orientation of the bar pin flats, see Figure 8-38. Mark orientation the equalizing beam with a paint stick.
4. Press on the end bushing inner metal, see Figure 8-39, of the end bushing until the inner metal is flush with the top of the beam end hub. This will dislodge the confinement washer and move the bushing rubber away from the outer metal of the bushing so the removal tool can be installed.
5. Center the bushing push out tool directly on the bushing's outer metal and press the bushing out of the equalizing beam end hub.
6. After removing the bar pin end bushings, thoroughly inspect each end hub bore.

FIGURE 8-38

NOTE

Prior to removal, mark the orientation of the bar pin flats with a paint stick on the equalizing beam end hub.

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** re-bush or otherwise use an equalizing beam that has been damaged.

FIGURE 8-39

WARNING

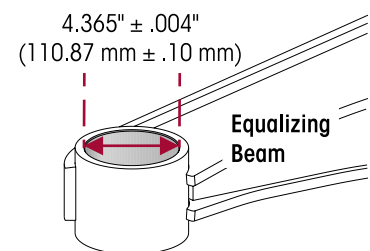
FAILURE TO REPLACE AN EQUALIZING BEAM THAT HAS BEEN DAMAGED FROM BUSHING REMOVAL CAN RESULT IN THE FAILURE OF THAT BEAM, LEADING TO ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

When installing bar pin end bushings, the following steps will minimize the chance of damaging a new bushing:

7. Clean the end hub bores with emery cloth or hone, removing any nicks or metal buildup from bushing removal.
8. Measure the equalizing beam end hub bore inner diameter and the bushing outer diameter. The Hendrickson specification for the equalizing beam end hub bore diameter of the equalizing beam is 4.365" ± .004", (110.87 mm ± .10 mm) see Figure 8-40. If components are **NOT** within the specified range, replacement is required.

FIGURE 8-40

**Equalizing Beam
End Hub Bore Inner Diameter**


CAUTION

ALWAYS USE THE BUSHING'S OUTER METAL FOR PRESSING OPERATIONS, UNLESS OTHERWISE INSTRUCTED. PRESSING ON THE BUSHINGS INNER METAL MAY DAMAGE THE BUSHING REQUIRING BUSHING REPLACEMENT.

INSTALLATION

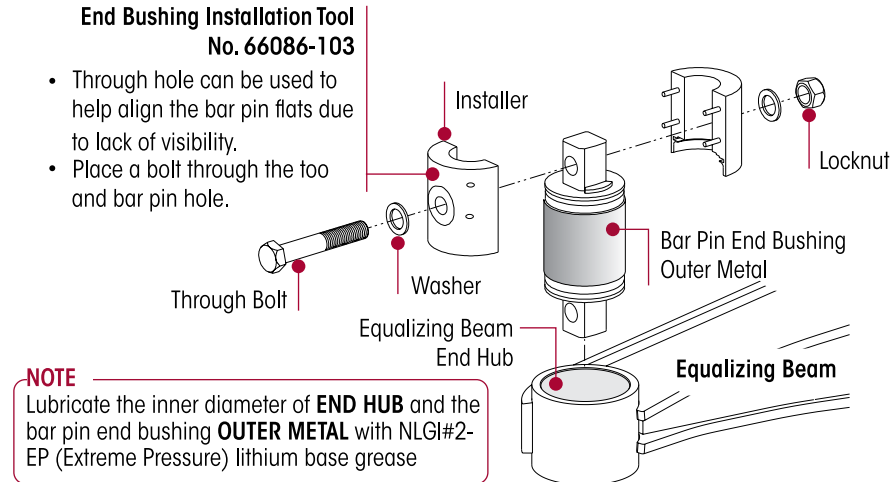
1. Place the equalizing beam in a shop press with the end hub, see Figure 8-41, squarely supported on the press bed or receiving tool, see Special Tools Section of this publication.

SERVICE HINT

The end hub bore may have a more substantial leading chamfer at one end of the bore than the other. Take advantage of the larger chamfer by pressing in the new bushing from this end.

- Install the end bushing installation tool (Hendrickson Part No. 66086-103 – refer to Special Tools Section of this publication) on the new end bushing as shown in Figure 8-41. Tighten the through bolt until the two (2) halves of the tool touch. The installation tool compresses the rubber between the inner and outer metal of the bushing to allow press force to be transmitted only to the outer metal of the bushing.

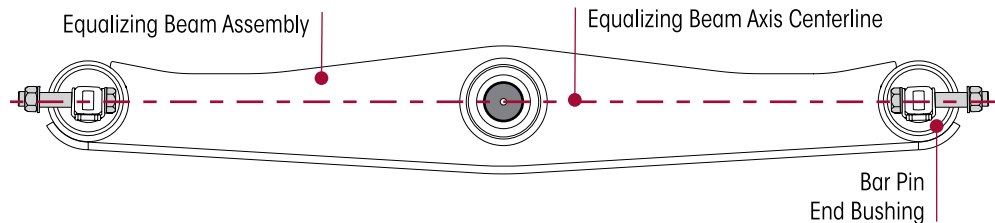
FIGURE 8-41



- Lubricate the equalizing beam end hub inner diameter **AND** the bar pin end bushing's outer metal with a heavy layer of NLGI #2 – EP (Extreme Pressure) lithium base grease, see Figure 8-41.
- Position the equalizing beam end bushing and installation tool on the end hub. Verify the bolt holes in the end bushing are in line with the beam axis, see Figure 8-42.

FIGURE 8-42

NOTE
Press in bar pin end bushing into the end hub bore and ensure that the bar pin holes follow the same orientation as the centerline of the equalizing beam axis.

**NOTE**

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

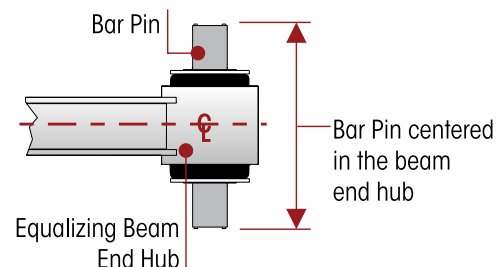
- Verify the end bushing's outer metal is square with the end hub. Equalizing beam and end bushing damage will result if the bushings are pressed in at an angle.



CARE MUST BE TAKEN DURING THE INSTALLATION OF THE BUSHING. DO NOT PUSH ON THE INNER METAL OF THE BUSHING, DOING SO WILL CAUSE DAMAGE TO THE BUSHING AND VOID WARRANTY.

FIGURE 8-43

- Install the end bushing into the end hub by pressing on the installation tool until the installation tool contacts the end hub. This will center the end bushing in the end hub, see Figure 8-43.
- Install the equalizing beam assembly into vehicle as detailed in Equalizing Beam Assembly instructions in this section.



ADAPTER STYLE END BUSHINGS

You will need:

- A shop press with a capacity of at least 100 tons
- Air hammer / chisel / Bent chisel, see Figure 8-44
- Hendrickson Part No. 66086-102 – Refer to the Special Tools Section of this publication

FIGURE 8-44



REMOVAL

WARNING

THE ADAPTER REMOVAL PROCESS CAN CAUSE DAMAGE. REUSE OF DAMAGED OR WORN ADAPTERS COULD RESULT IN A COMPONENT FAILURE LEADING TO ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY.

SERVICE HINT

It is recommended that a penetrating oil be applied to all beam end connections prior to removal to aide in disassembly.

1. Chock the wheels of the steer axle.
2. Raise and support the drive axles with safety stands.
3. Remove the tires.

WARNING

PRIOR TO REMOVING BOTH EQUALIZING BEAMS, SUPPORT THE PINION OF EACH DRIVE AXLE. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR ALLOW THE AXLES TO SHIFT MAKING REASSEMBLY MORE DIFFICULT.

4. Support the pinion angle of the drive axles to prevent axle movement during service.
5. Remove and discard the saddle cap fasteners from both inboard and outboard sides of the equalizing beam.
6. Remove the saddle caps, refer to Saddle Cap Assembly in this section.
7. Raise the vehicle's frame just enough to create a ½" (13 mm) gap between the saddles and the center bushings. Support the vehicle's frame at this height.

CAUTION

THE WEIGHT OF THE EQUALIZING BEAM ASSEMBLY IS APPROXIMATELY 155 POUNDS. PRIOR TO REMOVING THE BEAM END FASTENERS FROM THE EQUALIZING BEAM, SUPPORT THE END OF THE EQUALIZING BEAM TO PREVENT FROM DROPPING. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

8. Support both equalizing beams with floor jacks.
9. Remove the beam end bolt or shaft (as equipped), see Figure 8-45.

NOTE

Due to the process necessary to remove the beam end adapters, the adapter can be subjected to damage. **DO NOT** reuse worn or damaged adapters.

10. The beam end adapters have two chisel recesses located in their flanges as shown in Figure 8-46.
11. Locate the recess for the chisel, rotate the adapter if necessary. Place the air hammer / chisel in the recess to rotate the adapter collar.
12. If the beam end adapter does not turn, use a hammer to rap the outside of the axle bracket legs around the adapter area and repeat air hammer chisel procedure until removed.
13. Remove the beam end adapter from the other equalizing beam ends.

FIGURE 8-45

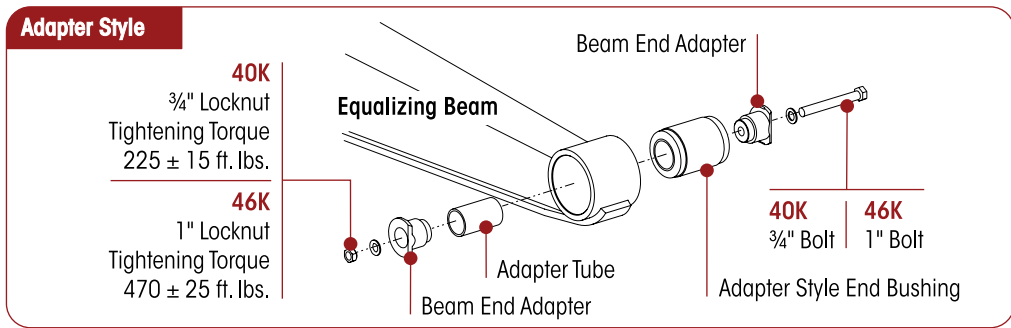
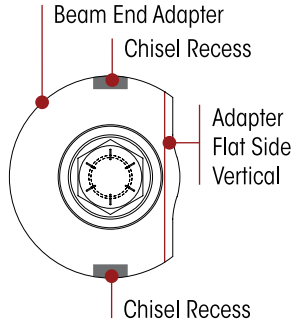
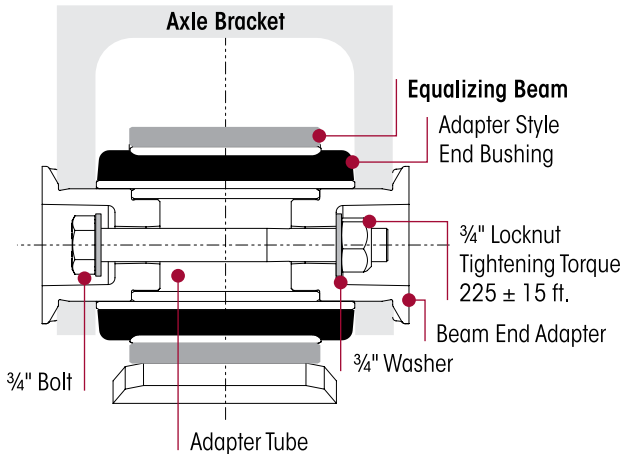


FIGURE 8-46



14. Slowly lower the floor jacks and remove / pry the equalizing beams from the axle brackets.
15. Remove the end bushing adapter tube (if equipped), see Figure 8-47.

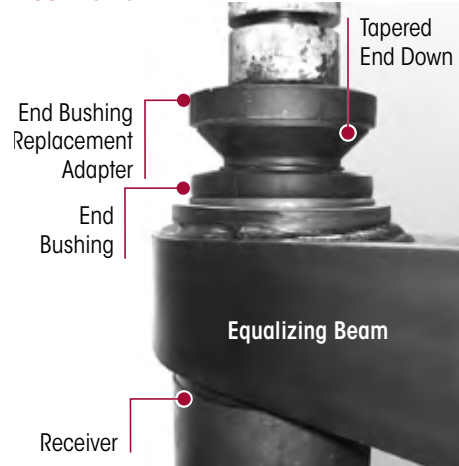
FIGURE 8-47



NOTE
Adapters must not be used without adapter tube

16. Remove the floor jacks from under the equalizing beams.
17. Position the equalizing beam in the shop press and align the end bushing removal / replacement adapter tool with the **tapered end down** on top of the rubber end bushing, see Figure 8-48.

FIGURE 8-48



WARNING

CHECK TO ENSURE PROPER ALIGNMENT OF TOOLING ADAPTERS WITH EQUALIZING BEAM COMPONENTS BEFORE APPLYING FULL HYDRAULIC PRESSURE WITH A SHOP PRESS.

18. Apply hydraulic force and remove the old bushing.
19. Inspect the axle bracket legs per the Beam End Axle Brackets, Physical Inspection for Adapter Style bushings in the Preventive Maintenance Section of this publication.

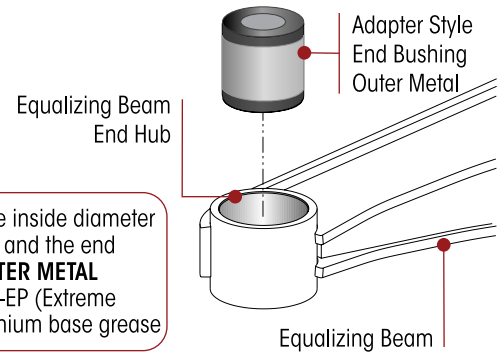
INSTALLATION

1. Clean the equalizing beam bushing bore with a cylinder ball hone or emery paper of any debris.
2. Lubricate the equalizing beam bore and the equalizing beam center bushing outer metal sleeve with an NLGI#2 – EP (Extreme Pressure) grease, see Figure 8-49.

- Position the end bushing removal / replacement adapter with the **tapered end up** onto the clamp, see Figure 8-50.
- Use a wrench to tighten the installing clamp tool on the rubber bushing and the end bushing replacement adapter as shown in Figure 8-50.

FIGURE 8-49
NOTE

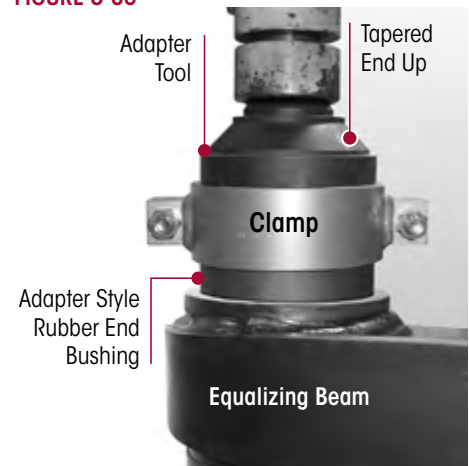
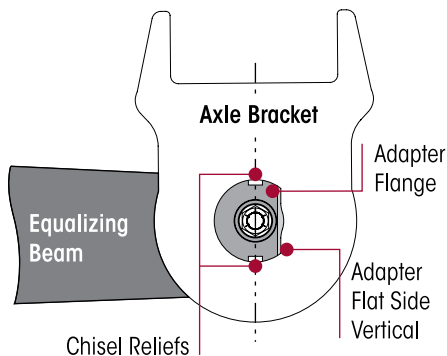
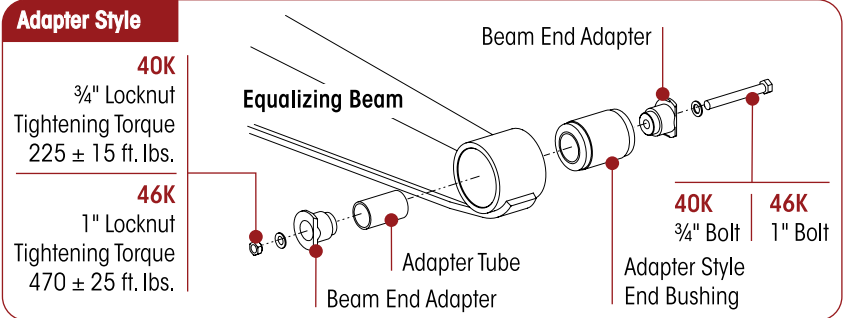
Lubricate the inside diameter of **END HUB** and the end bushing **OUTER METAL** with NLGI#2-EP (Extreme Pressure) lithium base grease


WARNING

CHECK TO ENSURE PROPER ALIGNMENT OF TOOLING ADAPTERS WITH EQUALIZING BEAM COMPONENTS BEFORE APPLYING FULL HYDRAULIC PRESSURE WITH A SHOP PRESS.

FIGURE 8-50

- Apply hydraulic force and press the new bushing into place. The bushing will be completely seated when the clamp makes contact with the beam face.
- Using the floor jacks, slowly raise both equalizing beams and cross tube as an assembly into the axle brackets. Ensure that each equalizing beam end bushing correctly engages the axle bracket.
- Install one (1) adapter through the axle bracket leg at the wheel side, into the beam end bushing.


FIGURE 8-51

FIGURE 8-52


- Install the other adapter through the axle bracket leg at the axle side, taking advantage of the cut-off flange on the adapter to clear the axle.
- Rotate the adapters so that the adapter cut-off flats are vertical as shown in Figure 8-51.
- Install the end shaft and slotted nuts.
- Place the axles in their normal operating positions before the slotted nuts are torqued to specifications.

WARNING

IF THE TIGHTENING TORQUES RECOMMENDED BELOW ARE NOT PROPERLY MAINTAINED, THE METAL SURFACES OF THE AXLE BRACKET LEGS, HOLES, ADAPTERS AND RUBBER BUSHING INNER METALS CAN EXPERIENCE EXCESSIVE WEAR AND / OR FAILURE. THIS CAN CAUSE SEPARATION OF COMPONENTS AND ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR PERSONAL INJURY.

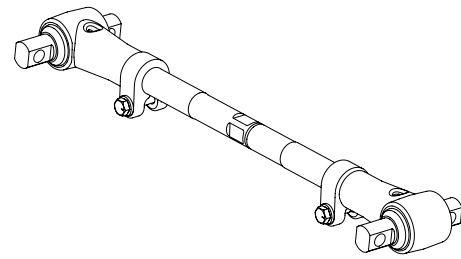
12. Tighten the locknuts until final torque value is achieved, **DO NOT EXCEED** specified torque value, see Figure 8-52.
 - **40K** — 225 ± 15 foot pounds torque
 - **46K** — 470 ± 25 foot pounds torque
13. Remove the frame supports and lower the saddle onto the center bushings.
14. Install the saddle caps, refer to Saddle Cap Assembly in this section.
15. Install the tires.
16. Remove the supports from the drive axles and lower the vehicle onto the ground.
17. Remove the wheel chocks.

3-PIECE ADJUSTABLE LONGITUDINAL TORQUE RODS (Manitowoc)



AR2 SUSPENSIONS INCORPORATE TORQUE RODS FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL, THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, ADVERSE VEHICLE HANDLING, POSSIBLE TIRE CONTACT WITH THE FRAME, PREMATURE COMPONENT DAMAGE, OR SEVERE PERSONAL INJURY.

FIGURE 8-53



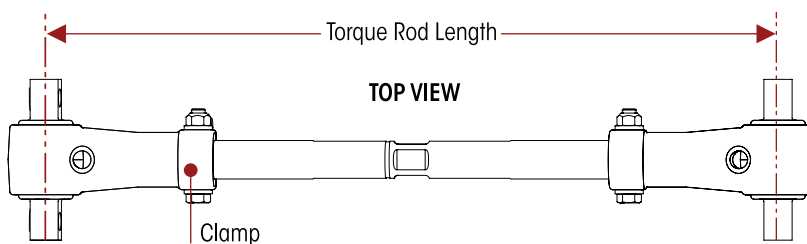
DISASSEMBLY

NOTE

Prior to disconnecting the longitudinal torque rods, check and record the pinion angle. This will help facilitate the setting of the axle pinion angle during assembly.

1. Chock the front wheels of the vehicle.
2. Support the frame of the vehicle at ride height.
3. Prior to disassembly measure the length of the torque rod center to center and document to ensure the replacement torque rod is adjusted to the required length, see Figure 8-54.

FIGURE 8-54



4. Remove and discard the torque rod mounting fasteners.

SERVICE HINT

To remove all the load from the longitudinal torque rods, raise or lower the pinion as needed. This will ease in longitudinal torque rod removal.

5. Support the pinion on the axle being serviced.
6. To ease in torque rod removal, the torque rod may be shortened by loosening the ½" clamp bolts and rotating the center of the torque rod.
7. Remove the longitudinal torque rod from the vehicle.

INSPECTION

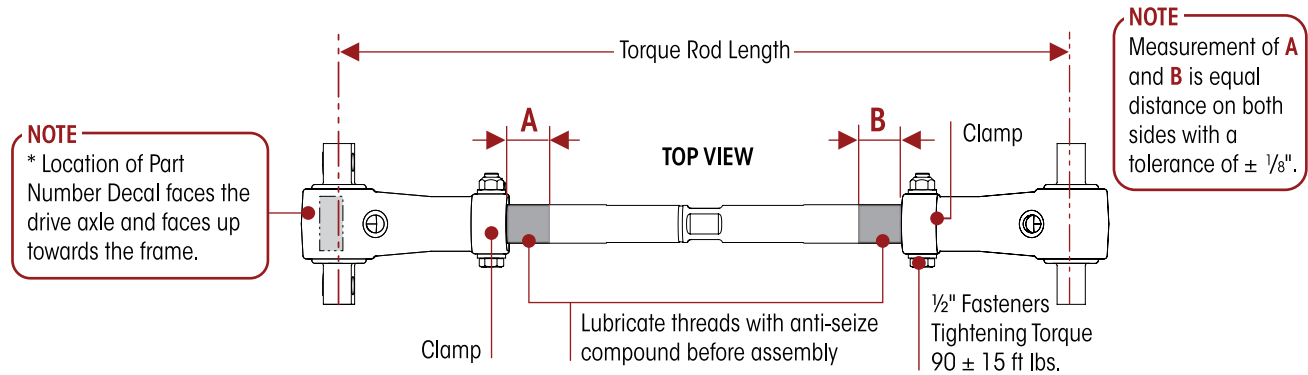
- Inspect the torque rod mating components for any wear or damage, replace as necessary

ASSEMBLY

1. Prior to installation, apply lubricate the 3-piece torque rod threads with anti-sieze compound, see Figure 8-55.

SERVICE HINT

The part number decal must face towards the (front or rear) drive axle and face up to the bottom of the frame, see Figure 8-55.

FIGURE 8-55


2. Install the 3-piece torque rod in the proper orientation and ensure the clocking of the bar pins are in positioned in the following orientation with the clamp group fasteners below, see Figures 8-56 and 8-57.
 - **Front Torque Rod** — 11° degrees at the front axle and 3° degrees at the mounting gusset
 - **Rear Torque Rod** — 3° degrees to the mounting gusset and -5° degrees to the rear axle
3. After the correct orientation is achieved, Install longitudinal torque rods.
4. Loosen the 1/2" clamp bolts and rotate the center rod to increase or decrease the length of the 3-piece torque rod. The measurement of **A** and **B** (see Figure 8-55) is equal distance on both sides and the thread tolerance is $\pm 1/8"$.
5. Once the correct measurement of the longitudinal rod is achieved, hand tighten the fasteners, **DO NOT** tighten to torque at this time.

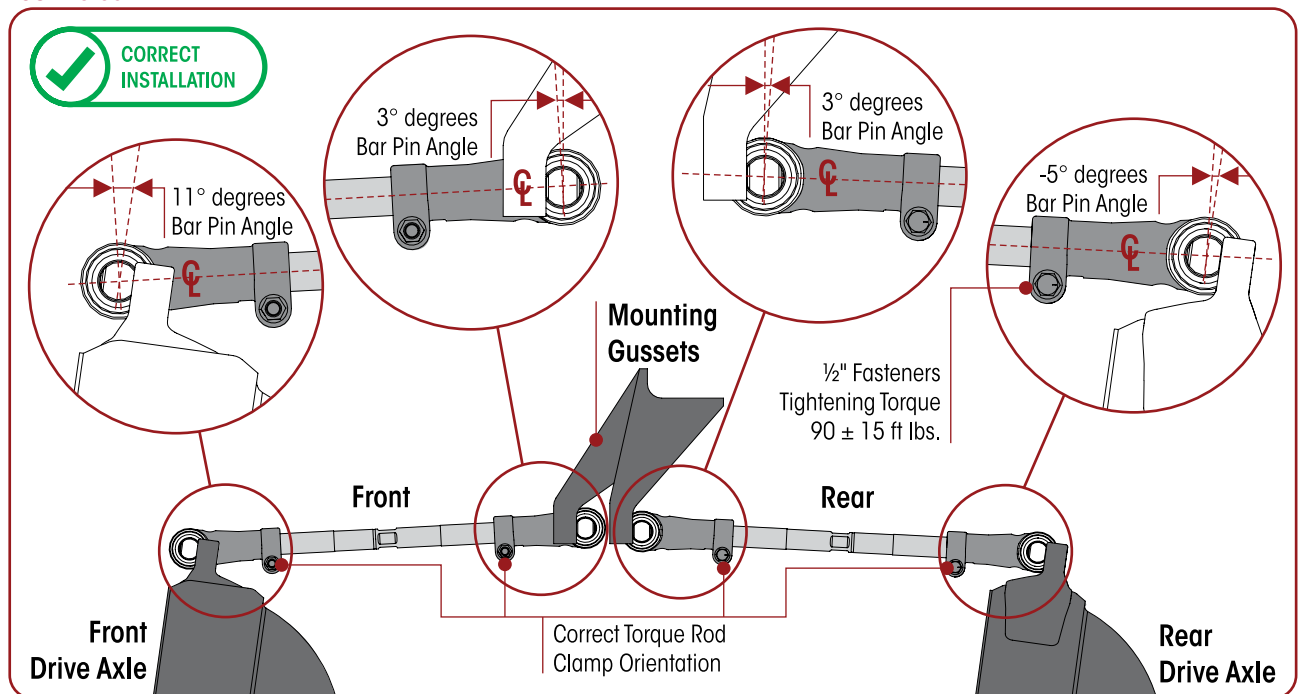
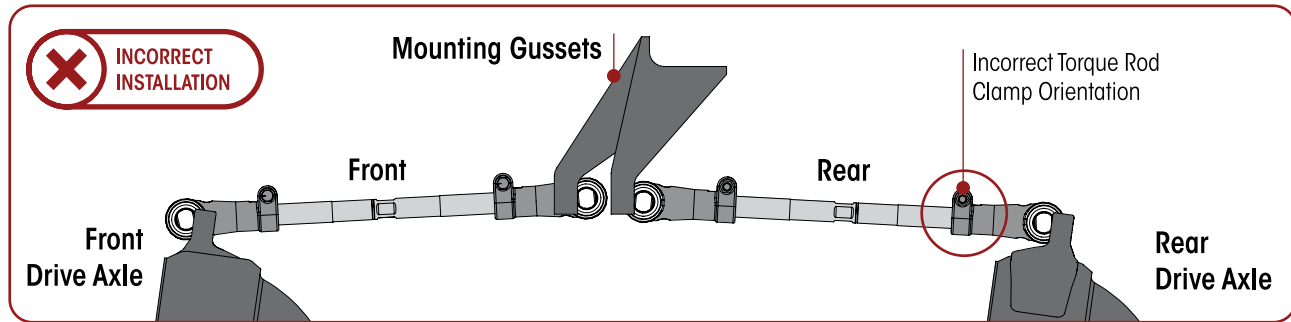
FIGURE 8-56


FIGURE 8-57



6. Install the new longitudinal torque rod mounting fasteners.
7. Prior to tightening torque rod mounting fasteners, ensure that the vehicle is at the proper ride height, see Alignment and Adjustment section in this publication.

NOTE

Hendrickson recommends the use of Grade 8 bolts and grade C locknuts. If flange head bolts and locknuts are not used, then hardened structural washers must be used under bolt heads and locknuts.

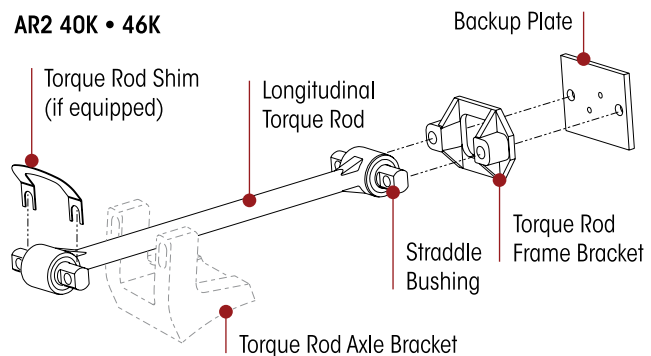
8. Tighten all longitudinal torque rod mounting fasteners to vehicle manufacturer's torque specifications.
9. Tighten the torque rod clamp fasteners to 90 ± 15 foot pounds torque, see Figure 8-56.
10. Verify proper pinion angle and correct as necessary. To adjust, rotate the torque rod and ensure the measurement of **A** and **B** have an equal distance, see Figure 8-55. Contact the vehicle manufacturer for proper pinion angle specifications.
11. Remove the wheel chocks from the vehicle.

ONE PIECE LONGITUDINAL TORQUE RODS (40K • 46K)

WARNING

AR2 SUSPENSIONS INCORPORATE TORQUE RODS FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL, THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, ADVERSE VEHICLE HANDLING, POSSIBLE TIRE CONTACT WITH THE FRAME, PREMATURE COMPONENT DAMAGE, OR SEVERE PERSONAL INJURY.

FIGURE 8-58

AR2 40K • 46K**DISASSEMBLY****NOTE**

Prior to disconnecting the longitudinal torque rods, check and record the pinion angle. This will help facilitate the setting of the axle pinion angle during assembly.

1. Chock the front wheels of the vehicle.
2. Support the frame of the vehicle at ride height.

NOTE

Prior to disassembly of the longitudinal torque rods, note the quantity and orientation of the longitudinal torque rod shims. It is required that the longitudinal torque rod shims are installed in the same orientation and location as removed to preserve the existing alignment.

SERVICE HINT

To remove all the load from the longitudinal torque rods, raise or lower the pinion as needed. This will ease in longitudinal torque rod removal.

3. Support the pinion on the axle being serviced.
4. Remove and discard the torque rod mounting fasteners.
5. Remove shims (if equipped), see Figure 8-58.
6. Remove the longitudinal torque rod from the vehicle.

INSPECTION

- Inspect the torque rod mating components for any wear or damage, replace as necessary

ASSEMBLY

1. Install longitudinal torque rods.
2. Install new fasteners and any shims (if equipped).
3. Prior to tightening, ensure that the vehicle is at the proper ride height.

NOTE

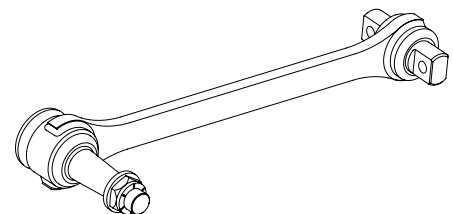
Hendrickson recommends the use of Grade 8 bolts and grade C locknuts. If flange head bolts and locknuts are not used, then hardened structural washers must be used under bolt heads and locknuts.

4. Tighten all fasteners to vehicle manufacturer's torque specifications.
5. Verify proper pinion angle and correct with drop in shims between the torque rod bar pin and the cross member or torque rod axle bracket depending on the direction of adjustment needed. Contact the vehicle manufacturer for proper pinion angle specifications.
6. Remove the wheel chocks from the vehicle.

TRANSVERSE TORQUE RODS


AR2 SUSPENSIONS INCORPORATE TRANSVERSE RODS FOR VEHICLE STABILITY. IF THESE COMPONENTS ARE DISCONNECTED OR ARE NON-FUNCTIONAL, THE VEHICLE SHOULD NOT BE OPERATED. FAILURE TO DO SO CAN RESULT IN ADVERSE VEHICLE HANDLING, ADVERSE VEHICLE HANDLING, POSSIBLE TIRE CONTACT WITH THE FRAME, PREMATURE COMPONENT DAMAGE, OR SEVERE PERSONAL INJURY.

FIGURE 8-59
AR2 for Manitowoc
TRAAX Rod


DISASSEMBLY
NOTE

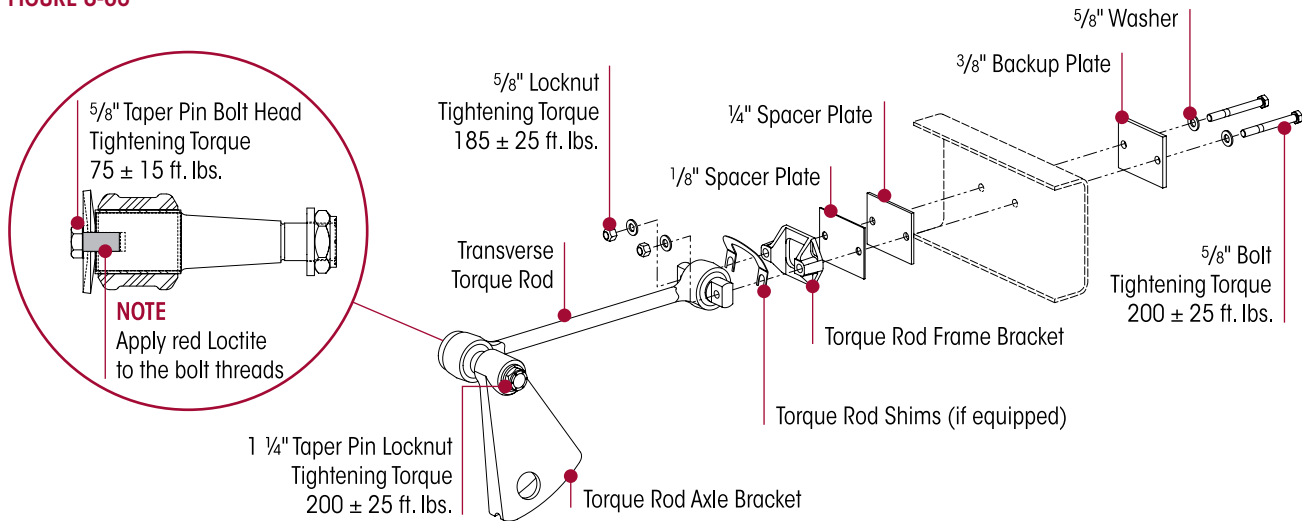
AR2 for Manitowoc is equipped with transverse TRAAX RODs. The TRAAX RODs have pre-compressed bushings, therefore the bushings are non-serviceable.

SERVICE HINT

Note the quantity and location of shims removed to maintain the lateral alignment of the axle during assembly. See Alignment & Adjustments Section of this publication.

1. Chock the wheels of the vehicle.
2. Remove and discard the torque rod mounting fasteners, see Figure 8-60.
3. Remove and discard the two (2) torque rod-to-frame mounting fasteners.
4. Remove the transverse torque rod.
5. If servicing the inner spacer plates or outer backup plates, remove the 5/8" fasteners from the frame rails, see Figure 8-60.

FIGURE 8-60



INSPECTION

1. Inspect the torque rod mating surfaces and rubber bushings for any wear or damage. Repair as necessary.
2. Inspect the torque rod for straightness, wear, or cracks. Replace as necessary.
3. Inspect the inner spacer plate, outer backup plates and frame rail for wear or damage. Replace as necessary.

ASSEMBLY

1. If the inner spacer plates or outer backup plates are being serviced, install the 5/8" fasteners through the inner spacer plates, frame rail, and outer backup plate, see Figure 8-60.
2. Prior to installing the transverse torque rod to the axle bracket, apply red Loctite to the taper pin 5/8" bolt thread, see Figure 8-60.
3. Install the 1 1/4" taper pin through the torque rod axle bracket. Install fasteners, **DO NOT** tighten at this time.
4. Install the transverse torque rod to the frame bracket, see Figure 8-60.
5. Install the two (2) 5/8" fasteners through the torque rod bar pin and shims as per prior to removal.
6. Install transverse torque rod frame bracket, spacer plate, and backup plate as per prior to removal.

NOTE

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

7. Prior to tightening torque rod fasteners ensure the vehicle is at the proper ride height, refer to Ride Height in the Alignment & Adjustment Section of this publication.
8. Tighten the taper pin to axle bracket at the 1 1/4" locknut to \mathbb{E} 200 ± 25 foot pounds torque.
9. Tighten the 5/8" bolt head to torque rod to \mathbb{E} 75 ± 15 foot pounds torque.
10. Tighten the two (2) 5/8" torque rod-to-frame mounting fasteners to \mathbb{E} 185 ± 25 foot pounds torque and at the 5/8" bolt head to \mathbb{E} 200 ± 25 foot pounds torque, see Figure 8-60.
11. Check the lateral alignment, if not within the vehicle manufacturer's specified range, a lateral alignment is necessary. Refer to the Lateral Alignment in the Alignment & Adjustments Section of this publication.
12. Remove the wheel chocks.

ULTRA ROD • ULTRA ROD PLUS TORQUE ROD BUSHINGS

You will need:

- A vertical press with a capacity of at least 10 tons
- Shop made receiving tool and installation / removal tool, refer to the Special Tools Section of this publication for more information
- Hendrickson funnel tools: **ULTRA ROD** (Part No. 66086-001L) and **ULTRA ROD PLUS** (Part No. 66086-000L).

FIGURE 8-61
Taper Pin Bushing

Straddle Pin Bushing

DISASSEMBLY

1. Remove torque rods as detailed in Torque Rod Disassembly instructions in this section.

WARNING

DO NOT USE HEAT OR USE A CUTTING TORCH TO REMOVE THE BUSHINGS FROM THE TORQUE ROD. THE USE OF HEAT WILL ADVERSELY AFFECT THE STRENGTH OF THE TORQUE ROD, HEAT CAN CHANGE THE MATERIAL PROPERTIES. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

2. Support the torque rod end tube centered on the receiving tool. Be sure the torque rod is squarely supported on the press bed for safety.
3. Push directly on the straddle mount bar pin, until the top of the pin is level with the top of torque rod end tube. Place the push out tool directly on top of the bar pin and press until the bushing clears the torque rod end tube.
4. Remove the fasteners from the tapered bar pin bushing and support the torque rod end on the receiving tool with the tapered stud pointing up and the end tube centered on the tool. Be sure the torque rod is squarely supported on the press bed for safety.
5. Push directly on the tapered stud until the bushing clears the torque rod end tube.

ASSEMBLY

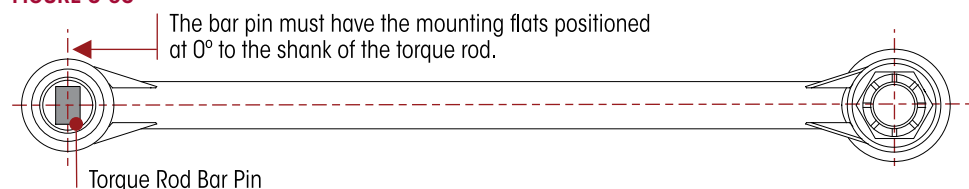
1. Clean and inspect the inner diameter of the torque rod end tubes.

NOTE

DO NOT use paraffinic oil, or soap base lubricant. Such lubricants can cause adverse reactions with the bushing, such as deterioration of the rubber, causing premature failure. Use **ONLY** a light Naphthenic base oil, such as 60 SUS at 100°F.

FIGURE 8-62


2. Lubricate the inner diameter of the torque rod end tubes and the new rubber bushings with a light Naphthenic base oil, such as 60 SUS at 100°F, see Figure 8-62.
3. Support the torque rod end tube centered on the receiving tool. Be sure the torque rod is squarely supported on the press bed for safety. The straddle mount bar pin bushings must have the mounting flats positioned at zero (0°) degrees to the shank of the torque rod, see Figure 8-63.

FIGURE 8-63


4. Push directly on the straddle mount bar pin, or the tapered stud. The bushing must be centered within the end hubs of the torque rod.
 - When pushing in the new rubber bushings, overshoot the desired final position by approximately $\frac{3}{16}$ " (4.76 mm), see Figure 8-64
 - Push the rubber bushing again from the opposite side to center the rubber bushing within the end hub, see Figure 8-65

FIGURE 8-64

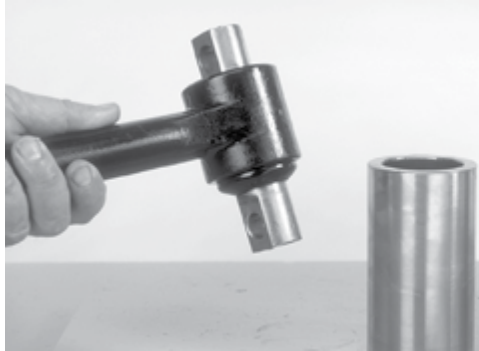
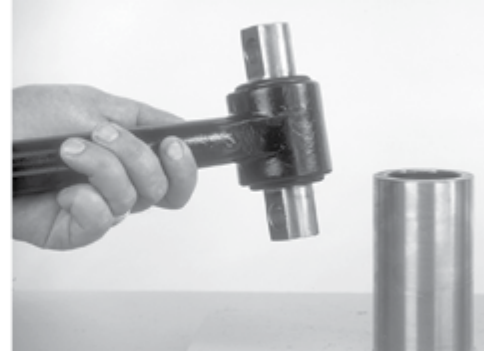


FIGURE 8-65


CAUTION

IF THE TORQUE ROD ASSEMBLY IS NOT ALLOWED THE ALLOTTED TIME FOR THE LUBRICANT TO DISSIPATE, THE BUSHING MAY SLIDE FROM THE TORQUE ROD END HUB CAUSING THE BUSHING TO BE REMOVED AND A NEW BUSHING RE-INSTALLED.

5. Wipe off the excess lubricant. Allow the lubricant four hours to dissipate prior to operating the vehicle.
6. Install the torque rod as detailed in the Torque Rod Assembly instructions in this section.

XTRB TORQUE ROD BUSHINGS (if equipped)

FIGURE 8-66

You will need:

- A vertical press with a capacity of at least 10 tons
- Shop made receiving tool and installation / removal tool, see the Special Tools Section of this publication for more information

WARNING

DO NOT USE HEAT OR USE A CUTTING TORCH TO REMOVE THE BUSHINGS FROM THE TORQUE ROD. THE USE OF HEAT WILL ADVERSELY AFFECT THE STRENGTH OF THE TORQUE ROD, HEAT CAN CHANGE THE MATERIAL PROPERTIES. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.



DISASSEMBLY

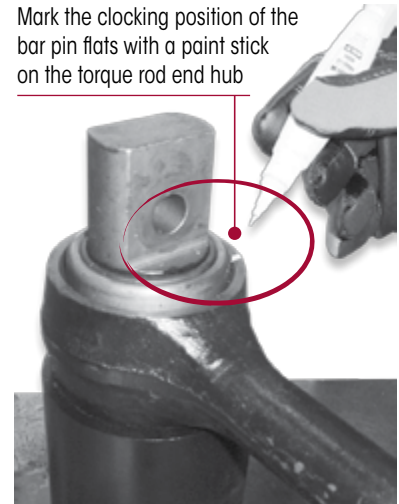
1. Remove the torque rod(s) as detailed in Torque Rod Disassembly instructions in this section.

SERVICE HINT

When servicing a straddle mount bar pin bushing assembly, mark the clocking position of the straddle mount bar pin flats with a paint stick on the torque rod end hub prior to disassembly, see Figure 8-67. This marking will serve as a guide when installing the new bushing assembly so the original clocking position can be retained.

FIGURE 8-67

Mark the clocking position of the bar pin flats with a paint stick on the torque rod end hub



2. Mark the clocking position of the straddle mount bar pin flats with a paint stick on the torque rod end hub prior to disassembly, see Figure 8-67.
3. Support the torque rod end hub centered on the receiving tool. Be sure the torque rod is squarely supported on the press bed for safety.

FIGURE 8-68

4. Push directly on the straddle mount bar pin, until the top of the bar pin is level with the top of torque rod end hub, see Figure 8-68.


FIGURE 8-69

5. Place the shop made removal tool on the bar pin and press until the bushing clears the torque rod hub, see Figure 8-69.



6. Remove the fastener from the tapered bar pin bushing and support the torque rod hub on the receiving tool with the tapered stud pointing down and the end hub centered on the tool. Be sure the torque rod is squarely supported on the press bed for safety.

ASSEMBLY
FIGURE 8-70

Inspect and clean the inner diameter of torque rod end hubs


FIGURE 8-71

Apply NLGI #2-EP (Extreme Pressure) lubricant to the inner diameter of torque rod end hub and bushings





1. Clean and inspect the inner diameter of the torque rod end hubs, see Figure 8-70.

SERVICE HINT

DO NOT use a paraffinic oil, or soap base lubricant. Such lubricants can cause adverse reactions with the bushing, causing premature failure.

2. Lubricate the inner diameter of the torque rod end hubs and the new bushings with NLGI#2 – EP (Extreme Pressure) lithium base grease, see Figure 8-71.
3. Support the torque rod end hub centered on the receiving tool. Be sure the torque rod is squarely supported on the press bed for safety.
4. Re-align the bar pin bushings to the mark made before removal as shown in Figure 8-67.
5. Using the shop made tool, place the installer tool on the bushing and press in. The bushing must be centered within the hub of the torque rod.
6. Wipe off the excess lubricant.
7. Install the torque rod as detailed in the Torque Rod Assembly instructions in this section.

CROSS TUBE

A cross tube seldom requires replacement, usually only when it has been bent, possibly due to hitting an object.

NOTE

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

- **Method 1 — Equalizing Beam Removal** - Follow 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.
- **Method 2 — Center Bushing End Plug Removal**

You will need:

- Center Bushing End Plug (see Parts Lists Section)
- Cutting Torch
- Welding Equipment
- Hole Saw

DISASSEMBLY

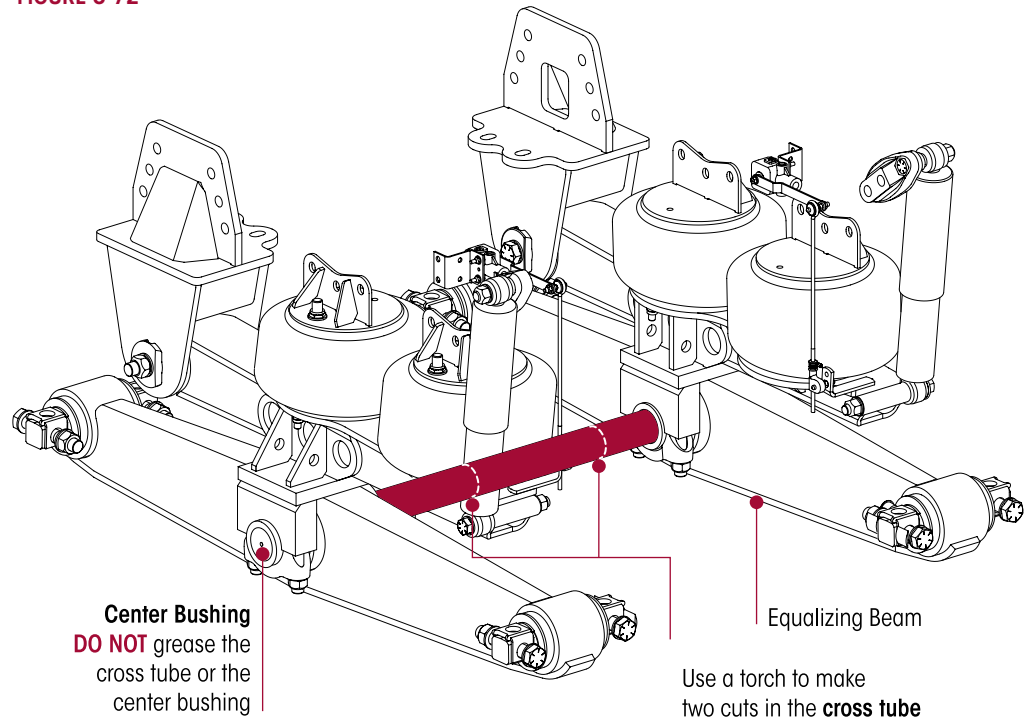
1. Use a work bay with a level surface.
2. Chock the front steer axle wheels.
3. Use a cutting torch to make two cuts in the cross tube, see Figure 8-72.
4. Remove the cut section of the cross tube and slide the remaining sections out of the center bushings and discard.
5. Use a 2½" hole saw and remove only one (1) center bushing end plug from the suspension.



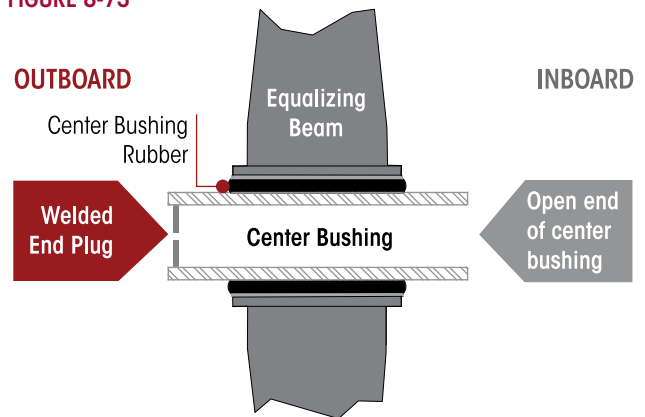
FOLLOW THE SAFETY GUIDELINES FOR OPERATING THE TORCH. USE CAUTION AS PARTS MAY BE HOT.

ASSEMBLY

1. Clean the open end of the center bushing bore to approximately 1" (25.4 mm) depth of weld and debris.
2. From the open center bushing slide the new cross tube into both center bushings.
3. It may be necessary to use a floor jack under one (1) or both equalizing beams to align the cross tube.

FIGURE 8-72

4. Position the end plug $\frac{1}{4}$ " (6.35 mm) recessed in the center bushings and tack weld, see Figure 8-73.
5. Check end plug position, final weld shall be a $\frac{1}{4}$ " (6.35 mm) fillet.

FIGURE 8-73

SECTION 9

AR2 Conversion from RT•RTE

AR2 aftermarket conversion kits are available in conversion or complete kit form with 40,000 and 46,000 pound (18,144 and 20,865 kilograms) capacities, AR2 can be installed by service centers and OEM dealerships who want to give their customers a new suspension solution.

The Hendrickson AR2 offers a better ride and improved suspension performance by converting your Hendrickson RT™•RTE™ suspension into a highly engineered and lighter weight walking beam air suspension. The air spring system in AR2 absorbs the load and road inputs — delivering the preferred combination of empty-ride and loaded stability for vocational applications.

- **Trailing arm / Saddle assembly** — Replaces spring / saddle assembly of existing RT•RTE suspensions. The heavy-duty trailing arm / saddle assembly provides lighter weight, good articulation and optimal ground clearance
- **Equalizing beam** — AR2 is compatible with 40K • 46K capacity Hendrickson RT•RTE walking beams. If required, rigid forged beams or robust lightweight fabricated beams are available separately

AR2 CONVERSION SPECIFICATIONS

	40K	46K
Suspension Rating	40,000 lbs.	46,000 lbs.
Gross Vehicle Weight (GVW) Approval ²	73,000 lbs.	80,000 lbs.
Gross Combination Weight (GCW) Approval	160,000 lbs.	190,000 lbs.
Site Travel Rating ³	See Below ⁵	60,000 lbs.
Diagonal Articulation ⁴	14"	
Ride Heights	9.5", 10.5"	
Axle Spacing	52", 54"	
Lift Axle	See Below ⁵	See Below ⁶

AR2 is approved for vocational truck applications such as dump under 18 feet, crane / boom and platform applications. Contact Hendrickson for approval of additional applications.

1. Conversion kit — if the pre-existing RT • RTE suspension includes bronze center bushings, they must be replaced with rubber center bushings. Bronze center bushings are not compatible with transverse torque rods.

NOTE: Any comparison to other suspensions should consider all of these components, including axle brackets.

2. Contact Hendrickson for applications that may exceed GVW approval ratings.
3. Job Site Travel Rating — Ratings are limited to no more than 5% of vehicle operation at speed not to exceed 5 mph. Site travel ratings are consistent with published axle manufacturer's limitations. Axle and suspension site travel specifications must not be exceeded.
4. Suspension articulation may exceed vehicle's capability and may be limited by vehicle manufacturer; vehicle manufacturer installed axle stops may restrict suspension's articulation.
5. No add-on lift axles approved for 40,000 pound applications.
6. One or more lift axles. Maximum 60,000 pound load suspension for site travel.



This section is only for the **conversion from a Hendrickson RT•RTE rear suspension 52" or 54" (1,321 mm or 1,372 mm) axle spacing, with a 9½" or 10½" (241 mm or 267 mm) ride height] to AR2**. All other conversions to AR2 will require approval from Hendrickson Engineering.

Prior to removal of the existing RT•RTE suspension, all the following inspection and measurements need to be checked and recorded. The truck must be on a level surface prior to making any measurements:

- Check and record rear suspension ride height (Bottom of frame to axle centerline)
- Check and record drive axle pinion angles
- Mark existing suspension centerline on frame
- Verify the total vehicle alignment is within specification
- Verify the lateral alignment is within specification
- Check for irregular tire wear
- Road test (Note any unusual noise or vibration)

PERIPHERAL COMPONENTS

A complete inspection of the equalizing beams, torque rods, and frame rails and peripheral components should be performed prior to suspension removal. If any of these components are found to be worn it will be necessary to replace them. Check for any driveline or axle interference on the vehicle chassis prior to suspension removal. Verify that the axle stops are installed by the vehicle manufacturer and in good condition. If the vehicle is not equipped with axle stops, contact the vehicle manufacturer for the correct amount of articulation allowed for the rear suspension. After AR2 installation is complete, check for proper clearance with all suspension and chassis components.

FASTENERS

Hendrickson recommends when servicing the vehicle, replace all removed fasteners with new equivalent fasteners. Maintain correct torque values as specified. See Hendrickson's Torque Specifications Section of this publication. If non-Hendrickson fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual.

EQUALIZING BEAMS

If the equalizing beams are equipped with **bronze center bushings** it will be necessary to **replace them with rubber center bushings** to accommodate transverse torque rods.

If the equalizing beam inspection requires the replacement of the bar pin style end bushings equipped with alignment shims it is recommended that replacement bar pin alignment shims be installed in the neutral position prior to the equalizing beam installation. This should position the axles square to the centerline of the vehicle prior to alignment.

All pre-existing components that are to be re-used for the AR2 installation must be replaced if they are not in serviceable condition. An installation drawing of the AR2 suspension is normally supplied with an AR2 suspension kit. Installers should ensure that they have the correct assembly drawing for the vehicle to which the AR2 is to be installed, questions can be addressed by contacting Hendrickson Engineering at 630-910-2800.

CROSS MEMBER

Hendrickson requires an RT•RTE cross member (not supplied by Hendrickson) be used on all AR2 installations. To obtain the correct cross member, contact the vehicle manufacturer.

LONGITUDINAL AND TRANSVERSE TORQUE RODS

Refer to Preventive Maintenance Section in this publication for complete longitudinal and transverse torque rod inspection.

VEHICLE PREPARATION AND SUSPENSION REMOVAL

DISASSEMBLY

1. Chock the front wheels.
2. Lift and support the frame.
3. Lift and support the axles.
4. Remove the tires.

SERVICE HINT

It is recommended that the suspension is at full rebound before installing the jack stands. This will provide maximum clearance for removal and installation of suspension components.

SERVICE HINT

If the is equipped with a fifth wheel, to ease in AR2 installation it may be necessary to remove the fifth wheel and re-install after AR2 suspension installation is completed.

5. Mark the centerline of the old suspension on both sides of the frame.
6. Disconnect and remove the old suspension. Leave the walking beams installed, unless being re-bushed.

PREPARATION AND INSPECTION OF SUSPENSION

1. Clean the frame rail from rust and debris.
2. Inspect the frame rail for any cracks or damage. Repair or replace as necessary.
3. Reference the schematic and lay out holes on the frame. Typically all holes are referenced from the centerline of the front hanger, see Figure 9-1. If equipped with a non-RT•RTE suspension, the holes will be referenced from the centerline of the cross member.

NOTE

Prior to drilling any holes in the frame or cross member gusset it is recommended that the height control valve and linkage be fitted for proper location within the confines of the chassis.

FIGURE 9-1

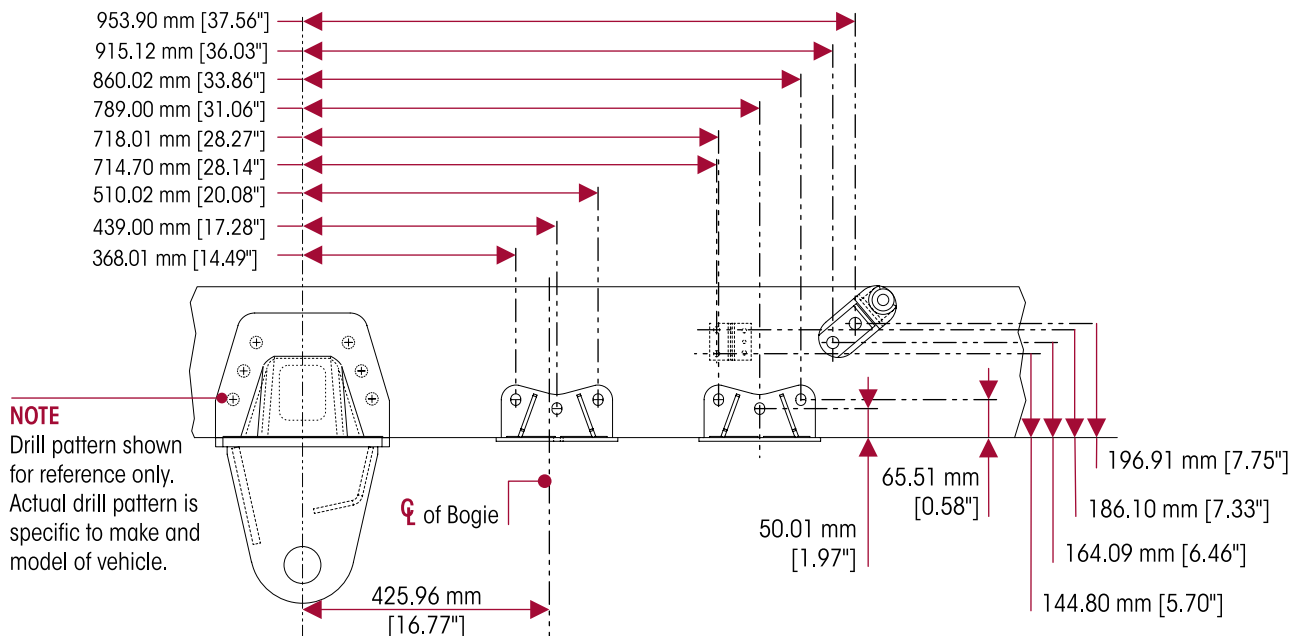
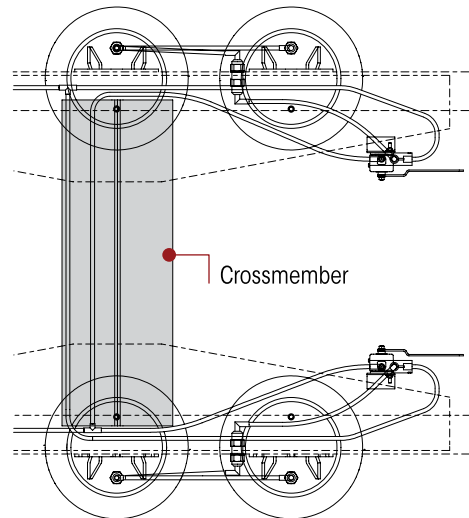
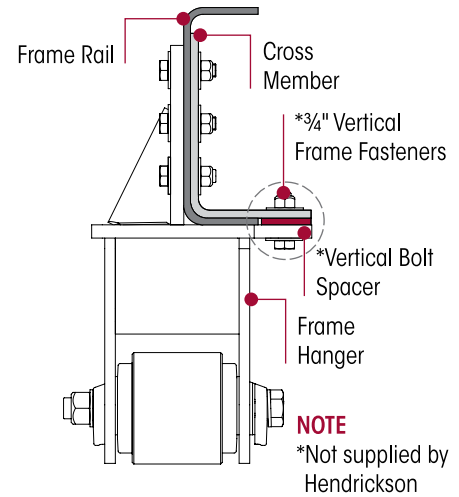


FIGURE 9-2

FIGURE 9-3

NOTE

Hendrickson requires an RT•RTE cross member be used on all AR2 installations.

4. Replace the cross member with the RT•RTE cross member and if needed, install spacers (not supplied by Hendrickson) between the frame flange and the bottom of the hanger, see Figure 9-3.
5. Recheck measurements.
6. Center punch and drill holes in the frame.
7. Remove any burrs or shavings on the new holes.
8. Hendrickson recommends painting the frame rails to inhibit rust prior to installation of the AR2 suspension components.

HEIGHT CONTROL VALVE AND LINKAGE

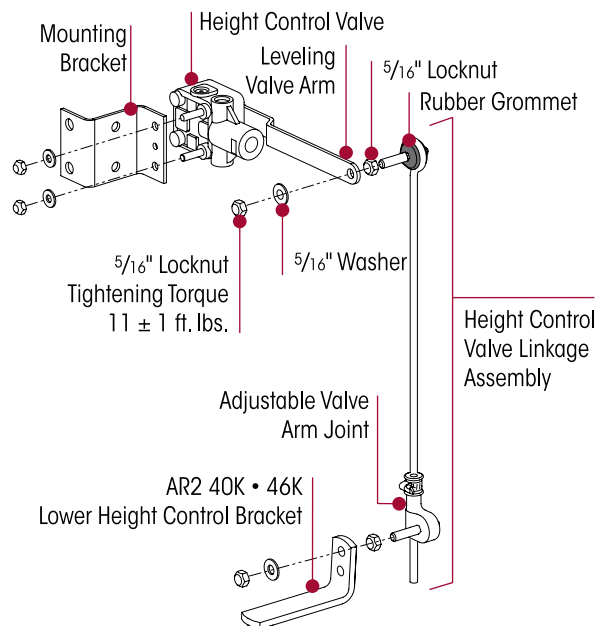
SERVICE HINT

Prior to drilling any holes in the frame or cross member gusset, it is recommended that the height control valve and linkage be fitted for proper location within the confines of the chassis.

ASSEMBLY
NOTE

It may be necessary to modify the height control valve mounting bracket to mount on the cross member gusset.

1. The bracket can be modified by straightening one of the bent legs on the bracket to form an "L" shaped bracket rather than a "Z" shaped bracket.
2. The chosen height control bracket location on the chassis requires that the leveling valve arm face the rear of the truck.
3. Mount the linkage in a vertical position.

FIGURE 9-4


4. The arm on the height control valve requires enough clearance to allow for 45° degrees of travel without contacting any chassis components. The lower mounting bracket **MUST** be positioned on the rear of the trailing arm top surface.
5. Weld the lower mounting bracket into position.
6. Recheck the height control valve bracket and linkage for proper operation when installed.
7. Verify ride height, refer to the Alignment & Adjustment Section of this publication.

AIR SUSPENSION DUMP VALVE

When installing an AR2 suspension conversion kit, it is required that a height control valve with a dump feature be installed as part of the suspension air system. Contact the vehicle manufacturer for the proper dump switch and follow their dump switch installation instructions. Refer to the Parts List Section of this publication.

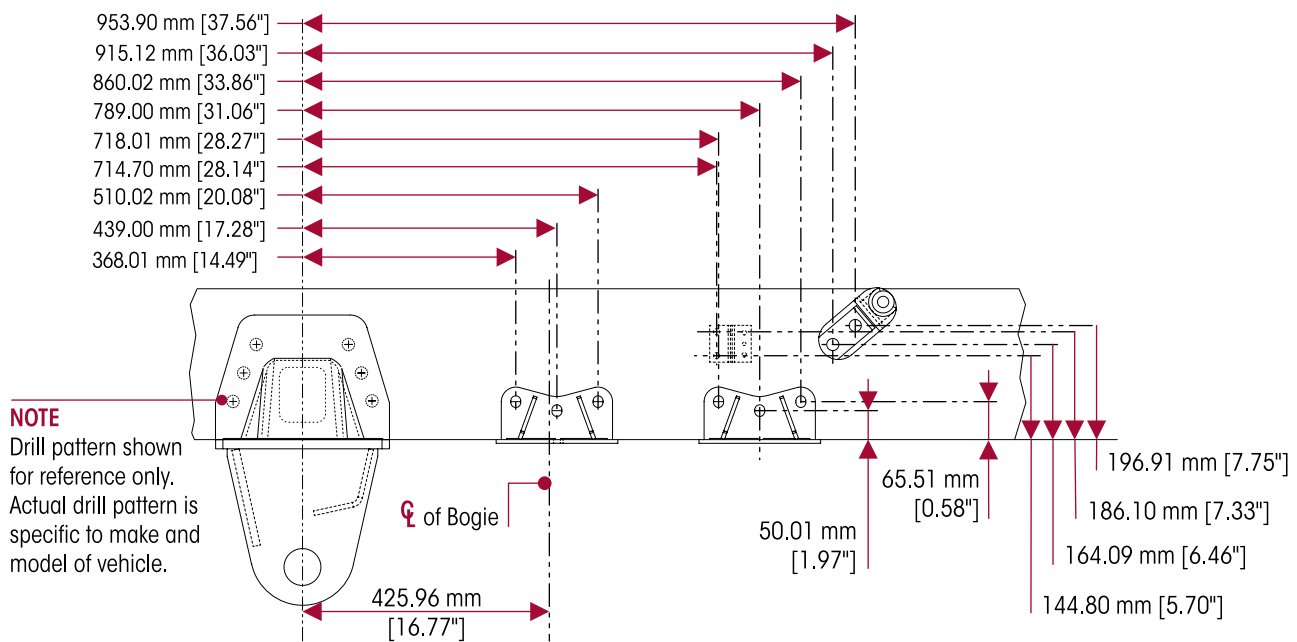
SUSPENSION AIR SYSTEM PRESSURE GAUGES

Hendrickson recommends when installing an AR2 suspension conversion kit, to have two (2) in-dash air pressure gauges installed. These gauges will help determine equal loading of the vehicle as well as indicate any potential suspension air system problem. If in-dash air pressure gauges are installed, follow the air pressure gauge manufacturer's installation instructions.

FRAME HANGER INSTALLATION

The AR2 frame hangers will be supplied in the suspension kits as blanks. Therefore, it is necessary to drill the hanger mounting holes in the blank hangers, see Figure 9-5. The procedure to drill the mounting holes in the hangers can be accomplished by two different methods. Whichever method is used (1 or 2), it is important to use a sharp drill bit and keep the bit cool and lubricated while performing the drilling operation.

FIGURE 9-5



- **Method 1** — is to clamp the blank hanger to the frame and line up the existing holes in the frame from the RT hanger. Back drill the AR2 blank hanger using the existing holes as a guide.
- **Method 2** — is to clamp the blank hanger to the frame and line up the existing holes in the frame from the RT hanger. Center punch the holes in the blank hanger and remove the hanger from the frame. Drill the holes in the hanger.

1. All sharp edges should be removed from the hanger once the drilling operation is complete.
2. Install the fasteners that attach the frame hanger to the vehicle per vehicle manufacturer's specifications.
3. Install frame hanger and spacer plate (supplied by vehicle manufacturer) located between the frame hanger and lower cross member flange.
4. Clamp the bottom of the front hanger to the frame flange.

WARNING

FAILURE TO CLAMP THE FRAME HANGER AGAINST THE UNDERSIDE OF THE FRAME WHILE TIGHTENING THE FRAME BOLTS CAN RESULT IN COMPONENT DAMAGE AND PERSONAL INJURY OR PROPERTY DAMAGE.

5. Snug the frame bolts.
6. Snug the cross member flange bolts.
7. Tighten all frame hanger bolts to the required torque specification.

TRAILING ARM INSTALLATION – EQUALIZING BEAMS INSTALLED

SERVICE HINT

Prior to installing the trailing arm it may be necessary to raise the frame to provide additional clearance for the saddle studs to go over the center bushings on the equalizing beams, see Figure 9-6.

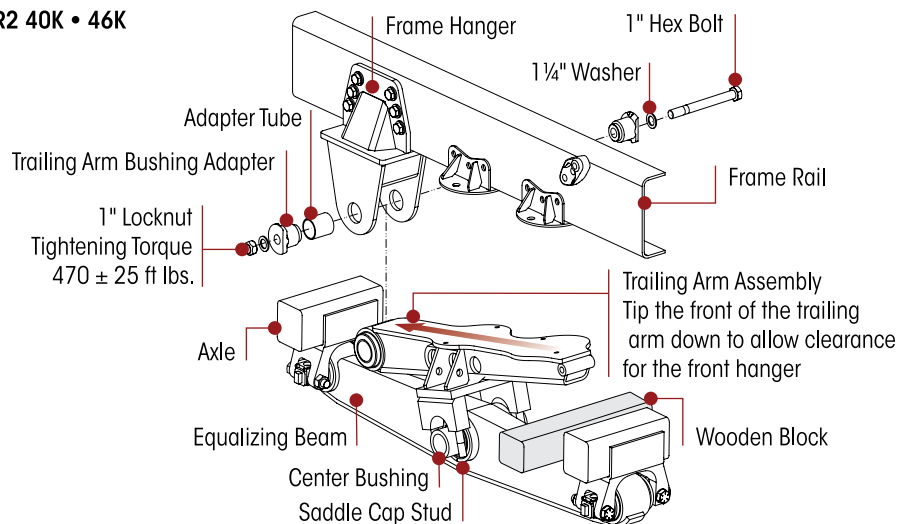
WARNING

THE WEIGHT OF THE TRAILING ARM ASSEMBLY IS APPROXIMATELY 225 POUNDS (102 KILOGRAMS). CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

1. Raise frame high enough to allow adequate clearance between the frame flange and the center bushing.
2. Tip the front of the trailing arm down to allow clearance for the front hanger, see Figure 9-6.

FIGURE 9-6

AR2 40K • 46K



3. Position the trailing arm between the frame and the equalizing beam center bushing.
4. Carefully lower the trailing arm until it is seated on the equalizing beam center bushing.
5. Install the trailing arm saddle caps. **DO NOT** tighten at this time.

SERVICE HINT

It may be necessary to install a block of wood behind the trailing arm to keep it from tipping backwards.

6. Install the trailing arm bushing into the front hanger.
7. Install the trailing arm bushing adapter and fasteners. **DO NOT** tighten at this time.
8. Lower the frame to the correct ride height.
9. Tighten the 1" fasteners to 470 ± 25 foot pounds torque.

AIR SPRING INSTALLATION

1. The upper air spring brackets are **NOT** identical. The bracket with the air spring locating holes closer together is the front bracket and should be mounted closest to the front hanger. The bracket with the locating holes further apart is the rear bracket and should be mounted furthest away from the front hanger, see Figure 9-7.
2. Install the upper air spring brackets against the frame.
3. Install the mounting fasteners.
4. Clamp the upper air spring bracket against the frame flange.



WARNING

FAILURE TO CLAMP THE AIR SPRING BRACKET AGAINST THE UNDERSIDE OF THE FRAME WHILE TIGHTENING THE AIR SPRING BRACKET CAN RESULT IN COMPONENT DAMAGE AND PERSONAL INJURY OR PROPERTY DAMAGE.

5. Tighten all air spring bracket mounting fasteners to the vehicle manufacturer's specified torque.

NOTE

The air spring combination stud is on the outboard side of the frame rail.

6. Install the ½" studs in the bottom of the new air springs and tighten to 25 ± 5 foot pounds torque.
7. Assemble the air springs to air spring frame hangers by inserting studs into appropriate holes. The ¾" combo stud faces outboard of the vehicle.
8. Install the air springs into the trailing arm assembly by inserting the studs into the trailing arm mounting holes, see Figure 9-8.

SERVICE HINT

Depending on the frame height of the vehicle, it may be necessary to compress the air spring to facilitate installation into the frame bracket and trailing arm.

9. Assemble the washers and locknuts which connect the air springs to the trailing arm assembly and tighten the locknuts to 25 ± 5 foot pounds torque as shown in Figure 9-8.

FIGURE 9-7

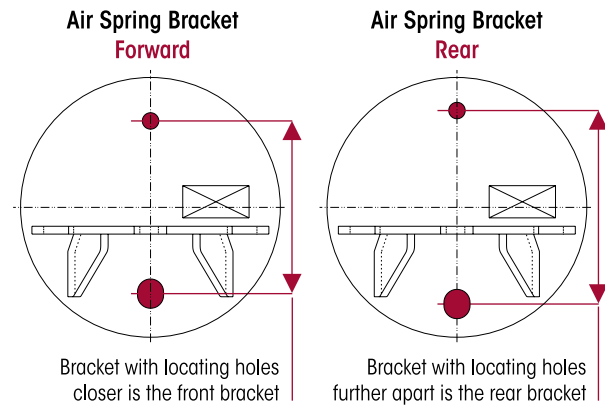
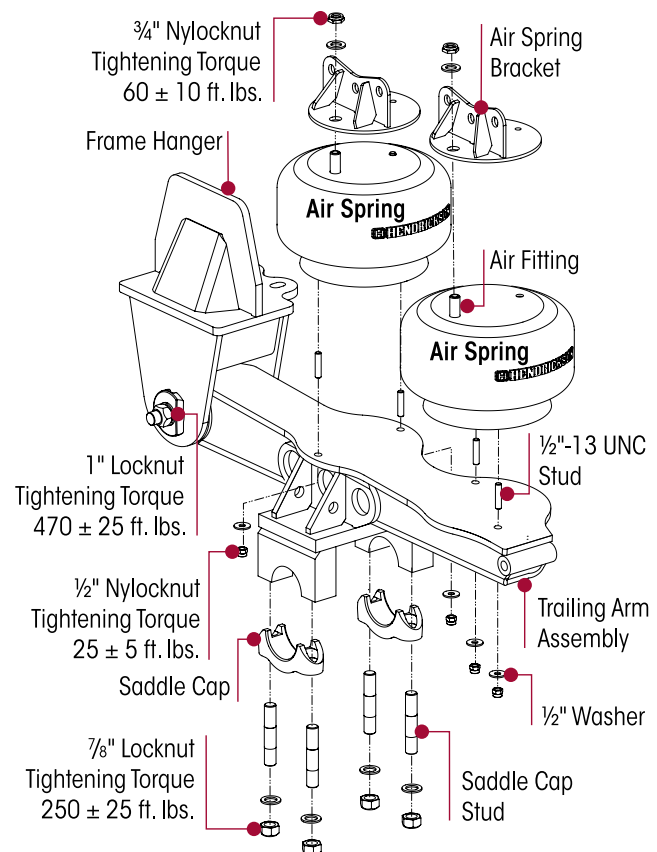


FIGURE 9-8
AR2 40K • 46K



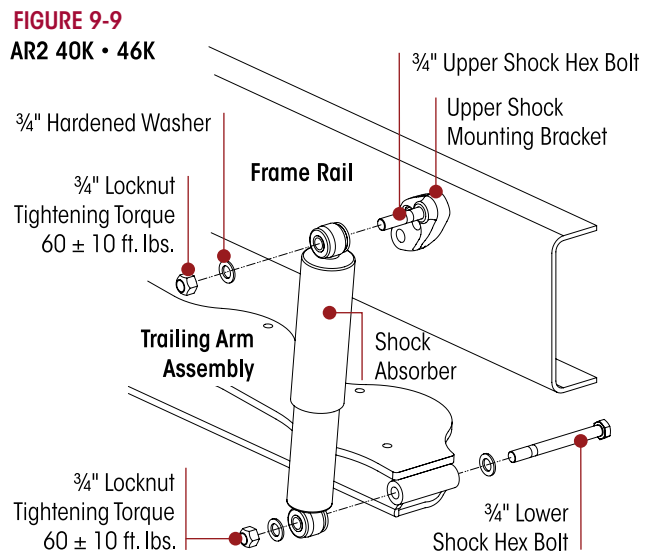
10. Assemble the washers and locknuts on the combo studs which connect air spring to the air spring bracket. Tighten the combo stud locknuts to $\boxed{60 \pm 10}$ foot pounds torque as shown in Figure 9-8.
11. Install the air fittings to the air springs using Teflon thread seal.
12. Install the air lines to the air springs. Lower the frame, if necessary, to connect the air springs and the shock absorbers.

SHOCK ABSORBER INSTALLATION

1. Install the upper shock hex bolt in the upper shock mounting bracket prior to mounting the bracket to the frame, see Figure 9-9.
2. Mount the upper shock mounting bracket to the frame.
3. Install the shock absorber on the upper shock mounting bolt.
4. Install the $\frac{3}{4}$ " washer and locknut, **DO NOT** tighten at this time.
5. Install $\frac{3}{4}$ " x $7\frac{1}{4}$ " lower shock mounting bolt and washer from the inboard side into the trailing arm and the shock absorber. Install outboard washer and locknut, see Figure 9-9.
6. Tighten both of the shock eye locknuts to $\boxed{60 \pm 10}$ foot pounds torque.

TRAILING ARM INSTALLATION – EQUALIZING BEAMS REMOVED

1. Install the frame hangers.
2. Install the upper air spring brackets.
3. Install the upper shock brackets.
4. Install the trailing arm into the front hanger.
5. Install the trailing arm bushing adapter and fasteners. **DO NOT** tighten at this time.
6. Install the air springs into the upper air spring brackets.
7. Install the shock absorber on the upper mounting bracket.
8. Raise the trailing arm up indexing the air spring studs into the trailing arm, see Figure 9-6.
9. Install the lower shock mounting hardware into the trailing arm.
10. Final torque on the trailing arm mounting collars will need to be done after the beams are installed.

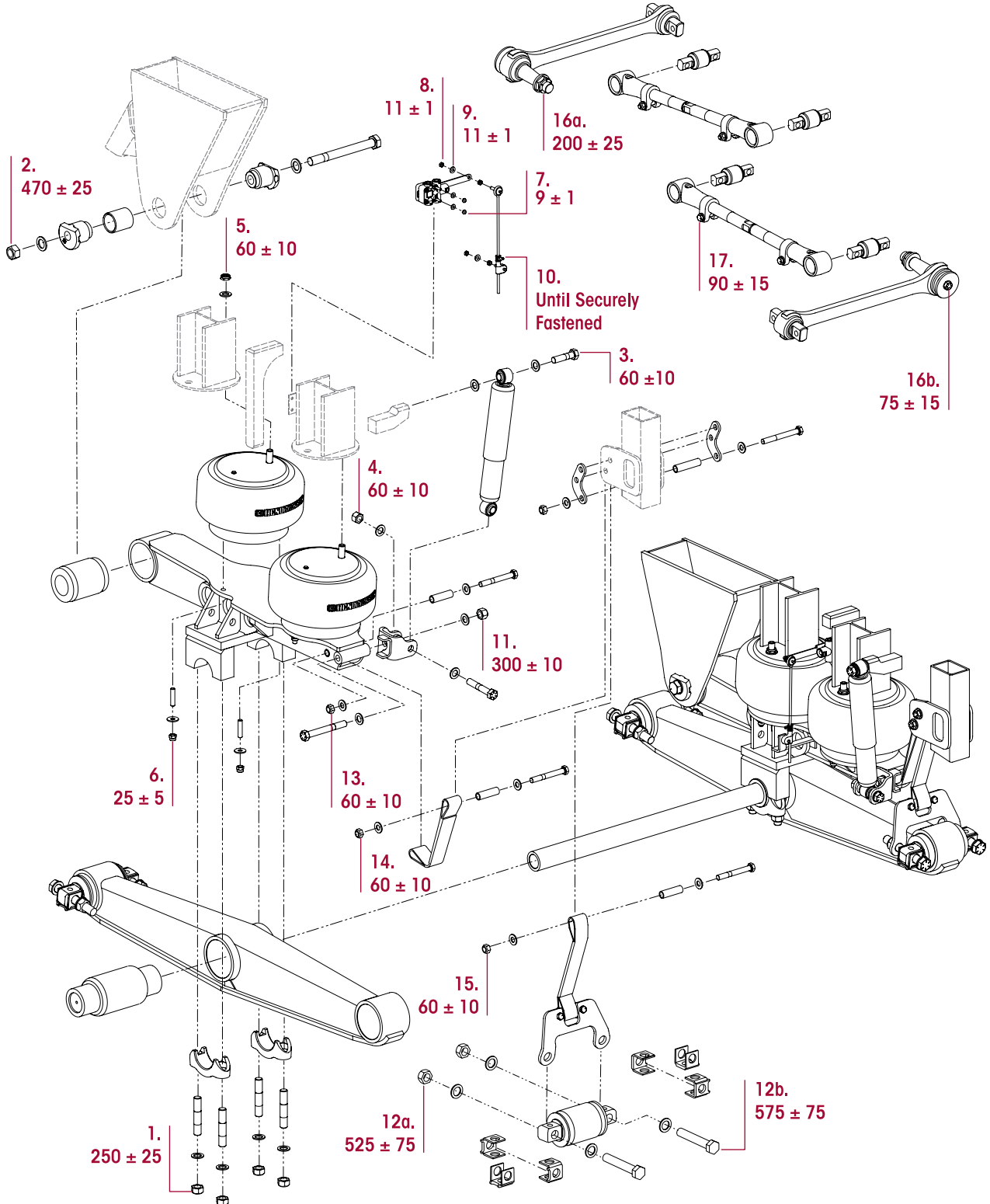


SADDLE AND CENTER BUSHING CONNECTION

1. Lower the frame to the proper vehicle ride height and index the saddles on the walking beam center bushings.
2. Verify that the saddles are centered on the center bushings.
3. Install the saddle caps and tighten in 50 pound increments of torque before achieving a final torque of $\boxed{250 \pm 25}$ foot pounds.

SECTION 10 Torque Specifications

Hendrickson recommended torque values provided in Foot Pounds

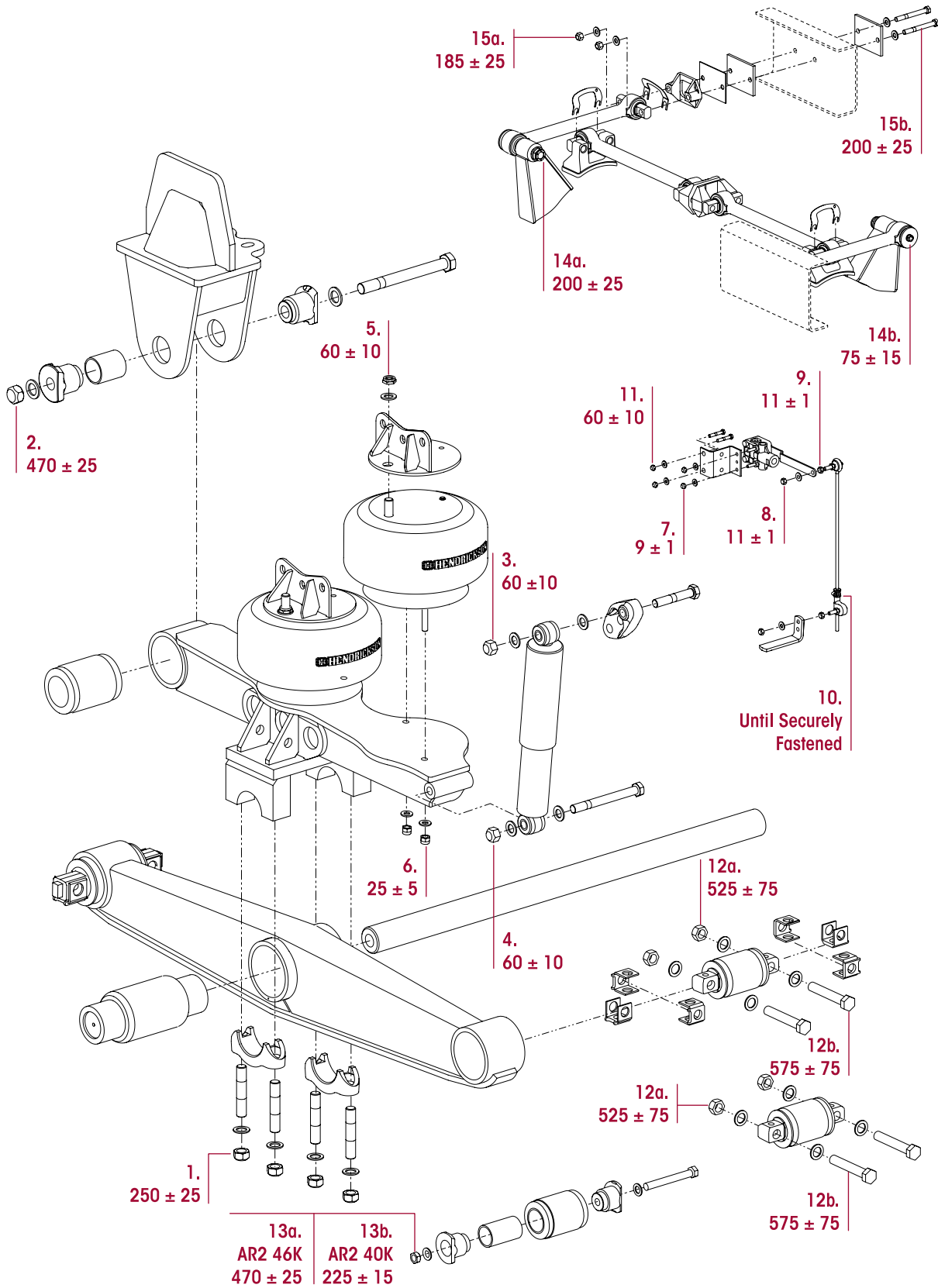




AR2 for Manitowoc

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS					
NO.	COMPONENT		FASTENER		*TORQUE VALUE
			Quantity	Size	Foot Pounds
1	Trailing Arm Assembly to Saddle Cap		8	7/8"-14 UNF	250 ± 25
2	Trailing Arm Adapter		2	1"-14 UNS	470 ± 25
3	Upper Shock Bolt		2	3/4"-10 UNC	60 ± 10
4	Lower Shock Locknut		2	3/4"-10 UNC	60 ± 10
5	Air Spring Upper Locknut		4	3/4"-16 UNF	60 ± 10
6	Air Spring Lower Locknut		8	1/2"-13 UNC	25 ± 5
7	Height Control Valve to Height Control Valve Bracket		4	1/4"-20 UNC	9 ± 1
8	Height Control Valve to Height Control Valve Linkage		4	5/16"-18 UNC	11 ± 1
9	Height Control Valve Jam Nut		4	5/16"-18 UNC	11 ± 1
10	Height Control Valve Linkage Clamp		2		Until Securely Fastened
11	Lower Shock Bracket Locknut to Trailing Arm				300 ± 10
12A	Bar Pin Bushing	at the Locknut	8	1"-8 UNC	525 ± 75
12B		at the Bolt Head	8	1"-8 UNC	575 ± 75
13	Lower Trailing Arm Support Strap Locknut to Trailing Arm Strap				60 ± 10
14	Upper Trailing Arm Support Strap Bracket Locknut to Trailing Arm Strap				60 ± 10
15	Upper Equalizing Beam Support Strap Locknut to Equalizing Beam Strap				60 ± 10
16A	Transverse Torque Rod	at the Locknut			200 ± 25
16B		at the Bolt Head			75 ± 15
17	3-piece Longitudinal Torque Rod		4	1/2"-13 UNC	90 ± 15
NOTE: Axle and frame mount hardware are supplied by vehicle manufacturer.					
* Torque values listed above apply only if Hendrickson supplied fasteners are used. If non-Hendrickson fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual.					

Hendrickson recommended torque values provided in Foot Pounds





AR2 40K • 46K

HENDRICKSON RECOMMENDED TORQUE SPECIFICATIONS					
NO.	COMPONENT		FASTENER		*TORQUE VALUE
			Quantity	Size	Foot Pounds
1	Trailing Arm Assembly to Saddle Cap		8	7/8"-14 UNF	250 ± 25
2	Trailing Arm Adapter		2	1"-14 UNS	470 ± 25
3	Upper Shock Locknut		2	3/4"-10 UNC	60 ± 10
4	Lower Shock Locknut		2	3/4"-10 UNC	60 ± 10
5	Air Spring Upper Locknut		4	3/4"-16 UNF	60 ± 10
6	Air Spring Lower Locknut		8	1/2"-13 UNC	25 ± 5
7	Height Control Valve to Height Control Valve Bracket		4	1/4" -20 UNC	9 ± 1
8	Height Control Valve to Height Control Valve Linkage		4	5/16"-18 UNC	11 ± 1
9	Height Control Valve Jam Nut		4	5/16"-18 UNC	11 ± 1
10	Height Control Valve Linkage Clamp		2		Until Securely Fastened
11	Height Control Valve Bracket to Frame		4	1/2"-13 UNC	60 ± 10
12A	Bar Pin Bushing	at the Locknut	8	1"-8 UNC	525 ± 75
12B		at the Bolt Head	8	1"-8 UNC	575 ± 75
13A	Bar Pin Bushing Adapter Style	AR2 46K Capacity	4	1"-16 UNF	470 ± 25
13B		AR2 40K Capacity	4	3/4"-16 UNF	225 ± 15
14A	Transverse Torque Rod to Axle Bracket	at the Locknut	2	1 1/4"-12 UNF	200 ± 25
14B		at the Bolt Head	2	5/8"-11 UNC	75 ± 15
15A	Torque Rod to Frame	at the Locknut	4	5/8"-11 UNC	185 ± 25
15B		at the Bolt Head	4	5/8"-11 UNC	200 ± 25

NOTE: Axle and frame mount hardware are supplied by vehicle manufacturer.

* Torque values listed above apply only if Hendrickson supplied fasteners are used. If non-Hendrickson fasteners are used, follow torque specifications listed in the vehicle manufacturer's service manual.



SECTION 11

Troubleshooting Guide

AR2 TROUBLESHOOTING GUIDE

CONDITION	POSSIBLE CAUSE	CORRECTION
Suspension has harsh or bumpy ride	Air spring not inflated to specification or damaged	Repair air system and check ride height, see Ride Height in the Alignment & Adjustments Section
	Ride height set incorrectly	Adjust ride height to proper setting, see Ride Height in the Alignment & Adjustments Section
	Suspension is overloaded	Redistribute load to correct weight
Excessive driveline vibration	Incorrect pinion angle(s)	Adjust pinion angle(s), refer to the vehicle manufacturer for specifications
	Ride height set incorrectly	Adjust ride height to proper setting, see Ride Height in the Alignment & Adjustments Section
Vehicle leans	Air spring(s) not inflated to specification	Check air supply to air spring and check ride height, see Ride Height in the Alignment & Adjustments Section of this publication
	Load not centered	Redistribute load
	Frame twisted	Straighten the frame per vehicle manufacturer guidelines
	Axle housing bent or broken	Replace axle housing per vehicle manufacturer guidelines and align vehicle
	Front suspension	Inspect and repair front suspension
Suspension is noisy	Worn torque rod bushings	Replace torque rod bushings as necessary
	Worn trailing arm bushings	Replace trailing arm bushings as necessary
	Loose equalizing beam end connection	Check for any improper torque and damage on the equalizing beam mounting hardware. Replace as necessary and tighten to specified torque, see Torque Specifications Section of this publication
	Shock absorbers loose	Check shock absorber fasteners for proper tightening torque, see Torque Specifications Section of this publication, and inspect shock absorbers, see Preventive Maintenance Section of this publication
	Worn or damaged equalizing beam center or end bushings	Inspect and replace as necessary
Irregular tire wear	Incorrect tire inflation pressure	Correct tire pressure
	Incorrect alignment	Correct the alignment, refer to the Alignment & Adjustments Section
	Worn torque rod bushings	Replace torque rod bushings as necessary

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 **1.866.755.5968** (toll-free) or **1.630.910.2800** for additional information.



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