

Reyco **Granning** S U S P E N S I O N S

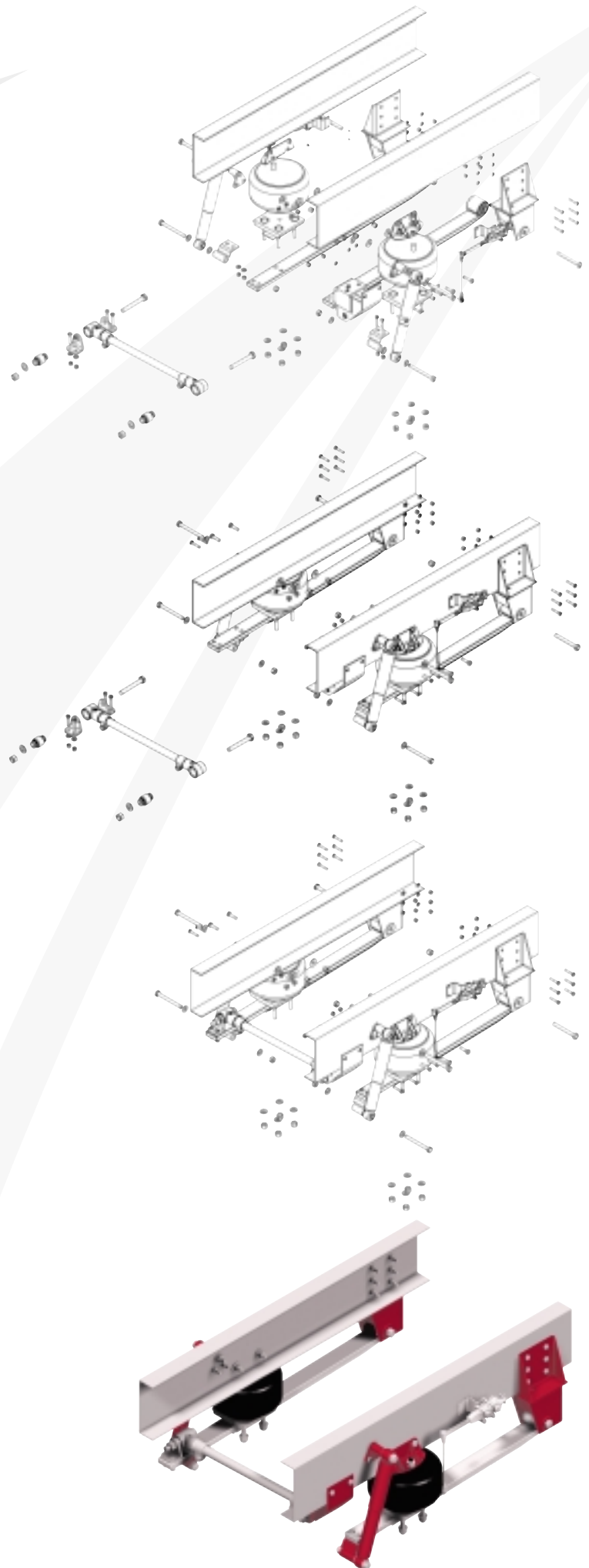
Model 510AR

Steer Axle Air-Ride

Suspension System

Installation and

Maintenance Instructions



Installation Instructions Model 510AR

COMPANY PROFILE

Tuthill Transport Technologies is the new Line of Business name arising from the acquisition and merger of two companies in the heavy-duty suspension and off-road axle industries. These companies were formerly known as Fluidrive, Inc. of Brookston, IN and Reyco® Industries, Inc. of Springfield and Mt. Vernon, MO and Reyco® Canada of Grimsby, Ontario. Tuthill Corporation purchased Fluidrive in December, 1998 and purchased Reyco® in February, 1999.

Granning® Air Suspensions was founded in 1949 in Detroit, Michigan. Granning's product line was consolidated under Fluidrive, Inc. in 1985.

Reyco® was founded in 1924 as Reynolds Mfg. Co. and assumed the Reyco® Industries, Inc. name in 1956 in Springfield. Reyco® Canada began at the current location in Grimsby, Ontario in 1963. The Mt. Vernon facility was established in 1973.

ReycoGranning® air and steel spring suspension systems are sold to truck, trailer, and specialty vehicle OEM's, and to truck equipment distributors. Tuthill Transport Technologies design, test, manufacture and market these products.

Tuthill Transport Technologies is certified to the internationally recognized ISO 9001 Standard. This certification includes ReycoGranning® operations.

ISO 9001 is the highest international quality standard and is recognized worldwide by all major countries and corporations. To obtain certification a company must undergo a series of rigorous audits to remain certified and ensure consistent quality standards are being maintained. This quality standard was developed by the International Organization of Standardization.

Tuthill Corporation is a privately held manufacturing company with over 3,000 employees and facilities on five continents. Tuthill's corporate offices are located in Burr Ridge (Chicago), Illinois.

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SAFETY FIRST

Be sure to read and follow all installation and maintenance procedures.

LIFTING

Practice safe lifting procedures. Consider size, shape and weight of assemblies. Obtain help or the assistance of a crane when lifting heavy assemblies. Make sure the path of travel is clear.



PARTS HANDLING

When handling parts, wear appropriate gloves, eyeglasses and other safety equipment to prevent serious injury.

WELDING

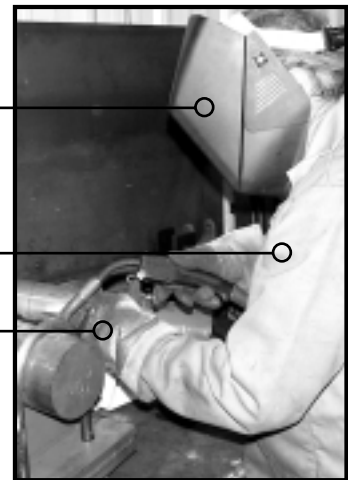
When welding, be sure to wear all personal protective equipment for face and eyes, and have adequate ventilation. When welding, protect spring beams and air springs from weld spatter and grinder sparks. Do not attach "ground" connection to springs.

Under normal use, steel presents few health hazards. Prolonged or repeated breathing of iron oxide fumes produced during welding may cause siderosis.

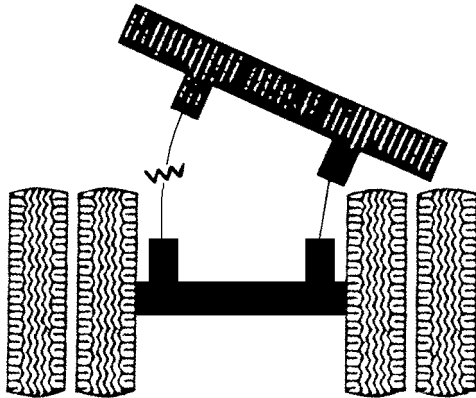
Welding Helmet

Welding Apron

Welding Gloves



 **WARNING**



OVERLOADING

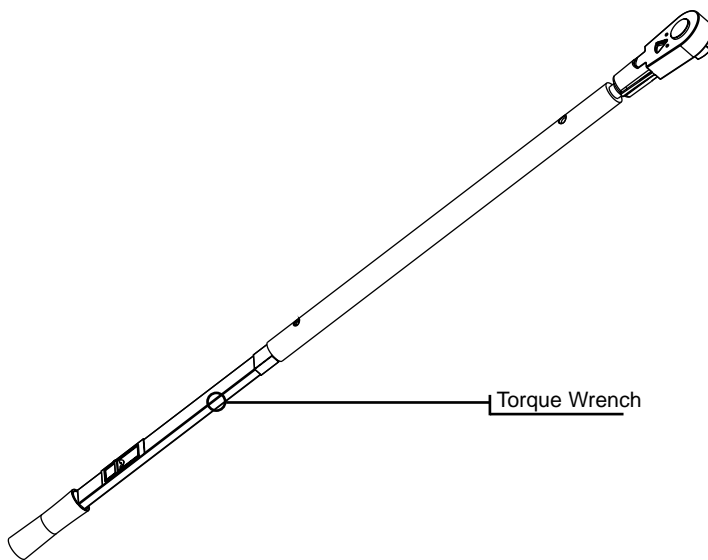
Overloading is the practice of transporting cargos that surpass the specified vehicle's ratings. Overloading can cause component failure, resulting in accidents and injuries.



This symbol indicates to the reader to use caution when seen and to follow specific requirements or warnings stated.



CAUTION: Specific torque requirements are recommended.



TORQUE

Proper tightening of the U-bolt nuts and alignment bolts are high priority items. A fastener system is considered "loose" any time the torque is found below required values. Failure to maintain the specified torque and to replace worn parts can cause component failure resulting in accident with consequent injury.

NOTE: It is extremely important after the first 1,000 to 3,000 loaded miles (1,600 - 4,800 kms) of operation, and with each annual inspection thereafter, that all of the bolt and nut tightening recommendations be followed. Any loose fasteners must be retorqued to comply with warranty requirements and to ensure long, trouble-free performance.

Installation Instructions Model 510AR

Normally, prior to any installations at an OEM, engineering contacts between companies have been made and all necessary information to make the installation has been exchanged. However, the following steps are listed in the interest of all concerned, and should be included in any OEM plan to install the suspension.

PRIOR TO INSTALLATION

1. The mounting height range for the Model 510AR is 9.5 to 10.5 . This height represents the distance from the bottom of the chassis to the top of the axle. See ReycoGranning drawing #94122, for details (page m.6).

NOTE: All dimensions shown in drawings are expressed in inches.

NOTE: There are several versions, so be sure to get proper version for the application.

2. The axle capacity should be matched for compatibility with the Model 510AR s capacity range of 6000 to 9000 pounds.

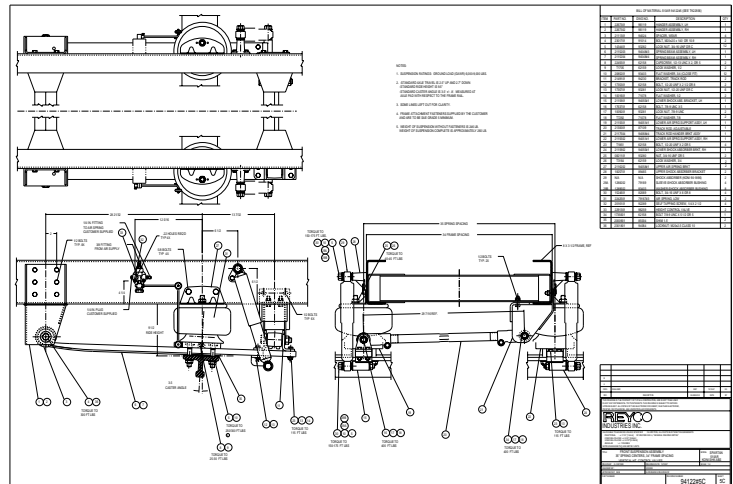
3. The brake, axle, and steering components should be checked for compatibility and clearances with the suspension.

NOTE: Refer to ReycoGranning assembly drawing.

4. The chassis should be of suitable design for the suspension to be installed. Crossmembers, which tie the front left hand (LH) and right hand (RH) hanger mounting positions together, and also, at the track rod hanger position, are required.

5. If any welding is involved, all suspension parts must be protected to avoid burns and weld splatter.

IMPORTANT: This system does not have an alignment feature. Therefore special attention should be exercised to maintain alignment during the assembly process.

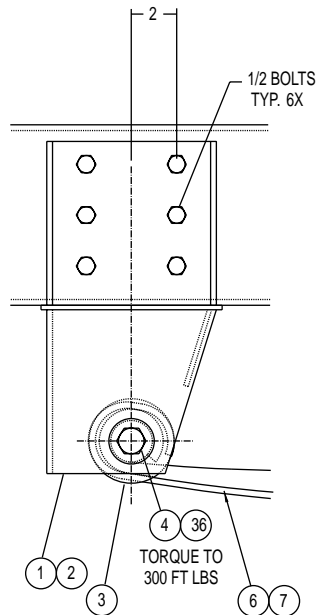


INSTALLATION

FRONT HANGERS

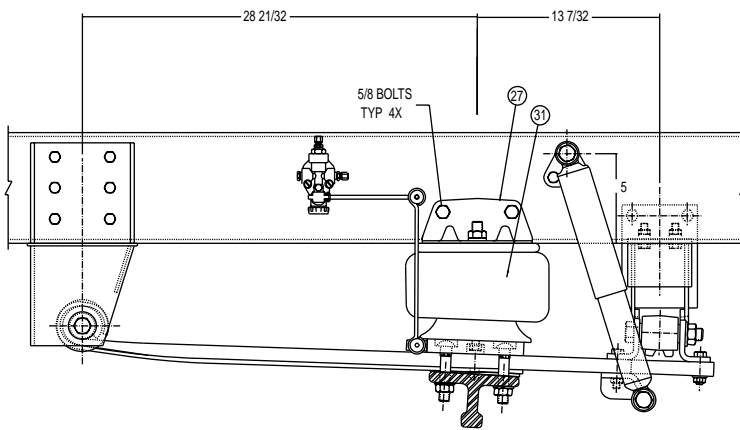
1. The standard distance between the outer sides of the chassis rails is 34.0 , which results in a spring center spacing of 35.0 . These dimensions may vary by model.

NOTE: If frame has not been drilled prior to installation, typically obtain applicable parts, clamp in-place, mark side rails of frame at hole locations, and match drill holes as required. The following instructions will pertain to a pre-drilled frame.



2. Locate LH and RH Hangers on side of frame, per assembly drawing. Recheck location and squareness, and install proper 1/2 fasteners (customer supplied).

3. Torque hanger mounting bolts to proper specifications.



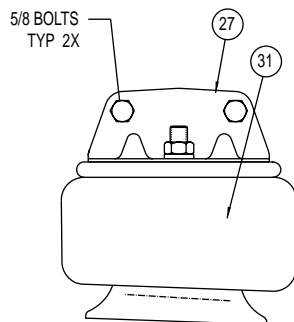
UPPER AIR SPRING BRACKETS, WITH AIR SPRINGS ATTACHED

1. Obtain LH and RH Upper Air Spring Brackets, (with air springs pre-attached).

2. Locate on frame per assembly drawing.

3. Check squareness of setup. When all parts are properly positioned, install 5/8 fasteners (customer supplied), per print.

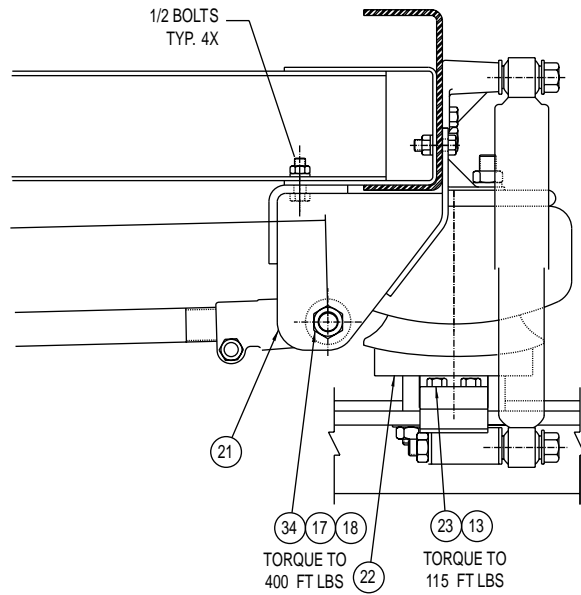
4. Torque fasteners to proper specifications (OEM).



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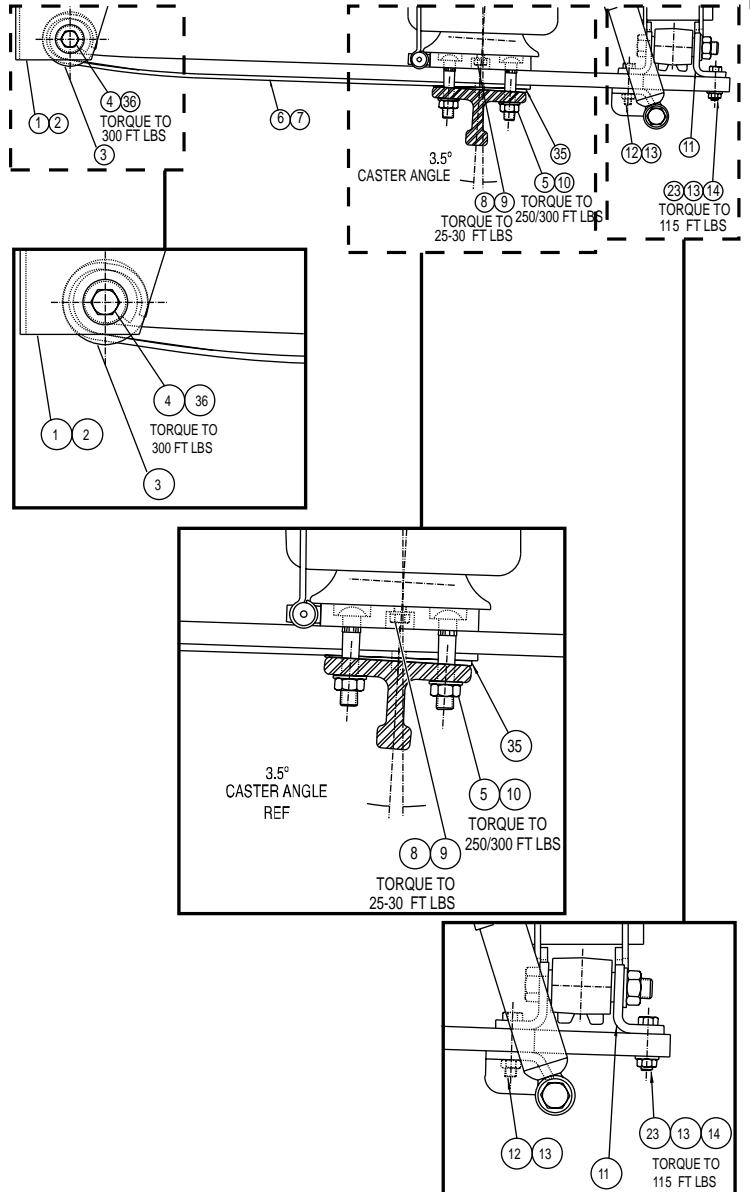
TRACK ROD BRACKET, FRAME MOUNTED

1. Obtain Track Rod Bracket that mounts to frame. (Design varies with caster angles, length and type of rod used.)
2. Depending upon application, locate on frame per print.
3. Install proper 1/2 fasteners (customer supplied).
4. Torque fasteners to proper specification.



SPRING BEAMS

1. Obtain the LH and RH spring beam assemblies.
2. Install beams into front hangers using the 20MM bolts and locknuts. Be sure to install one each of the 2111301 Wear Spacers on each side of each spring beam. Snug fasteners, but do not tighten.



AXLE INSTALLATION AND PREPARATION

1. Place axle with predrilled holes in correct position that will accept the LH and RH Lower Air Spring Support Assemblies (LASSA).

2. Carefully align the center hole in the piston of each air spring with the hole in the LASSA.

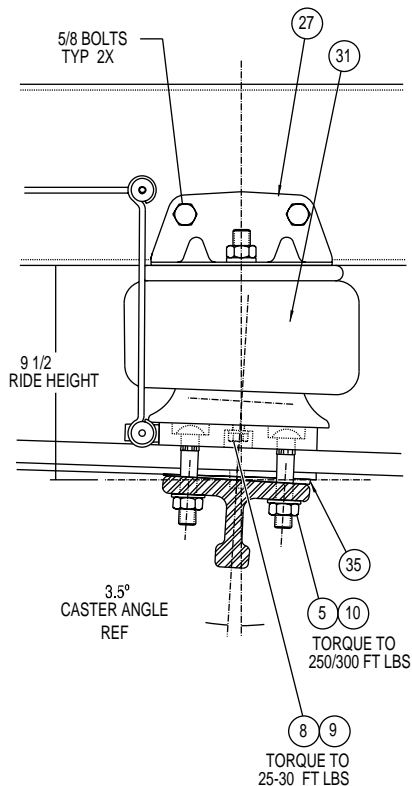
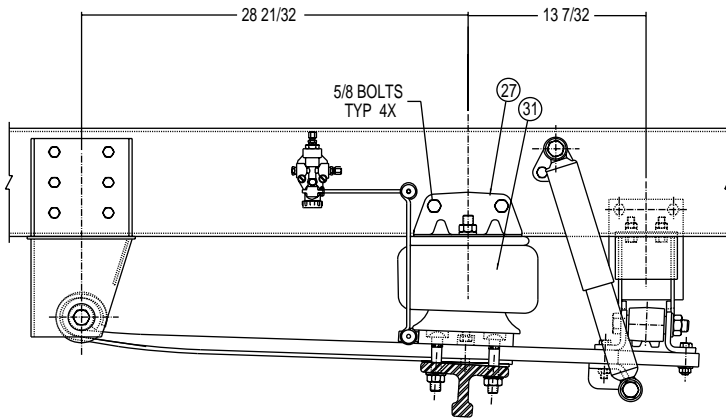
3. Install the 1/2 capscrew and the lockwasher thru the LASSA and into the piston. Torque to 25-30 ft.lbs.

4. With all parts in proper location, guide bolts in LASSA past spring beams and thru axle holes. Loosely install the 3/4 locknuts and flatwashers.

5. When all parts are together and square, torque the 3/4 locknuts to 250-300 ft.lbs. in a criss-cross sequence, in 50 ft.lb. increments to load the bolts evenly.

6. Obtain the Lower Track Rod Brackets, and the Lower Shock Bracket, L.H. and install these on the Left Hand spring beam using the 1/2 bolts, and the locknuts. Torque the locknuts to 110-120 ft.lbs.

7. Install the Lower Shock Bracket, R.H., similarly, on the RH beam.

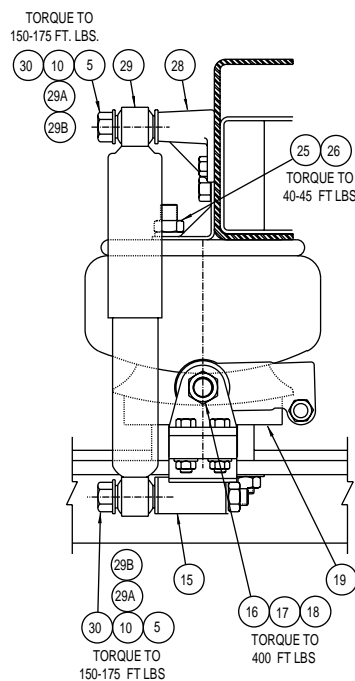
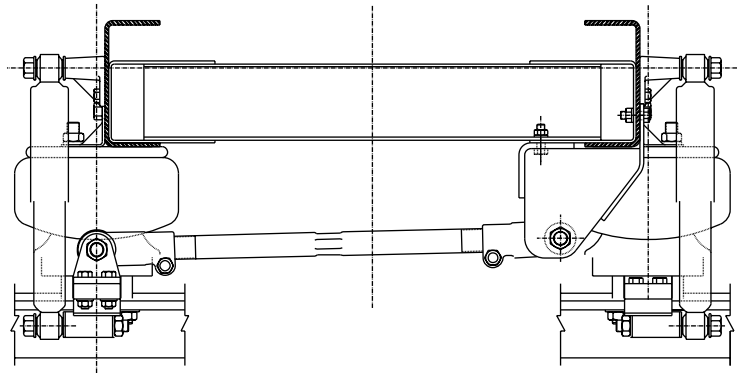


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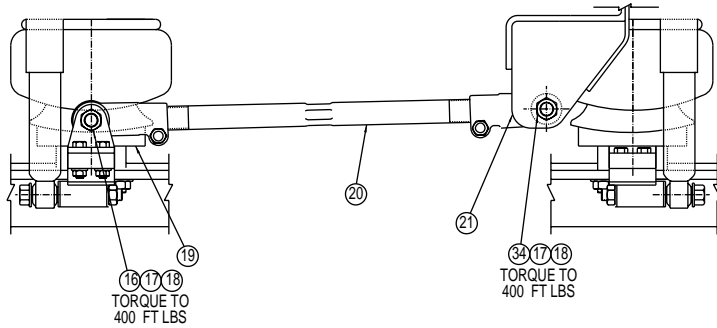
SHOCK ABSORBER

With the axle blocked-up roughly at ride height, perform shock absorber installation.

1. Obtain the RH and LH Upper Shock Absorber Brackets.
2. Install the brackets on each side of frame, using 1/2 fasteners (customer supplied), loosely.
3. Obtain the Shock Absorbers. With the large end up, install the 3/4 bolt with one 3/4 flatwasher on each side of shock bushing. Insert through the upper bracket and frame, and then install the 3/4 locknut, loosely.
4. Complete the upper shock installation on the other side.
5. Using one 3/4 bolt, one 3/4 flatwasher on each side of shock bushings, and 3/4 locknut, similarly install the lower end of the both shocks in lower brackets on the LH and RH axle bottom plates.
6. Tighten all 3/4 locknuts at the ends of the shock absorbers to 150-175 ft.lbs.
7. Tighten the 1/2 upper shock bracket nuts to OEM's spec.



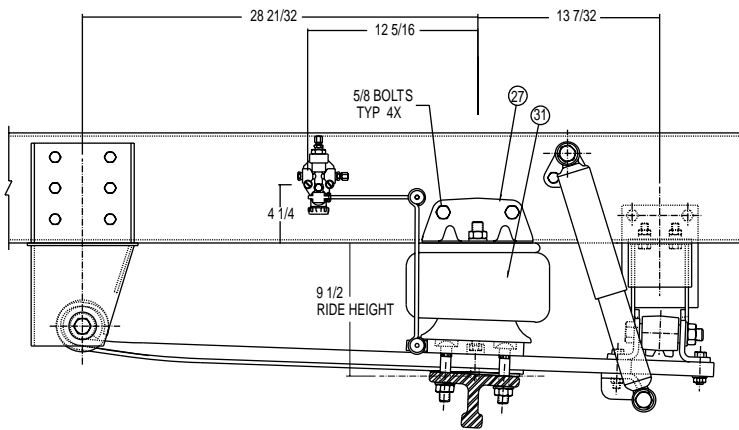
TRACK ROD INSTALLATION, AXLE END



1. Obtain the applicable track rod, and install the 7/8 bolts, 7/8 flatwashers, 7/8 locknuts, at each end. Snug the 7/8 locknuts, but do not tighten.

2. With the suspension at proper ride height, tighten the 7/8 track rod end nuts to 400-425 ft.lbs.

3. With the track rod adjusted to optimum length (spring beams parallel and centered), tighten the track rod clamp nuts to 125-150 ft.lbs.



HEIGHT CONTROL VALVE INSTALLATION

1. One height control valve (HCV) and linkage assembly is used to control each air spring. The air springs and HCVs are connected by 1/4 minimum inside diameter tubing (customer furnished). Ensure the valve is positioned properly, per the print (as there are several variations).

2. Each HCV is attached to the sides of the frame by drilling two 7/32 holes in the frame, as shown in the print.

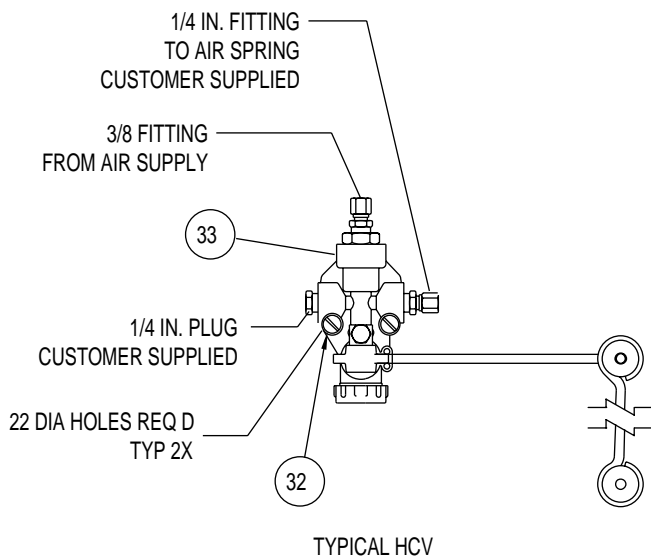
3. Tighten the self-threading 1/4 bolts to 5 ft.lbs.

4. Assemble the linkages, per the assembly drawing. The lower linkage is attached to a bracket on each LASSA.

5. Tighten all TTT (ReycoGranning) furnished 1/4 nuts to 5 ft.lbs.

6. The air supply for the suspension should be taken from an air supply reservoir. Position the brake Pressure Protection Valve/Filter between the reservoir and the HCV.

7. As with any air pressure system, when plumbing is completed, check for leaks and eliminate leakage.



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HEIGHT CONTROL VALVE ADJUSTMENT (FOR UNITS EQUIPPED WITH ADJUSTABLE VALVES)

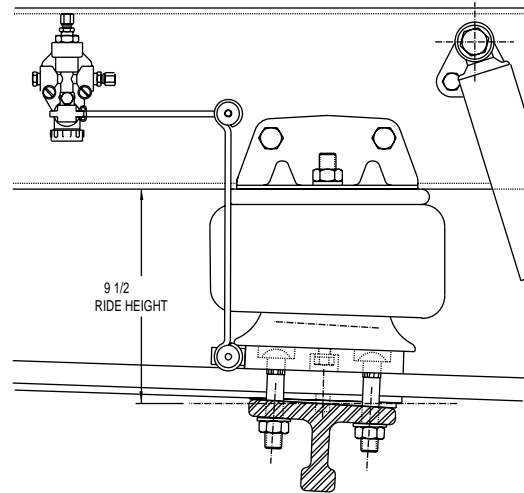
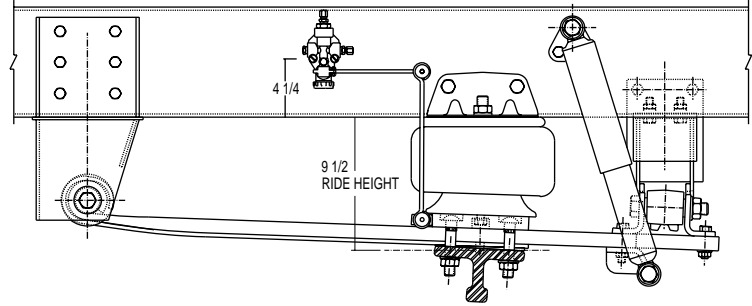
1. Position the assembled, unladen vehicle on a level floor with air pressure of 90+ psi, available to the system.

2. Disconnect linkages, and exhaust all air from the springs.

3. Connect the links to both valves, and let the springs inflate. Measure frame-to-top-of-T axle distance. If correct, no adjustment is needed. If incorrect, use adjustment feature on links or on HCVs.

4. Recheck by disconnecting the links and deflating the spring. When the links are reconnected, the springs should reinflate to the proper ride height.

Note: 9.5 is standard. Ride height varies with applications, check owners manual.



The Model 510AR suspensions require, by design, a minimum of maintenance. However, suspensions in normal operation require periodic checks to assure continued trouble-free performance.

TORQUE REQUIREMENTS (Verify with each inspection.)

With the air system operating, make sure all fasteners are tightened to the following levels:

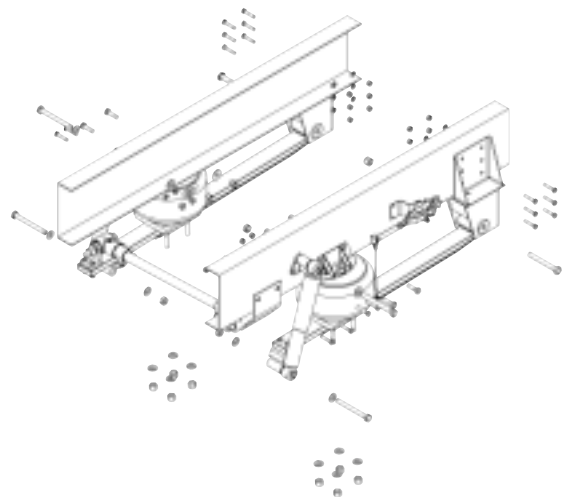
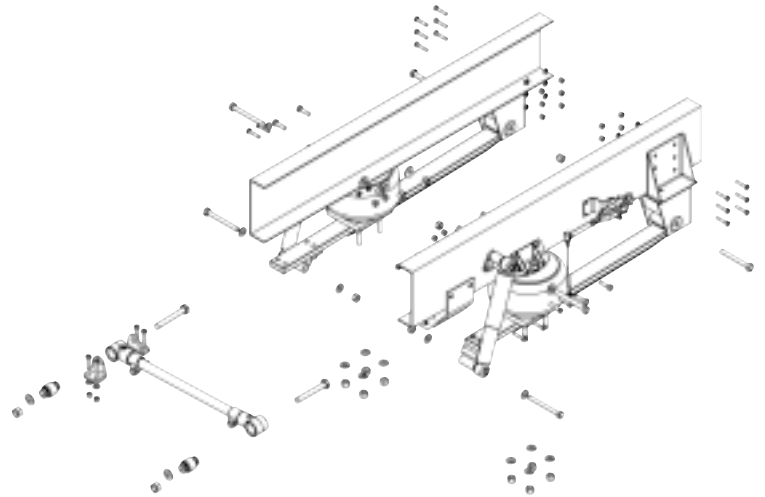
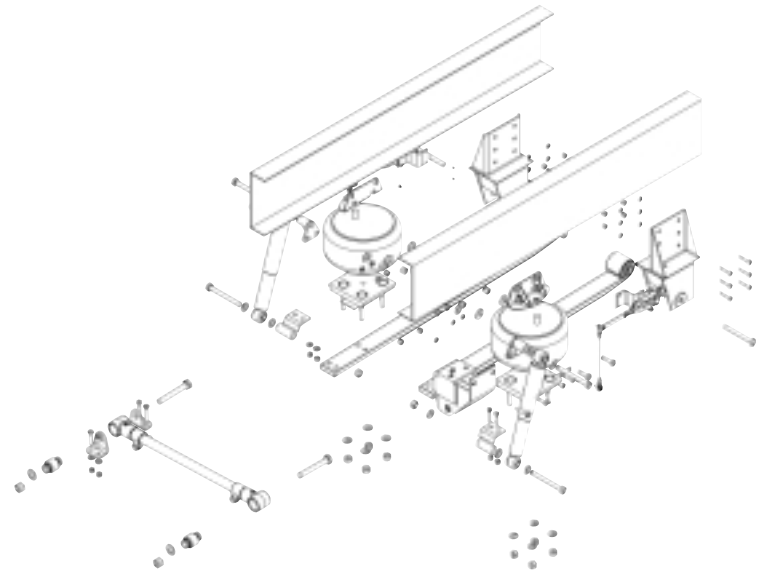
1. LASSA-to-Axle Nut, (3/4")	250-300 ft-lb	(340-410 Nm).
2. Front Spring Beam Pivot Nut, (20MM)	300-325 ft-lb	(410-440 Nm).
3. Shock Absorber End Nut, (3/4")	150-175 ft-lb	(205-240 Nm).
4. Track Rod End Nut, (7/8")	400-425 ft-lb	(545-580 Nm).
5. Track Rod Clamp Nut, (5/8")	125-150 ft-lb	(170-205 Nm).
6. Lower Shock/Track Rod Bracket Nut (1/2")	110-120 ft-lb	(150-165 Nm).
7. Upper Air Spring Mount Nut, (3/4")	40-45 ft-lb	(55-60 Nm).
8. Lower Air Spring Mount Bolt, (1/2")	25-30 ft-lb	(35-41 Nm).
9. Air Valve and Linkage Nut, (1/4")	5 ft-lb	(7 Nm).

ft lb = Foot - Pounds; Nm = Newton - Meters

Installation Instructions Model 510AR

SUSPENSION ASSEMBLY OVERVIEW

1. Organize suspension components.
2. Attach air springs/shock absorbers, height control valve and hangers to the frame.
3. Attach spring beams to suspension.
4. Attach track rod.



MAINTENANCE SCHEDULE, REQUIREMENTS & INSPECTION _____ ○ m.1

Maintenance Schedule _____ ○ m.1

Torque Requirements _____ ○ m.1

Visual Inspection _____ ○ m.1

TROUBLE SHOOTING GUIDE _____ ○ m.3

General _____ ○ m.3

Air Control System _____ ○ m.4

BILL OF MATERIAL _____ ○ m.5

SUSPENSION DRAWING _____ ○ m.6

94122#5V _____ ○ m.6

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Product Installer Responsibilities _____ ○ m.7

Product Owner Responsibilities _____ ○ m.8

Warranty Claim Procedures _____ ○ m.8

Maintenance Instructions Model 510AR

The Model 510AR suspensions require, by design, a minimum of maintenance. However, suspensions in normal operation require periodic checks to assure continued trouble-free performance.

RECOMMENDED MAINTENANCE SCHEDULE

1. Pre-service inspection.
2. First service inspection, after 1000-3000 miles (1600-4800 km).
3. PM inspections, required annually.
4. During replacement of any service parts.
5. Upon discovery of any loose components.

TORQUE REQUIREMENTS (Verify with each inspection.)

With the air system operating, make sure all fasteners are tightened to the following levels:

1. LASSA-to-Axle Nut, (3/4")	250-300 ft-lb	(340-410 Nm).
2. Front Spring Beam Pivot Nut, (20MM)	300-325 ft-lb	(410-440 Nm).
3. Shock Absorber End Nut, (3/4")	150-175 ft-lb	(205-240 Nm).
4. Track Rod End Nut, (7/8")	400-425 ft-lb	(545-580 Nm).
5. Track Rod Clamp Nut, (5/8")	125-150 ft-lb	(170-205 Nm).
6. Lower Shock/Track Rod Bracket Nut (1/2")	110-120 ft-lb	(150-165 Nm).
7. Upper Air Spring Mount Nut, (3/4")	40-45 ft-lb	(55-60 Nm).
8. Lower Air Spring Mount Bolt, (1/2")	25-30 ft-lb	(35-41 Nm).
9. Air Valve and Linkage Nut, (1/4")	5 ft-lb	(7 Nm).

VISUAL INSPECTION

1. Loose or missing fasteners.
2. Cracks in hangers or axle connection brackets.
3. Springs, centered in hangers and in good condition.

All torque values are with clean, dry fasteners and should only be verified with a quality wrench, of known accuracy. Failure to follow these recommendations could void warranty. Failure to maintain the specified torque values and/or to replace worn parts, can cause component and/or system failure resulting in an accident with consequent injury.

ft lb = Foot - Pounds; Nm = Newton - Meters

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Drive Axle Suspension System—Trouble Shooting—General		
Symptoms	Possible Causes	Remedies
Excessive vehicle roll or lateral movement (side to side movement)	Loose or worn spring beam pivot connection(s).	Tighten (see previous torque chart) or replace as required.
	Worn out spring beam pivot bushing(s).	Replace as required.
	Axle "U"-bolts loose.	Tighten (see previous torque chart) or replace.
	Worn or loose track rod.	Tighten or replace track rod.
Hard ride or axle bottoming out	Air suspension not operational.	Check height control valve(s).
	Incorrect ride height.	Adjust to correct ride height.
	Vehicle overloaded.	Reduce drive axle load.
	Defective height control valve(s).	Replace height control valves as required.
	Height control linkage disconnected or damaged.	Reattach or replace as required.
Tire hop or poor handling.	Loose or worn shock absorbers.	Tighten or replace shock absorbers.
	Incorrect tire pressure.	Correct tire pressure.
	Mismatched tires.	Install matched tires.
Prematurely worn front tires.	Incorrect ride height.	Adjust to correct ride height.
	Incorrect alignment.	Correct alignment. Note: There is no realignment feature on this suspension. The hangers will need to be repositioned, if serious misalignment conditions exist.
	Bushings worn.	Check bushings for splits, tears, or excessive wear. Replace is necessary.

Air Control System—Trouble Shooting		
Symptoms	Possible Causes	Remedies
Air compressor runs excessively.	Air leaks.	Inspect all air lines, fittings, and air springs with a soapy water solution. Repair, retighten, or replace as required. Note: Plastic air lines must be cut square. See Air Control System Parts List (General Notes) for additional notes.
	Internal air leak in height control valve.	Insert exhaust tube into a cup of water and examine for bubbles. This will show evidence of both inlet and exhaust valve leaks. Replace components.
	Brake pressure protection valve malfunctioning.	Check operation and replace if necessary.
	Height Control Valve stuck in the exhaust position.	Locate obstruction and remove or relocate interference.

Maintenance Instructions Model 510AR

ITEM	PART NUMBER	DRAWING NO.	DESCRIPTION	SINGLE	REMARKS
1	2267301	96119	HANGER ASSEMBLY, LH	1	VARIABLE
2	2267302	96119	HANGER ASSEMBLY, RH	1	VARIABLE
3	2111301	94024	SPACER, WEAR	4	
4	2301701	91014	BOLT, M20x2.5 x 140 GR 10.9	2	
5	1434401	93282	LOCK NUT, 3/4-16 UNF GR C	12	
6	2115203	94048#3	SPRING BEAM ASSEMBLY, LH	1	
7	2115204	94048#4	SPRING BEAM ASSEMBLY, RH	1	
8	2245501	62158	CAPSCREW, 1/2-13 UNC X 2, GR 5	2	
9	T1705	62159	LOCK WASHER, 1/2	2	
10	2085201	93403	FLAT WASHER, 3/4 (CLOSE FIT)	12	
11	2149101	94230	BRACKET, TRACK ROD	2	
12	1735301	62158	BOLT, 1/2-20 UNF X 2 1/2 GR 8	2	
13	1735701	93281	LOCK NUT, 1/2-20 UNF GR C	6	
14	1001601	71078	FLAT WASHER, 1/2	2	
15	2115901	94055#1	LOWER SHOCK ABS. BRACKET, LH	1	
16	1763701	62158	BOLT, 7/8-9 UNC X 5	1	
17	1009201	93281	LOCK NUT, 7/8-9 UNC	2	
18	T7292	71078	FLAT WASHER, 7/8	2	
19	2115501	94051#1	LOWER AIR SPRG SUPPORT ASSY, LH	1	VARIABLE
20	2130001	87109	TRACK ROD, ADJUSTABLE	1	
21	2117504	94068#4	TRACK ROD HANGER BRKT ASSY	1	
22	2115502	94051#1	LOWER AIR SPRG SUPPORT ASSY, RH	1	VARIABLE
23	T1851	62158	BOLT, 1/2-20 UNF X 2 GR 5	4	
24	2115902	94055#1	LOWER SHOCK ABSORBER BRKT, RH	1	
25	0821101	93280	NUT, 3/4-16 UNF GR 5	2	
26	T3164	62159	LOCK WASHER, 3/4	2	
27	2116202	94058#1	UPPER AIR SPRING BRKT	2	
28	1825701	89465	UPPER SHOCK ABSORBER BRACKET	2	
29	20960-01	79168 #1	SHOCK ABSORBER	2	STANDARD
29A	1288202	79169	SLEEVE-SHOCK ABSORBER BUSHING	4	
29B	1289502	93403	WASHER-SHOCK ABSORBER BUSHING	8	
30	1524601	82069	BOLT, 3/4-16 UNF X 6 GR 8	4	
31	2242501	79167#3	AIR SPRING	2	
32	2016101	92289	SELF TAPPING SCREW, 1/4 X 2 1/2	4	
33	2291301	96259	HEIGHT CONTROL VALVE	2	VARIABLE
34	1735601	62158	BOLT 7/8-9 UNC X 5 1/2 GR 5	1	
35	2000901	85004	SHIM 1.5"	2	
36	2301801	94064	LOCKNUT- M20x2.5 CLASS 1094064	2	

Maintenance Instructions Model 510AR

Tuthill Transport Technologies (TTT) (The Company) warrants ReycoGranning suspension products manufactured by it to be free from defect in material and workmanship which occur under normal use and service subject to the following conditions and limitations.

Trailer suspension models: 21B Cast, 21B Fab, 44AR, 44AR/RS1020, 74B, 86AR, 86AR/RS1015, 86AR/RS1035, 86/88, and 91. (See ReycoGranning InnovAir Warranty for models with axles.)

Powered Vehicle suspension models: 79KB, 102 series, 102AR, 240AR, 510AR, 510P, 610AR, 900 and 1200.

1. Coverage is per below in months or in miles depending upon which occurs first. *

Months	Mileage	Coverage Provided
0-12	0-100,000	Cost of Parts and Labor Allowance
13-60	100,001-500,000	100% Cost of Parts Only

*Products designed and used for off-road have six months or 50,000-mile coverage only.

2. This warranty shall not apply and no warranty of any kind shall exist as to any product which has been subject to abuse, misuse, neglect, misapplication or accident of any type or cause or which has been repaired, replaced, substituted or used with parts other than genuine parts of The Company or has been altered by anyone.

3. The Company shall not be liable for the loss of use of any product, loss of time, inconvenience, commercial loss or any other indirect consequential, special or incidental damages due to breach of the above warranty of any other failure to comply with the terms of the contract between The Company and The Buyer, The Company makes no warranties of any kind, express or implied, other than as herein expressly provided, and specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

4. With respect to parts manufactured by others, The Company shall have no duty except to assign to the buyer any claim which The Company may have against the manufacturer thereof. (TTT warrants purchased components to the same extent as the Warranty extended by the original manufacturer to TTT). This warranty does not apply to the normal "wearing out" of rubber bushings, shock absorbers, etc., or sacrificial wear areas such as springs to hangers.

5. The determination of the reasonable cost of labor as required in paragraph one (1), shall be made in accordance with the TTT shop standard times. Maximum hourly allotment for labor cost is determined by TTT annually. Shop standard times and the maximum hourly allotment for labor cost may be revised periodically at the sole discretion of The Company.

6. The Company is not responsible for damages from improper installation or operations beyond design capability. The Company in its sole discretion shall determine whether or not any product is defective or otherwise covered by this warranty. No action for breach of this warranty may be commenced more than one year after the occurrence of alleged breach. This warranty is not transferable.

7. Retention of possession or use of the product for the warranty period shall constitute an unconditional acceptance thereof and fulfillment of all warranties and obligations of TTT and no assistance rendered by The Company in operating the product or remedying any defect either before or after that time shall operate to extend the warranty period.

PRODUCT INSTALLER RESPONSIBILITIES

8. Installer is responsible for installing the product in accordance with The Company specifications and installation instructions.

Installer is responsible for providing proper vehicle components and attachments as well as required or necessary clearance for suspension components, axles, wheels, tires, and other vehicle components to ensure a safe and sound installation and operation.

Installer is responsible for advising the owner of proper use, service and maintenance required by the product and for supplying maintenance and other instruction as readily available from The Company.

PRODUCT OWNER RESPONSIBILITIES

9. Owner is solely responsible for pre-operation inspection, periodic inspections, maintenance, and use of the product as specified in the particular TTT instructions available by product model, except as provided in this warranty, and for maintenance of other vehicle components. Of particular importance is the re-torque of fasteners including axle u-bolts, torque rod bolts and track rod bolts. This re-torque must be performed within 90 days of the suspension being put in service. Owner is responsible for "down time" expenses, cargo damage, and all business costs and losses resulting from a warrantable failure.

WARRANTY CLAIM PROCEDURES

10. For a claim to be considered it must contain adequate documentation which states vehicle mileage, starting date, product model, where and how used, and a TTT Return Material Authorization Number. This claim must be made within six months of failure of the component. Such part or parts must be returned to TTT, transportation charges paid. TTT reserves the right to inspect any returned components to determine cause of defects.

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