



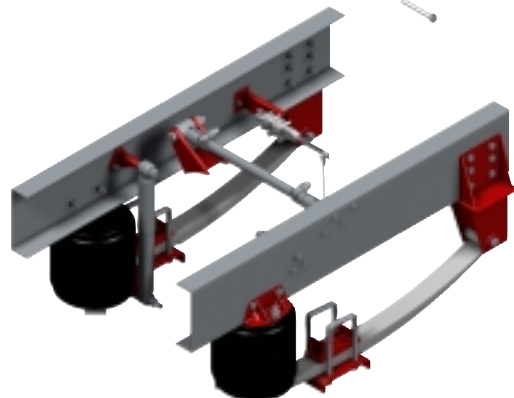
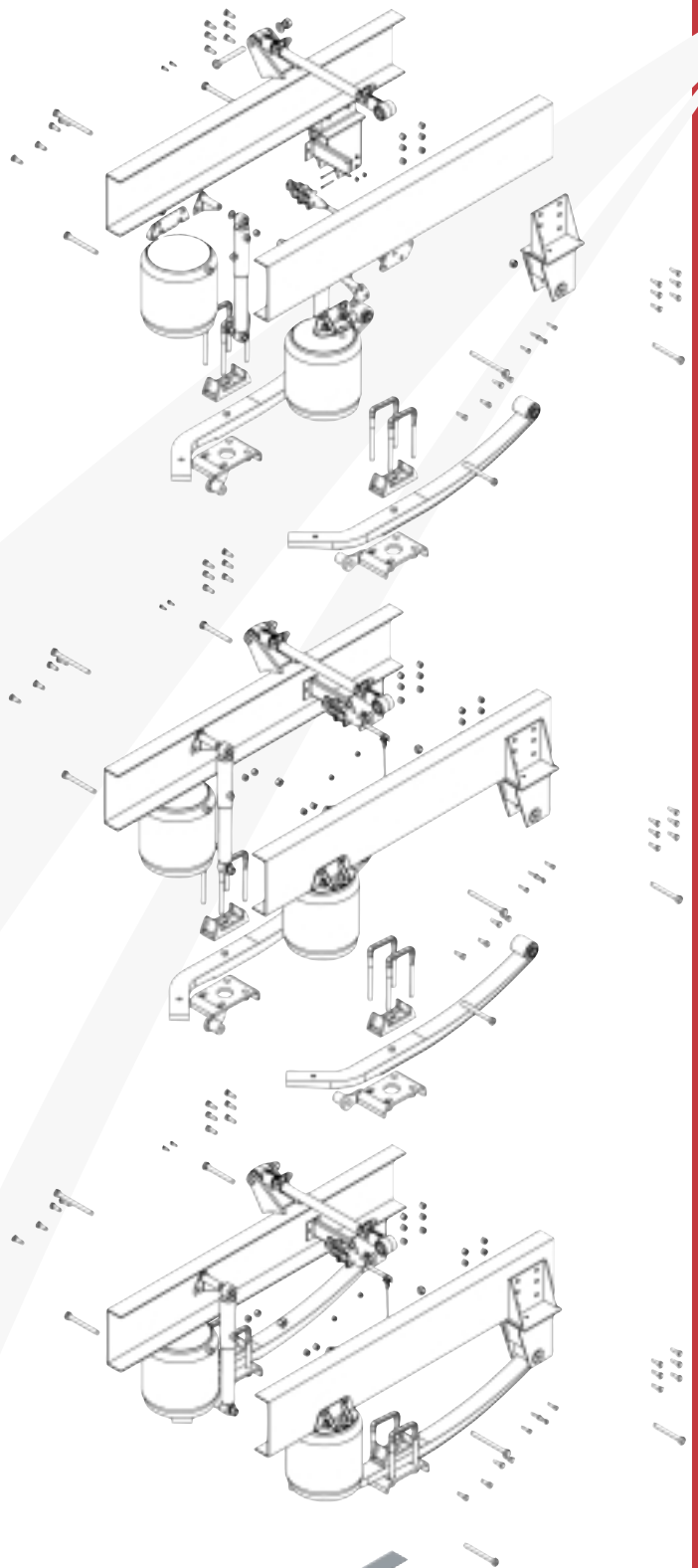
Model 610AR

Installation and

Maintenance Instructions

Drive Axle Air-Ride

Suspension System



Installation Instructions Model 610AR

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.

SAFETY PROCEDURES & INFORMATION ○ i.1

SAFETY FIRST ○ i.1

OPERATOR SAFETY ○ i.1

Lifting ○ i.1

Parts Handling ○ i.1

Welding ○ i.1

SUSPENSION SAFETY ○ i.2

Overloading the suspension ○ i.2

Torque ○ i.2

SUSPENSION INFORMATION SECTION ○ i.3

SUSPENSION INSTALLATION SECTION ○ i.4

Front Hangers ○ i.4

Upper Air Spring Brackets ○ i.4

Track Rod Bracket (Frame) ○ i.5

Spring Beams ○ i.6

Air Springs ○ i.6

Axle Seats ○ i.7

Shock Absorbers ○ i.7

Track Rod Bracket (Axle) ○ i.8

Track Rod ○ i.8

Height Control Valve ○ i.9

Height Control Valve Adjustment ○ i.10

FINAL INSTALLATION TORQUE REQUIREMENTS ○ i.11

SUSPENSION ASSEMBLY OVERVIEW ○ i.12

Installation Instructions Model 610AR

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

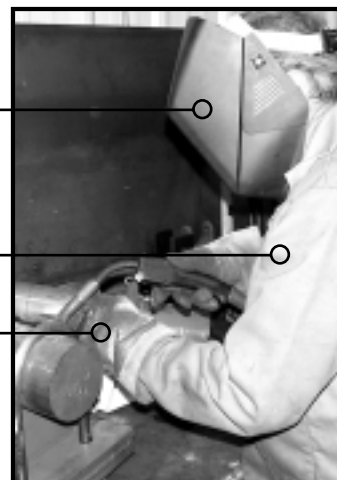
When welding, be sure to wear all personal protective equipment for face and eyes, and have adequate ventilation. When welding, protect spring beams and air springs from weld spatter and grinder sparks. Do not attach "ground" connection to springs.

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

Welding Helmet

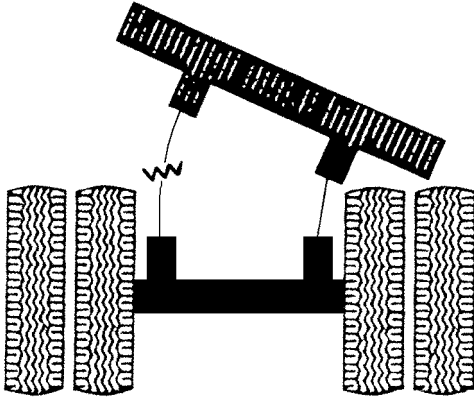
Welding Apron

Welding Gloves





WARNING



OVERLOADING

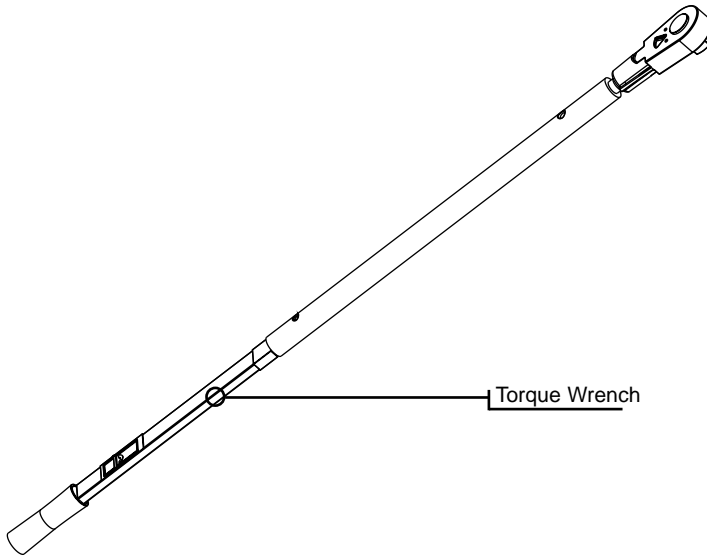
Overloading is the practice of transporting cargos that surpass the specified vehicle's ratings. Overloading can cause component failure, resulting in accidents and injuries.



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 610AR

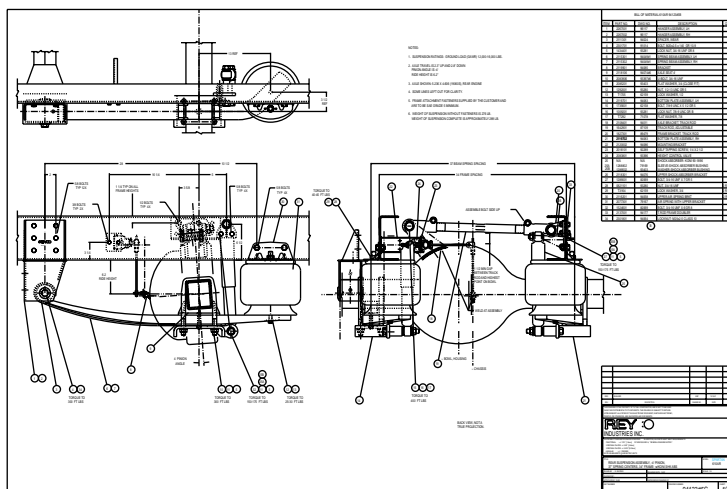
Normally, prior to any installations at an OEM, engineering contacts between companies have been made and all necessary information to make the installation, has been exchanged. However, the following steps are listed in the interest of all concerned, and should be included in any OEM plan to install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

PRIOR TO INSTALLATION

1. The mounting height for the standard Model 610AR is 6.0 to 6.5 . This height represents the distance from the bottom of the chassis to the centerline of the axle. See Reyco drawing # 94123 (page **m.6**), for details. This version shown is designed for rear engine installations.

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

Note: There are several versions, so be sure to get proper version for application.) Reyco drawing # 94132 has information on frame drilling for this suspension.



2. The maximum axle capacity should be matched for compatibility with the Model 610AR s capacity range of 12000 to 16000 pounds.

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

NOTE: Refer to REYCO assembly drawing.

4. The chassis should be of suitable design for the suspension to be installed. A crossmember which ties the left hand (LH) and right hand (RH) hanger mounting positions together is required.

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

IMPORTANT: Since this system does **NOT** have an alignment feature, special attention should be exercised to maintain alignment during the installation process.

SUSPENSION INSTALLATION

FRONT HANGERS

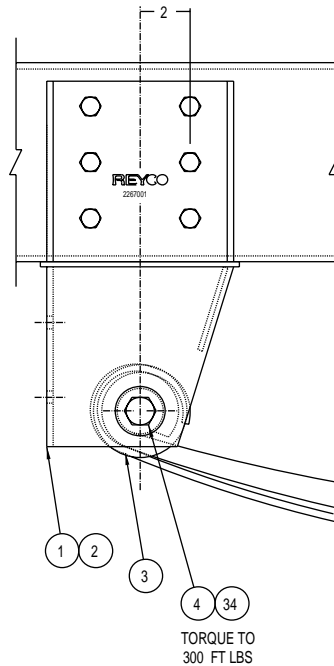
1. The distance between the outer sides of the chassis rails is 34.0 , which results in a spring center spacing of 37.0 . However, dimensions may vary by model, check print.

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

2. Locate LH and RH Hangers (1, 2) on side of frame, per assembly drawing. Recheck location and squareness, and install proper 5/8 fasteners (customer supplied).

3. Torque hanger mounting bolts to proper specifications, (Customer Specs).

NOTE: Item numbers (in circles) refer to part numbers listed on Drawing # 94123, sheet 10.



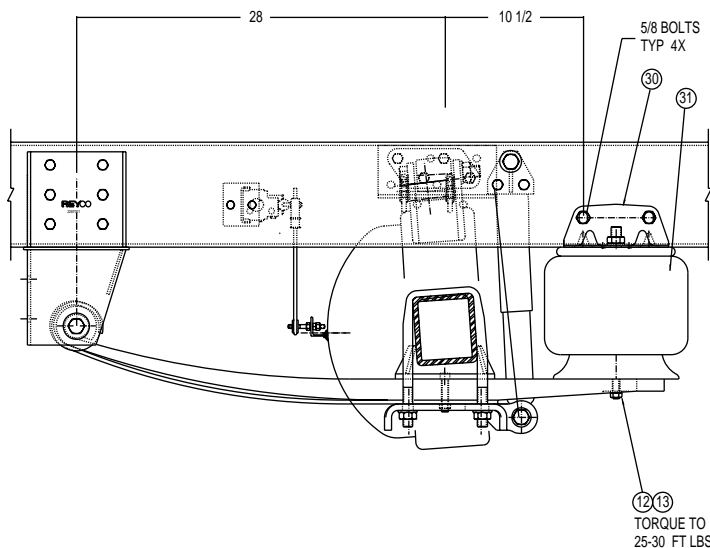
UPPER AIR SPRING BRACKETS, WITH AIR SPRINGS ATTACHED

1. Obtain LH and RH Upper Air Spring Brackets (30), (with air springs 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.



Installation Instructions Model 610AR

TRACK ROD BRACKET, FRAME MOUNTING

1. Obtain Track Rod Bracket (20) that mounts to frame. Note: location varies with seat angles, and type of rod used.

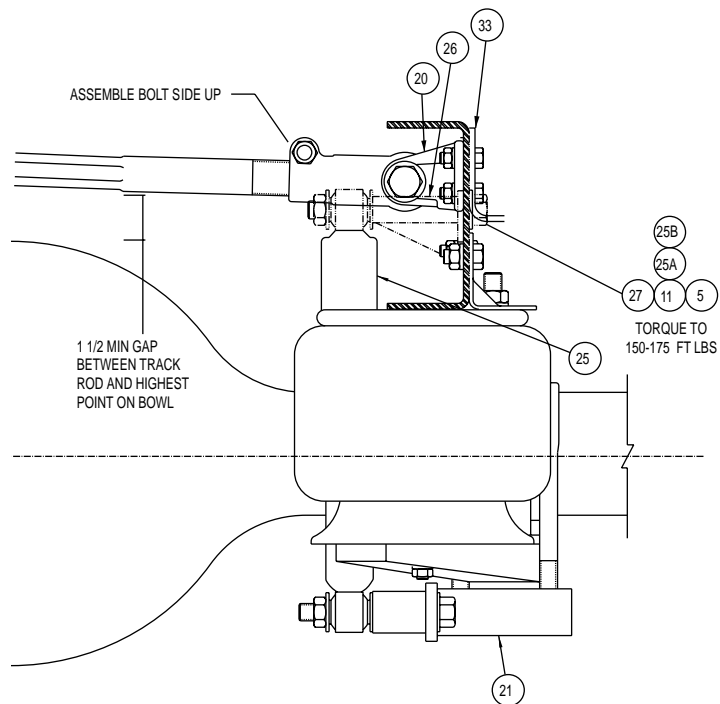
2. Depending upon application, locate on frame per print.

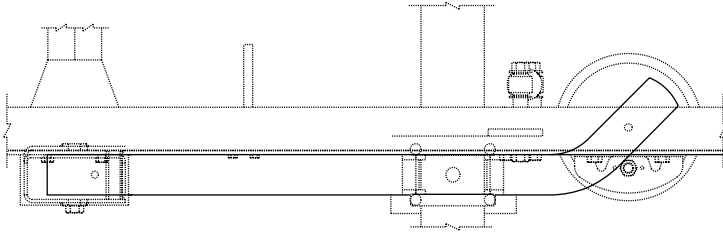
3. If using optional 2137001 Frame Doubler (33) install it.

NOTE: TTT recommends using doubler if no previous history exists.

4. Install proper 1/2 fasteners (customer supplied).

5. Torque fasteners to proper specification.

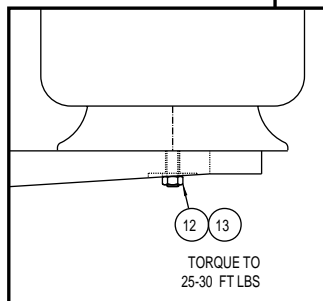
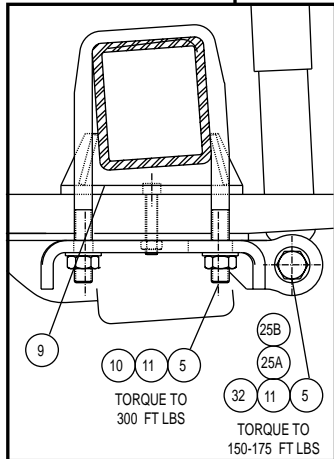
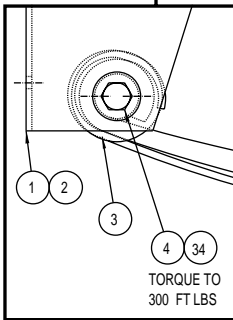
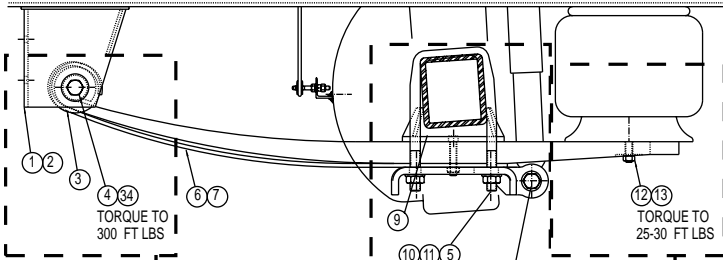




SPRING BEAMS

1. Obtain LH and RH spring beam assemblies(6), (7)

2. Install beams into front hangers using 20MM bolts (4) and locknuts (34). Be sure to install one each of the 2111301 Wear Spacers (3) on each side of each spring beam. Snug fasteners, but do not tighten.



AIR SPRING ASSEMBLY:

1. Align stud provided at lower piston of each air spring (31), with hole in each spring beam assembly.

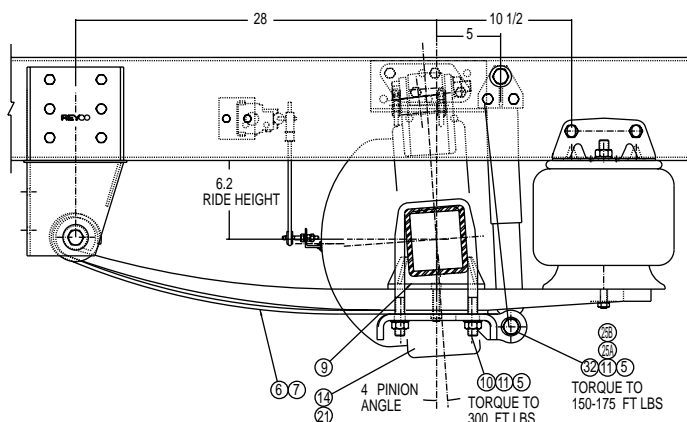
2. Install 1/2 lockwasher (12) and nut (13) onto each stud, and torque to 25-30 Ft-lbs.

Installation Instructions Model 610AR

AXLE SEATS AND AXLE

1. Obtain proper axle, LH and RH axle seats (9), and bottom plate assemblies (14), (21) with all parts in proper location guide U-Bolts (10) around axle, aligning seats, and thru bottom plates. Loosely install the 3/4 locknuts (5) and flatwashers (11), to the U-Bolts.

2. When all parts are together torque the 3/4 locknuts to 300-325 Ft-lbs. Use criss-cross sequence, in 50 Ft-lb increments to load the 3/4 U-Bolts evenly.



SHOCK ABSORBER INSTALLATION

1. Obtain the RH and LH Upper Shock Absorber Brackets (26).

2. Install the brackets on each side of the frame, using 5/8 fasteners (customer supplied), loosely.

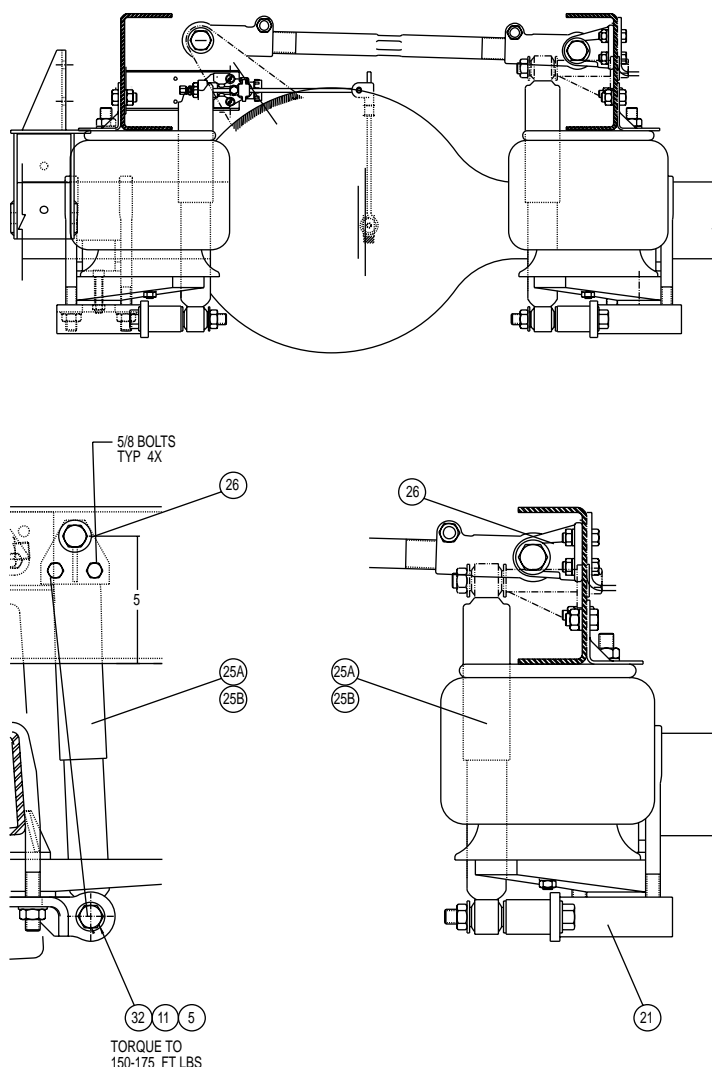
3. Obtain shock absorbers (25) and with large end up, install one 3/4 bolt (32), (11), with one 3/4 flatwasher (11) on each side of the rubber shock bushing. Insert through the upper shock bracket and frame, and then install the 3/4 locknut (5).

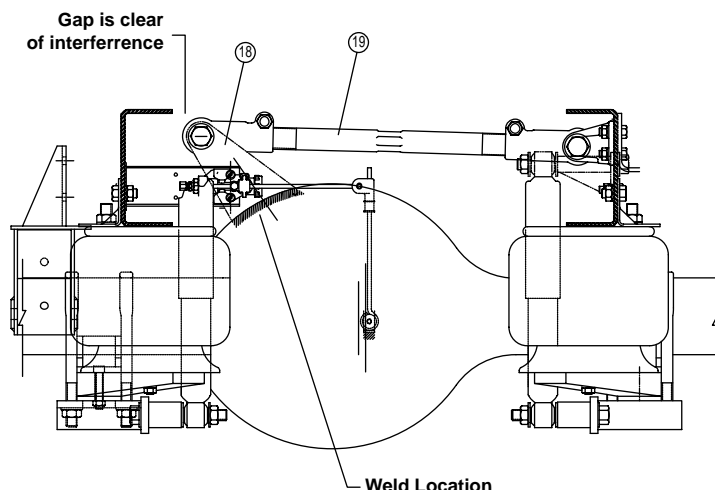
4. Complete the upper shock installation on the other side.

5. Using one 3/4 bolt (32), (11) the 3/4 flatwashers (11) on each side of the shock bushing, and 3/4 locknut (5). Similarly install the lower end of both shocks into the lower brackets on the LH and RH axle bottom plates (14, 21).

6. Tighten the 3/4 locknuts at the ends of the shock absorbers to 150-175 Ft-lbs.

7. Tighten the 5/8 upper shock bracket nuts to OEM's spec.





WITH THE AXLE BLOCKED UP ROUGHLY AT RIDE HEIGHT, PERFORM:

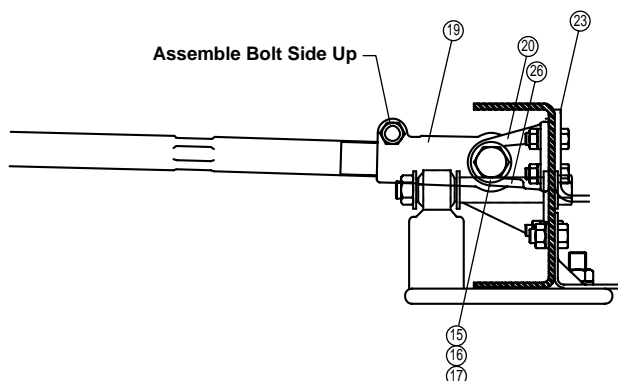
TRACK ROD BRACKET, AXLE MOUNTING:

1. Obtain Track Rod Bracket (18), that mounts to axle. Note: location varies with frame width, seat angles, etc.

2. Depending upon application, locate on axle per print.

NOTE: This location must be done at proper ride height. Track Rod should be as level as possible at ride height.

3. When all is properly located, weld to axle per print on page **m.6**.



TRACK ROD INSTALLATION:

1. Obtain the applicable track rod (19), and install the 7/8 bolts (15), 7/8 locknuts (16), and flatwashers (17), at each end. Snug the 7/8 locknuts, but do not tighten.

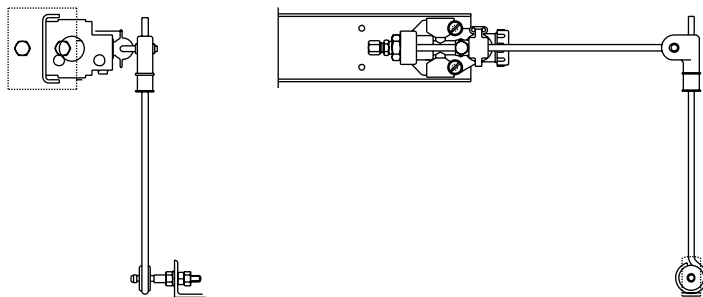
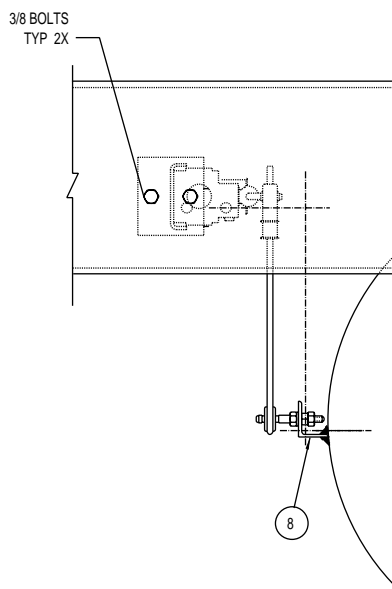
2. With the suspension at proper ride height, tighten the 7/8 track rod end nuts to 400-425 Ft-lbs.

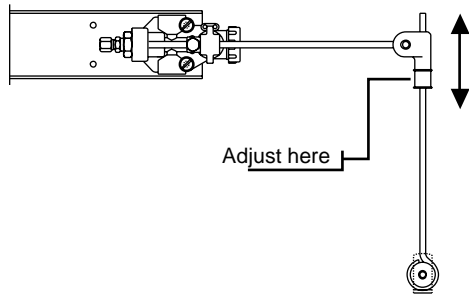
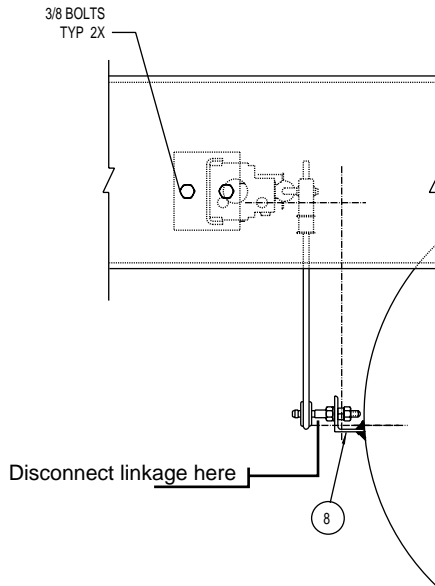
3. With the track rod adjusted to optimum length (spring beams parallel and centered), tighten the track rod clamp nuts to 125-150 Ft-lbs.

Installation Instructions Model 610AR

**HEIGHT CONTROL VALVE
INSTALLATION**

1. One height control valve (HCV)(24) and linkage assembly (35) is used to control the drive axle. The air springs and HCV s are connected by 1/4" minimum inside diameter tubing (customer furnished). Ensure the valve is positioned properly, per the print (as there are variations).
2. The HCV is attached to the sides of the frame by utilizing the mounting bracket included (22). This is attached by 3/8" bolts (customer furnished). Tighten to specs.
3. Assemble the linkages, per the assembly drawing. The linkage is attached to the axle differential bowl using the mounting bracket included (8). Locate properly and weld to axle bowl.
4. Tighten all ReycoGranning furnished 1/4" nuts to 5 Ft-lbs.
5. The air supply for the suspension should be taken from an air supply reservoir. Position the Pressure Protection Valve/Filter between the reservoir and the HCV.
6. As with any air pressure system, when plumbing is completed, check for leaks, and eliminate leakage.





HEIGHT CONTROL VALVE ADJUSTMENT (FOR UNITS SO EQUIPPED)

1. Position the assembled, unladen vehicle on a level floor with air pressure of 90+ psi, available to the system.
2. Disconnect linkage and exhaust all air from the springs.
3. Reconnect the linkage, and let the springs inflate. Measure frame-to-axle centerline distance. If correct, no adjustment is needed. If incorrect, use adjustment feature on linkage, or on HCV.
4. Recheck by disconnecting the linkage and deflating the spring. When the linkage is reconnected, the springs should reinflate to the proper mounting height.

Installation Instructions Model 610AR

The Model 610AR 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.)

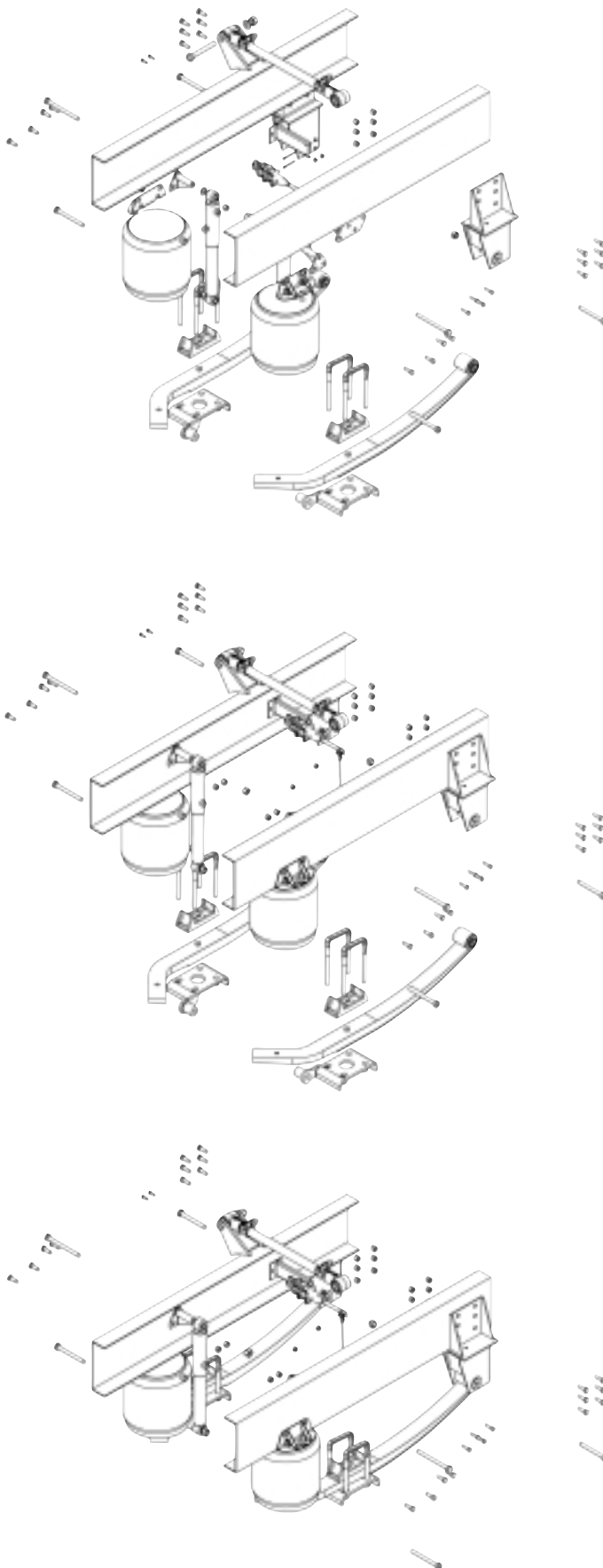
With the air system operating, make sure all fasteners are tightened to the following levels:

1. U-Bolt Nuts, (3/4")	300-325 Ft-lbs.	(410-440 Nm).
2. Front Spring Beam Pivot Nut, (20MM)	300-325 Ft-lbs.	(410-440 Nm).
3. Shock Absorber End Nut, (3/4")	150-175 Ft-lbs.	(205-240 Nm).
4. Track Rod End Nut, (7/8")	400-425 Ft-lbs.	(545-580 Nm).
5. Track Rod Clamp Nut, (5/8")	125-150 Ft-lbs.	(170-205 Nm).
6. Upper Air Spring Mount Nut, (3/4")	40-45 Ft-lbs.	(55-60 Nm).
7. Lower Air Spring Mount Nut, (1/2")	25-30 Ft-lbs.	(35-41 Nm).
8. Air Valve and Linkage Nut, (1/4")	5 Ft-lbs.	(7 Nm).

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

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.2

TROUBLE SHOOTING GUIDE _____○ m.3

BILL OF MATERIAL _____○ m.5

SUSPENSION DRAWING _____○ m.6

94123#5B _____○ m.6

LIMITED WARRANTY _____○ m.7

Product Installer Responsibilities _____○ m.7

Product Owner Responsibilities _____○ m.8

Warranty Claim Procedures _____○ m.8

Maintenance Instructions Model 610AR

Maintenance Schedule						
General Maintenance	Service to be Performed	Mileage in Thousands				
		3	24	48	72	96
Spring Beam Pivot Connection	Check nut torque	X				
	Inspect for worn bushings		X	X	X	X(1)
	Inspect for signs of looseness due to worn parts		X		X	X(1)
Axle Connection	Check "U"-bolt nut torque	X	X	X	X	X(1)
Shock Absorbers (2)	Inspect for signs of fluid leak, broken eye ends, loose fasteners, or worn bushings	X	X	X	X	X(1)
Air Springs	Inspect for proper clearance (1" minimum all around).	X				
	Check mount nut torque	X				
	Inspect for signs of chafing or wear	X	X	X	X	X(1)
	Check for air line fitting torque	X				
	Inspect for air leaks using soapy water solution	X				
Height Control Valve Linkage	Inspect for signs of bending, binding, or slippage	X	X	X	X	X(1)
Air Fittings and Air Lines	Inspect for air leaks using soapy water solution	X				
	Inspect for signs of chafing, cracking, or wear	X	X	X	X	X(1)

(1) - Continue to perform specified maintenance every 24,000 miles.

(2) - Shock absorbers are a component part of the ReycoGranning suspension system. Light misting of fluid on body of shock absorber is not a failure. Fluid dripping from the body of the shock absorber is a failure.

See your vehicle s owners manual for instructions regarding the maintenance of wheels and tires.

Wheel lug nuts must be retightened to proper torque specifications as per the vehicle or chassis manufacturer s Owner Guide.

The Model 610AR 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. U-Bolt Nuts, (3/4")	300-325 Ft-lbs.	(410-440 Nm).
2. Front Spring Beam Pivot Nut, (20MM)	300-325 Ft-lbs.	(410-440 Nm).
3. Shock Absorber End Nut, (3/4")	150-175 Ft-lbs.	(205-240 Nm).
4. Track Rod End Nut, (7/8")	400-425 Ft-lbs.	(545-580 Nm).
5. Track Rod Clamp Nut, (5/8")	125-150 Ft-lbs.	(170-205 Nm).
6. Upper Air Spring Mount Nut, (3/4")	40-45 Ft-lbs.	(55-60 Nm).
7. Lower Air Spring Mount Nut, (1/2")	25-30 Ft-lbs.	(35-41 Nm).
8. Air Valve and Linkage Nut, (1/4")	5 Ft-lbs.	(7 Nm).

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

Maintenance Instructions Model 610AR

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 springs beam pivot bushing(s).	Replace as required.
	Axle "U"-bolts loose.	Tighten (see previous torque chart) or replace.
Hard ride or axle bottoming out	Air suspensions not operational.	Check height control valves.
	Incorrect ride height.	Adjust to current 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.

Air Control System—Trouble Shooting		
Symptoms	Possible Causes	Remedies
Air compressor runs excessively.	Air leak.	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.
	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.

m.5 Drive Axle Air-Ride Suspension System

[illegible]

Maintenance Instructions Model 610AR

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.

The Road To Success Is Quality Customer Care...



1-800-753-0050 (USA)

1-800-811-4011 (CAN)

1-417-837-0423 (Intn'l)

www.tuthill.com

CANADA

Grimsby, Ontario
241 South Service Road
Grimsby, Ontario L3M 1Y7
(800) 811-4011
(905)945-2234
Fax (905)945-5906

INDIANA

Brookston
9098 West 800 South, P.O. Box 600
Brookston, Indiana 47923
(800) 255-7824
Fax (219) 279-2390

MISSOURI

Springfield
2715 N. Airport Commerce, P.O. Box 2268
Springfield, MO 65803
(800)753-0050, Fax (800)753-1095
(417)862-4343, Fax (417)837-0401
International - (417) 837-0423, Fax (417) 837-0485

Mount Vernon

1205 Industrial Park Drive
Mount Vernon, MO 65712
(417)466-2178, Fax (417)466-3964



TUTHILL
Transport Technologies