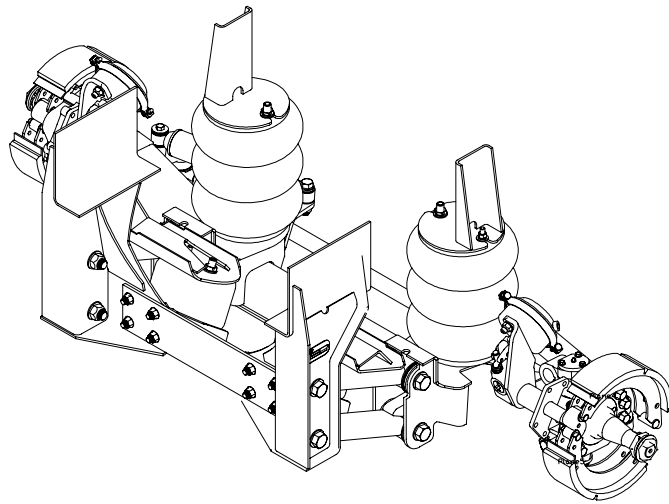
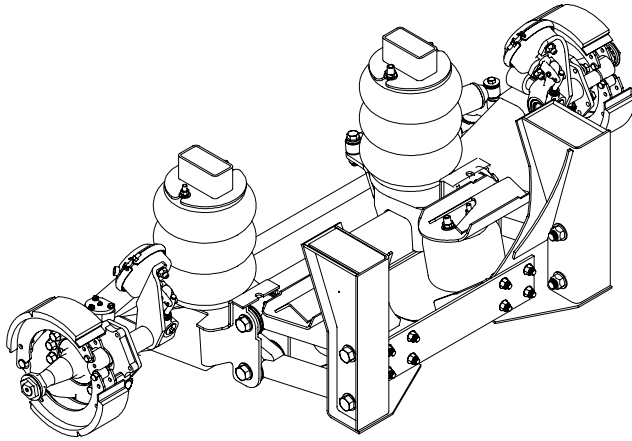


MAXIMISER[®]

By **Reyco**
Granning
SUSPENSIONS

INSTALLATION & OPERATION MANUAL L<132 Suspension System



Produced by



TUTHILL
Transport Technologies

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INTRODUCTION

Founded in 1948 by one of the pioneers of air suspensions, Granning Air Suspensions supplies auxiliary and primary air suspensions to heavy duty original equipment manufacturers and aftermarket users. This experience has been incorporated into the L132/LT132 MaxiMiserTM suspension system. The L132/LT132 MaxiMiserTM suspension system is installed to maximize your payload, increase your maneuverability, and increase your vehicle stability. With Granning's manufacturing experience, you can be assured that the L132/LT132 MaxiMiserTM suspension system was manufactured using the highest quality materials and processes available.

Granning Air Suspensions supplies the suspension system and air control system. The vehicle manufacturer supplies the brake control system for the suspension. Refer to your vehicle's operation and service manuals for detailed information regarding the operation and service of the brake system.

The following instructions are intended for use with the Granning Air Suspension Auxiliary Lifiable Air Ride Suspension product line. For instructions concerning other suspension models, contact the Granning Air Suspension Customer Service Department.

These instructions are written with the assumption that page one of the 9846 - L132/LT132 MaxiMiserTM Specification form has been completed. Completion of 9846 is required to verify the L132/LT132 MaxiMiserTM suspension will function in the desired application. 9846 takes into consideration the required capacity, loaded frame-to-ground distance, drive line clearance, axle travel and spacing. For additional information concerning suspension selection, contact the Granning Air Suspensions Customer Service Department.

SPECIAL NOTES & WARNINGS

IT IS IMPORTANT THAT THE ENTIRE INSTALLATION INSTRUCTIONS ARE READ THOROUGHLY BEFORE PROCEEDING WITH A SUSPENSION INSTALLATION.

The L132/LT132 MaxiMiser suspension system, as with all air suspensions system, must be installed with the proper amount of tire-to-ground clearance to ensure trouble free operation. Excess ground clearance will result in the suspension not carrying its intended load. Insufficient ground clearance may damage the suspension or other vehicle components.

A correct installation must result in a LOADED suspension ride height that is within the range specified on the suspension assembly drawing.

The vehicle manufacturer should be consulted before making any changes to the vehicle's frame. Alterations to the vehicle's frame rail or crossmembers that affect the manufacturer's warranty are not permitted.

Defective or incorrect components are to be returned to Granning Air Suspensions for warranty disposition and replacement.

Auxiliary Lifiable Air Ride Suspensions with factory installed axles require slack adjuster & brake adjustment and verification of bearing lubrication (oil).

It is the responsibility of the installer to ensure that the vehicle will function properly under the increased loading and weight conditions that will exist when an additional axle is installed.

It is the responsibility of the installer to determine the correct location of the suspension in order to provide the proper vehicle load distribution. The load carried by each axle must not exceed the rated capacity of the components involved. However, Granning Air Suspensions can provide recommendations for suspension location based on data provided by the installer. The information provided will be only as accurate as the data provided by the installer.

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It is the responsibility of the installer to ensure that proper clearances exist between:

- * The drive shaft and the auxiliary axle(if applicable). (see Figure 1)
- * Tires - laterally, fore & aft and vertically
- * Air springs when they are at their maximum diameter (one (1) inch minimum clearance).

No welding of any of the suspension components is permitted except where specified by Granning Air Suspensions.

No alteration of any of the suspension components is permitted.

In order to comply with FMVSS 121, additional air reservoirs that may be required to handle the additional air chamber and air spring volumes are the responsibility of the installer.

Any installation deviations must be approved, in writing, by Granning Air Suspensions Product Engineering Department. Failure to comply with any of the above will void the suspension warranty.

PRE-INSTALLATION CHECK LIST

Before beginning the installation, the following items should be reviewed:

Check that the suspension about to be installed matches the specification provided by your Production or Engineering Department.

Vehicle auxiliary suspension location check list:

- a) Verify that the axle location conforms to Federal and local bridge laws.
- a) Verify that the self steer axle location is based on; front axle steer angle, vehicle wheel base and minimum recommended auxiliary axle spacing.
- b) Verify that the frame width is within the allowable mounting range of the suspension, 35.0 to 33.5 inches.
- c) Mark the wheel center of the lift axle on the vehicle frame.
- d) Mark the approximate location of the suspension frame hangers and upper air spring pads. Check for interferences with any existing bracketry, mounting bolts, or components already mounted or to be mounted to the vehicle frame.
- e) Verify that the vehicle crossmembers are correctly positioned for proper support of the suspension.
- f) Check for any interference between the axle and the drive shaft, if applicable. (see Figure 1)

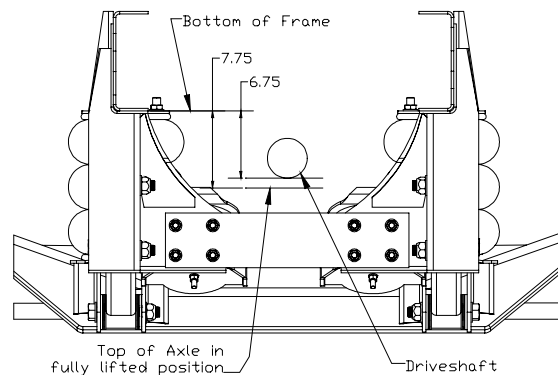


Figure 1

Confirm that the components listed on the suspension assembly drawing have been provided in sufficient quantities. Contact the Granning Air Suspensions Customer Service Department if any missing or damaged components are found.

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FRAME HEIGHT VARIATIONS

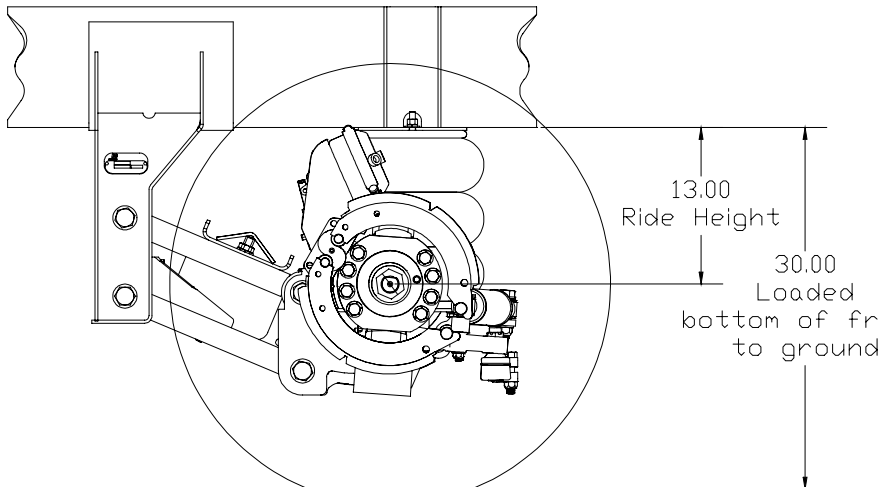
The L132/LT132 MaxiMiserTM suspension is designed to accommodate a wide range of vehicle frame heights (loaded frame to ground). The suspension ride height in conjunction with the vehicle's loaded frame to ground measurement will determine the allowable loaded tire radius (tire size).

To determine the correct tire size, perform the following calculation:

$$\text{Loaded Frame-to-Ground Measurement} - \text{Designed Ride Height} = \text{Required Loaded Tire Radius}$$

NOTE: Loaded Frame-to-Ground Measurement must be measured at the intended suspension location of **LOADED** Vehicle.

Granning Air Suspensions defines the suspension "ride height" as the distance between the suspension mounting surface (bottom of the vehicle frame rail) and the spindle center of the auxiliary liftable axle (See Figure 2).



A correct installation requires that the installed suspension ride height be no longer than the 13.00 inches when the vehicle is in its **LOADED** condition. A shorter ride height is allowed and is determined by the amount of tire clearance required by the end user.

If the tire's static loaded radius added to the suspension ride height is shorter than the loaded bottom of frame to ground measurement, a frame lowering spacer is required.

FRAME WIDTH VARIATIONS

The L132/LT132 MaxiMiserTM auxiliary liftable air-ride suspension can accommodate various vehicle frame widths. However, the width variation cannot be adjusted beyond the range stated on the suspension assembly drawing #9833. While the suspension cannot be mounted if the frame width exceeds the drawing specification, an undersized frame width can be compensated for through the use of spacers. If spacers are used, the suspension must be centered to the vehicle centerline.

SUSPENSION MOUNTING - Vehicle

The instructions in this section assume that the pre-installation checklist was thoroughly reviewed. It is important that the vehicle be located on a flat level surface during installation of the suspension.

1. Determine the location of the auxiliary axle wheel center on the vehicle frame rail and mark this location. The location marks must be referenced from a hanger bolt or similar feature on the vehicle frame. The marks should be directly opposite each other on the frame to assure suspension squareness. Measure forward and mark a mounting line to align the suspension hangers for positioning the suspension on the vehicle frame. This is the alignment mark that will be used during installation. Refer to the suspension assembly drawing and mark the boundary areas of the auxiliary suspension mounting surfaces on the vehicle frame. (See Figure 3).

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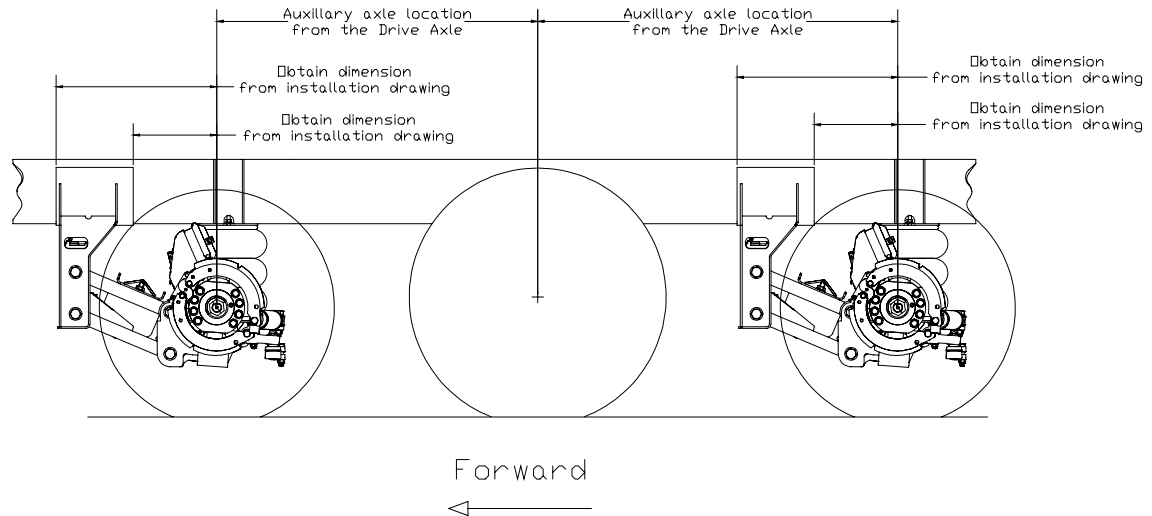


Figure 3

3. Allowances should be made at this time for correcting any interference's that occur between the auxiliary suspension mounting surface and any existing frame bolts or brackets (located in the marked boundary areas). The auxiliary suspension side rail(s) can be drilled to accommodate existing bolts. Notching the side rail(s) to clear bolts or brackets requires Granning Product Engineering approval.
4. Refer to the suspension assembly drawing to verify that vehicle crossmembers and backing plates are positioned correctly relative to the intended axle location.

IMPORTANT! - Failure to properly support the suspension or reinforce the vehicle frame can result in premature failure and loss of warranty coverage.

Required For Non-unitized Suspension Assembly (assembled by installer) - otherwise, go to step 14.

5. Mark and drill the crossmember per the chart on the installation drawing, based on the vehicle frame width.

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6. Install the crossmember and lower lift air spring pad assemblies to each suspension hanger, trailing arm and saddle assembly using the supplied appropriate fasteners and snug.
7. Set the distance between the hanger mounting angles to match the vehicle frame width (Refer to the suspension assembly drawing). Verify the hangers are square to the crossmember. The hangers must be vertically parallel to one another to assure squareness of the suspension during installation onto the vehicle frame.
8. Tighten the crossmember bolts to 180 ft.-lbs.
9. Install the lift air springs by aligning and inserting the upper air spring studs into the slots on the upper air spring plate on the upper trailing arms as shown on the installation drawing. Align and insert the lower air spring stud with the hole in the lower air spring pad assembly and install fasteners.
10. Install the upper & lower control arms into the hanger assemblies. See the installation drawing for spacer placement per frame width and hardware used. Snug pivot bolts but **DO NOT TORQUE** at this time.
11. Assemble upper & lower control arms to axle assembly. See the installation drawing for spacer placement per frame width and hardware used. Snug pivot bolts but **DO NOT TORQUE** at this time.
12. Check axle alignment by measuring the distance from the axle hub face and the side of the upper or lower trailing beam on each side and compare the difference. Adjust by moving spacers (part # 310 & 311) **all of the spacers are used** to the inside or outside of the upper & lower control arms until each side measures the same within 1/8".
13. Raise axle until control arms are parallel to the ground and torque pivot bolts to 660 - 720 ft.-lbs.
14. Verify side to side alignment after torquing. Adjust if required.
15. Check steering stops. See Figure 4 page 9. Failure to do so could result in damage to the stabilizer shocks.

For Unitized (pre-assembled w/ axle installed) Suspension Assembly

16. With the vehicle crossmembers and backing plates correctly positioned, raise the auxiliary suspension into position, using the previously marked hanger location lines as the locator. Refer to the installation drawing.
17. Once the suspension is located at the desired position, secure the suspension to the vehicle frame rail with vertical and horizontal (width of the frame rail) clamps and spacers as required.
18. **IMPORTANT!** - The entire auxiliary suspension mounting surfaces must set flush with both the side and bottom of the vehicle frame rails or spacers. Failure to do so will void all of the suspension warranty.
19. The L132/LT132 MaxiMiserTM auxiliary suspension was designed without an alignment feature to ease in the installation of the suspension. Therefore it is at the utmost importance the auxiliary suspension remain aligned (parallel to) to the other axles on the vehicle during the entire installation process. Verify the alignment of the suspension using a trammel bar or linear measuring instrument. Adjust the suspension location as needed.
20. With the suspension mounting angles tight against the vehicle frame, mark the location of the mounting holes on the outward side of both auxiliary suspension hanger mounting angles. Punch mark all hole centers. (See the supplied suspension assembly drawing for recommended hole locations)
21. **IMPORTANT!** - Do not drill or bolt through the bottom flange of the vehicle frame rail. Check with chassis manufacturer for their warranty disclaimer on vehicle frame modifications.

22. **CAUTION!** - Inspect vehicle frame rail for any obstruction (i.e. fuel lines, wiring harness and brake lines) that might be located on the backside of the frame rail and adjust accordingly before drilling.
23. Drill one 21/32" diameter hole through the auxiliary suspension hanger mounting angle, vehicle frame rail and the customer supplied backing plate. Inspect the suspension for location, fasten with one 5/8" Grade 8 flange bolt and 5/8" Grade G prevailing-torque type steel hex flange nut and tighten snugly.
24. Drill, install and tighten snugly the remaining fasteners (5) on the one side.
25. Inspect the opposite side of the suspension for the perpendicularity and parallelism between the vehicle frame rail and the suspension hangers. Repeat steps #18 and #22 for the opposite side of the suspension.
26. Tighten the hanger and frame bolts to 180 ft.-lbs.
27. Remove the horizontal and vertical clamps on both sides of the vehicle frame rail.
28. Position the upper air spring plate assembly under the vehicle frame rail per drawing #9833, page 1. Once the assembly is located at the desired position, secure the assembly to the vehicle frame rail with vertical and horizontal (width of the frame rail) clamps and spacers as required.
29. With the upper air spring plate assembly tight against the vehicle frame rail, mark the location of the mounting holes on the outward side of the assembly. Punch mark all hole centers. (See the supplied suspension assembly drawing for recommended hole locations)
30. Drill one 21/32" diameter hole through the upper air spring assembly and the vehicle frame rail. Inspect the upper air spring plate assembly for location, fasten with one 5/8" Grade 8 flange bolt and 5/8" Grade G prevailing-torque type steel hex flange nut and tighten snugly.
31. Drill, install and snug the remaining fastener on the other side.
32. Tighten the upper air spring pad bolts to 180 ft.-lbs.
33. Align and insert the upper air spring studs into the slots on the upper air spring plate assembly. Align and insert the lower air spring stud with the hole in the saddle assembly and install fasteners.

AIR KIT INSTALLATION

For L132/LT132 MaxiMiserTM suspension systems, Air Kit #9915 is the only air kit available.

The following notes apply to all Granning Air Suspensions air control kits:

1. Do not add lubrication to air system.
2. All connections must be checked for leaks. Sealant should be applied to all fittings. **DO NOT USE TAPE SEALANT.** Pieces of tape sealant can be introduced into the air system and cause valve leakage or malfunction. Any leaks observed must be repaired.
3. Avoid sharp bends or loops in the air lines that can restrict air flow or collect moisture that will freeze in cold weather.
4. SAE J844 air brake tubing and fittings are to be furnished by the installer unless otherwise specified. It is recommended that all air tubing be protected with loom. Fitting and mounting bolt kits are available as options. Contact Granning Customer Service for ordering.

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FINAL ASSEMBLY

1. Install wheels and tighten wheel nuts per manufacturer's specifications.
2. Check wheel end lubrication level.
NOTE: Wheel hub bearing oil and/or grease not provided by Granning Air Suspensions.
3. Install brake lines per the chassis manufacturer's specifications.
4. Adjust brakes by rotating the 7/16 hex extension on the slack adjuster clockwise until the brake shoe contacts the brake drum. Once the shoe has contacted the drum, rotate the hex extension counterclockwise 1/2 turn. Rotate the wheels to assure free to rotation.
NOTE: Axles purchased from Granning Air Suspensions require brake adjustment.

FINAL, PRE-SERVICE, AND PERIODIC INSPECTION

Before the truck is placed into service, the following items should be inspected.

Suspension Bolt Torque

Check that all suspension nut torque's are to Granning Air Suspensions specifications.

Air Kit Function

Check air kit installation for leaks and proper valve function.

Air Springs

Articulate the suspension through its entire travel with wheels and tires installed to assure that adequate component clearances (i.e. air springs, brake chambers, etc.) have been provided. **IMPORTANT!** - With the vehicle unloaded, the ride (or down) air spring air pressure must be limited to a maximum of 30 psi to avoid improper vehicle loading or component damage.

Cycle the suspension to its fully lifted, suspension up, position and then the ride position, tires resting on the ground.

Raise the suspension again to its lift position, check both lift air springs for equal firmness. Verify clearance of one inch minimum around both lift and ride air springs. Any items interfering with the air springs must be relocated or adjustment of the air spring is required. Check air springs and connecting fittings for leaks.

Lower the suspension to the ride position, check both ride air springs for equal firmness. Verify clearance of one inch minimum around both lift and ride air springs. Any items interfering with the air springs must be relocated or adjustment of the air spring is required. Check air springs and connecting fittings for leaks.

Brake Adjustment

Brake adjustment verification is accomplished by rotating the 7/16 hex extension on the slack adjuster clockwise until the brake shoe contacts the brake drum. Once the shoe has contacted the drum, rotate the hex extension counterclockwise 1/2 turn. Rotate the wheels to assure free to rotation.

Lubrication

Apply grease to the upper beam saddle pivot joints.

Apply grease to the automatic slack adjuster and cam tube grease fittings.

Verify that the hub bearing is filled with the proper amount of oil. Indicator marks have been provided on the hubcap. If filling is required, use SAE 90W bearing lubricant.

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Wheel Nut Torque

Verify that the wheel nuts are tightened to the proper torque specifications per your vehicle owner's manual.

Toe Setting

DEFINITION

Toe is the relationship of the distance between the front of the self-steer axle tires and the distance between the rear of the tires on the same axle. When the front distance is less than the rear distance, the wheels are in a "toe-in" condition.

Toe is preset at $1/32 \pm 1/32$ toe-in. Setting and checking must be done with the axle under load.

Turn Angle - Mechanical Stop

DEFINITION

A turn angle - mechanical stop (bolt) is an adjustable fastener that limits the steer axle's turn radius angle. It is important that the stop is set with the intended wheels so no interference(s) occur. See Dim "A" Figure 4 below.

The axle turn limiting stop screw is adjusted to a minimum length of 2.00 inches for L132 and 2.25 inches for LT132 suspension for maximum turn angle to prevent over compressing the steering stabilizer shocks while still providing adequate chassis clearance. The stop screw must be adjusted properly, otherwise damage to the steering stabilizer shocks can occur.

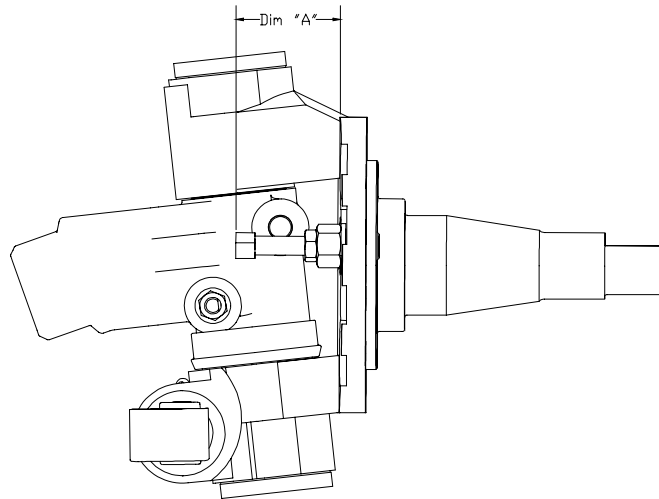


Figure 4

Castor Angle

DEFINITION

Castor angle is the fore or aft inclination of the vertical position of the steer axle's kingpin, when viewed from the side of the vehicle. Positive castor is when the top of the kingpin is positioned rearward of neutral (vertical) position. Negative castor is when the top of the kingpin is forward of the neutral position.

A castor angle of 4° is built into the L132/LT132 MaxiMiser suspension and is not adjustable.

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Periodic Inspection Timetable

General Maintenance	Service to be Performed	Mileage Interval (in thousands)				
		1	3	15	30	60 ²
Beam Pivot Connection	Check locknut torque	x	x	x	x	x
	Inspect for worn bushings		x	x	x	x
	Inspect for looseness from worn components		x	x	x	x
Air Springs	Inspect for proper clearance (1 inch minimum)		x	x	x	x
	Check mount nut torque		x			
	Inspect for chafing or wear		x	x	x	x
	Check air line fitting connections		x			
	Inspect for air leaks		x			
Air Fittings and Lines	Inspect for leaks	x	x	x	x	x
	Inspect for damage	x	x	x	x	x
Wheels and Hubs	Check wheel nut torque ¹	x	x	x	x	x
	Check hub end play	x	x	x	x	x
Brakes	Check slack setting	x	x	x	x	x
	Check brake shoe wear	x	x	x	x	x
Automatic Slack Adjuster, Brake Cam Bushings, and Saddle Pivot connection on Upper Beam	Grease ³	x ³	x ³	x ³	x ³	x ³

¹ Wheel Nut torque must be checked after the first 50 to 100 miles of service.

² Continue to perform period inspections every 15,000 miles or at regular engine service intervals.

³ Grease the brake automatic slack adjuster and the cam bushings at 2,500 mile intervals.

Axle Lubrication Schedule

Axle Component	Lubrication Interval	Lubrication Type
King Pin	3 mo. / 2500 miles	Multipurpose NLGI 2 or any good equivalent chassis lubrication
Tie Rod Ends	3 mo. / 2500 miles	Multipurpose NLGI 2 or any good equivalent chassis lubrication
Wheel Bearing Lubrication	1000 miles	EP-SAE 90 gear oil or any good equivalent petroleum base or synthetic lubricant

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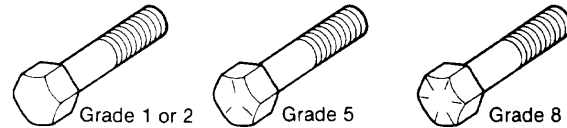
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TORQUE SPECIFICATIONS

Threaded fasteners are covered by specifications that define required mechanical properties, such as tensile strength, yield strength, proof load, and hardness. These specifications are carefully considered when a fastener is selected for a particular application. To assure continued safe vehicle performance and suspension operation, replacement fasteners used must of the same mechanical and physical properties as the fasteners originally provided.

Most fasteners have identification markings as shown that indicate the fastener strength or grade. Care must be taken to insure replacement fastener strength or grade is the same as the original fastener.



Grade Marking on Bolts



Lock Nut Grade B



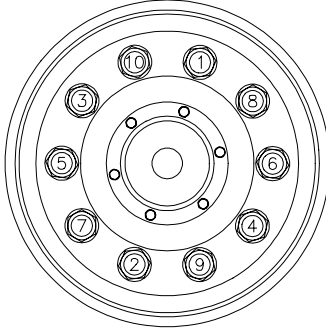
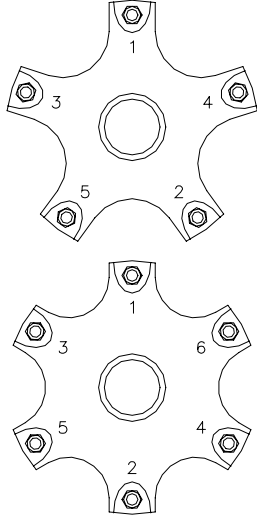
Lock Nut Grade C, G

Grade Markings on Locknuts

Application	Nut Size	Torque Specification (cleaned and lubricated)	Torque Sequence (if required)
Beam Pivot Connection	1-14 Grade G	660 - 720 ft.-lbs.	n/a
Stabilizer to Saddle Mounting Bolts	3/4-16 Grade G	40 ft.-lbs.	n/a
Stabilizer to Axle Mounting Bolts	1/2-20 Grade G	40 ft.-lbs.	n/a
Crossmember Bolts	5/8-18 Grade G Locking Flange	180 ft.-lbs.	n/a
Lift and Ride Air Spring Mounting (upper)	3/4-16 Grade 5 1/2-13 Grade 5	35 ft.-lbs. 35 ft.-lbs.	n/a n/a
Lift and Ride Air Spring Mounting (lower)	1/2-13 Grade 5	35 ft.-lbs.	n/a
Hub Cap Bolts	5/16-18 Grade 5	16 to 20 ft.-lbs.	n/a
Hub Spindle Nuts	Refer to Installtion Drawing	Refer to Installation Drawing	Refer to Installation Drawing

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	<p>Hub and Drum Type:</p> <p>Hub Piloted Hubs: M22x1.5</p> <p>Stud Piloted Hubs: 3/4-16 or 1 1/8 - 16</p>	<p>Step torque to:</p> <p>50 ft.-lbs. 450 to 500 ft.-lbs.</p> <p>50 ft.-lbs. 450 to 500 ft.-lbs.</p>	
<p>Spoke Wheel Nuts</p> <p>Verify with vehicle owners manual</p>	<p>Hub and Drum Type:</p> <p>Spoke 5 or 6: 3/4-16</p>	<p>Step torque to:</p> <p>200 to 260 ft.-lbs.</p>	

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AIR RIDE OPERATION

The Granning L132/LT132 MaxiMiserTM suspension system is controlled by regulating air pressure to the ride air springs. Air pressure adjustment is required to balance the load subjected to the other axles on the vehicle. The ride air pressure can be varied manually from the in-cab control panel. To increase suspension loading, unlock the regulator adjusting knob and rotate the knob in the clockwise direction. This will increase the ride spring pressure an amount that will correspond to the desired suspension load (see Table 1). To decrease suspension loading, unlock the regulator adjusting knob and rotate the knob in the counterclockwise direction. This will decrease the ride spring pressure an amount that will correspond to the desired suspension load (see Table 1). The air pressure used to lift the tires from the ground is not regulated.

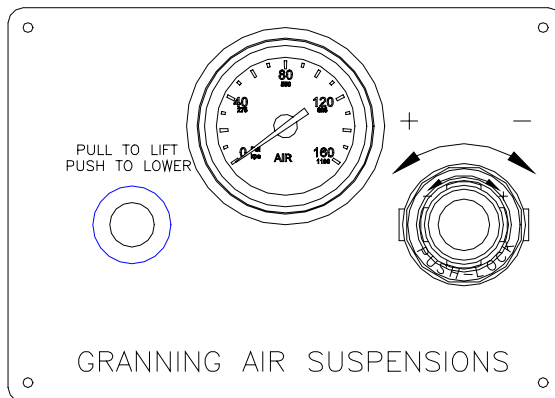


Figure 5 - Control Panel

To lift the tires from the road, move the control switch to the lift position. Adjustment of the air pressure is not required since the regulator only controls ride spring pressure. The control system uses full air system pressure to lift the tires from the road..

The suspension maximum rated capacity is 13,200 pounds. The L132/LT132 MaxiMiser suspension air control system, number 9915, is designed to automatically lift when the vehicle is shifted into reverse.

Table 1 lists the approximate ride spring pressure versus axle load. It is to be used as a guide only; to obtain accurate air pressure to load readings, the vehicle must be weighed on a certified level scale.

Table 1
Air Spring Pressure vs. Axle Load

Ride Air Spring Pressure (PSI)	Axle Load (LBS)
20	2000
40	4000
55	6000
75	8000
90	10000
110	12000
120	13200

(Values are based on a Ride Height of 13.00 in., 255/70R22.5 tire, and 30 in. Bottom of Frame to Ground)

The maximum capacity of the L132/LT132 MaxiMiser suspension system is 13,200 LBS.

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TROUBLESHOOTING

Axle System - General

Symptoms	Possible Causes	Remedies
Abnormal tire wear	Toe-In out of adjustment	Check Toe-In as described in the Manual and adjust as required
	Camber out of adjustment	Check Camber as described in the Manual
	Worn bushings	Inspect Bushing for wear and replace as required
	Worn or loose bearings	Adjust wheel end play - Refer to the Manual
	Wheel bent	Replace wheel
Tire wobble	Worn bushings	Inspect Bushing for wear and replace as required
	Worn or loose bearings	Adjust wheel end play - Refer to the Manual
	Wheel bent	Replace wheel
Air Chamber leaking	Diaphragm punctured or torn	Replace diaphragm
	Broken spring	Replace spring and diaphragm
	Impact damage	Replace air Chamber
Brake not working properly	Air chamber spring is broken	Replace spring and diaphragm in the air chamber
	Brake shoe return springs broken	Replace brake shoe return springs
	Bent push rod	Straighten or replace
	Autoslack broken	Replace
	Autoslack out of adjustment	Adjust autoslack
	Cam sticking	Lubricate the cam
	Cam bushings worn	Replace the cam bushings
	Cam and rollers worn	Replace the cam and cam rollers
	Worn brake shoes	Replace brake shoes
Suspension cycles slowly	Air control valve plugged	Replace or clean the air valve
	Pinched air line	Inspect and replace damaged air line

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WARRANTY

Granning warrants its suspensions (other than R-Series suspensions) to be free from defects in material and workmanship under normal use and service in the U.S. and Canada as follows:

Main Structural Components -- 36 months or 300,000 miles, whichever occurs first. Labor allowance is provided for 12 months or 100,000 miles, whichever occurs first. Labor will be allowed on Granning's estimated time to make repairs at a maximum rate of \$50.00 per hour. Main structural components are defined as: hangers, beams, torque arms, axle saddles, clip plates, bellows pads - excludes bushings and fasteners.

Other Air Suspension Components -- 12 months or 100,000 miles, whichever occurs first - valves, fasteners, bushings, and other components not stated specifically (when provided by Granning), and other fabricated metal components. Granning provides no warranties on components such as axles, air springs, controls, brakes, shock absorbers, and hub and drum assemblies, except to the extent of any warranty provided to Granning by the manufacturer of such components.

As used herein, the term "normal use and service" means that the suspension will be installed, operated, inspected and maintained in accordance with the applicable Granning owner's manual, and any applicable vehicle owner's manual or instructions. Labor allowance, if applicable, will be determined in accordance with Granning's warranty labor rate and time allowances established from time to time.

ADJUSTMENTS

The starting date for the above warranty period is the date of purchase of the suspension by the first end user. Proof of such date is the responsibility of the first end user. If the purchase date is not established to Granning's satisfaction, the date of manufacture determined from the suspension system's serial number shall be used as the effective starting date. When adjustment is sought under this warranty, a claim should be made by contacting the distributor or manufacturer who installed the suspension, who will coordinate the fix, documentation, parts shipment, etc. directly with Granning.

***NOTE* Granning must be notified in writing using warranty claim form promptly upon claimed defect.**

INSTALLER AND END USER RESPONSIBILITIES

The Distributor/Installer is responsible for installing the product according to Granning's approved procedures, the installer is also responsible (either directly or through its agent/dealer) for providing a copy of Granning's warranty and owner's manual to the end user, and for advising the end user of proper use, service and maintenance required for the product. The end user is responsible for operating, inspecting and maintaining the suspension according to the instructions in the Granning owner's manual and any applicable vehicle owner's manual, and for properly instructing all operators and maintenance personnel.

***NOTE* Warranty may be denied for improper installation.**

LIMITATIONS AND EXCLUSIONS

No warranty applies in the event of: use of components, parts and/or accessories not obtained from or approved by Granning or which do not meet Granning quality and performance specifications; improper installation, maintenance or repair; misuse or abuse including but not limited to overloading; or unauthorized alterations or modifications.

THE ABOVE WARRANTIES ARE SUBJECT TO THE "WARRANTY LIMITATIONS" AND "REMEDIES" SECTIONS OR GRANNING'S INVOICE TERMS AND CONDITIONS.

This policy supersedes any previous warranty statements.

9/1/95