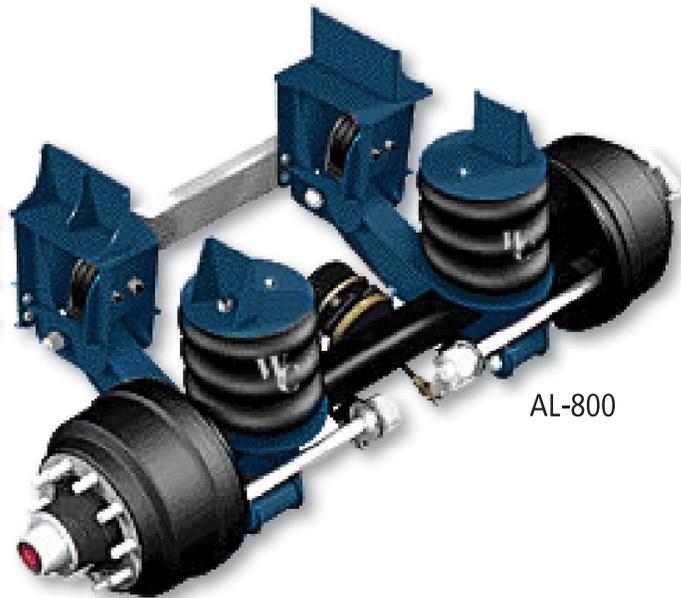
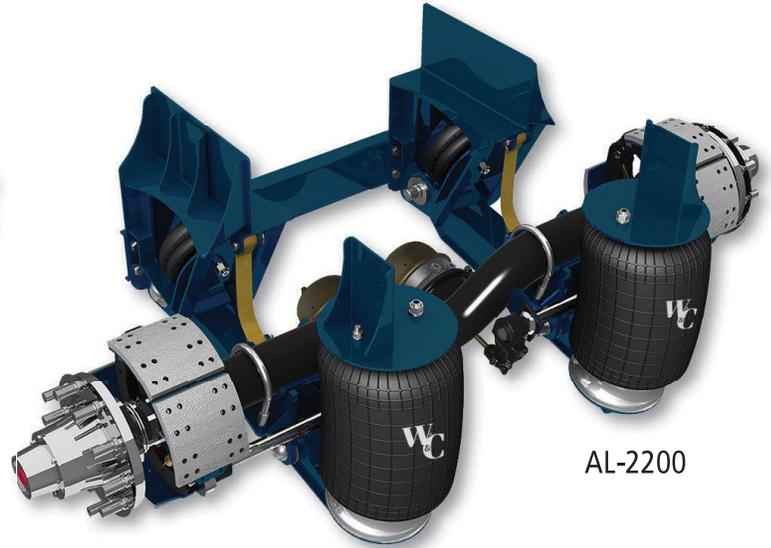
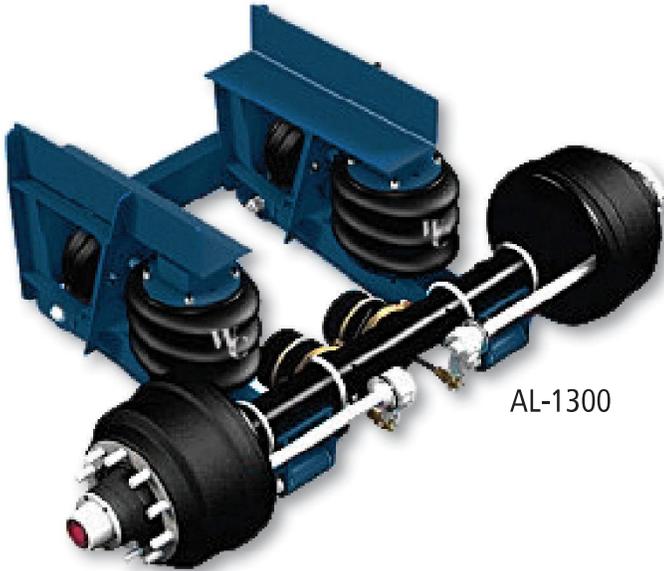


INSTALLATION AND OPERATION MANUAL

NON-STEERABLE LIFT AXLE SYSTEMS

AL SERIES



Delivering Suspension Solutions



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RIGID – NON-STEERING AXLE

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INTRODUCTION

The following instructions are intended for use with the Watson & Chalin Truck Auxiliary Lifiable Air Ride Suspension product line.

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

In writing these instructions, it has been assumed that the proper suspension has been chosen for the application (taking into consideration axle loading, ride height, axle travel and axle spacing). For additional information concerning suspension selection, contact Watson & Chalin Mfg., Inc.

WARNING!

The Watson & Chalin suspension systems, must be installed with the proper amount of tire-to-ground clearance to ensure trouble free operation. If there is too much ground clearance, the suspension will not carry its share of the load and strain suspension components. Too little ground clearance may damage the suspension or other vehicle components.

The vehicle manufacturer should be consulted before making any changes to the vehicle's frame. Typically, cutting or altering the vehicle's frame or side rail is not permitted and may affect the manufacturer's warranty coverage.

It is the responsibility of the installer to ensure that the vehicle will function properly under the increased weight conditions and loading 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 proper vehicle load distribution. The load carried by each axle must not exceed the rated capacity of the components involved.

It is the responsibility of the installer to ensure proper installation of correct brake systems components and proper braking performance.

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



Auxiliary Rigid Air Ride Suspension with factory axles require axle centering between trailing arms, welding to axle seats and U-Bolt torque, refer to Axle Mount, Axle Alignment and Torque Chart Sections.

It is the responsibility of the installer to ensure that proper clearances exist between the drive shaft and the auxiliary axle, if applicable.

No welding of any of the suspension components is permitted, except where specified by Watson & Chalin Mfg., Inc.

Proper axle attachment and alignment collar weldments are required for long and safe operations.

No alteration of any of the suspension components is permitted.

Defective or incorrect components are to be returned to Watson & Chalin Mfg., Inc., which will supply replacements for the components in question. When returning goods an RGA (Return Goods Authorization) Number must be issued by Watson & Chalin. This number must accompany all paperwork and items returned.

Any installation deviation must be approved, in writing, by Watson & Chalin Mfg., Inc 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 follow items should be reviewed:

1. Check that the suspension matches the specification provided by your Production or Engineering Department.
2. Truck or tractor frame check list:
 - a. Verify that the frame width is within the allowable mounting range of the suspension.
 - b. Locate the center of the lift axle.
 - c. Mark approximate location of the suspension frame rails and check for interferences with any existing bracketry or mounting bolts (refer to suspension assembly drawing.)
 - d. Verify that the actual vehicle crossmembers are correctly positioned.
 - e. Check for any interference's between the axle and the drive shaft, if applicable (refer to Suspension Assembly Drawing.)



RIDE HEIGHT ADJUSTMENTS

DEFINITION

Watson & Chalin 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 lift-able axle (See Figure 3-1). A correct installation requires that the installed suspension ride height be within the range specified on the suspension assembly drawing when the vehicle is in its **LOADED** condition.

Loaded condition is defined as wheels in contact to ground with proper air pressure set.

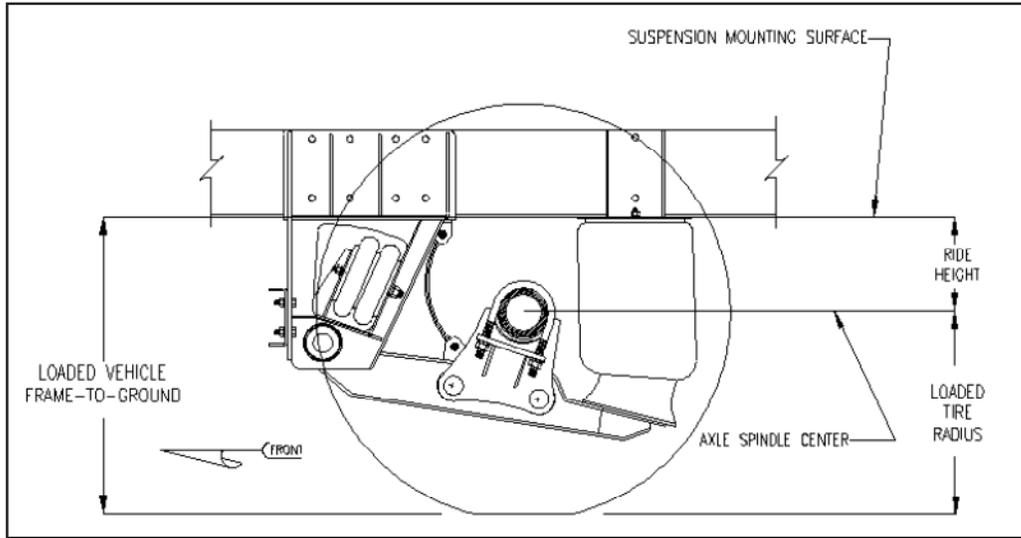


Figure 3-1

WCAL-2200 SERIES SHOWN

On some vehicles, a spacer may be required between the suspension frame rail and vehicle frame to achieve the required installed ride height. (A maximum of 3” spacer) If more than 3”, consult Watson & Chalin customer service or Engineering Department. To determine thickness of the spacer, perform the following calculation.

- Loaded Frame to Ground Measurement (at intended suspension thickness) _____
- Subtract Loaded Tire Radius _____
- Subtract Designed Ride Height _____
- Requires Spacer Thickness (Assuming No Drive-Line Interference) _____



FRAME WIDTH VARIATIONS

The mounting width of the suspension can be varied to accommodate different truck frame widths. To accomplish this, the suspension beams are moved along the axle, however, the suspension beams are tack welded at the most popular frame width (34") and can adapt plus or minus 1/2 inch (See Figure 4-1). The axle is supplied with the U-bolts only "snugged" and axles seats tack welded onto the axle to allow for this adjustment. The width variation cannot be adjusted beyond the range stated on the suspension assembly drawing. Refer to Page 11 for Axle Weldment Specifications.

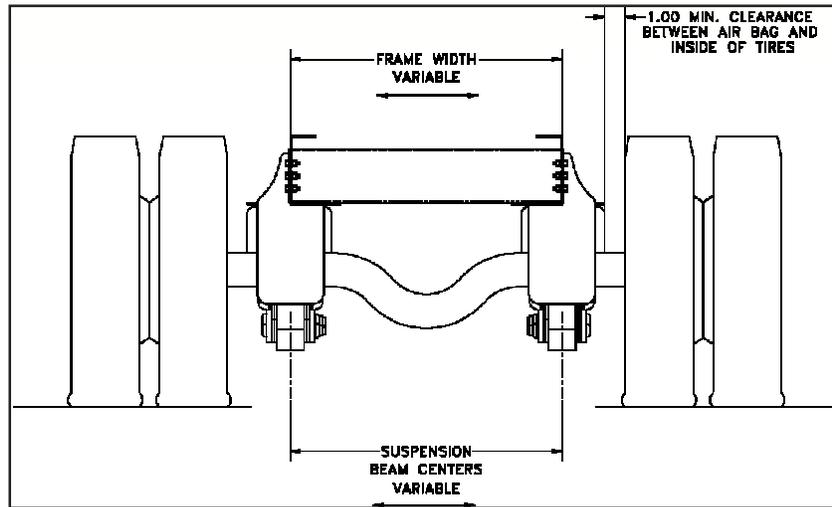


Figure 4-1

VARIABLE FRAME WIDTH ACCOMMODATIONS

While the standard 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. (See Figure 4-2) Special wide frame widths can be accommodated, contact factory.

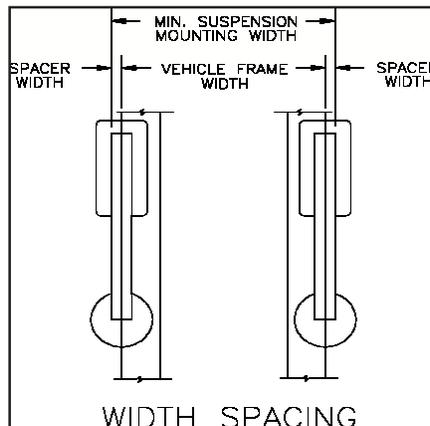


Figure 4-2



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SUSPENSION MOUNT

The following pages provide instructions for mounting the Watson & Chalin Truck Rigid (Non-Steering) Lift Auxiliary Air Ride Suspension.

WATSON & CHALIN SUSPENSION MOUNTING TRUCK OR TRACTOR

The instructions in this section assume that the correct auxiliary suspension and axle was chosen on the individual design criteria and that the pre-installation checklist was thoroughly reviewed. It is important that the vehicle be located on a level surface during installation of the suspension.

1. Determine the location of the auxiliary axle, mark the location of the center line of the axle on the outside of the vehicle frame rail. Refer to the suspension assembly drawing and mark the boundary areas of the auxiliary suspension mounting surfaces on the previously marked surfaces (See Figure 5-1). Again check for suspension clearance problems to truck components.

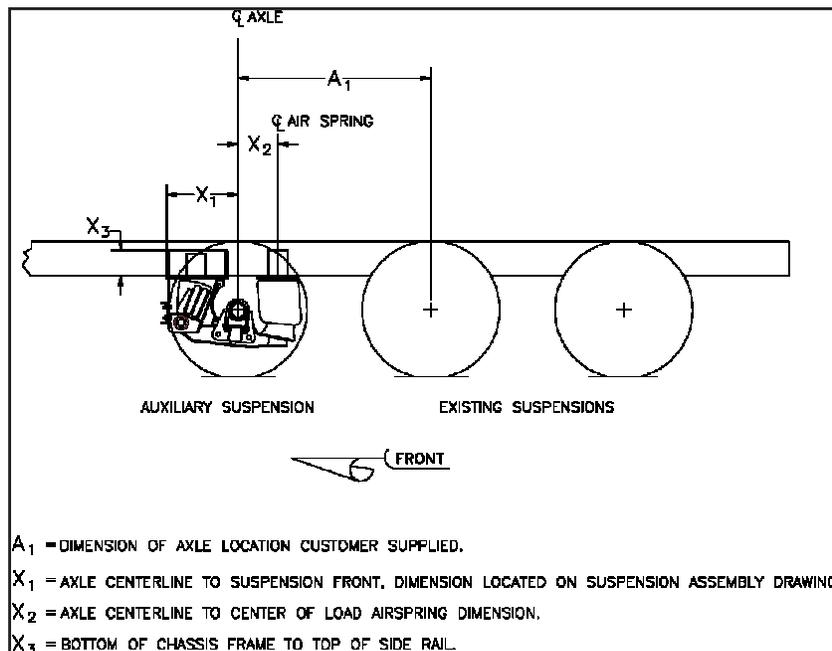


Figure 5-1



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2. **IMPORTANT:** Check with customer or vehicle manufacture to determine if chassis frame has sufficient crossmember reinforcement location in the area where the auxiliary axle rail is located. Any crossmembers required are to be supplied by customer (See Figure 5-2 for suggested crossmember location).

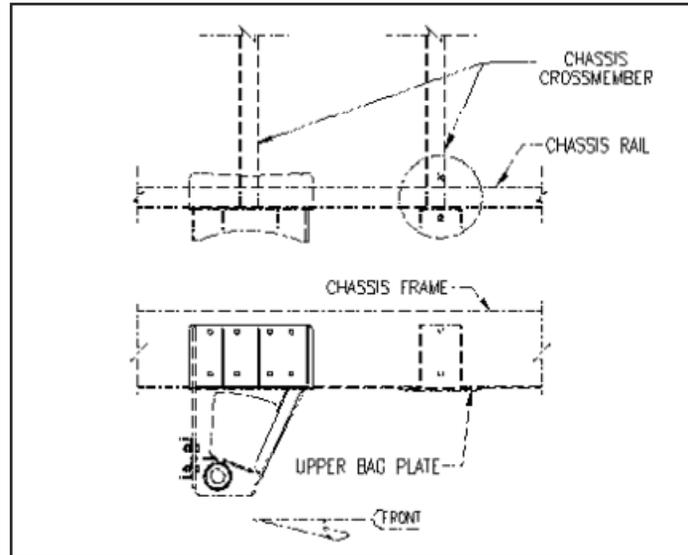


Figure 5-2

3. If rail width has to be changed, loosen axle U-bolts (4 each), grind loose tack welds and adjust the width of suspension frame rails to accommodate.
4. After proper frame rail width is confirmed and adjusted, insure that the **suspension arms are parallel before axle weldment**. Refer to Page 11, “Axle Mounting” for weld procedures.
5. Position the suspension on frame using the previously marked axle center, and use front hanger rail and upper bag plate centerline as locators.
6. Once the suspension is properly located at the desired position, vertically and horizontally, clamp the suspension rail to the truck frame.



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7. **IMPORTANT** – The entire Auxiliary Suspension mounting surfaces must set flush with both the side and bottom of the truck frame rails or spacers. Failure to do so will void all of the suspension warranty. (See Figure 5-3)

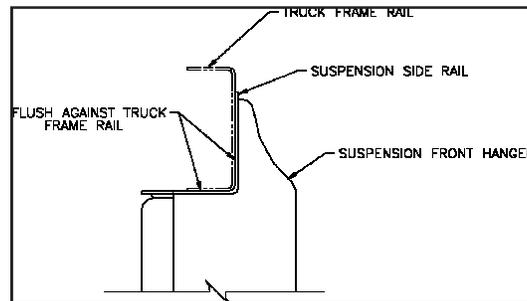


Figure 5-3

8. Mark the location of the mounting holes on the outward side of both Auxiliary Suspension Frame Rails.

CAUTION – Inspect truck frame rail for any obstruction (fuel tanks, wiring harness and air lines) that might be located on the inside of frame rail and adjust before drilling.

IMPORTANT – Do not weld on, drill, or bolt thru the bottom flange of the suspension frame rail or truck rail. Check with chassis manufacturer for their warranty disclaimer on vehicle frame modifications.

9. Drill (2) 11/16” diameter hole thru suspension side rails and truck frame rails. Fasten each suspension side rail to truck frame with 5/8 – SAE Grade 8 flat washer and 5/8 lock nut Grade 8. Recheck proper location, then drill the remaining holes, 8 (eight) minimum per Side Rail recommended. Install the remaining bolts, washer and lock nuts (See Figure 5-4) and torque capscrews to proper torque.

NOTE: Recommended mounting hardware (fasteners) not supplied by Watson & Chalin.

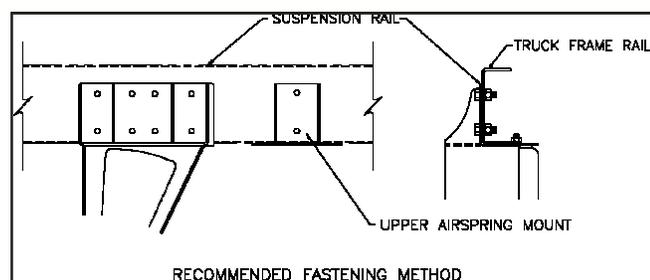


Figure 5-4



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10. Properly locate the upper bag plate. Refer to the suspension drawings. Drill (2) 11/16" Diameter holes thru mounting bracket and chassis frame. Fasten each bag plate assembly with 5/8 SAE Grade 8 capscrew, 5/8 SAE Grade 8 flat washer and lock washer. (See Figure 5-4.)
11. Check front hangers for proper centers (arm centers) and install front lower cross-member (this will be either bolt on or weld on.) See Figure 5-5.

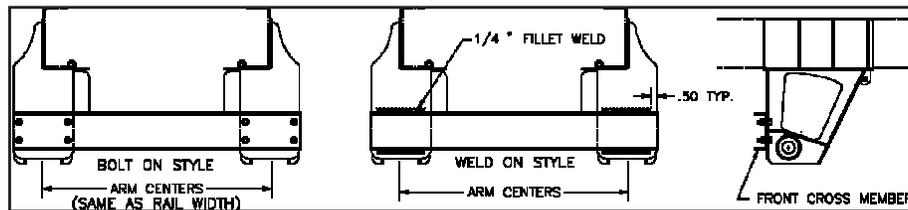


Figure 5-5

CAUTION: Crossmember must be installed for proper and safe suspension operation.



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AXLE MOUNTING

1. Auxiliary Liftable Air Ride Suspension with factory axles require centering just as customer supplied axles do. To center the axle to the suspension beams, check the relationship between the axle and the parallel beams by measuring the left and right spaces between the beam assembly and the hub assembly and position the axle until both sides are equal.
(See Figure 6-1)

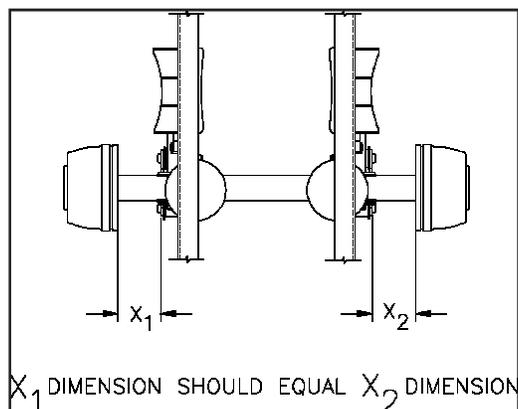
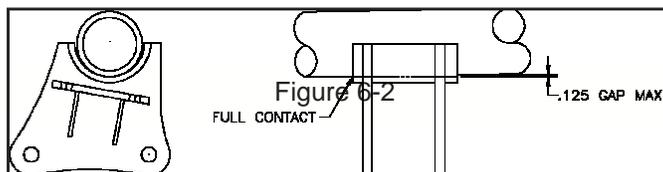


Figure 6-1

2. Rotate axle so that there is .25" between S-Cam shaft to rear of Axle Seat and minimum of 1.0" to top of Arm. Remove paint on the areas to be welded with a wire brush.
3. With axle seated in axle seats special attention must be given in keeping both arms parallel and perpendicular to the axle.
4. Inspect for any gap between axle seat and axle when seated. The axle is to have contact with axle seat. A 1/8" gap is maximum between the axle and one edge of the axle seat. (See Figure 6-2)



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- Tack weld axle in place and then weld axle seat to the axle as specified. (See Figure 6-3) Check with axle manufacturer to confirm proper axle weldment.

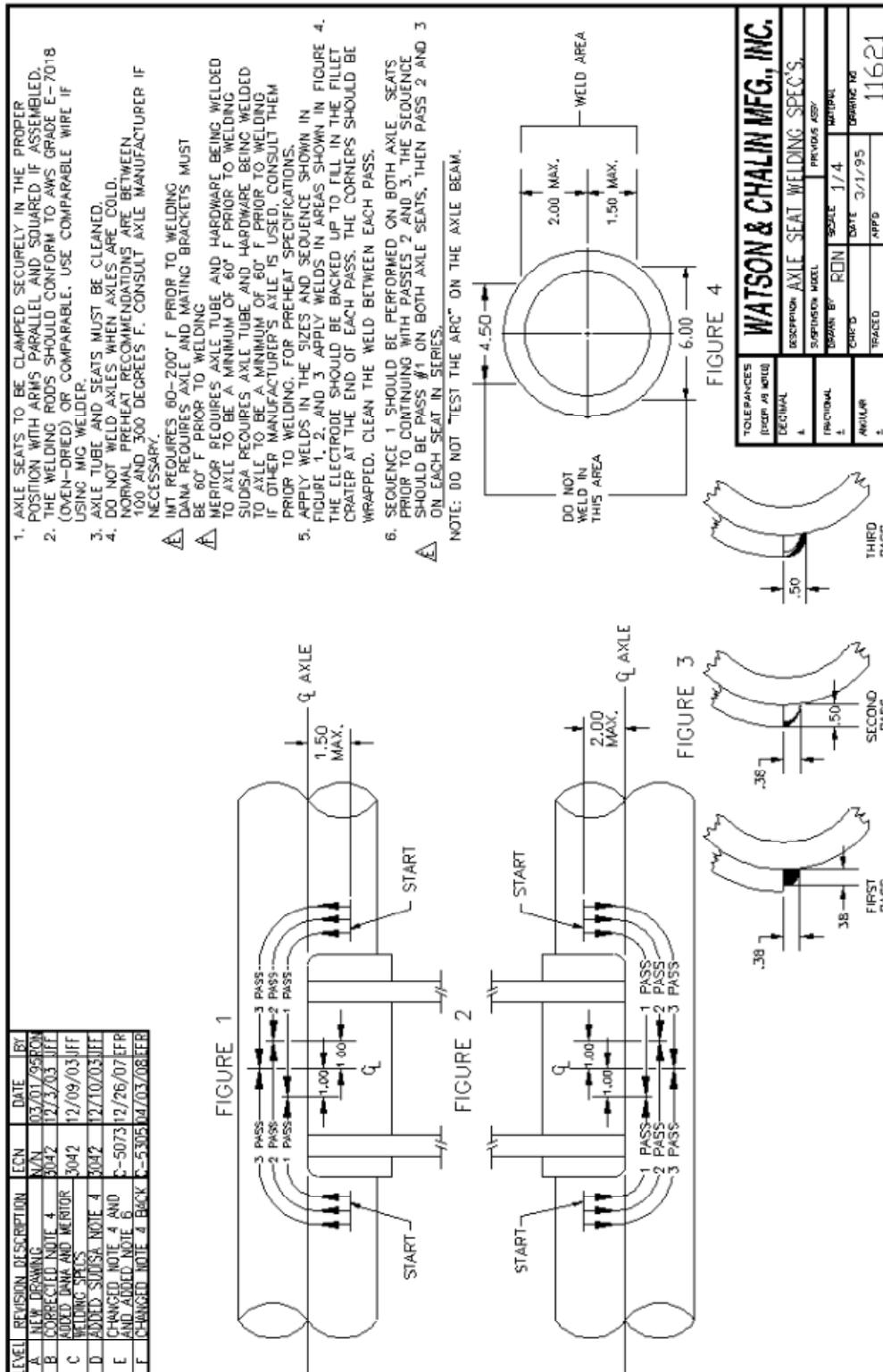


Figure 6-2



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AXLE ALIGNMENT

Final alignment for WELD Collar Type

Final Alignment of the axle is very important. If alignment is done properly, it will provide a safe, secure and low maintenance connection at the pivot of the suspension. If the axle alignment is not correct, the bushing can wear prematurely and/or make the axle track out causing tire wear.

Tools Required: 1/2" break over bar, correct socket, and impact wrench with 1000 ft-lbs capability.

1. With truck chassis on a flat surface set suspension at the proper ride height. Block tires on truck chassis and release brakes on auxiliary axle. This will allow tire rotation while positioning the suspension fore and aft.

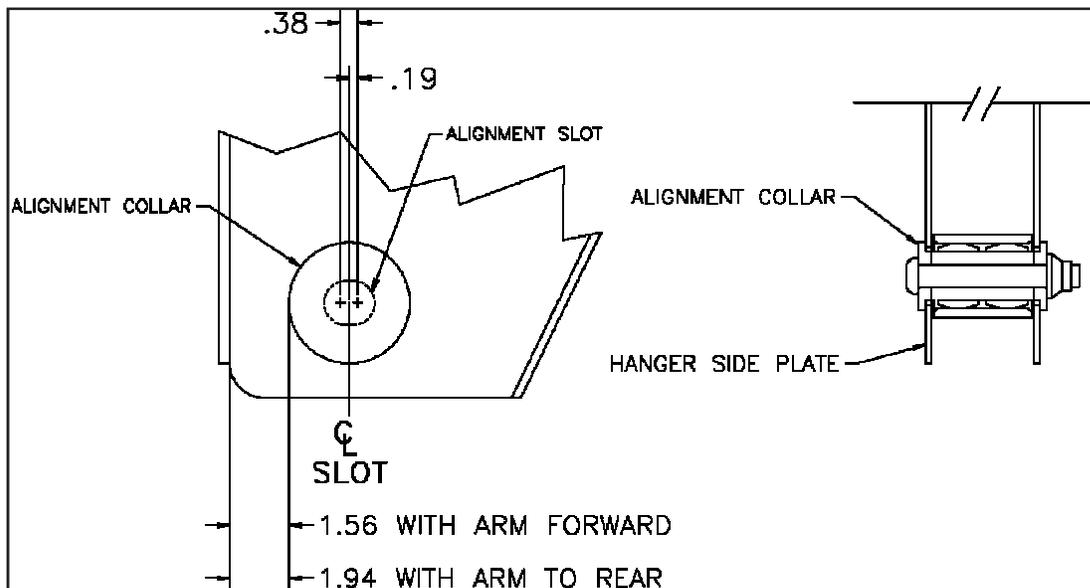


Figure 7-1

2. Position one beam of the auxiliary suspension so the alignment collar is in the center of the alignment slot and tack weld the alignment collar to frame bracket side plate. (See Figure 7-1)
3. For pusher application, measure from the truck front drive axle (or rear drive axle for tag axle) to the center line of the spindle of auxiliary axle. Move the free beam fore or aft until both sides are equal distance to drive spindle. A total maximum alignment tolerance of 1/8" is considered acceptable. If additional axle movement is required remove tack weld performed in step 2 and adjust axle as required. (See Figure 7-2)

NOTE: WELD COLLARS WITH AXLE IN RUN POSITION.



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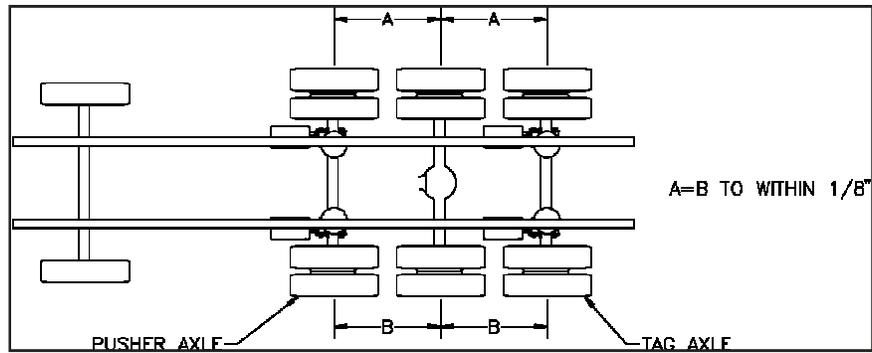


Figure 7-2

4. **IMPORTANT:** Recheck alignment, then weld 1/4" minimum fillet weld all-around alignment collars to hanger side plate.
(total of four collars)

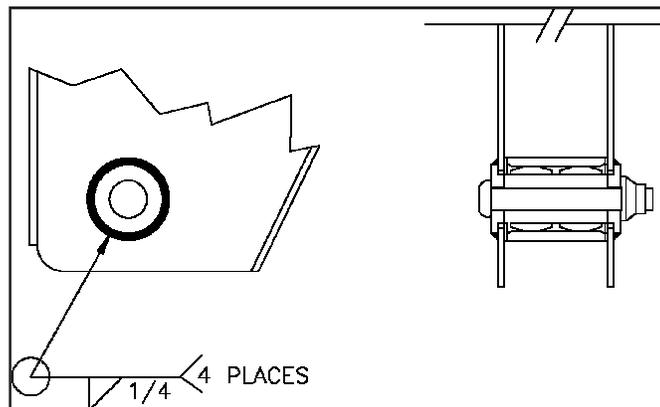


Figure 7-3

WARNING: All 4 alignment collars are to be welded. Failure to do so will cause severe strain and could cause damage or premature failure.
(See Figure 7-3)

NOTE: Failure to weld alignment collars will void the suspension warranty.



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AL Series Supplement:
Final alignment for Eccentric Collar Type

Final Alignment of the axle is very important. If alignment is done properly, it will provide a safe, secure and low maintenance connection at the pivot of the suspension. If the axle alignment is not correct, the bushing can wear prematurely and/or make the axle track out causing tire wear.

Tools Required: 1/2" break over bar, correct socket, and impact wrench with 1000 ft-lbs capability.

Sequence for alignment for Eccentric Collars:

1. Tires must be the same size, diameter, and inflation pressure.
2. The suspension must be at the correct ride height to align properly. The truck and axles must be level. Refer to **Figure 1** and make sure height is true on **both** sides of the truck frame.

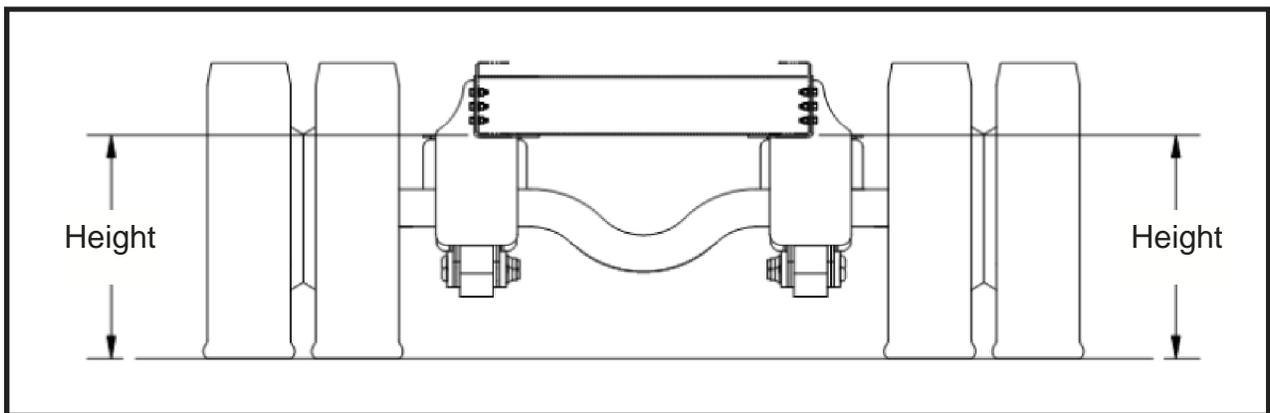


Figure 1

3. Start out with the Adjustment-Square vertically aligned with pivot as shown in **Figure 2**.
4. Snug up one Hanger's pivots so that the collars cannot rotate.
5. Using (2) 1/2" break over bars or ratchets rotate the other two collars on the other hanger so the suspension moves forward or backward to allow the distance from center of spindle to the center of the drive axle (**Figure 3** Dimension A & B) to be equal distance within 1/8".

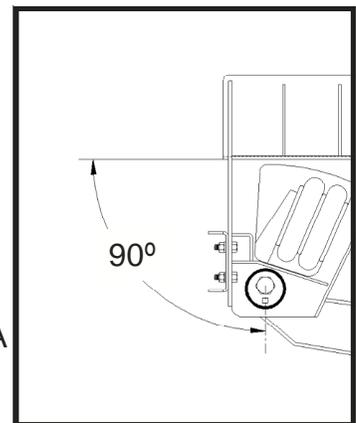


Figure 2



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6. Snug up pivot bolt so the collar cannot move.
7. Re-Check alignment before proceeding. If more suspension movement is needed to align, loosen the centered collar on the unadjusted hanger and rotate it to allow for more movement.
8. Make sure axles protrude evenly on both sides from frame. Figure 4 dimensions E and F must be within 1/4" of each other
9. Torque both pivot locknuts to 800-1000 lb-ft.

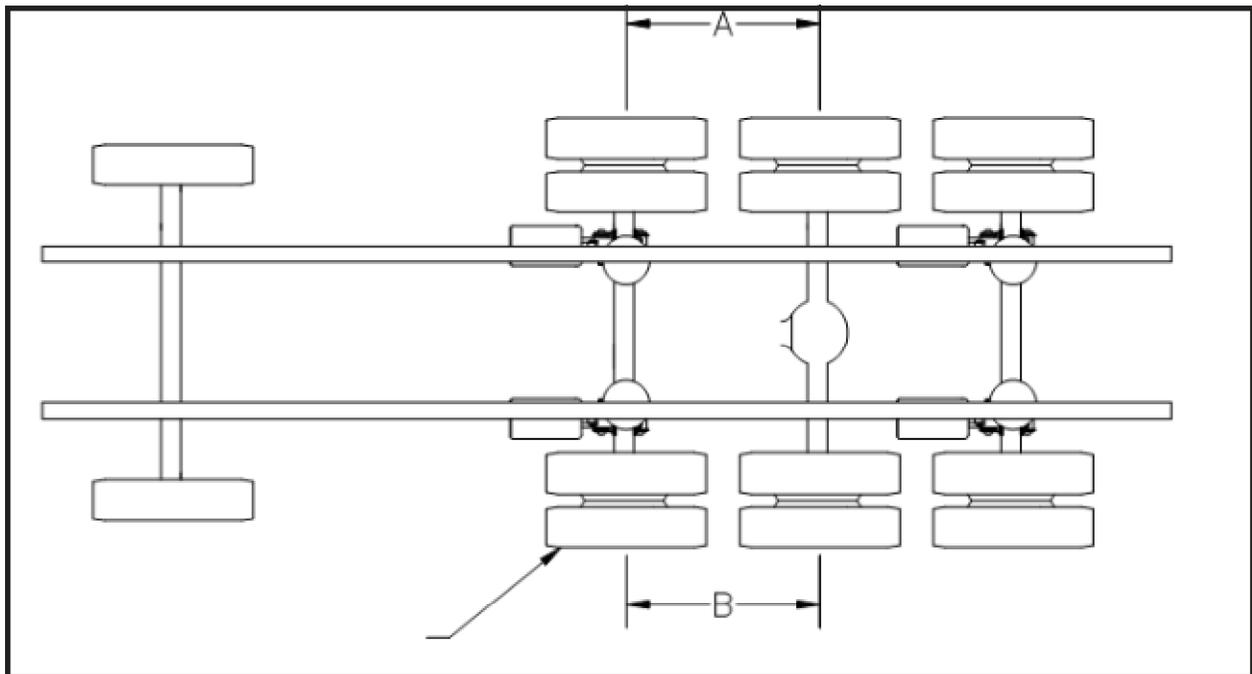


Figure 3

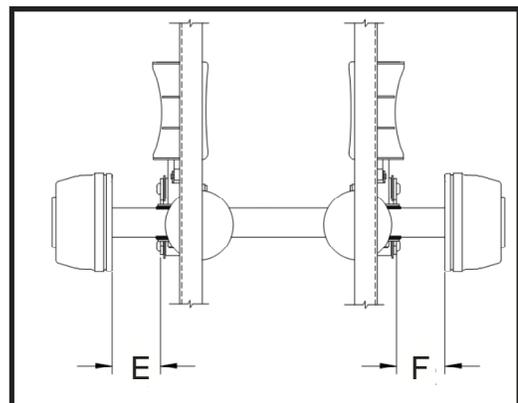


Figure 4



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AIR CONTROLS (STANDARD)

- 1 The air lift, air ride suspension is operated by a control panel which consists of a pressure gauge, toggle valve and a pressure regulator. The function of the control panel is to regulate the air pressure in the load bags for the proper (or desired) load on the auxiliary axle, and to then be able to lift the auxiliary axle to the up position when the unit is empty or not required.

OPERATION MANUAL CONTROL

The operator controls the outlet pressure by using the regulator and the toggle valve. Outlet pressure, which is indicated on the gauge, is set by the pressure regulator. Pressure is increased by turning the knob in a clockwise direction, and is reduced by turning the knob in the counter-clockwise direction. When the toggle is moved to the ON (DOWN) position, pressurized air is supplied through the regulator and to the load bags. When the toggle is moved to the OFF (UP) position, pressurized air is exhausted through the regulator and the load bags are vented to the atmosphere.

MANUAL FUNCTIONAL DIAGRAM

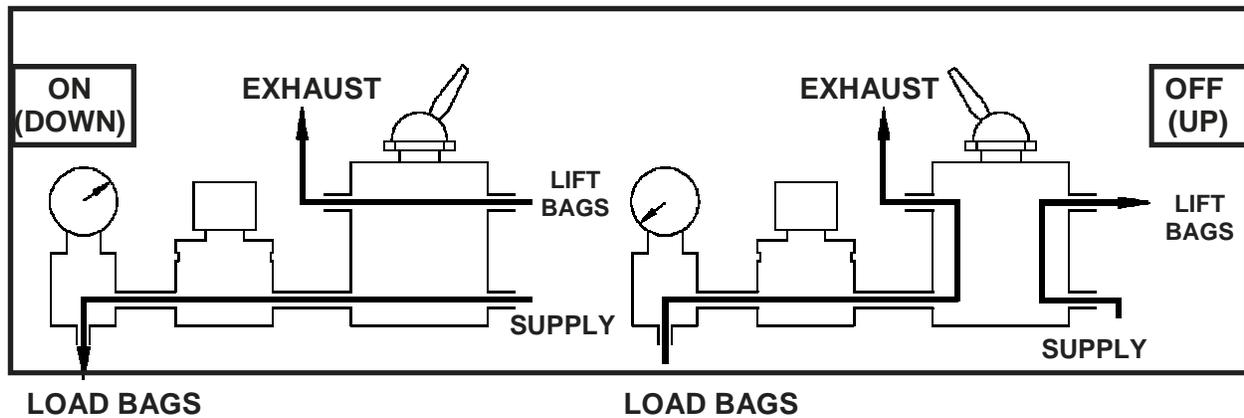


Figure 8-1

NOTES: Chassis air pressure must be built up to the minimum DOT required before truck operation, which maintains a safe air brake pressure in the event of air loss. (Other control packages may be available, please contact factory for information.)



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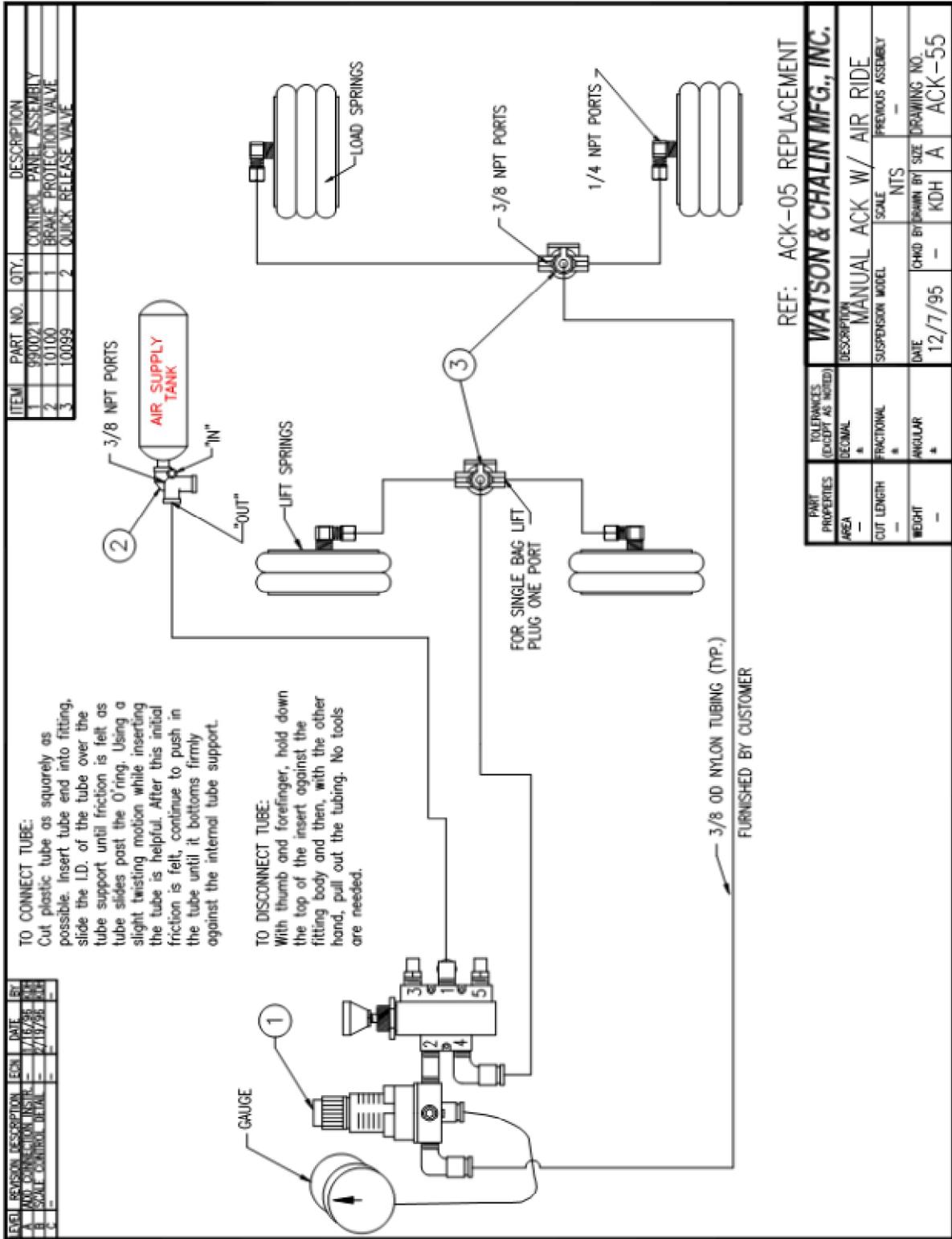


Figure 8-2



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AIR PRESSURE (PSI) VS. LOAD

Assuming 1500 lbs. ground weight with no (0 PSI) air pressure.

AL-2200

GROUND AXLE LOAD	Mounting Height		
	9"	10"	11"
5,000 lbs.	15 psi	15 psi	15 psi
10,000 lbs	36 psi	36 psi	36 psi
15,000 lbs	58 psi	58 psi	58 psi
20,000 lbs	79 psi	79 psi	79 psi

*** NOTE: FOR UNITS WITH 12-1/4" X 7-1/2" BRAKES (15" WHEEL TYPE) ADD 2" TO MOUNTING HEIGHT.**

Assuming 1250 lbs. ground weight with no (0 PSI) air pressure.

AL-800

GROUND AXLE LOAD	Mounting Height			
	13"	14"	15"	16"
5,000 lbs.	25 psi	27 psi	29 psi	31 psi
7,500 lbs	42 psi	45 psi	48 psi	51 psi
10,000 lbs	59 psi	63 psi	67 psi	72 psi
13,000 lbs	79 psi	84 psi	90 psi	96 psi

AL-1300

GROUND AXLE LOAD	Mounting Height			
	13"	14"	15"	16"
5,000 lbs.	28 psi	28 psi	29 psi	31 psi
7,500 lbs	47 psi	47 psi	48 psi	51 psi
10,000 lbs	65 psi	66 psi	67 psi	72 psi
13,000 lbs	87 psi	89 psi	90 psi	96 psi

NOTE: The above charts are to be used as a Guide Only.

1. The "Air Pressure vs. Load Guide" shown above is approximate and may vary.
2. To obtain an accurate load vs. air pressure reading it is necessary that the unit be calibrated over a flat and accurate scale.



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Torque Requirement Procedures

All fasteners should be re-torqued according to the following schedule.

- after 30 days
- every 6 months thereafter

Capscrew/Bolt (Grade 8 UNF) Torque Requirements

Capscrew/Bolt Size	3/8"	1/2"	5/8"	3/4"	3/4" (Stabilizer Shock Stud)	7/8"	1"	1 1/8"
Torque minimum feet/lbs.	25	50	150	300	150	500	700	900
Torque maximum feet/lbs.	35	75	200	350	175	550	800	1000

NOTE

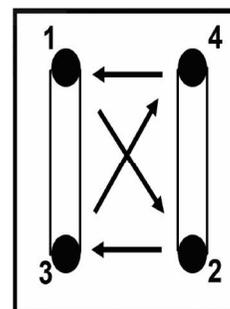
Torque Values do not apply to air springs or lower grade fasteners.

U-bolt Torque Instructions

To torque or re-torque u-bolts:

1. Partially tighten bolts #1 and #2 according to figure 1.

Figure 1: U-Bolt Torque Pattern



2. Partially tighten bolts #3 and #4.
3. Using the same sequence, torque to the proper torque as specified below.

U-Bolt (Non-Plated Clean Lubricated Thread) Torque Requirements

UNF Grade 8 Size	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"
U-bolt minimum feet/lbs.	15	40	120	200	400	650	800
U-bolt maximum feet/lbs.	20	60	150	250	450	750	900

Airspring Torque Requirements

Size	Description	Max Torque Requirement (ft./lbs.)
3/8"	UNC Blind Nuts	15-20
1/2"	UNC Bolt or Stud	25
3/4"	UNC Stud	55
3/4"	UNF Combo Stud	50

Air Fitting Torque Requirements

Size	Max Torque Requirement (ft./lbs.)
1/4" NPTF	20
1/2" NPTF	20
3/4" NPTF	20

TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
AXLE NOT TRACKING PROPERLY	FRONT ALIGNMENTS COLLARS NOT WELDED	ALIGN UNIT AND WELD ALIGNMENT COLLARS (REFER TO PAGE 13)
	AXLE MISALIGNMENT	CUT LOOSE FRONT ALIGNMENT WELDMENT COLLARS & REWELD COLLARS (REFER TO PAGE 13)
	ARM BUSHINGS WORN OUT	INSTALL NEW ARM BUSHINGS
	AXLE SEATS NOT PROPERLY INSTALLED TO AXLE	CHECK AXLE SEAT LOCATION REFER TO PAGE 11 AND IMPROPERLY INSTALLED CUT LOOSE & INSTALL PROPERLY AS SHOWN ON PAGE 11 AND REALIGN.
NOT GETTING THE DESIRED LOAD ON AXLE	NOT HAVING THE PROPER AIR PRESSURE TO LOAD BAGS.	INCREASE OR DECREASE AIR PRESSURE AT REGULATOR VALVE. (REFER TO PAGES 15 AND 17)
	AIR CONTROL SYSTEM NOT PROPERLY INSTALLED	CHECK PIPING OF AIR SYSTEM (REFER TO PAGE 17)
INSUFFICIENT AIR PRESSURE TO SYSTEM	DEFECTIVE BRAKE PROTECTION VALVE	REPLACE BRAKE PROTECTION VALVE AND CHECK AIR PRESSURE
UNIT NOT GETTING THE CORRECT LIFT	LIFT AIR BAGS NOT GETTING PROPER AIR PRESSURE	A) CHECK SYSTEMS PRESSURE B) CHECK AIR SYSTEM PIPING DRAWING REFER TO CONTROL SCHEMATIC. (REFER TO PAGE 17)
	INTERFERENCE WITH CHASSIS DRIVE LINE OTHER CHASSIS AND COMPONENTS	INSPECT FOR INTERFERENCE
	UNIT NOT INSTALLED PROPERLY	CHECK INSTALLATION WITH FACTORY INSTALLATION DRAWING.



Watson Suspension Systems

MAINTENANCE

ITEMS	INSPECTION
BUSHINGS	CHECK FOR EXCESSIVE WEAR & MOVEMENT EVERY 30 DAYS
AIR LEAKS	CHECK FOR AIR LEAKS DAILY BEFORE USING
BOLT TORQUE	CHECK UNIT FOR BOLT TORQUE PER INSTRUCTION GIVEN IN SECTION 10
BRAKE OPERATION	CHECK FOR PROPER OPERATION DAILY BEFORE MOVING AND USING THE UNIT IN ANY MANNER.
STRUCTURAL	INSPECT DAILY FOR SIGNS OF STRUCTURAL DAMAGE, CRACKS OR WEAR IN ALL COMPONENTS OF SUSPENSION PARTS (ARMS, HANGERS, AXLE SEATS & ETC.) INFORM MANUFACTURER IMMEDIATELY OF ANY STRUCTURAL DAMAGE OF ANY KIND



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