

SELF-STEERING AXLE

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INTRODUCTION

The following instructions are intended for use with the Watson & Chalin Truck Auxiliary Steerable 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 will strain the 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 the 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 brake systems components and braking performance.

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

Note: Auxiliary Steerable Lifiable Air Ride Suspensions with factory installed axles require adjusting Toe-In & Caster, refer to Sections 5 and 7.

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.

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 following 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, Section 12.)
 - 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, Section 12.)

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 liftable 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.

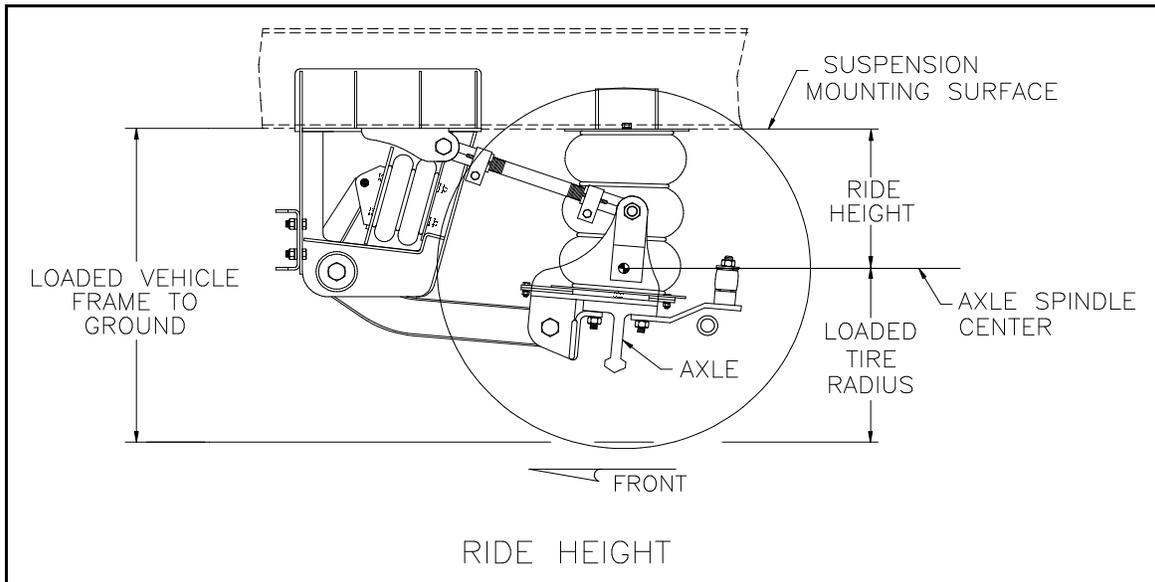


Figure 3-1

Calculating “Ride Height” is performed as follows:

| | |
|---|----------------------|
| Loaded Frame to Ground Measurement (at intended suspension location) | _____ |
| Minus Loaded Tire Radius | _____ |
| Ride Height | <input type="text"/> |

“Ride Height” If dimension is not in “Ride Height” range contact factory.

SUSPENSION MOUNT

The following sections provide instructions for mounting the Watson & Chalin Truck/Tractor Steering Liftable 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 based on the individual design criteria and that the pre-installation check list 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, 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 4-1). Again check for suspension clearance problems to truck components.

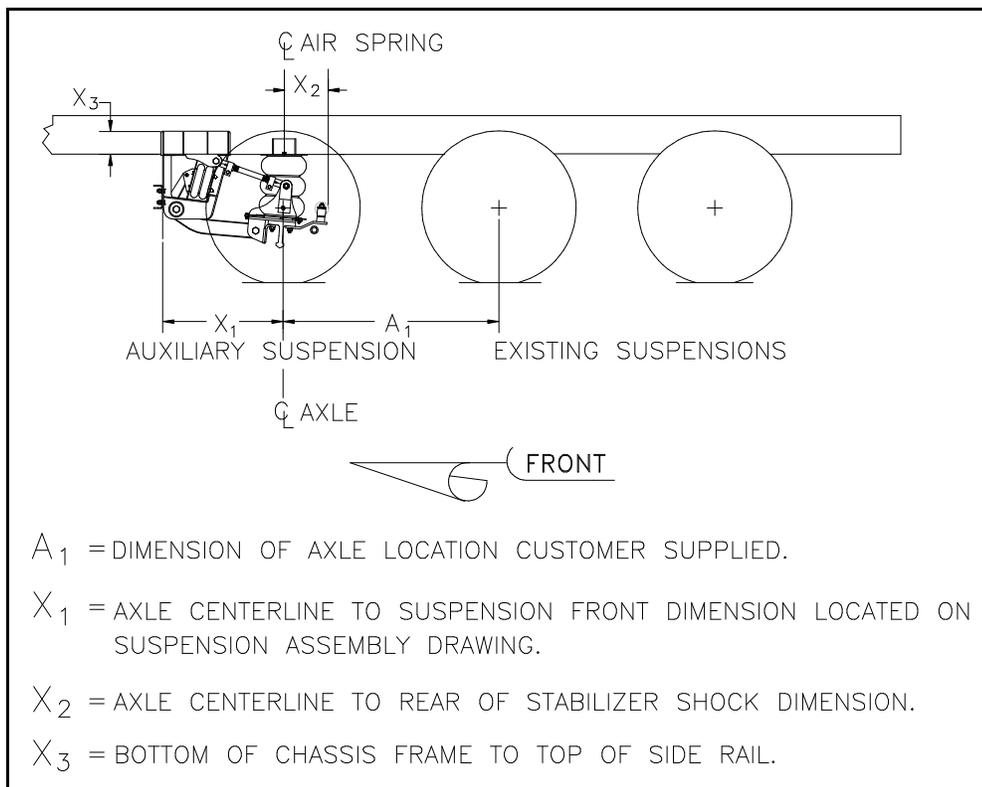


Figure 4-1

2. **IMPORTANT:** Check with customer or vehicle manufacturer to determine if chassis frame has sufficient crossmember reinforcement location in the area where the auxiliary axle rail is located. Any crossmembers required to be supplied by customer (See Figure 4-2 for suggested crossmember location.)

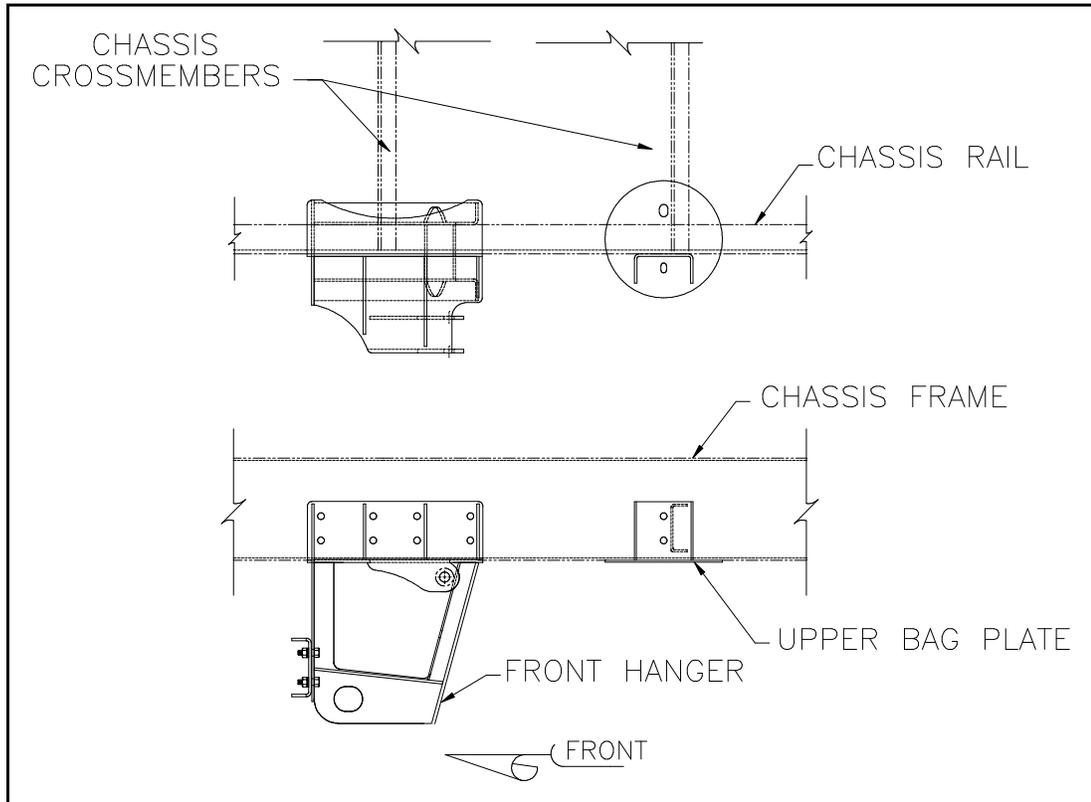


Figure 4-2

3. Raise the suspension in position using the previously marked axle center, front hanger rail and upper bag plate center line as locators.
4. Once the suspension is located at the desired position, vertically and horizontally (width of frame rail), clamp the suspension rail to the truck frame rail.
5. **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 4-3)

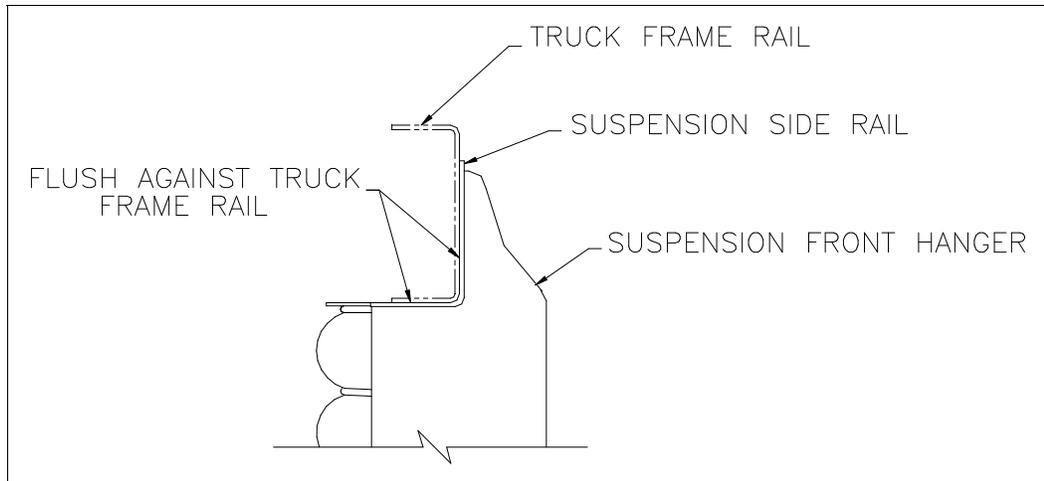


Figure 4-3

6. 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, 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.

7. Drill (2) 11/16" diameter holes thru suspension side rails and truck frame rails. Fasten each suspension side rail to truck frame with 5/8 - SAE grade 8 capscrew, 5/8 SAE grade 8 flat washer and 5/8 lock nut grade 8. Recheck proper location, then drill the remaining holes, **6 (six) minimum per Side Rail** recommended. Install the remaining bolts, washer and lock nuts (See Figure 4-4) and torque capscrews to proper torque. NOTE: Recommended mounting hardware (fasteners) not supplied by Watson & Chalin.

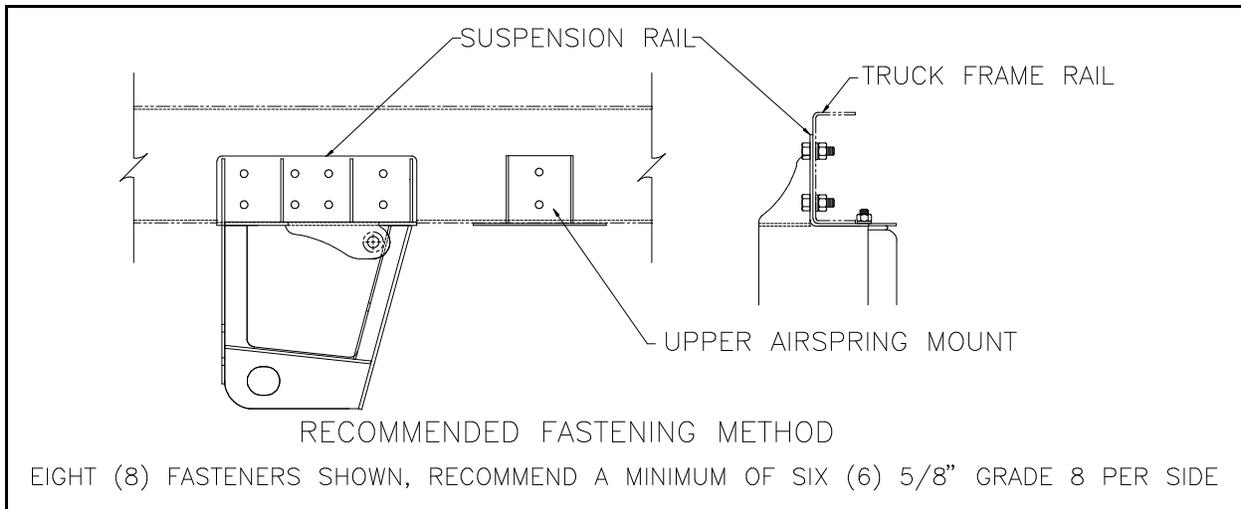


Figure 4-4

8. Locate the upper bag plate in the proper location. 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 4-4.

9. Check front hangers for proper centers (arm centers) and install front lower crossmember (this will be either bolt on or weld on.) See Figure 4-5

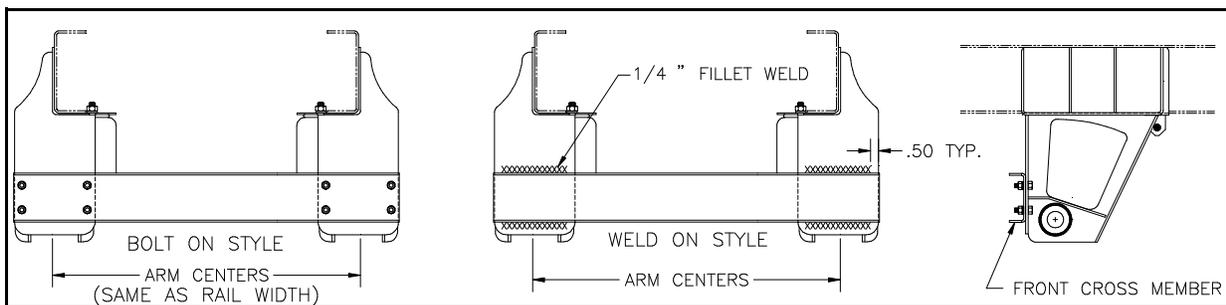


Figure 4-5

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

AXLE MOUNTING

1. Auxiliary Liftable Air Ride Suspension with factory installed axles are centered at 34" frame width or specified frame width. If a customer's axle is installed, customer to locate and drill holes in suspension axle seat to match spring mounting holes in axle for proper arms centers and desired frame width. (See Figure 5-1)

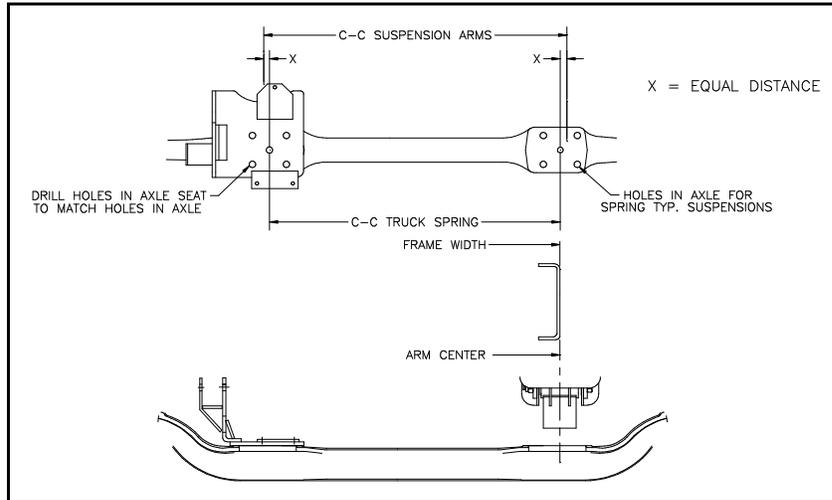


Figure 5-1

2. Bolt axle seats and lower axle support angle to axle. (8) Grade 8 capscrews, nuts & lockwasher) after axle is squared with axle seat, tighten bolts and weld axle support angle to axle seat arm connecting lugs. See Figure 5-2.

Axle Mounting (Steerable)

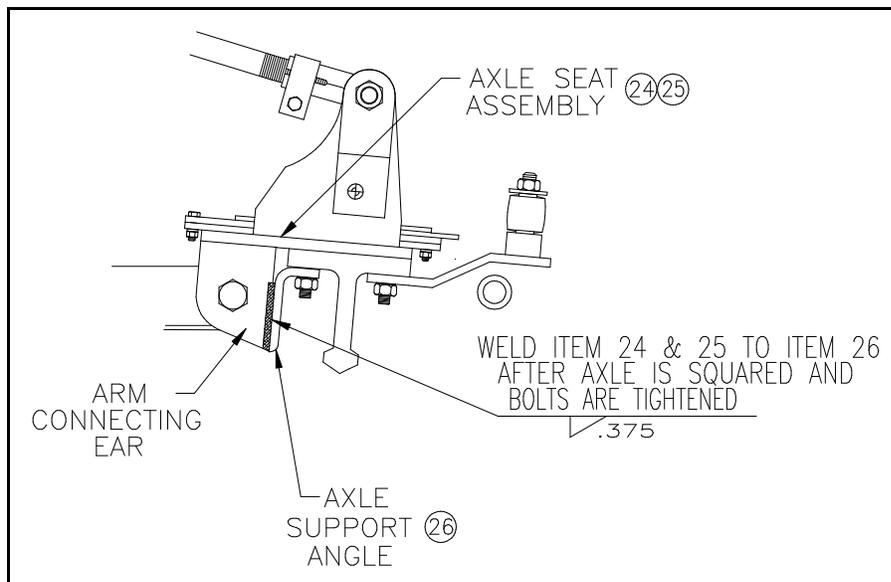


Figure 5-2

AXLE ALIGNMENT

Following the procedures below will provide the proper axle alignment.

(Note: Does not apply to units that are pre-aligned.)

1. With chassis on a flat level surface set suspension at the proper ride height with no load. Block tires on truck chassis and release brakes on auxiliary axle. This will allow tire rotation while positioning the suspension fore and aft.
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 6-1)

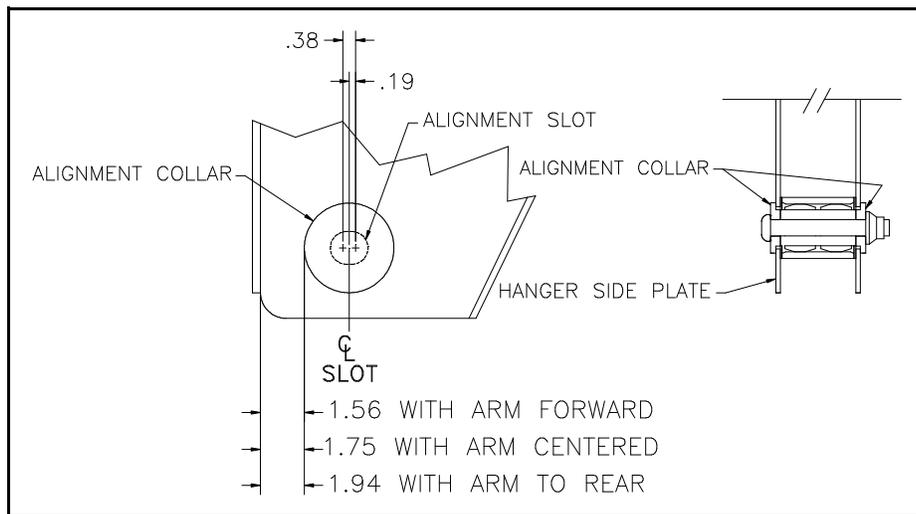


Figure 6-1

3. Measure from the truck chassis front drive axle (or rear drive axle for tag type axle) to the top of kingpin housing (common point on both sides of 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 6-2)

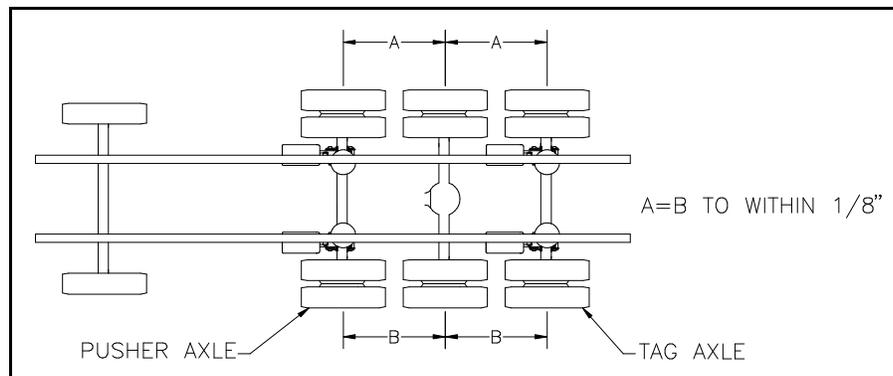


Figure 6-2

4. **IMPORTANT:** Recheck alignment. Weld 1/4" minimum fillet weld all-round all (four) alignment collars to hanger side plate.
NOTE: Failure to weld alignment collars will cause severe strain and damage to suspension components.
NOTE: Failure to weld alignment collars will void the suspension warranty. (See Figure 6-3)

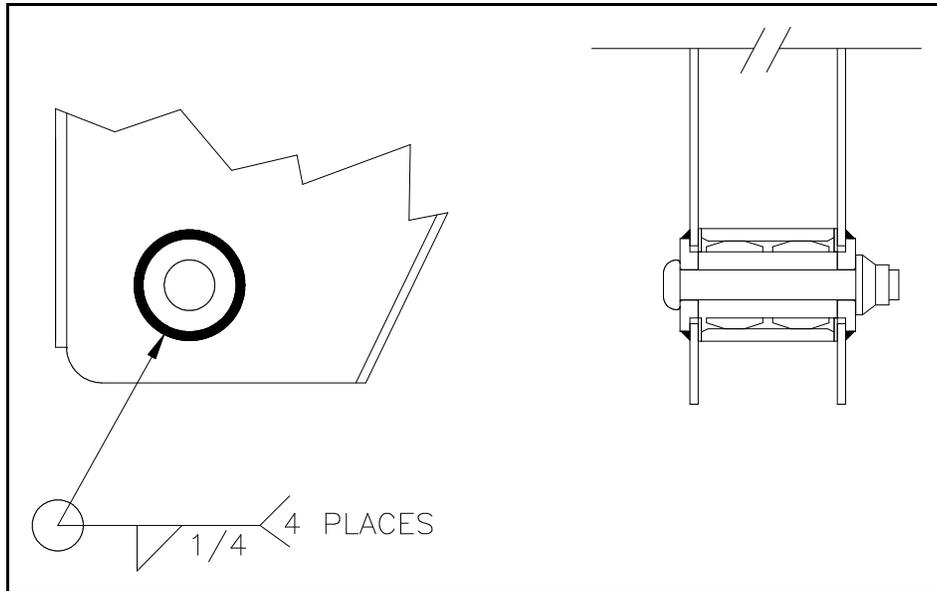


Figure 6-3

WHEEL ALIGNMENT

The proper alignment of wheels must be maintained to ensure ease of steering and satisfactory tire life. The most important factor of wheel alignment are: toe-in and axle caster.

Wheel and tire assemblies should be checked for both static and dynamic balance. This is particularly true when a tire has been changed from one wheel to another, or when a tire has been removed for repairs or for any other reason, and put back on the wheel.

These points should be checked with precision instruments at regular intervals, particularly when axle has been subjected to heavy impacts due to collision or hard bumps. When checking wheel alignment, it is important that tires be inflated to proper pressure, and the wheel and knuckle bearings be in proper adjustment. Uneven tire pressure and loose bearings will affect reading on wheel aligning instruments.

AXLE CASTER

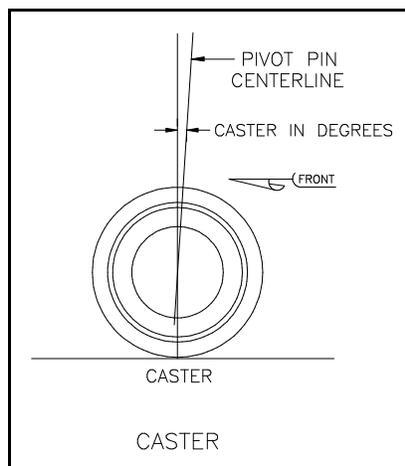


Figure 7-1

Caster should be adjusted and checked with axle at ride height. See Figure 7-1.

Axle caster is the amount of fore and aft tilt at the top of the kingpin, and is measured in degrees.

- “Positive” caster is when the top of the pin is tilted toward the rear.
- “Negative” caster is when the top of the pin is tilted forward.
- Axle caster should be set at **5 degrees positive**. Axle caster setting can

be made by adjusting the upper torque arms (one each side) unless unit from factory specified preset caster. See Figure 7-2.

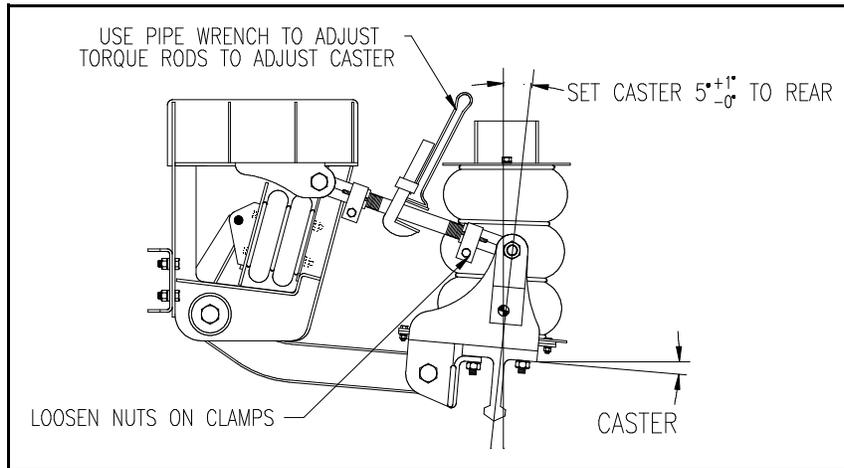


Figure 7-2

Negative or too little caster results in a shimmy or wobble condition. Must adjust & check caster on both sides, which may require going side to side more than once.

WHEEL TOE-IN

1. Toe-in, as its name implies, is the amount which the wheels point inward at the front, and is necessary to offset the effect of camber on tire wear. This setting should be plus or minus 1/32".
2. Both toe-in and camber must be correct to insure long tire life.
3. Toe-in is usually measured from center of treads at height of wheel centers. (See Figure 7-3) This measurement should always be made with the wheels in straight-ahead position and after vehicle has been moved forward to take up all play in steering connections.
4. The tie rod is equipped with end assemblies, one having a left-hand thread, and the other a right-hand thread. These ends are threaded into the tie rod and are held securely in position by clamp bolts, nuts, and lock washers.
5. Toe-in adjustment is made by loosening clamp bolts and nuts on each end of the tie rod and turning the tie rod with a pipe wrench. After desired toe-in has been obtained, tighten clamp bolts and nuts.

NOTE: Always recheck toe-in after any change in caster or after altering tie rod. (See Figure 7-3)

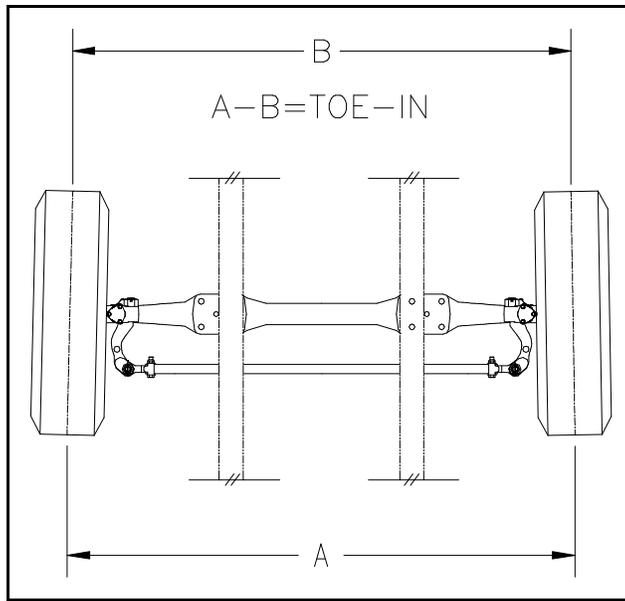


Figure 7-3

AIR CONTROLS

Standard: The air ride, air lift suspension is operated from a control panel consisting of a pressure gage, 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 be able to lift auxiliary axle to the up position when the unit is empty or not required.

Optional: Automatic Reverse Lift * will automatically lift the suspension when the tractor is put into reverse.
Automatic Reverse Lockout * will automatically lock the steering axle where it cannot turn when the tractor is put into reverse.

*** Auxiliary Steering Axles need to be lifted or locked out when in reverse due to the fact that Self Centering Steerable Axles can only track in forward motion. Damage can result to the axles steering components if the truck is put into reverse with the auxiliary suspension in the down position unless the optional Automatic Reverse Lockout is installed and operated properly.**

MANUAL CONTROL OPERATION

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 it is reduced by turning the knob the opposite direction. When the toggle is moved to the ON (DOWN) position, pressurized air is supplied to the regulator and to the load air springs. Moving the toggle to the OFF (UP) position causes the load air springs to be exhausted and the lift air springs to be inflated with system pressure. (See Figure 8-1)

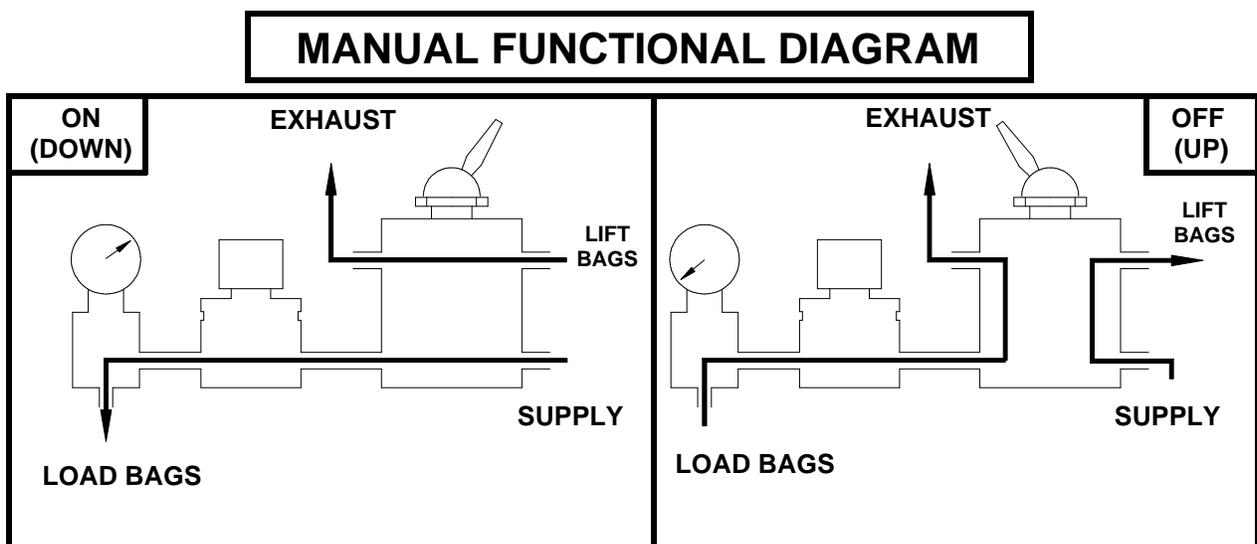


Figure 8-1

NOTES: Chassis air pressure must be built up and maintained in excess of 80 psi before operation. 80 psi is required to operate the brake protection valve, which maintains a safe air brake pressure in the event of an air loss in suspension system. Other control packages are available, contact Watson & Chalin.

Standard Air Control Figure 8-2

TORQUE CHART

1. Bolts that have been torqued to a set per load are recommended to be retorqued after a short time.

WARNING!

RETORQUE AFTER EACH OF THE FOLLOWING
FIRST 5 DAYS OF SERVICE
FIRST 30 DAYS OF SERVICE
FIRST 60 DAYS OF SERVICE
EVERY 6 MONTHS THEREAFTER.

TORQUE REQUIREMENTS (MIN. TORQUE WITH CLEAN LUBRICATED THREADS)

| | | | | | | | | |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-------|
| SIZE | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 7/8 | 1 | 1-1/8 |
| TORQUE IN FOOT LBS. | 5 | 15 | 25 | 150 | 200 | 550 | 600 | 1000 |

LOAD / PRESSURE CHART

for

SL-1100 & SST-1000 SERIES

| LOAD AT GROUND | RUN HEIGHT ¹ 10 | RUN HEIGHT ¹ 11 | RUN HEIGHT ¹ 12 |
|----------------|-------------------------------|-------------------------------|-------------------------------|
| 5000 | 29 | 31 | 34 |
| 6000 | 37 | 39 | 43 |
| 7000 | 44 | 47 | 52 |
| 8000 | 52 | 56 | 60 |
| 9000 | 60 | 64 | 69 |
| 10000 | 67 | 72 | 78 |
| 11000 | 75 | 80 | 87 |
| 12000 | 82 | 88 | 96 |
| 13000 | 90 | 97 | 105 |
| 14000 | 98 | 105 | 114 |

PRESSURE SETTINGS

¹ Run heights are based on units with no axle / bag shim and a 3.50" offset axle.

The values above are based on the standard units with **bag heights of 12, 13, and 14** respectively.

These values are approximations and will vary, especially with different mounting heights and or bag heights.

These weights are based on the axle and wheel equipment weighing **1200 lbs** which also varies. (0 pressure load)

The suspensions must be calibrated on a scale to determine the correct pressures.

These weights are approximations only and will vary slightly.

LOAD / PRESSURE CHART

for

SL-1800 SERIES

| LOAD AT GROUND | RUN HEIGHT ¹ | | |
|----------------|-------------------------|----|-----|
| | 9 | 10 | 11 |
| 8000 | 32 | 34 | 37 |
| 9000 | 37 | 39 | 43 |
| 10000 | 42 | 44 | 48 |
| 11000 | 46 | 50 | 54 |
| 12000 | 51 | 55 | 59 |
| 13000 | 56 | 60 | 65 |
| 14000 | 61 | 65 | 70 |
| 15000 | 66 | 70 | 76 |
| 16000 | 70 | 75 | 82 |
| 17000 | 75 | 80 | 87 |
| 18000 | 80 | 86 | 93 |
| 19000 | 85 | 91 | 98 |
| 20000 | 90 | 96 | 104 |

PRESSURE SETTINGS

¹ Run heights are based on units with no axle / bag shim and a 3.50" offset axle.

The values above are based on the standard units with **bag heights of 11, 12, and 13** respectively.

These values are approximations and will vary, especially with different mounting heights and or bag heights.

These weights are based on the axle and wheel equipment weighing **1400 lbs** which also varies. (0 pressure load)

The suspensions must be calibrated on a scale to determine the correct pressures.

These weights are approximations only and will vary slightly.

TROUBLE SHOOTING

| PROBLEM | POSSIBLE CAUSE | REMEDY |
|---|---|--|
| 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 SECTION 8). |
| | AIR CONTROL SYSTEM NOT PROPERLY INSTALLED | CHECK PIPING OF AIR SYSTEM (REFER TO SECTION 9) |
| | MOUNTED TOO HIGH | SHIM AXLE AREA, MAY REQUIRE ARM REPLACEMENT |
| INSUFFICIENT AIR PRESSURE TO SYSTEM | DEFECTIVE BRAKE PROTECTION VALVE OR TRUCK COMPRESSOR | REPLACE BRAKE PROTECTION VALVE AND CHECK AIR COMPRESSOR |
| UNIT NOT GETTING THE CORRECT LIFT | LIFT AIR BAGS NOT GETTING PROPER AIR PRESSURE | A) CHECK SYSTEMS PRESSURE. B) CHECK AIR SYSTEM. REFER TO CONTROL SCHEMATIC. (REFER TO SECTION 8) |
| | INTERFERENCE WITH CHASSIS DRIVE LINE OTHER CHASSIS AND COMPONENTS | INSPECT FOR INTERFERENCE |
| | UNIT NOT INSTALLED PROPERLY | CHECK INSTALLATION WITH FACTORY INSTALLATION DRAWING. |
| | ARM BEING RESTRICTED FROM FULL RETRACTION | CONTACT FACTORY |
| PUSHER STEERING OPPOSITE DIRECTION THAN TRUCK | IMPROPER CASTER SETTING | READJUST CASTER |
| UNIT HAS VERTICAL HOP | | INCREASE AIR PRESSURE |
| | | INSTALL VERTICAL SHOCK KIT |

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. |