# S&W Race Cars & Components, Inc.

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***CAUTION!!! - The most important requirement for a successful installation of this, or any, S&W chassis component is that you take your time and use good common sense. Check & recheck all measurements before cutting or welding. If at any time before or during the installation - STOP - and call our tech line at 610-948-7303 and we will gladly explain in more detail any step in the installation.***

## Please read complete instructions thoroughly before beginning!

# Installation Instructions for S&W Ladder Bars

*( NOTE: Page 1 is an Installation Summary. Detailed Instructions Begin on Page 2)*

**I. Preparing the Rear Housing.**

**A.** Clean and inspect the rear housing.

**B.** Weld axle tubes to center casting (GM & Dana).

**II. Assemble Ladder Bars and Brackets.**

**A.** Thread rod ends into ladder bars.

**B.** Bolt brackets to ladder bars.

**III. Place Rear Housing Under Car.**

**A.** Set chassis at ride height.

**B.** Position rear housing under car.

**III. Installing Coil-Over Shocks**

**A.** Shock dimensions at ride height

**B.** Installing lower shock bracket

**C.** Recheck and final weld

**IV. Tack Weld Ladder Bars to Rear Housing.**

**A.** Determine location of ladder bars in relation to chassis and rear housing.

**B.** Tack weld housing brackets to axle tubes.

**V. Check Your Work and Final Welding.**

# *S&W LADDER BAR INSTALLATION*

**INTRODUCTION**

The S&W Ladder Bar rear suspension is the most reliable and easy to tune pure drag racing suspension available, if it is properly installed. Patience and good workmanship will reward the builder with a suspension that is square within the car, and remains so after many passes. Through the use of ladder bars and related shock tuning, racers can set the rear suspension to react to the engine/transmission combination.

The following information will be need to be established before installation of this kit begins:

- Wheel Base
- Size of rear tire to be used?
- What is the front-to-rear location of the ladder bar chassis mounts?
- Chassis centerline (C/L)
- Ride height

While considering the loads placed on the ladder bar rear suspension, remember that the quality of your workmanship will also reflect the ultimate strength of the entire suspension. During construction of the rear suspension, the alignment of components before and after assembly is critical. Stock rear housings used for drag racing must be thoroughly cleaned and carefully inspected for cracks and alignment. All areas that are to be welded should be free of road grime, weld slag, paint and rust.

**HERE IS A LIST OF THE TOOLS YOU WILL NEED:**

A. Common hand tools.

B. Jack stands (6) for supporting the car and rear housing.

C. Floor Jack

D. Measuring tools. Such as: 12 foot tape measure, small carpenter's square, level.

E. Cutting tools such as a hack saw and hand grinder.

F. Mig welder (recommended). If possible, a stick welder should be avoided.

*Tig welding is unnecessary for this kind of work.*

This work should be performed in a dry, well lit shop with level or near level floor.

Hopefully, you will have enough room around the car to position the floor jack and move tools.

*The first element to a successful installation is to have a clear understanding of the job to be performed.*

Understanding the steps involved ahead of time will help you perform a better installation.

*In all phases of construction, remain patient and intent on each step of construction.*

***Above all, be careful when supporting the chassis and wear eye protection while grinding or welding.***

**Preparing the Housing.**

Regardless of the type of rear axle housing that will be used ( GM, Dana or Ford) the same pre-cautions apply. Care must be taken to insure that the ladder bars and brackets are installed square with the axles and parallel to each other. The rear axle housing is often neglected as a structural member of the rear suspension. Many of the problems related to inconsistent launches and not driving straight are related to the housing, not the ladder bar adjustment, nor chassis flex.

**Note:** Ladder bar brackets, shock brackets and any other hardware being welded to the rear housing should be final welded *before* the housing ends are installed. The welding of these brackets to the axle tubes can distort the them. The housing ends should be installed by a chassis shop or individual with the proper fixture. Misalignment of the housing ends will result in uneven loading of the axle bearing and eventual failure.

**A.** Clean the rear housing and inspect it for cracks.

Before proceeding with any further work the housing should be checked for straightness. This is done by placing a straight edge on the gasket surface of the housing. Observe the space between the straight edge and the axle tubes, this space should be uniform from the center section to the end of the tube. Some misalignment can be compensated for when the axle bearing ends are welded back on.

**B.** The GM and Dana rear housings consists of a cast center section and two separate axle tubes. These axle tubes are pressed in place and often spot welded by the original manufacturer. This method of attachment will not hold up to the torque applied to the rear housing of a drag race car. The joint between the center section and the axle tubes should be welded entirely.

**Assembly of Ladder Bars**

**A.** The spherical rod ends are installed at the front of the bar and the solid rod ends are to be at the back. If the ladder bars are the double adjustable type - place the hex links in the bottom, rear tube of the ladder bar. You my want to apply never seize to the threads. To assure that both bars are the same length, place one on top of the other and put bolts through the rod ends. If the bolts do not go through freely screw the rod ends in or out until they do. The solid rod ends, hex links and the spherical rod ends should show no more than 4 - 5 threads once they have been screwed into the ladder bars. The ladder bar safety straps can now be bolted to the front of the ladder bars.

**B.** Next, bolt the ladder bar housing brackets to the ladder bars. While bolted together, they will function as a fixture while tack welding the brackets to the housing. *It is important to remember, however, that once the brackets have been tacked into place, the ladder bar, rod ends and bolts should be removed from the brackets before final welding . The parts won't get damaged by the heat caused from welding and there will be greater access to weld areas.*

**Place the Housing Under the Car**

**II. Setting the Chassis and Housing at Ride Height -** Establishing a ride height for the chassis and the housing will allow the builder the best opportunity to locate the final position for the lower shock mounts, install the housing and pre-set the suspension.

**A.** Because the suspension must be set for the conditions that exist at the race track, the chassis and rear axle housing should be positioned at “ride height.”. The chassis ride height should be measured at four points to assure that the car is level side-to-side and at the front to rear "rake" desired. Suspension mounts or body seams on the rocker panels can be used as references.

**B.** Place the rear axle housing under the car. The height of the housing will be determined by the size of the rear tires and the ground clearance desired. One half (1/2) the tire diameter can be used as the preliminary height of the axle C/L. Level the housing from side to side. Square the housing in the chassis by measuring the wheel base on both sides of the car from the center of the front spindle.

Determine the pinion gear location within the housing and the chassis. This will involve the *“pinion offset” and “pinion angle”.*

*Pinion offset* is the side-to-side location of the pinion gear. This is related to the offset of the stock engine location and transmission tunnel from which the rear housing originally came from. If the engine is to remain in the stock location and a stock housing is going to be used, this relationship will be easy to maintain. However, if the housing comes from a different car, the pinion offset must be considered during construction. This means that the pinion must be offset to accommodate the stock engine location.

The housing ends and ladder bar brackets are positioned in reference to the chassis C/L, *not* the pinon offset. Each housing end should be an equal distance from the frame rails, while the pinon is in it’s correct position.

*Pinion angle,* is the angle of the pinion gear in relation to the drive shaft, when viewed from the side of the car. S & W recommends that the pinion is installed so that it aims directly at the tail shaft of the transmission. This puts the drive shaft and pinion are at the same angle, this is said to have a pinion angle of zero.

**Locate the Ladder Bars on the Rear Housing**

*The ladder bar bracket location on the rear housing will need to be checked carefully.*

**A.** First, determine how far apart the ladder bars will be from each other, this depends on the width of the frame rails. Keep the ladder bars as far apart as possible while at the same time leaving enough room for the mounting hardware at the front of the bars. The ladder bar tubes should not get closer than a half inch (1/2") to the frame rails through out their entire travel. The ladder bars must be parallel to each other and the center line of the chassis. Mark the axle tubes for the location of the ladder bar housing brackets. The distance from the end of the axle tube and the housing bracket should be the same from side to side.

Hold the ladder bar/housing bracket assembly in place so that it is parallel with the chassis C/L and the bottom tube is level with the ground. The housing brackets are to be installed so that they are perpendicular to the axle

center line. Lightly tack weld the housing brackets to the axle tubes. A final check of the ladder bar position includes diagonal measurements from the center of the front rod end of one ladder bar to the center of the rear rod end of the opposite ladder bar. Take this same measurement for the other two corners of the ladder bar assembly. Adjust the location of the bars until these diagonal dimensions are equal, then tack weld them a little heavier.

Check Your Work

• Check the ride height

• Check the wheel base on both sides of the car.

• Check the alignment of the rear housing in the chassis.

• Check the alignment of the Ladder Bars with each other and the frame rails.

• Check the alignment of the housing brackets and the axle tubes.

• Check the clearance of the bars and chassis.

When you are satisfied with your work remove the ladder bars from the brackets and weld them to the housing. To minimize the heat build-up in any one area, weld short beads on alternate brackets until the brackets are completely welded.