



S&W Race Cars and Components, Inc.

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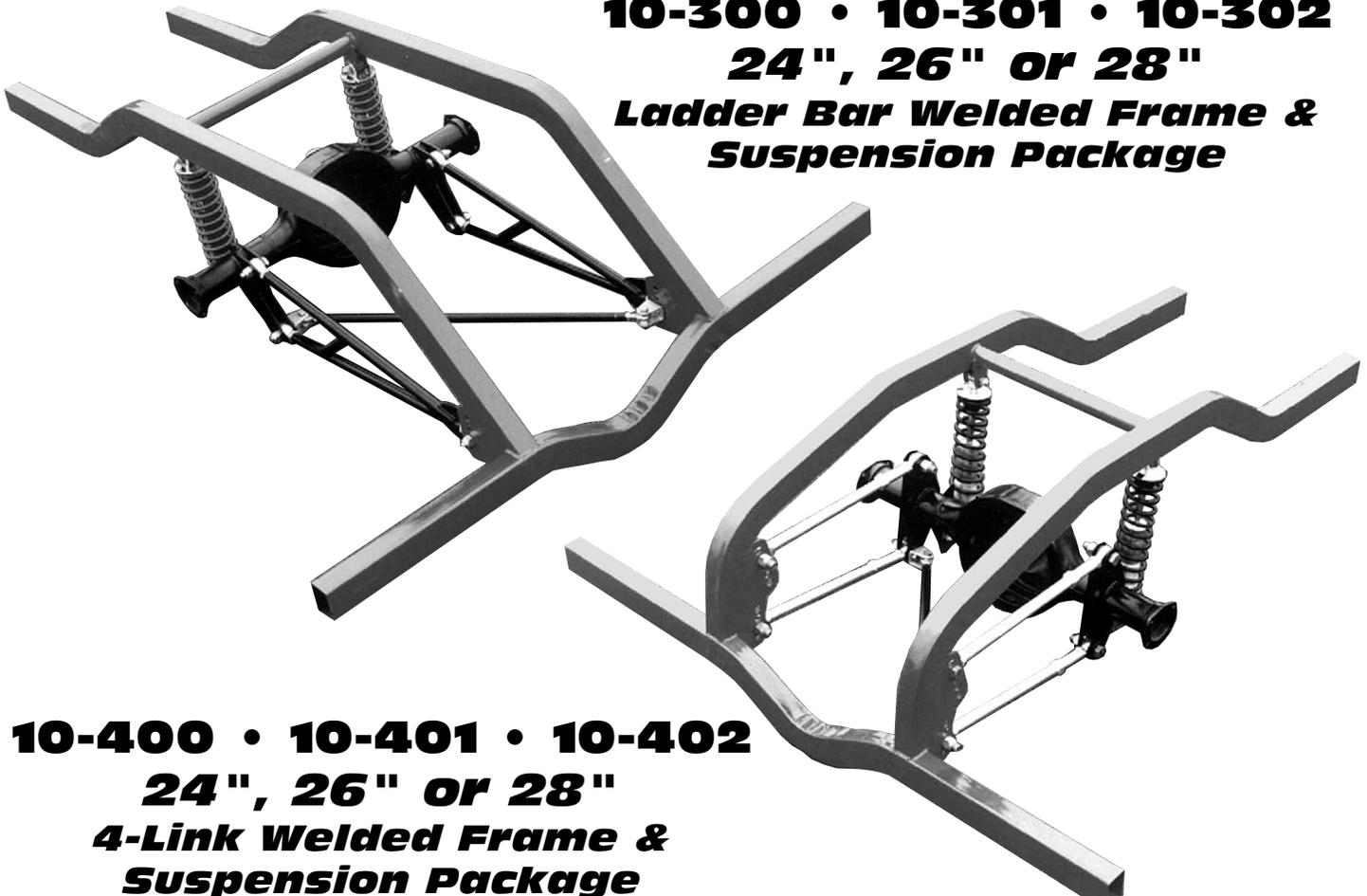
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Installation Instructions for Pro/Series 2000 Welded Frame Unit (Ladder Bar and 4-Link)

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 you have any questions, 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!

10-300 • 10-301 • 10-302
24", 26" or 28"
Ladder Bar Welded Frame & Suspension Package



10-400 • 10-401 • 10-402
24", 26" or 28"
4-Link Welded Frame & Suspension Package

Please read all instructions in full before beginning installation.

Preparation:

Installing S & W RACE CARS frame rails and rear suspension into a clean car is a relatively easy job, although there are certain precautions that should be taken for your safety and to insure that the finished product is aligned properly. It is recommended that you wear eye protection during the removal of the stock floor, suspension and other components, and during welding and fabrication. Proper supports and jack stands must be used, not only for construction purposes (such as keeping the chassis level), but also for safety reasons. This work should be performed in a dry, well lit shop with a level or near-level floor.

While installing your frame rails and rear suspension, remember that the quality of your workmanship will directly affect the ultimate strength of the entire race car structure. It is important that all areas to be welded are clean, free of oil, slag, paint, undercoating and of course rust.

Quality work requires the proper tools. Here is a list of some of the tools you will need.

- A. Common hand tools - for removing the stock suspension components and car interior.
- B. Jack stands - for supporting the car and new frame rails.
- C. Floor jack - for raising the car, removing the frame section.
- D. Measuring tools - 12' tape measure, level, inclinometer, plumb bob, string, builders square, large square felt tip pen or soap stone.
- E. Cleaning tools - gasket scraper and wire brush to remove undercoating.
- F. Cutting tools - oxyacetylene torches, hand-held reciprocating saw or rotary grinder with a cutting disc.
- G. Welding equipment - a MIG welder is recommended. TIG welding is acceptable, but is unnecessary for this type of work.

**Warning: Effective Jan. 1, 1995 stick welding will be prohibited by NHRA.
S&W Race Cars strongly suggests that these components not be stick welded!**

- 1) With all the stock components still in the car and the car sitting on the floor at ride height measure and record the wheelbase and axle center line measurement from the center line of the axle to a mark on the quarter panel.
- 2) Raise the car to a comfortable working height and level it from front to back and side to side. This can be done front to back by placing the level on the rocker panel and side to side by placing the level on the front crossmember and on a horizontal floor panel at the rear of the car.

Note: from this step to the final step always be aware and maintain the car's level condition!

- 3) In order to insure that your frame rails are centered in the car properly, you must find the chassis centerline (C/L). The chassis C/L is the midpoint line that runs the length of the car. To find the C/L, drop a plumb line from the same two points on the opposite side of the car to the shop floor and make a mark on the floor at these locations. Do this at the front and rear of the car, then measure half the distance between each set of plumb line marks on the floor. Each of these half distances can be connected and a straight line can be drawn on the floor running from front to back, which represents the center line of the car. It is a good idea to drop a plumb line to the C/L on the ground and transfer it onto the car by punching marks on a few crossmembers. Now if you have to move the car or when you do future work, the C/L can be quickly reestablished. The C/L can also be used for suspensions alignment work.

Disassembly:

- 4) Remove all stock components such as front and rear seats, carpeting and insulation, interior trim panels, rear wheels and tires, rear axle assembly, rear springs, rear shocks, brake lines, fuel tank and lines, rear mounted fuel pumps, rear mounted electrical components and wires.

During and after the removal of the floor always keep the doors shut and the car supported at 6 points on the car, to keep the car from bending, twisting or drooping.

- 5) Cut out the stock floor and inner wheel wells. This initial construction step is one of the most critical and care should be taken when you make your cuts, making sure that the body is supported properly and will not drop or sag. Throughout the cutting process, keep an eye on the door and body alignment. Any change in the gap or angle of the door to sill clearance will alert you to bending, twisting or drooping of the car. When cutting the floor, cut the front of the rear floor by making a straight cut parallel and forward of the axle centerline 39" for the ladder bar frame and 27" for the 4-link frame, from the bottom of each rocker panel to the base of the transmission / driveshaft tunnel for front crossmember clearance.

See drawing #1 and #2.

Now cut the transmission / driveshaft tunnel back at the same angle as the frame rails.

Note: during this step make sure that you support the floor to keep it from dropping.

After the floor has been removed, grind all slag from the body panels and remaining floor.

During any cutting, welding or grinding, the sparks can damage the windows. Be sure to sufficiently cover or remove the windows, to avoid damaging them.

Assembly:

- 6) Installing the welded frame unit. If this step is not done correctly and misalignment occurs, you will have a car which may not launch or drive straight. In future chassis tuning work, you may have to compromise the suspension components to overcome your unsquare race car.
 - a) Install a set of 1/8" plates on the body at the rear of the car at the same width as the frame rails. Using the chassis C/L to establish the side to side location of the plates. The plates should remain flat, but trim the edges to clear any obstructions.
 - b) The front edge of the front crossmember will mount 39" forward of the axle center line for a ladder bar frame and 27" for a 4-link frame. Install a set of 1/8" plates on the rocker panel boxes at this location on each side. Form the plates so they follow the contour of the stock sheet metal as closely as possible. This can be done with a metal brake or by tacking one edge, heating and forming.
 - c) Trial fit the new S & W frame unit into the car. Trim the front crossmember width and rear of the frame rails length for your application, then lift the welded frame unit into place, leveling the frame front to back and side to side. Check the side to side location using the chassis C/L. Inspect all clearances and the alignment with the 1/8" plates.
 - d) If you are satisfied with the installation, tack weld the new frame unit in place, **tack weld only.**
 - e) Recheck the squareness and location of the welded frame unit with the chassis C/L, also rechecking all clearances, including the distance from the frame rails to the tire and from the tire to the inner fender.

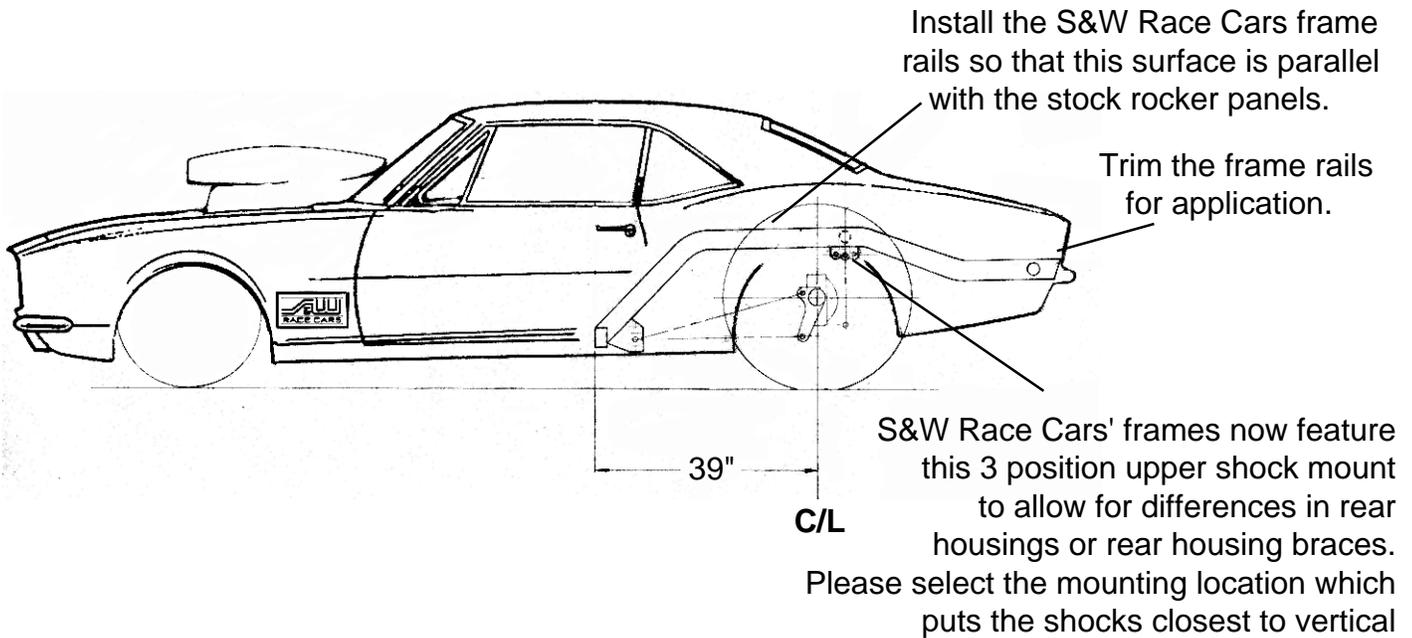
- 7) Install the frame connectors and outriggers. With the welded frame unit in position, you must now install a set of frame connectors to tie the chassis together as one structural unit.
 - a) The connectors are to be installed with 3" edges as the horizontal surface. The back of the connector is to be located directly ahead of the rear suspension mounting points. The front will be welded to the stock subframe. Cut the front subframe to match the connectors. The connectors may not be parallel to each other for some applications.
 - b) Fit the connectors in place and tack weld. Recheck all the dimensions and alignments.
 - c) Position roll bar outriggers where necessary for proper main hoop installation.
- 8) Refer to instructions included with ladder bars, panhard bar or track locator bar and shock & spring kit for proper installation of these components. Then install all of these components.
 - a) With all the rear suspension installed in the car and the tires and wheels installed at ride height, run the suspension up and down through it's travel checking all suspension and tire clearances.
 - b) If all clearances are okay remove all rear suspension components and tires and wheels to keep from damaging them during final welding.
- 9) Install a minimum of an 8-point roll bar. The installation of an S&W welded frame does not result in a completed chassis, you must install a minimum of an 8-point roll bar to tie the chassis together . **Note: see your sanctioning body's rule book for the correct roll bar or cage for your class.**
- 10) After your roll bar or cage is tack welded in place. You can now finish weld your new S&W frame and roll bar or cage.
- 11) Reinstall all your suspension components and wheels & tires to complete the installation of your new S&W Race Cars Welded frame unit.

**If you have any questions during or after the installation of your frame unit ,
call S&W Race Cars' tech line (610)948-7303.**

**For detailed explanation of tuning your new chassis
DOORSLAMMERS - The Chassis Book by Dave Morgan
and
DOORSLAMMERS - The Video Parts 1 & 2
are available through S&W Race Cars.**

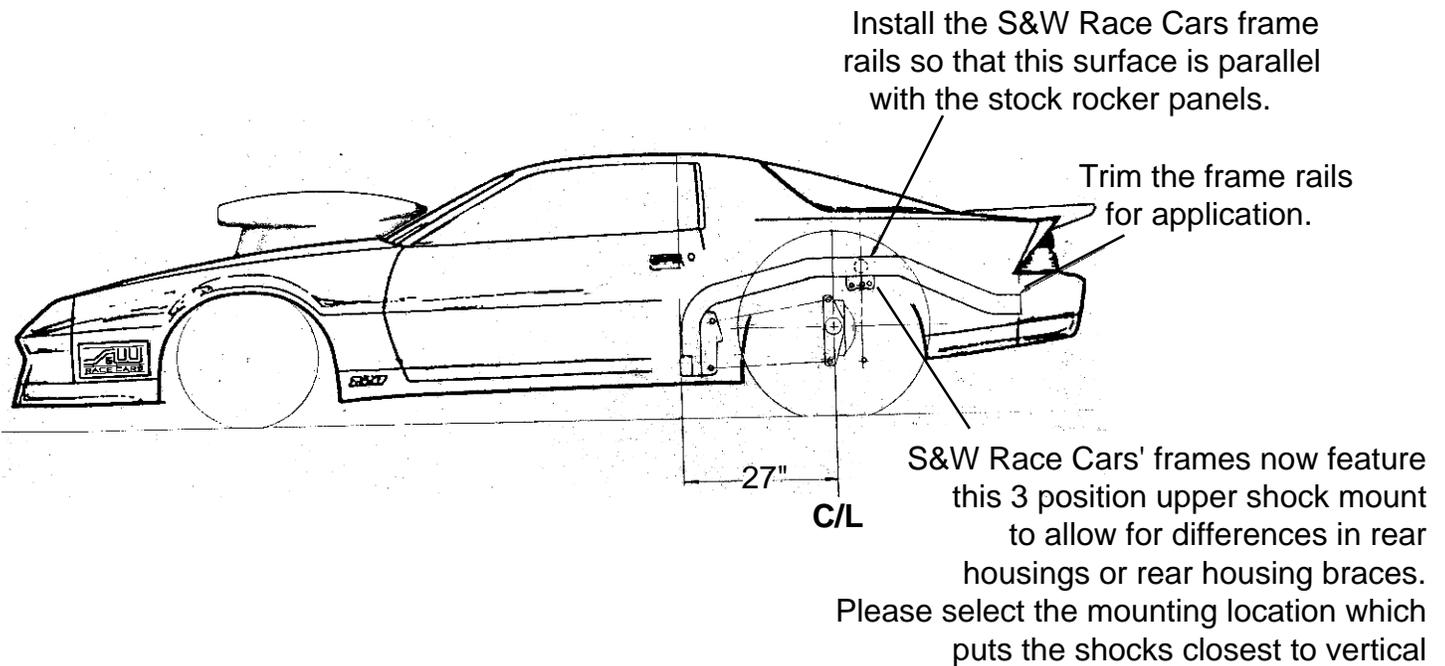
S&W Race Cars Welded Ladder Bar Frame Unit

Drawing # 1: representative of part numbers 10-300, 10-301
& 10-302 ladder bar welded frame units.



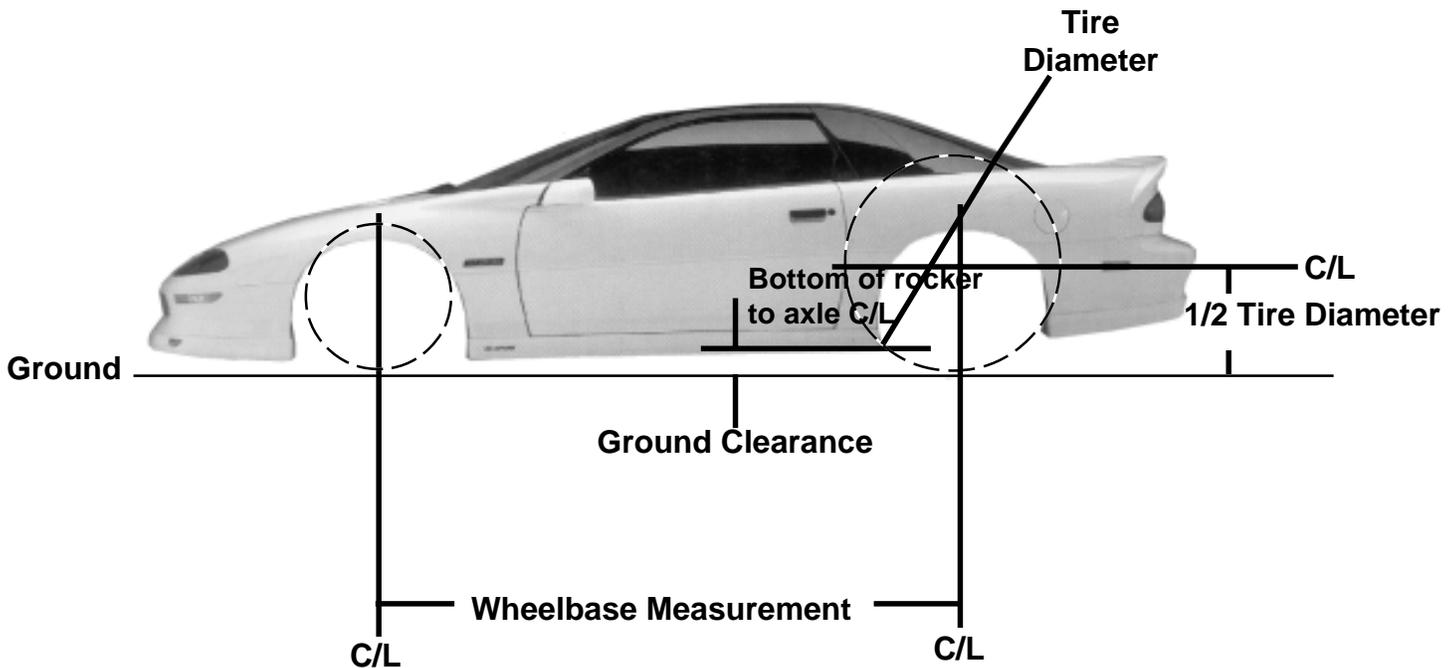
S&W Race Cars Welded 4-Link Frame Unit

Drawing # 2: representative of part numbers 10-400, 10-401
& 10-402 4-link welded frame units.



Instructions For Locating The Rear Housing Under The Car

- 1) With the car sitting on the ground at ride height and all the weight in the car, measure and record the wheel base and the rear housing center line measurement up and down. The up and down measurement should be made from the same two reference points on the body on both sides of the car.
- 2) Raise the car to a comfortable working height leveling it from side to side and sitting at the same angle front to back as it will ride at. Leveling can be done side to side by placing the level on the front crossmember and on a horizontal floor panel at the rear of the car.
- 3) Position the rear housing under the car at the correct wheelbase (**note: the wheelbase should be checked on both sides of the car**) and raised to the desired ride height.
- 4) The ride height of the rear housing will be determined by the tire height and the ground clearance off the body or chassis.
 - a) Determine a suitable ground clearance at the rear edge of the rocker panel. Subtract this ground clearance from 1/2 of the tire diameter, this will give you the measurement from the center line of your axle tube to the bottom edge of the rocker panel. Position the rear at this height, leveling it from side to side.
- 5) Determine the housing location side to side **by the pinion center line**, not the opening of the housing. For most applications the pinion will be centered in the car or have a slight offset to the passenger side.
- 6) Set the pinion angle, the actual angle in degrees is not what is important; what is important is that the pinion is aimed directly at the tail shaft of the transmission. Imagine that the pinion and the driveshaft are one piece, with only one u-joint at the transmission yoke. By reducing the u-joint angle it will also reduce u-joint failure.



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Determining Rear Axle Housing Width

To do this accurately, you should have the wheels and tires that you plan to race with. You will need to know.

- 1) Tire section width - To determine section width, lay the tire and wheel combination, with the air pressure you plan to use, on a flat surface. Place a straight edge against the top sidewall and measure the distance to the ground. This is your tire section width.
- 2) Backspacing of your tire/wheel combination - While the tire is on the floor, measure the distance from the inside mounting surface of the wheel to the top of the tire sidewall, using the straight edge as you did above. Next measure the thickness of your brake drum or disc brake rotor hat and subtract the thickness from the backspace measurement.
- 3) Inner fender to inner fender dimension - Take this dimension at the narrowest point of the car such as the three o'clock or nine o'clock position of the quarter panel above the wheel opening.

- A = Fender to Fender Width
- B = Fender to Tire Clearance
- C = Tire Section Width
- D = Tire to Frame Clearance
- E = Frame Rail Width
- F = Wheel/Tire Backspacing, less your brake drum or rotor hat thickness

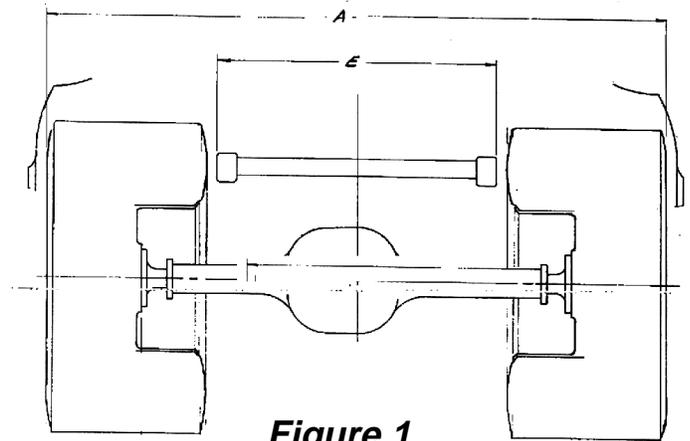


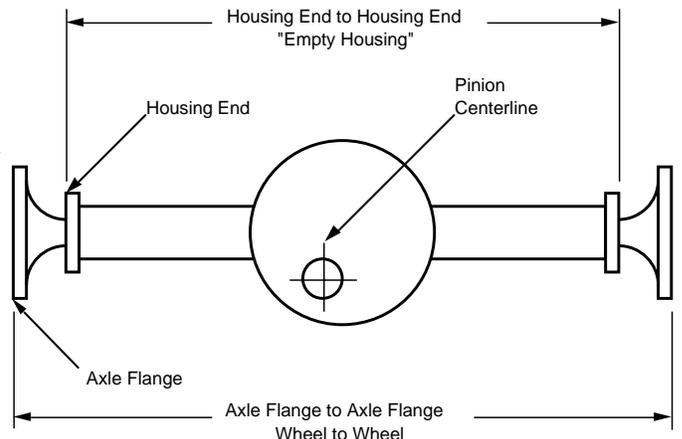
Figure 1

Here is a formula that, along with **Figure 1** will help you calculate the *rear housing width*.

Start with the frame rail width dimension (E) = _____ inches
ADD Twice the tire to frame clearance width (D) = _____ inches
ADD Twice the wheel/tire backspacing (F) = _____ inches
 This is your **AXLE FLANGE TO AXLE FLANGE** (Outside dimension) = _____ inches

Refer to the chart below and determine the housing end to axle flange dimension listed next to the type of housing end you are using. **SUBTRACT TWICE** that dimension from your previously determined axle flange to axle flange measurement, this total is your housing width.

| | |
|-------------------------------|---------------|
| 57-64 Olds | 2-3/4" |
| Big Mopar | 2-1/2" |
| 2.835 Small Ford | 2-5/8" |
| 3.150 Big Ford | 2-1/4" |
| 12 Bolt Chevy | 2-3/4" |



If you are uncertain as to the type of housing end you are using, please refer to the chart in your S&W Race Cars catalog or call S&W Race Cars for assistance