



## INSTALLATION INSTRUCTIONS

P/N: C2005

### **MAGNUM SERIES DOUBLE ADJUSTABLE LADDER LINK™**

The Competition Engineering Double Adjustable Ladder Link™ offers ease of installation through the use of a two piece bracket system. By being able to assemble the one piece Ladder Bar Brackets and the one piece Housing Brackets (together they create a 360 Degree housing bracket that can be tack welded in half the time of an older style system offered by our competitors. No more safety straps, individual plates and gussets.

This kit will permit you to adjust preload and pinion angle without bind.

#### **PARTS LIST**

- |                                    |                                  |
|------------------------------------|----------------------------------|
| 2) Ladder Bars                     | 2) Formed 180 Deg. Housing Brkts |
| 2) RH Solid Rod Ends 3/4" x 1/2"   | 6) RH Jam Nuts                   |
| 2) Moly Rod Ends 3/4"              | 2) Housing Bracket Sm            |
| 2) 3/4" x 2-3/4" Bolts             | 2) 3/4" Nylock Nuts              |
| 4) 1/2" Loc Nuts                   | 4) 3/8" x 1" Bolts               |
| 4) 3/8" Locknuts                   | 2) LH Jam Nuts                   |
| 2) Threaded Adjuster Link          | 4) 1/2" x 2" Bolt                |
| 2) Safety Loops                    | 2) LH Solid Rod Ends 3/4" x 1/2" |
| 8) Steel 1.25 O.D x .50 ID Washers |                                  |

Read all instructions completely before beginning the installation. The following suggestions will help to ensure a quality installation.

- Welding should be done using either the MIG or TIG process. A welding machine rated at 130 amps or higher should be used to ensure adequate penetration.
- Do not install this kit with the rear suspension extended. Set the car at ride height and leave it there for the duration of the project.
- Tack weld everything and double-check all your measurements before final welding.
- Remove the axles and axle bearings before welding on the housing to prevent damage.
- Leaf spring equipped vehicles require a housing floater to eliminate bind. We recommend using either Competition Engineering's Part No. C2030 bolt-on floater mount.
- Coil spring equipped vehicles require a diagonal link or panhard bar to keep the rear centered in the car. Competition Engineering offers Part No. C2052 Bolt-on Diagonal Link and Part No. C2037 Panhard Bar to suit your needs.

**INSTALLATION**

1. Jack up the front and rear of the vehicle; support it with jack stands. Level the car from front to back and side to side.
2. Using a plumb bob, mark the front spindle centerline onto the shop floor.
3. Use the plumb bob again to locate the front of the REAR axle tube onto the shop floor. Mark these points down on the floor with a magic marker. Draw a line connecting these two points using a straight edge.
4. Measure the diameter of the axle tube and divide this number by 2. Make another line parallel and behind the first line made in step 3. This is your rear axle centerline.
5. With all these critical measurements taken, you may now remove the axle housing and any other unnecessary suspension components.
6. Remove all existing brackets and links from the rear axle housing that will not be used. This can be accomplished by using either a plasma cutter or an oxy-acetylene torch. Use caution when removing brackets so that you don't add too much heat to the housing, which will warp it.
7. Determine the centerline of the vehicle and mark its location on the shop floor. This can be done as follows:
  - a. Measure the distance from one front spindle to the other and divide by 2. Mark this dimension on the floor.
  - b. Take another measurement from the inside of one frame rail to the inside of the other frame rail; divide this number by 2. Mark this dimension on the floor.
  - c. Stretch a chalkline between the front and rear marks on the floor. Snapping a line between these points gives you the chassis centerline.
  - d. Using a straightedge, make this line permanent on the floor with a marker.
8. Next we will determine the offset of the drivetrain. Most cars, but not all, have on-center drivetrains. You can figure this as follows:
  - a. Measure from the center of the transmission tailshaft to the inside of the front frame rails on both sides.
  - b. Subtract one side dimension from the other. The result will be the drivetrain offset.
  - c. Mark this dimension on the floor.
9. Using a floor jack and jack stands, position the rear end under the car at the correct ride height and wheelbase using the axle centerline. Set the pinion angle at 0° using a jack stand to hold it in position. Center the pinion on the line corresponding to the drivetrain offset.
10. Thread the jam nuts onto all the rod ends leaving 4-5 threads showing.

NOTE: Always use anti-seize compound on all threads when assembling the ladder bars.

11. Thread the Rod Ends into the Double Adjustable Ladder Link weldment. The Solid Rod Ends thread into the rear portion of the bar, the spherical rod ends thread into the front. The Left Hand Solid Rod Ends thread into the rear of the Link Adjusters.

12. Bolt the front safety loops to the front of the ladder bars using the 3/8" bolts and locknuts supplied.
13. Place two 1/2" bolts through the holes in one of the large housing brackets. Place it on the floor with the threads facing up.
14. Place one 3/4" Jam Nut on each of the adjuster links and thread the Adjuster Link into place on the Ladder Bar.
15. Adjust the rear Rod Ends in or out so that they line up with the bolt holes on the large housing bracket. The bottom bar of the Double Adjustable Ladder Link should be 90° from the front edge of the large housing bracket.
16. Using a tape measure, measure the distance from the rear edge of the housing bracket to the center of the front rod end. This dimension should be 33-1/2" +/- 1/8". Adjust the front rod end accordingly to achieve this dimension. Tighten all jam nuts.

NOTE: Never adjust rod ends so that less than 3/4" of the shank is threaded into the bar.

17. Repeat this procedure for the other bar, laying it on top of the first bar so that the bolts protrude through the rod ends.
18. Bolt the remaining Large Housing Bracket to the bars making a complete assembly for each side.
19. We will now trial-fit the bars into the vehicle to determine their proper position.
  - a. Position the bar assemblies in place on the axle housing tubes.
  - b. Mount the front rod end in the middle hole of the ladder bar crossmember bracket. Doing this will provide the necessary clearance for the safety brackets.
  - c. The bottom bar should be parallel with the floor. Adjust the location of the front crossmember to achieve this.
  - d. Square the front crossmember between the frame rails and tack weld it in place.
  - e. Make sure there is adequate clearance between the Ladder Bar assembly and the floor pan. The bar must not contact the floor throughout the suspension travel.

HINT: Mount the bars as far apart as possible keeping them straight (Don't angle them in or out). This will allow more stability on initial launch.

20. Center the bars under the frame rails and check that the pinion angle remains the same. Keep in mind that there should be a minimum of 1" clearance between the tire sidewall and the ladder bar. Tack weld the Brackets to the axle housing.
21. Un-bolt the ladder bars from the mounting brackets and remove the rear axle housing from the car.
22. Level the housing side to side and make sure that the pinion angle is set at 0°. Check the Large Ladder Bar Bracket to ensure that it is 90° from the axle centerline. If not, break the tacks on the brackets and re-adjust.
23.
  - a. Tack weld the Small Hosing Brackets to the back of the housing and the Large Housing Bracket, in-line with the Large Housing Brackets.
  - b. Finish weld the Brackets to the housing and each other. Weld each Bracket a little at a time to prevent housing warpage.

**NOTE:** You can increase the strength of the housing by welding the axle tubes to the main case of the housing.

24. With everything welded completely, re-assemble the ladder bar/rear housing assembly into the vehicle.
25. Using the dimensions that you measured earlier, check the wheelbase to make sure it is correct. You can adjust this by threading the front rod ends in or out to achieve the correct dimension.
26. Adjust the Ladder Bar Adjuster Link to a neutral position by turning the lower link in or out so that the 1/2" Bolts slide in without force. Tighten all nuts, bolts and jam nuts.
27. If you installed the bars correctly, you should now have 0° pinion angle with the car at ride height. We will now adjust the Double Adjustable Ladder Link to give you a baseline setting. Remember if you get confused while tuning, always return to the baseline setting.
  - a. Loosen the Jam Nuts on the Link Adjusters.
  - b. Place the angle finder on the pinion yoke. It should read 0°.
  - c. Rotate the adjusters evenly until the angle finder reads 2° downward angle.
  - d. Tighten all Jam Nuts.

### **TUNING TIPS**

1. After the first run, check the tightness of all nuts, bolts and jam nuts. Also check all welds for stress cracks. This should be done before each race.
2. Check the condition of the Rod Ends. Replace any that show signs of stress such as bending, cracks and looseness. Use only high quality replacement rod ends.
3. If the car doesn't launch straight and flat, pre-load may have to be added to the right hand bar (Passenger side). Loosen the Jam Nuts on the Adjuster Link and lengthen by turning it one wrench flat. Tighten the Jam Nuts. Continue to add pre-load until the car launches correctly.
4. Pinion angle can be adjusted by rotating both Adjuster Links an equal amount and checking the angle with an angle finder such as Competition Engineering Part No C5020.

### **TROUBLESHOOTING**

#### **CAR DOES NOT DRIVE STRAIGHT:**

- Check the wheelbase on both sides of the vehicle. If the dimensions differ more than an 1/8" reset the wheelbase. Make sure the housing is square under the car.
- Check for excessive pre-load. Too much pre-load will cause the vehicle to launch unevenly.
- Rotate the rear tires from side to side. If the problem goes away think about replacing the tires.
- Uneven ballast. Make sure that the ballast in the trunk is located in the correct place (center or passenger side of the trunk) and not excessive.
- Suspension bind. Check that the bars are not binding throughout the suspension's travel. Also look for obstacles that would limit full suspension travel.

**CAR DOES NOT LEAVE HARD:**

- Poor weight transfer. Raise front of ladder bars to top hole.
- Check front suspension travel. If front travel is too tight it will not allow the vehicle to transfer weight to the rear. Add Competition Engineering 3-Way Adjustable Shock Absorbers and Front Drag Race Springs.
- Change front to rear weight bias by moving heavy items (Battery, Fuel, and Ballast) as far to the rear of the vehicle as possible.
- Check for correct flywheel weight / torque converter selection.
- Make sure the Wheel-E-Bars are not set too close to the ground.

**ILLUSTRATIONS**

**MAGNUM SERIES  
DOUBLE ADJUSTABLE  
LADDER BAR**

