

# **LAZER** **CHASSIS** *The Ultimate Weapon*

## **2011**

### **OPEN WHEEL MODIFIED**



*Manufactured By:*

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# *Front Suspension*

- I. Front Suspension
- A. Upper Control Arms– Bottom holes front, Top holes rear on chassis
1. Small Screw-in Holder
  2. R.S.– 5” Tube Front 6” Tube Rear
  3. L.S. Legs– 6” Tube Front 7” Tube Rear
  4. Center of Heim to Center of Ball Joint (front),  
Center of Heim to Center of Clevis (rear)
- |        | R.S.    | L.S     |
|--------|---------|---------|
| Front– | 9 1/4”  | 10 5/8” |
| Rear–  | 9 7/8 ” | 11 1/8” |
- B. Lower control arms-67-69 Camaro-I.M.C.A. / Tubular-U.M.P.
1. Left– on Right
  2. Right– on Left
- w/screw-in Ball Joints & Offset Bushings
- C. Steering
- 78-88 GM Metric
- Steering Box
  - Center Link—Drilled to 5/8” @ Tie Rod Connection
  - Idler Arm
- D. Tie Rods
1. L.S.-15” Rod @18 1/2” on Center
  2. R.S.-17” Rod @ 21” on Center
- E. Tie rod Spacers– 1/2” at Center Link
- F. Alignment
1. Camber– right side– 3 3/4 degrees / left side– 2 1/2 degrees
  2. Caster– right side– 6 1/2 degrees / left side– 3 1/2 degrees
  3. Toe 1/4” out
  4. Bump Steer-Spacers R.S. 3 1/4” / L.S. 2”
- G. Spindles
1. Pinto
  2. Reamed for Screw-in Ball Joints, Top Small / Bottom Large
  3. Drill steering Arm to 5/8”
- H. Front Ride Height-Measure at Hexagon hole or lower control arm to 1/8” hole in chassis
1. Right Ground to Bottom of Metric Main Frame - 6 1/8”
  2. Left Ground to Main Frame - 6”
- I. Misc.
1. Use Extended Upper Ball Joint
  2. Front Edge of Body Bracket to Back Edge of Upper Shock Mount, (Rotate mount to get proper clearance)  
R.S. 33”                      L.S. 32 3/4”
  3. Front Shock Mounts,  
R.S. 1” Drop                      L.S. 2” Drop

## *4 Link Rear Suspension*

### II. 4 Link Rear Suspension

- A. Lift Bar Slider– Non-adjustable
- B. Lift Bar– Adjustable 24” - 36”
  - 1. 5/8” Bolt in top (grade 8)
  - 2. 1/2” Bolt in bottom (grade 8)
  - 3. Spacer between rod end and plate-1/2”
  - 4. Mount on right side of steel rear end plates
  - 5. Use spacer for strength between plates
  - 6. 6” Stabilizer Rod
  - 7. Cut 3 1/4” off end of L.M. Torque Arm
  - 8. Urethane Decel Cage (Chain mounted in end hole)
  - 9. 5th coil-Center Hole
- C. Pull Bar
  - 1. 34 1/8” center to center.
  - 2. Use Pull-bar to set Pinion Angle
  - 3. Use 9” Damper Shock-Front Hole on Rear, 2nd Hole from Top on Frame
  - 4. Mount– Frame 4th Hole from Top, Rear Top Hole
- D. Rear End Adjustment (side to side)
  - 1. Left upper torque arm plate to left ride height tab-16”  
depends on LR bite and ride height
  - 2. Panhard bar (plate mounted towards rear of car, j-bar mounted on front side of plate)
    - a. R.S. of Rear Second hole on bottom
    - b. Frame 5th hole from top inside row
    - c. Center to center 21 5/8”
- E. Rear Ride Height– tab to top of birdcage body
  - 1. Over rail rear clip
    - a. Left 10 1/4”
    - b. Right 10 ”
- F. Pinion Angle– 7.5 degrees negative
- G. Birdcage– Assembly and Location
  - 1. Shock Brackets– R.R. on outside of plates, L.R. on inside of plates
    - a. L.S. Front- shock High for L.R. behind (Low for clamped)
    - b. L.S. Rear- shock low
    - c. R.S. Front- shock low
  - 2. Location– Inside edge of rotor to Center of shock brackets
    - a. L.R.– 8 ”
    - b. R.R.– 9 ”
- H. Brake Brackets– **MUST BE DOUBLE PINNED TO AXLE TUBE!**- install caliper on backside of tube

Continued on next page...

## ***4 Link Rear Suspension-continued***

### **I. 4 Link Rods**

1. L.S. rods on outside of birdcage with 3/4" spacer
2. R.S. rods on outside of birdcage with 3/4" spacer
3. Center all 4 link rods in front brackets
4. Upper rods
  - a. 14" tube
  - b. 17 1/2" on center
  - c. 3rd hole from top
5. Lower rods
  - a. 12" tube
  - b. 15 1/2" on center
  - c. 3rd hole from bottom
6. R.R. Z-link
  - a. 14" Tube
  - b. 17 1/2" on center
  - c. Second hole from bottom

### **J. Square Rear**

1. Set 4 link rods accurately or
2. Drop a plumb bob from axle tube and measure to 2 x 2 outriggers

### **K. Rear Shocks Angles**

1. Over rail rear clip (gap between frame rail to center of shock brkt.)
  - a. Left rear front 3 1/2"
  - b. Left rear behind 3 1/4"
  - c. Right rear 3"



# GENERAL INFORMATION

## IV. Set Up

- A. Fuel 25 Gallons
- B. Wheel offsets
  - 1. Front- 2"
  - 2. Rear- 3"
  - 3. Super slick– put 4" on right rear
  - 4. Super tacky– put 2" on right rear
- D. Percentages
  - 1. Left side– 52%
  - 2. Rear– 57%Note: w/o driver w/ 25 gallons fuel
- E. Bite
  - 1. Tacky 60# Left rear
  - 2. Average 80# Left rear
  - 3. Slick 100# Left rear

## V. Miscellaneous

- A. Wheelbase-110 "
- B. Brakes-Metric large piston calipers w/.810 rotors
- C. Master cylinder
  - 1. Front– 1" Slick track– 7/8"
  - 2. Rear– 7/8" Slick track– 1"
- D. Rear End
  - 60" Track-center pinion

## V. Remember

- A. All recommendations listed are general. Your situation may vary.
- B. All adjustments are a compromise. Think through what you are doing.
- C. Different race tracks require different combinations, due to Driver...
  - 1. Style
  - 2. Technique
  - 3. Experience

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Use your computer for help. <http://www.bernheiselracecars.com>

# 2009 Open Wheel Modified

## PARTS LIST

### **Front Suspension**

Left upper control arm– 1801  
Right upper control arm– 1802  
Upper ball joint– 20034-1  
Tubular Left lower control arm– 88010  
Tubular Right lower control arm– 88020  
Lower ball joint– 20036  
Tie rod tube– R.S. 42-1703-C, L.S. 42-1503-C  
Spindles– Pair AD30436  
Center Link– 30270  
Idler Arm– 30261  
Steering Box– 84090

### **4-Link Rear Suspension**

Left Birdcage– 8310L  
Right Birdcage– 8310R  
Bolt on shock mount– 35-3322  
Lift bar– 29201  
Lower radius rod tubes– 42-1203C  
Upper radius rod tubes– 42-1403C  
Lift bar link rod– 42-0603C  
Panhard bar– 307-4205  
Pinion mount– 82169  
Over rail Integral Panhard Mount– 85159  
Pro Coil-over Eliminator– 20132P  
Pull Bar– 21209X



## **2009 OPEN WHEEL MODIFIED** **Shock and Spring Packages**

### I. L.R. Behind

- A. RF- 73-5 w/ 600
- B. LF- 75-3 w/ 600
- C. RR- 94 w/ 225
- D. LR- 95-3 (front) Coil-over Eliminator w/ 225 (behind)

### II. L.R. Clamped

- A. RF- 75 w/ 600
- B. LF- 75-3 w/ 550
- C. RR- 94 w/ 250
- D. LR- 95 w/200

### III. 5th Coil- 93 shock with 175 spring, center hole

### **Please Remember:**

**These are basic setups designed to give you a base line starting point. Your situation may require additional tuning.**

## Tech Tips

### I. Four Link

- A. More angle upward angle on rods (toward chassis) increases loading on that wheel (up in front, down in back)
- B. Rod angle changes also affect roll steer (typically lowering the lower rods at the frame decreases roll steer)
- C. Roll steer generally loosens the car through the center
- D. Lowering left upper rod on birdcage greatly increases drive off
- E. Specific rod angles
  1. Drop right upper for slick track
  2. Drop left upper for tacky track
  3. Raise right lower for tacky track
  4. Raise left lower for slick track

### II. Lift bar

- A. Longer and softer on the 5th coil brings weight transfer/bite in slower but lasts longer
- B. Shorter and stiffer on the 5th coil brings weight transfer/bite in faster but does not last long

### III. Panhard bar

- A. Shorter and more angle exaggerates wheel loading increasing side bite for a shorter time
- B. Longer and flatter smoothes out wheel loading and side bite

### IV. Ballast

- A. Higher ballast causes the car to move around more (side to side and front to rear) increasing amount of weight transfer
- B. Lower ballast settles car down by limiting weight transfer

### V. L.R. behind setup

- A. Amount of lift (roll-up) can be controlled by changing valving + length of L.R. shock front side
- B. Soft extension valving along with 1" or 2" shock end allows car to roll farther and faster (valving controls speed, extension controls distance)

### VI. Watts Link

- A. Many Lazer Chassis cars are equipped with a Watts Link bracket on the RR and/or LR
- B. Remove RR top 4 link bar and install a new one going towards the rear

### VII. Helper Spring

- A. A 5# helper spring on the LF ensures that the spring remains seated when car lifts
- B. A nylon collar is utilized with the helper spring to prevent shock damage
- C. One can also be used on LR behind shock

VIII. Damper Shock

- A. A 90-10 axle damper can be used to tighten and stabilize car on corner entry
- B. Too much angle can hurt forward bite– in that instance a 2nd shock can be added

IX. Driving

- A. Momentum and slick tracks require more driver finesse and a smoother less radical setup
- B. Stop and go tracks and traction tracks can more easily handle a radical combination and a stomp and steer driver





# Chassis Adjustment Guide

Adjustment Area	Adjustment			
	To Tighten In:	To Loosen In:	To Tighten Off:	To Loosen Off:
Front Springs	*Stiffen L.	*Soften L.	*Stiffen	*Soften
Front Shocks	*Stiffen L.	Stiffen R.	*Soften	Stiffen
Rear Springs	*Stiffen R.	Stiffen L. and/or Soften R.	*Stiffen L. and/or Soften R.	*Soften L. and/or Stiffen R.
Rear Shocks	*Soften L.	*Stiffen L.	Soften L.	—
Stagger	*Decrease	*Increase	*Decrease	*Increase
Track Alignment	Move rear CI to L.	Move rear CI to R.	*Move rear CI to L.	*Move rear CI to R.
Bite [L.R.]	Decrease	Increase	*Increase	*Decrease
L.S. Weight	*Decrease	*Increase	—	—
Rear Weight	Increase	Decrease	*Increase	*Decrease
Torque Arm Length	—	—	*Lengthen	*Shorten
Torque Arm Rate	—	—	*Soften	—
3rd Link Position	Raise on Chassis	Lower on Chassis	*Lower on Chassis	*Raise on Chassis
Panhard Position	*Lower all or raise on frame only	*Raise all or lower on frame	—	—
Rear Steer	Lead R.R.	Lead L.R.	*Lead R.R.	Lead L.R.
Spring Rod Pre-load	—	—	*Decrease	Increase
Damper Position	*Raise Front	*Lower Front	—	—
Gear Ratio	—	—	*Decrease	Increase
Center of Gravity	Raise	Lower	Raise	Lower
Brake Bias	*Decrease Rear	*Increase Rear	—	—
Brake Floater Rod Position	*Raise R.R. on frame or lower L.R.	*Raise L.R. on frame or lower R.R.	— *recommended	— adjustment areas

### Points to Remember:

- Corner exit handling is greatly affected by corner entrance handling.
- It's better to add traction to correct a problem than to reduce traction
- Going too far on an adjustment can produce an effect that is opposite of what is desired
- If adjustments produce no effects, check improper suspension geometry, suspension binding, chassis flex, and/or defective chassis components
- Adjust stagger to affect middle of corner handling
- Document all changes!