

Oval-track & Road-race Suspension HEIGHT & WEIGHT Setup

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We assume here that you have already "SQUARED" the car - that both axles are square to the chassis, centered left to right and that the pinion angle and suspension components are properly adjusted.



This DOCUMENT is interactive - it shows:

How to adjust these weights while MAINTAINING the proper/desired ride heights.

NOTE: You can ENTER wheel weights for YOUR car in the **YELLOW** cells. Calculated values are displayed in **BLUE**.

BLUE BACKGROUNDS are calculated numbers.
BLUE BACKGROUNDS are previously entered numbers.

AREA setup

- Find a FLAT area in the shop where ALL weight measurements will be made.
- Mark the exact place where EACH scale will be positioned - use duct tape or paint. If you can afford it - The best method is to pour a new epoxy pad for the whole area. Otherwise, don't worry about it IF this is the ONLY place you will set up your car.

PREPARATION

- Disconnect ONE END of any sway-bars (torsional anti-roll bars). Make sure that all suspension locknuts are tight.

BEFORE you start

- Place car on scales. Be sure THE DRIVER and ALL the "race-ready" weight it will carry (liquids etc) are in place.

Ride-Height MEASUREMENTS

- Measure ride-heights (usually frame to ground) on all 4 corners - write them down. Measure the ride-length of each shock (or coil-over) and the amount of rod showing and the loaded length of all coil springs - write all this down. **These may be handy later.**

- We assume you know what your desired ride-heights are. Calculate how much each corner must be raised or lowered to get the proper ride-heights.

NOTE: Always raise the chassis to take the weight OFF the springs before adjusting them. Then, set car back on scales & bounce it a bit before taking ANY measurements.

- Make your ride-height adjustments to all 4 corners. Confirm ride heights are correct. Fine-tune as required to get it RIGHT!

NOTE: Adjusting BOTH front (or BOTH rear) springs/coil-overs at the same time, up or down by the same amount, will raise or lower the car without changing wheel weights.

Weight MEASUREMENTS

- Weigh all four wheels (with DRIVER) and write the individual weights down. You may want to know how to set wheel weights & ride-height WITHOUT the driver. It's best to do it WITH the driver FIRST. Then LATER remove him & measure what you have. **Some Oval-Track cars don't use a link on ONE END of the front sway-bar and DO PRELOAD the bar. We will deal with these issues LATER.**

GOALS

- The 1st goal is to: **Set & Keep all 4 desired ride-heights.**

Our 2nd goal is to: **Get all wheel-weights desired (without a change in ride-height).**

WEIGHT-JACKING

- There are several terms & ways to "SPEC" wheel weights. The most common are: WEDGE, OUTSIDE-WGT & CROSS-WGT. We will deal only with these methods. WEDGE means the LR is heavier than the RR. OUTSIDE-WGT means the RR is heavier than the LR. CROSS-WGT is a "Percentage" figure: The total wgt of the LR & the RF divided by the cars total wgt.

COMMENTS

If there are any low areas, you can redo the area so that at least the scales are level with each other. Using a water-level (very handy & cheap at a hardware store), find out how level the area is. There are "thin" epoxies made just for this purpose that will "flow" to be level all over before hardening. If time or money prevent this - use shims to get four (4) areas exactly level with each other. Make them large enough so you can also use them for frame to ground measurements & glue them down.

Torsional anti-roll bars transfer weight and make your life a NIGHTMARE if you don't disconnect it during setup.

We will re-connect it NEUTRALLY after EVERYTHING is done.

If you want to get a HEADACHE - just try adjusting wheel weights with the links connected!

Weighing the car with anything other than race-ready weight is a waste of time that will "get you " later.

RIDE-HEIGHTS

EX:	Goal	Now	Diff	Goal	Now	Diff	RF	START Rod showing	ENDING Rod showing
LF	+4.000	+3.750	+0.250	+4.000	+4.125	-0.125	RF	+2.250	+2.875
LR	+7.500	+7.125	+0.375	+7.500	+7.750	-0.250	RR	+4.125	+4.250
	STARTING Shock Length		ENDING Shock Length		START Spring Length		ENDING Spring Length		
	+15.500	+16.125			+9.000	+8.875			
	+18.375	+19.000			+11.250	+12.000			

Some find it A LOT EASIER to change 2 adjacent wheels at a time because it doesn't affect the other 2 - Do it in steps:

1. Raise LEFT .250 - that will get the LF right & close on the LR (+.125).
2. Lower RIGHT .125 - that will get the RF correct & the RR close (+.125).
3. Lower REAR .125 - that will get BOTH rears down to be correct.

If only 3 of the 4 to come out right - the floor is not FLAT or the chassis is twisted. If it's the frame: fix it or take the DIFFERENCE into account as follows: Let the RF fall "wherever" or change the RF spec

- EX:

LF	550	550	RF
RF	650	530	RR

 BE SURE to "bounce" the car to settle the shocks & suspension after EACH adjustment. If you want to place a "driver substitute" weight in the seat - do it now.

In most "methods", ride-heights change with wheel weights, which requires compensating adjustments. You can go "back & forth" forever - getting more frustrated every time. The following "process" is The METHOD that will dramatically shorten a usually frustrating experience. Wheel weights will change as desired and the ride-heights will come out exactly right in the end.

Weight Jacking does NOT change, an any way, the weight percentages for front, rear, left or right sides.

These are determined by WHERE each item is placed in the car.

Jacking changes how much each spring "contributes" and, therefore, how much each tire carries.

The TOTAL weight between any two adjacent tires will ALWAYS remain the SAME!

Following is the FASTEST & EASIEST method of getting to desired weights (once ride-height is set):
It will take only FOUR (4) STEPS.

Existing Weights		RF	1200	Cross-Wgt	52.6 %	
LF	550	550	RF	1100	Front	48.2 %
LR	650	530	RR	1180	Rear	51.8 %
Left	1200	1080	Right			
Left %	52.6	47.4	Right %			
Total	2280					

11 ENTER your **DESIRED** "result" (Wgt or %) in ONLY ONE of these three (3) **YELLOW** boxes:
It will calculate the NEW weights & everything you need to do this PAINLESSLY.

EXAMPLE: We want 200 lb of WEDGE (LR weight)

and we have 120 lb now (LR is 120 lb heavier than the RR) : **Enter 200 in WEDGE.**
If we want LESS (40 lb compared to the 120 we have) : Or, enter **40** in WEDGE.

EXAMPLE: We want 50 lb of OUTSIDE-WGT (RR is heavier than LR)

and we have -120 lb now (LR is 120 lb heavier than the RR) : **Enter 50 in OUTSIDE-WGT.**

EXAMPLE: We want 56.1% CROSS-WGT

and we now have 52.6% (LR & RF will go up): **Enter 56.1 in CROSS-WGT.**

Existing Wedge	120	-120	Existing Cross-Weight %	52.6	Existing Outside Wgt	
CHOOSE & Fill-in only ONE			Desired CROSS-WGT %	56.1	Desired OUTSIDE-WGT (RR)	
Desired WEDGE (LR)						

We will get the desired weights & maintain ride-heights by doing it all in 4 steps.
To find the "Weight change PER wheel PER Step":

Divide the Weight-DIFFERENCE by 8. **Write this down.**

EXAMPLE: We want 200 lb, subtract the 120 we have = 80 divided by 8 = **10 lb**

We will change weight on EACH wheel by this much at a time.

We'll call this "**X**" = **10 lb**

Most cars have one of 3 types of weight adjustment: Coil-overs have "Adjusting-nuts"

Torsion-bars have "Stop-screws" & Big spring cars have "Jacker-screws".

We will deal with all three here & simply call the "**ADJUSTERS**".

Because, the way they work is sometimes different we will use the following terms:

"UP" means raising weight (and raising the car). **"DOWN" means reducing weight** and lowering the

New DESIRED Weights		RF	1280	Cross-Wgt	56.1 %	
LF	510	590	RF	1100	Front	48.2 %
LR	690	490	RR	1180	Rear	51.8 %
Left	1200	1080	Right			
Left %	52.6	47.4	Right %			
Total	2280					

NOTE:

Weights are **ROUNDED** off to whole numbers

There could be slight differences (usually 1 lb

Total LR to add: **40** Wgt per STEP: "**X**" = **10**

With this METHOD it will take only 4 steps to get EVERYTHING right.

We will change each wheel weight by this "**X**" amount.

12 We will need to know how much each adjuster changes weight. Usually these are pretty much the same for both front & for both rears .

And, this may vary depending on spring rates used. BUT, it is best, for now, to find out the numbers for all 4 wheels just in case they are different.

13 Note all 4 wheel weights. Turn the RR Adjuster 1.00 Turns to raise the car.

Bounce the car to free everything and write down the new weights.

Turn it back 1 turn to the original position , bounce the car & confirm it came back to the original weight.

Enter weight DIFFERENCE for ONE-TURN of each Adjuster:

Lb per Turn on Adjusters		RF		RF
LF	15	15	RF	
LR	10	10	RR	

14 You may not get exactly the same weight changes on all 4 wheels - this is due to scale resolution errors.

The best method is to add all four of the weight changes together (reductions/negative numbers should be counted as positive numbers) and then divide by 4 to get the AVERAGE change for 1 .00 Turn of the RR Adjuster.

Repeat this for each of the other three wheels and note the average change per 1.00 turn of each adjuster.

Now, ANY TIME IN THE FUTURE - you can figure how much to turn each adjuster.

15 The program now calculates HOW MUCH TO TURN each Adjuster (Wgt per step

LF Turns Required		RF		RF
LR	-0.659	0.659	RF	
	0.989	-0.989	RR	

NOTE: Ride-heights on all 4 wheels will change **DIFFERENTLY** during each of these steps but they will ALL come "right back to go" by the 4th adjustment.

16 Turn the LR adjuster-nut **UP** 0.989 turns until the LR wheel is **9.9** "X" lbs".

LF	560	540	RF	1100
LR	640	540	RR	1180
	1200	1080		

This does the 1st 1/4 of the weight change & jacks up the RR.

All 4 ride-heights will appear "out of whack" - Don't worry!

17 Turn the RF adjuster-nut **UP** 0.659 turns until the RF wheel is **9.9** "X" lbs".

LF	570	530	RF	1100
LR	630	550	RR	1180
	1200	1080		

This does the 2nd 1/4 of the weight change & jacks up the LF.

Everything will appear more normal now BUT the car is higher all around.

18 Turn the LF adjuster-nut **DOWN** -0.659 turns until the LF wheel is **-9.9** "X" lbs".

LF	580	520	RF	1100
LR	620	560	RR	1180
	1200	1080		

This does the 3rd 1/4 of the weight change & brings down the RF.

It will all appear distorted again BUT the car is nearly back down where it belongs

19 Turn the RR adjuster-nut **DOWN** -0.989 turns until the RR wheel is **-9.9** "X" lbs".
go to #28.

LF	590	510	RF	1100	1121	Cross-Wgt	49.2 %
LR	610	570	RR	1180			
	1200	1080					

This does the 4th 1/4 of the weight change & brings down the LR.

The car is now COMPLETELY back where it started & belongs.

20 **We have accomplished our 1st & 2nd goals.**

The **REAR** weights are **EQUAL** and ride-heights are back where they started.

If ride-height, front or rear, is off a bit, you can make final, minute adjustments **NOW**.

Total	2280
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21 Measure the Spring lengths & Rod showing on each shock. Go back to **5 & 6** and fill it the YELLOW boxes.

FINAL WEIGHT SETTING

22 Re-connect the sway-bar (torsional anti-roll bar) link.
This MUST be NEUTRAL - the bolt should SLIDE in with no resistance - NO PRE-LOAD.
CONFIRM that the wheel weights have not changed - if it does you didn't get it neutral.

The sway-bar will ALSO jack weight if preloaded - even the slightest preload will make an ENORMOUS difference in rear wheel weigh
(If you want a SURPRISE: Try putting ONE turn of preload in the link and watch how much the wheel weights change)

"Tricks" & WAYS TO VERIFY WHEEL WEIGHTS

23 **CHANGING SPRINGS:** If you ever have to change to different springs (rate or length) you can simply & easily do this & maintain your weights & ride-heights WITHOUT scales. **It can be done ANYWHERE!**

1. Only change ONE spring at a time. 2. Measure the RIDE-HEIGHT at each corner you are going to change (frame to ground). 3. Reset the exact same ride height after changing each spring.

24 **WEDGE:** In a **straight-axle** car, if you raise the car up with a floor jack at EXACTLY the center (left to right) of the axle you can get a very accurate INDICATION of wheel weights.

If the tires are EQUALLY loaded, BOTH tires will come off the ground at the SAME time.

If NOT equally loaded, the tire with the LEAST weight will come off the ground first.

By measuring how far the first tire is off the ground when the heavy wheel leaves the ground you can determine the weight difference.

This effect is commonly called WEDGE. This term comes from very old technology, when racecars used cross-leaf springs, like on Fords up through 1948.

They would put a wedge under one side of the spring which tilted it down on one side - this made the spring pick up more weight on that side and, obviously, pick up less weight on the other side.

There is NO WAY to determine wheel weights from wedge without scales. You MUST first measure the weight difference (left-to-right - wedge) on scales.

The weight difference **is proportional** to this distance.

You MUST use a "round" surface (use a SOCKET) where the jack contacts the EXACT CENTER of the axle housing so it can freely "rock" from left to right.

This "distance" or "wedge" will vary dramatically with spring rates and chassis stiffness - BUT, it will always be proportional.

25 **In the shop:** Measure and mark the point on the axle center.

If the bottom is flat you may want to weld a small piece of metal there that has a "cupped" radius & make a small stud with at round top end that will locate on the jack lift plate.

For best results, put a piece of paper or cloth under each tire first. Jack up the car till the first paper slides loose.

Note where that is and continue jacking till the 2nd paper comes loose. Measure the difference (lower outside edge of tire to the ground) - that is your WEDGE.

EXAMPLE: If the car has 50 lbs more weight in the RR than the LR, and the LR comes 1/4" off the ground before the RR does, you will know that 1/4" = 50 lbs of RR weight.

And, you could deduce, therefore, that 1/8" = 25 , 3/8" = 75 lbs & 1" = 200 lbs..

It is a good idea to **measure the WEDGE beforehand, in your shop** (on a flat, level surface, when you know the weight difference).

This will be VERY VALUABLE later, when you are at a race track, because the pit areas almost NEVER are exactly flat.

26 **At the racetrack:** You can put a round socket wrench, laid sideways, on the jack plate and then jack up the axle on the axle center mark.

Then, when you jack up the rear axle at the exact center you will be able to see the "wedge" & measure how high the lighter tire lifts before the heavy one leaves the ground.

When you get the car in position at the track, simply jack it up, as described above, and measure the wedge. It will be different if the pit area is not flat. BUT, you can easily compensate for this.

If the car had 1/4" of wedge in the shop and it measures 1/2" at the track; all you have to remember is:

1/2" is NORMAL for the Wedge in the suspension at the track (whatever wedge you KNOW you have).

So, if you want to add more RR weight, and you have already determined that another 1/8" of wedge will do it, just jack it till you have 1/8" more (from 1/2" up to 5/8" of wedge).

You DO NOT have to disconnect the sway-bar to do this. Wedge "compensates" for ALL the springs & bars - it measures the NET weight difference.