



Driver 61
— THE MOTORSPORT RESOURCE —

THE **6** MOST COMMON **RACE CAR** **HANDLING PROBLEMS:**

HOW TO UNDERSTAND, OPTIMISE
& GO FASTER





INTRODUCTION

Thank you for taking the time to download this Driver 61 guide to help you understand and develop your track car's setup.

My name is Scott Mansell, I've been racing for 21 years and over this time I have been lucky enough to drive and develop the setup of many, many racecars - from Caterhams to ex-F1 racers. It is my pleasure to begin to share the knowledge I have built up over many years of racing.

Getting the most out of a racecar's setup can be challenging and with that said, the goal of this guide is to help you understand the basics - there are many other alterations possible, but to keep things simple we have only focused on a few core changes.

We ask you to be careful when altering mechanical parts and to accurately record any changes made - so you can revert back to the original settings if you make a mistake. If there is any doubt when making a change, please seek the advice of a race engineer.

Once again, thanks for reading and be sure to **look out for the launch of the full Driver 61** website.

Have fun and stay safe,

Driver 61 Founder

THE 6 MOST COMMON RACECAR HANDLING PROBLEMS

- #1 GLOBAL OVERSTEER
- #2 GLOBAL UNDERSTEER
- #3 TURN-IN OVERSTEER
- #4 THROTTLE-ON OVERSTEER
- #5 THROTTLE-ON UNDERSTEER
- #6 POOR CHANGE OF DIRECTION



#1 GLOBAL OVERSTEER

THE CAR IS TRYING TO SWAP ENDS AT EVERY OPPORTUNITY - AND AT ALL POINTS ON TRACK!



How it Feels

The rear of the car will feel light and will slide at all sections of the corner. You will have to steer gently and apply the throttle smoothly to reduce the risk of the rear of the car stepping out of line. The front of the car feels stable and secure.



What to change

Rake - the difference between the front and rear ride heights. For example, if the front ride height is 40mm and the rear is 60mm, you have 20mm of rake.

To reduced global oversteer, reduce rake by increasing front ride height or reducing rear ride height.



How much to change it?

It's hard to say as different cars will vary in how sensitive they are to rake change. However, begin with a small change of 1-2mm and see if you can feel a difference for the better on track.



Why this works

Changing the car's rake alters the front-to-rear weight distribution by moving more of the car's mass rearwards - therefore giving the rear more grip.



#2 GLOBAL UNDERSTEER

THE CAR WILL NOT TURN AS MUCH AS YOU WANT IT TO - AT ANY POINT ON THE CIRCUIT.



How it feels

The front of the car will not turn as much as you'd like and will feel as if it's washing away in all sections of the corner. When front traction is broken and the car understeers, the steering will feel lighter than usual. The rear will feel stable and secure.



How much to change it?

It's hard to say as different cars will vary in how sensitive they are to rake change. However, begin with a small change of 1-2mm and see if you can feel a difference on track.



What to change

Rake - which is the difference between the front and rear ride height. For example, if the front ride height is 40mm and the rear is 60mm, you have 20mm of rake.

Reduced global understeer by increasing rake: decrease front ride height or increase rear ride height.



Why this works

Changing the car's rake alters the front-to-rear weight distribution and by moving the car's mass forwards the vehicle has more frontal grip.



#3 TURN-IN OVERSTEER

AS SOON AS YOU TURN THE STEERING WHEEL, THE CAR WANTS TO SWAP ENDS.



How it feels

The rear of the car feels unstable when you turn the steering wheel as you enter the corner. Once you have reached the apex and head towards the exit, the car feels stable again.



How much to change it?

Anti-roll bar: It depends on the type of anti-roll bar - adjustment varies, so make a small change when first altering.

Front springs: It depends on the car's mass and suspension ratios, but a small change would be around 10lbs/in.

Dampers: The range of adjustment between dampers varies. Firstly, find out what position the damper is adjusted to and then what the range is. A normal range is around 30 'clicks'. A good first adjustment here would be 3 clicks, so around 10%.



What to change

There are a few options here:

Anti-roll bar: stiffen the front anti-roll bar

Springs: stiffen the front springs

Dampers: increase front damping

- 1 way dampers: stiffen

- 2 way dampers: stiffen bump

- 3 way dampers: stiffen slow bump



Why this works

Anti-roll bar: Reduces the force of lateral load change at turn-in - basically it slows how quickly the weight is transferred to the outside of the car, reducing the initial 'bite' of the steering input.

Front springs: stiffening reduces the amount of dive under braking - the front of the car will not drop as much. This leaves more mass at the rear, equalling more grip. If the car is already well balanced from apex to exit, this may cause understeer.

Dampers: stiffening reduces the amount of dive under braking - the front of the car will not drop as much. This leaves more mass at the rear, equalling more grip.



#4 THROTTLE-ON OVERSTEER

THE REAR END SLIDES AS SOON AS YOU TOUCH THE THROTTLE. IT LOOKS COOL, IT'S NOT FAST!



How it feels

When throttle is applied (smoothly at the apex), the rear of the car slides. The rear of the car feels okay at corner entry, but is rear limited on the exit. It's great for a powersliding picture in Autosport, not so good for laptime!



How much to change it?

Springs: It depends on the car's mass and suspension ratios, but a small change would be around 10lbs/in.

Dampers: The range of adjustment between dampers varies. Firstly, find out what position the damper is adjusted to and then what the range is. A normal range is around 30 'clicks'. A good first adjustment here would be 3 clicks, so around 10%.



What to change

There are a number of options:

Springs: Soften the rear springs.

Damping: Soften rear damping.

- 1 way dampers: soften
- 2 way dampers: soften bump
- 3 way dampers: soften slow bump



Why this works

Springs: When you apply the throttle the car's mass moves rearwards, also known as squat. The softer springs will allow more squat and more weight to transfer to the rear axle, increasing rear grip.

Dampers: Softening the rear dampers will allow more squat and more weight to transfer to the rear axle, increasing rear grip.



#5 THROTTLE-ON UNDERSTEER

THE MOST TEDIOUS OF ALL SETUP PROBLEMS, HERE'S HOW TO CURE THROTTLE-ON UNDERSTEER.



How it feels

When throttle is applied (from the apex) the front of the car washes away and does not turn as much as expected. The front of the car is okay at turn-in, but you are front limited once you begin to accelerate.



How much to change it?

Springs: It depends on the car's mass and suspension ratios, but a small change would be around 10lbs/in.

Dampers: The range of adjustment between dampers varies. Firstly, find out what position the damper is adjusted to and then what the range is. A normal range is around 30 'clicks'. A good first adjustment here would be 3 clicks, so around 10%.



What to change

There are a number of options:

Springs: Stiffen the rear springs.

Damping: Increase rear damping.

- 1 way dampers: soften
- 2 way dampers: soften bump
- 3 way dampers: soften slow bump



Why this works

Springs: When you apply the throttle the car's mass moves rearwards also known as squat. The stiffer springs will allow less squat and less weight to transfer to the rear axle, leaving more on the front and increasing front grip.

Dampers: Stiffening the rear dampers will allow less squat and less weight to transfer to the rear axle, leaving more on the front and increasing front grip.



#6 POOR CHANGE OF DIRECTION

CHICANES ARE DIFFICULT (SEE ABOVE), TURNING LEFT-TO-RIGHT FEELS UNSTABLE AND NERVOUS.



How will it feel?

When turning from left to right, or right to left (eg in a chicane) the car feels unstable and doesn't give confidence - you feel as if you have to be careful with the steering when changing direction.



What to change

Try stiffening the front or rear anti-roll bars - but be aware that this will likely influence handling in other areas of the corner.



How much to change it?

It depends on the type of roll bar - adjustment varies, so make a small change when first altering.



Why this works

Stiffening the anti-roll bar will slow how quickly the car's mass transfers from side to side. When the car feels nervous changing direction, it's because the mass is transferring too violently - stiffening the anti-roll bar will slow this process down and make the car feel more secure.

Be sure not to go too far with this as if the anti-roll bar is too stiff you will reduce turning grip. Like all setup, it's a balancing act!



THANK YOU FOR READING!

THANKS FOR TAKING TO TIME TO READ THIS GUIDE, WE HOPE IT'S BEEN OF VALUE.

If you found this guide useful, please be sure to share it!



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Q and A's

We're currently creating great content for track drivers all over the world.

If you'd like to be part of this and have your questions answered, please email us at questions@driver61.com, we'd love to hear from you!

What is Driver 61?

Driver 61 is a resource website for track day and racing drivers with the goal of improving your motorsport experience.

We are currently in the pre-launch stage, however the first content will be ready shortly so please look out for our new site!

