GPL Setup Guide   Intro & What The Settings Mean

Introduction

My aim is to show you the principle that I use to set up cars to start you. There are more comprehensive guides should you find that you want to learn more. There are links to those guides here. I have also been privalaged enough to be given permission to host all the tools that I use so that after reading this guide you can pick them up and get started.

If you want to get further more technical information please go to the Useful Information page for Links and books that may help you.

I will only be using imperial measurements as that is what I am used to using. If you are used to using metric units I am affraid that you will have to convert them.

I must also thank Bas Van Meurs creator of the Tyre Temps Utility for his help in writing this guide, and to Robin (Stirling Herbert) of the Tleague whose questions promted me to write this.

Basic Principles

Do not assume that any particular setup must be better than others.

Try several peoples setups to find ones that you can drive consistently.

There are different basic types of track that will require different styles of setup.

You can use a setup for one car to give you a base line for another car.

What The Settings Do

I use Setup Assistant 65 by Marko Rasanen and Mark Stone to make a lot of my adjustments, some I do within GPL so I will use SA65 through out for illustration.

Suspension

The settings are the same for front and rear of the car.

Tyre pressure

If the tyre pressure is too high you will have very high temperatures in the middle of the tyre, this will mean reduced grip as the main contact to the road is the centre of the tyre.

If the pressure is too low you will have high temperatures on the outsides of the tyre, again you will suffer from poor grip.

I find that for racing in the 67's 19 psi is about right and the 65's 20 psi is good. I do vary them if I need to. These pressures do make life difficult for the first lap or two.

Wheel Rate

This is the rate of the spring. Lower means a softer car which is good for slower twistier circuits. Higher means a stiffer car which is good for fast circuits. Wheel rates will be higher at the rear because of the weight of the engine.

Bump and Rebound Rate

This is how much the damper controls the movement of the spring. An undamped spring will oscillate like a ball on a hard floor. The damper slows the spring's movement and makes a smoother transition back to it's normal position after hitting a bump or landing from a jump. It will also affect the way the car behaves in a corner because of the body roll

The lower the rate the less "damping" which is better for tight twisty circuits. Higher rates are more suited to faster circuits.

Bump and rebound rates will be higher at the rear because the weight of the engine.

Camber

This is the angle of the wheel on the road. The left wheel in the diagram has negative camber and the right positive.
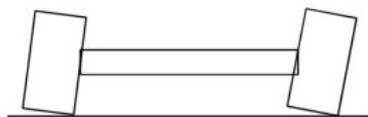

Bump Rubber

This stops the upward movement of the wheel. Flat circuits need only the minimum, circuits like Nurburgring will need more. The taller the rubber the softer it is.

Toe, Roll Bar & Ride Height
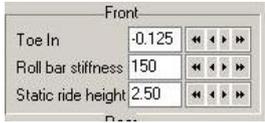
Toe In

The **Toe** is the angle of the wheel relative to the centre line of the car. The illustrations below show the effects on the wheels of **Toe In** and **Toe Out** when looking down on the vehicle. Negative numbers in the Toe In box will give you toe out and positive numbers will give you toe In.
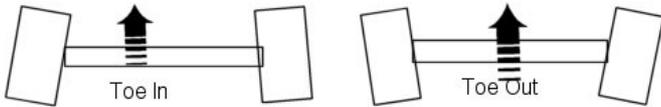
Toe Out is required on the front wheels and Tie In at the rear. These angles provide a force that will help to keep the car stable in a straight line.
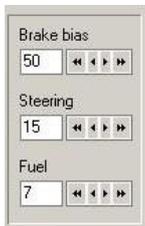
Roll Bar

The **roll bar** stops the body of the car twisting relative to the wheels during cornering or acceleration. I use higher settings for fast circuits and lower ones for slower and twistier circuits.

Static Ride Height

This is the height of the bottom of the car to the ground. If the car scrapes on the ground you will need to alter this setting.

Fuel, Brakes & Steering

Brake Bias

This sets the amount of braking force that goes to the front and rear wheels.

25 will give you 25% braking force to the front wheels and 75% force to the rear wheels

50 will give you 50% braking force to both front and rear wheels

75 will give you 75% force to the front wheels and 25% to the rear.

Steering Ratio

This is how sensitive the front wheels are to the amount of turn on the steering wheel. Higher numbers make the response less sensitive.
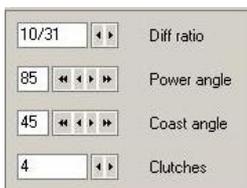
Fuel

This is the amount of fuel in the car.

Gearing

Here you set the ratio for each gear.

Diff Settings

Diff Ratio

This will set the range of speed that can be achieved by the car, increase the ratio to make the car go faster.

Power/Coast Angle

The power and coast angles set how fast the differential engages high numbers mean a fast engagement, low numbers a slower engagement.

Clutches

The number of clutches will also affect the rate of engagement of the Diff. More clutches means a softer engagement.

To how I set a car up.

GPL Setup Guide   The Guide - How I Setup A Car

| What The Settings Mean | How I Setup A Car | The Utilities I Use | Useful Links & Information |

This is How I Set a Car up.

Start with your baseline setup. Do about 10 laps and save the entire replay.

When you come out of GPL you must think about how the car was behaving.

1. Does it wiggle a lot on acceleration and the tail step out a too fast to control easily.
2. Do the front brakes lock a lot under braking or the tail step out under braking
3. Does the car scrape on the track at any point.

To correct these you will need to do the following.

When you start out make 1 adjustment at a time until you have learned the effect of the adjustments.

1. You will need a softer diff setting. This is achieved by making the power on setting higher, the maximum is 85. Reduce the coast setting, the minimum is 30. Increase the number of clutches, the maximum is 6

2. If the font brakes lock up a lot try not braking as hard or reduce the brake bias setting. 50% is even front to back, 45% is 45% power to the front brakes. If the back of the car is trying to pass the front under braking then the setting is too low and the rear brakes are locking.

3. If you get a scraping noise after jumps or in dips and find the car out of control the ride height may be too low. There are 3 methods of resolving this problem.

• Increase the bump rubbers. This is more effective on the lighter 65 cars.

• Increase the ride height and bump rubbers. If you do not increase the bump rubbers the car can still go as low because there is nothing to limit the suspension travel.

• Stiffen the suspension.

You may need to make a combination of the second two adjustments. Fast circuits like Sachsenring will need stiffer suspension. Slower circuits like Mosport and Nurburgring need softer suspension

You may need to make 2 or 3 runs to get these settings comfortable.

Note altering the ride height of the car will alter the behaviour of the car and require adjustments to the diff settings.

Once you have made these adjustments and are happy with the overall ride of the car you can start to look at the other settings.
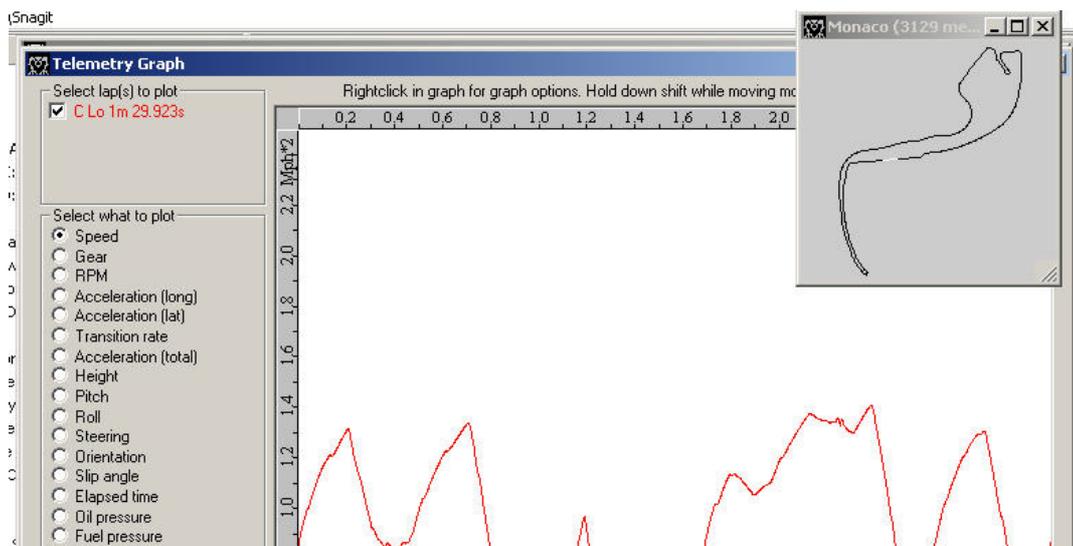
Gearing.

If the car is at maximum revs long before the end of a straight you will need to increase the gearing to bring maximum revs towards the end of the straight. If you are changing gear just before braking for a corner that gear may need to be raised. Sometimes you may find that a gear is too high to cope with a series of corners and you are constantly changing gear.

Here I use GPL Replay Analyser (GPLRA).

Open GPLRA and choose up to 5 laps from you last run.

Now open the graph viewer [icon]

Click on the map button and you will see a white section on the map that moves with the mouse pointer. You can now move this to the peaks for speed and rpm to see what your maximum speed and rpm is at any part of the track.

You can mow adjust your gearing to give you optimum revs in each gear using Setup Assistant 65 (SA)

Click on the show graphs button and you will have a useful display of what the gearing means.

	Opt UC RPM	Opt UC vel	UC RPM drop	Max vel	Time lost
Gear 1	9200	77.3	1900	77.3	0.592
Gear 2	9200	103.6	1550	103.6	0.088
Gear 3	9200	129.2	1150	129.2	0.027
Gear 4	9200	150.8	1175	150.8	0.015
Gear 5	-	-	-	176.3	0.061
Gear 6	-	-	-	-	

UC RPM drop shows you the drop in revs between each gear. Max vel shows you the maximum speed that you will achieve in each gear.

Once you have the car stable and geared well you can look at the remaining settings.
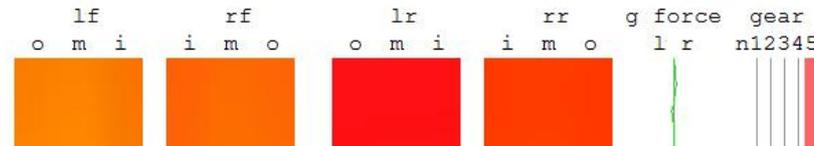
Camber Angles

Open your tyre temps utility output.

Scroll through the output and look at the average temperatures for each lap. These will tell you what part of the tyre is hottest over a whole lap.

Your aim should be to have even tyre temperatures as that will mean that the tyre is getting the maximum contact with the track

The first two columns are your front tyres and the right columns are your rear tyres.

Here you can see that I have higher temperatures for the inner section of the front tyres than the middle or outer sections. This will tell me to make the angles either less negative or more positive. The left rear tyre has only 0.5 degree difference which I would leave. The right rear tyre is 1.1 degree cooler requiring more negative camber adjustment.

If you find that after several laps the centre of the tyre is either hotter or colder than the edges of the tyre you will need to raise or lower the tyre pressures

Note on tyre pressures. Many people will use high pressures than you need for a long run. This gives them less rolling resistance because there is less tyre in contact with the track but reduces the cornering ability.

Note I always look at several laps to make sure that I am getting a consistent result.

The spring Settings

Basic rules

Springs need to be set higher at the back because of the engine weight.

Heavier cars need higher settings.

Tracks like Silverstone and Monza can be offset. I use higher settings for the left side of the car at Monza and Silverstone because the car is nearly always turning right. I do this because it should help to stop the inside of the car lifting in the corners and maintain more tyre on the track.

Generally these settings I work as follows. Once I have a stable car I will increase the spring rates for fast flowing circuits. As you increase the springs you will find a point where the car does not grip as well. At this point go back to the previous setting.

There are exceptions like Adelaide and Sandown. These are quite fast tracks but work very well with softer settings. They both have big curbs that can be ridden hard which does not work well with a stiff car.

Note a rule of thumb here is the faster the circuit the higher the settings. The more twisty and slow a circuit the lower the settings.

Roll Bars

The roll bars are there to limit the amount of body roll. This helps to maintain the angles between the body and wheels to keep the maximum amount of tyre in contact with the road.
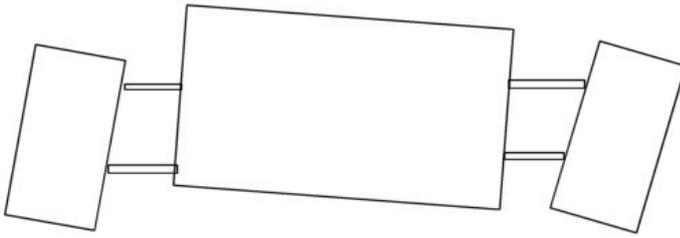
Generally I increase the roll bars with the springs. I usually run a higher setting at the front than the back.

Note a rule of thumb here is the faster the circuit the higher the settings. The more twisty and slow a circuit the lower the settings.

Damper Bump and Rebound.

Like the spring and rollbar settings higher for faster circuits.

Where you have a fast flat track you can use high settings because there is little spring movement.

On slower twisty tracks or ones with a lot of jumps you generally need softer settings because there is a lot more movement on the springs and you need the car to settle smoothly.

Toe In/Out

The toe adjustment is used to produce a force on the tyres that will keep the car stable in a straight line. Too little will make the car wander in a straight line.

Use a negative adjustment on the front and positive on the rear. Tighter circuits you can increase the toe out (-ve numbers) at the front and toe in (+ve numbers) at the rear.
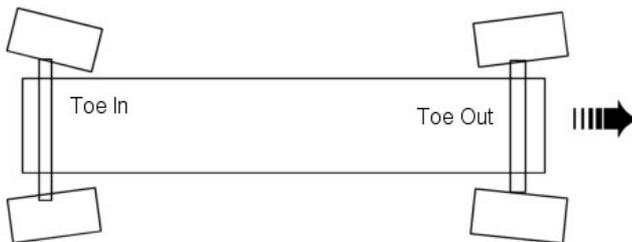
Once I have been through this process I repeat it until I am happy with the way that the car is handling. It usually takes me 4 or five runs to get a car to work well.

If as is often the case for me I am setting up several cars for one track I will use the setup for one car to form the base for the other cars. SA 65 will allow you to copy the setup from one car to another. You must remember to change the chassis in the setup.
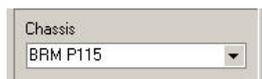
Some drivers will use setups from one circuit to provide a base for another for example Silverstone and Monza are similar types of circuit, as are Monaco and Pau.

GPL Setup Guide

The Utilities I Use

| What The Settings Mean | How I Setup A Car | The Utilities I Use | Useful Links & Information |

The Tools That I Use

I would just like to thank everyone who is involved in the development of these tools for allowing me host them here so that I can provide you with a one stop shop for these tools

Tyre Temps Utility

This utility was designed by Bas Van Meurs of the Tleague. I was privaleged to be able to make some small contributions while Bas developed the program.

It will generate a bmp file showing the temperatures of each tyre. The file gives you a lap by lap temperature chart and the average temperature for each section of each tyre.

I have found this very usefull for getting the camber angles at their optimum.

There are 3 zip files in the download.

1 GPL tyre temps utility (works with Windows XP)

2 GPL tyre temps utility Win 95 98 (works with Windows 95 and 98)

3 Camber Batch files (Batch files to have the utility start up when using GEM) * The batch files have now been updated for the 69 Mod

Download Here

Batch files only here

View the orginal release thread at RSC here

Setup Assistant 65

This utility was designed by Marko Rasanen and Mark Stone.

For me this utility has replaced GPL Race Engineer becuase it can be used for both the 67 and 65 cars. It has a very useful display for the gearing with the RPM drop between gears. I have found this particularly useful to get the gearing ideal.

Dowload Here

View the RSC thread here

GPL Replay Analyser

This utility was designed by Jonas Matton and Martin Granberg.

Invaluable for many reasons other than setting up your cars, it has many features that can assist you but I shall deal with how I use it.

Download Here I have packaged the History file and Read Me file with the analyser

The GPL Replay Analyser web site is here. It contains a wealth of information and is well worth a visit.

GPL Setup Guide   **Useful Links & Information**

| What The Settings Mean | How I Setup A Car | The Utilities I Use | Useful Links & Information |

This is a short list of useful links to setup guides and reading material that I have found useful

Paul Jacksons Setup guide

GPL Foolishnes Setup Guide

Niels Differential Guide

Books

Car Suspension and Handling by Donald Bastow

Vehicle and Engine Technology Volume 1 by Heinze Heisler

Motor Vehicle Science by P. W. Kett