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Williams-Toyota FW31
Quick Car Setup Guide

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MOTORSPORT SIMULATIONS

In this guide we will briefly explain a number of key setup parameters which are distinct to the FW31 and which are new to iRacing vehicles. We hope this introduction will enable members to familiarize themselves with these features and hit the track quickly, rather than being overwhelmed by a number of new and unknown variables.

Aerodynamics

Chassis

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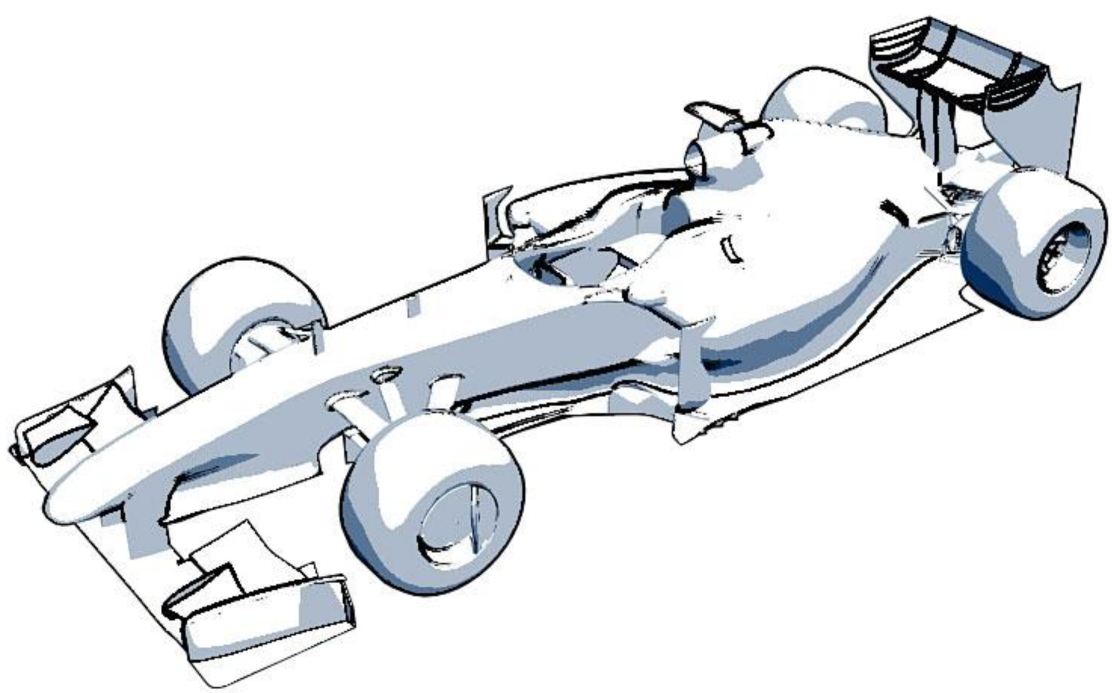


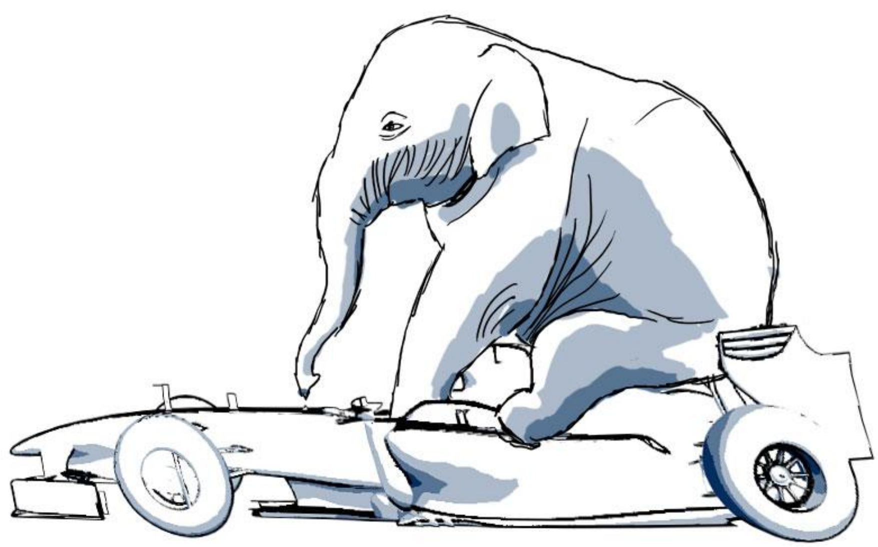
Aerodynamics

As the Williams-Toyota FW31 and other modern grand prix cars are very much influenced by aerodynamics, we have decided to offer three *downforce trim* levels to choose from: low, medium and high. The speed of the track should determine which trim level to select. Typically, extremely fast tracks such as Spa or Road America may be best suited to low downforce trim, slower more technical tracks such as Zandvoort or Laguna Seca might require high downforce trim to be fastest.

The simplest way to adjust aerodynamic balance is by using the *front flap angle* and/or *rear wing wicker* adjustments. To increase oversteer or decrease understeer, increase front flap angle and/or decrease rear wing wicker (vice versa to decrease oversteer or increase understeer). The flap adjuster dial that is visible on the steering wheel, and in the Aerodynamics section of the garage, controls an electric motor which drives additional front flap adjustment. You can set it in the garage or while during a pit stop only. The flap adjuster dial has limited movement so it is necessary to have set an appropriate *base front flap* angle.

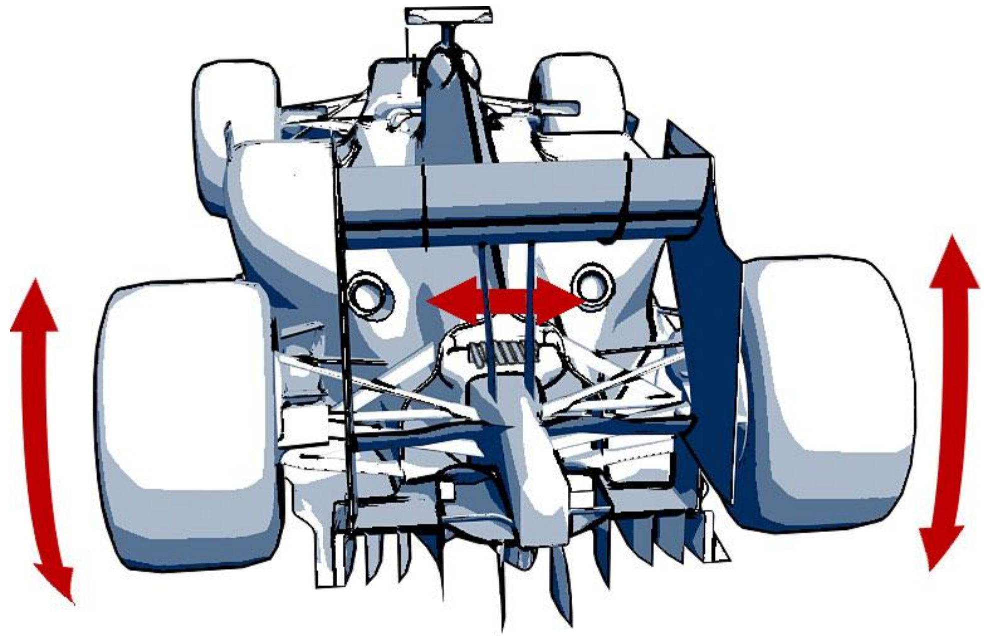
The included *aero calculator* will allow you to visualize aerodynamic balance shifts while experimenting with ride heights and front and rear wing adjustments.

While working with the aerodynamics of the car, keep in mind that drag also increases as downforce is increased. The *downforce to drag* ratio in the aero calculator will provide detail on how much drag will change as the result of increasing or decreasing downforce.



Chassis

For the most part, the FW31 is similar to most other single-seat racecars, but it does have a number of unique performance features.



Typical for most racecars, the front suspension includes conventional front corner springs (torsion bars as apposed to coil springs), and an anti-roll bar. However, the FW31 also includes a third spring, which we call a *heave rate* spring. This heave spring adds additional wheel rate stiffness in vertical heave or bounce motion only. Its primary function is to help control the chassis platform in order to keep consistent aerodynamic performance. High heave rate settings will result in less ride height change while the car rides over bumps and while downforce increases as vehicle speed go up versus softer heave rate settings. The key in adjusting this component is finding the appropriate amount of stiffness to help aide the aerodynamics while maintaining an adequate amount of front mechanical grip. At faster tracks the best compromise might be to use a very stiff heave rate and give up some mechanical grip in exchange for better aerodynamics control, whereas at much slower tracks where raw tire grip would take precedence, perhaps less heave rate would be required. The correct way to set the front heave spring is to choose the *rate* and adjust its *perch offset* until the spring is just slightly preloaded while the car has no fuel. This will ensure that, as fuel weight burns off, the heave spring will always be carrying vehicle load rather than 'floating' off of its perch, thus forcing the corner springs to do extra work to hold up the front of the car.

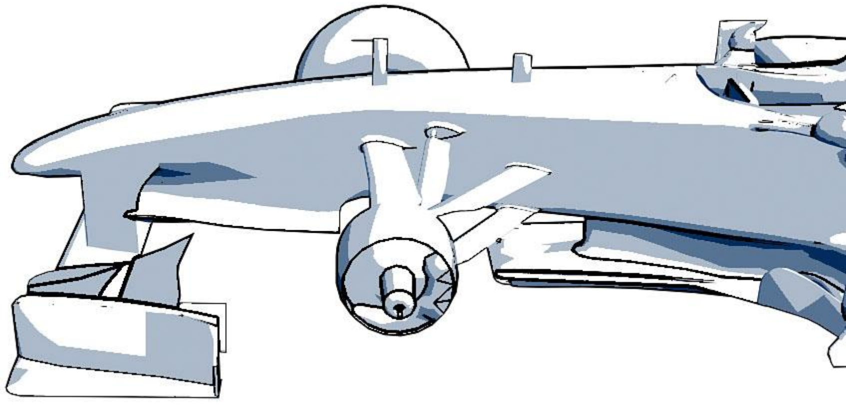
For the rear suspension no conventional corner springs are used at all. All of the lateral, or roll motion, is controlled by an *anti-roll bar*. The rear also uses a heave rate spring just as the front suspension does. While it doesn't share vehicle load with any corner springs, unlike in the front, there need not be any concern with how much preload it requires. Set the *rate* and *perch offset* to the desired stiffness and height and go!

You will notice on the General tab a few new parameters which are new to cars in iRacing.

First, the *ballast*, although available in a number of our advanced oval cars, is new to our road racing cars. Ballast placement, and correspondingly calculated *nose weight* percentage, allows members to shift weight forwards and back to affect static front and rear corner weights and consequently mechanical balance in corners. More forward weight percentage will reduce oversteer/ increase understeer during cornering events. However, it may reduce the amount of acceleration traction available powering out of a corner. More rearward percentage will do just the opposite.

For this vehicle we have made available three brake pressure settings in order for drivers to reduce or increase braking force to their preference. These settings are scaled to downforce trim level, so the recommended setting aligns with which downforce trim has been selected.

Finally, in addition to brake pressure the FW31 also has an innovative way of changing front to rear braking bias percentage with pedal travel. Typically, at higher speeds more front brake bias would be advantageous to help decelerate the vehicle; however, as speeds decrease the optimal brake bias may need to be more rearward. *Base, peak and begin bias ramping* parameters allow the driver to set the minimum and maximum front brake bias, and ramping determines where the minimum value will start to ramp up towards the peak number. Play around with these settings at different race tracks and see which settings work best for you. While sitting in neutral in your pit box you can press the brake pedal and the digital readout will display the forward brake bias as determined by how much pedal displacement is currently present.



Dampers and Inerters

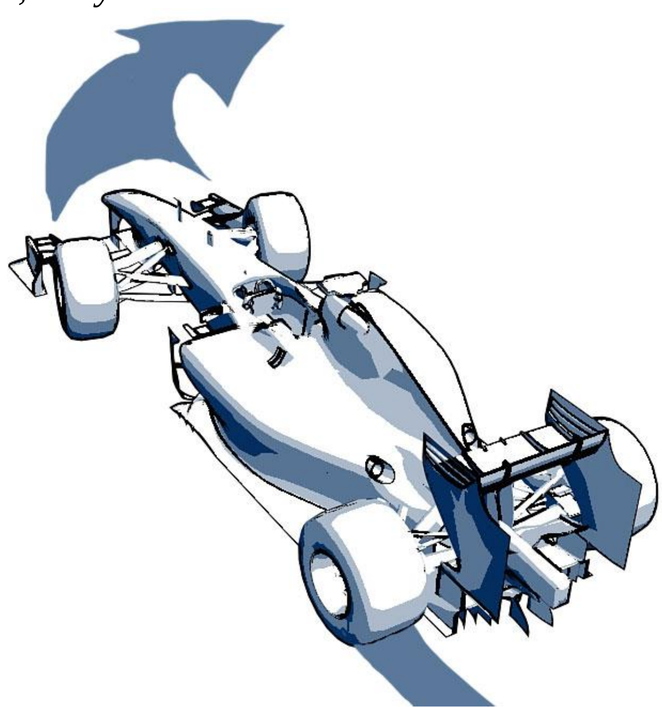
As per your average ordinary racecar, the FW31 has dampers for each corner. Along with them it also has third dampers, or *heave dampers*, in the front and the rear as well. These additional shock absorbers, similar to the additional third springs, only work with vertical heave or bounce motion.

All six dampers are 2-way adjustable, where adjusting compression and rebound separately is possible.

Other innovative tuning elements featured on the FW31 include front and rear devices called *inerters*. These inerters literally add inertial mass to the un-sprung suspension without actually adding weight to the wheels, thereby avoiding the pitfalls associated with extra weight. More inertia will reduce the ride frequency or response time of the suspension just like a heavier wheel would, and may be beneficial over different types of track surfaces. In some instances a lot of inerter mass will be beneficial and at other times no inertial mass will.

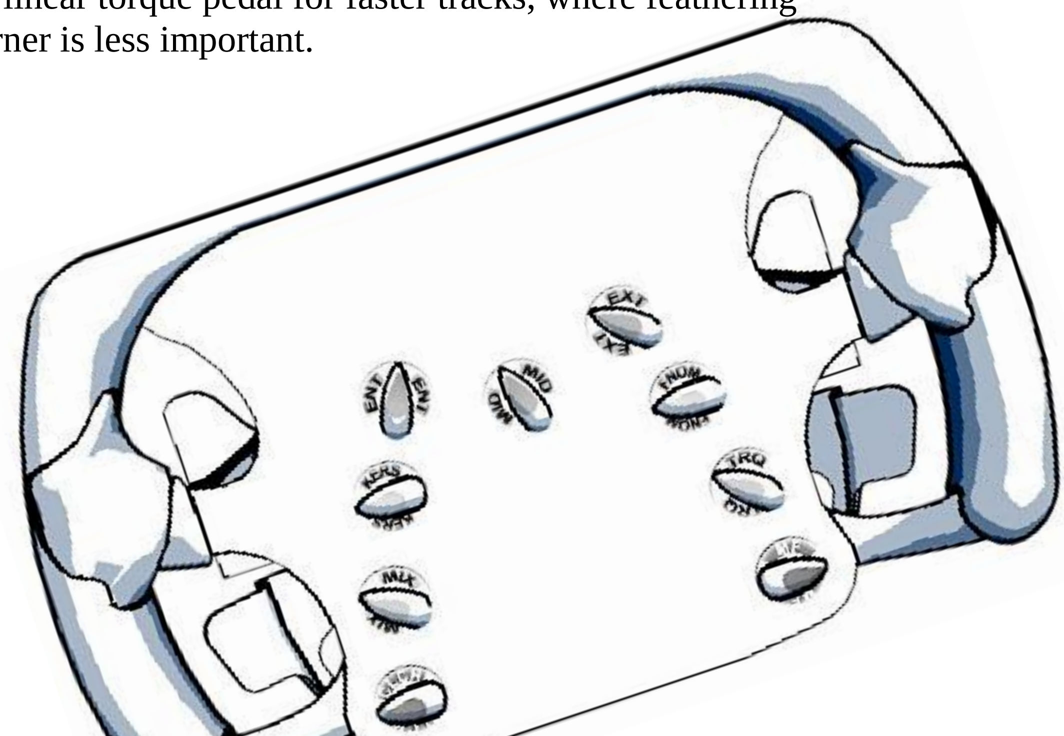
Engine and Drivetrain

Another feature of the FW31 that is unique among iRacing cars is the ability to *design differential* settings. Members will have the ability to choose differential locking settings for different segments of the corner. As with current grand prix race cars, this area has a major influence on the performance of the racecar. More *entry preload*, *entry* and *middle* differential locking will increase understeer or decrease oversteer on entry and through the middle of corners. On *exit* more locking will increase oversteer or reduce understeer. For entry to middle sections of a corner, this setting mainly controls vehicle balance: however on exit not only does it affect balance, it also alters the amount of acceleration thrust generated by both wheels. A compromise will need to be found which will allow the



most amount of locking to power straight out of a corner without overwhelming the rear tires and generating too much oversteer during corner exit. The driver will also have the ability to make micro adjustments to the differential settings in the garage or via dials in-car (ENT, MID and EXT) while driving, which will slightly increase or decrease understeer and oversteer performance of the diff.

Other dials which are also adjustable in the garage as well as in the car while driving include *engine braking* (TRQ), *engine power* (MODE) and *throttle pedal shaping* (PED). These dials will alter the performance of the engine to suit a desired preference. The engine braking dial will change the amount of off throttle braking the engine produces. Drivers may want to reduce or increase the amount of engine braking in order to adjust balance on entry. More engine braking will create less understeer and more oversteer compared to less engine braking. The engine power dial affects the amount of power the engine produces as well as the engine speed at which the shift lights engage in order to save fuel when circumstances warrant. Finally, throttle pedal shaping allows the driver to select the type of engine performance as he/she rolls into the throttle pedal coming off a corner. Setting 1 maps the throttle-to-engine torque just like a typical engine that uses a butterfly throttle plate. Setting 4 uses a direct throttle position to engine torque output relationship. The two settings in between blend the butterfly model and the direct linear torque model together. This setting is completely dependent on driver preference. At race tracks with low grip and slow speeds, where exit performance is critical for fast lap times, you may want to use the more conventional butterfly shape throttle curve in order to control the power application. Conversely, drivers might want the brute force torque from the linear torque pedal for faster tracks, where feathering the throttle off the corner is less important.



Tires

A quick note about the optimum tire settings for the FW31 on road circuits: Peak lateral grip should be in 17-20 psi hot range for both front and rear tires. Optimal longitudinal drive and braking grip will likely be in the lower end of the peak lateral range or possibly a little less. Peak grip will be maintained in and around 200 F in average temperature, with some temperature spread from inside to outside of the tire being reasonable. Best camber angles to use are anywhere from -2.5 to -4 degrees in the front to -0.5 to -1.5 degrees in the rear.