# GRANDPRIX 3

BY GEOFF CRAMMOND

## HEALTH WARNING

For your health, rest about 15 minutes for each hour of play. Avoid playing when tired or suffering from lack of sleep. Always play in a brightly lighted room, and stay as far from the television screen as possible. Some people experience epileptic seizures when viewing flashing lights or patterns in our daily environment. These persons may experience seizures while watching TV pictures or playing video games. Even players who have never had any seizures may nonetheless have an undetected epileptic condition. Consult your doctor before playing video games if you have an epileptic condition or immediately should you experience any of the following symptoms during play: dizziness, altered vision, muscle twitching, ther involuntary movements, loss of awareness of your surroundings, mental confusion, and / or convulsions.

## CONTENTS

## Introduction

Welcome to the most advanced Formula One racing simulation ever made. Grand Prix 3 is specifically designed to give you the complete racing experience. Whether you're new to the game or a Grand Prix 1 or 2 veteran there's plenty in this simulation for everyone. No matter what your experience of racing games, you'll know that Grand Prix 3 is an instant classic, achieving new heights of performance, accuracy and attention to graphic 3D detail. Designed and written by the legendary Geoff Crammond, Grand Prix 3 is the answer to all Formula One racing fans' prayers: it has the real teams, the real drivers, the real cars, the real engines, and the real tracks. In fact, everything you could ever want to tackle the Formula One World Championship Season. Complete!

But the cars are always the stars of this simulation. It's not just that they look so perfect (which they do in abundance) but they handle just like the real thing (so we've been told by real Formula One drivers). Springs, dampers, wings, gear ratios, brake balance and ride height are just a few of the items that are realistically adjustable and that will truly affect car performance and handling characteristics. And you can study the effects of these adjustments by downloading telemetric data into the highly accurate performance analysis utility that will help you compare different car setups.

Now you've got Grand Prix 3 in your hands, get racing and good luck!

## This Manual

This manual is structured in such a way as to introduce the game to rookie players and to encourage them to delve deeper to get the most out of the real simulation. If you're a Grand Prix 2 veteran you'll be familiar with the basic controls and could probably get racing quite quickly, but be aware that there are many differences between Grand Prix 2 and Grand Prix 3 so you'll find it very worthwhile reading the manual to understand all the simulation controls.

## Technical

### Specification

Make sure the specification shown on the Grand Prix 3 box matches that of your computer.

### Installation

- Insert the Grand Prix 3 CD into your CD-ROM drive.

If autorun is enabled, Grand Prix 3 will take you to the Installation screen.

- Simply click on the 'Install' button and follow all on-screen directions.
- If autorun has not been enabled, you'll have to double-click on the 'My Computer' icon on the Windows® Desktop, then on the CD-ROM icon, and then click on 'Setup.exe'.

The simulation will now install.

- Follow all on-screen instructions.
- Once Grand Prix 3 is installed it will appear in the Program Group on the START Menu.

### Loading

- Select Start > Programs > Hasbro Interactive > Grand Prix 3.

The game will now load.

### The Readme File

Note that this manual will guide you through most of the Grand Prix 3 simulation but due to printing constraints may not contain the most up to date information. For all last minute information you are advised to consult the Readme file found on the CD (selected by clicking on View Readme in the Program group).

## QUICKSTART SECTION

## Part One: The Driving Controls and Keys

Throughout this manual, you'll see references to the Accelerator, the Brake, Changing Gear and Steering. How these controls operate depends on your preference of Keyboard, Joystick, Wheel, or Joypad. The default Keyboard and Joystick driving controls are:

### Keyboard Driving Controls

| | | |
|---|---|---|
| Accelerate | = | A |
| Brake | = | Z |
| Steer Left | = | <, |
| Steer Right | = | >. |
| Change Up a gear | = | Accelerate A key + Space |
| Change Down a gear | = | Space |

(If you are using separate buttons for changing up or down a gear there is no need to accelerate when changing up.)

### Joystick Driving Controls

| | | |
|---|---|---|
| Accelerate | = | Forward |
| Brake | = | Back |
| Steer Left | = | Joystick Left |
| Steer Right | = | Joystick Right |
| Change Up a gear | = | Accelerate + Press Fire Button |
| Change Down a gear | = | Press Fire Button |

(If you are using separate buttons for changing up or down a gear do not accelerate.)

**Note:** All the above driving controls can be reassigned (see page 54).

## Other Keys

**Driving Aid Keys:**

| | | | | | |
|---|---|---|---|---|---|
| Auto Brakes | = | F1 | Show Best Line | = | F5 |
| Auto Gears | = | F2 | Suggested Gear | = | F6 |
| Auto-right the Car | = | F3 | Throttle Help | = | F7 |
| Indestructible | = | F4 | Steering Help | = | F8 |

**Action Keys:**

| | | |
|---|---|---|
| Intending to Pit | = | Enter/Return |
| Return to Pits (Qualifying/Practice) | = | SHIFT + Q |
| Leave Race | = | Esc |
| Pause | = | P |
| Pause (when using Joystick) | = | Space |
| Replay | = | R (when the game is in the PAUSED state) |

**Miscellaneous Keys:**

| | | |
|---|---|---|
| See Driver Name | = | N |
| See Processor Occupancy | = | O |
| Decrease Cockpit View Angle | = | Minus – |
| Increase Cockpit View Angle | = | Plus + |
| Virtual Cockpit On/Off | = | @ (Software graphics only) |
| PC Spec Information | = | CTRL + I |
| Joystick On/Off | = | CTRL + J |
| Background Sound On/Off | = | CTRL + S |

**View Keys:**

| | | |
|---|---|---|
| Your Car Cockpit View | = | Right Arrow |
| Trackside Camera View | = | Left Arrow |
| All On-car Camera Views | = | Page Up (Cycle through) |
| Chase View | = | Page Down |
| Reverse Chase View | = | Delete |
| Car Ahead | = | Up Arrow |
| Car Behind | = | Down Arrow |
| Return to Your Cockpit | = | Home |
| TV Director Mode | = | Insert |

**Network Keys:**

| | | |
|---|---|---|
| All Escape to Menu Screen | = | SHIFT + U |

**Two Player Link Keys:**

| | | |
|---|---|---|
| Send Message | = | CTRL + M |
| Host Release Control in Menus to other player | = | CTRL + R |
| Hang Up | = | CTRL + H |



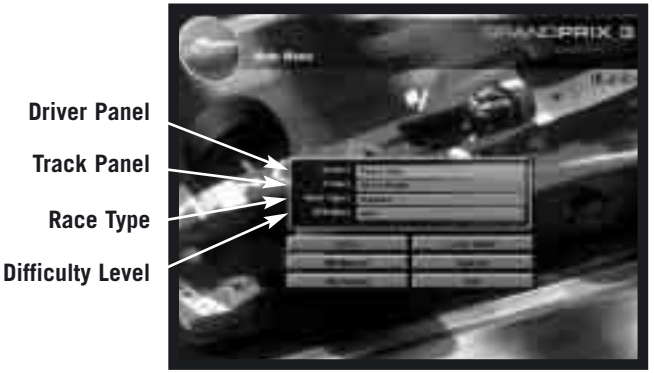
# Part Two: Getting Started

## One Lap of Monza for Rookie Drivers

- Install and load Grand Prix 3 as explained previously.

After the opening animations, you will be given the choice of **Quickrace** or **Main Menu**. Use **Quickrace** if you want a quick blast of Grand Prix 3. But for the purposes of this tutorial guide...

- Click on **Main Menu**.




For the duration of this **Quickstart** tutorial, you will be racing under your own name. You just need to select a team to race for and rename one of its drivers.

- Click on the **Driver** panel to go to the **Driver Select** screen.

- In the left hand **Teams** panel, one of the drivers is already selected (the number is highlighted). Click on the driver's photo to deselect.
- Click on the button to the right of **Ferrari** to view the two team drivers, then click on the button to the right of driver number 4's name: **Eddie Irvine**.
- Click on the name panel under Eddie's photo and delete his name with the backspace key.
- Type in your name (or the name you want to race under) and press **Return**.

You are now Driver 4, racing for the **Ferrari** team. Your team's badge now appears on screen, rotating in the top left corner.

From this screen you can also access your individual **Car Setup** options and save the driver names. But for this tutorial, simply click **OK** and you'll return to the **Main Menu** screen. The name you typed in will be shown as the **Driver**.

Monza has been chosen as the track where you'll have your shakedown test.

- Click on the **Track** panel and you'll be taken to the **Track** screen. A list of the 1998 Championship Season tracks appears on the left and allows you to view each one from a number of positions.
- Click on **Italy** then select **OK** to return to the **Main Menu**.

Italy now appears in the **Track** panel.

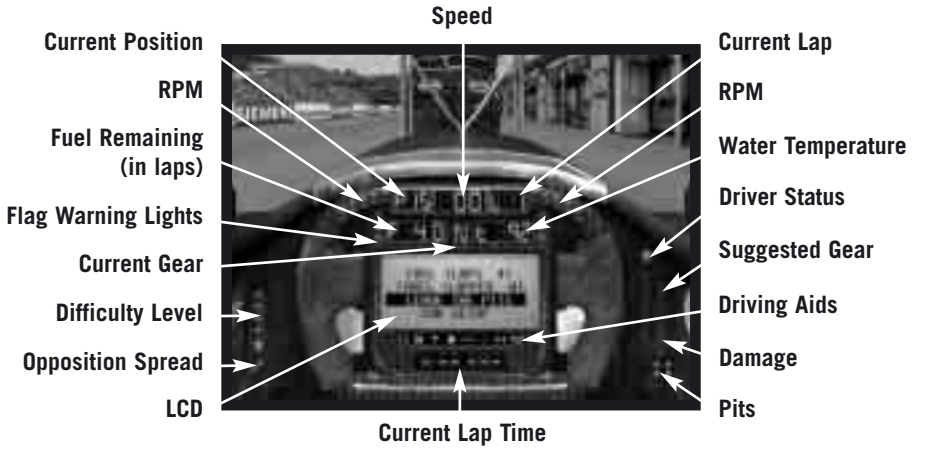
Now choose the kind of race you want.

- Click on the **Race Type** panel and select **Practice**.
- Click **OK** to return to the **Main Menu**.

The preparations are over. It's time to drive!

- Click on the **Drive** button. You'll see a **Weather** screen that details the **Current Track** and **Sky** conditions and the **Forecast** chance of rain.
- Click **OK** to start your first practice session.

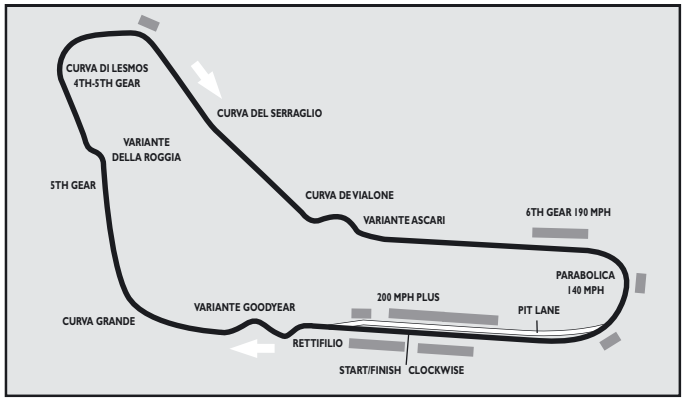
You're now sitting in the Ferrari cockpit in the pits at Monza. As with any test session, it's now time to check the instruments and controls...




- Below the LCD screen on the steering wheel is a row of eight lights. Each corresponds to a Driving Aid designed to help you control the car. Keys F1 to F8 turn each of these on and off. In **Rookie** mode, all lights should be on. If they're not, press the relevant F key. Suggested Gear (F6) is not needed for this session.

With the Driving Aids activated, you won't have to worry about changing gear or braking: this will be done automatically and all basic steering around the circuit will also be assisted. You may crash if you stray from the racing line, but your car will not be damaged. If you spin off the track, the car will right itself once it has come to rest and face the right direction so you can get on with the session.

- Now check the Monza track plan below...



- Find the Start/Finish line and then run your eye clockwise around the course until you come back to the Finish line. Check where the pit lane joins the track so you'll know exactly when you'll be on the actual racing track. Memorise the track plan so you can anticipate what the corners will be like. As you improve your racing skills and become more experienced, you'll realise just how important knowing each circuit will be to your success.

Your car is still on its jacks in the pits.

- Select the **Leave the Pits** option on the LCD, using the Throttle and Brake controls, then press the Gear Change button.

The car will come down off its jacks and you'll see a new LCD screen appear on the central steering wheel panel.

- Now slowly squeeze the accelerator…

Your car will begin to move forward (if it doesn't, check that you've pressed F2 and that the second symbol on the Driving Aids display is lit).

- Steer out from your pit and drive down the pit lane. Remember that in race conditions, you'll need to stick to the pit lane speed limit of 50mph/80kph.

If you want to pause the simulation at any point, press key P (or Space if you are driving with a Joystick, Wheel or a Joypad). Press P again to reactivate. During this session, pause as many times as you feel you need to, so that you can study the track plan and anticipate what's coming next.

As you steer out of the pit lane, join the main track, keeping on the inside of the broken yellow line. Once on the circuit proper, the yellow line will be replaced by a long broken white line.

- Try to keep the middle of the steering wheel lined up with the broken white line as you progress around the circuit. This white line is the Best **Driving Line** Driving Aid (F5): the quickest possible line into and out of bends without spinning off the track.

At some point before the first bend, you should, see a white sign with a black arrow bending to the left, then countdown marker signs with 200 and 100. These signs show how many metres remain before the approaching left-hand bend.

- This is a good spot to pause the simulation and check the Monza track plan again:

The first bend at Monza turns to the left and is followed by a sharp right. Next is another left-right combination making up a double chicane called the **Variante Goodyear**.

- Find the **Variante Goodyear** on your track plan and examine the next bend, the **Curva Grande**.

This is what Formula One racing is all about: being aware of the next part of the course and making sure you are properly prepared to drive through it. Only by knowing what lies ahead can you optimise the line you take through each corner.

- Reactivate the simulation by pressing P or the Space bar.
- Steer carefully around **Variante Goodyear** (don't try to go too fast) - left then right, along a short straight and left and right again. Try to follow the broken line even though it sometimes appears to be aiming away from the track.

If you do leave the track at any time, steer back towards it (this might be slippery on grass or gravel) to get back on the tarmac. If you have spun and are facing the wrong way (and you still have the **Auto-right the Car** (F3) Driving Aid on), don't touch the controls. Wait for the car to right itself and point in the correct direction.

- See how the ideal racing line takes you out of this last corner, using the whole width of the track and taking you over to the left side of the road, ready for the approach to the long sweeping right-hander: the **Curva Grande**. You'll probably find that you can drive quite fast through this bend.
- Continue along the straight and go under the bridge. Just after the bridge is a left turn.
- Press pause and have another look at the track plan. This left turn is the first part of the **Variante della Roggia**: another chicane. Check how this looks and imagine how you will drive through it.
- Now look ahead on the plan to the next three bends and try to imagine what they will look like from the cockpit.
- Press the pause button again to continue.
- Steer through the chicane and on through the next two right hand curves (**Lesmo 1** and **Lesmo 2**).

You'll now face a long, downhill straight.

- Accelerate!

As you're moving, glance at the gear indicator (the red number in the centre of the wheel display) as the car changes gear automatically. Listen to the sound of the engine and watch the rpm indicator lights as the gears change up and down. Get used to glancing quickly at the displays and the mirrors as you're travelling at speed.

At the end of this straight is an unusual chicane called the **Variante Ascari**. Pause, check your track plan, analyse and memorise, reactivate the game and drive through the corners, following the ideal racing line. The more you can commit to memory, the easier the corners will be to drive through at speed.

- Accelerate along the straight and see if the automatic gear change will take you into top gear (6th) before the auto-brakes slow you down for the **Curva Parabolica**.

As you come out of the bend, you'll see the grandstands, the pits and a yellow dotted line marking the pit lane entrance. Remember that each track has its own specific pit entrance and exit layout, and it's important to take a note of this as part of your race preparation.

- Keep following the broken white line. You're now back on the start/finish straight: the **Rettifilio Tribune**.
- Accelerate at full speed. You'll see the starting grid - the spaces where the cars line up for start of the race - and a thick solid white line across the track that marks the end of this lap.
- As you cross the line, you'll be starting your first flying lap: the timer on your cockpit lap time display will start. You can pause the game at any time to double-check the track plan – your lap time will not be affected.
- When you complete your first flying lap, check your time and try another lap to see if you can beat your previous time.

## Controlling Your Own Brakes

Although the auto-brakes you were using are effective, they're still a Driving Aid. To get the very best lap speeds, you'll need to apply your own brakes.

When you feel confident you've mastered steering and the racing line, try switching off the **Auto-brakes** Driving Aid:

- Press F1 and check that the auto-brakes light has gone out on the bank of green icons below the LCD.

Now it's up to you to choose the best moment to brake as you continue lapping Monza! The car will feel very different this time.

Remember how the brakes are operated by your choice of controller:

**Keyboard**

| | | |
|---|---|---|
| Brake | = | Z |

**Joystick**

| | | |
|---|---|---|
| Brake | = | Back |

## Controlling Your Own Gears

- When you're ready to try controlling your own gears, stop on a straight part of the circuit and press F2 to cancel the **Auto-gears** Driving Aid.
- Now press F6 to activate the **Suggested Gear** Driving Aid we left off earlier in the session. The corresponding icon will light up on the display.

You're now in control of ALL gear changes, but to guide you, when you see a number in the **Suggested Gear** panel, that will be the gear to be in as you go into the NEXT corner.

Check the gear change method for your choice of controller:

**Keyboard**

| | | |
|---|---|---|
| Change Up a gear | = | Accelerate A key + Space |
| Change Down a gear | = | Space |

**Joystick**

| | | |
|---|---|---|
| Change Up a gear | = | Accelerate + Press Fire Button |
| Change Down a gear | = | Press Fire Button |

**Note:** If you have separate buttons for gear changes then you do not need to accelerate to change up.

- Practise gear changing up and down and watch the red gear indicator.
- Try to get into neutral (N) and then accelerate. The engine will rev and make a high-pitched noise.
- Blip the accelerator and look at how the revs rise on the digital rev counter, then select first gear BUT keep the revs up - not too much power otherwise the car may spin.

The '1' on the red gear change indicator in the centre will appear, showing that you've successfully selected 1st. You'll start moving forward…

- Listen to the change in engine tone and watch your speed rise on the mph/kph indicator.
- Accelerate away and watch the rpm indicator lights illuminate as the revs increase. When the red light appears at the end of the set of green lights, change up to second gear (you'll see a '2' on the display).
- Try changing up as far as fourth gear, then try changing down before a corner by taking note of the **Suggested Gear** indicator.

**Note:** You don't have to be braking when changing down, but you must not be accelerating.

Your car has six forward gears, neutral (N), and reverse (R). If you are in reverse, accelerate to move backwards (just like in a real car).

## Driving into the Pits

Once you're familiar with the Monza circuit and the basic car controls, practise driving back into the pits.

- At any point during the lap before you want to come in, press the Return key to let your pit crew know you're going to come into the pits. The pit signal on your instrument panel will light up in green, giving you the 'all clear' to come in. If the pit signal is red, this means that your crew are busy with the other team car. Do another lap before trying again.
- Drive slowly into the pit lane keeping on the inside of the broken yellow line. The simulation will then 'direct' you into the correct bay, but you must brake when you have fully entered the bay.

As your car is jacked up by your crew, a **Pit Options** menu will appear on your cockpit LCD allowing you to add **Fuel**, change **Tyres**, **Leave the Pits** or go to the **Car Setup Options**. Use the A/Z keys or joystick Up/Down to select the option you want from your cockpit LCD menu.


**Note:** Grand Prix 3 features extremely detailed **Car Setup Options**, ranging from Basic to Advanced (Level 1) and Advanced (Level 2). To enjoy the simulation to the full, you can learn much more about setting up the car for the track conditions later in the manual.

## Refuelling

- First select the **Fuel** option from your cockpit LCD menu.
- Use your left/right steering control to alter the amount of fuel (in laps) to be taken on board.
- Press the space bar or the joystick fire button to quit the Fuel menu.

## Tyres

- Select **Tyres** from your cockpit LCD menu. The cockpit LCD will show your available sets of tyres with the amount of laps completed on each set. At the top of the LCD is the tyre type.
- Select using the A/Z keys or joystick Up/Down. Switch tyre type using the left/right controls.

When you select Tyres on the LCD you will see three tyre sets marked 0, three tyre sets marked r1, r2, r3, three tyre sets marked q1, q2, q3 and one set marked qr.

The 0 sets are for practice.

The 'r' tyres are the sets allocated for the race (r1 starts the race, r2 being used at the first pitstop etc.) but you can also use these sets in practice if you have used up the other 0 sets.

The q sets are reserved for qualifying sessions with the exception of the one qr set which can be used in qualifying and race.

**Note:** A tyre set comprises of 4 tyres.

Be aware that there are different tyre sets for different conditions: two types of Dry – Hard and Soft and four types of wets – Intermediate, Hard, Soft and Monsoon, and that before you begin your qualifying sessions you will have to decide what type of Dry tyres you are going to race on during the rest of the race weekend

- Press the spacebar or the joystick fire button to exit the **Tyres** option.

## Leaving the Pits

When you're ready to leave the pits, highlight this option on the LCD, press the spacebar or fire button and the jacks will be lowered. You can now drive down the pit lane (remember the speed limit!) and re-join the circuit.

## Car Setup Options

Select **Car Setup Options** from your cockpit LCD menu.

- This will take you to the **Car Setup** screen where you'll be able to adjust all the basic options for your car: **Front Wing, Brake Balance, Rear Wing, Gear Ratios** and **Pitstop Strategy**. The **Car Setup Options** screen also gives you access to all the **Advanced Setup** options (Levels 1 and 2). For details on all these, see **The Car Handling Section** on page 81.
- Press **OK** to return to the **Pits Options** screen.
- Press **Return to Cockpit** to get back to your car.
- Press the Esc key to open the **Practice** menu.
- Select **Leave Practice** to return to the **Main Menu** screen.

Now you can try to get a good qualifying lap time and enter a race at Monza (you should know the track quite well by now). This will be a 'one-off' Non-Championship Race.

## A Timed Qualifying Session


- From the **Main Menu** screen, click on the **Race Type** panel.
- Click on the **Non-Championship Race** button, then click on **OK** to go back to the **Main Menu**.
- Click on the **Drive** button and you'll be taken to the **Italian Grand Prix** menu screen.
- Select **Qualifying**.

The **Track** and **Sky** conditions and **Weather** screen will appear. If it's raining, you'll want to fit special tyres for wet conditions. These wet tyres vary depending on whether it's a light drizzle, rain or very heavy rain (monsoon). Remember, you can also do this from within the cockpit (in a pitstop) if race conditions change during a race.

- Click **OK**. You'll now be taken to the Pits, but this time, a 'telemetric' monitor will appear in front of your cockpit. This lists all drivers in the qualifying session, with your name highlighted.

Ideally, you should still be in **Rookie** difficulty level and have all your Driving Aids (F1 to F8) switched on - you're free, of course, to deselect one or more of them.


Check your tyres. You will see that qualifying tyres q1, q2, q3 and qr are available plus seven sets of the four wet types. **Note:** Once you go to qualifying the Dry tyre choice (Hard or Soft) in Car Setup screens is fixed for the rest of the race weekend. Wet tyres will always be available however.

Don't adjust anything on the car at the moment. When you're ready, set off on your first qualifying session.

- Press the spacebar (or the fire button in joystick control) and the telemetric monitor will swing out of the way and your car will lowered off its jacks.
- Using the experience you gained in the earlier session, drive away from the pits and complete a lap.

Remember, you won't be timed until you cross the start/finish line for the first time. As soon as you do, the lap timer in the panel below the LCD will be triggered and your time for that lap will be displayed when you next cross the start/finish line.

The time remaining in the qualifying session is shown on the LCD in your steering wheel.

- When you have logged two lap times, return to the pits. (You can either drive around to the pit lane entrance or hit SHIFT + Q to jump back to the pits.)
- Once you are in your bay, your car will be raised on its jacks and the monitor will appear once again in front of you showing practice times so far – the four nearest to your times and the current pole.

You can now change the qualifying tyre set by selecting Tyres and using the left/right control. **Note:** Qualifying tyres are only good for a limited amount of laps and the fresher they are the more effective they are.

You can now alter the setup of your car by selecting the **Car Setup Options** on the LCD display. If you're still new to Formula One car setups, stick to the default settings of Grand Prix 3.

- If you want to speed up the qualifying session, select the fast forward symbol (>>) in the cockpit LCD menu.
- If you ever want to exit the session before the end, press Esc and select **Abandon Qualifying**. No time will be logged and you will start the race from the back of the grid.

When time is up, the **Qualifying Over** screen will appear. You can choose to **View Full Session Times**, or go to the **Options** screen (where you can alter Controls, Driving Aids, Race Options, Graphics, Sound, Save or Exit the game) or **Continue** with the Non-Championship Race.

- When you click on the **Continue** button, you'll have the option of a **Pre-Race Warm Up** or you can go straight to the **Race**.

The **Pre-Race Warm Up** is a chance to practise on the circuit in full racing trim. For this **Quickstart** tutorial, you will go straight to the race.

- When **Race** is selected, you will see side-on views of the cars in their qualifying positions on the starting grid.
- Click on the control buttons to find your name and car, then click **OK**.

Again, the track, sky and weather conditions will appear on the screen, but this time, you'll also be given the option to make **Last Minute Changes** such as altering **Pitstop Strategy, Tyre Choice** (for instance, if the weather has changed radically) and full **Car Setup Options** (at all 3 levels).

- Click **OK** when you're ready to race.

## A Non-Championship Race

You're now on the starting grid at Monza – somewhere between a headline-grabbing pole position at the front of the field or on the last row if your performance was poor (or you failed to get a time)!

Your LCD display will show the number of laps in the race. This will be a percentage of the real race and can be altered in the **Options** menu (see page 60 for details). Your pitstop strategy (**No Stop, One, Two** or **Three Stops**) is also pre-set.

Whatever your position on the grid, you'll be able to see the starting gantry: five banks of five lights.

Wait for the banks of lights to come on in sequence. When all five are glowing red, watch for the moment when they all go out. This is a random number of seconds later.

- When the red lights go out, the race is on!

The most dangerous moment of the race, yet also the best chance to make up places on the grid, be prepared to jostle for position as you head for the first corner. Be extra careful when you approach the braking area and be prepared to take evasive action to avoid touching other cars.

If you've selected Driving Aid F4, you'll be indestructible but you might still be slowed and perhaps pushed off the track by other cars.

As you race, keep checking the cockpit display for:

- Your position = P
- The lap you are currently on = L
- The fuel left in tanks (in laps) = F
- Your water temperature = T

It's best to choose a moment on one of the straights to carry out these checks.

**Pitstops**

If the **Pits Indicator** (cockpit lower right) turns green, you're being called into the pits by your crew for a planned pitstop (to change tyres and refuel) or for an unplanned pitstop to repair damage. Drive into the pits as soon as you complete the current lap. If you want to cancel this order, press Return and the light will go out. Similarly if you decide you want to pit, press Return and the green Pit Indicator will light (press Return again to cancel).

**Flags**

At the side of the track, you may see race marshals waving different flags at the drivers:

YELLOW means NO OVERTAKING – there's probably been a spin or accident on, or near the track. Do not overtake. When you see a marshal waving a GREEN flag, the yellow flag order has been cancelled – continue all out racing!
RED means stop racing immediately.
BLUE means a faster car is trying to overtake you.

The cockpit has flag warning LEDs to show which of the main flags are in force.

Throughout the race, you'll be given information about who is achieving the fastest laps.

**Pulling Out**

If you ever want to leave the race at any time press the Esc key. A menu screen will appear: if you select the **Abandon race** option, you can **Save** the game (see below) and then return to the **Main Menu**.

**Saving the Game**

You can save the race at any point. Here's how:

- Press Esc to freeze the race and access the **Race** menu.
- Select the **Options** button.
- Click on **Save** to go to the **Save Game** screen.

**Note:** The **Option** panels allow you to change the Path and Drive on your computer, but leave these as default for now.

- Click on **Filename** and name your saved game 'Monza1'. Notice that it is given a **.ran** suffix where **ra-** stands for a non championship race, and **-n** identifies Monza as the track (see page 64 for a full list of track codes).
- When you have named the saved game, click on **OK** and you'll get a confirmation that the game is saved.

If you return to this **Saved Game** screen, you will see **Monza1.ran** in the file/directories panel. If you select this file and look at the information panel (bottom right), you'll see detailed information about this specific save:

| | |
|---|---|
| Date saved | Number of Players |
| Time saved | Race condition (e.g. in race/in pits) |
| Race Type | Laps completed |
| Track | Race Leader |

- Click on the **Cancel** button to return to the **Options** screen.
- Click on the **Back** button to return to the **Race** screen.
- Click on **Return to Cockpit** to return to the race (the game will be paused when you return to the cockpit).
- Press **P** to resume the race.

**Finishing the Race**

- Keep racing until you see the chequered flag waved over the start/finish line or you see a 'Race Over' message. You will then be taken to the **Race Results** screen.

This screen allows access to a number of screens showing extensive race information:

| | |
|---|---|
| Full Race Results | Driver Race Points |
| Driver Best laps | Constructor Race Points |
| Circuit Records | Lap Chart |
| Starting Grid | |

- Click on the **Continue** button and you'll be taken to the **Race Completed** screen. This gives you the option to **Race Again On This Circuit** or to **Leave the Circuit** (return to **Main Menu**).

By now you will have seen just how different it feels to race compared to the practice and qualifying sessions. The big difference, of course, is the proximity of other cars and the competitive attitude of the other drivers - some are aggressive, others take chances, all have a real passion to win.

## Winning the World Championship

If you have followed the **Quickstart** guide up to now, you should know the Monza circuit pretty well, but winning a World Championship means acquiring intimate knowledge of all 16 tracks on the calendar. If you undertake a Championship Season, you'll be entered into the 1998 championship and race on all the tracks in the correct sequence – it's hard work and there are no easy answers except practice and defining the correct car set up.

You can win the World Championship in Grand Prix 3 even at the lowest level starting with all eight Driving Aids turned on (F1 to F8) and with the opposition on their lowest performance level. Then, as you progress through the season, you can begin to turn off some of the Driving Aids, but if you do win the Championship, it will still only be at the **lowest** level.

To win the Championship at the **highest** Ace Level, you'll need to drive with just the Ace Level Driving Aids on for the complete duration of the season.

## Part Three: The Cockpit Controls

Packed into the confines of a typical Formula One car is a wealth of information designed to help the driver extract the best performance from his machine, to work out his race strategy and keep an eye on the opposition. Knowing how to use this information and acting on it in a fraction of a second can mean the difference between winning and losing.

You've had a taste of racing, but now it's time to delve a little deeper into the cockpit and its many secrets.


### Difficulty Levels

These five lights indicate your chosen Difficulty Level, the hardest at the top, the easiest at the bottom:

Ace
Pro
Semi-Pro
Amateur
Rookie

The Difficulty Level affects the ability of the opposition and also limits the number of driving aids you can switch on.

### Driving Aids

These eight icons show which Driving Aids are active. The higher the Difficulty Level, the fewer of these will be switched on. Some can be turned on and off from inside the cockpit.

**F1 – Auto Brakes**

The computer applies braking functions to suit the circuit but will **not** brake to avoid other cars.

**F2 – Auto Gears**

The computer changes all the gears for you at the correct point.

**F3 – Auto-right the Car**

If you spin off the track, the computer will auto-right the car by pointing it in the correct direction so you can keep racing (so long as your car is not too badly damaged, in which case it will be craned off the track).

**F4 – Indestructible**
Your car will not be damaged, no matter how serious the shunt.

**F5 – Ideal Line**
A broken white line on the track shows the 'best line' around the track. Keep the line in the centre point of the cockpit.

**F6 – Suggested Gear**
This cockpit indicator shows the best gear to be in as you approach the **next** corner.

**F7 – Throttle Help**
This will reduce the throttle when the rear wheels spin.

**F8 – Steering Help**
This will help you with any basic circuit-driving manoeuvre that requires the steering wheel to be turned.

## Driving Aids and Difficulty Levels

The number of Driving Aids available varies with each Difficulty Level:

| | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 |
|---|---|---|---|---|---|---|---|---|
| | Auto Brakes | Auto Gears | Auto-right the car | Indestructible | Ideal Line | Suggested Gear | Throttle Help | Steering Help |
| Ace | | ✓ | | | | | ✓ | ✓ |
| Pro | | ✓ | | | | ✓ | ✓ | ✓ |
| Semi-Pro | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Amateur | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Rookie | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Opposition Spread

The **Opposition Spread** indicator displays your chosen performance distribution among the other drivers. You can set up racing **Opposition Spread** by accessing **Main Menu** > **Options** > **Race Options** screen.

A flat line means all teams and drivers have the same potential performance.
A rising line simulates 1998 performances for all drivers and teams.
A wavy Line represents a random distribution of performance for all drivers and teams.

## RPM Indicators

These two banks of five LEDs will light up as your revs increase and guide you as to when to change up or down a gear.

The final LED on each bank is red: when this lights up, **change up** a gear; when all the lights go out, **change down** a gear.

Like a conventional rev counter measuring revs per minute (rpm), the LCDs tell you at what speed your engine is spinning when in a particular gear. Keeping within the limits of the LCD scales will help you to change up a gear at the right time, avoid hitting the rev limiter (a device designed to prevent engine damage due to over-revving, for instance when dropping down to a lower gear), as well as show you when you are using too high a gear, losing speed in the process.

## Gear Indicator

This tells you what gear you are currently in. There are 6 forward gears (6, 5, 4, 3, 2, 1), Neutral (N), and Reverse (R).

## Flag Warning Lights

These two sets of three flag warning lights indicate the current colour flag in force, if any (yellow flag – no overtaking, red flag – stop the race, blue flag – car trying to overtake). If all six flags are flashing, look at your instruments or read the message on the LCD.

## Driver Status Indicator

This shows the car is being driven by a player.

## Suggested Gear Indicator (F6)

If the F6 Driving Aid is on, you will see a small number here telling you what gear you should be in before the next bend. This is an 'intelligent aid' and the suggestion will vary depending on the car setup you have chosen.

## Damage Indicator

This diagram will highlight any faulty or damaged parts on the car. If any section is lit and you can still drive the car, make your way back carefully to the pits where the damage will be repaired.

## Pits Indicator

This gives you the current status of your pit-to-crew communication:

**Off** – No pits request in force.
**Green** – You've been called in to the pits by your team (press the Return key to cancel this order).
**Green** – You've warned your team you're coming in to the pits (by pressing the Return key).
**Red Cross** – Your pit crew are currently busy with your other team car. Stay out.

Press the Return key to inform your crew of your intention to pit. Press again to cancel.

## LCD Displays

The central steering wheel LCD shows a lot of important information, depending on what you are doing at any given stage of the Grand Prix weekend.

**During Qualifying/Practice:**

**Time to go** – The amount of time in minutes and seconds left to complete this part of the qualifying session.
**Car** – Your car number.
**Runners** – The number of cars on the track.
**Split/Best** – Your best lap time or split time.

**During the Race:**

**XX Lap Race** – The number of laps in the race.
**Car** – Your car number.
**Runners** – The number of cars on the track.

You will also receive split time information and nearest rival details.

**Split Times**

On each circuit, there are two intermediate timing points in addition to the start/finish line.

During practice, a 'split' time is shown on the LCD as you do a timed lap. This is a time you are trying to beat at the next intermediate timing point. The split times come from the best lap time you have achieved so far. As you cross the intermediate timing point, you will see a new time displayed. If this has a **minus** symbol, you know that you have put in a faster time.

During a race, a timed gap is shown on the LCD a little time after you cross the Start/Finish line. This shows the time difference between your car and the one behind and the one in front.

## Pitstop Controls

**Qualifying**

The LCD shows **Tyres, Fuel, Leave the Pits, Car Setup** and (if in the middle of a session) **>> Accelerate Time**

All tyres are marked with the number of laps driven on them.

**Race**

The LCD shows Fuel Laps + /- and Stops to Go +/-

When you come into the pits, the crew will automatically change your tyres to the next set of selected race tyres, and refuel the car according to the current pitstop strategy. If your race position warrants it, then you can adjust the pitstop strategy by increasing or decreasing Fuel carried and increasing or decreasing the number of pitstops. Use your Selector and Controller to change these values.

**Pit Strategy**

In the basic **Car Setup** screen there is a **Pitstop Strategy** panel that can be set to **Automatic** or **Custom**. **Automatic** will allow the computer to set a 'sensible' strategy based on race length and conditions. **Custom** allows you to set your own choice from **None, 1 Stop, 2 Stops** or **3 Stops**. The bar graphs indicate a percentage and a lap of the race that you will stop at.

Just before you enter a race, a **Last Minute Changes** button (shown on the **Weather** > **Conditions** screen) allows you to alter the **Pitstop Strategy, Car Setup** (and **Tyre Choice**) taking into account track conditions.

Your **'Come into the Pits'** warning light (green) will come on as you cross the finishing/start line of the lap before you stop. Remember that you must go into the pits next time you pass the pit lane (or cancel the call by pressing Return).

## Part Four: Camera Views and TV Director

You're not limited to the cockpit view in Grand Prix 3. The simulation allows you to access a large number of other camera views. And if you've just pulled off a breathtaking overtaking manoeuvre or want to review a spin to see just what went wrong, you can select the replay option.

### Cockpit View

**Right Arrow Key**

The race from the cockpit of your car. This is your default racing view.

### On Car Camera Views

**PageUp Key (Cycle through)**

You can view the action from various cameras attached to your car. The PageUp key scrolls through a large number of views.

### Other Car Views

**Up Arrow/Down Arrow/Home**

You can 'jump' into the cockpit of the car ahead by pressing the Up Arrow Key. Further presses will move you forward (one car per press). In the same way, you can move back through the field with the Down Arrow Key. The Home key will return you to your own car.

### Trackside Camera Views

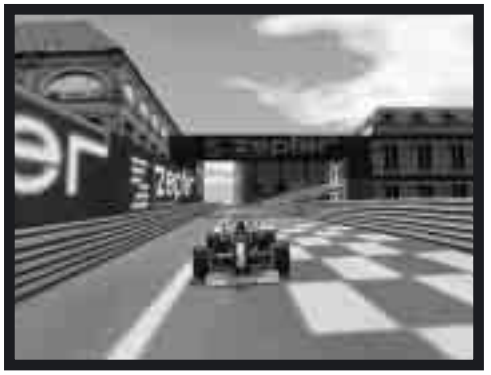
**Left Arrow Key**

View all the action centred on any car at any time during the race (Use Up/Down arrow keys to move through the field). The Right Arrow Key will return you to your own cockpit view.

### Chase View

**PageDown Key**

View any car from just behind and slightly above it.



### Reverse Chase View

**Delete Key**

View any car from the front and slightly above.

## TV Director

**Insert Key**

TV Director mode automatically shifts the trackside views between different cars and different camera angles. When you press the Insert key, a 'clapperboard' will be displayed for five seconds in the top right hand corner of the screen. When you turn Director Mode off (by selecting any other view) the clapperboard will appear with a cross through it.

## Replay Mode

**Pause Key P + R**

The Pause key (P) pauses the action and the R key replays the previous 20 seconds of action with an 'R' displayed on the top left of the screen. You can change all camera views during a Replay (see above). At the end of the 20 seconds, the game is left in Pause mode. Either press R again to see the replay as many times as you want, or press P to continue with the game and return to your original position (in your cockpit if you were racing).

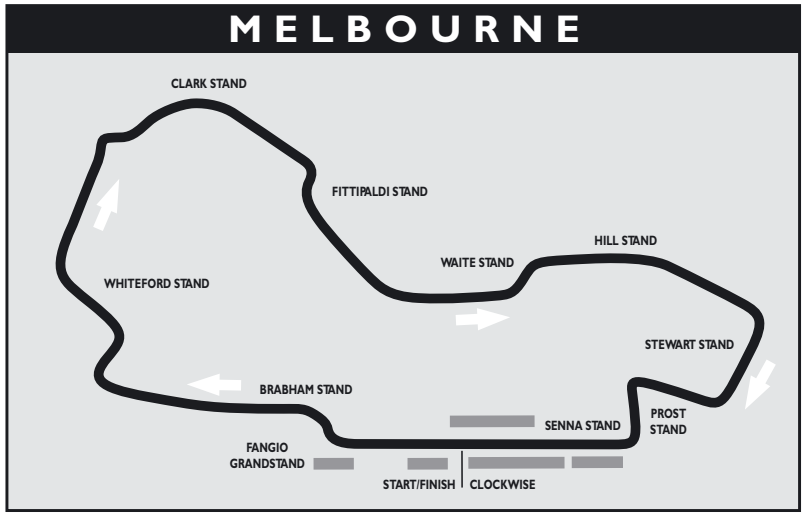
# CIRCUITS ON THE FORMULA ONE CIRCUS

Between the claustrophobic, twisting streets of yacht-strewn Monte Carlo and the open sweeps of a modern facility such as Austria's A1-Ring with its generous run-off areas, similarities are few. Teams face a bewildering set of variables as the Formula One circus re-invents the playing field every two weeks.

Venues like Monza and Silverstone may be part of racing lore, corners like Lesmo, Tabac and Eau Rouge, part of every fan's vernacular. But to a driver, they are simply places to be mapped and memorised, a clinical mix of braking point, apex and rumble strip. A trajectory to be optimised. An opportunity or a problem.

## AUSTRALIAN GRAND PRIX

**6-8 March 1998**




**Albert Park Circuit, Melbourne**

1 lap: 3.295 miles/5.303km (clockwise)

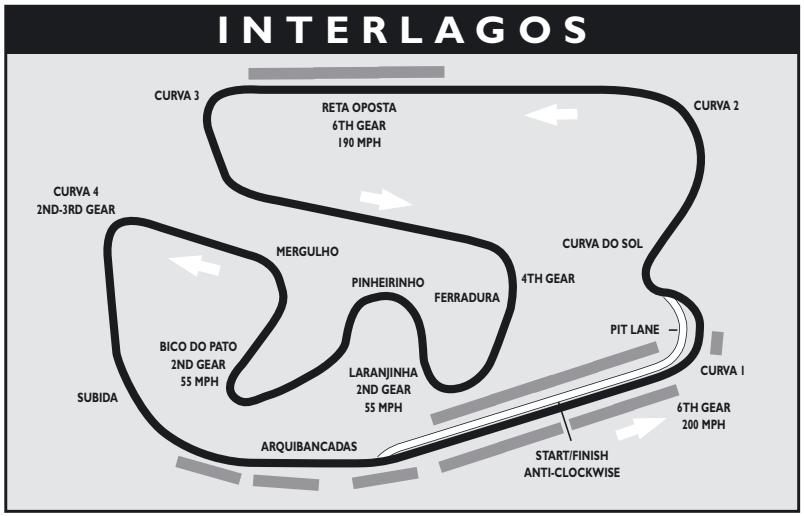
58 laps: 191.117 miles/307.574km

Kicking off the new season, Albert Park's mix of tight corners and sweeping curves is popular with the drivers. Despite some bumps and a certain appetite for tyres, the track is less demanding than conventional street circuits. A **high downforce** set up is best, with good traction a must.

With the exception of the pit straight where speeds top out at 185mph, Melbourne mixes short bursts of acceleration with hard braking, sharp bends being linked by short sweeps rather than straights worthy of the name. A couple of 45° right and left turns lead to one of the circuit's best overtaking spots, a right-left S bend. Expect trouble here in the opening lap. After braking hard down to 70mph for the tight right-hander at Turn 9, the middle section of the lap opens out, giving cars with good horsepower the chance to pull away, while the tighter section that links Turn 13 to the last corner at Turn 16 will favour cars with good handling, bringing them back into contention. Finish the lap close enough here and you may get enough tow down the pit straight to take you past the car in front.

## BRAZILIAN GRAND PRIX

**27-29 March 1998**




**Autodrómo José Carlos Pace, Interlagos, São Paulo**

1 lap: 2.667 miles/4.292km (anti-clockwise)

72 laps: 192.018 miles/309.024km

Punishing your transmission and neck muscles alike, marshy Interlagos is notorious for its bumps. Overtaking opportunities are few, so although **low downforce** may make the car skittish on the track's inner section, it's best to sacrifice cornering stability in favour of the straight-line speed you'll need to overtake at the end of the two long straights.

Your best chance comes at the first corner: if you crest the rise with enough speed, pull out of the slipstream and dive for the inside at 180mph. Watch your line through the S do Senna, keeping it tidy and building speed up for the critical Curva do Sol. A good exit here means good top speed for the Reta Oposta straight, ready for the track's second overtaking opportunity, Descida do Lago, a tight left-hander where it's easy to spin off. Sweep through another left-hander in fourth at 135mph, accelerate to 170mph before braking for Ferradura, a sweeping, double apex right. Maintain a smooth flowing rhythm as you tackle a series of slow winding bends, dropping as low as second and 55mph for Bico do Pato, before building momentum up the slope, past the pit lane entry and back onto the main straight.

## ARGENTINIAN GRAND PRIX

**10-12 April 1998**


**Autodromo Oscar Alfredo Galvez, Buenos Aires**

1 lap: 2.645 miles/4.256km (clockwise)

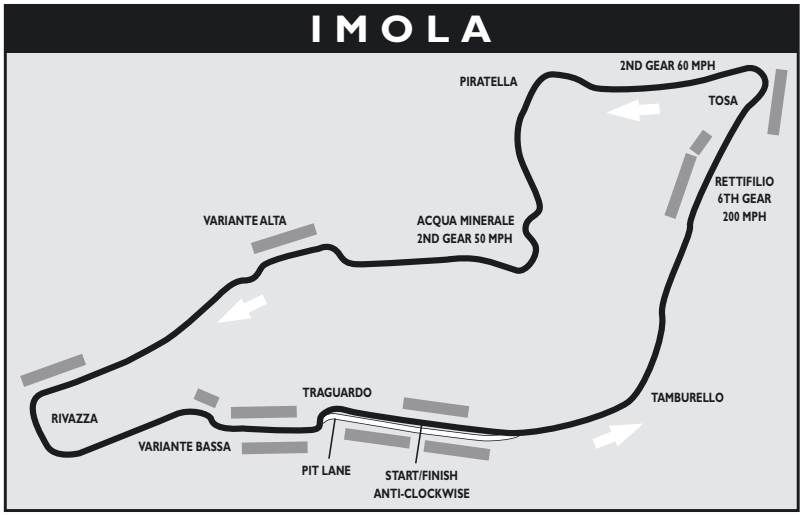
72 laps: 190.418 miles/306.449km

A technically challenging course with many twists, low speed corners, bumps and changes in gradient. Good grip is critical here, calling for steep wing angles for **high downforce**. The sheer variety and frequency of corners will have you flicking the car left and right, so keep your lines clean to set yourself up for the best overtaking spot at the end of the main start/finish straight.

Be prepared to go on the attack, or to defend the inside line as you brake hard from 180mph down to 2nd gear and 60mph for the first corner. Accelerate up to a right-hand kink, taken at 130mph and push to 150 before driving into the Curva de la Confiteria, clipping the apex at 60mph. Sweep through a left-right combination to the long constant radius right-hander that opens onto the second longest straight. Lift off for the 165mph Curva de Ascari, before braking hard for a 180º right that leads to the Esses. Carry as much speed as you can out of Ombú onto the short straight before braking hard for the Senna 'S'. A short burst up to 150mph, then slow to 55mph for the hairpin, before building speed through the kink onto the half-mile Tribunas straight and the finish line.

## SAN MARINO GRAND PRIX

**24-26 April 1998**




**Autodromo Enzo e Dino Ferrari, Imola (Italy)**

1 lap: 3.061 miles/4.927km (anti-clockwise)

62 laps: 189.782 miles/305.443km

Imola is a medium speed circuit where brakes take a pounding. To get a good balance under deceleration, set up the car for **medium downforce** with stiffer settings, even if it means sacrificing grip.

At the end of the main straight, brake hard down to 3rd gear for Tamburello, a left-right S-bend. Accelerate down the straight and slow for Villeneuve, another S-bend, this time in 4th. Next is Tosa, one of the best places to pass and pick off back-markers. Out of the 2nd gear hairpin, head up the 175mph climb to Piratella. Brake as you enter this blind left-hand curve, exiting at about 160mph, over the crest and down to the Acqua Minerale chicane, where the approach is blind and off-camber. Mind the kerbs as the car will tend to bounce, trying to throw you into a spin. Now flat out to the 3rd gear chicane at Variante Alta, before dropping down towards two bumpy left-handers – Rivazza – braking hard, dropping from 6th to 2nd. Back up to 5th as you approach Variante Bassa, a right hand kink with another hidden apex. Finally thread through the Traguardo chicane, checking your mirrors for any cars looking for a tow as you race down the straight.

## SPANISH GRAND PRIX

**8-10 May 1998**

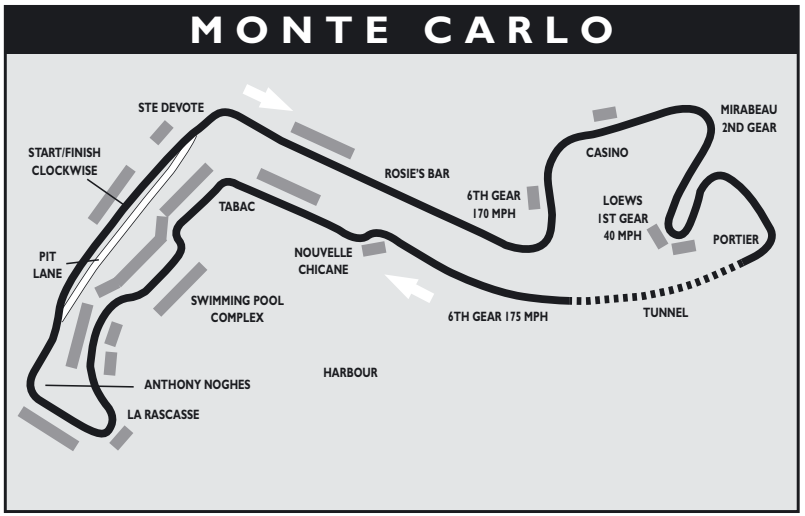

**Circuit de Catalunya, Barcelona**
1 lap: 2.937 miles/4.726km (clockwise)
65 laps: 190.882 miles/307.196km

Featuring a wide range of corners from slow 2nd gear turns to fast 4th or 5th gear curves, and a very long, high-speed overtaking straight, Catalunya calls for compromise: you need enough grip for neutral handling through the many bends, but **low downforce** to achieve a good top speed at the end of the straight.

The first corner, Elf, is probably your best overtaking opportunity on the circuit. Then it's a gentle left before a long sweeping 4th gear 100mph right-hander and a short straight to Repsol, taking a late apex and accelerating hard as the turn gradually opens out. Next, a short burst up to 155mph in 5th takes you into Seat, the hairpin, braking hard down to 60mph in 2nd. Sweep through a gentle left before braking hard again at Würth, a sharp 90º left before a right kink leads to Campsa, a blind right-hander. After that it's right and left through Nissan and flat out up to La Caixa (65mph in 2nd) that leads into the long right-hander at Banc Sabadell. From here, build your speed for the two corners that follow, taking the last one in 5th at 140mph and charge out hitting top gear, flat out over the line.

## MONACO GRAND PRIX

**21-24 May 1998**



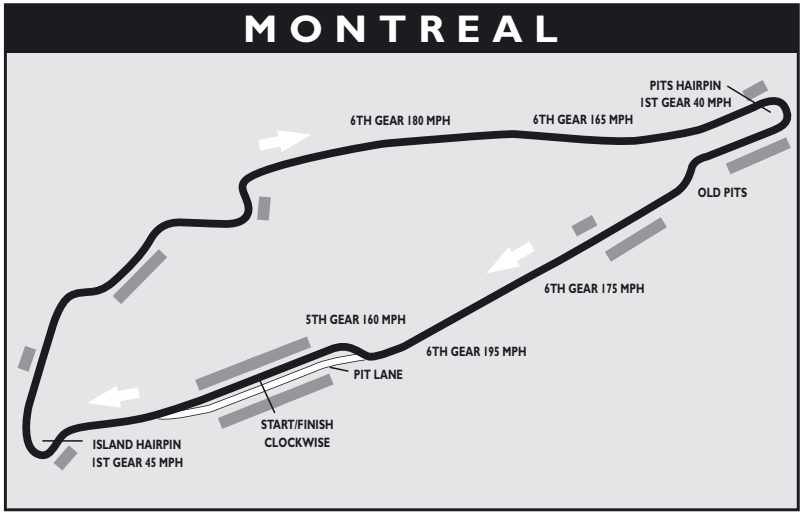

**Circuit de Monaco, Monte Carlo**
1 lap: 2.092 miles/3.367km (clockwise)
78 laps: 163.186 miles/262.624km

The definitive street circuit, a test of stamina, precision and smoothness. With passing so difficult, a pole here is the most prized of the season. Good chassis balance, a flexible engine, strong brakes, a **high downforce** set up and keeping out of trouble are all key.

If you can funnel through the first corner on race day, Sainte Dévote, you'll emerge in line, snaking uphill, the car juddering and thumping over manhole covers. Hug the barrier on the inside for Massenet at the top, a long left-hander taken in 3rd at about 80mph. Into Casino Square and out again as you go light over the hump before dropping downhill, off-camber, almost brushing the barrier and on to the hairpin at Mirabeau (an overtaking opportunity for the brave). A short burst down to Loews, braking almost to a standstill (2nd gear, 20mph), arms crossed for maximum lock (be ready to queue here in the early laps). Then it's right through Portier and flat out through the Tunnel, emerging in 6th at about 175mph. Stay well to the right as you brake to 30 for the Nouvelle Chicane. Head down to the 90º left-hander, Tabac, in 4th at about 90mph and into the Swimming Pool Complex, hopping over the kerbs and skimming the walls. La Rascasse is next, taken at a crawl in 1st, before flicking through the last corner, looking for a way past as you go flat out across the finish line.

## CANADIAN GRAND PRIX

**5-7 June 1998**




**Circuit Gilles Villeneuve, Montréal**

1 lap: 2.747 miles/4.421km (clockwise)

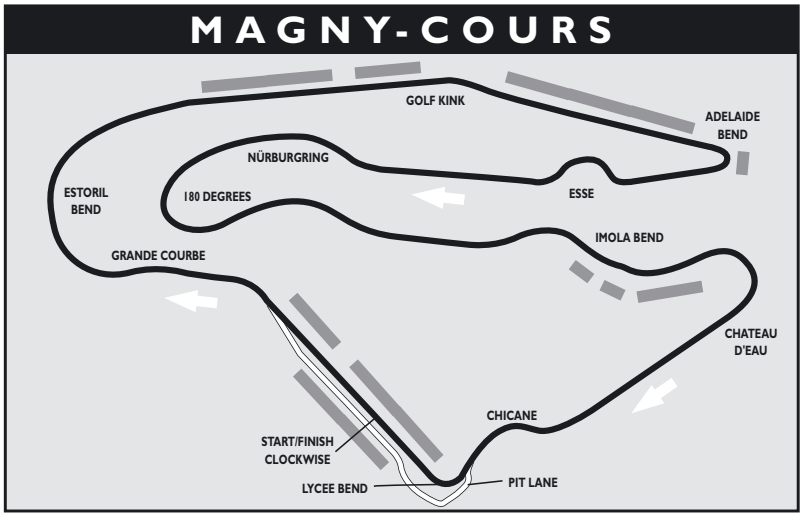
69 laps: 189.548 miles/305.049km

This island circuit is a mix of fast sweepers and straights punctuated by hard-breaking chicanes and hairpins. A **low downforce** set up gives maximum straight line speed, even if it makes slower sections tricky and emphasises the uneven road surface.

After sweeping left and right, overtaking is possible into the first corner, braking hard for this 90º left, often a trouble spot on the first lap. This leads directly into a 180º 2nd gear right-hander before you pick up speed through a long series of sweeping bends, together with a swift right-left combination. Scrub off speed for Turn 10, down from about 180mph in top gear to 40mph. Check your mirrors or try to out-brake a rival yourself as you dive into the hairpin. Build your speed up for the fastest part of the circuit, before braking very hard for Turn 11. At the end of the next straight is another overtaking spot as you brake for the right-left combination that takes you back onto the main straight. Watch you don't clip the kerb on the entry or the apex as you'll come mighty close to the wall on the exit. Come out cleanly and you'll be well set up for a charge down to the finish line.

## FRENCH GRAND PRIX

**26-28 June 1998**




**Circuit de Nevers, Magny-Cours**

1 lap: 2.639 miles/4.247km (clockwise)

71 laps: 187.383 miles/301.564km

Smooth and challenging, Magny-Cours is a mix of fast 4th and 5th gear corners, 1st gear hairpins and five fast straights. Teams choose a **medium downforce** set up with a lower ride height to reduce drag. Acceleration and top speed are more important than the fraction of a second gained by carrying more downforce through the corners.

Past the pits, brake from about 170mph down to 4th gear and 120mph for the Grande Courbe, an easy left before setting up the car for Estoril, a seemingly endless right that leads onto the circuit's longest straight. Take the kink (Golf) flat out before breaking hard for Adelaide, a 40mph, 2nd gear hairpin, the best place for overtaking. Accelerate hard through a gentle right-left to the chicane at Nürburgring, before another short burst leads to the '180º' hairpin, taken at 50mph. Accelerate out to the right-left combination of Imola before slowing for the Château d'Eau turn. Exit in 2nd at 50mph then attack the straight before braking hard for the Chicane, a tight right-left. Finally, watch for cars taking the inside line as you turn into Lycée and the home straight. A clean exit here will get you on the throttle early, in good shape for the start/finish straight.

## BRITISH GRAND PRIX

**10-12 July 1998**


**Silverstone Circuit, Northamptonshire**

1 lap: 3.193 miles/5.139km (clockwise)

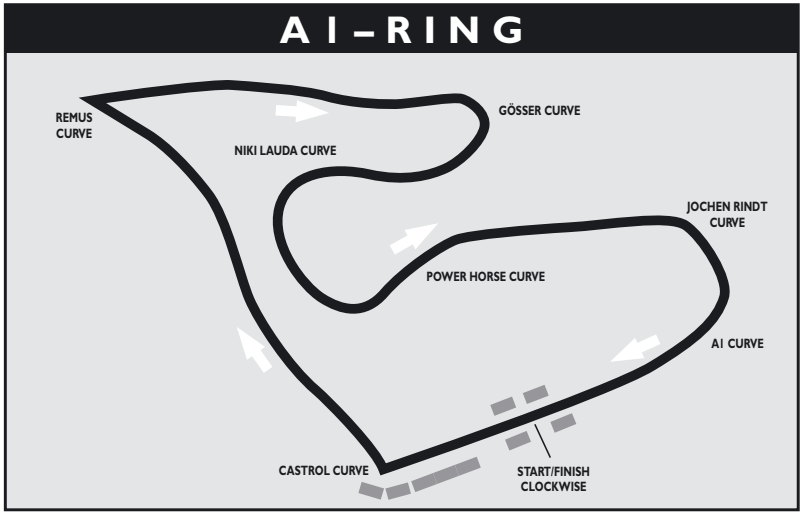
60 laps: 191.566 miles/308.296km

Once one of the quickest venues on the calendar, in recent years Silverstone's character has changed to a mix of fast straights and a greater variety of corners. Calling for a **medium downforce** set up, its smooth surface gives good grip in the dry.

The first corner, Copse, is a daunting 4th gear, 140mph curve with a blind apex where grip and grit will let you overtake. A short straight leads to the fast left-right sweeps that are Maggotts and Becketts. Chapel Curve follows, exiting at 150mph in 6th gear onto the Hangar Straight (185mph), the longest on the circuit. Now brake hard for the double apex right-hander at Stowe, taken in 4th at about 100mph - again a place where a well-planned overtaking manoeuvre can succeed. The road dips into Vale as you drop to 2nd for a hard left into Club, which you'll exit at 130mph. Up the rise to Abbey now, another overtaking spot, before building to 160mph and dabbing the brakes for the spectacular sharp right at Bridge where the road falls away and the banked track catapults you round into the 'complex': Priory, Brooklands and Luffield follow in quick succession before Woodcote opens out, letting you sweep flat out onto the finishing straight.

## AUSTRIAN GRAND PRIX

**24-26 July 1998**




**A1-Ring, Zeltweg**

1 lap: 2.684 miles/4.319km (clockwise)

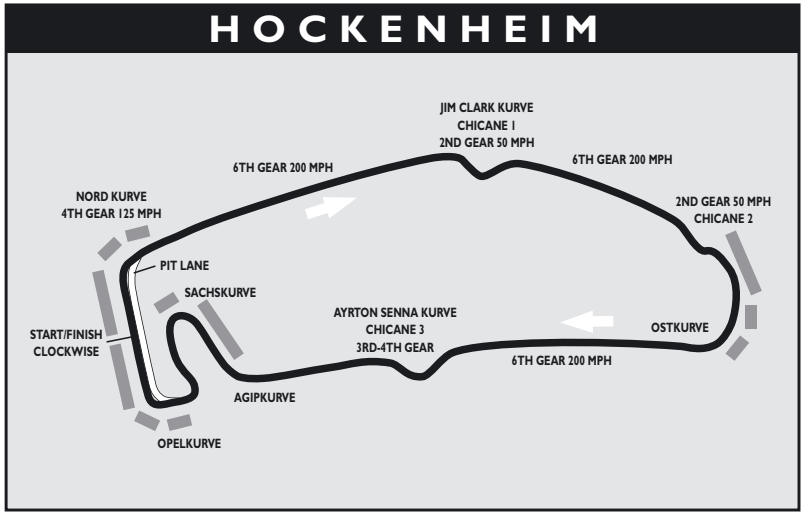
71 laps: 190.543 miles/306.649km

Despite a new name and major refurbishment, the A1-Ring opened in 1997 retains the essential character of the old Österreichring: big changes in gradient, long straights and tight sweeping corners in a setting as spectacular as ever. While the straights suggest low downforce, the track's lack of grip leads many to choose a **medium downforce** set up.

Power uphill in top gear and 180mph, brake hard for the first corner, the Castrol Curve, taken at 65mph in 2nd. This leads to a long, fast section that's almost straight, taken flat out. Brake very hard on the approach to Remus, down to 40mph on the apex for this 150º turn, one of several overtaking spots. Another long, very fast straight lies ahead: you'll reach 180mph before down-shifting into the Gösser Curve double right-hander, going into it in 2nd gear at 50mph and exiting in 4th at 105. The tarmac drifts round to the Niki Lauda Curve, a sweeping left turn leading into another, the Power Horse Curve. Rattle up through the gears on the straight to 175mph, ready for an open right-hander, Jochen Rindt (100mph) and the A1 Curve that leads you back to the finish.

## GERMAN GRAND PRIX

**31 July-2 August 1998**




**Hockenheim**

1 lap: 4.240 miles/6.823km (clockwise)

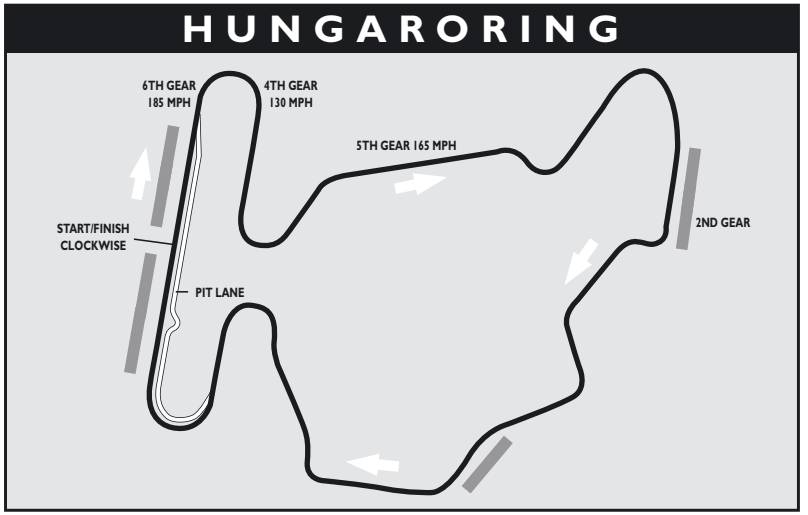
45 laps: 190.782 miles/307.035km

Despite three chicanes and a winding 'Stadium' section, much of the course is a series of very long straights calling for slim wings and **low downforce**. This makes the cars very twitchy on the bends, and unsteady under braking, a situation made worse by brakes cooled below optimum temperature on the long straights.

The circuit features a number of overtaking opportunities, starting with the 4th gear, 125mph Nord Kurve. Then comes the first of the straights cutting through dense pine forests, hitting speeds close to 210mph. Brake hard and drop to 2nd for the first chicane, the Jim Clark Kurve. (Watch your line, as a mistake may force you down to 1st.) Up through the gears again as the road sweeps into the braking area for the second chicane. Full throttle pushes up the Gs as you tackle the Ostkurve, one of the fastest bends in Formula One, taken in 6th at 200mph. Keep the power on until the Ayrton Senna Kurve, a left-right 2nd gear 60mph chicane. The final stretch through the woods leads up to the Agip Kurve, an important place to pass if you don't want to get held up through the Stadium's slippery Sachs Kurve and a double apex right-hander, the Opel Kurve, which leads onto the pit straight.

## HUNGARIAN GRAND PRIX

**14-16 August 1998**




**Hungaroring, Budapest**

1 lap: 2.468 miles/3.972km (clockwise)

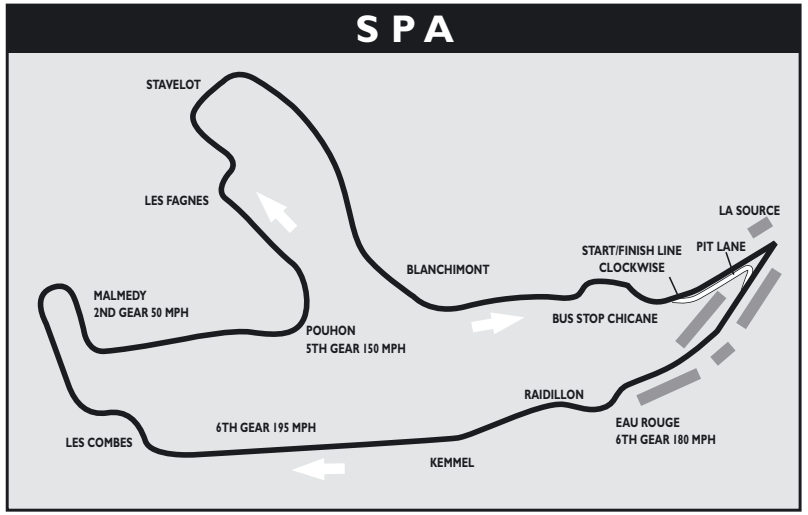
77 laps: 190.036 miles/305.844km

This is a tough but relatively slow circuit: poor grip, many bends and very few straights make it difficult to pass, so qualifying well is critical. Cars are set up for **high downforce** to improve grip, but the twisting, up-and-down track means tyres wear quickly as drivers lose patience and try to exit corners faster than their tyres will allow. Pitting at the right time, if only to avoid the queues that develop here, is often the key to victory.

The first corner - downhill, flat out in 6th at 175mph – is the main overtaking spot on the circuit. Next is the first of several constant radius bends requiring a clean line to keep you off the 'marbles', the loose rubber chippings shed by the tyres. A short straight takes you into a 4th gear right, before the road drops and rises again towards a double apex left-hander and a long 3rd gear 85mph sweeping right. Slow down for the 2nd gear right-left chicane before gradually building speed for the series of 3rd gear corners that follow, taking Turn 10 in 5th. Watch the kerbs as you thread through the tight section at Turn 12 and onto the penultimate corner, a slow left-hander setting yourself up for a long right-hander, sticking cleanly to the racing line for a quick exit onto the finishing straight.

## BELGIAN GRAND PRIX

**28-30 August 1998**




**Circuit de Spa-Francorchamps**

1 lap: 4.329 miles/6.968km (clockwise)

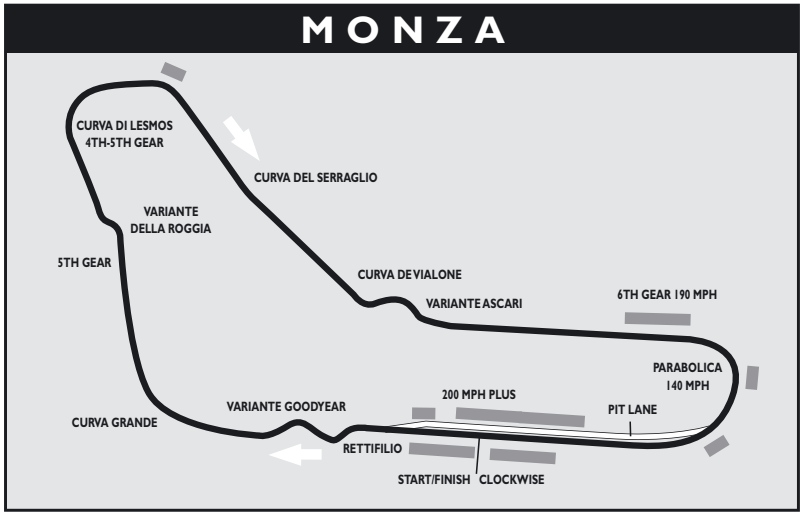
44 laps: 190.498 miles/306.577km

Fast, challenging and exhilarating, Spa is a favourite circuit among drivers. Cars are set up with low to **medium downforce** to deal with the track's variety of fast 6th and 5th gear corners, as well as its tricky 1st gear hairpins and 2nd gear chicanes. Wet weather is often a big factor at Spa, with the track sometimes dry at one end and rain-soaked at the other.

From the grid, a short straight takes you into the 1st gear 40mph La Source hairpin, the scene of many an opening lap shunt. Then it's a race through the gears, heading downhill at 180mph into the Eau Rouge dip, before sweeping uphill on the legendary Raidillon. This is one driving line you cannot afford to get wrong! Speed through the Kemmel kink, checking your gauges on the straight before braking hard for Les Combes (a good overtaking section), a 3rd gear chicane that takes you into Malmedy and Rivage, a tricky 180º corner leading downhill to Pouhon, a hugely challenging double-apex 140mph left-hander. Through Fagnes, flicking smoothly right and left before heading back onto the old circuit with its daunting series of corners - Blanchimont is taken in 6th at 185mph! Now brake hard for the Bus Stop chicane (another good place to overtake), bumping over the shallow kerbs and back on the pit straight.

## ITALIAN GRAND PRIX

**11-13 September 1998**




**Autodromo Nazionale di Monza**

1 lap: 3.585 miles/5.770km (clockwise)

53 laps: 189.858 miles/305.548km

Monza's innumerable chicanes have done nothing to dampen the spirits of the faithful tifosi. Despite the twists, Monza still requires a **low downforce** set up to take advantage of the very fast start/finish straight. The downside is poor grip in slower corners, making outbraking a tricky business.

The fast, long starting straight (Rettifilio) leads to a bumpy 2nd gear double chicane, the braking area being an ideal spot for a calculated overtaking attempt. Exit at 80mph and head for the Curva Grande, a long, bumpy right-hander that's tough on steering, exiting at about 185mph. Next, it's flat out along the straight to the Variante della Roggia, another 2nd gear chicane. Now accelerate hard to the first of the Lesmo bends, building up speed for the second that opens onto the long 200mph Curva del Serraglio. Scrub off speed for the tricky 3rd gear Variante Ascari chicane, trying to carry as much speed onto the straight down to the famous Parabolica (also a good place to overtake), coming out in 4th at 170mph ready for the long drag down the home straight.

## LUXEMBOURG GRAND PRIX

**25-27 September 1998**


**Nürburgring (Germany)**

1 lap: 2.831 miles/4.556km (clockwise)

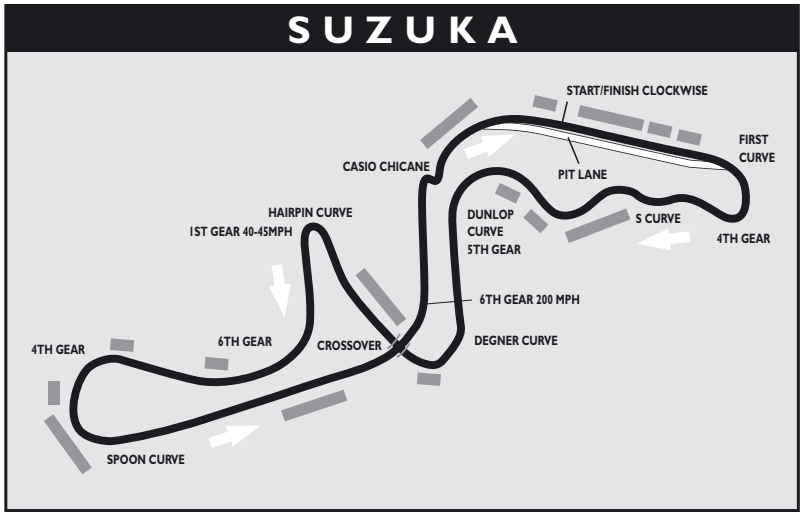
67 laps: 189.664 miles/305.235km

Playing host to the Luxembourg Grand Prix, the German track is typical of a fast, modern circuit with many wide run off areas and large gravel traps. Teams usually choose a **medium downforce** set up as the best compromise to suit the track's short straights and its wide variety of corners.

From the start, it's foot down to 180mph before braking for the Castrol-S, a quick 3rd gear right-left. Accelerate hard to the left at Valvoline and then straight into Ford, dropping to 65mph and 2nd gear. The road stretches downhill now to the Dunlop turn, a slow, looping, 190º right-hander best taken in 2nd - often a good overtaking area. The exit is fast as you speed through a gentle left and right, getting up to top gear at about 175mph, before a near 90º left, good for 80mph. This is immediately followed by the Bit-Kurve, a slightly tighter bend to the right, yet taken slightly faster. Now apply full throttle for the straight, barely lifting for a fast right kink before braking hard for the 60mph, 2nd gear Veedol Chicane, the slowest part of the course. Now accelerate out up to 130mph before slowing for the Coca-Cola Kurve, a long, sharp 2nd gear left-hander, ready to press on across the finishing line.

## JAPANESE GRAND PRIX

**30 October-1 November 1998**




**Suzuka Racing Circuit, Mie-ken**

1 lap: 3.641 miles/5.860km (clockwise & anti-clockwise figure of eight)

51 laps: 185.708 miles/298.868km

The only 'figure of eight' circuit on the calendar, the undulating track mixes tough 4th gear corners with 1st gear hairpins to give tyres a hard time. **Medium downforce** is the best compromise, to take account of the many twists.

After the 190mph straight, brake hard into the First Curve, looking for overtaking opportunities. Drift the car out to the left and you head for the 'S' Curves, a series of 4th gear bends. Driving as tight a line as possible through these, exit Dunlop Curve at full throttle, uphill, heading for a blind left-hander. The car lifts over the bumpy crest and comes down hard for a tightening right-hander, Degner, before running under the bridge at the Crossover. Next is the slow 40mph 2nd gear Hairpin (watch for wheelspin on the exit). A fast, looping right will put you in top gear at 170mph approaching Spoon Curve, a long, tricky double left-hander (where you need to slow for the second apex). Hit 180mph as you sweep over the Crossover this time, slowing for '130 R', before braking hard to weave through the Casio Chicane and accelerating over the finish line.

# MENU REFERENCE SECTION

## Startup Menu Screen

When Grand Prix 3 loads, the Startup Menu will be displayed. This gives you the option of jumping straight into a **Quickrace** (a one-off, short lap contest) or to continue to the **Main Menu**.

### Quickrace

Select this option if you want a quick blast of Grand Prix 3 in a short distance race.

- Select your preferred control method from Keys, Joystick, Joypad and Wheel. If you choose joystick it will need to be calibrated (follow all on-screen instructions).

**Quickrace** will take you to the Track Selection screen where you can choose which track you will be racing on.

- Select the track you want to race on and click OK.

**Weather, Track and Sky Conditions**

You will be shown the **Weather** screen that will indicate track and sky conditions and forecast (as a percentage over the race period) any chance of light rain, rain or heavy rain.

**Last Minute Changes button**

This will take you to a screen where you can change your Car Setup, your Pitstop Strategy and adjust your Tyre Choice (Soft Drys or Hard Drys) taking into account the track conditions and forecast weather (if it's raining, fit Wets).

***Pitstop Strategy***

Select from **Custom** or **Automatic** Pitstop Strategy. Custom allows you to set one, two or three stops and the actual lap to stop on.

***Tyre Choice***

Select the tyres you want to use in the race.

***Car Setup***

This button allows you to go to the basic car setup screen (where you can alter the front wing, the rear wing, brake balance, gear ratios and pit strategy). It also allows your current car setup for the specified track to be loaded and saved, and **all** of your car setups for **all** tracks/conditions to be loaded and saved.

Car setup is a complex and extremely realistic part of the game. More in-depth car setup controls are accessible by clicking on the **Advanced** button.

For full car setup details see pages 83-94.

**The Race**

You will begin any **Quickrace** on the grid of your chosen track, in the grid position you have set in Race Options (Quickrace). The default position is 6th on the grid.

Wait for the five banks of red lights to go out for the race to start.

## Main Menu Screen

**Driver Panel**

The **Main Menu** screen allows you to set up your basic Grand Prix 3 racing options from:

### Driver

- Click on the Driver panel to access the **Driver Select** screen.

- Click on the Team to access and select the 1998 team drivers.

In the left hand **Teams** panel, there will be a driver already selected (the number is highlighted).

- If you want to deselect or rename that driver, click on the driver's photo.
- To change the driver's name, click on the driver's photo. Delete the existing name in the panel (under the photograph) and type in your name and press Return.

You can also select multiplayer 'hotseat' drivers from here. Simply click on other driver positions. The panel in the screen will show you how many 'hotseat' drivers have been selected and confirm if you are playing Multiplayer or Single Player.

**Load Driver Names/Save Driver Names**

This screen also allows you to Save the driver name(s) and Load the driver names you have set up by clicking on the Load Driver Names/Save Driver Names buttons.

**Note:** Driver names will be saved to a file with a .NAM suffix.

**Edit Team Name**

If you want to change the name of the Team, or Team Engine, click on the Edit Team Name button. Type in your choice of Team/Engine Name and press Return.

**Driver Car Setups**

Once you have selected a driver position you can go to **Driver Car Setup** from this screen by clicking on the button under the portrait. This will access the Car Setup section for your choice of car (plus all other Advanced Level setup options).

- Click on OK to return to the **Main Menu**. If you have entered a driver name, that name will be shown in the **Main Menu** Driver panel.

### Track

- Click on the Track panel to access the **Track** screen. It's from here that you can choose a track to race on (unless you are in Championship Season mode when you will have to tackle all the races in the correct sequence).

- Click on your choice of track and use the directional view buttons (+/-) to orientate the 4-way track illustration.

The Info button gives you details of Track Length, Qualifying Lap Record and Race Lap Record (1998).

The View button gives you a clear view of the track with an orientation panel allowing you views from the North, South, East and West.

Also, by placing the mouse pointer over the various sections of the track, information regarding those sections will be shown.

- Click on OK to return to the **Main Menu**. Your chosen track name will be shown in the Track panel.

## Race Type

- Click on the **Race Type** panel to select the type of race you want to participate in.

Choose from:

**Quickrace**

This is a quick blast. A short race that's ideal if you want to jump in the cockpit and get driving. You'll start on the grid ready for the off.

**Practice**

This option allows you to practise on any chosen circuit and is the best way to get to know a particular track without the pressures of competition or having to achieve fast qualifying times. You will start in the pits.

**Non-Championship Race**

This option allows you to participate in a complete race event; including Practice and Qualifying sessions. Once you are familiar with a circuit this is your **next big step** before attempting the complete Championship Season.

**The Championship Season**

This will take you through all 16 races of the 1998 season, starting from the Australian Grand Prix and ending in Suzuka, Japan. **This is the ultimate challenge in Grand Prix 3.**

## Difficulty

- Click on the **Difficulty** panel to choose the Level of Opposition you want to race against from **Ace, Pro, Semi-Pro, Amateur** or **Rookie**.

## Multiplayer

The **Multiplayer** button takes you to the Multiplayer screen that allows you to set up the game to play against real opponents across a local area network, via modem or by serial link.

For full details on the Grand Prix 3 multiplayer game see the Multiplayer section on page 75.

## Workshop

The Workshop screen offers important game information and utilities:

**About Grand Prix 3**

Grand Prix 3 credits.

**Utilities**

This allows you to delete unwanted Save files and to Load/Save the game state and Menu Setup options ('Show Tooltips', 'Highlight Follows Mouse', 'Fast Fades' and 'Disable Joystick Control in Menus').

**View Circuit Records**

Select this option to get information about all 16 track records (Qualifying and Race) with options to Restore all Original Records, Restore Current Track Record, Merge Track Records (if you are importing records created on another machine) and to Save Track records. Saved circuit records have a .REC suffix.

**Review Performance**

This option allows you to view saved hotlaps and graph, load, save and extract performance charts for any track. For more details on Performance Analysis see page 94.

### Load Game

Select to load a previously saved game. All saved game files are stored in the form of .RA plus the track code (e.g. MONZA = N). Select a file and look at the Screen Information panel for full Saved Game details.

### Options

The Options button allows you to set up **Controls, Graphics, Sound** and **Race Options** (see below for details).

### Drive

When you have set up your choice of Race, Driver, and Team, select the **Drive** button to go to the track and begin driving.

### Icon Buttons

At the top right of the screen are a number of icon buttons. These are shortcut buttons to access various game functions such as Information about your PC specification, Joystick on/off and Background Sound on/off.

### Exit

Select to leave Grand Prix 3 and return to your desktop.

## Game Options

### Controls

- From the **Main Menu** click on the **Options** button.
- Click on the **Controls** button.

Grand Prix 3 allows you to control the simulation using the Keyboard, a Joypad, a Joystick or a Wheel and to Save/Load individual control sets for each of these control methods.

- Select your preferred method of control.

You can also select an **Advanced Control** option for the four control methods, by clicking on the **Advanced** button.

**Calibrate Joystick**

To calibrate your joystick, first select joystick control method and click on the **Calibrate Joystick** button. This will take you to the **Joystick Calibration** screen. Follow all on-screen instructions and click on OK to return to the **Controls** screen.

**Keyboard Setup**

This shows you the keys used in the simulation and allows you to customise the 'drive keys'. Click on the **Change Drive Keys** button and follow all on-screen directions to set up your choice of drive keys.

**Wheels/Pedals**

Calibration of wheels/pedals should be done with the **Control Driven Calibration** option selected in Advanced Controls.

### Controls (Advanced)

This menu allows you to change most aspects of the way in which your car is controlled as well as creating, saving and loading custom control sets, calibrating joysticks and changing keyboard keys assigned.

**Controller Type**

- Set your controller from Keyboard, Joypad, Joystick and Wheel.

**Steering**

***Steering Device***

- Select your steering device using the pull-down menu.

**Note: Joystick Horiz** means this function is operated by moving the joystick along its **horizontal** axis. Similarly, **Joystick Vert** means that the function is operated by moving the joystick along its **vertical** axis.

***Steering Mode***

- Select a **Steering Mode** from Switched or Analog.

Switched means that the action is either On or Off while Analog means that the action is performed to a lesser or greater extent. For example, with Joystick steering set in Analog mode moving the joystick slightly to the left would make the car alter its course only slightly.

***Low Sensitivity Zone (0% – 100%)***

The low sensitivity zone enables you to control how sensitive the controls are as you move your controller from its centre point. For example, if you set the low sensitivity zone to 30%, then the first 30% of travel from the centre of the control is progressively sensitive but the remaining 70% of the control remains at the sensitivity level reached at the end of the low sensitivity zone. Use this feature to make steering, throttle, clutch and brake controls **less** sensitive to small control changes. A setting of 0% will give constant sensitivity and a setting of 100% will give progressive sensitivity across the full range of the control device.

***Steering Help (0% – 100%)***

This estimates the amount of steering help your car requires by taking account of your control input and the manoeuvre you are trying to perform on the track.

***Maximum Lock***

Lock can range from 8 degrees to 20 degrees and will affect the overall sensitivity of your steering control (if you are using analog steering). At a high setting your car will be extremely responsive to your steering control. At a low setting the car will be less sensitive to your steering control.

***Reduce With Car Speed***

This feature helps to compensate for the small travel of a joystick or the limited turn of a steering wheel. The maximum lock sensitivity setting is automatically reduced as the car speed increases. Big steering locks are only really needed at low speed corners. At high speeds, by reducing the overall sensitivity, you will achieve more precision in steering the car. 0% is **no effect** and 100% is **maximum effect**.

**Accelerate**

***Acceleration Device***

Select your acceleration device using the drop-down menu options.

***Acceleration Mode***

Select the acceleration mode between Switched and Analog (see page 56 for explanation).

***Low Sensitivity Zone (acceleration)***

See page 56 for explanation.

**Brake**

***Brake Device***

Select your brake device using the drop down menu.

***Brake Mode***

Select the brake mode between Switched and Analog (see page 56 for explanation).

***Low Sensitivity Zone (brake)***

See page 56 for explanation.

**Clutch**

***Clutch Device***

Select a clutch device from the pop up menu. Choose from Use Gear Change to Joystick Vertical or Joystick Horizontal travel.

***Low Sensitivity Zone (Clutch)***

See page 56 for explanation.

**Gear Change**

Use the drop down menus to select a method for gear changing up and down.

**Force Feedback**

Click in the box to enable a Force Feedback device.

***Scaling***

Set a stronger or weaker level for your Force Feedback device.

**Choose Control Method**

You can select one of four control method presets for Keyboard, Joypad, Joystick or Wheel or you can select from a choice of four user sets.

**Edit Set Name**

Select this button to edit the name of your User Controls Set. The name will be shown in the User Sets column.

**Load Control Set**
This allows you to load in previously saved user control sets. Select the name of the user set and click on OK. User Control Set files are shown with a .CON suffix.

**Save Control Set**
Allows you to save a user control set under a given name with a .CON suffix.

**Calibrate Joystick**
See page 55 for explanation.

**Keyboard Setup**
See page 55 for explanation.

Press the **Back** button to return to the previous menu with all changes in force and the **Cancel** button to return to the previous menu without implementing the changes made in Advanced Controls.

## Driving Aids Options

- From the **Main Menu** click on the **Options** button to enter the Options screen.
- Click on the Driving Aids button.

### Driving Aids

These are shown as a bank of eight icons in the lower centre of the wheel below the LCD. The number of driving aids will reduce according to the level of difficulty selected but (if available) can be turned on and off from within the cockpit.

**F1 – Auto Brakes**
The computer applies braking functions to suit the circuit but will **not** brake to avoid other cars.

**F2 – Auto Gears**
The computer changes all the gears for you at the correct point.

**F3 – Auto Right the Car**
If you spin off the track, the computer will auto right the car by pointing it in the correct direction to continue the race (if your car is not too badly damaged) and you can continue to race). Note that cars that cannot continue to race will be craned off the track.

**F4 – Indestructible**
Your car will not be damaged no matter how serious the shunt.

**F5 – Ideal Line**
A broken white line on the track shows the 'best path' to drive along the whole circuit. This is particularly useful for approaching and driving through bends. Keep the line in the centre point of the cockpit.

**F6 – Suggested Gear**
Show on a cockpit indicator the gear to be in at the **next** corner.

**F7 – Throttle Help**
Will reduce the throttle when the rear wheels spin.

**F8 – Steering Help**
Will assist any basic circuit-driving manoeuvre that requires the steering wheel to be turned.

### Driving Aids available with Difficulty Levels

| | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 |
|---|---|---|---|---|---|---|---|---|
| | Auto Brakes | Auto Gears | Auto-right the car | Indestructible | Ideal Line | Suggested Gear | Throttle Help | Steering Help |
| Ace | | ✓ | | | | | ✓ | ✓ |
| Pro | | ✓ | | | | ✓ | ✓ | ✓ |
| Semi-Pro | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Amateur | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Rookie | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

All available Driving Aids can also be turned on or off from inside the cockpit by pressing the appropriate buttons.

## Race Options

From the **Main Menu** click on the Options button to enter the **Options** screen then click on **Race Options**. The Race Options screen allows you to set or adjust a number of in-race features:

### Time/Distance Race Options

Select (by clicking on the +/- buttons) a time limit for Practice sessions, a time limit for Qualifying sessions and a Race Distance (as a percentage of the actual race length).

### Quickrace Options

Select a starting position for yourself on the grid for any **Quickrace** (by clicking on the +/- buttons).

### Race Weather

Select a **Race Weather** option from Realistic Weather or Custom Weather. Realistic Weather gives you a realistic weather pattern for the race. Custom Weather allows you, via a slider bar, to select the chance of rain within a race.

### Multiplayer (Hotseat)

Players can control the number of changeovers that occur during a 'hotseat' multiplayer race by specifying the number of turns per player. Remember to set up enough laps for each person to get a good drive.

### Opposition Spread

This allows you to alter the strength of all the other simulation drivers in any game against the computer AI from **All the Same**, **1998 Levels** and **Random**. Details are shown on a display in the car cockpit.

**All the Same**

All teams and drivers with the **same** potential performance (The Flat Line).

**1998 Levels**

Simulated 1998 performance for all drivers and teams (The Rising Line).

**Random**

A random distribution of performance for all drivers and teams (The Wavy Line).

### Player Cars Only

If you are playing a multiplayer game you can choose to exclude all AI driven cars and feature only those cars driven by the human players.

### Race Type

Alter the Race Type from **Quickrace, Practice, Non-Championship Race** and **Championship** Season.

### Car Realism

Setup the Car Realism elements you require from:

Suspension Failure
Loose Wheel
Puncture
Engine Failure
Transmission Failure
Oil/Water Leaks
Throttle or Brake Problems
Electrical Problems

You can also choose to set up the correct qualifying time criteria and make sure only times 107% of pole get on to the starting grid.

## Graphics Options

From the **Main Menu** click on the **Options** button to enter the Options screen, then click on **Graphics**. This allows you to set the following Screen Resolution and Details Levels:

### Graphics Detail

Use the +/- buttons (or click inside the bar) to increase/decrease graphics detail. This control will inevitably depend on the specification of your machine but if you find the game does not run smoothly you may have to reduce detail.

### Screen Resolution

Set a resolution from the available options.

### Render Device

Select the card fitted to your machine.

The Graphics Option also allows access to **Advanced Options** for graphics:

### Advanced Options (Graphics)

**Note:** The level of graphic detail and the amount of texture mapping will affect the speed of the game. Select **Automatic** graphics detail to let the game set up the best detail level for your specification machine, or choose **Manual** mode to set up your own detail level.

In **Manual** mode you can choose to display textures on various aspects of the game display (including cockpit mirrors).

**Trackside Objects**

Select the level of **Trackside Objects** you want from None, Low, Medium or All.

**Frame Rate**

The 3D frame rate can be set using the + or – buttons or you can choose to select the frame rate estimated by the computer (click the **Use Estimate** button).

**Note:** Whenever you are in the 3D, you can press the Occupancy Key 'O'. If this is on average less than 100%, you could increase your detail level or frame rate, however, if it is on average more than 100% you could try reducing detail level or frame rate.

## Sound Options

From the **Main Menu** click on the **Options** button to enter the Options screen then click on **Sound** to go to the Sound Options menu. This allows you to increase or decrease:

Music Volume
Background Music Volume
Car Engine Volume
Car Skid Volume
Sound Effects Volume

## Save Options

From the **Main Menu** click on the **Options** button to enter the Options screen then click on the Save button (if accessible).

It's from here that you can save races, hot laps etc.

### Loading and Saving Files

Grand Prix 3 will let you save and load a number of different file types. You are able to save and load Championship Seasons, Individual Races, Hot Laps and Performance Analysis files.

Using an appropriate Save/Load screen you can enter a name for your stored Grand Prix 3 files and select any Grand Prix 3 files you want to load.

Each different file type has its own distinctive file suffix (the bit after the .dot). The first two letters of the suffix identify the file type and the third letter represents the race circuit.

## File Suffix Codes

***File Type (the first two letters)***

| | | | | | |
|---|---|---|---|---|---|
| Championship Season files | = | CH | Hot Lap files | = | HL |
| Non-Championship Race files | = | RA | Performance Analysis files | = | PA |

***Race Circuit (the last letter)***

| | | | | | |
|---|---|---|---|---|---|
| Australia | = | A | Great Britain | = | I |
| Brazil | = | B | Austria | = | J |
| Argentina | = | C | Germany | = | K |
| San Marino | = | D | Hungary | = | L |
| Spain | = | E | Belgium | = | M |
| Monaco | = | F | Italy | = | N |
| Canada | = | G | Luxembourg | = | O |
| France | = | H | Japan | = | P |

So, for example, a Championship Race file in Canada will show the suffix .CHG, and Performance Analysis from the Italian GP will have the suffix .PAN.

***Other Save/Load file suffixes***

| | |
|---|---|
| This driver car/track car setup | .CS + track code letter (see above) |
| This driver all tracks/car setups | .TSU |
| Driver names | .NAM |
| Track records | .REC |
| User control set (joystick/keys etc) | .CON |

Return to the **Main Menu** by pressing the **Back** button or **Exit** the game.

# THE GRAND PRIX MENU SECTION

## Non-Championship Race

This race will be a complete race session for a pre-selected track. Once you have chosen to drive a Non-Championship Race, you will be shown the **Grand Prix** menu (below). This shows you all the available race event options. You can (if you so wish) select simply to **Race** (but you will begin at the back of the grid because you will have no qualifying time logged).

## Friday Free Practice

Select **Friday Free Practice** and you will be shown the Track And Sky Conditions screen and be given a rain forecast.

You will be taken to the pits. The in-car steering wheel display (the LCD) allows you to:

- Add Fuel (in Laps).
- Change Tyres.
- Leave the Pits.
- Go to Car Setup.

**Add/Reduce Fuel**
Highlight and select the Fuel option, then use your left/right controller to add or reduce fuel carried by the car.

**Tyres**
Select the Tyre Type by using the left/right controller and select a set of tyres.

When you select Tyres on the LCD you will see three tyre sets marked 0, three tyre sets marked r1, r2, r3, three tyre sets marked q1, q2, q3 and one set marked qr.

The 0 sets are for practice.

The 'r' tyres are the sets allocated for the race (r1 starts the race, r2 being used at the first pitstop etc.) but you can use these sets in practice if you have used up the other 0 sets.

The q sets are reserved for qualifying sessions with the exception of the one qr set which can be used in qualifying and race.

Be aware that there are different tyre sets for different conditions: two types of Dry – Hard and Soft and four types of wets – Intermediate, Hard, Soft and Monsoon, and that before you begin your qualifying sessions you will have to decide what type of Dry tyres you are going to race on during the rest of the race weekend.

***Tyre Rules***
The rules surrounding the selection of tyres are complicated, however, they do add to the strategic nature of the sport. **Note:** A 'set' of tyres consists of all four tyres (2 front and 2 rear) required by one car.

At the start of a race weekend, every driver has 10 sets of the two different Dry compounds (Soft/Hard) and 7 sets of the four different Wet compounds (Intermediates, Hard Wets, Soft Wets, or Monsoon), making 48 sets in total.

Prior to the start of First Practice, each driver has to reserve 4 sets from each of the dry compound groups. These are reserved for the Qualifying session. Grand Prix 3 does this for you automatically.

During the Practice sessions, drivers can use **any** tyre compound. This is normally done to enable the team to test and compare the available grip and wear under various load conditions – important factors when calculating the pitstop strategy.

After all Practice sessions are completed, the driver has to decide on which of the two dry compounds he will use for the rest of the race weekend. In Grand Prix 3 you will make that decision when selecting the tyre compound for use in the Qualifying session.

The drivers will then only be allowed **seven sets** of the selected dry compound for the rest of the event: 4 sets for Qualifying session (the 4th set can be used in the race) and 3 sets for the Race itself.

**Car Setup**
Select **Car Setup** to go to the Pits Options:

The **Pits Options** screen gives you access to all Logged Data information and all levels of Car Setup.

***Fetch Logged Data***
Transfers any lap data currently held by the Data Logger.

***View Logged Data***
Accesses Data for Performance Analysis (see page 67 for details).

***Car Setup***
This will go to the basic car setup screen for your car and give you access to all other Advanced Setup options.

***Return to Cockpit***
Takes you back to the cockpit.

## Saturday Free Practice

This is the same as Friday Free Practice.

## Qualifying

The Qualifying session is where you can try to get the best lap time possible in order to start the race as near to the front of the starting grid as possible. Note that on some circuits, such as Monaco, overtaking is very difficult and pole position almost guarantees a podium place.

You will begin your qualifying session in the Pits with a telemetric monitor placed just above your cockpit showing the times of other drivers. The monitor will show the four nearest times to yours plus the pole position driver/time. If you see that other drivers are improving on your lap times, you can go out (as long as there is time left) to set up a better lap time. You will have four sets of your choice of Dry (Hard or Soft) qualifying tyres available to you (q1, q2, q3, and qr) and ideally you should go out on the first lap, do your best time on the middle lap and come back in on the third lap, then change tyres and do it again. Note that there is a maximum qualifying session lap limit of 12 laps. Exceeding this limit will result in a disqualification of your times.

**Quitting a Qualifying Lap (SHIFT+ Q)**

If you want to quit a qualifying session and return to the pits without having to drive around the track, simply press SHIFT + Q.

**Accelerating Time**

Once back in the pits you can choose to accelerate time for all the other drivers by selecting the >> symbol at the top of the LCD. This will take you to the Accelerated Time screen. You can leave Accelerated Time mode and return to the Pits by pressing the Spacebar.

**Logged Data**

The Data Logger will begin to work as soon as you leave the Pits (a message on the car LCD will tell you this). When you return to the pits, you can select Car Setup to go to Pits Options and click on the Fetch Logged Data/View Logged Data buttons to undertake Performance Analysis. Remember that to win at the highest levels in the simulation you must achieve good car setups for all 16 tracks.

## Pre-Race Warm-Up

This gives you the option to race in full racing trim (fuel, settings etc). All qualifying and race tyres (and Wets) are available to you (but limited to your earlier choice of Drys (Soft/Hard). This session has a time limit of 30 minutes (or your set up % on this). This is your final chance to get to know how well your car will perform in the race itself. Be careful in this session, there will be a lot of other cars on the circuit.

## The Race

Once you have practised, got to know the track, qualified for a good grid position and performed a pre-race warm up, you will enter the race itself. If you have not managed to get a qualification lap time you will start at the back of the grid.

**The Grid Display**

Check the position of all the cars/drivers on the starting grid. Scroll the screen by using the + or – buttons to view the complete field. Select OK to continue.

**Weather**

You will be shown the weather conditions/forecast screen with the option to make any Last Minute Changes.

**Last Minute Changes**

This will take you to a screen where you can adjust Pitstop Strategy, Car Setup and Tyre Choice taking into account the track and forecast weather conditions.

***Pitstop Strategy***

Select Custom or Automatic Pitstop Strategy. Custom allows you to set one, two or three stops and to select on which lap to stop.

***Tyre Choice***

Select the tyres you want to use in the race from Soft Drys/Hard Drys, Intermediates, Hard Wets, Soft Wets, or Monsoons. Remember that your choice of Dry tyres will be limited to the selection you made before Qualifying.

**Car Setup**
This button allows access to the basic car setup screen (front wing, rear wing, brake balance, gear ratios and pit strategy). It also allows your car setup for that track to be loaded and saved and all of your car setups for all tracks/conditions to be loaded/saved.

More in-depth control of car set up is also accessible by clicking on the **Advanced** button. For full car set up details see later in this manual.

Click the OK button to go to the starting grid.

**Starting Off**
When the race is about to start you will hear the sound of a horn. You must then wait as five banks of five red lights are lit from left to right. After the fifth bank has been lit you must wait for the lights to go out. That is the signal for the start of the race.

**Escape Menu (ESC Key)**
An Escape Menu is always available to you by pressing the ESC key. This freezes the race and shows the current first six race positions plus additional options to:

***Return to Cockpit***
Takes you back to the cockpit at the point when you pressed the ESC key.

***Accelerate Time***
Accelerates the race and shows the status of the first 10 race positions plus their current times.

***Current Race Positions***
Shows the complete current race positions and the times of all participants.

***Options***
Takes you to the **Options** menu (see page 54).

***View Track***
Take a look at the track graphic at various orientations. You will be warned that you'll have to **Save** the race before continuing with this option.

***Leave Race***
Exit from the race.

**Finishing the Race**
When the race is over you will be taken to the podium **Results** screen.

The top panel shows the first six drivers (the ones in the points) and further **Results** screen buttons show the following:

***Full Race Results***
Complete information on position, times, and average speeds relative to the winner or in absolute format.

***Driver Best Laps***
The best lap times for all participating drivers.

***Circuit Records***
Details of the records for the current event and previous track records.

***Starting Grid***
How the drivers lined up on the grid at the start of the race.

***Driver Race Points***
The points gained by the top six drivers at this race.

***Constructor Race Points***
The points gained by the top six constructors at this race.

***Lap Chart***
A lap-by-lap chart of the race with options to view the path of the top six finishers, the grid, the players or your choice of any driver.

All results screens can be printed out on your printer and printer options help you setup your printer.

**Race Completed Menu**
At the end of a Non-Championship Race you will be given the option to 'Race again on this circuit' or 'Leave the circuit' (to try another track).

## The Championship Season

The full **Championship Season** will take you through the sixteen races from the Australian Grand Prix to the Japanese Grand Prix.

The specific menu details for the individual Championship Season races are the same as for the **Non-Championship Race** (see page 65) but at the end of a Championship Season Race you will be shown the Championship screen that summarises the Driver and Constructor points won to date. You will then be given the option to go to the next Grand Prix, exit the season, or go to the Options menu, from where you can save the game.

If you have completed the last race of the season (Suzuka, Japan), you will be shown the final points total. This is where you hope to be number one at the end of the 1998 season!

## Hot Laps

A **Hot Lap** is a full lap in race, qualifying or practice that is saved to disk then loaded, replayed and reviewed from the many camera angles available in Grand Prix 3.

### Saving a Hot Lap

If you are racing, practicing or qualifying and want to have a second look at the action all around you and feel that a particular 'hot' lap was worth saving:

- Press Esc and select the **Options** button to go to the Options screen.
- Select **Save** and you will be given the option to Save Game or Save Hot Lap.
- Click on the **Hot Lap** button and you will go to the Hot Lap Replay screen.

In the Hot Laps Replay screen you will be shown all the Hot Laps available with one - or a number of - lap times.

- Click on the lap you want to save and click on OK.

You will go to the **Save Hot Lap** screen.

- Give the Hot Lap a filename, for example Monza1 (it will be given a .HLN suffix meaning HL = Hot Lap, N = Monza).
- Click on OK.

### Viewing a Hot Lap Replay

The real fun about viewing hot lap replays is to be able to view all the action from all the different track cameras available in Grand Prix 3. You will have experienced the hot lap from your cockpit so it's fun to find out what really happened from an external view or what happened in an exciting shunt in another part of the circuit!

- To view the Hot Lap replay return to the **Main Menu** and click on the Load Game button to go to the Load Game screen.
- Select the filename you saved (Monza1.HLN for example), click on OK and you will be taken to the View Hot Lap screen.

The View Hot Lap screen has options to:

- Cycle through the hot lap (show repeatedly) or to Show Once.
- View Hot Lap.
- Save Hot Lap without Performance Data.
- Select View and you will be taken to your cockpit (in paused mode) - this is the Hot Lap.
- Unpause the game and you will begin the Hot Lap Replay.

Remember to use all available cameras to get the best view of all the action.

| | | |
|---|---|---|
| Your car cockpit view | = | Right Arrow |
| Trackside Camera View | = | Left Arrow |
| On car camera views | = | Page Up (10 x Cycle through) |
| Chase View | = | Page Down |
| Reverse Chase View | = | Delete |
| Car Ahead | = | Up Arrow |
| Car Behind | = | Down Arrow |
| Return to Your Cockpit | = | Home |

You can also pause the replay at any time (as normal).



## THE MULTIPLAYER SECTION

- Select **Multiplayer** from the **Main Menu**.

Grand Prix 3 allows you to play the simulation across a number of multiplayer connection types from Serial Cable, Modem, IPX Network and TCP/IP Network. The top panel in this screen allows you to set up the following connections:

## Connection Type

**Serial Cable (2 players)**
Creates a serial cable link between two machines.

**Modem (2 players)**
Creates a modem connection between two machines.

**IPX Network (2 or more players)**
A local area network game.

**TCP/IP Network (2 or more players)**
A local area network game.

## Number to Dial

This allows you to enter the number to dial for a modem game.

## Player Name

Enter the name that you will be known by in a network game.

## Game Selection

The lower panel in this screen allows you to input the number of players.

***Two Players***
Two player games can use all connection types (Serial, Modem, IPX, TCP/IP) and allow all Grand Prix 3 race types (Quickrace, Non-Championship Race, and Championship Season).

***Two or More Players***
Multiplayer games are Local Area Network only (TCP/IP and IPX) and will only allow players to jump into the race without needing to qualify.

## Session Selection

This allows you to select whether you want to Host or Join a multiplayer session.

**Host a New Session**
In a two player Serial link, the host has control of both machines during setup.

In a Modem link, the host also has control of both machines but must initially wait for the joining player to dial through.

**Join an Existing Session**
In a two-player link game, the player joining the session will 'follow' the host, who will have control of the menus on both computers. In a modem link game, the player joining will dial the other player.

## Session Name

Click on the default name, delete and type in a session name to identify the multiplayer game on a Network.

**The Settings Button**
This will take you to the Multiplayer Settings screen and detect technical settings (Port, Baud Rate and TCP/IP Address) for the link method you are using.

**The Phonebook Button**
Takes you to your phonebook. Use it to store phone numbers for 2-player modem linked games. Click on the Add button to enter a telephone number and name. Click on the Add button to add numbers to your book. Up and Down buttons allow you to scroll through your phone number list. Other buttons allow editing or removal of numbers. You can also Load and Save phonebook numbers (saved with a .pho suffix).

## Connecting

**The Linking Screens**
The Connect button will take you to the Linking screen. This will implement the linkup for the multiplayer game using the method you have selected (Network game or Modem/ Serial Cable game).

**The Network Game**
The Linking screen shows (in the top panel) the players' names, which drivers they are playing and where they are in the game (Main Menu etc). The lower panel shows the number of players who are Ready to Play.

The lowest panel in the Linking screen allows access to Driver selection, Track, and Difficulty Level. All players can access Driver Selection but Track and Difficulty Level are set by the Host.

**The Chat Button**
The Chat button allows you to type in a message to chat to other players. Type a message in the lower panel and press the Send button to transmit). The chat messages will appear in the central main panel of the chat screen showing who sent the message and when.

**The Options Button**

This allows you access to all the game options: setup controls, graphics, sound and race options.

**The Leave Session Button**

Click to leave the multiplayer game and return to single player mode. If you are hosting the session, then host control will migrate to the next player in the session.

**The Close Session Button**

Select if you are the host and wish to end the race session.

- Click on Ready to get started. The game will wait for all players to be Ready.

The Ready message will flash to prompt you to click on it. It will flash more intensely when everyone else is ready and waiting for you. Once everyone has clicked on ready all other linking options will be greyed out and unavailable to you.

**Weather Screen**

Once all players have clicked Ready you will be taken to the Weather Network screen. This is similar to the standard Grand Prix 3 Weather screen but also has options for going to the Last Minute Changes screen (and then Car Setup), to Chat or Leave the session. You also have option to Continue/Go Back.

Click on the flashing Ready button to indicate you are ready to race.

**Last Minute Changes (Network) Screen**

This summarises the weather/track and sky conditions and has a Driver list, Pitstop Strategy settings and Tyre choice. You can also access Car Setup from here as well as the Chat and Leave Session options.

- Click Continue and Ready to get racing.

**The Two-Player Link Screen**

When you link up for a 2-player session you will access the Two-Player Link screen which will show you the Selected Drivers (This Machine and Other Machine). You can also choose a different Driver and you will be taken to the Driver Select Screen. If you click on Other Machine control will pass to the other machine player to reselect a driver and then return to This Machine.

- Click the Continue button to go to the Main Menu.
- Click on Drive to get racing.

The 2-player game has the following quick keys:

| | | |
|---|---|---|
| Send Message to other player | = | CTRL + M |
| Host release menu control to other player | = | CTRL + R |
| Hang Up | = | CTRL + H |

## 'Hotseat' Multiplayer Games

Two or more players can enjoy a Grand Prix 3 'multiplayer' game on the same computer by selecting a Hotseat game.

To set up Hotseat mode you must select more than one driver in the **Driver Select** screen (accessed from the **Main Menu**). The central information panel in the Driver Select screen will show, for example, '2 Drivers Selected. Multiplayer.'.

Hotseat games can be played by any number of players up to the maximum number of drivers that can start a race.

The Car Setup screen functions in the usual way (see page 70), simply select a driver from the list and enter the Car Setup screen for that driver's car.

**How Does a 'Hotseat' Game Work?**

The game will allocate equal time slots to each human driver in a race. For example, if two players want to compete in a ten lap race, they each select a driver from the **Driver Select** screen. The computer then chooses one human driver to drive first and drives the opponent's car (plus all the other cars) in the race. The computer then allocates equal driving time to each human driver.

When changeover is approaching, the single LED (light) to the right of the steering wheel will flash as a warning and the message 'Automatic in 5 Seconds' will eventually appear on the screen. You will still be driving during these five seconds. The seconds are counted down on the screen and on reaching the zero the computer will take over control of your car.

This is the point when you can change seats with your human opponent (literally, take the 'hotseat'). His/her car cockpit will now appear (still controlled by the computer). A message 'Control in 5 Seconds' will then appear on the screen. Again, when this is counted down to zero the second player gets control of his/her car and drives the race as normal.

The option to pause the game and watch a replay of the recent action is always available and can be used very effectively here to view all the action and how the two rival cars out-manoeuvre each other.

Remember that to get a good drive in a hotseat race you must set a sufficient number of laps.

When you are in qualifying mode during a hotseat multiplayer game, changeovers will take place when you return to the pits. The qualifying session will end once the time period is over and all the players have used the same number of tyre sets.

# GRAND PRIX VETERANS' SECTION

**Written by Dave Surplus**

## Secrets of the Pro's – Driving at the Limit

### Introduction

Anyone can drive a Formula One car fast. It's easy. You get in and point it in a straight line with your foot down hard on the throttle until you reach maximum revs in 6th gear. And there you are. Going fast. Only there aren't many Formula One tracks that consist of just one long straight. Drive too fast on most tracks and you'll end up in the first gravel trap. Which is why professional drivers talk about being 'quick' rather than being simply 'fast' – 'quick' is the controlled application of speed around a race circuit.

In order to drive a Formula One car 'quickly' you need three things:

- A fast car.
- Knowledge of the best route around the circuit.
- The ability to operate the car at its limits.

But what do we mean by these things and how are they achieved?

A fast car is generally one with a relatively high-powered engine, low overall aerodynamic drag and well-balanced setup of suspension, drivetrain and aerodynamic wings. Some of these things are set by the designer and cannot be changed but others are fully within the driver's ability to adjust in order to achieve greater performance from the car. These setup parameters are described in detail on pages 158-164.

The best line to take around the circuit is determined by the layout of the corners and straights. You've already had a chance to experiment and learn the lines around Monza if you followed the **Quickstart** guide. More instruction on how to calculate the ideal racing line is described in detail in the **Driving Techniques** section (see page 101).

However, a fast car driven on the best line around the circuit will not perform very well unless it is driven correctly and to its limits. This is an important concept to grasp and means that it is crucial for you, the driver, to develop your driving style and proficiency at the same time as developing an understanding for setting up your car. The setup must suit your driving style and equally, your driving style must suit the setup. No two drivers are exactly the same and so their optimum setups may differ. What's more, it's always possible to improve your driving style and/or setup in order to find more speed, even if it's only improving a lap time by a 1000th of a second!

Discovering how to operate the car at its limits is a challenging and rewarding process. And this is where it starts! During braking, cornering and acceleration, the car will always be on the verge of sliding, spinning off or losing rear wheel traction. Generally the term for this is "losing grip" and it has all to do with the adhesion of the tyre to the surface of the track. It is worth looking at tyre grip in some detail as it is fundamental to the rest of the section.

## How does a Tyre Work?

A tyre grips the track as a result of the friction between it and the road surface. This can vary with the smoothness and dryness of the track surface and the compound of the rubber used in the manufacture of the tyre. The driver has no control over the track surface but he can select different tyre compounds. In general, the softer the rubber compound chosen, the more grip the tyre will generate.

The amount of grip is also related to the surface area of the tyre that is in contact with the road. The bigger this "contact area", the more grip will be generated. The tyre contact area is determined partly by the Formula One rules on tyre width and diameter and partly by the design of the suspension geometry.

The last and most important factor for determining grip, as far as the driver is concerned, is the downward force acting on the tyre. This force or load comes from the combined weight of the car and the aerodynamic downforce generated by the wings. In general, the greater the combined vertical load, the more friction there is between the tyre and the road surface and the more grip the tyre will generate. However, when the tyre is close to the limit of its grip it is useful to consider these two vertical loads separately.

Firstly, the weight of the car. While cornering, the tyre is not only supporting the weight of the car, but it is also preventing that weight from travelling on in a straight line (which all things in motion have a tendency to do). This puts the tyre under considerable sideways stress and becomes a critical factor when the tyre is close to the limit of its grip. For example, when the car is heavy with a full fuel tank at the beginning of a race, there is more weight acting downwards and you may expect this to increase the available grip. But in practice, while cornering, the extra weight causes extra sideways stress on the tyres, which is concentrated on the outside tyres due to roll of the car. However, instead of simply cancelling out the benefit of the extra downward weight, this concentration of stress causes the limit of grip on the outside tyres to be reached sooner and as a result, the car will not be able to take the corner as fast. As the car becomes lighter through using up the fuel, the cornering speeds will begin to increase (assuming that the tyres are not wearing out).

Secondly, the aerodynamic downforce generated by the wings. Again while cornering, the tyre is supporting an aerodynamic down force which has no sideways influence and which therefore exerts no additional sideways stress on the tyre. It follows that by increasing the wing angles to add more aerodynamic downforce, the available grip will always be increased. With more grip, the car will be able to take a corner at a higher speed, it will be able to brake harder and later and it will have better traction from the driven wheels when accelerating out of corners. However, there is a penalty to be paid for all this extra grip, which is as you increase your wing angles, your top speed will be reduced due to increased aerodynamic drag.

Clearly, it is important to know when the car is being driven at the grip limit of the tyres. But how can the driver know if he is at the limit? In the case of longitudinal grip, during braking and acceleration, it is difficult to feel the limit of the tyres and much reliance is put on familiarity and experience.

***Expert Tip:***
Some drivers adopt a technique called cadence braking which is a repeated on-off application of the brakes with the limit being reached and possibly exceeded each time the brake is applied. Care must be taken not to upset the balance of the car during cadence braking.

Most acceleration near the limit of the tyre is carried out when exiting corners. We shall look at this later in the section dealing with power oversteer.

## The Slip Zone

When cornering, contrary to what you may think, the tyres do not suddenly lose grip beyond the limit. There is actually a grey zone between gripping and spinning off which comes about as a result of the way the tyre rubber behaves under stress. At cornering speeds well below the limit, the tyre will travel along the road in the same direction as it is pointing. But as cornering speeds increase and sideways stress builds up in the tyre, the rubber in contact with the road is deformed slightly like an elastic band. This causes the remainder of the tyre in question, and the car in general, to actually move sideways towards the outside of the corner by a small amount. When the tyre rolls forward, the stretched portion of rubber is no longer in contact with the road and so it contracts to its original shape. The process then starts again with the next piece of rubber being stretched and so on.

On each occasion, the tyre moves further towards the outside of the corner and to the observer the tyre appears to travel in a slightly wider arc than the direction it is pointing. In other words it seems to slip sideways. Although we know that the actual rubber in contact with the road at any moment is not slipping, we still describe the angle between the path the tyre is travelling and the direction it is pointing as the slip angle. As the cornering speeds increase, the driver can sense the increasing sideways motion and through experience he knows when the grip limit of the tyres has been reached.

***Expert Tip:***
In Grand Prix 3 the onset of the tyre screeching sound denotes when the tyres are slipping at or near the limit of grip. This means that unless you hear a lot of screeching while you drive through corners, you are not going fast enough!

When the limit of grip is exceeded, the tyre is carrying more sideways stress than the friction between tyre and road can withstand and so physical sliding does take place. At best this will lose significant amounts of time and at worst the driver will be unable to recover from the slide. To avoid this, the driver can control the car at the limit by adjusting the steering or throttle position or a combination of the two. In general, steering into the corner more and/or increasing throttle will bring the car to the limit. Straightening the wheel and/or easing the throttle will prevent the limit being exceeded. The adjustments being made in each case must be small and subtle so as not to upset the balance of the car. There will be more about balance later.

When the driver makes adjustments to the steering or throttle, he is actually controlling the distribution of the car's weight between the 4 wheels and therefore the amount of downward force being exerted on each tyre. Controlling this weight transfer is another fundamental part of developing a fast driving style and understanding how to set up the car.

## Controlling Weight Transfer

The driver has complete control over the distribution of weight between the 4 tyres by virtue of how he controls the car and by the way he has adjusted the car setup. An effective driving style is just as important as finding a suitable setup and indeed the two compliment each other.

***Expert Tip:***
Each driver has his own preferences for style and setup and so an excellent setup for one driver may not produce the same results for another.

Every control action that the driver makes will result in weight transferring between the wheels. Coming off the throttle and applying the brakes transfers the weight forward, turning into a corner moves the weight towards the outside wheels and acceleration transfers the weight towards the rear wheels. Both the amount and speed of the driver's action will influence exactly how much weight is transferred.

For example, the harder he applies the brakes or the quicker he applies the brakes, the more weight will be transferred forward. The stiffness of the suspension elements will also determine how fast this weight is transferred. If the front springs and/or dampers are set relatively stiff, then the weight will transfer forward faster. In general, the driver will feel more in control of the car if he adopts a smooth style, which allows him to sense where the weight is at any moment. He must allow time for the car to settle into each of the operations such as braking, cornering and acceleration and in order to be smooth he needs to feel that the suspension is working at the same rate that he is.

The different corner characteristics at each circuit will determine how quickly the car needs to settle into the next operation. Slow and twisty circuits will require more rapid weight transfer than fast and open circuits. If he feels that the handling is too twitchy (too stiff with rapid weight transfer) or sloppy (too soft with slow weight transfer) then he can make adjustments to the setup and/or driving style accordingly. However, because most circuits have a variety of corner types and the priority is to set the car up in favour of the most important corner (normally the one leading into the longest straight), it follows that some corners will be taken with a compromised setup. On these corners the driver needs to adjust his style to suit.

## Weight Transfer and Balance (Understeer and Oversteer)

The front-to-rear balance of the weight transferred to the outside wheels in a corner is one of the most important aspects of controlling the car at the limit of grip. Although the weight of an Formula One car is concentrated towards the rear, it is convenient to consider an example of a car, where the weight is in the middle and the front wheels are identical to the rear wheels. If the car is neutrally balanced with front and rear tyres taking their ideal share of the car's weight, when cornering, both tyres will see the same sideways stress and reach their limit of grip at the same time.

But if the front tyre takes more of the weight than the rear tyre, then it will become overloaded before the rear tyre and will begin to slide sooner. This makes the car feel as if it does not want to turn the corner, a condition known as **understeer**.

Conversely, if the rear tyre takes more of the weight than the front, then it will lose grip before the front tyre. This makes the car feel as if it wants to spin, a condition known as **oversteer**.

In theory, the combined grip of front and rear tyres, and hence the cornering speed, is greater with a neutral balance than with either understeer or oversteer, because the available grip of the rear tyre of an understeering car and the front tyre of an oversteering car are not being used to their full capability. In practice however, the understeering car is directionally more stable and easier to control than the neutrally balanced or oversteering car, although oversteering does have advantages in some circumstances.

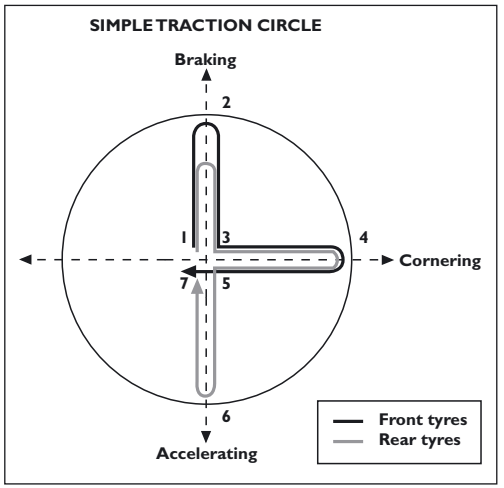
In slow speed corners, the front/rear balance is mainly determined by the relative stiffness of the front/rear suspension, including springs, anti-roll bars and dampers, with a relatively stiff suspension attracting more weight. In fast corners, the front/rear balance is mainly determined by the relative size of the front and rear wing angles, with a larger angle creating more downforce. This means, for example, that the car could be set up to oversteer in slow corners but understeer in fast corners.

***Expert Tip:***
The slow corner setup can be adjusted to give a different balance at each of the three stages of the corner. For example, in the middle of the corner, when the springs and anti-roll bars are supporting the car, it may understeer due to the stiffer setting of the front anti-roll bar. When entering the corner the car is additionally supported by the dampers and so the relative stiffnesses of these will affect the balance until the car has settled into the corner. For example, if you stiffen the rear dampers relative to the front, this would give rise to oversteer at corner entry, which changes to the balance determined by the anti-roll bars and springs, as the roll motion stops and the dampers become unloaded.

More of how setup changes affect balance can be found on pages 158-164.

## Traction Circle

So far we have considered how grip is generated by the deformation of the tyre, both for the longitudinal case of acceleration and braking and the sideways case of cornering. We can draw a simple traction circle diagram to represent these forces…




Position 1: The car is at the end of a fast straight with tyres under little stress

Position 2: The driver has applied maximum braking force and the car slows down for a corner.

Position 3: The braking has finished and the driver is about to turn into the corner.

Position 4: The driver has applied steering demand and the car is turning the corner with high sideways stress on the tyres.

Position 5: The car has exited the corner, the steering wheel has been straightened and the driver is about to accelerate along the next straight.

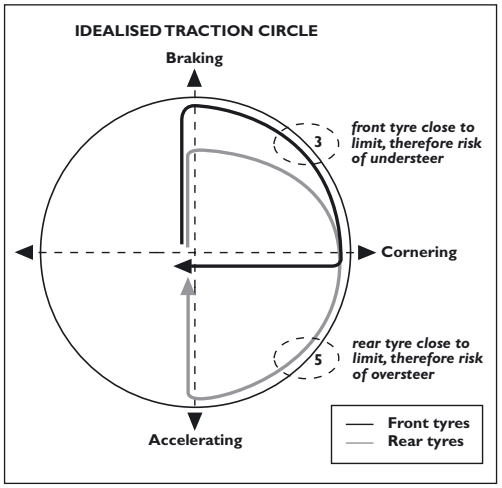
Position 6: The throttle has been applied and the rear tyres are now stressed with traction effort.

Position 7: The car has returned to full speed and once again the tyres have become relatively unloaded.

The problem with such a simple traction circle is that the tyres are not being used to their full potential at positions 3 and 5.

The solution is to overlap the end of braking with the start of turning in order to move position 3 out onto the traction circle. (See Idealised Traction Circle diagram on page 138.)

The brake must be partially released before turning commences and progressively eased as the steering wheel is turned further. The outside front wheel is the highly loaded one in this case, so watch out for the onset of excessive understeer.




Similarly, position 5 can be moved out to the traction circle by overlapping the final stages of turning with feeding in the throttle. The steering wheel must have been partially straightened before applying more throttle and progressively returned to the centre as the throttle is increased to full power. The outside rear wheel is the highly loaded one in this case, so watch out for the onset of excessive oversteer.

Grand Prix 3 has two additional data trace functions which are recorded by the data logger and these are Lateral Acceleration and Longitudinal Acceleration. Lateral Acceleration is influenced strongly by steering angle and Longitudinal Acceleration is influenced strongly by throttle and brakes. By overlaying the lateral and longitudinal acceleration traces it is possible to see how much the tyres are being used in the overlap of braking/turning and turning/acceleration.

## Understeer versus Oversteer

The aim of balancing the car with oversteer or understeer is to achieve the fastest lap-time, the fastest cornering speeds and the most reliable and consistent results. An understeering car is inherently directionally stable and relatively easy to control whereas an oversteering car is unstable, more difficult to control and will spin round to face the wrong direction without much warning.

On entry to a corner, the driver is easing off the brakes and turning the steering wheel into the corner. The weight is coming off the front wheels and moving onto the outside wheels. If the driver feels the car begin to understeer, then he can reduce speed and/or remove some steering wheel angle in order to regain front outside tyre grip and continue with turning the corner. This is a stable and manageable situation, which can be brought about by using slight understeer to the setup. If an oversteer setup is chosen, then the weight moving towards the outside rear, due to the car rolling, may overload the outside rear tyre and cause a spin. This is an unstable situation and very difficult for the driver to recover from.

***Expert Tip:***
Adjustment of the corner entry balance can be made using the dampers.

In the mid part of the corner when braking has finished and the throttle has not yet been increased, a neutral balance would ideally achieve the best cornering speed. In practice though, the driver needs to make small adjustments to the controls and wants to know that these will not suddenly induce oversteer. This is achieved again by selecting a slight understeer setup for the mid corner. In this case, the dampers are unloaded so the adjustment of mid corner balance will be made using the anti-roll bars.

On exit from a corner, the main priority is to be able to stay on the throttle to maximise the car's speed down the straight. As the throttle is gradually applied, the rear tyres become more heavily stressed and the car transforms from slight understeer to slight oversteer. This condition is only felt while the throttle is pushing the tyres close to their limit and so it is described as power oversteer. The driver can feel the limit of tyre grip during acceleration by sensing the onset of excessive power oversteer. In this condition, the steering wheel can be used to control the direction of the car towards the overrun kerb with the throttle only being reduced as a last resort.

Steering angle should be gradually reduced as the car gathers speed. It is important to steer as straight as possible in order to reduce drag from the front tyres. It is also important to keep steering wheel movements to a minimum so that there is less chance of making a mistake. The dampers will be in operation as the car rolls back to the upright position but in this case their setup, (i.e. understeer bias for corner entry), has the beneficial effect of helping to keep both rear tyres in contact with the road and thereby improving traction.

## Wet Weather Setup

Driving in wet conditions is more difficult than in the dry. This is because the tyres have much lower grip on the slippery road surface so that any problems encountered while driving the car become exaggerated.

Lower grip means that less weight can be transferred during braking, cornering and acceleration before the limit is reached. This forces the driver to brake earlier and lighter, to corner at a slower speed and to accelerate more gently out of corners. The resulting lower weight transfer means less body roll and pitch. It also means that the dry setup of springs, anti-roll bars and dampers will be overly stiff for the lighter loads and this will make the car feel twitchy. A wet setup therefore will be much softer all round for springs, anti-roll bars and slow speed dampers.

In addition, weight transfer towards the front is smaller in the wet so that the brake balance needs to be moved to the rear to avoid the front wheels from locking up under braking. Top speeds will be lower in the wet, so aerodynamic drag is less of a concern. This will let you run the car with higher wing settings for greater downforce to try to increase the available grip.

When the setup and driving style bring about understeer in the dry, the effects in the wet will be more exaggerated. This is because the grip limit for the outside front tyre will be reached sooner. Similarly when the car is required to oversteer, the outside rear tyre will also lose grip sooner. As a result, you need to be gentler with the brakes and steering wheel movements.

With the enormous horsepower of the engine being unchanged, throttle control becomes the most difficult aspect of driving in the wet. One way of helping this situation is to short shift the gears, changing up through the lower gears at lower engine speeds to avoid the maximum drive from the engine. In the higher gears, short shifting is not necessary because the aerodynamic downforce is greater and the drive on the rear wheels is less.

A major factor which influences wet weather performance is choice of tyre. There are 4 wet weather tyres available; intermediate, hard wet, soft wet and monsoon. In this order, they are capable of coping with increasing levels of wetness on the track. This is achieved by increasing the amount of tread on the tyre, which removes more water and allows the tyre to have better contact with the road surface. The problem with more tread is that the actual area of rubber in contact with the road is smaller. This reduces tyre grip in dry or drying conditions, which is not a problem in short qualifying runs because the correct tyre can be chosen, but it can easily affect the outcome of a race.

If it is already raining before the start and it looks set to continue for the majority of the race, then choose an appropriate wet setup and wet tyre type from the start and reassess the situation at each pitstop. If the weather and track conditions change, then it's up to you to judge if it is better to come in and change tyres to improve your laptimes (and suffer the lost time in making the pitstop), or stay out and wait until your next scheduled stop. You can compromise by changing your pitstop strategy mid-race and come in earlier. Fuel consumption is much less in the wet, so extended runs, and runs with lighter fuel loads are both possible tactics.

If the track is wet at the start but you are confident that the rain will stop fairly early in the race, then use a dry setup with wet tyres, but be careful: the dry brake balance will lead to difficult driving in the wet. When the dry conditions arrive, switch to dry tyres at the next suitable opportunity. There will be more grip on the drying line but remember that the tyre wear will also increase.

If the track is dry at the start but there is a fair probability that rain will arrive later, then the choice of setup is a difficult one. If you choose a wet setup and the rain comes late in the race, then you will lose out to those on a dry setup. If you go for a dry setup and the rain comes early then you will lose out to those on a wet setup. The solution is to choose one and hope for the best! In either case start the race on dry tyres and switch to wets at a suitable opportunity after the track conditions change.

Tyre choice at the start and at pitstops should suit the conditions that are current unless you think this will change very soon. Bear in mind that the track conditions may change from one side of the circuit to the other due to local variations in the rainfall. This is especially noticeable at long circuits such as Spa.

There are other hazards associated with wet weather. Bad visibility will force you to rely on your prior knowledge of the circuit layout and to watch out for familiar trackside objects. You will have to think further ahead and have a strong mental picture of where you want the car to go. The kerbs are more slippery than the road surface and should be avoided unless you want to end up on the grass. And the grass is like ice!

# The Pits

## Summary

You begin any practice or timed/qualifying session in the pit lane. From here you can choose to drive straight away with the current setup, or change any of the car settings. You can also drive into the pits at any time during practise to change your car setup.

For the Rookie Driver, the car setup will seem very complex at first. Do not worry! Accept the current setup, learn to drive fast around the circuits, then return to this section and adjust the settings. Do not adjust more than one setting at a time before trying it out in a practice session. This is when you will notice the difference in performance.

Each of the 16 circuits is unique so it's necessary to setup your Formula One car with the correct combination of Wing, Gear Ratios and Brake Balance. You are advised to study the track layouts and take note of all the track notes and summaries; these will give you an indication of the type of car setup required, but there is no substitute for experience.

Try a few laps with various settings, get an idea of how the car is running through corners and along straights. Compare your performance with other cars in practice, go into the pits and adjust a setting then try again.

A good pit strategy can make all the difference. You can decide your strategy just prior to racing or you can make your choice in the Car Setup screen. You can also change your strategy during the course of the race by entering the pits and changing the number of pitstops to go and which lap to stop next on.

If you are having problems with your car setup and are finding it difficult, for example, to drive into corners please consult the Car Setup Procedure Guide and the Car Setup Reference Guide. It may help to read the "Secrets of the Pros – Driving at the Limit" section.

# Basic Car Setup Options

## Front/Rear Wing Downforce Adjust

In general terms the wings on a Formula One car push it down on the track, creating 'downforce'. This produces better grip and less roll, giving better control in corners, but less speed on the straights because of greater aerodynamic drag.

You can adjust the amount of front and rear wing used by the car, using a scale from 1 to 20. The higher the number, the more downforce. Adjust the wings (front and rear) by clicking on the +/- buttons.

## Front/Rear Brake Balance

Grand Prix cars have a low centre of gravity, centred just behind the driver. If you brake hard at speed, the weight – and the centre of gravity – shift towards the front of the car. Therefore, brakes must be balanced to cope with the weight transfer during deceleration (slowing down).

You can change the brake balance of your car by altering the way in which the front and rear brakes are applied. Remember that in the dry, it's always best to have more brake bias at the front than at the rear.

The scale goes from 50% to 75%. The lower the figure, the more balance is applied to the rear of the car. Adjust the balance by clicking on the +/- buttons.

## Gear Ratios

You must set the gear ratios in your gearbox to suit each circuit. This is usually done by setting the 6th gear for the fastest possible speed along the longest straight and then setting the lowest gear for the slowest corner. The rest of the gears are ranged evenly between the two.

Gear ratio selection is very important. Different cogs can be fitted to the gearbox that can have a major effect on the car's acceleration, performance in bends and top speed.

- Twisty circuits with few long straights and plenty of chicanes need 'short' gearing - the cogs are closer together - for quick acceleration. The nearer the cogs are to each other, the less work the lower gear has to do to get to the higher gear.
- Circuits with predominantly long straights require 'long' gearing - the cogs are further apart - to help the car reach a higher top speed. The further away the cogs are from each other, the more work it has to do to get up to the higher gears but the faster the speed in top gear.

The gearbox has a range from 1 to 64. Select +/- to change the gear ratios.

The nearer the cogs are to each other, the less work the lower gear has to do to get to the higher gear (short gearing).

The further away the cogs are from each other the more work it has to do to get up to the higher gears but the faster the speed at the top gear (long gearing).

## Save the Car Setup

You can save the Setup you have chosen for your car when you are in the pits, by selecting **Car Setup** and then selecting **Save Setup**. From the **Save Setup Menu** enter the name by which you wish to save your car setup in the filename section and press Return.

## Advanced Car Setup

For advanced changes to your car setup select **Advanced** from the **Car Setup Menu**. The changes to your car setup that you make in **Advanced Car Setup** will affect your vehicle's suspension. For each wheel, you will be able to adjust the settings for the following:

**Advanced Level 1**

- Damper
- Spring
- Ride height
- Anti-roll bars

**Advanced Level 2**

- Packers
- Damper fast bump
- Damper fast rebound
- Damper slow bump
- Damper slow rebound
- Spring
- Ride Height
- Anti-roll bars
- Differential

**Note:** For a full explanation of the above please consult the **Car Setup Reference Charts** on pages 158-164.

## Typical Problems in Standard Setup

**Problem:** the car does not want to steer into the corners.
**Cause:** understeer.
**Remedy:** increase front wing or decrease rear wing values.
**Further Options:** bias brake balance towards rear (-).

**Problem:** the car turns too quickly into corners or spins too easily when cornering.
**Cause:** oversteer.
**Remedy:** decrease front wing or increase rear wing.
**Further Options:** bias brake balance to the front (+).

**Problem:** rival cars are much faster on long straights.
**Cause:** too much downforce/gear ratio too 'short'/not enough speed through previous corner.
**Remedy:** reduce wings front and back/space out higher gear ratios/use more throttle.
**Further Options:** check correct driving line.

**Problem:** car does not grip in corners/other cars are faster in corners.
**Cause:** too little downforce/speed too high.
**Remedy:** increase wing front and back/slow down in corner.

**Problem:** car lacks acceleration over short distances.
**Cause:** gear ratios too 'long'.
**Remedy:** close down gaps between gears.

**Problem:** car tends to spin-off when braking into corners.
**Cause:** underbraking/braking too late.
**Remedy:** move brake balance towards front/brake earlier.
**Further Options:** increase wing.

**Problem:** car is slow in corners and straights.
**Cause:** gearing.
**Remedy:** lengthen the gears.
**Further Options:** reduce wing.

**Problem:** a gradual worsening of performance.
**Cause:** tyres wearing out.
**Remedy:** fit a new set of tyres.
**Further Options:** none.

**Problem:** sudden loss of performance.
**Cause:** car damaged in accident.
**Remedy:** return to pits.
**Further Options:** check outside views for obstructions.

**Problem:** car stops suddenly.
**Cause:** no fuel.
**Remedy:** none.
**Further Options:** none.

## Data Logging Guide

The Data Logger records car performance information that can be graphed and analysed in the **Performance Analysis** Menu. This information can be useful when adjusting car setups, to compare performance over different laps and help you improve your driving technique. It will most often be of use in Practice or in Qualifying sessions and is a great way to compare your performance with that of a friend.

## Recording Data

Data recording starts when the car exits the pit lane. You will see a message on the LCD as you leave the pits: **Starting Data Logger**. A lap of logged data is registered when the car either crosses the start/finish line or comes back into the pit lane. All registered laps are available after they have been fetched from the Data Logger. You can also convert saved '**hot laps**' into '**data logged**' data (i.e. **Performance Analysis** files).

The data logger records the following information:

Speed
Steering demand
RPM
Throttle
Brake
Gear
Ride height (for each wheel)
Suspension travel (for each wheel)
Wheelspin (for each wheel)
Lateral acceleration
Longitudinal acceleration

**Speed** (See colour chart on page 114.)
The **Speed** trace enables you to analyse your speed at any point in the lap.

It can be particularly useful when comparing laps, especially when you have one split time better than the other. Used in combination with **Steer, Brake, Throttle, RPM** and **Gear**, you can discover which driving techniques produce the best results.

If you are adjusting the car setup, the **Speed** trace can show on which section of the circuit the car is fastest and show you where the fastest corners are. All of this information should help you improve your car setup and performance.

**Steering Demand**
This trace shows the position of the steering wheel and is useful for seeing the point at which you turned into a corner. The car will be faster if the steering wheel is kept as straight as possible. Upwards deviations indicate turns to the left, downward deviations show turns to the right.

**RPM**
The **RPM** shows how you made use of the engine in relation to the gears.

You can also see when rev limiting occurs by looking at when the revs are at their highest and the speed curve becomes flat instead of climbing.

**Throttle**
The throttle can be of interest when comparing laps to see which level of throttle produces the best result through a given corner.

You can also use this measure to assess the level of wheelspin. This occurs when the car is travelling at low speeds, or is in a low gear and there is a large throttle demand. If the inside rear wheel goes 'light', when travelling around a corner, then traction may be lost and you may wonder whether too much throttle was applied (as opposed to there being a need to soften the rear suspension).

One sign that a setup change has been successful is if the throttle traces of 'before' and 'after' laps demonstrate that you were able to get on the throttle earlier, or had more throttle through a bend.

Remember that the more time you spend with the throttle on full, the faster your lap will be!

**Brake**
Use the trace to compare laps and see which braking points produce the best result.

One sign that a setup change has been successful is if the brake traces of 'before' and 'after' laps demonstrate that you were able to brake later for a bend.

Remember that the less time you spend braking, the faster your lap will be.

**Gear** (See colour chart on page 114.)
The gear display shows when gear changes occur. These can sometimes explain spikes in other traces as the forces on the car change temporarily.

**Ride Heights - for each wheel** (See colour chart on page 115.)
The ride height measures the distance between the car floor and the ground.

When the car is travelling on a straight, the two rear wheel traces should be virtually identical to each other. The same applies to the two front wheel traces. Then, for example, if the car goes around a right hand corner, the left hand side of the car floor drops and the right hand side of the car floor rises. This results in the two rear traces moving apart from each other, and similarly with the front traces.

You can examine how low the car gets as it travels around the circuit to examine what adjustments, if any, you should make.

For example, if the ride height is 25mm above the ground at its lowest point (probably a fast straight) then, considering there is a 10mm plank under the floor, this means you could lower the ride height by 15mm before the plank would start to rub on the ground. This is a slight simplification, but the principle is important. The plank is located in the middle of the car and not at the front. This means that the plank may be off the ground if the front is less than 10mm off the ground. This is due to the pitch angle of the car (i.e. the pitch angle may be higher at the back of the car than at the front). The same is true for roll angle. One side of the car can dip lower than 10mm. Ultimately inspection of the plank will produce the final verdict. However you can make sensible judgements using the trace.

**Remember:** When the car is moving, the lower the ride height, the greater the undercar downforce. Downforce will tend to be biased towards the front of the car if the front ride height is lowered much more than the rear and vice-versa.

**Suspension Travel - for each wheel** (See colour chart on page 115.)
Useful in **Car Setup** Advanced Level 2 this trace helps to identify how many **packers** you need to keep the plank off the ground. The **Performance Analysis** trace actually represents suspension movement relative to any packers you have fitted. This means that the trace relative to the bottom of the chart actually shows the available remaining travel of the suspension. Therefore, if you find the point on the circuit with the lowest ride height (using the ride height trace) and then check the available suspension travel at the same part of the lap, this will show you the depth of **additional** packers required to remove the remaining suspension travel. So, in effect, at that part of the lap the car is on the **bump rubbers**.

Once those packers have been inserted, if you reduce the ride height by, for example, 3mm, then an additional 3mm of packing is required to keep the plank off the ground at the worst part of the lap (i.e. where the ride height is at its lowest). Inspection of the plank indicates the actual wear, but the traces allow you to make the best judgements.

**Wheelspin - for each wheel** (See colour chart on page 116.)
The trace shows the wheel circumference velocity. If the wheel is gripping without slipping, then this velocity is the road speed of the wheel. You can see how, when the car goes around a bend, the outside wheels have further to go and so have a higher speed than the inside wheels. Wheelspin is shown on the trace as sharp upward spikes. Wheels locking due to braking or scrub, are shown as a sharp downward spike. This trace can be useful when assessing traction on a bumpy circuit, or in corners generally. It may indicate a need to soften the suspension at the rear of the car.

## Standard Car Setup Procedure

You can improve your chances of qualifying on pole position by looking for the optimum set up. The key is to use a systematic approach. Check out the list of common problems you're likely to encounter when using the Standard Setup (see page 144). Then using the first part of the step-by-step guide to setting up the car that follows, you should start to see an improvement in your lap times.

**Note:** You may need to consult the **Glossary** (at the back of this manual) to gain a clearer understanding of some of the technical terms used in this section.

## Making step-by-step Setup Changes: Basic Principles

Setting up the car is an exercise in compromise - everything affects everything else! Remember, if you try something and it doesn't work, you still have a positive result because, if nothing else, you can disregard that particular solution by a process of elimination.

**Wing Angles**
***Option 1. Select an initial set-up with slight understeer.***
Grand Prix 3 provides you with an initial set-up with slight understeer for each track.

Ask yourself: 'does the circuit have high, low or medium downforce priority?'

This depends on the characteristics of a given circuit. For example, Monaco needs high downforce because of the many corners and few straights. Hockenheim requires low downforce because of the long straights and few corners, while Suzuka, with its mix of long corners and fast straights calls for medium downforce (see the Circuits section for a full list of tracks and their characteristics).

Examine the track layout diagrams and try out a few laps to get a feel for each circuit.

*If you decide on low downforce, choose...*

***Option 2a. Reduce the rear wing setting to reach high speeds on the straights.***
If you reduce the rear wing setting by a large amount, reduce the front wing setting by an equal amount to avoid large balance changes. Eventually, if you reduce the rear wing too much, a resulting lack of cornering performance will outweigh any straight line speed advantage. This will become apparent by trial and error and when your lap times slow down. Remember, too, that the car's top speed will have increased, so you will need to brake earlier for corners.

Use the **Speed** trace on the **Performance Analysis Graph** to determine the fastest straight on the circuit. Use the speedometer to determine the fastest speed on the straight. If the rev limit is reached in 6th gear then lengthen the gear ratio (see Option 4a). If the car oversteers in fast bends then lower the front wing (see Option 3).

*If you decide on high downforce, choose...*

***Option 2b. Increase the rear wing setting to reach high speeds in corners.***
Use the **Speed** trace on the **Performance Analysis Graph** to compare your speeds through the corners with different wing settings. Also use the speedometer to determine the fastest speeds through the corners. If you have no acceleration in 6th gear, then shorten the gear ratio (see Option 4b). If the car understeers in fast bends, then increase the front wing setting (see Option 3). Eventually a lack of straight line performance will outweigh any cornering speed advantage. Again, this will become apparent by trial and error and when your lap times slow down.

Setting up the car is an exercise in compromise - everything affects everything else! Remember, if you try something and it doesn't work, you still have a positive result because, if nothing else, you can disregard that particular solution by a process of elimination.

*If you decide on medium downforce, choose...*

***Option 2c. Adjust the rear wing setting to find the best overall compromise between high speeds on straights and in corners.***
Do this along with adjustments to the front wing and the gear ratios (see Options 3 and 4). Use the **Speed** trace on the **Performance Analysis Graph** to study the circuit. Use the split times, to compare laps with differing car set-ups. The best adjustment is found by trial and error and by comparing your lap times.

***Option 3. Adjust the front wing setting to achieve balance in high speed corners.***
This adjustment should be made in tandem with rear wing adjustments (see Options 2a, 2b or 2c).

Unlike the body, wheels and rear wing, the front wings don't add to aerodynamic drag because of the nature of the airflow over a Formula One car. As a result, the front wing is used to control the aerodynamic balance of the car. However, more front wing can interfere with airflow over the rear wing, resulting in reduced rear downforce. Remember that compensating for this with more rear wing will increase drag, or that compensating with more steering demand will increase tyre wear.

**Gear Ratios**

***Option 4a. Adjust the gear ratios if reaching the rev limit in 6th gear.***
In these circumstances, lengthen the 6th gear ratio.

***Option 4b. Adjust the gear ratios if there is a lack of acceleration in 6th gear.***
If this happens, shorten the 6th gear ratio.

In both cases, use the **Speed** trace on the **Performance Analysis Graph** to determine the fastest straight on the circuit. Use the speedometer to determine the fastest speed on the straight. It may be necessary to adjust 3rd, 4th and 5th gears to prevent a large gap in the gear ratios. This adjustment should be made in tandem with rear wing adjustments (see Options 2a, 2b or 2c).

**Brake Balance**

***Option 5. Adjust the brake balance to avoid understeer or oversteer when braking at turn-in.***
If the car understeers when braking, adjust brake balance towards the rear of the car. If the car oversteers when braking, adjust brake balance towards the front of the car. Both of the above conditions can result in braking distances on the straights being too long. Keep making adjustments until you achieve the preferred balance.

## Car Setup Advanced Level 1

Advanced Level 1 introduces the setup options of springs, dampers, ride height and anti-roll bars. In general, the stiffer a wheel's suspension is, compared to the other wheels, the more load it will attract as the car moves around the track. The more heavily loaded a tyre is, the less efficient its grip becomes. You'll see that a stiff front leads to understeer, while a stiff rear leads to oversteer.

When the car is travelling in a straight line, only the springs support the weight of the car. In the middle of a long corner, as the car leans, the anti-roll bars also help to support the car, controlling the extent to which the car will be allowed to lean. Dampers also help support the car, but their main job is to dissipate any energy stored in the springs as they compress and expand. Generally stiffer springs require more damping. There'll be more about dampers in Advanced Level 2.

Dampers are necessary to dissipate any energy that is stored in the springs as they compress and expand (e.g. when going over bumps). Generally stiffer springs require more damping. Usually, the setup on the left and right side of the car will be the same (giving a condition of lateral symmetry). However, on certain tracks that have a bias in the number of left or right hand corners, you could try different setup values on the left and right sides of the car (lateral asymmetry).

Ride height – the distance between the road and the bottom of the car - is strictly controlled in Formula One. Since 1994, rules require that the teams fit a 10mm thick wooden plank to the underside of the car in an attempt to slow cars down and as a means of checking that cars are not running closer to the ground than regulations permit. No more than 1mm plank wear (due to rubbing on the ground) is allowed during the race. The Advanced Level 1 menu allows you to inspect the plank, but in Grand Prix 3, rather than being disqualified for excessive plank wear, you will find that there is an extra drag penalty (once the legal limit has been exceeded) as the plank runs along the ground.

Take a look at how these variables affect the performance of the car…

## Making Setup changes: Advanced Level 1

### Springs

***Option 6a. Fit softer springs to improve your performance over bumps.***

Because some circuits have more bumps than others, suitable spring adjustments have to be made to smooth out the ride over bumps. Only driving round the tracks will reveal just how much more bumpy some tracks are than others. Make small adjustments in tandem with Options 8 and 11.

If the car understeers on bumps then soften the front springs. If the car oversteers on bumps, soften the rear springs. If the car loses traction on bumps, then soften the rear springs. Use the **Wheelspin** trace, on the **Performance Analysis Graph**, to determine any loss of traction. If softening the springs makes the plank rub along the ground, you may need to increase the ride height (see Option 7). Use the **Ride Height** trace on the **Performance Analysis Graph** to determine any ride height variations. Continue making adjustments until these become smoother. Maximum suspension travel will now have been finalised.

Softer springs will lead to more weight being shifted to the front wheels during braking. This leads to a loss of braking power due to the front tyres locking. Therefore, you will need to shift the brake balance, by a small amount, towards the rear of the car.

***Option 6b. Stiffen the springs on a smooth circuit to allow a reduction in ride height.***

On a relatively smooth circuit, you should stiffen the springs to facilitate a reduction in ride height because…

- Stiffer springs mean less suspension travel.
- Smaller suspension travel allows a reduction in ride height.
- Reducing the ride height will increase undercar downforce.

Be careful not to lose traction by stiffening the rear too much. Compare the **Speed** trace on the **Performance Analysis Graph** to determine where loss of acceleration occurs.

### Ride Height

***Option 7. Ride height adjustment.***

Ride height values are inspected when the car is stationary. When the car is in motion, the ride height at the rear will be higher than at the front ride, owing to the car's design. Downforce, weight transfer and bumps will vary the overall ride height. It must be high enough to keep the plank off the ground when the springs compress, yet as low as possible to increase undercar downforce. Ride height settings will vary depending on spring settings, needing to be higher if the springs are softer.

**Note:** Downforce gained from lower ride height has no drag penalty. Therefore, reducing ride height all round is better than increasing wing settings. This needs to be carefully judged as this will increase plank wear if the car gets too low. Use the **Ride Height** trace on the **Performance Analysis Graph** to see what ride height you are achieving around the circuit.

### Dampers

***Option 8. Adjust dampers to improve performance over bumps.***

As well as adjusting springs, corresponding changes must be made to the dampers to help keep the tyres in contact with the track (see Option 6a). If the car understeers on bumps, soften the front dampers. If the car oversteers on bumps, soften the rear dampers. Continue to make adjustments until the car ceases to skate or step out of line. If you are losing traction on bumps, soften the rear dampers. Making the dampers too soft will cause sloppy handling.

**Anti-Roll Bars**

***Option 9. Adjust anti-roll bars for balance in slow and medium corners.***

Anti-roll bars only come into play when the car has 'roll angle' (for example when leaning in a bend). Pick a long corner to ensure damper effects have finished. If the car understeers in corners, soften the front anti-roll bars, or stiffen the rear anti-roll bars. If the car oversteers in corners, stiffen the front anti-roll bars, or soften the rear anti-roll bars. Keep making adjustments until the preferred balance has been achieved. You may have to adjust the front wing since the anti-roll bars also work in fast corners (see Option 3).

Softer anti-roll bar settings all round will improve cornering grip/traction and reduce tyre wear. Stiffer settings all round will improve sloppy handling and allow lower ride heights without the plank rubbing on one side.

**Tyre Wear**

***Option 10. Soften the suspension all round, if necessary, to prevent excessive tyre wear.***

Use the **tyre wear** display on the **Performance Analysis Graph** to assess the amount of tyre wear.

## Car Setup Advanced Level 2

In Advanced Level 1, we saw that springs support the car on the straights and that they are helped by anti-roll bars in corners. Besides absorbing energy from the springs, dampers also help to support the car, but only when the car is actually rolling. As a result, the support from the dampers is only noticeable at the entry to and exit from corners. Advanced Level 2 lets you fine-tune the 4-way adjustable **dampers** and **packers**. This is useful if the driver wishes to have a different balance at the turn-in to, or exit from a corner than the balance determined for the apex of the corner by the spring and anti-roll bar stiffness. The transient effect of the dampers will last longer if their settings are stiffer.

As you may have found in Advanced Level 1, the only way to keep the plank off the ground when the springs are compressed under downforce is to raise the ride height of the car, losing undercar downforce in the process.

Another disadvantage is that the car rolls and pitches more as a result of the higher centre of gravity, becoming less responsive to sudden changes in direction or sudden braking. The balance of the car is also affected due to an exaggeration of any front/rear bias in the setup. Advanced Level 2 will allow you to overcome these difficulties.

## Making Setup Changes: Advanced Level 2

**4-Way Adjustable Dampers**

The dampers on a Formula One car are designed to have different stiffnesses when the wheel is moving up and towards the body (**bump**) and when it is moving down and away from the body (**rebound**). The bump direction, as its name suggests is meant principally to cope with bumpy road surfaces. The rebound direction is used to control car balance at entry to and exit from corners. Rebound forces are typically two or three times the strength of bump forces of the same setting. As a car rolls into a corner, the outside wheels go into bump and the inside wheels go into rebound, the rebound tending to provide the dominant damping. Both the bump and rebound directions have high and low speed adjustments. The low speed adjustment sets the car handling characteristic of the damper and the high speed adjustment allows further adjustment of the damper's effect over surface bumps.

***Option 11a. Soften bump dampers to improve performance over bumps.***

Bump damper adjustments are made to help keep the tyres on the track. Make small adjustments in tandem with adjustment of the springs (see Option 6a). If the car understeers on bumps, soften the front bump dampers. If the car oversteers on bumps, soften the rear bump dampers. Set the slow bump first and then the fast bump. Continue to make adjustments until the car ceases to skate or step out. If losing traction on bumps, soften the rear dampers. Making the dampers too soft will cause sloppy handling.

***Option 11b. Adjust the rebound dampers to obtain desired balance during cornering.***

Rebound damper settings affect car balance during cornering at the entry to and exit from a corner. If the car understeers through a corner, soften the front rebound damper (or stiffen the rear). If the car oversteers in a corner, soften the rear rebound damper (or stiffen the front). Be careful not to lose traction by stiffening the rear too much. Compare the **Speed** trace on the **Performance Analysis Graph** to determine areas with loss of acceleration. Use the **Wheelspin** trace to see where loss of traction occurs. Set the slow rebound first and then the fast rebound.

**Packers**

Advanced Level 2 makes it possible to run the car on a set of bump stops (or bump rubbers) to limit the downward movement of the body: for a given spring stiffness, the ride height can be substantially reduced to gain downforce, without the plank rubbing on the ground. The method adopted for controlling at what ride height the bump stops come into play is to fit packers (spacers) into the spring/damper unit so that the bump rubbers are reached prematurely and to limit suspension travel.

Lowering the car will result in less roll and pitch as the centre of gravity is lowered. That will affect cornering and brake balance, which must be adjusted afterwards.

*Do you wish to run for periods on the bump rubbers?*

As we have seen, running on bump rubbers allows a reduction in ride height, but it can also allow softer springs to be used for bumpy tracks. But bump rubber suspensions only become usable at high speeds. When in use, the bump rubbers are the only active part of the suspension and are very much stiffer than springs, bars and dampers. However, the additional stiffness does not generally affect handling because the tyres are so heavily loaded by the time the bump rubbers come into play.

**Answer:** Yes - to intentionally use the bump rubbers as suspension.

***Option 12a. Fit packers to facilitate a reduction in ride height.***
A reduction in ride height does not affect suspension travel. Consequently, for the same spring rate, the car may ground at high speeds. Use the **Speed** trace on the **Performance Analysis Graph** to determine the fastest straight on the circuit. Start by lowering the ride height until the car grounds at high speed (use the plank wear display to verify that grounding has occurred). Then, fit packers to restrict the suspension travel and keep the car off the ground. You can use the **Suspension Travel** trace on the **Performance Analysis Graph** to determine when the bump rubbers are in play and how many packers to use (see the **Data Logging Guide**). Carry on until the suspension travel is too restricted (in corners or over bumps). If the track is bumpy, the ride height may end up relatively high.

**Answer:** Yes - to intentionally use the bump rubbers as suspension but not in high speed corners.

***Option 12b. Adjust the ride height to prevent running on bump rubbers in high speed corners.***
When the car slows down to enter a corner, the ride height increases. This increase will ideally bring the car off the bump rubbers. If not, then increase the ride height and remove the redundant packers. Use the **Suspension Travel** trace on the **Performance Analysis Graph** to determine how many packers to fit (see Data Logging Guide). Finish the adjustment when you're no longer running on bump rubbers.

**Answer:** No - to intentionally avoid running on bump rubbers.

***Option 12c. Increase the ride height to prevent excessive use of bump rubbers.***
As above, but increase the ride height further and remove the redundant packers. Use the **Suspension Travel** trace on the **Performance Analysis Graph** to determine the frequency of bump stop contact. Finish adjusting when you are no longer running on the bump rubbers. If a new ride height is excessive, consider fitting stiffer springs.

**Differential**
The differential connects the output shaft of the gearbox to the two drive-shafts which power the rear wheels . The differential allows the outside wheel in a corner to travel faster than the inside wheel while still transmitting power from the gearbox.

This freedom of relative movement between the two shafts can be a disadvantage when on the limit of grip: one wheel can lose traction while the other can gain traction and start to 'spin up'. This can be countered by using a differential with some added coupling between the two shafts. The stiffness of the coupling can be adjusted to suit the type of circuit and your driving style. A higher stiffness coupling will improve traction out of corners, especially in the wet. This is because the outside wheel will be receiving more of the engine's power and the inside wheel will have reduced wheel spin due to the coupling.

On the minus side however, too high a stiffness coupling will reduce the ability of the differential to allow the outer wheel to go at a different speed to the inside wheel on corners, thereby reducing the steering response and tending to make the car understeer, particularly in tight corners.

## Car Setup Reference Charts

***Springs: (Set to maximise traction, cornering grip and vertical car movement).***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Stiffen the front | More understeer in corners | Additional traction, especially when exiting corners.<br>Less cornering grip on bumpy surfaces.<br>Additional front tyre wear.<br>Handling more responsive.<br>Less drive under braking. |
| Stiffen the rear | More oversteer in corners | Traction loss, especially when exiting corners.<br>Less cornering and traction grip on bumpy surfaces.<br>Additional rear tyre wear.<br>Handling more responsive. |
| Stiffen all round | | Can achieve lower ride heights and so more downforce.<br>Less cornering and traction grip on bumpy surfaces.<br>Additional tyre wear all round.<br>Handling more responsive. |
| Soften the front | More oversteer in corners | Traction loss, especially when exiting corners.<br>Additional cornering grip on bumpy surfaces.<br>Less front tyre wear.<br>Handling less responsive.<br>May be forced to increase front ride height.<br>More drive under braking. |
| Soften the rear | More understeer in corner | Additional traction, especially when exiting corners.<br>Additional cornering grip on bumpy surfaces.<br>Less rear tyre wear.<br>Handling less responsive.<br>May be forced to increase rear ride height. |
| Soften all round | | Improved traction and cornering grip on bumpy surfaces.<br>Additional cornering grip on bumpy surfaces.<br>Reduced tyre wear all round.<br>Handling less responsive.<br>May be forced to increase ride height. |

***Ride height (Static): Set to maximise downforce and minimise plank wear.***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Reduce at front | More oversteer in fast corners because of more front under-car downforce | More front-biased undercar downforce.<br>More chance of plank wear at front.<br>May restrict use of soft front springs on bumpy surfaces (Level 1).<br>May force the use of additional front packers (Level 2). |
| Reduce at rear | More understeer in fast corners because of more rear under-car downforce | More rear biased undercar downforce.<br>Increase or decrease in total undercar downforce.<br>More chance of plank wear at rear.<br>May restrict use of soft rear springs on bumpy surfaces or for extra traction (Level 1).<br>May force the use of additional rear packers (level 2). |
| Reduce all round | | More chance of plank wear all round.<br>May restrict use of soft springs all round (Level 1).<br>May force the use of additional packers all round (level 2).<br>More undercar downforce all round.<br>NB: Downforce gained from lower ride height has no drag penalty therefore reducing ride height all round is more desirable than increasing wing settings. |
| Increase at front | More understeer in fast corners because of less front under-car downforce | Less front biased undercar downforce.<br>Less chance of plank wear at front.<br>May allow use of softer springs to improve performance over bumps.<br>May allow removal of front packers to increase suspension travel over bumps (Level 2). |
| Increase at rear | More oversteer in fast corners because of less rear under-car downforce | Less rear biased undercar downforce.<br>Increase or decrease in total undercar downforce.<br>Less chance of plank wear at rear.<br>May allow use of softer springs to improve performance over bumps and traction out of corners.<br>May allow removal of rear packers to increase suspension travel over bumps (Level 2). |
| Increase all round | | Less chance of plank wear all round.<br>May allow use of softer springs to improve performance over bumps.<br>May allow removal of packers all round to increase suspension travel over bumps (Level 2).<br>Less undercar downforce all round. |

***Anti-roll bars: Only effective when car is leaning in the corners.***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Stiffen at front | More understeer in corners | Less cornering grip on bumpy surfaces.<br>Additional front tyre wear.<br>Handling more responsive. |
| Stiffen at rear | More oversteer in corners | Traction loss, especially when exiting corners.<br>Less cornering grip on bumpy surfaces.<br>Additional rear tyre wear.<br>Handling more responsive. |
| Stiffen, front and rear | | Less cornering and traction grip on bumpy surfaces.<br>Additional tyre wear all round.<br>Handling more responsive. |
| Soften at front | More oversteer in corners | Gain cornering grip on bumpy surfaces.<br>Reduced front tyre wear.<br>Handling less responsive. |
| Soften at rear | More understeer in corners | Gain cornering grip on bumpy surfaces.<br>Traction gain, especially when exiting corners.<br>Reduced rear tyre wear.<br>Handling less responsive. |
| Soften, front and rear | | May need increased ride height or extra packers to avoid plank wear at the sides.<br>Gain cornering and traction grip on bumpy surfaces.<br>Reduced tyre wear.<br>Handling less responsive. |

***Wings: Only effective when car has forward velocity...***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Increase at front | More oversteer in fast corners | Increase aerodynamic downforce on front wheels.<br>No additional aerodynamic drag, but may reduce effectiveness of rear wing.<br>Increase cornering speed in fast corners.<br>May need increased front ride height or extra front packers to avoid plank wear (Level 2).<br>May need to stiffen front springs to avoid plank wear. |

***...Wings: Only effective when car has forward velocity.***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Increase at rear | More understeer in fast corners | Increase aerodynamic downforce on rear wheels.<br>Increase aerodynamic drag.<br>Reduced top speed on straights.<br>May need to shorten 6th gear ratio.<br>Increase cornering speed in fast corners.<br>May need increased rear ride height or extra rear packers to avoid plank wear (Level 2).<br>May need to stiffen rear springs to avoid plank wear. |
| Increase, front and rear | | Increase aerodynamic downforce on wheels all round.<br>Increase aerodynamic drag.<br>Reduced top speed on straights.<br>May need to shorten 6th gear ratio.<br>Increase cornering speed in fast corners.<br>May need increased ride height or extra packers to avoid plank wear (Level 2).<br>May need to stiffen springs to avoid plank wear. |
| Decrease at front | | More understeer in fast corners.<br>Decrease aerodynamic downforce on front wheels.<br>No reduction in aerodynamic drag, but may increase effectiveness of rear wing.<br>Decrease cornering speed in fast corners.<br>May allow decreased front ride height or removal of packers for extra front undercar downforce (Level 2).<br>May allow softer front springs for more cornering grip on bumpy surfaces. |
| Decrease at rear | More oversteer in fast corners | Decrease aerodynamic downforce on rear wheels.<br>Decrease aerodynamic drag.<br>Increase top speed on straights.<br>May need to lengthen 6th gear ratio.<br>Decrease cornering speed in fast corners.<br>May allow decreased rear ride height or removal of packers for extra rear undercar downforce (Level 2).<br>May allow softer rear springs for more cornering and traction grip on bumpy surfaces. |
| Decrease front and rear | | Decrease aerodynamic downforce on wheels all round.<br>Decrease aerodynamic drag.<br>Increase top speed on straights.<br>May need to lengthen 6th gear ratio.<br>Decrease cornering speed in fast corners.<br>May allow decreased ride height or removal of packers for extra undercar downforce (Level 2).<br>May allow softer springs all round for more cornering and traction grip on bumpy surfaces. |

***Gear Ratios.***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Lengthen 6th gear | | Decrease acceleration in 6th gear.<br>May need to change other gears to prevent large gaps in ratios. |
| Shorten 6th gear | | May find rev. limiting in 6th gear.<br>May need to change other gears to prevent too much overlap in ratios. |

***Packers: Used to vary the limit downward suspension travel (Level 2)...***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Increase number | More understeer | Increase front ride height at front.<br>Less front-biased undercar downforce.<br>Run on front bump rubbers more often.<br>May restrict benefit of soft front springs on bumpy surfaces.<br>Allows front ride height to be reduced with no extra plank wear. |
| Increase number | More oversteer | Increase rear ride height at rear.<br>Less rear-biased undercar downforce.<br>Increase or decrease in total undercar downforce.<br>Run on rear bump rubbers more often.<br>May restrict benefit of soft rear springs over bumpy surfaces.<br>Allows rear ride height to be reduced with no extra plank wear. |
| Increase number front and rear | Increase ride height all round | Less undercar downforce.<br>Run on bump rubbers more often.<br>May restrict benefit of soft springs on bumpy surfaces.<br>Allows ride height to be reduced with no extra plank wear. |
| Reduce number at front | More oversteer | Reduce front ride height.<br>More front-biased undercar downforce.<br>May need to stiffen front springs to avoid plank wear.<br>May need increased front ride height to avoid plank wear.<br>Allows extra benefit of soft front springs over bumpy surfaces. |

***...Packers: Used to vary the limit downward suspension travel (Level 2).***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Reduce number at rear | More understeer | Reduce rear ride height.<br>More rear biased under car downforce.<br>Increase or decrease in total undercar downforce.<br>May need to stiffen rear springs to avoid plank wear.<br>May need increased rear ride height to avoid plank wear.<br>Allows extra benefit of soft rear springs over bumpy surfaces. |
| Reduce number front and rear | | Reduce ride height all round.<br>More undercar downforce.<br>May need to stiffen springs to avoid plank wear.<br>May need increased ride height to avoid plank wear.<br>Allows extra benefit of soft springs over bumpy surfaces. |

***Bump Dampers: Dissipates spring energy and is mostly effective when car is on bumpy surfaces.***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Stiffen at front | More understeer in bumpy corners | Additional front tyre wear. |
| Stiffen at rear | More oversteer in bumpy corners | Less traction grip on bumpy surfaces.<br>Additional rear tyre wear. |
| Stiffen, front and rear | Less traction grip on bumpy surfaces | Additional tyre wear all round.<br>Twitchy handling over bumps. |
| Soften at front | More oversteer | Reduced front tyre wear in bumpy corners. |
| Soften at rear | More understeer in bumpy corners | More traction grip on bumpy surfaces.<br>Reduced rear tyre wear. |
| Soften, front and rear | More traction grip on bumpy surfaces | Reduced tyre wear all round. |

***Rebound Dampers: Dissipates spring energy and dominates over bump dampers when car is rolling or pitching.***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Stiffen at front | More understeer during turn entry and exit | Additional front tyre wear. |
| Stiffen at rear | More oversteer during turn entry and exit | Less traction grip during turn exit.<br>Additional rear tyre wear. |
| Stiffen, front and rear | Tendency towards more responsive handling | Body motions slowed down; pitch and roll.<br>Body roll takes longer; full anti-roll bar forces delayed.<br>Quicker load transfer - corner balance determined more by damper stiffnesses.<br>Becomes difficult to differentiate from springs that are too stiff. |
| Soften at front | More oversteer during turn entry and exit | Reduced front tyre wear. |
| Soften at rear | More understeer during turn entry and exit | More traction grip during turn exit.<br>Reduced rear tyre wear. |
| Soften, front and rear | Tendency towards unresponsive handling | Body motions speeded up; pitch and roll.<br>Body roll completed sooner; full anti-roll bar forces sooner.<br>Slower load transfer - corner balance determined more by springs and bars. |

***Brake Balance: Only effective when braking.***

| Action | Effect on Car Balance | Other effects |
|---|---|---|
| Move towards the front | Understeer under braking at turn-in | Fronts can lock-up giving lower overall brake force.<br>Braking distance lengthened. |
| Move towards the rear | Oversteer under braking at turn-in | Rears can lock-up giving lower overall brake force.<br>Braking distance lengthened. |

## Data Logging Guide

**Lateral Acceleration** (See colour chart on page 116.)

This trace is a record of the sideways acceleration acting on the car and is measured in multiples of the force of gravity (g)s. Lateral acceleration is mainly influenced by steering angle so that on a straight the value is zero and in corners the value is either positive for a right hand corner, or negative for a left hand corner. The trace can be used to determine the amount of downforce being achieved in a corner. It is also possible to determine how close you are to the idealised traction circle by overlaying the lateral and longitudinal acceleration traces and assessing how much the tyres are being used in the overlaps of braking/turning and turning/acceleration. The larger the values are in the overlap the closer you are to the idealised traction circle. (See "The Secrets of the Pros – Driving at the Limit".) It may also be useful to plot the steering trace at the same time as lateral and longitudinal acceleration.

**Longitudinal Acceleration** (See colour chart on page 116.)

This trace records the forward and backwards acceleration acting on the car and is measured in multiples of the force of gravity (g)s. Longitudinal acceleration is mainly influenced by throttle and brakes. The value of longitudinal acceleration is positive when the throttle is applied and negative during braking. The trace can help to determine if the best brake balance is being used. It is also possible to determine how close you are to the idealised traction circle by overlaying the lateral and longitudinal acceleration traces and assessing how much the tyres are being used in the overlaps of braking/turning and turning/acceleration. The larger the values are in the overlap the closer you are to the idealised traction circle. (See "The Secrets of the Pros – Driving at the Limit".) It may also be useful to plot the steering trace at the same time as lateral and longitudinal acceleration.

## GLOSSARY

| | |
|---|---|
| **Active Suspension** | Software controlled method of automatically pitching the suspension for specific bends. |
| **Aerodynamics** | The force that comes into play when the car has picked up speed. Wings mounted upside down give negative lift and hold the car down. |
| **Angle of Slip** | The angle between the direction of the wheels (front and rear) and the direction of travel. |
| **Anti-Roll Bar** | Forms part of the suspension assembly and helps to support the car when cornering, by resisting the tendency for the body to roll. |
| **Apex or Clipping Point** | The nearest point a car gets to the inside of a curve in an ideal racing line. |
| **Balance** | The degree to which a car has understeer or oversteer in a corner. |
| **Brake Balance** | The bias of braking power between the front and rear tyres. |
| **Braking Distance** | The distance between the point where braking starts and ends. |
| **Bump Damper** | An energy absorbing device, fitted between the wheel and car body, which resists upward movement by the wheel. |
| **Camber** | Slight upward curve to the centre of race track. |
| **Camber Angle** | Camber angle is designed to make a tyre work as effectively as possible when a car is going through a corner. Negative camber is applied so that when fully stressed a tyre will be as close to perpendicular as possible. |
| **Castor Angle** | Castor gives greater responsiveness and stability to the front wheels. The larger the castor angle, the heavier the steering and more stable the front end. |
| **Centre of Gravity** | The position within the car around which all the mass is gathered. The lower the centre of gravity, the greater the downforce. |
| **Chicane** | A sharp 'S' bend that reduces speeds by forcing drivers to drive through in single file. |
| **Damper** | Forms part of the suspension system and absorbs the energy that is produced when the spring is compressing or extending. Damper force increases with speed (heave, roll and pitch velocity). |
| **Downforce** | The force which pushes the car downward allowing the vehicle to 'grip' the road surface. |
| **Drag** | Resistance to forward motion of the car. Can be caused by aerodynamic resistance or mechanical resistance. |
| **Electronic Control Box** | Contains, among other information, the Driver aids software and settings, (traction control, active suspension etc.) The Electronic Control Boxes are frequently inspected by the FIA following a race to test for illegal driving aids being used by constructors. |

**FIA** Federation Internationale de l'Automobile. The motor racing sport's governing body.

**Getting a Tow** Another term for 'slipstreaming', gaining speed by sitting behind a rival car prior to overtaking.

**Ground Effect** Now outlawed by FIA but in the period 1980 to 1982 virtually all cars were built in this way. The car had an underbody shaped like an inverted wing which almost sucked the car on to the track and gave tremendous grip.

**Increase the Lock** For some tight hairpins, such as Loews in Monaco, the car steering lock is increased to take the bends faster albeit to the detriment of the tyres.

**Logged data chart** Graphical method of displaying information which has been recorded during a lap. Also known as Performance Analysis.

**Outbrake** To brake very late into a corner when dicing with a rival car.

**Oversteer** Oversteer is characterised by the rear end of the car losing grip, giving the car a tendency to spin.

**Packers** Packers form part of the suspension assembly and adjust the position at which the bump rubbers become loaded.

**Paddock** The parking area behind the pits where all the equipment, trucks and spare cars are kept by the teams.

**Parc Fermé** The area where cars are isolated after a race finishes. Only officials may touch the vehicles for an hour after the finish.

Some engines may be 'sealed' for later inspection.

**Plank, The** A 10mm plank running down the length of the underside of all Formula One cars. This addition following the '94 Imola Grand Prix, means that the ride height of the car must be sufficient to avoid the plank 'grounding'. This results in less downforce and therefore lower speeds, particularly round dangerous corners.

**Points System** The points awarded for finishing a Grand Prix are as follows: 1st = 10 points, 2nd = 6 points, 3rd = 4 points, 4th = 3 points, 5th = 2 points and 6th = 1 point.

**Rebound damper** An energy absorbing device fitted between wheel and car body which resists downward movement by the wheel.

**Refuelling** Refuelling is an essential part of race strategy. The less fuel a car holds, the faster it can travel, but this will result in the need for more time-consuming pit stops to refuel.

**Responsive handling** The car responds quickly to steering, acceleration and braking inputs from the driver, allowing very accurate manoeuvres.

**Rev limiter** A device which limits the RPM of the engine to a preset value. This is used in the pit lane to keep the car speed within the pit lane speed limit.

**Ride height** The height of the car floor, above the ground, measured from the wheels.

**Rumble Strip** The bobbly, coloured strip on the edge of the track which serves as a warning to the driver to transgress no further.

**Run Off Track** A stretch of track close to a dangerous section of the circuit, that gives the driver an escape route if things go wrong, e.g. the driver loses control of the car.

**Shunt** A knock from the car behind you.

**Skidblock** See Plank, The.

**Springs** The springs form part of the suspension assembly and are the main means of supporting the car.

**Stewards Decision** In the event of a breach of FIA rules, a stewards enquiry is normally called. The party in question is called before the 'Steward of the Meeting' who issues a 'Stewards Decision' with accompanying fine/disciplinary action, if relevant.

**Super Licence** A licence required by all drivers, competitors and officials participating in a Formula One Championship.

**Suspension travel** The distance through which the moving parts of the suspension travel in relation to the fixed parts.

**Telemetry System** Multi-function system that measures all aspects of car and driver performance.

**Tifosi** Italian Fans.

**Time Penalties** Should the stewards choose to impose a time penalty the offending driver must, in normal circumstances, proceed to the designated area and remain there until a specified time period has passed, after which the driver may rejoin the race.

**Torque** The amount of thrust driving through from the engine to the wheels.

**Traction** The ability of the rear tyres to grip the track surface and cause the car to accelerate.

**Traction Control** An electronically-controlled clutch allowing the car to accelerate as fast as possible without losing traction and the wheels spinning. This system was outlawed in the '94 season.

**Turn-in** The point on the track where the driver starts to steer the car into a corner.

**Tyre Blankets** Special electric blankets placed over tyres just before a start to keep them up to racing temperature.

**Understeer** Understeer is characterised by the front end of the car losing grip. This gives the rear of the car a tendency to carry straight on, through a corner.

**Wings** Devices fitted to the front and rear of the car which produce aero-dynamic downforce. This allows faster cornering speeds. The rear wing also produces significant aerodynamic drag.

# CUSTOMER INFORMATION

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- The name of the product.
- The make and model of your computer.
- The processor and its speed.
- Any peripherals attached to the computer.
- The graphics card, driver date and version.
- The sound card, driver date and version.
- The version of Windows you are using.
- Total memory installed.
- The exact error message (if any).
- For Windows users, the version of DirectX installed.
- The type of CD-ROM drive.
- For Windows users, the total system resources free before running the program.
- The name of any programs running in the background.

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**Circuit Topography**
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**Performance Analysis & Test Driving**
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*With special thanks to John Cook*

## MicroProse MotorSport

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*Published by BMG Music Publishing*

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**Producer**
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