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Schmidt Digital Solutions



RACE CONTROL SYSTEM 64

Scalextric Sport Digital Race Management System Manual
Formula One and Formula Three Editions
Version 3.0.0.28

Contents

CONTENTS.....	2
INTRODUCTION AND FEATURES	5
RCS64 AND LABVIEW	5
WHAT YOU NEED TO USE RCS64.....	5
REGISTERING YOUR SOFTWARE.....	6
FEATURES IN FORMULA THREE EDITION.....	7
SUPPLEMENTARY FEATURES IN FORMULA ONE EDITION	7
COMING SOON TO RCS64	8
START UP – GETTING CONNECTED	9
MAIN PAGE	10
REGISTRATION.....	11
TRACK NAME AND LENGTH.....	11
DISTANCE UNITS.....	11
CAR SETTINGS - FUEL.....	12
PIT-PRO (ONLY AVAILABLE IN F1 EDITION).....	13
ARDUINO(ONLY AVAILABLE IN F1 EDITION)	15
GENERAL RACE SETTINGS	16
‘STOP&GO’	16
AUTO TRACK CALL	16
MANUAL TRACK CALL	17
MINIMUM POSSIBLE LAP TIME	17
PARALLEL PIT LANE	18
DAMAGE.....	19
MAIN PAGE COLOUR	20
ENDURANCE	20
GRAND PRIX RACE	20
TYRE WEAR (AVAILABLE ONLY IN FORMULA ONE EDITION)	21
WEATHER (AVAILABLE ONLY IN FORMULA ONE EDITION)	25
DATA BUTTONS	29
SOUND PAGE	30
CARS/USERS PAGE.....	31
SETTING UP CONTROLLER WITH DRIVER AND CAR	31
PROGRAMMING CARS	33
ADDING DRIVERS TO LIST.....	33
INDIVIDUAL CAR SET UP DIALOG BOX.....	34
CARS LIST	34
ADD PICTURE OF CAR	34
INDIVIDUAL CAR FUEL TANK SIZE	35

INDIVIDUAL CAR POWER%	35
INDIVIDUAL CAR SAFE SPEED%	35
INDIVIDUAL CAR SETTINGS FOR FUEL LOAD SIMULATION	35
<u>THROTTLE SETUP PAGE</u>	<u>37</u>
REAL TIME CONTROLLER POWER INPUT GRAPH.....	37
THROTTLE CALIBRATION	38
VIEWING THROTTLE PROFILES.....	39
SOME PROFILES EXPLAINED.....	40
LINEAR	40
HIGH SPEED (H.SPD)	41
LOW SPEED (L.SPD):.....	42
RELOADING DEFAULT PROFILES.....	42
EDITING PROFILES	42
CHOOSING INDIVIDUAL CONTROLLER THROTTLE PROFILES.....	43
<u>ADVANCED PIT STOP MENU © (APM).....</u>	<u>45</u>
ADVANCED PIT STOP MENU FOR PRACTICE/QUALIFYING	45
ADVANCED PIT STOP MENU IN GP/ENDURANCE MODE	46
HOW TO REFUEL USING APM.....	46
<u>PRACTICE/QUALIFYING PAGE</u>	<u>47</u>
PRACTICE MODE.....	47
QUALIFYING MODE.....	48
SCREENS FOR PRACTICE AND QUALIFYING.....	48
<u>RACE (GRAND PRIX) PAGE</u>	<u>50</u>
GRAND PRIX SCREEN.....	50
GRAND PRIX DASHBOARD	51
<u>RACE (ENDURANCE) PAGE</u>	<u>52</u>
ENDURANCE SCREEN.....	52
<u>PACE CARS – A WORKAROUND!.....</u>	<u>53</u>
<u>CHILDREN AND BEGINNERS USING RCS64.....</u>	<u>54</u>
CHILD25.....	54
LINEAR (RESTRICTED).....	55
BEGINNER40	55
<u>PIT STOP MANAGEMENT</u>	<u>57</u>

PIT STOP MANAGEMENT USING FUEL BURN	57
STEP 1: DETERMINING BURN RATE AND AVERAGE LAP TIME (GP AND ENDURANCE) ...	57
STEP 2: CALCULATING BURN RATES (GP AND ENDURANCE)	58
SETTING UP A GRAND PRIX RACE	58
REFUEL SPEED SETTING CHART	60
SETTING UP AN ENDURANCE RACE	61
RACE COMPUTATIONS FORM	63
INDIVIDUAL CAR'S DATA FORM.....	64
<u>TROUBLESHOOTING</u>	<u>65</u>
<u>KNOWN ISSUES</u>	<u>66</u>
<u>APPENDICES</u>	<u>66</u>

Introduction and Features

Race Control System 64 is a computer software Race Management System (RMS) that has been designed to enhance the functionality of the Scalextric (C7042) Digital Advanced 6 Car Powerbase (APB). The program has been developed by two serious and experienced slot car racers who are also real life race fans.

Martin Schmidt, who lives in Denmark, is the programmer. Marcel Minnaard, who goes by the name of Minardi in Slotforum, is from the Netherlands, and is the driving force behind the project.

RCS64 and LabVIEW

RCS64 has been developed using LabVIEW. LabVIEW (short for Laboratory Virtual Instrumentation Engineering Workbench) is a system design platform and development environment made by National Instruments. LabVIEW is commonly used for data acquisition, instrument control, and industrial automation.

LabVIEW is a very expensive tool originally made for testing electronic parts, but it has become commonly used for testing almost everything. There are a lot of visual tools in LabVIEW to calculate and visualize results obtained.

LabVIEW is designed to communicate with all types of equipment (It actually only took a day to make the driver for the C7042). There are a lot of exciting routines that are well tested. The potential for further development using this software is vast. The RCS64 team is committed to investigating and implementing it to its full potential. The journey has only just begun!

What You Need to Use RCS64

To run RCS64 you will need a Windows PC. So far it has been tested on Windows XP and Windows 7. Partial testing has been done using Vista, with no problems becoming apparent.

You will also need a cable between the powerbase and your PC - these cables are specially made for this exact purpose.

To obtain a cable contact RichG

- email - richg@girling.net or,
- PM (private message) via SlotForum - <http://www.slotforum.com/> .

Advanced Power Base (C7042) Firmware Update

The APB, when new, uses firmware that has some issues regarding lap counting. You can update the firmware using the RichG cable. For details on how to update the firmware visit <http://rcs64.com/>.

Controllers Supported by RCS64

RCS64 supports all standard controllers plus SCS wireless controllers
<http://slotcarsolutions.com/> .

Registering your Software

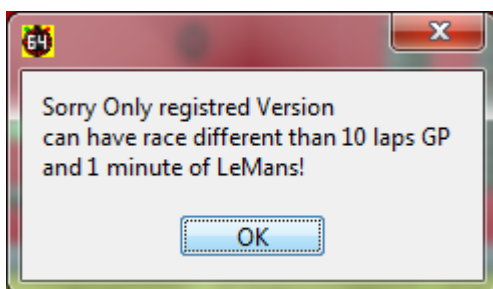
There are two editions of RCS64 - both are available for download from the RCS64 website.

- Formula One Edition
- Formula Three Edition (unregistered and registered).

The Formula One Edition is the full edition with all the available RCS64 features.

The Formula Three Edition (registered) has all the basic RCS64 features and is available free of charge.

The Formula Three Edition (unregistered) is also free of charge; however it is limited to 10 laps for Grand Prix races and 1 minute for Endurance races.



To purchase the Formula One Edition visit www.rcs64.com

To register your Formula Three Edition you can obtain a registration key from Marcel.

Contact Marcel via -

- PM (private message) at SlotForum - <http://www.slotforum.com/> or,
- email at rcs64rms@gmail.com

If you have any questions about registering, or you would like to report software related issues, please do not hesitate to contact the RCS64 team using the contact methods above.

See our website: www.rcs64.com for latest news, versions and software updates.

Or follow us on twitter https://twitter.com/RCS_64.

or Facebook <http://www.facebook.com/RCS64.Scalextric>

or view our YouTube channel

<https://www.youtube.com/user/RaceControlSystem64?feature=mhee>

If you notice errors or omissions in this manual, or have any comments contact Andy P (Vector) via PM at SlotForum.

Features in Formula Three Edition

The following features are available in the Formula Three Edition of RCS64:-

- 'Stop&Go' penalties
- Fuel load simulation
- Individual car settings for fuel load simulation
- APM: Advanced Pit Stop Menu ©
- Qualifying events
- Grand Prix Races
- Endurance Races
- Throttle calibration
- Editable throttle profiles
- ID cars from PC
- Dedicated dashboards with lap difference boxes
- Automatic and Manual Track Call
- Dynamic braking
- Car data base
- Multichannel sound options

Supplementary Features in Formula One Edition

- Tyre Wear.
- Weather
- Damage feature
- Pit-Pro support
- Lights control using Arduino

Coming Soon to RCS64

The RCS64 team also have a myriad of other ideas for future development; here is a list of just some of them:

- Pace Cars
- Wireless Controller support (ThrottlePro, Scorpius and Slot.it oXigen)
- Analogue mode
- Rally mode
- Individual driver consoles
- And a lot more cool stuff you never thought was possible.

The RCS64 team hope you enjoy using RCS64. We are having fun developing the program and we hope you have fun using it.

Happy Racing☺

Start Up – Getting Connected

To download RCS64 go to the download page on the rcs64.com website http://rcs64.com/?page_id=80 . Or go directly to the download page <http://schmidt-thomsen.dk/rcs64/> . Browse for the latest version and then download, following the instructions that appear on screen. The download time is longer than one would expect due to the fact that LabVIEW uses a lot of its own drivers.

The download page is also where you can download updated versions. To find out when new versions are available visit one of the following -

- <http://rcs64.com/>
- https://twitter.com/RCS_64
- <http://www.facebook.com/RCS64.Scalextric>
- <http://www.slotforum.com/forums/index.php?showforum=63>

To start using RCS64, first make sure that the cable that connects the powerbase to the PC is connected properly – and then switch on the powerbase. Then open up the RCS64 race software.

Main Page

This is the opening screen of RCS64.

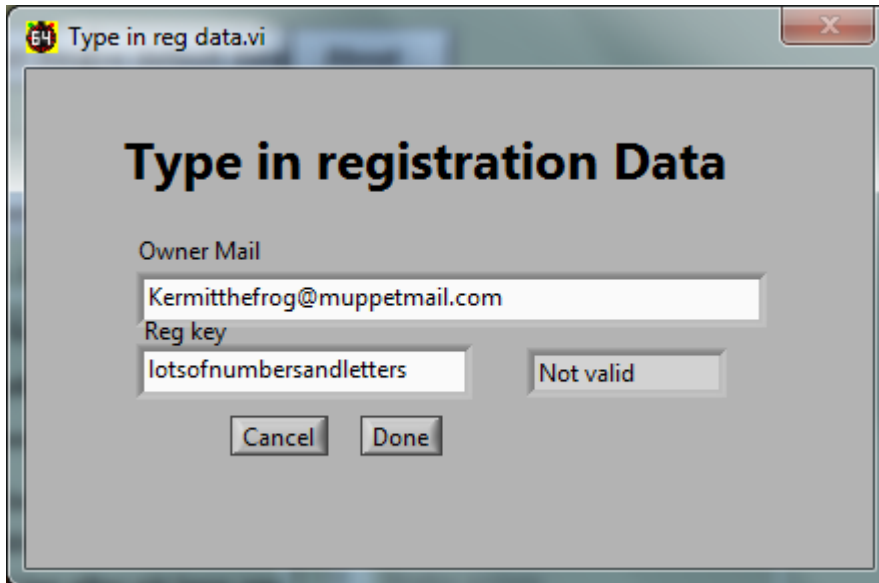


On opening RCS64, if the PC and powerbase 'see' each other the **Connected** LED will come on, a COM port will be identified and an introductory voice will be heard. If you do not become connected within a few minutes, click the **Search PB** button. If you are still not connected, see the troubleshooting section at the end of this manual or contact the RCS64 team.

You are now ready to start racing. At this point you can go directly to Practice/Qualifying or the Race pages and start racing using the RCS64 default settings. It is recommended that for your first races you use the default settings. However, you may wish to change some of the settings, such as drivers and cars, prior to your first race. Or, if you have registered for RCS64 and have received a registration key (available by contacting Marcel rcs64@rms@gmail.com) you may wish to complete the registration process for your software first.

Registration

To complete the registration process first click on the **Reg key setup** button. Type in the email address that you used for registering and enter the registration key which you received in the **Reg key** text box and click the **Done** button. If the data is entered correctly 'Not valid' will change to 'NonFree(Paid version)' and the heading on the page will change from unregistered to registered. The software registration process is now complete.



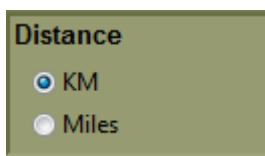
The 10 lap limit and 1 minute time limit, which applies to the Formula Three non-registered Edition, will no longer apply. You can now start racing using all of the features available to your Edition of RCS64.

Track Name and Length

You can change the track name and track length in the **Track name** and **Track length** text boxes. Enter the track length in either metres or feet depending on the units you have chosen in the distance units section described below. The track length will be used for calculation of travelled distance and average speed.

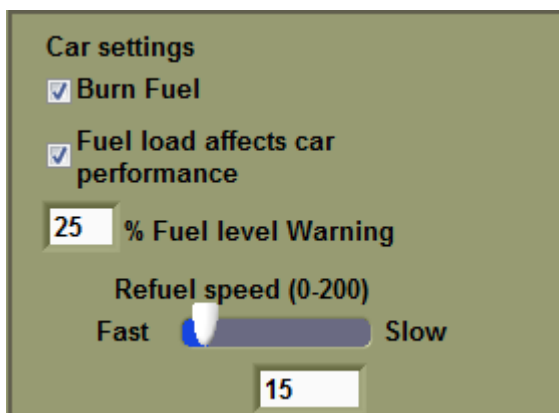
Distance Units

Select the unit of distance that you prefer. If KM is selected data in the results HTML screen, such as average speed, will be given in metric units.



Car Settings - Fuel

If you want your car to burn fuel, based on throttle input, check **Burn Fuel** box. You will then be required to refuel during a race or practice session.




Check **Fuel load affects car performance** box if you want your car to be heavier with maximum fuel load and become lighter during the race as fuel is used (fuel load simulation). Available power will be less with maximum fuel load and will increase as fuel is used. These settings can be changed in the **Power Control** section of the individual cars setting window.

Beginners and Children may find refuelling difficult at first. Racing without having to refuel is probably the best choice to start off with. After they can cope with keeping the car on the track, then move on to burning fuel and then finally on to the more advanced Fuel load simulation option. Fuel load simulation has an 'ever changing power value' for controller throttle positions, which makes the controller harder to use.

 *Individual cars fuel tank size can be changed by clicking the **Cars/users page** then the **Set up cars** button.*

RCS64 will warn you when you are getting low on fuel. You can change the audible warning for low fuel level to your own desired setting by inputting a number in the **% Fuel level warning** text box - 25% would mean that you only have a quarter of a tank of fuel remaining. At your chosen fuel level you will be called to the pits – you do not have to go immediately to the pits but you do risk running out of fuel if you leave the pit stop too long.

In the current version, if you run out of fuel, laps will cease to be counted and your car will start to run at Safe Speed. Safe Speed will allow you to reach the pits to re-fuel again.

 *Safe Speed can be set for each individual car via the **set up cars** button in the **Cars/users** page.*

The **Refuel Speed** slider sets the speed that **all** of the cars' fuel tanks will be refuelled at, during a pit stop. A combination of Refuel Speed and Fuel Tank Size determine the length of time a fuel tank will take to fill.

Example 1: A fuel tank size of 600 and a refuel Speed of 10 will fill the tank in 6secs.

Example 2: A fuel tank size of 600 but a refuel speed of 25 will fill the tank in 15sec.

A chart (Fig.1) showing the effects of changing Tank Size and Refuel Speed is in the Race Management section of this manual.

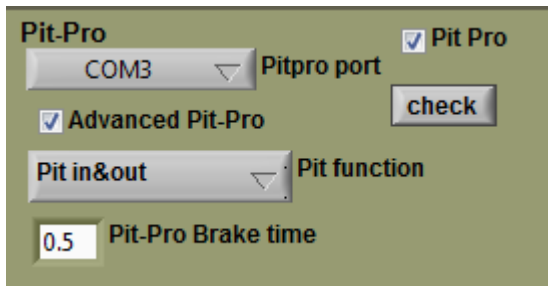
Pit-Pro (Only available in F1 Edition)

RCS64 supports Pit-Pro which is a specially modified Scalextric Pit Lane Game (C7041). To purchase Pit-Pro contact RichG richg@girling.net.



Scalextric Pit Lane Game (C7041)

To use Pit-Pro with RCS64 check the **Pit-Pro** box.



Click on the **check** button while looking at the large red and green lights on the Pit-Pro console. If the lights flash Pit-Pro is connected to a com port on your computer and is working correctly. If the lights do not flash press the Pit-Pro button to see a drop down menu listing available ports. Choose a port and click on the **check** button again – continue until the lights flash.

Pit function

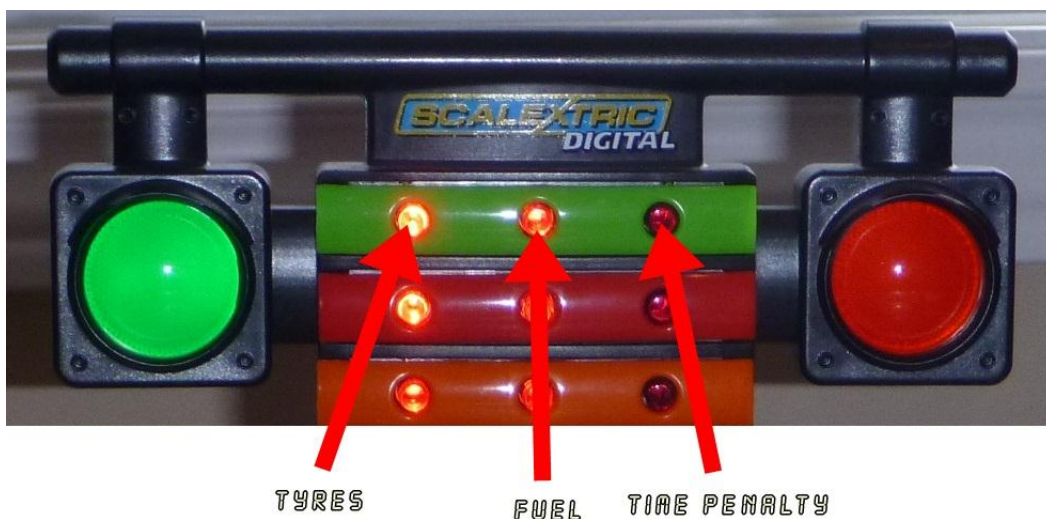
There are four options in the Pit Function drop down menu -

- *Pit in&out sensors – Only use this if you have both pit in and pit out sensors. These sensors are not the pit sensors found in the C7014 and C7015 track pieces. You require both a Pit Lane Game and an extra 'sensor track' that can be plugged into the Pit Lane Console. The extra sensor track piece can be purchased at the same time as you purchase Pit-Pro.*

- *Use SF as out sensor – If you only have the one sensor (the one that comes attached to the Pit-Pro consol) then you can use this option. Car slows to 'safe speed' when it crosses sensor and reverts back to normal speed when it crosses the start/finish sensor.*
- *Pit out when exit pit menu – Similar to above except car reverts to normal speed when pit menu is exited.*
- *Only lights – Sensors are not triggered when a car crosses them, however lights work as set by user.*

Lights

Check the Advanced Pit-Pro check box if you wish to use the Advanced Pit-Pro lighting sequence that is specially designed for use with RCS64.



- **Light 1** – Tyres. Starts to flash slowly when tyre wear below 50%. The rate that the light flashes at increases with tyre wear.
- **Light 2** – Fuel level. Starts to flash slowly when fuel level is below 50%. The rate that the light flashes increases as fuel level gets lower.
- **Light 3** – Stop and Go penalty – Lights up when penalty is awarded and goes out when penalty has been completed.

If you wish to use the standard light display that is used with Pit-Pro - lights display fuel level only - uncheck the **Advanced Pit-Pro** check box.

When a car enters the pits a green led will light up in the row of pit lights shown below.



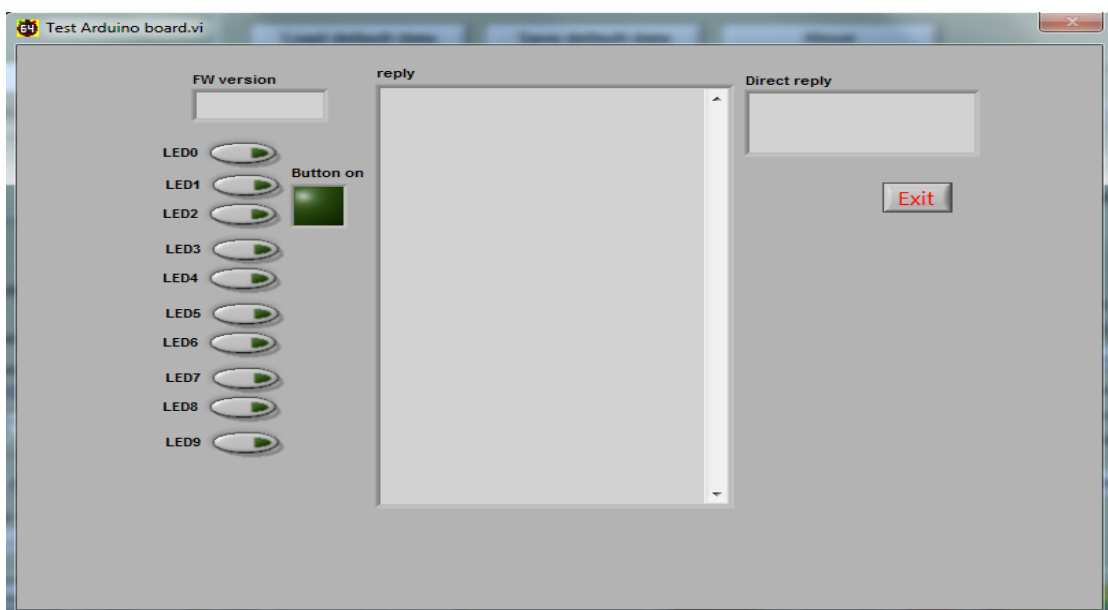
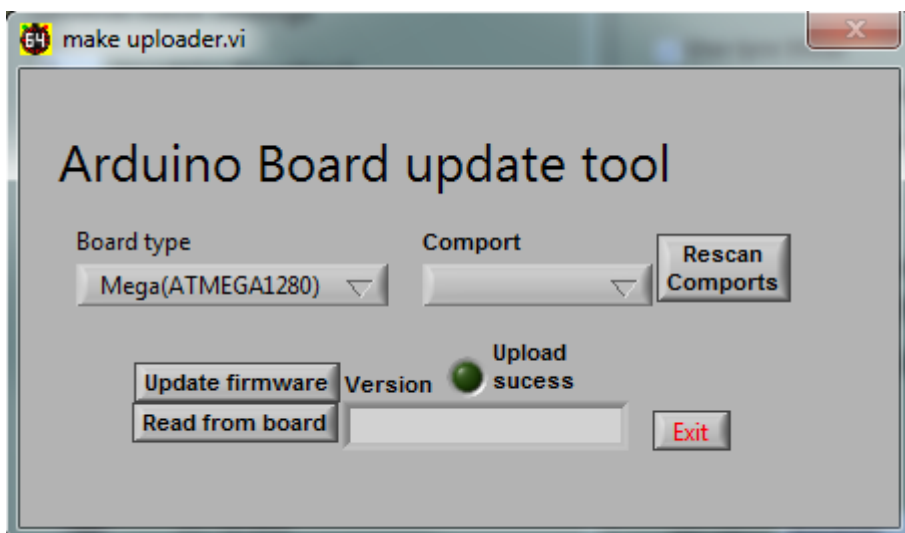
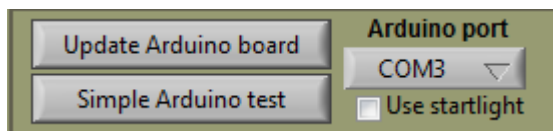
Each light corresponds to a controller ID. Led 1 lights when the car with ID 1 enters the pit and goes out when it exits.

Pit-Pro Brake Time

As a car crosses the first or only sensor the Pit-Pro brake is applied for a set amount of time. This is especially useful for short pit lanes where stopping may be difficult. Enter the value, in seconds, that you would like the brake to be applied for. If you do not want brake to be applied enter zero in the text box.

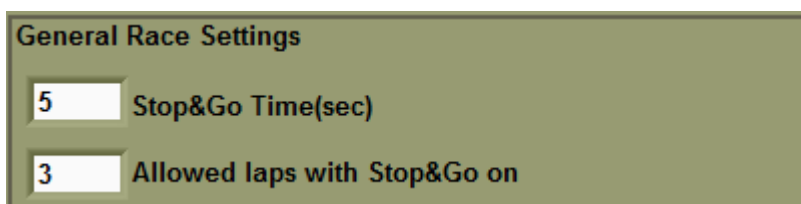
Arduino(Only available in F1 Edition)

Instructions will be available soon!



General Race Settings

'Stop&Go'



The screenshot shows a software interface titled "General Race Settings". It contains two input fields. The first field is labeled "Stop&Go Time(sec)" and has the number "5" entered. The second field is labeled "Allowed laps with Stop&Go on" and has the number "3" entered.

'Stop&Go' is a penalty system where penalties can be given for rule infringements such as dangerous driving etc. To issue a 'Stop&Go' the race official simply enters the driver's controller/ID number into RCS64 by using the computer's keyboard. If the official enters a 'Stop&Go' in error they can delete it simply by entering the number again. The driver must enter the pits within a set number of laps and stay stationary for a set time.

When a 'Stop&Go' is issued the green LED in the driver's dashboard will turn red. If you do not do the 'Stop&Go' within the set number of laps, all further laps will not be counted and your car will revert to safe speed. After driving into the pits and stopping, press the LC and BRK (or LC only if this is your setup) buttons on your controller at the same time. A timer will countdown the number of seconds that have been set for the 'Stop&Go'. Power will resume to your car when the timer reaches zero. RCS64 will not allow you to refuel until the 'Stop&Go' has been completed. Also, you have to exit the pits after the penalty and complete another lap before you can refuel or change tyres.


The length of time a car must remain stationary in the pits, in seconds, can be set by entering a time in the **Stop&Go Time (sec)** text box.

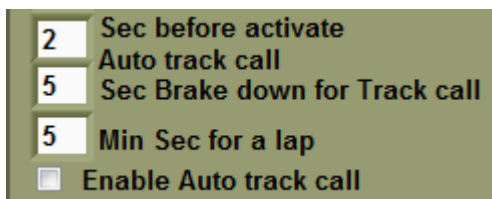
You also need to set an amount of laps within which the 'Stop&Go' has to be made – this can be done via the **Allowed laps with Stop&Go on** text box.

Auto Track Call

RCS64 can pause a race via its Automatic Track Call function. If no throttle input is received from a connected controller for a set number of seconds (i.e. if a car de-slots) power to all cars will be cut, and the race paused. Auto track call is not available in untimed practice.

If you want to use this function, check **Enable Auto track call**. By entering a time in seconds in the **Sec before activate auto track call** text box, you can initiate a short delay before power is cut to all cars – this value can be set to the nearest tenth of a second. You will notice that the brake is applied when an auto track call occurs - this is to prevent cars coasting too far.

 *Some cars will take a little more time to come to a complete stop than others.*



To resume racing after a track call press either the space bar on the keyboard or the start button on the powerbase.

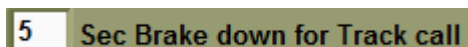
You will notice that there is a small delay after resuming the race before cars receive power again. This is to give the person who pushes the button time to focus on their car before racing recommences.

Refuelling and any 'Stop&Go' in process, when the track call occurs, will be paused until the race is re-started.

Manual Track Call

If '**Auto Track Call**' is **not** checked, you can still pause the race by pressing the space bar or the start button on the powerbase.

You can also manually initiate a track call by holding down the brake button (or LC/Brake, depending on your setting). The length of time (sec) you need to hold down the brake button before a track call is started, can be changed by entering a value in the **Sec Brake down for Track call** text box.

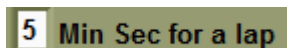


To restart the race, press either the start button on the APB, or the space bar on your keyboard. Manual Track call is not available in untimed practice.

If you do not use the brake button for braking you can set the value to as low a value as 2 sec or even lower. This will enable you to make a track call as soon as it is required. However, to stop track calls being made accidentally by drivers pressing the brake button instead of the lane change button, this value should be set higher if possible.

Minimum Possible Lap Time

You can stop the possibility of unrealistically fast lap times being recorded by entering a time, in seconds, in the **Min Sec for a lap** text box.



This can happen when a car de-slots past the start/finish sensors but is re-slotted in front of the start/finish sensors. Choose a time that it is **not** possible for a car to do on your track. For example, if the fastest time ever recorded is 5.75 seconds, set the minimum possible lap time to 5 seconds or less.

Parallel Pit Lane

Check the **Add lap after pit lane use** box if you have a pit set up where the pit lane is parallel to the powerbase (pit entry is before the powerbase sensors and pit exit is after the powerbase sensors – lap counting is missed on pit use). If checked, a lap will be added after each pit lane use.

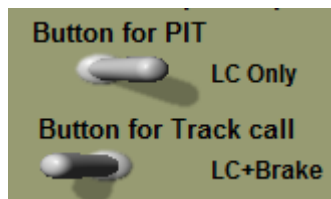
- ☞ *Be careful not to have this function checked if it is not needed or laps will be incorrectly recorded.*

Buttons for entering Pit menu and Manual Track call

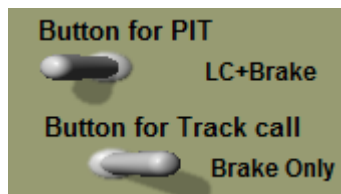
Use the switch Button for Pit to change between the two methods of opening the Advanced Pit Stop Menu and instigating a manual track call.

The two methods are;

- LC only– hold lane change button for 2 seconds (Use LC change button for PIT if you have a Slot IT SCP throttle or similar that uses LC and Brake buttons pressed together, for another purpose).



- LC + Brake – hold both lane change and brake button together for 2 seconds. RCS64 was originally designed to only have this option - it is still the recommended method to use for entering the pit menu.

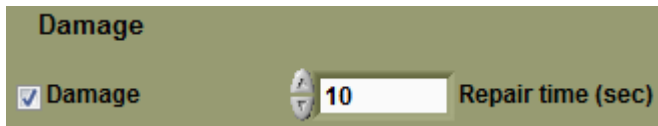


If you choose LC only for entry into the pit menu RCS64 automatically selects LC + Brake for making a manual track call and viceversa.

How to use the Advanced Pit Stop Menu (APM) is covered in detail later in this manual.

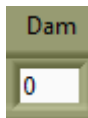
Damage

To use damage function check Damage box. Damage feature is only available in GP and Endurance modes.



How does Damage feature work? Whenever a car deslots and causes an automatic track call, or a manual track call is called by a driver, a damage point is deducted. When damage points are zero the car will revert to safe speed. The driver will now have to come back into the pits and repair the damage. When you repair damage the repair value you had at the start of the race will be reset.

Enter the number of damage points, amount of times a driver can instigate a track call before their car reverts to safe speed, by entering the required number in the last column of the Users/Drivers page.



These values can be different for each driver – this can be used as a handicap for good drivers by giving them a lower damage quota than a beginner. Or it can be used as a penalty system within a series by giving a lower damage quota to a racer for their actions in a previous race. Setting a high value would be like driving an armoured car and a low value would be like driving a Trabant!

The length of time that damage repair takes is set by entering a value, in seconds, in the **repair time** text box. This number should be high enough to act as a deterrent to crashing. It is recommended that this number should be higher than the time set for a full refuel and changing tyres – it is a punishment for poor driving after all!

- You cannot repair damage during a track call.
- You cannot repair damage before you serve a 'stop&go', or immediately after, without leaving pits first.
- If you start refueling or changing tyres you will not be able to repair damage until that action is completed.

Adjusting Damage Points

You can adjust the amount of damage points that a driver has at any time during a race or track call.

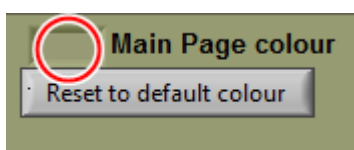
This is useful if your car instigates a track call through no fault of your own. Say another drive knocks you off the track. The race official can reimburse your lost damage point and could also issue a 'stop and go' to the offending driver at the same time.

To adjust damage settings during a race or track call use the following keys on your keyboard -

	ID 1	ID 2	ID 3	ID 4	ID 5	ID 6
Up	q	w	e	r	t	y
Down	a	s	d	f	g	h

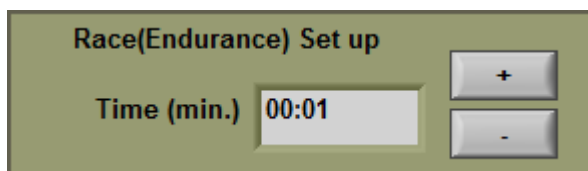
Main Page Colour

Click in the encircled box to choose the main page colour and the background colour for all other screens. This is purely an aesthetic option.



Endurance

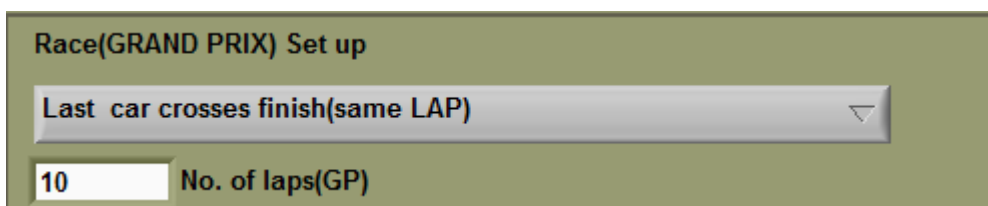
Using the + and - buttons, enter the length of time that the race should last (hrs:mins) in the race time text box. Clock will countdown to zero during the race.



The race will end when the set time has elapsed. The winner is the car who has done the most laps. Positions for 2nd - 6th are based on the number of completed laps. If there is a tie on laps, then the car which crossed the finish line first, on the last lap completed, will be placed before other tied cars.

Grand Prix Race

First enter the number of laps to be raced and then enter how the race should end.



The following race end options are available:

End when **First car crosses finish line**. Only the winning car completes all laps. Results for positions 2 to 6 may not be accurate. Good choice if you only want to know who won the race.

End when **last car crosses finish**. All cars finish allotted laps. When cars finish their race they will have to be removed from the track to stop causing other drivers problems. Set safe speed to enable cars to continue after the finish until they can be removed ('Safe Speed' set via Cars/users page and set up cars button).

End when **Last car crosses finish (same lap)**. After the winner crosses finish line, all other cars will finish when they cross the finish line next. All cars will not necessarily finish their allotted number of laps. Gives a fair and accurate result and avoids confusion at end of race. Set safe speed to enable cars to continue until they are clear of the finish area or can be removed ('Safe Speed' set via Cars/users page and Set up cars button).

Tyre Wear (available only in Formula One Edition)


The amount of tyre wear is affected by both the amount of braking and the duration of tyre use.

Using either dynamic braking or the brake button on the controller will cause tyre wear.

If you want tyre wear to be effected by dynamic braking, instead of button braking, you must select the dynamic braking option (cars/users page) for each car in the race.

Dynamic braking causes tyre wear when the controller is released fully.

As the tyres wear the brakes become less responsive (delayed), resulting in the brakes having to be applied earlier.

 *Note at present there is no difference in speed between hard and soft tyres.*

To use tyre wear tick the **Use Tyre Wear** box.

<input checked="" type="checkbox"/>	Use tyre Wear	<input type="text" value="5"/>	Change time (sec)
<input type="text" value="3"/>	% standard wear/lap Hard		
<input type="text" value="5"/>	% standard wear/lap Soft		
<input type="text" value="2"/>	Brake points		
<input type="text" value="0.1"/>	Brake Delay (100-51%) Hard tyre		Type of race
<input type="text" value="0.2"/>	Brake Delay(50-20%)		<input type="radio"/> GP
<input type="text" value="0.3"/>	Brake Delay(21-0%)		<input type="button" value="Tyre set estimate"/>
<input type="text" value="1"/>	Hard sets	Avg. lap time per lap (sec)	<input type="text" value="10"/>
<input type="text" value="1"/>	Soft sets	Req. % of race time on hard tyres	<input type="text" value="50"/>

Setting Standard Wear

There are two different specifications of tyres, hard and soft. The rate of tyre wear is influenced by a number of factors e.g. track temperature, amount of braking. Standard wear rate is the normal wear rate of each specification of tyre. You set how long each specification lasts by entering a value in the **% standard wear/lap** boxes for each compound. Your choice of value should be based on the length of the race.

The value you set will be the percentage of wear per lap. Imagine it as a new tyre with all its rubber intact (100%) on each lap it will lose a certain amount (percentage) of rubber – how much you want it to lose per lap is the value you enter in the text box.

A tyre which is set to a value of 10 will lose 10% of its rubber per lap – it will last only 10 laps (100 divided by 10). Set to a value of 2 (100 divided by 2) will last 50 laps.

In real life softer compound tyres will give you more grip but will also wear faster. To replicate this, set the value for the soft compound tyres higher than for the hard tyres.

Hard compound tyres set at a value of 5 will last 20 laps - soft tyres set at a value of 10 will last 10 laps. Result, hard tyres will last twice as many laps.

What values you choose to set for **% standard tyre wear**, as mentioned above, will depend on how long the race is and the number of pit stops for tyre changes you wish the drivers to take.

If your tyres wear out during a race your car will revert to the **safe speed%** set for that car. Setting safe speed to 0 will effectively disable the car which is not what would happen in real life. Setting safe speed to a low value which enables the car to reach the pits is more realistic. Bear in mind that safe speed also affects what happens to the car when it runs out of fuel and the speed it travels at the end of a race. Also remember that if you are using Fuel Simulation the 0% fuel level power value will in effect be the safe speed.

Change Time (sec)

Change Time is the length of time (sec) that a tyre change will take. To change tyres come into the pits and enter the pit menu as normal. Scroll through the options until you reach the soft and hard tyres buttons. Choose whether you want soft or hard and proceed to the exit button. Whilst you are in the menu you can also choose to refuel or change your profile.

Tyres cannot be changed during a track call. The length of time it takes to change tyres will be the same whatever condition the tyres are in prior to changing.

Brake points

The amount of braking that you do on each lap can be set to effect tyre wear.

Determine the number of brake points for your track. When using the brake button the number of brake points is easy to determine – simply the number of times you would use the brake button. This number is slightly harder to choose when using dynamic braking – remember that dynamic braking occurs only when the controller is released fully. You may need to set the value higher if using dynamic braking due to braking happening more often.

If, when racing, you brake more than the brake points value you entered, standard tyre wear will increase by 1% for every time you use the brake. Brake less than the brake points value and standard tyre wear will decrease by 1% from the standard wear/lap.

Say you set standard tyre wear to 10% and brake points to 5, but you only braked once during a lap, tyre wear will only be 6%. (This is not actually what will happen because track temperature also affects %standard tyre wear so the value may be higher or lower than this).

Setting this value correctly will encourage drivers to use their brakes more efficiently during a race to save tyre wear.

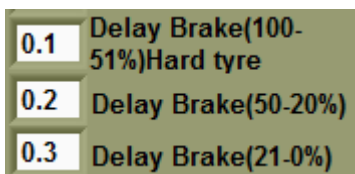
Brake delay

Tyre wear causes a delay in your braking.

With new (100%) to half worn (51%) soft compound tyres, when the brake button is pressed or the throttle released (dynamic braking), brakes are applied straight away without any delay.

For Hard tyres between 100% and 51% you can choose the delay you wish the brakes to have by entering a value in the **delay brake (100-51%) hard tyre** text box. Setting this value to 0.1 sec. would be a good value to try - Just enough to feel the difference between Hard and Soft tyres, with the need to think before you brake.

When both hard and soft tyres have more than 51% wear, braking is delayed by the value you set in the relevant text boxes.



Brake delay can be set to an accuracy of 100th of a second. The smaller the value, the less the time delay from pressing the brake button or releasing throttle, to the brake being applied.

The delay for 50-20% (0.3sec) should be smaller than the value for 21-0% (0.5sec).

Do not put the delay value up too high. When you need brakes you will probably be travelling fast – your longest straight may take less than 1 sec to travel so setting the delay value above this say 1.5 sec would not be a good idea.

On the opposite side of the scale setting a value of 0.01sec you may not actually feel any real difference in braking.

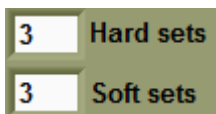
Setting smaller differences between delay settings will make the transition from one delay setting to the next easier to handle when driving.

Brake delay setting example:

Hard compound	100 to 51% = 0.1sec
Hard and soft compound	50 to 20% = 0.2 sec
	21 to 0% = 0.3 sec

Replacement tyres

You can choose the number of sets of hard and soft tyres that drivers have access to during the race. This number **does** include the tyres that you use at the start of the race. You can choose to start the race using either hard or soft tyres via the cars/users page.



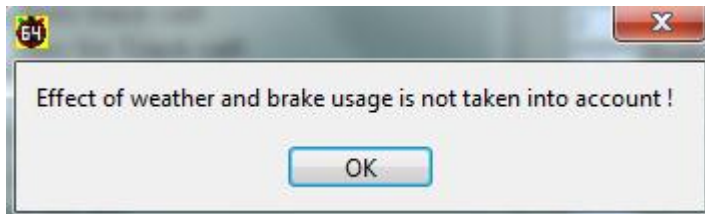
It is important to make sure that the number of tyres that you make available to each driver is sufficient for them to complete the race based on standard tyre wear. However, if a driver has used up all their Hard and Soft sets of tyres they will still be able to finish the race using Rain tyres.

Tyre allowance calculating tool

This tool will help you to choose the number of tyres that should be made available to each driver prior to the start of a Grand Prix or Endurance race.

First use the switch to select the type of race you are running, Grand Prix or Endurance. Next enter a value in the **Avg. Lap time (sec)** text box - this should be an approximation of the average time taken to complete a lap by the type of cars you are using for the race. Next enter the % time that you want to race on hard tyres for in the **req. % of race time using hard tyres** text box.

Click on the **Tyre Set Estimate** button – the number of tyres required for the race will be entered into the Hard and Soft tyre text boxes. The following warning will appear during this process.



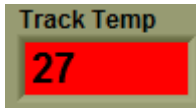
If you are running a long race it may be a good idea to add another set of tyres due to the fact that weather and brake usage are not factored into the formula when working out the number of tyre sets required.

Weather (Available Only in Formula One Edition)


To use the weather feature tick the **Use weather** tick box. Weather can be used in all race formats including timed practice.

Track Temperature

The track temperature will be different each time you open the software. If track temperature is not to your liking you can change it by using the reset button in race mode until the desired track temperature is found.



The Track temperature will increase when the weather is sunny and decrease when the weather is cloudy. Tyre wear either increases or decreases with track temperature. Hotter more wear colder less wear. Tyre wear is higher than the Standard Tyre Wear value when the track temperature is above 25 degrees and lower when the value is below 25 degrees. When temperature is above 25 the track temperature text box will be red and when the temperature is 25 or below it will be blue.

 *Track temperature effects tyre wear even if weather option is not selected*

Weather options


There are four weather options – Sunny, cloudy, rainy or random. When sunny, cloudy or rainy are chosen the weather will not change.

Random

When random is selected the weather will change, between sunny, rainy and cloudy randomly over the length of a race or practice.

The number of times it changes depends on the value you set for **Random Weather Types**. If you set the value to 3 there will be three types of weather over the length of the race. If you set the value to 8 there will be 8 types of weather over the length of the race. You should choose this value based on the length of the race. If you are having a 10 lap race and you set the **Random Weather Types** value to 8 you will find that the weather will change almost every lap – not very lifelike! So, for short races set the **Random Weather Types** value low.

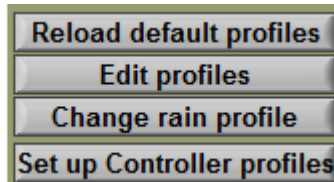
The **Random 1...5** option will give the most random weather pattern. You will not be sure if the weather forecast is going to be 100% correct, there may be other weather types throughout the race.

 *You must reset the weather after making changes to the Random Weather Types value or changes will not be applied.*

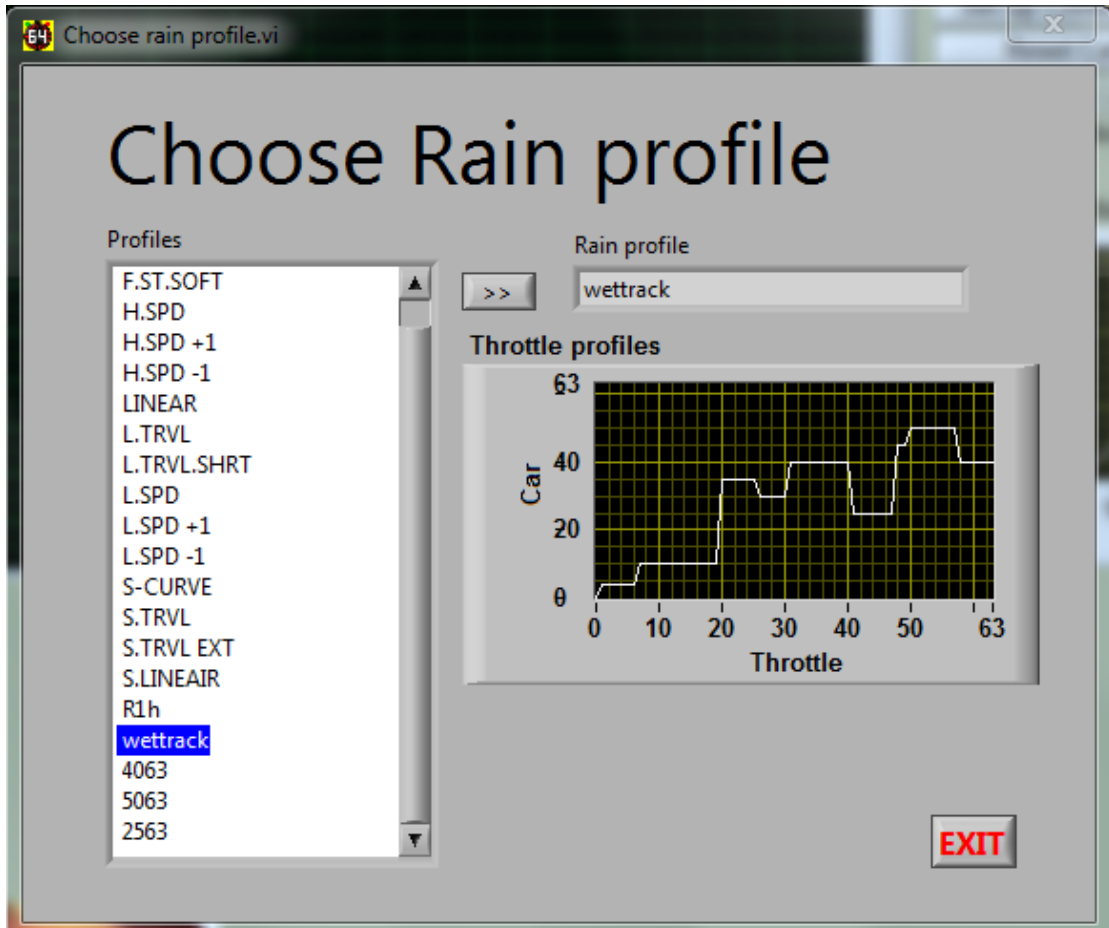
When the weather changes there will be a period of time when it is difficult to predict what the track conditions are like – imagine a drying track in real life.

Rain

When it starts to rain in random weather mode your car will become very difficult to control with either hard or soft tyres. This is because when it rains your throttle profile is automatically changed to one of two special rain throttle profiles (R1h and wettrack). You must select one of the rain profiles to be your default rain profile. To do this open the **Throttle Profile** page and click the **Change rain profile** button.



The following screen will appear.



Highlight one of the rain profiles, R1h or wettrack, and then click on the arrows buttons to make the chosen profile your rain profile.

You will see a graph showing what the profile looks like. You can see that the curve is highly irregular – this is what makes the car so difficult to drive when it is raining.

It is possible to design your own race profiles and use them instead of the default profiles. You can do this via the **Throttle Profile** page as you normally would for creating or editing a normal profile

When it starts to rain you can either continue to race using the chosen unpredictable rain profile or you can come into the pits and change your tyres to wet weather tyres. Changing to rain tyres will change your profile back to the one you were using before.

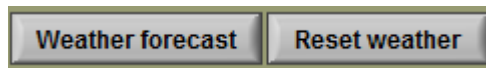
To change your tyres simply enter the pits as normal, open the pit menu and scroll along to the rain option. Select this option to change to rain tyres. As you drive out of the pits you will see that your throttle profile has returned to the normal one that you were using before it started to rain.

Rain tyres do not wear while it is raining, however brake delay is the 20 – 0% value set. When the rain stops it is important to change your tyres back to normal tyres (soft or hard). Rain tyres in dry weather conditions will wear very fast 50 - 20% standard tyre wear.

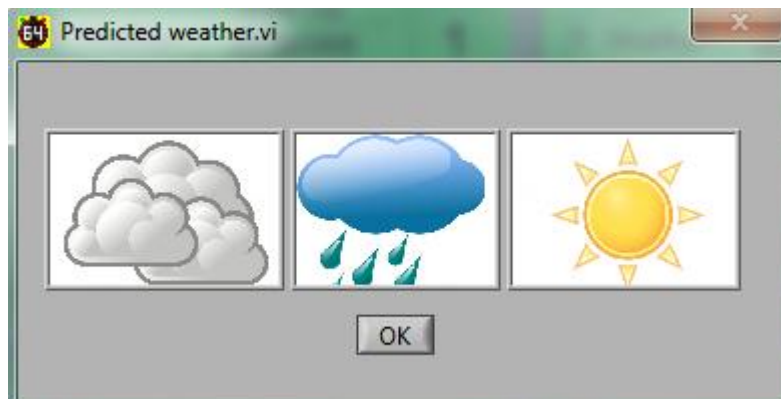
If it is raining when the race starts RCS64 will automatically select rain tyres for you, and you can use your normal throttle profile.

Weather Forecast

Use the Weather forecast button to give you a weather forecast prior to the race. A weather forecast can be obtained either in the main page or in the race/practice page. The weather forecast will be the same whichever screen you use to obtain the forecast. However, you can change the weather for the impending race by using the **Reset weather** button in the main page.



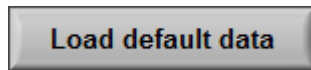
If the forecast for the race is all rain but you don't want it to rain for the entire race you can reset the weather by using the reset weather button, also referred to as the God button (Or the Oh heck, if i'd had one of those sooner i'd still be living in Yorkshire button).



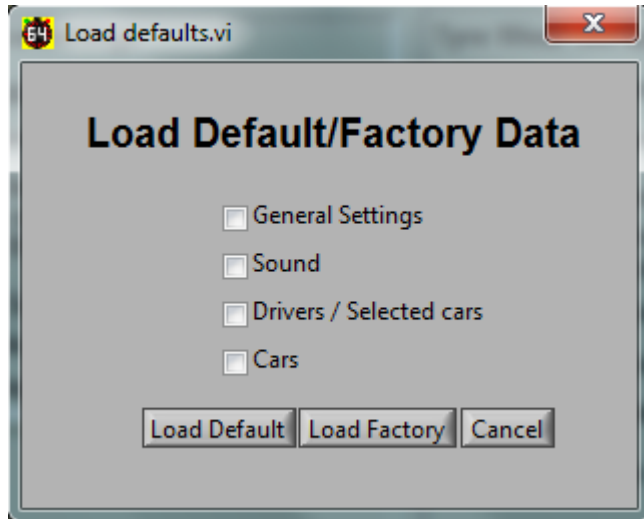
Take note of the forecast because it is only available prior to the start of the race. If you have chosen a high value for random weather types, for example 8, the weather forecast will be only for the weather at the start of the race, half way through the race and at the end of the race. Weather types between these points are not forecasted (good luck with that!).

Data Buttons

If for some reason you need to reload factory or default data you can do so by clicking on the **Load default data** button.

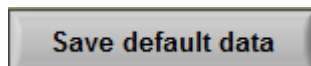


The following screen will appear. You can choose to either **Load Default** data or **Load Factory** data for the categories with tick boxes.



Load factory data will clear **all** settings from the software including registration information. RCS64 will inform you that it will close and that you will need to reopen it.

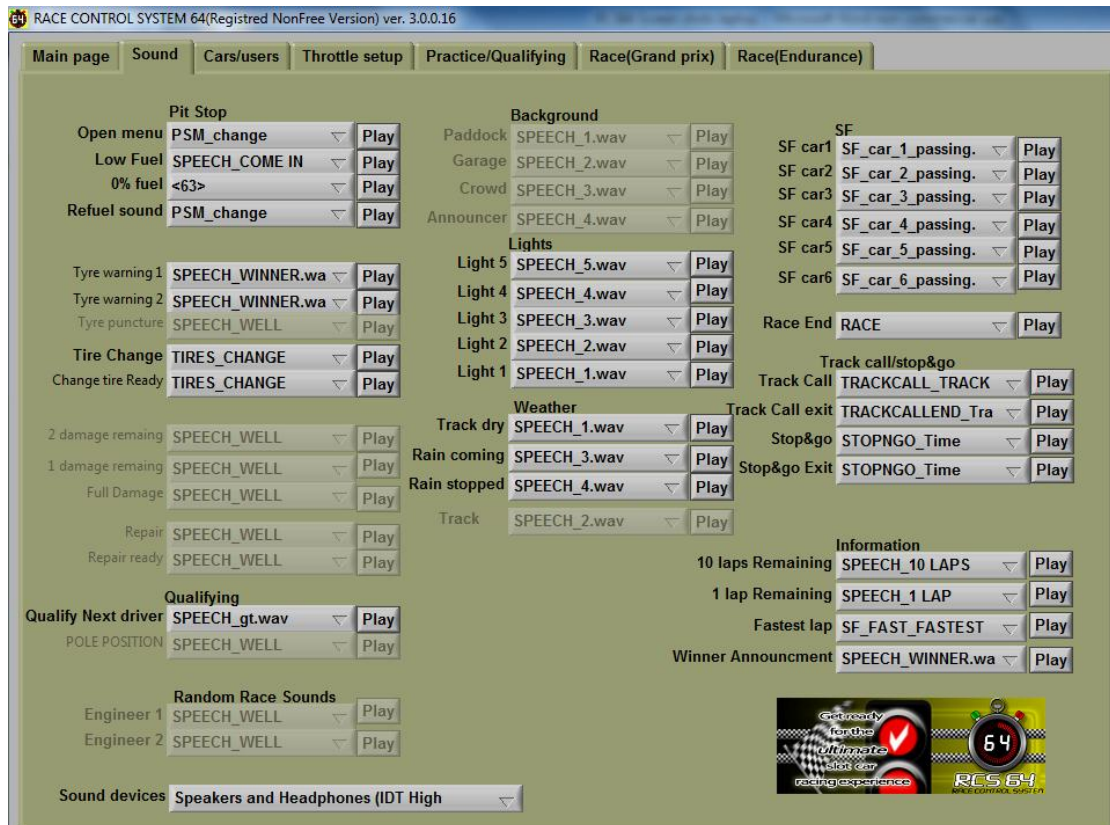
RCS64 on opening shows the settings that were set in RCS64 when it was last closed. If you wish to save race settings and then go on to make other changes you can do so by clicking on the **Save default data** button.



If in future you wish to use the saved race settings it will be possible to do so by clicking on the **Load default data** button. RCS64 will warn you that it needs to close. The program will close - when you reopen the program your saved race settings will appear. This is especially useful if you have a regular race night which uses the same settings.

Sound Page

Many more 'sound events' for RCS64 will be added in the future. The available options are highlighted in the drop down boxes - in some cases you will find a choice of samples for a particular event.



It is not necessary to explain all the options here as they are fairly self-explanatory.

However, you may like to try out some of the following fun features: Individual car sounds for passing start/finish; car passing sounds or short beeps; separate sounds for every start light that comes on; and Fastest Lap sounds!

Cars/Users Page

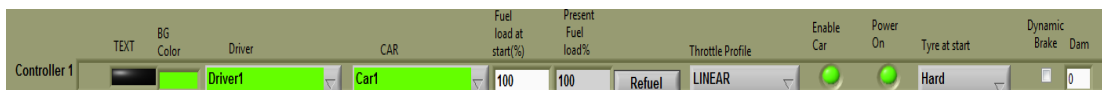
The Cars/Users Page is used to choose, drivers, cars and car set up.



Setting up Controller with Driver and Car

The top section of the page is where you can set up the driver and car settings for each controller.

The top row (see screenshot below) shows the set up for Controller 1 – the controller that is connected to port 1 on the powerbase which is also referred to as ID1.



RCS64 makes extensive use of colours. Clicking on the coloured boxes allows you to choose your text (black or white) and background colour. These colours will be used to help you easily identify your race information on the screen during races. Ideally you should select the colours for each controller based on the colours on your APB (controller 1 = port 1).

The next columns are where you make your driver and car selection for each controller. RCS64, by default, adds Driver1 and Car1, but you can easily change them to the driver and car of your choice by using the dropdown menus. How you add drivers and cars to the dropdown menus is explained later in the manual.

The next 2 columns represent your fuel load. Choose the amount of fuel that you would like to start qualifying or a race with, by entering an amount in the **Fuel load at Start (%)** text box. Choosing less fuel will mean that you have to pit earlier but, if you are racing with Fuel Load Simulation on, then you will also be faster at the start of the race than you would be with a full tank. Also, the pits may be less crowded when you want to pit.

The next column, **Present Fuel load%**, shows a percentage value which indicates how much fuel is actually in your tank. You will see that after a race or qualifying the fuel level that is left is shown – if you are using Fuel Load Simulation and you have 30% left at the end of a race you may want to start the next race with less fuel to gain an advantage. You can, of course, choose to start a race with the amount of fuel that is left or use the **Refuel** button to refuel. By clicking the **Fuel all cars** button you can quickly and easily fill all of the fuel tanks, of all of the cars.

The **Throttle profile** column enables you to choose the throttle profile you want to start qualifying or races with. RCS64 has some interesting default profiles which are explained in the **Throttle Setup** section later in this manual. Linear is the standard profile used when the powerbase is not connected to a Race Management System.

Next to the **Throttle profile** column are 2 LED's. RCS64 automatically detects which controllers are connected and lights up the LED in the second column.

The 1st LED lights up if a controller is enabled. It is important to either ENABLE or DISABLE each car. Cars that are ENABLED but that are not used in a race can cause auto track calls to be initiated.

The next column, **Tyre at start**, allows you to choose which tyre compound you wish to start a race on.

Dynamic Brake allows you to select Dynamic Braking for each car. When the controller trigger is released, with the **Dynamic brake** box checked, brakes will automatically be applied – this is the standard setting for the APB without an RMS connected.

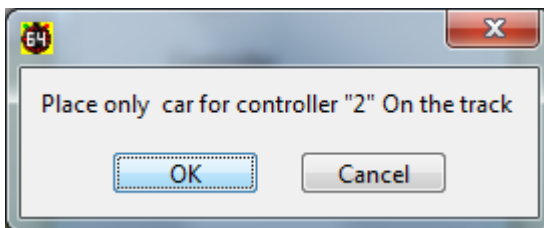
The final column allows you to enter the amount of Damage points that a driver is allowed for a race.

Programming Cars

With the **Program Cars** button you can ID cars directly from your PC. Click on the button and the following screen will appear. Choose the controller you want to program and click **Done**.



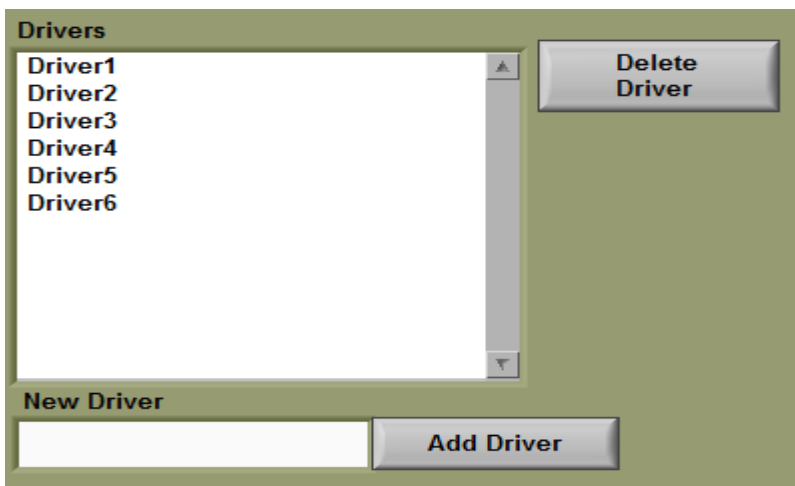
RCS64 reminds you to only have the car you want to program, to the chosen controller, on the track.



Click **OK** and the car is programmed to that controller.

Adding Drivers to List

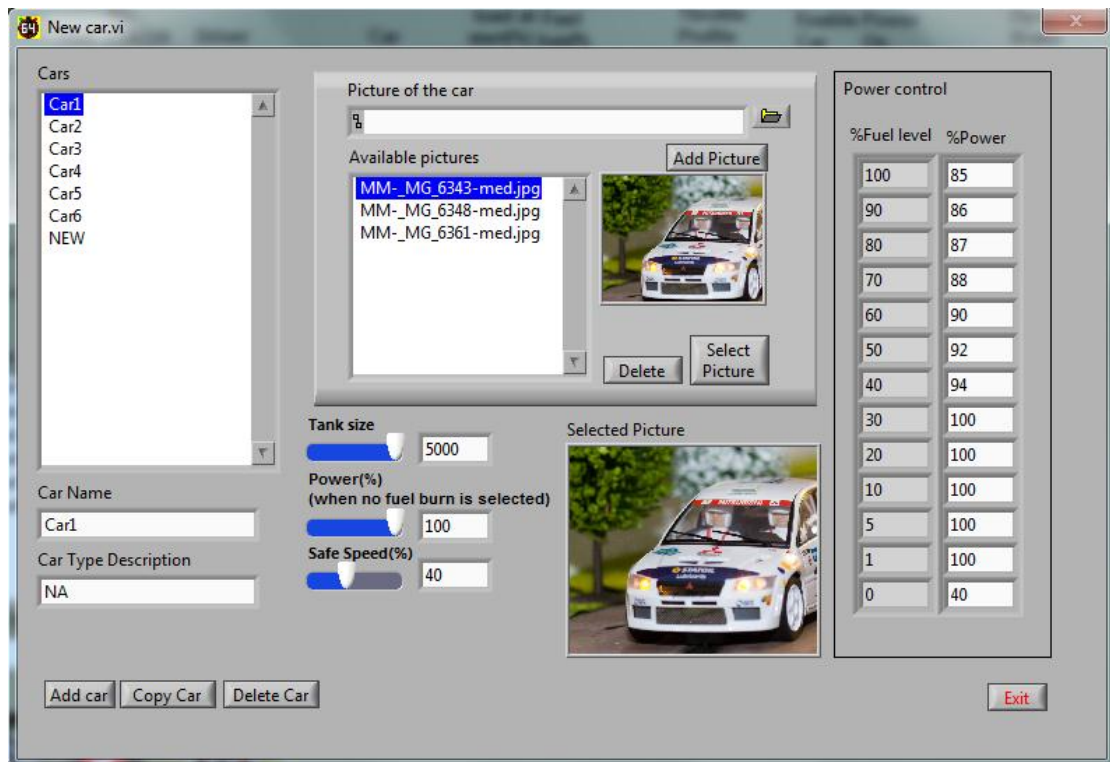
Enter a name in the **New driver** text box and then click the **Add Driver** button - the name of the new driver will be added to the drivers list above.



The newly added driver's name will now also appear in the controller **Driver** drop-down lists.

Individual Car Set Up Dialog Box

To set up cars, click on the **Set up cars** button. The following dialog box will appear.



Here you can copy, add, delete or edit cars, and even add a picture from your hard drive or USB.

Cars List

To add a car to the **Cars** list click on **Add car** and change the text from NEW to the name you would like to call the car.

To copy a cars set up highlight the car you want to copy in the list and click **Copy Car**.

To delete a car highlight the car from the list that you want to delete and click **Delete Car**.

Add Picture of Car

Browse your computer for the picture that you wish to add to the available pictures list. Click **Add Picture** and the picture will appear in the list of available pictures. Highlight the picture you wish to use for the car and click **Select Picture** – the picture will appear in the **Selected Picture** box.

The picture selected for the car will be used on the driver's dashboard.

Individual Car Fuel Tank Size

Set the volume of the tank by using the slider. Fuel tank size is a major factor in the length of time between refuelling stops. However, it is not the only factor – each car will burn fuel at a different rate. Cars with a higher burn rate will need to refuel more often. A fuller discussion on the effects of fuel tank size and burn rate is given in the chapter on Pit Stop Management later in this manual.

Individual Car Power%

Limits the Maximum power level available for the car (overrides throttle profile settings). Only available when you DO NOT have **Fuel load affects car performance** (fuel load simulation) on the main page checked.

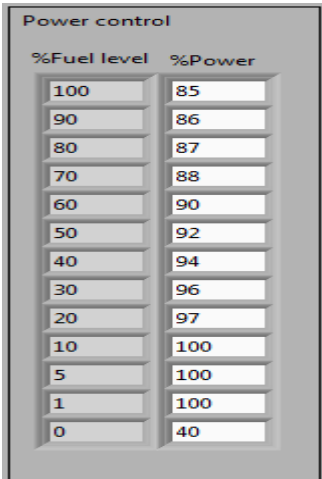
Perhaps a better way of limiting maximum power is to use limited power throttle profiles.

Individual Car Safe Speed%

This is the speed that the car will be able to drive to the pits at the end of a race. It is also the speed that the car can drive when its fuel tank is empty, tyres wear out or all damage points have been used. Some cars may require a higher Safe Speed to allow them to reach the pits. If you don't want cars to be able to reach the pits with an empty tank, set this value to 0. If you are using Fuel Load Simulation the power value you set for 0% fuel level will override the Safe Speed set.

Individual Car Settings for Fuel Load Simulation

The two columns on the far right of the screen allow you to change the power available for a set fuel level.



%Fuel level	%Power
100	85
90	86
80	87
70	88
60	90
50	92
40	94
30	96
20	97
10	100
5	100
1	100
0	40

In the default settings, shown in the screen capture above,

- A car with a full tank has 85% power.
- Available power increases until the fuel level reaches 10%.
- Full power is available when fuel level is between 10% and 1%.

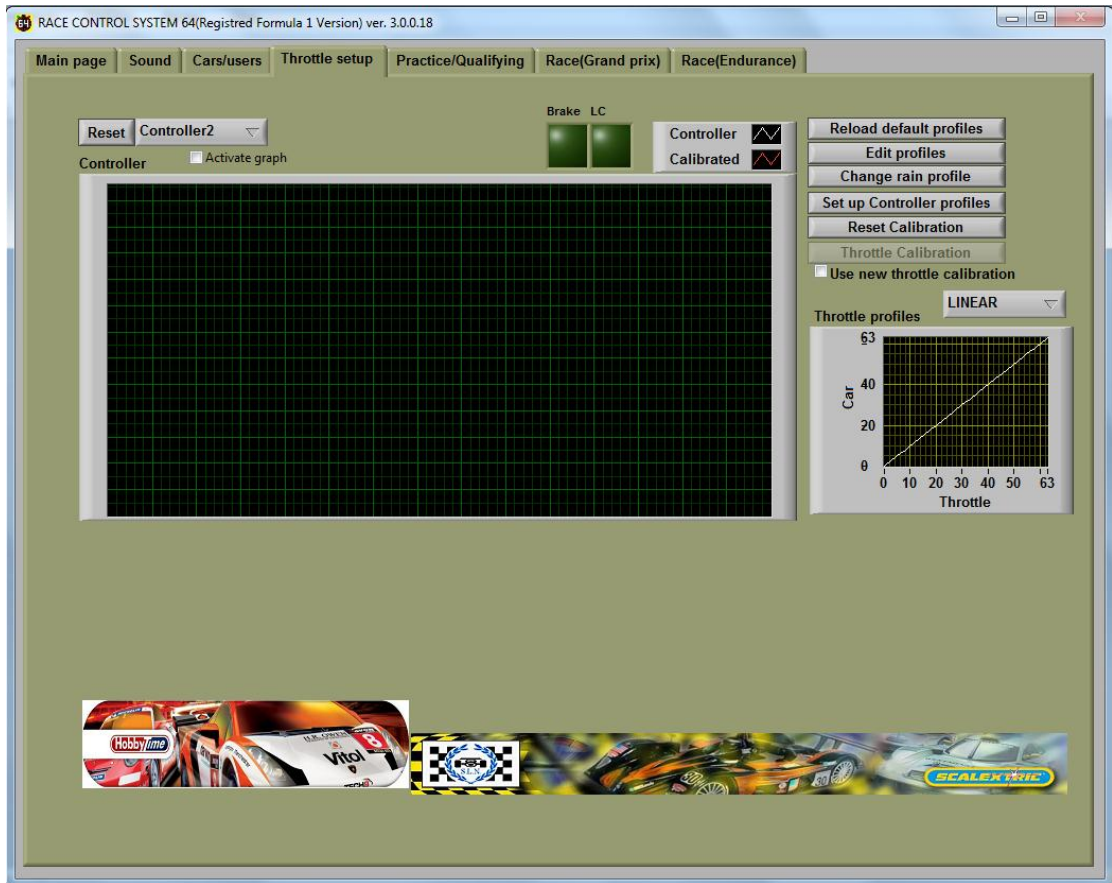
- If the tank is empty, you have 40% available power to reach the pits.

Of course you can change all these values, including 0% for an empty tank, but please give the default settings a try as they are the results of extensive testing!

If you set the zero power value to zero cars will stop when they run out of fuel. This overrides the **safe speed** value set

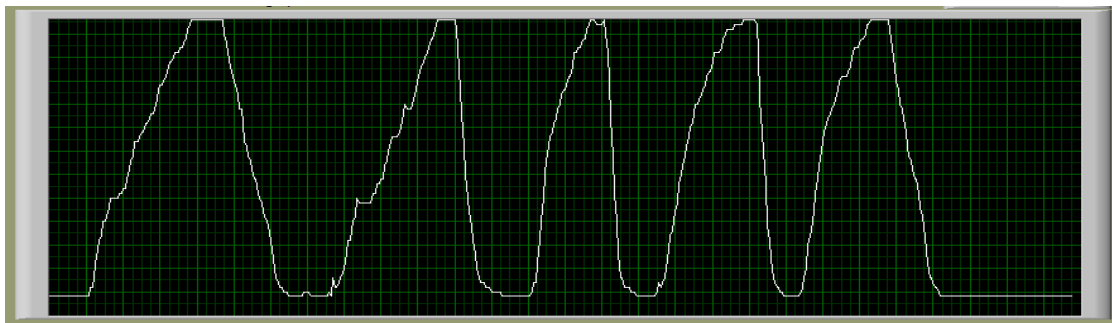
Percentage power is the maximum amount of power available to the cars. If you have a track where it is not possible to reach above the 85% power value of the default settings you will find that Fuel load simulation has no effect on car performance. In this case it will be worth lowering the values.

Throttle Setup Page



Real Time Controller Power Input Graph

With the graph at the top of the screen you can view how your controller reacts to the power input from the throttle. First click on **Activate graph** then select the controller input that you want to view. Then press the throttle on your controller slowly to see how the controller value increases with varying amounts of throttle movement. This is especially handy to see if your controller reaches top value with maximum throttle travel (63) or has a constantly low output (e.g. 3) instead of '0' with zero throttle travel.



Graph 1 Power input graph showing constantly low output at zero throttle, rather than zero

Remember to uncheck the **Activate graph** box when you have finished.

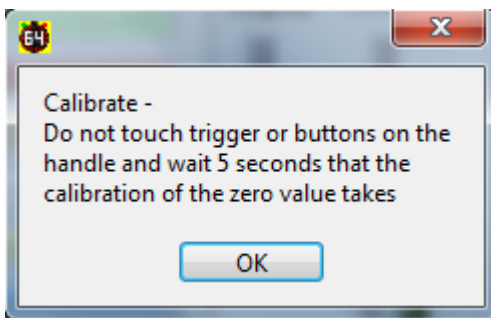
The two LCDs at the top of the screen enable you to check if the brake and lane change buttons on your controller are working.

Throttle Calibration

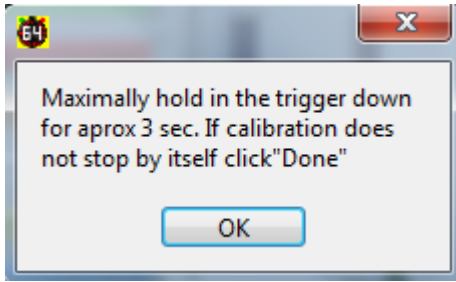
By calibrating your controller you can improve the way your throttle functions. To calibrate your controller, click on the **Throttle calibration** button. The **Throttle Calibration** window will open.



Select the controller you want to calibrate and then click on the **Calibrate Controller** button. Do not touch your controller's throttle or buttons during the calibration of the zero value of your throttle - this should take approximately 5 seconds.

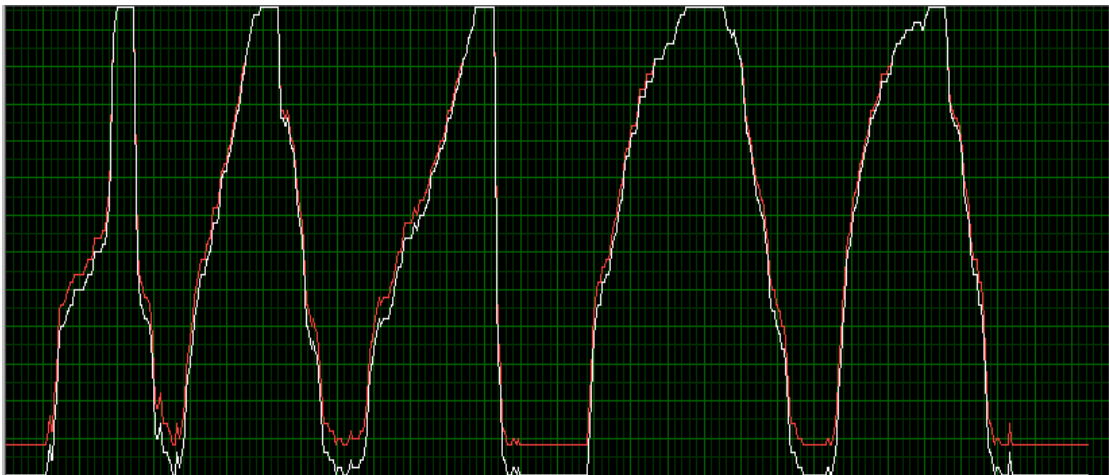


To obtain the maximum value of your controller you will be asked to apply maximum throttle for 3 seconds.



Click the **Exit** button when calibration is complete.

After calibration, you can see the difference in the real time throttle input view. You can view the power output values before and after calibration. The white curve on the graph is the controllers throttle curve, and the red curve is the newly calibrated curve for the controller.



Graph 2 Power Input graph showing pre and post calibration curves.

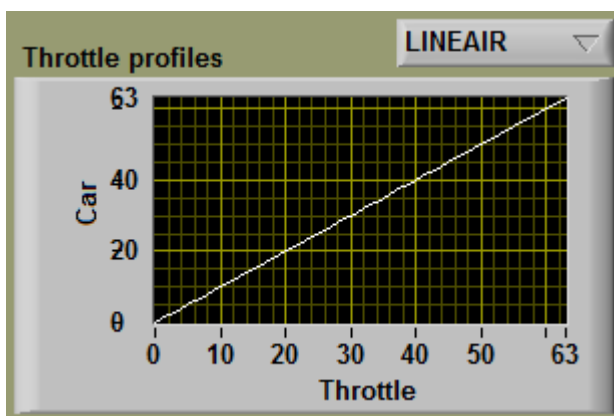
If you wish to zero set the values of all controllers, click on the **Reset calibration** button. This may be useful if you change your controllers.

The idea of calibration is to get a 0-value with controllers that actually don't reach 0, and a maximum value (63) for controllers that can't reach maximum values. RCS64 stores the minimum and maximum values and then interpolates the data. If the controller works in area 3..59, then RCS64 calculates $59 = 63$ and $3 = \text{zero}$ and interpolates the other values.

If you don't want to use the corrected values, uncheck the **Use Throttle calibration** box next to the throttle calibration button in the **Throttle setup** page.

Viewing Throttle Profiles

To view a throttle profile, click the button to open up a drop down list of available profiles. There are 20 default throttle profiles.



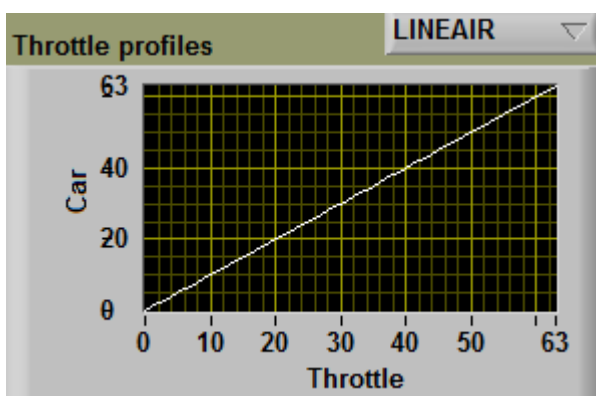
The horizontal axis displays the amount of travel of the throttle and the vertical axis shows the resulting power that the car will receive. The values used correspond to the 63 steps that the Scalextric controller has.

With the Linear profile when the throttle is half way through its range of travel (31.5) the car will receive 50% (31.5) of the maximum power available.

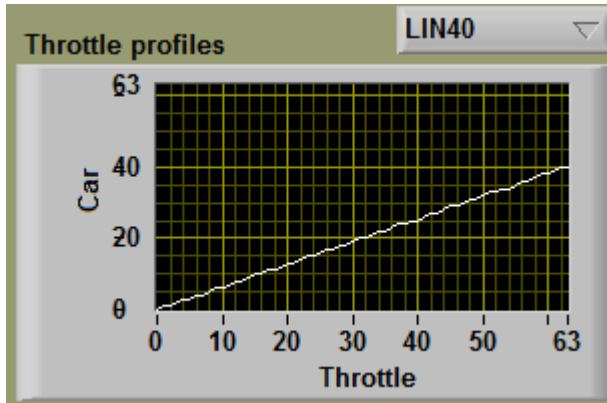
Some Profiles Explained

Linear

Standard linear response. Power will increase proportionally with amount of throttle movement. The screenshot below shows a linear throttle profile that reaches maximum power (63).

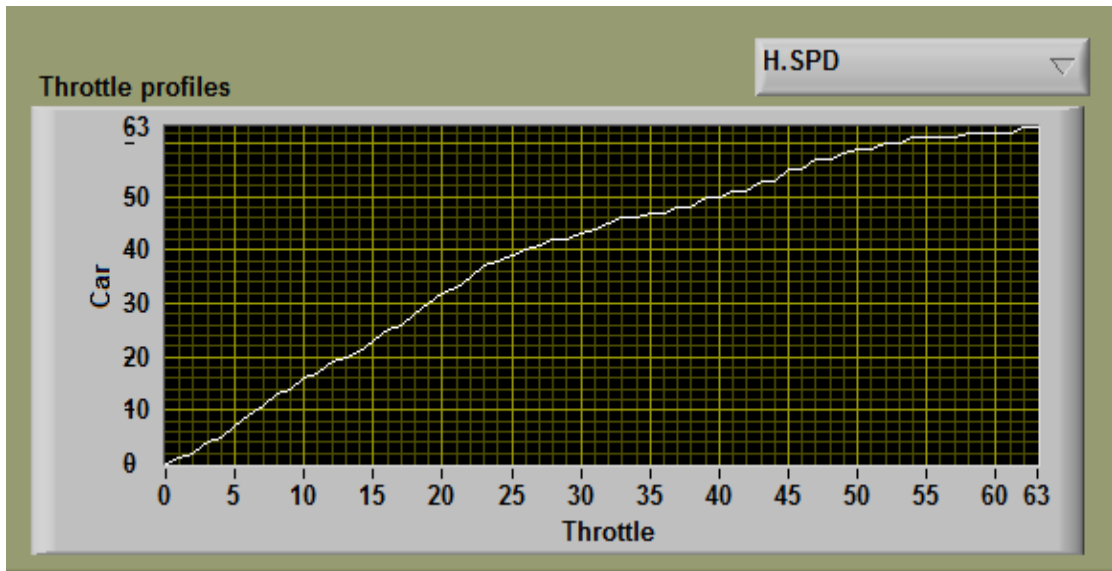


The screenshot below shows a linear throttle profile with power limited to 40 (63% power).



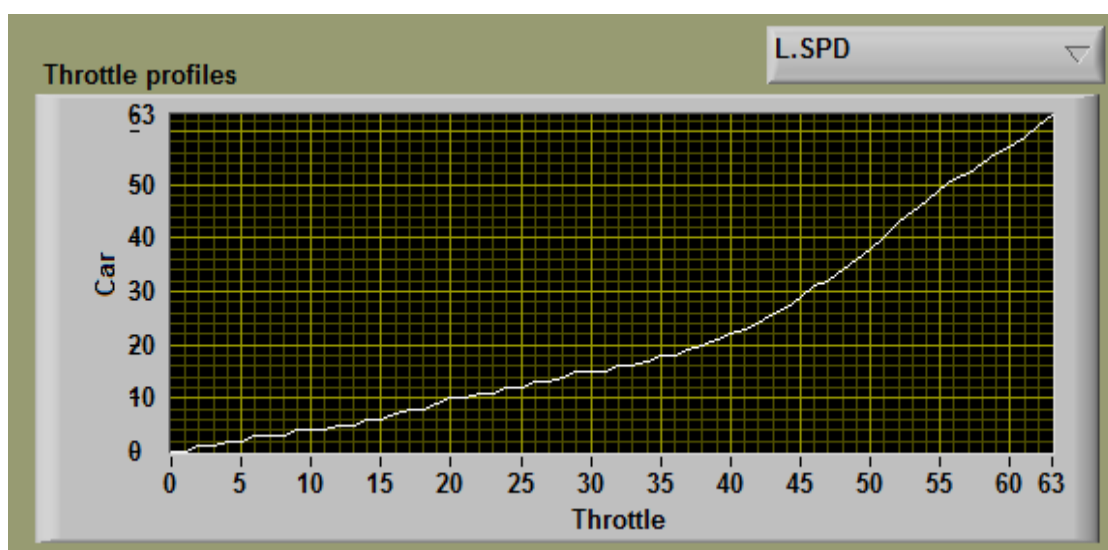
Appendix 1 has a chart with values for other linear throttle profiles that do not reach maximum power but use the full throttle range. You can also set this profile up easily by using the interpolate button in the profile editor screen.

High Speed (H.SPД)



Power will increase quickly within the first 50% of throttle movement and slowly for the remaining 50% of throttle movement. For heavy cars with lots of magnet – fast acceleration with little throttle movement. H.SPД also has variations + and - which have slightly different power increase and decrease values but is a similar curve to H.SPД.

Low Speed (L.SPD):



Initial throttle trigger movements give only small increases in power. The final 50% of throttle movement gives large increase in power. This profile gives more control in the first 50% of throttle movement. Especially for higher RPM motors (Scalextric F1 for example) tight technical circuits, children and beginners.

L.SPD also has variations + and – which have slightly different power increase and decrease values but is a similar curve to L.SPD.

Reloading Default Profiles

Use the **Load default profiles** button to reload default profiles in the event that the defaults are lost or edited in error. This can happen when editing profiles in the **Edit Profiles** screen which is discussed next.

Editing Profiles

To enter the Profile Editor dialog box click on the **Edit Profiles** button.

The screenshot shows the 'Profile editor.vi' window. The 'Available Profiles' table is as follows:

	0	1	2	3	4	5	6	7	8	9	10	11	12	13
F.START	0	21	22	23	24	25	26	27	28	29	30	31	32	33
F.ST.SOFT	0	20	21	21	22	22	23	23	24	24	25	25	26	26
H.SPD	0	1	2	4	5	7	9	11	13	14	16	17	19	20
H.SPD +1	0	1	2	3	4	6	8	9	11	12	13	14	15	16
H.SPD -1	0	1	3	5	7	10	12	15	16	18	20	22	24	26
LINEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13
L.TRVL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L.TRVL.SHRT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L.SPD	0	0	1	1	2	2	3	3	3	4	4	4	5	5
L.SPD +1	0	0	1	1	2	2	2	2	2	3	3	3	3	4
L.SPD -1	0	0	1	2	2	3	3	3	4	5	5	6	6	7
S-CURVE	0	1	1	2	3	4	5	6	7	8	9	10	11	12

The 'Editable profile' table is as follows:

	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
F.START	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56

The column headings are the throttle values:- 0 = No throttle travel, 31/32 = 50% throttle travel, 63 = 100% throttle travel. The editable text boxes are for available car power. It is also possible to change the name of the profile by simply clicking on the profile name, editing and exiting.

To edit a profile's characteristics highlight the profile you wish to edit - the profile data will appear in the **Editable profile** area of the window. Then, simply change the values in the text boxes and exit.

Click the **Reload** button to update the graph, which will enable you to view the edited profile.

To create a new profile, click one of the **New** buttons (**Default** or **Clean**). A profile named 'New' will be created at the bottom of the **Available Profiles** text boxes.

When you click on the **New (default)** button the default linear profile power values will show up in the editable text boxes. Simply edit these values as you would for any other default throttle profile.

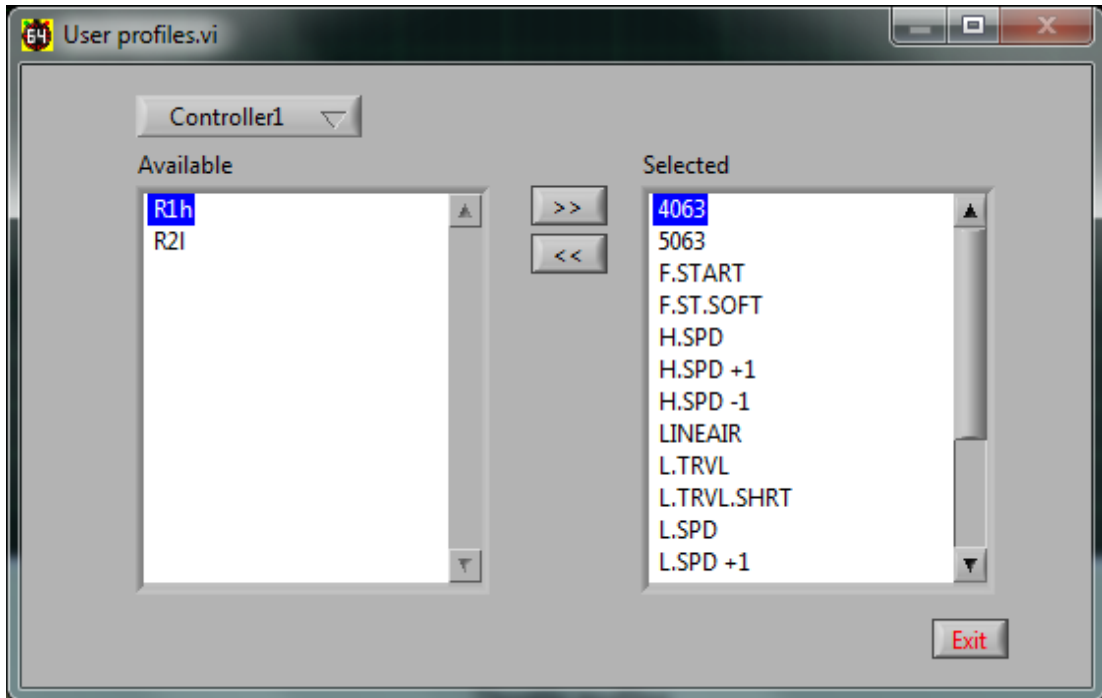
When you click on the **New (Clean)** button the editable text boxes will show up without any power values. Enter a few power values in the text boxes and press the **Interpolate** button. RCS64 will fill in all of the missing values for you – click the **Reload** button to view the profile that you have created. Sort of renders Appendix 1 as pointless (Thanks Martin!)

If you design your own throttle profile that you would like to share you can convert a profile into a file which you can then share with others. Use the **Convert** and **Load profile** buttons to do this.

Choosing Individual Controller Throttle Profiles

RCS64 allows you to change the throttle profile that you are using during a pit stop.

The default setting for each controller is to have 17 throttle profiles available during a pit stop. You can increase or decrease the number of available controller profiles by clicking on the **Set up controller profiles** button. Select the controller that you would like to edit. Highlight the profile that you would like to move. Click on one of the central buttons to either move it to the selected list or back to the available list. The profiles you have selected, are now selectable in the Advanced Pit Stop menu and **Cars/users** page.



- 📄 *Selecting throttle profiles is only related to controller at the present time, not driver*
- 📄 *Only 'enabled' controllers show up in drop down list.*
- 😊 *Say you only like 3 profiles, select them only. Now making a selection during a pit stop will be a lot easier as you will not have to scroll through all available options.*


Advanced Pit Stop Menu © (APM)

RCS64 is very proud to present the Advanced Pit Stop Menu (APM) a new way of making pit stops.

The Advanced Pit Stop Menu is used to:

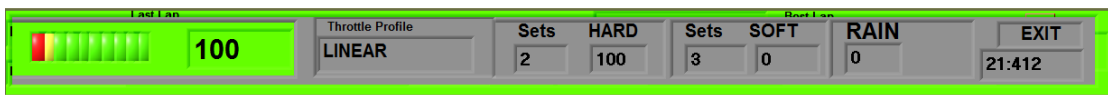
- *start and stop refuelling,*
- *change throttle profile,*
- *change tyres,*
- *repair damage*

To enter the APM you need to stop your car and then press the Lane Change (LC) and Brake buttons on your controller simultaneously (or just LC if that option is set) and keep them pressed until the APM is shown in your dashboard or leader board.

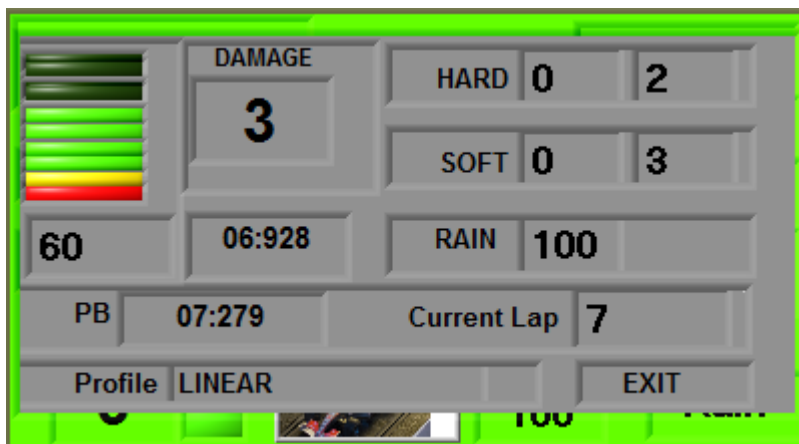
 *You must have had at least 1.5 sec of throttle prior to trying to enter the Advanced Pit Stop Menu or you will not be allowed to enter it. This is to stop drivers entering the APM more than once and being awarded more than one lap for entering pit lane, if **add lap after pit lane use** is checked.*

When the APM becomes visible, you can jump through the available options using the LC button on your controller. To confirm your selection press the BRAKE button on your controller.

Advanced Pit Stop Menu for Practice/Qualifying



Advanced Pit Stop Menu in GP/Endurance Mode



As you can see the GP/Endurance APM also shows your personal best lap time, your current lap number plus has a damage repair option.

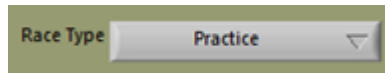
How to Refuel Using APM

So, for refuelling;

1. Drive into the pits
2. Stop car
3. Press LC/BRK (Or just LC if you selected that option in main page) until menu opens (screen greys out). Power is cut.
4. Tap LC button once to highlight the refuelling option.
5. Press BRK button to start refuelling. Refuelling will continue until you click the **exit** button.
6. Scroll, using the LC button, through the available options stopping to make further selections if required.
7. Or scroll through directly to the **exit** button where you can wait until you have received the required fuel load and then exit via clicking on the **exit** button.
8. On pressing exit power will return to your car so you can drive out.

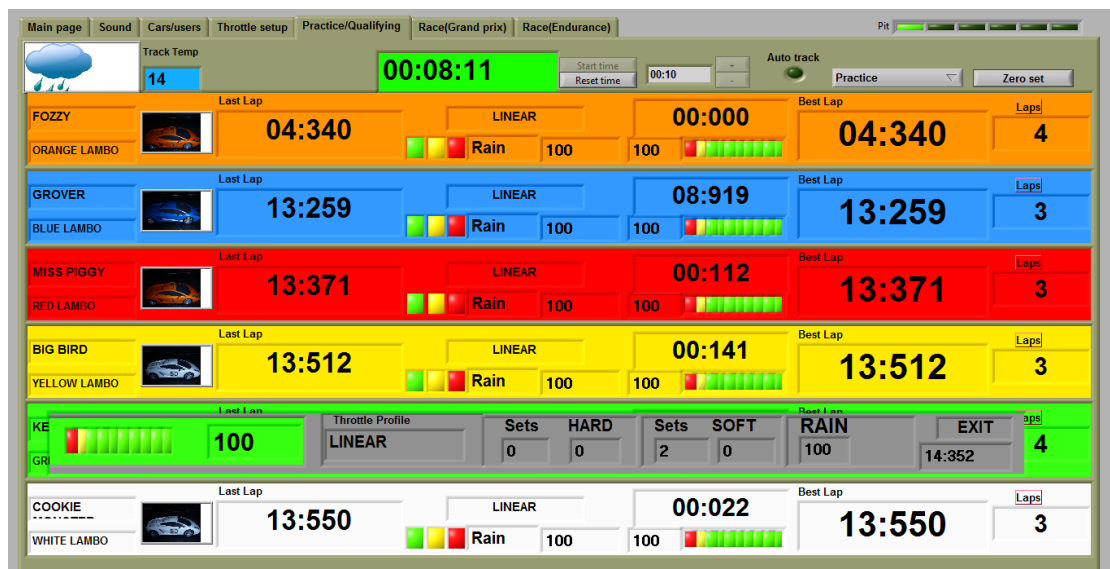
Practice/Qualifying Page

On opening the Practice/Qualifying page you will need to select Practice or Qualifying modes by using the **Race Type** button.



Practice Mode

To use the practice mode you only have to make sure that **practice** is selected under the **Race type** heading. Practice can be either timed or untimed. If a practice session is timed the weather function and track call can be used.



To use timed practice set the length of time (Hrs:sec) that you would like the session to last using the + and – buttons. After starting the practice session you can reset the session at any time.



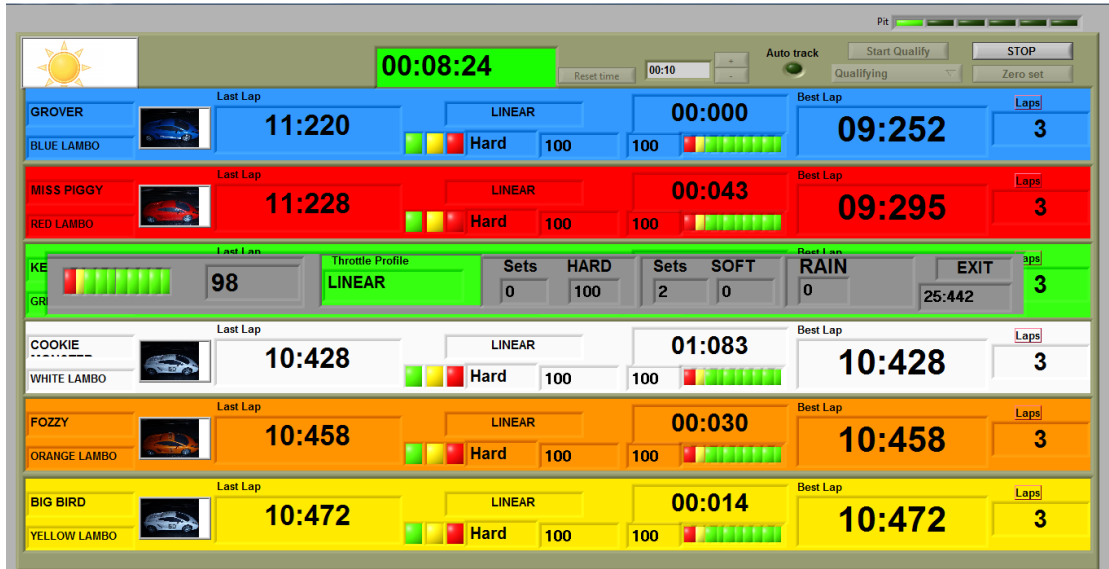
The green **Auto Track** LED will light when Auto track call is selected in main menu. The background to the timer will turn red when there is a track call.

The screen will change during the practice - always showing the car with the fastest lap time at the top. To reset race data to zero click the **Zero set** button.

- ☞ *If cars will not start, it may be that you are in qualifying mode not practice mode.*

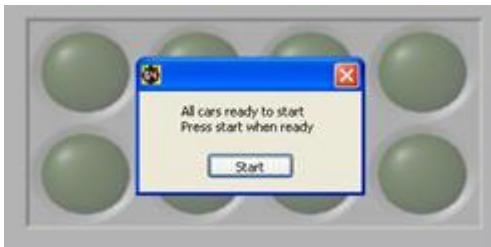
Qualifying Mode

To use the qualifying mode click **Qualifying** under the **race type** heading. Enter the length of the race that you want at the top of the screen.



TO START QUALIFYING YOU MUST PRESS THE 'START RACE' BUTTON OR NO POWER WILL BE SUPPLIED TO THE TRACK.

When you press the **Start qualifying** button a text box will appear asking if all cars are ready to race. Press start and the countdown will begin.



After both practice and qualifying you can see how much fuel you used by going to the Cars/Users page. If you wish to refuel your car, or all cars, you can do so by using either the **Refuel** buttons for each car or the **Refuel all cars** button. However, if you do not refuel, the level of fuel remaining at the end of the last session will be used for the next race/qualifying or practice session.

Screens for Practice and Qualifying

During Practice/qualifying the driver with the fastest lap time is shown at the top of the screen (leader board style). The colour set in the **Cars/users** page for each controller is used to easily identify that driver's information.

The information shown for each driver is as follows –



- Driver name and Car
- Picture of car
- Last lap time (recorded to 1000 th of a second)
- Throttle profile being used
- 3 LEDs for tyre wear
- Tyre chosen
- % tyre wear
- Difference between drivers fastest lap time and the driver placed immediately in front's fastest lap time
- Numeric value for fuel level (% of fuel remaining)
- LCDs showing fuel level
- Best lap time
- Number of laps completed.

At the end of qualifying an HTML screen will appear showing a summary of the results.

Result from Race(Qualify)

Track name : Monza

Place	Driver	Car	LAPS	Best lap	Average time	Scale distance(KM)	Real distance(M)	Average Speed(km/h)	Scale Average Speed	Pitstops	Pit stop verage time	Best pit stop time	Stop&Go
1	Oscar	Yellow Lambo	10	06:84:261	16:31:551	6.08	190.00	4.19	134.15	0	00:00:000	00:00:000	0
2	Cookie Monster	White Lambo	10	06:90:721	07:03:256	6.08	190.00	9.73	311.24	0	00:00:000	00:00:000	0
3	Kermit	Red Lambo	10	07:06:771	07:38:386	6.08	190.00	9.26	296.43	0	00:00:000	00:00:000	0
4	Fozzy	Orange Lambo	10	07:35:191	10:07:608	6.08	190.00	6.79	217.23	0	00:00:000	00:00:000	0
5	Barney	Blue Lambo	10	07:38:679	13:45:640	6.08	190.00	5.08	162.66	0	00:00:000	00:00:000	0
6	Miss Piggy	Green Lambo	10	07:69:415	08:31:244	6.08	190.00	8.23	263.32	0	00:00:000	00:00:000	0

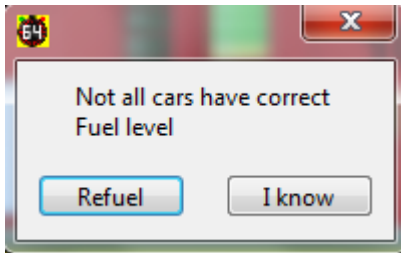
Date/Time : 06/10/2012 12:30 PM

@Copyright by Martin Schmidt

Race (Grand Prix) Page

Race (Grand Prix) is a lap limited race. Go to the Main Page to adjust settings such as number of laps, track calls etc. Choose the drivers and cars in the Cars/Users page.

Click on start race. If your cars are not all fully refuelled, you will be asked if you wish to refuel them now.



If you click **Refuel** all cars tanks will be fuelled. A window will appear asking if all cars are ready to start. Click ready and the starting lights will start the countdown. No power is available before the last light goes out, however fuel is being burnt if the throttle is applied prior to the start. As soon as the race starts your tanks will show up as full if you chose to fill it.

Grand Prix Screen

At the top of the page the current leader, best lap time, and the number of laps completed/laps to be completed (e.g.12/50) is shown. An LED is in the top right corner which shows whether the automated track call setting has been enabled or not. The current weather is also shown and the track temperature.

The second row shows at a glance which driver is in which position. This information changes as race positions change during the race. Driver name and the number of laps behind the leader are shown in each box.

You can stop the race at any time with the **Stop race** button, and then reset race data by pressing the **Reset race** button.

The status of the race is shown at the bottom of the screen - Race is Running, Track Call, Waiting for all drivers to pass, Race Finished etc.

Grand Prix Dashboard

The screen for Grand Prix races has an individual dashboard for each driver that stays stationary on the screen during the race.



The number of laps completed by the driver is shown in large text in the top left corner of the dashboard.

The number of 'Stop&Go' penalties and pit stops is at the top of the dashboard - LEDs underneath light up when lane change and brake button are pressed.

The last lap time is in the top right corner.

The LED in the top right corner will change from green to red if a Stop&Go penalty is given to the driver. ID number is to the left of this LED.

Driver name is on the left and the car name is on the right. To the right of the driver name is the driver's current race position.

Throttle profile chosen is under the driver's name.

Two rows of vertical LED's showing throttle position and fuel level are in the centre of the screen with a large text box to the left of it showing present fuel load (%).

The picture set for the car is shown in the picture window.

Damage value is shown at the bottom of the screen with a single LED.

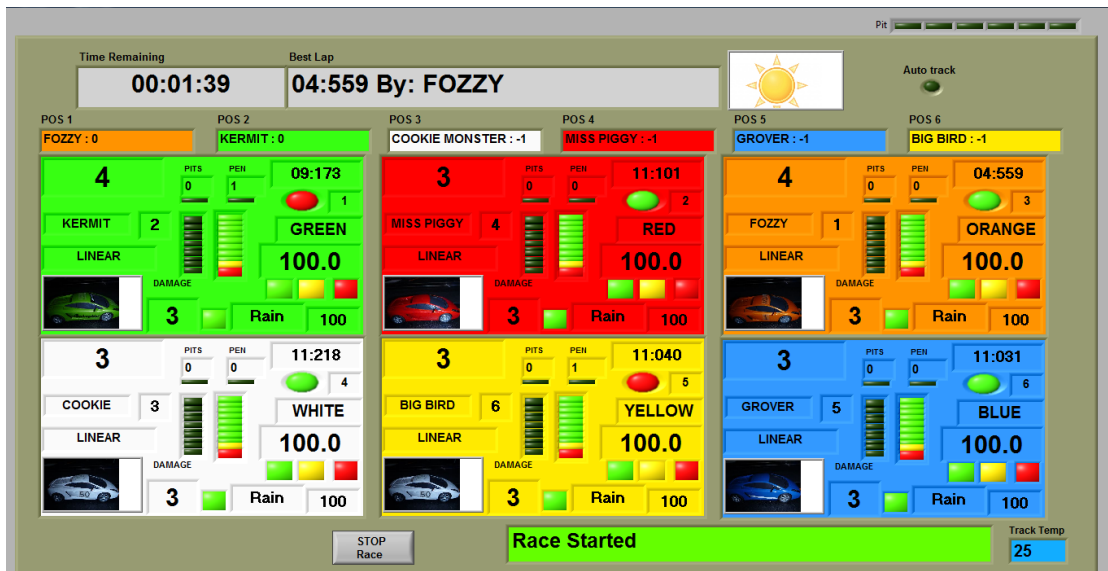
In the bottom right corner there are three LEDs showing the status of your tyres with a % value underneath and the tyres selected.

At the end of a Grand Prix race an HTML screen will appear showing a summary of the results.

Race (Endurance) Page

All the functions of the Endurance race mode are the same as for the Grand Prix race mode, except for the time remaining in the race is shown in the top left-hand corner instead of number of laps. Start the race using the **Start race** button. The race will end when the time has elapsed. The winner of the race is the car that has completed the most laps. If the laps completed are the same the winner is the car that completed the last full lap first – not necessarily the car that is in the lead when the time has elapsed.

Endurance Screen



☺ When using Endurance mode it makes sense to set the **Allowed laps with stop&go on**, which can be found on the main page, to zero.

At the end of an Endurance race an HTML screen will appear showing a summary of the results.

Pace Cars – A Workaround!

RCS64 does not, at present, support Pace Cars, however it is possible to get them working with a fairly high degree of success.

The key to getting them to work is to first set up some new throttle profiles. These profiles should look similar to this:

Editable profile																										
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Pace25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25

As you can see the 0 value for throttle travel is set to a corresponding power value of 25. So, when a controller is set to this Pace25 profile a car will move around the track even if the throttle isn't being pulled. You do not have to set all the values to the power value you want, it works with just the first 5 or 6 being set (I set them all due to my son picking up the pace cars controller by mistake one day and nearly burying one of my cars in a wall).

You can set up varying profiles to suit different cars. So with four cars on the track the fastest car might have their throttle profile set at Pace24 and the fastest car might have their throttle set at Pace26, with the other cars at Pace25. With this set up cars can be made to travel around the track at approximately the same pace. Be aware that the lane that a car is in will effect it's speed so you must allow for this also.

Pace cars cannot change lanes automatically; however lane change can be operated manually via the controllers. A fun game is to have one racer and one pace car operator – the pace car operator changes lanes to cause the driver problems!

To make sure the Pace Cars stop at the end of a race set the 'Safe Speed' to zero.

To stop the cars during a race click Stop Race and all cars will stop (not practice) or press space bar or the start button on the APB to initiate a track call (Endurance and GP mode only)

To stop practice sessions with pace cars you need to exit the practice session by clicking on one of the other race pages or the profile page.

Remember that this is only a workaround. Pace cars will be way better than this when they are actually added to RCS64.

Children and Beginners Using RCS64

RCS64 is a perfect Race Management System for use with Children and beginners to Slot Car Racing.

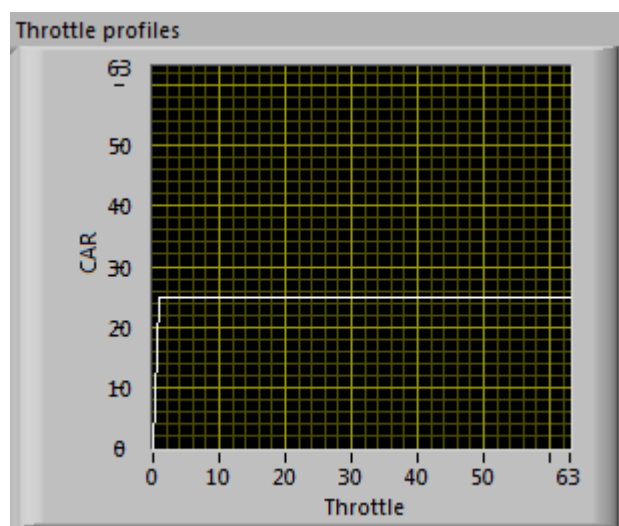
For racing with Children and beginners it is sensible to turn off the 'Burn Fuel' option – Children and beginners have enough to worry about let alone running out of fuel. If you want to burn fuel it may be easier to turn off fuel load simulation as well, as this is harder again to use.

Remember also that different lanes (and cars) require different driving, so it would be best to limit lane changing until drivers have mastered both lanes independently of each other.

The key to success, when using RCS64 with children and beginners, is setting up appropriate throttle profiles. Good throttle profiles make it easy for novice racers to stay on the track and gain maximum enjoyment from their slot car racing experience.

Child25

The following profile works well with very young children – as young as 2 years of age.

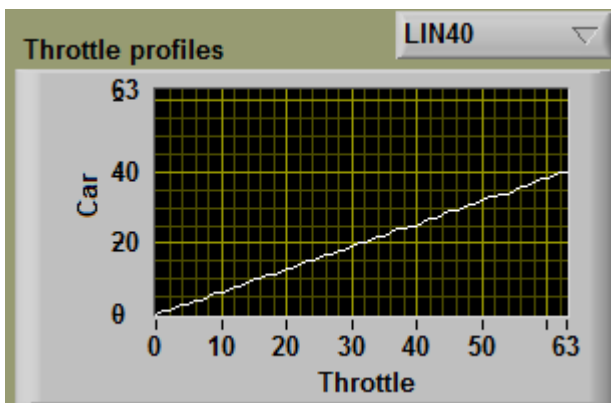


Editable profile

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Child25	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25

When the throttle is pressed the car moves. Set the profile to a speed that keeps the car on the track in both lanes. This profile enables even the youngest child to achieve success and feel that they are part of the action. You will need to avoid them because they can't slow down and they may stop at any moment.

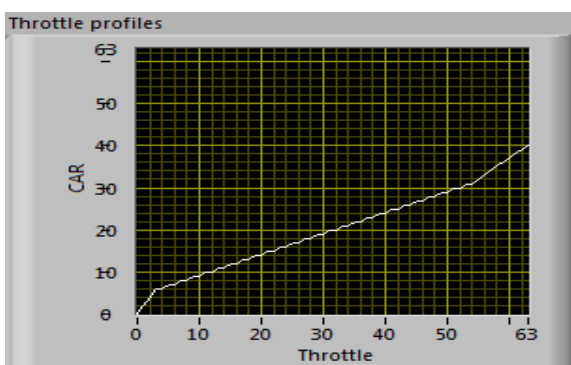
Linear (Restricted)



Set the maximum power just below deslot level on both tracks. This is perfect for young children who get frustrated by deslotting. They can race, change lanes and have lots of fun. You can also level car performance (approximately) using the same method as for the pace car workaround. A chart showing a full range of linear throttle curves is in Appendix 1.

Beginner40

The next profile works well with beginners and young children and gets them used to driving carefully around bends and accelerating down straights.



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Beginner40	0	2	4	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50		
17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29		
51	52	53	54	55	56	57	58	59	60	61	62	63														
30	30	31	31	32	33	34	35	36	37	38	39	40														

This profile has a lot of throttle travel at the start, very slow gradual rise in power with throttle movement in the middle, up to 30, and a linear rise in power at the end rising to a low power value of 40. The end of the middle section, which in this example is 30, should be equal to the max value that a pace car can travel around the track without deslotting. The maximum power value is set to 40 so that the driver can accelerate down straights however, crashes will not require major car rebuilds! Setting the Dynamic Brake option on will help cars slow quickly after the release of the throttle.

Using RCS64 you can make any profile you want – experiment and pass on your findings via SlotForum.

Pit Stop Management

RCS64 has four features that can be manipulated by the race designer to lead to highly strategic racing. With the correct race set up drivers will have choices as to which race strategy they will follow. They may decide to take on large fuel loads with limited pit stops or small fuel loads with many pit stops. The four features that can be manipulated are:

- Fuel burn
- Fuel simulation
- Tyre wear
- Weather

These features can be used together or on their own (Fuel simulation must be used in conjunction with Fuel burn). If none of the features are used there will be no need to make pit stops.

Pit stop Management using Fuel Burn

Making races where all drivers take a set number of pit stops during a race can be achieved through trial and error by varying cars' fuel tank size. However, the following section explains how to design race formats with set numbers of pit stops, of the same duration, using a more systematic approach. It is complicated and does have its limitations which are:

- *May not be able to be used with cars with large differences in fuel burn rates (Mini with an F1 car)*
- *The number of pit stops must be in a reasonable proportion to the race length e.g. **not** 5 pit stops in 2 minute race.*
- *Use similar throttle profiles for each driver – preferably linear with max power setting the same.*

Step 1: Determining Burn Rate and Average Lap Time (GP and Endurance)

Determine fuel burn rates and average lap times for all cars in the race.

Protocol:

- *Set **Burn Fuel** option on in main menu*
- *Set fuel tank size to 1000*
- *Use same controller for test*
- *Clean cars tyres and braids*

- *Use only one driver*
- *Do not change any settings between tests*
- *Use same lane – no lane changing*
- *No deslots*
- *Check car has full tank of fuel*
- *Start cars on starting grid near to APB sensors.*

In practice mode, race around the track as fast as possible until fuel runs out.

Take note of the time from start to when the car runs out of fuel and stops. For an accurate result get someone else to time while the other races.

Also, take note of how many complete laps it does and any parts of a lap that it completes. Record the distance to the nearest quarter of a lap for a reasonable level of accuracy.

Step 2: Calculating Burn Rates (GP and Endurance)

Calculate fuel burn rate for each car using the formula.

$$1000/\text{time to empty (sec)} = \text{Burn rate units/sec}$$

You now have a burn rate for each car for the track that you are using. If you use the same cars and the same track configuration you can record the results and use them each time you come to do a race.

Setting up a Grand Prix race

Decide on the number of laps that the race will last.

Also, decide on the number of pit stops that you want the cars to have to take.

Average Lap Time Calculation

To work out the average lap time use the following formula.

$$\text{Time to Empty/Laps Completed} = \text{Average Lap Time}$$

Race Duration Calculation

Once you have found out the average lap time for each car use the formula below to obtain the length of time that each car will take to complete the set number of laps.

$$\text{Average Lap Time} \times \text{Number of Laps} = \text{Race Duration}$$

Fuel Usage Calculation

Now, using the results from the two tests (burn rate and race duration), you need to work out the fuel usage for each car using the following formula.

$$\text{Fuel Burn Rate (units/sec)} \times \text{Race Duration (sec)} = \text{Fuel Usage (units)}.$$

- ☞ *If you don't want pits stops, just make sure you set tank size to above the value of the car with the highest fuel usage.*

Mid. Fuel Use Value Calculation

Now you have determined the fuel usage for each car you need to determine the middle fuel usage value.

$$(\text{Highest Fuel Usage} + \text{Lowest Fuel Usage})/2 = \text{Mid. Fuel Usage value}$$

Fuel Tank Size Setting Calculation

Now, using the middle fuel usage value, use the formula to find the fuel tank size setting for all cars.

$$\text{Middle Fuel Usage}/\text{number of pit stops} + 0.5 = \text{Fuel Tank Size (all cars)}$$

Checking Fuel Tank Size Setting

To check that the value you have obtained will work with the number of pit stops chosen use the following formula.

$$\text{Fuel Tank Size} \times \text{Number of Pit stops} = \text{Fuel used before final pit stop}$$

If the value is higher than the fuel usage value for the car with the lowest fuel usage value then you will have to reduce the number of pit stops.

Setting Refuel Speed

To set the **Refuel Speed** correctly you will have to decide how long you would like refuelling (empty to full) to take.

Refuelling may affect the way drivers choose to drive a race. A long refuel time (10% of race time) may make drivers drive slower, in effect lowering their Burn Rate, so that they can avoid pitting. A short amount of refuelling time (5% of race time) will make drivers drive at full speed with no thought of avoiding pit stops. A refuelling rate of around 7% should make the driver consider both options, full speed or slowing to save fuel.

Then using your newly calculated tank size setting and the refuelling time required, you can determine the **Refuel Speed** setting by using the chart (Fig 1) below.

Refuel Speed Setting Chart

Tank Size (units)	Refuelling Time Required (Sec)																
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
300	13	17	20	23	27	30	33	37	40	43	47	50					
350	11	14	17	20	23	26	29	31	34	37	40	43	46	49			
400	10	12	15	18	20	23	25	27	30	33	35	38	40	42	45	47	50
450	9	11	13	16	18	20	22	24	27	29	31	33	37	38	40	42	44
500	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
550	7	9	11	13	15	16	18	20	22	24	25	27	29	31	33	35	36
600	7	8	10	12	13	15	17	18	20	22	23	25	27	28	30	32	33
650	6	8	9	11	12	14	15	17	18	20	22	23	25	26	28	29	31
700	6	7	9	10	11	13	14	16	17	19	20	21	23	24	26	27	29
750	5	7	8	9	11	12	13	15	16	17	19	20	21	23	24	25	27
800	5	6	7	9	10	11	12	14	15	16	17	19	20	21	22	24	25
850	5	6	7	8	9	11	12	13	14	15	16	18	19	20	21	22	24
900	4	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22
950	4	5	6	7	8	9	11	12	13	14	15	16	17	18	19	20	21
1000	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1050	4	5	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19
1100	4	5	5	6	7	8	9	10	11	12	13	14	15	16	16	17	18
1150	3	4	5	6	7	8	9	10	10	11	12	13	14	15	16	17	17
1200	3	4	5	6	7	8	8	9	10	11	12	12	13	14	15	16	17
1250	3	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16
1300	3	4	5	5	6	7	8	8	9	10	11	11	12	13	14	15	15
1350	3	4	4	5	6	7	7	8	9	10	10	10	12	13	13	14	15
1400	3	4	4	5	6	6	7	8	9	9	10	10	11	12	13	14	14
1450	3	3	4	5	6	6	7	8	8	9	10	10	11	12	12	13	14
1500	3	3	4	5	5	6	7	7	8	9	9	10	11	11	12	13	13
1550	3	3	4	4	5	6	6	7	8	8	9	10	10	11	12	12	13
1600	2	3	4	4	5	6	6	7	8	8	9	9	10	11	11	12	12
1650	2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	11	12
1700	2	3	4	4	5	5	6	6	7	8	8	9	9	10	11	11	12
1750	2	3	3	4	5	5	6	6	7	7	8	9	9	10	10	11	11
1800	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10	10	11
1850	2	3	3	4	4	5	5	6	6	7	8	8	9	9	10	10	11
1900	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	11
1950	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	9	10
2000	2	2	3	3	4	4	5	6	6	6	7	8	8	9	9	9	10
2050	2	2	3	3	4	4	5	5	6	6	7	7	8	9	9	9	10
2100	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
2150	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8	9	9
2200	2	2	3	3	4	4	5	5	6	6	7	7	8	8	8	8	9
2250	2	2	3	3	4	4	4	5	5	6	6	7	7	8	8	8	9
2300	2	2	3	3	3	4	4	5	5	6	6	7	7	8	8	8	9
2350	2	2	3	3	3	4	4	5	5	6	6	6	7	8	8	8	9
2400	2	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8	9
2450	2	2	2	3	3	4	4	4	5	5	6	6	7	7	8	8	8
2500	2	2	2	3	3	4	4	4	5	5	6	6	6	7	8	8	8
2550	2	2	2	3	3	4	4	4	5	5	5	6	6				
2600	2	2	2	3	3	3	4	4	5	5	5	6	6				
2650	2	2	2	3	3	3	4	4	5	5	5	6	6				
2700	2	2	2	3	3	3	4	4	4	5	5	6	6				
2750	2	2	2	3	3	3	4	4	4	5	5	6	6				
2800	2	2	2	2	3	3	4	4	4	5	5	6	6				
2850	2	2	2	2	3	3	4	4	4	5	5	6	6				
2900	2	2	2	2	3	3	3	4	4	4	5	6	6				
2950	1	2	2	2	3	3	3	4	4	4	5	6	5				
3000	1	2	2	2	3	3	3	4	4	4	5	6	5				

Figure 1 Setting Refuel Speed using Fuel Tank Size Settings (units) and Required Pit Stop Duration (sec)

Race Settings

You now have all the race settings that you require. Make sure that you have done the following and then you are ready to race:

- *Set Number of Laps in Main Menu,*
- *Set Refuel Speed in the Main Menu*
- *Set Fuel Tank Size (all cars) for each car in the individual Cars/users menu*
- *Refuel all cars*
- *Check Burn Fuel is on.*

Setting up an Endurance Race

Decide on the length of time that the race will take and the number of pit stops required.

Fuel Use Calculation

Now, using race duration and fuel burn rate (which you worked out earlier) you need to work out the fuel usage for each car using the following formula.

$$\text{Fuel Burn Rate (units/sec)} \times \text{Race Duration (sec)} = \text{Fuel Usage (units)}.$$

- ☞ *If you don't want pits stops, make sure you set fuel tank size to above the value of the car with the highest fuel usage.*

Mid. Fuel Use Value Calculation

Now you have determined the fuel usage for each car, you need to determine the middle fuel usage value.

$$(\text{Highest Fuel Usage} + \text{Lowest Fuel Usage})/2 = \text{Mid. Fuel Usage value}$$

Pit Stop and Unused Fuel

Due to the fact that Endurance races are timed races, you need to make an allowance for the time taken to refuel - due to the fact that you will not be burning fuel at that time.

1. *To do this, determine the length of time that you would like each pit stop to take - multiply this number by the number of pit stops, to obtain the length of time taken refuelling.*
2. *Then, use the following formula to work out the amount of fuel that was **not used** due to the time spent refuelling:*

$$\text{Total Refuel Time} \times \text{Fuel Burn Rate} = \text{Fuel not burnt due to refuelling in pits}$$

3. *Take this number away from the Mid. Fuel Usage value.*

$$\text{Mid. Fuel Usage value} - \text{Fuel Not Burnt} = \text{revised Mid. Fuel Usage value}$$

Fuel Tank Size Setting Calculation

Now use the formula below to determine the fuel tank size setting.

$$\text{Revised Mid. Fuel Usage/Number of Pit Stops} + 0.5 = \text{Fuel Tank Size (all cars)}$$

Checking Fuel Tank Size Setting

To check that the value you have obtained will work with the number of pit stops chosen use the following formula.

$$\text{Fuel Tank Size} \times \text{Number of Pit Stops} = \text{Fuel used before final pit stop}$$

If the value is higher than the fuel usage value for the car with the lowest fuel usage value then you will have to reduce the number of pit stops.

Setting Refuel Speed

To set the **Refuel Speed** correctly you will have to decide how long you would like refuelling (empty to full) to take.

Refuelling may affect the way drivers choose to drive a race. A long refuel time (10% of race time) may make drivers drive slower, in effect lowering their Burn Rate, so that they can avoid pitting. A short amount of refuelling time (5% of race time) will make drivers drive at full speed with no thought of avoiding pit stops. A refuelling rate of around 7% should make the driver consider both options, full speed or slowing to save fuel.

Then using your newly calculated tank size setting and the refuelling time required, you can determine the **Refuel Speed** setting by using the chart (Fig 1) above.

Race Settings

You now have all the race settings that you require. Make sure that you have done the following and then you are ready to race:

- *Set Time of Race in Main Menu,*
- *Refuel Speed in the Main Menu*
- *Set Fuel Tank Size (all cars) for each car in the individual Cars/users menu*
- *Refuel all cars*
- *Check Burn Fuel is on.*

Wow that was easy! Now write down your results so that you can use the same information next time you race.

Looking forward to the day when RCS64 can do it all for you!

Race Computations Form

RACE DATE:-

Car	Burn Rate Test Time (A) (sec)	Burn Rate (B) (Units/sec) $1000/A$	Laps Completed (Z)	Average Lap Time (sec) (C) A/Z	Fuel Usage (Units/sec) (CxD)B	Lowest/Highest Fuel Usage (E) and (F)

GRAND PRIX

No. of Laps (D) =

No. of Mand. Pit Stops (H) =

Pit Stop Time (sec) =

Results

Lowest Fuel Usage (E) =

Highest Fuel Usage (F) =

Middle Fuel Usage (G) $(E + F)/2$ =

Settings

Fuel Tank Setting $(G/(H+0.5))$ =

Refuel Speed Setting (Fig.1) =

ENDURANCE

Race Time (sec) (J) =

No. of Mandatory Pit Stops (N) =

Pit Stop Time (sec) (M) =

Results

Lowest Fuel Usage (E) =

Highest Fuel Usage (F) =

Middle Fuel Usage (G) $(E + F)/2$ =

Length of Time in Pits (sec) (P) $(M \times N)$ =

Unburnt Fuel (units) (Q) $(P \times \text{lowest B value})$ =

Revised Fuel Usage (units) (R) $(G - Q)$ =

Settings

Fuel Tank Setting $(R/(N+0.5))$ =

Refuel Speed Setting (Fig.1) =

Troubleshooting

After having run a considerable number of laps using RCS64 I have found very few problems with the actual software. The vast majority of times the problems I encounter are due to my own ineptitude - I just have to stop kicking the computer, calm down and look for the mistake I have made.

Software cannot 'see' powerbase.

- *Do you have the correct cable? See RCS64 website or contact RichG.*
- *Check cable connection between computer and powerbase*
- *Is powerbase functioning? Remove aux port cable from powerbase. Test powerbase.*
- *Is the cable functioning correctly? Incorrect use of cable can cause problems. Refer to manufactures instructions.*
- *Are you running Windows 7 or Windows XP? RCS64 has only been tested on these.*

Cars stuttering around track.

- *Unlikely to be software issue.*
- *Check track connections are good. See SlotForum.com for more details.*
- *Clean track using Inox. See SlotForum.com for more details.*

Powerbase shorting out.

- *Unlikely to be software issue.*
- *Check for metal objects touching track rails. Vacuum track to get out difficult to see objects.*
- *Do you have old style lane changers that have not been modified? See SlotForum.com for more details.*

Car moves without touching the trigger.

- *Check controller's throttle map – is throttle returning to zero (white line at very bottom of graph)? If not recalibrate controller.*
- *Check profile set for controller – at throttle setting 0, is car setting at 0? If not change car setting to 0.*

Car does not drive at expected speed with a set throttle profile.

- *May happen if Burn Fuel is off and individual power setting is set.*

At race end some cars stop, others do not.

- *Check individual cars safe speeds and set as required*

Car acts like pace car when it is raining.

- *Check that your controller is calibrated correctly (returns to zero). Calibrate controller so that it returns to zero.*

Car won't move

- *Check that a throttle profile is selected.*

Car won't move but fuel being burnt

- *Check for other issues - last resort - reload default settings*

Known Issues

- *Poor screen quality using Windows 7 – Change screen resolution settings to optimize image quality. This is a known issue which will be resolved in the near future.*

Appendices

Appendix 1: Linear Throttle Profile Settings

