# RADICAL RXC GT3
# OWNERS MANUAL

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*V1.3*

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# INTRODUCTION

Dear Radical Owner,

Thank you for purchasing your Radical RXC GT3 and 'welcome' to the worldwide Radical family.

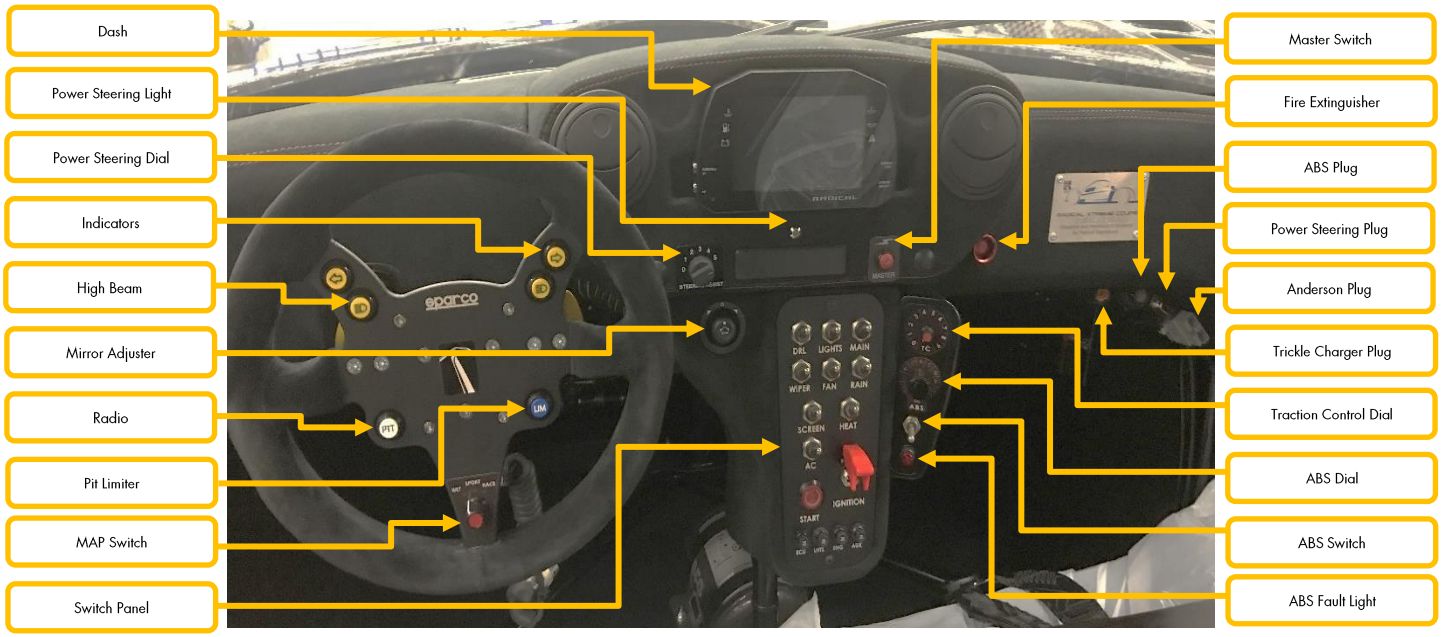
Since its launch in 2013 we have continually developed, refined and improved the RXC model range. The latest offering now ranges from the road friendly track day 600R to international endurance winning GT3 race specification. The popular concept has also been redesigned into an open top race car, the RXC Spyder. This owner's manual focuses on the race specification GT3, but all the technical information is relevant to the entire model range.

If properly maintained your GT3 will give you an amazing driving experience, every time you head down the pit lane. Although your car has been built and thoroughly inspected at the Peterborough factory prior to you reading this, please take the time to read through this manual to expand your knowledge of the car. This manual aims to guide you through every aspect of running and maintaining your car.

You will find any further help and support via our website www.radicalsportscars.com or alternatively please contact your local dealer. Parts and consumables can be purchased through our online store, whilst any race series information, sales or technical advice you may need is just an email away.

# 1. INTRODUCTION TO YOUR CAR

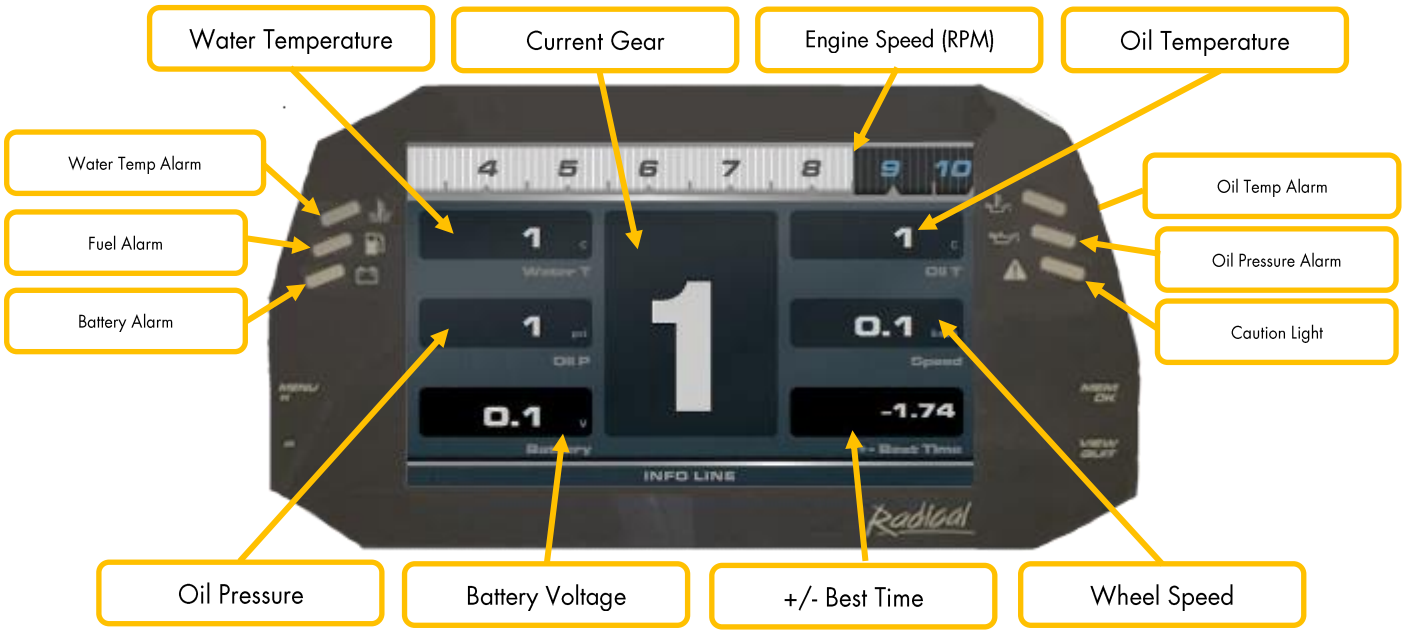
## 1.1 COCKPIT LAYOUT




## 1.2 SWITCH PANEL

| Switch Panel | |
|---|---|
| Label | Function |
| DRL | Daytime Running Lights |
| Lights | Headlights |
| Main | Main Beam |
| Wiper | Window Wipers on/off |
| Fan | Cockpit Cooling Fan |
| Rain | Rainlight |
| Screen | Heated Screen |
| Heat | Cockpit Heater |
| AC | Air Conditioning |
| Ignition | Ignition Switch |
| Start | Starter Button |
| ECU | Circuit Breakers (25A/35A) |

## 1.3 DASH CONFIGURATION




## 1.4 ALARMS

| Dash Alarms | | |
|---|---|---|
| **Alarm** | **Condition** | **Warning Lights** |
| High Water Trip | engineEnable=ECT Trip | High Water Temp Alarm Flashing Red + Warning Light Cont. Red |
| Engine Cold | EOT<45 & RPM>5000 | High Water Temp Alarm Cont. Cyan + Warning Light Cont. Yellow |
| Fuel Press Trip | engineEnable=FP Trip | Low Fuel Alarm Flashing Red + Warning Light Cont. Red |
| Oil Pressure Trip | engineEnable=EOP Trip | Warning Light Flashing Yellow Low Oil Pressure Cont. Red |
| Shift Light | RPM=6950 | All Lights Flashing Cyan |
| Low Oil Pressure | EOP<25 & RPM>2000 | Warning Light Cont. Yellow |
| High Water Temp | ECTOUT>95 | High Water Temp Alarm Flashing Red |
| High Oil Temp | EOT>115 | High Oil Temp Alarm Cont. Red |
| High Gbox Temp | GBT>130 | High Oil Temp Alarm Flashing Red |
| ABS Fault | ABS Light=On | 'ABS Fault' |
| Low Fuel Pressure | FP1<3.0 & RPM>50 | Low Fuel Alarm Cont. Yellow |
| Low Oil Temp | EOT<50 | High Oil Temp Alarm Cont. Blue |
| Low Water Temp | ECTOUT<60 | Water Temp Alarm Cont. Blue |
| Low Battery V | VBAT<11.6 | Battery Alarm Cont. Cyan |
| Pit Limiter | Pit Switch=On | Warning Light Cont. Green |
| ABS Active | ABS On | Water/Oil Temp Alarm Flashing White |
| TC Active | Traction=On | Battery/Warning Alarm Flashing Magenta |

## 1.5 DASH PAGES

Page 1 – General Running Page

Page 2 – Warm-up/Check Page

Page 3 – Traction/ABS Page

Page 4 – Brake Bias Page

## 1.6 ELECTRICAL HARDWARE LOCATION

On the left-hand side of the RXC cockpit you will find an access panel, this houses the ECU and GDI (which control the direct injection).

To remove the ECU, undo the 4 bolts holding the plate on, then the two bolts in the bracket for the ECU. Then pull the silver clip upwards to an upright position. The connecting hairbrush can then be rotated off the ECU. To refit repeat these steps in reverse.

## 2. RUNNING YOUR CAR

To ensure the reliability of your car we would strongly recommend following this procedure every time you start running your RXC. Despite all the thorough checks which are carried out on all our cars before they leave the factory, it is important you also do some basic checks before you take the car to the track for the first time.

- Before starting the car; check all fluid levels, water, brake, clutch and engine oil. Be sure there is oil in the tank before starting the vehicle.
- If the car has been shipped be sure to check the toes. Make sure the battery is charged and hasn't run flat during transit. Also make sure the fire extinguisher pin has been removed.
- To make sure the system is well lubricated, 'dry crank' the engine by pressing the starter button down for a few seconds before turning the ignition on. This should be carried out whilst checking the dash in order to display some level of oil pressure.
- Ensure there is a sufficient amount of fuel in the car. We strongly advise a minimum of 98 Octane fuel to be run. If you experience any engine related issues, contact engines@radicalsportscars.com

***Dry Crank –*** Before starting the car ensure the oiling system is well lubricated, 'dry crank' the engine by pressing the starter button for a few seconds before turning the ignition on. Keep an eye on the dash to check for oil pressure being displayed.

***Warming up the Car -*** Start the engine and leave to idle until the water gets above 80°C and the oil has warmed up. The oil will take longer to heat up than the water meaning you will need to switch the engine off when water reaches 80°C and allow the engine to rest for a short time whilst the water cools down before running up the engine again to get the oil up to temperature.

***Oil Check -*** When the oil temperature is over 50°C raise the RPM to 4,000 for 5 seconds to scavenge the oil, and switch the engine off. Using the dipstick, check the oil level; the oil level should be in between the minimum and maximum marks of the dipstick. If the car requires oil, it is recommended to follow the same process of holding the RPM at 4000 for 5 seconds, to re check the oil level.

### 2.1 PRE-SESSION CHECKS

- Torque the wheels to 260lb/ft. Fit the safety retaining clips
  Use the tyre guide to get a rough idea on starting tyre pressures and ensure these are set
- Double check the fire extinguisher system is set to active or the pin is out of the lever.
- Dependent on conditions, you may need to blank off the front cooling intakes in order to get the temperatures up whilst out on circuit, use tape to do this.
- Ensure the mirrors are all in the correct position.

Target engine running temperatures:

| ***Parameter*** | ***Temperature (C°)*** |
|---|---|
| Oil Temperature (EOT) | 90 – 110 |
| Water Temperature (ECT) | 70– 90 |

## STARTING THE CAR

To start the car, turn on the master switch and wait for the dash to load. Switch the ignition on. You can now press the starter to turn over the starter motor.

## IMPORTANT NOTE

As with any race car, it is important to put the car in neutral and release the clutch when stationary with the engine running. This will significantly reduce clutch wear. Ensure the car is always started in neutral.

## PADDLESHIFT CONTROLS

- To pull away, depress the Clutch and shift up to get to first. Once you have pulled away in first gear you can then shift up as normal all the way to 6th.
- The RXC is fitted with an auto blipper and ignition cut controls. This allows you to flatshift up the gearbox and means you ***do not*** have to blip the throttle on the way down the gearbox.
- The paddleshift system has safety controls that can override paddle requests help to reduce damage to the engine caused by overrevs. Because of this the system may deny shift requests if the rpm is too high for a downshift or you are still applying throttle whilst trying to downshift. These safety overrides are explained in more detail in the Radical Data Manual.
- When stopping the car and wanting to select neutral remember it is between first and reverse gear. To select neutral when the car is traveling at low speeds or has stopped; hold the clutch down and shift down from first.

The gear order is shown below:

***R → N → 1 → 2 → 3 → 4 → 5 → 6***

## STOPPING THE CAR

Leave the car running for a minute or two to keep the turbos fed with oil and water, make sure the temperatures are not getting too high. Use the ignition switch to turn off the car. Do not turn the car off via the master switch, unless in an emergency. Keeping the master switch turned on after the engine has stopped running allows the cooling fan and pump to continue to run if required to prevent heat soak. After 120 seconds they will automatically turn off and the master should be switched off.

## 2.3 MAP SWITCH

The map switch dial is located on the steering wheel, it can be used to change the engine mapping. The 3 positions apply the following calibration changes:

Position 1 – WET – reduced boost target, limited maximum TPS per gear (variable – increasing per gear), reduced gearshift speed

Position 2 – SPORT – reduced boost target, full TPS when requested, reduced gearshift speed

Position 3 – RACE – maximum boost target, full TPS when requested, normal gearshift speed

For championship/BOP specific boost targets or mapping please contact an authorized Radical engine shop.

## 2.4 TRACTION CONTROL AND ABS

### *TRACTION CONTROL:*

The traction control dial (0-9) controls the level of engine retardation when a wheel is calculated to be over rotating based on the amount of slip the car is experiencing.

***0 is the off position and 9 will provide maximum level of interference.***

### *ABS:*

The ABS M4 has 9 preconfigured control settings (maps), all varying in their control start time and control lengths. With the different control settings, the driver can select the preferable map for the weather, the racetrack and his driving style. With the map switch in map 1, which is the most sensitive (e.g. For heavy rain condition). When the map switch is in position 1 the ABS M4 is in the most aggressive map. Note: map 1 is not necessarily the fastest map; rather the map position that allows the driver to feel the most comfortable will be the most desirable position. Standard dry setting is position 4. ***The maximum dry setting is position 9.*** Maps 10 and 11 are not used. You can switch off the ABS functions by switching to position 12. All ABS sensor signals will still be communicated.

The ABS on/off switch is located below the dial. The on position for this switch is down and up is off.

The light at the bottom of the unit is the ABS fault light. ***When this light is illuminated the ABS system is not working and will not provide assistance.*** This light will show when the dial is in position 12.

## 3. SHAKEDOWN PROCEDURE

At Radical, we pride ourselves on our quality control and rigorous testing procedures that we have in place for every new car. However, there is nothing like driving round a race track. The first time you drive your new GT3 round a track is the first time the car has experienced the G-force you feel through the seat of the car. For this reason, we recommend our 'shakedown' procedure is followed for all new cars.

### *RUN 1 (OUT & IN):*

As the driver this is a good way for you to start to learn about the car. It is important to try and run through every gear if possible; it is advised to change gear at 4,000 rpm. During this run only use light pressure on the brake pedal. (See 'Bedding in Brakes' below)

It is imperative that the engine cover is removed after this run to check the engine bay for leaks or any components rubbing.

### *RUN 2 (3 LAP RUN):*

Now the engine bay has been checked, it's time to start building up the temperature and speed. Be mindful that the brakes and tyres are still new, and won't have reached their peak performance yet. Start to build up brake pressure, and roll some more speed in to the corners. Bring the RPM up to 5,000 before shifting up through the gears.

After this run it is advised for the mechanics to have a second look over the engine bay, check the tyre pressures, and re-check the wheel torque. Check the running temperatures of the oil and water before the car goes back out on track and adjust any coverings in order to ensure the car runs at an optimum temperature.

### *RUN 3 (5 LAP RUN):*

During this run build up to full brake pressure, and use the full rev range before shifting (7000rpm). After this run is complete it is recommended to spanner check the whole car, whilst checking for leaks and a general inspection of the car. When spanner checking the car, ensure suspension components are not overtightened as this will restrict the movement of these components.

You must never turn the car off via the master switch, unless in an emergency. Please use the ignition switch to stop the engine, and then keep the master switch turned on for two minutes after the engine has stopped. This is to allow the cooling pumps/fans to run which will help prevent damage to the engine.

## 3.1 BEDDING IN THE BRAKES

- All cast iron brake discs for competition use need to be bedded-in to ensure heat stabilisation and improve resistance to cracking. Cracks or warping can occur during the first few heavy stops if careful bedding is not carried out.
- The car comes fitted with carbon metallic brake pads. To bed in the brakes and achieve maximum stopping power, a film of carbon must be transferred to the discs; For a minimum of 15 Km use brakes gently at first from initially low speeds.
- The brake ducts should be ¾ blanked off in order to allow the brakes to warm up through this bedding in period, previously bedded pads should be used if possible.
- For the following 1-2 laps the brakes can be used quite heavily (above 40 bar pressure). The braking potential of the car will start to fade and the vibration will surpass; this is a sign that the bedding procedure is complete.
- It is possible to pick up a vibration or 'judder' through the brake pedal. This is due to the disk bell and disk becoming aligned for the first time; this is not a process that can be simulated in the build of the car. It is therefore very important that if the driver feels they have brake judder they continue to build up brake pressure and heat in the disk. And not to stop or decrease pedal pressure, to do so has the potential to make the vibration worse.
- Complete a cooling down lap with moderate brake pressure before stopping the car. Allow the brakes to cool for 15 minutes. Do not apply brakes whilst stationary during the cooling down period. Use only Radical recommended brake pads, available online.
- We strongly advise AP Racing thermal paint is used; if so then only the green paint (430°C) should have fully turned to white and the orange will have slightly turned (560°C) on the outside edges of the discs during the bedding procedure. If fitted, brake pressure sensors can be used to monitor the bedding in procedure.

## 3.2 BRAKE BIAS

The brake bias can be adjusted to suit the drivers needs dependant on the circuit, driving style and weather conditions. As a starting point, we recommend starting at 55%, which is 5% biased towards the front. During wet conditions it is advisable to move the bias rearwards at around 5%.

## 3.3 IMPORTANT NOTES:

With cast iron discs, brake pressures should not exceed 20bar during the outlap, even with pre-bedded discs. This is to prevent heat shocking which causes the discs to crack, this occurs when the disc is taken from ambient temperature up to 600°C very rapidly such as heavy braking on the out lap. When stationary never hold pressure on the brake pedal, this can cause warping and/or the discs and pads to bind.

## 4. GENERAL CAR RUNNING (POST SHAKEDOWN)

| Cold Starting Dunlop Pressures | | | |
|---|---|---|---|
| Slicks | | Wets | |
| 22 | 22 | 23 | 23 |
| 21 | 21 | 22 | 22 |

| Cold Starting Hankook Pressures | | | |
|---|---|---|---|
| Slicks | | Wets | |
| 20 | 20 | 22 | 22 |
| 19 | 19 | 22 | 22 |

| Target Hot Dunlop Pressures | | | |
|---|---|---|---|
| Slicks | | Wets | |
| 28 | 28 | 28 | 28 |
| 28 | 28 | 28 | 28 |

| Target Hot Hankook Pressures | | | |
|---|---|---|---|
| Slicks | | Wets | |
| 28 | 28 | 28 | 28 |
| 28 | 28 | 28 | 28 |

- Please note that the starting pressures are to only be used as a guide; conditions on the day will alter where you should start your pressures. Hot conditions will increase the pressure rise over the same period of time.
- Fit valve caps when running.
- Temperature spreads must not exceed 15°C across the front and 10°C on the rear.
- Measure tyre temperature spreads, 3cm in from each edge of the tyres and in the centre, make sure you are not measuring the temperature of any pickup on the tyre.
- Avoid kerbs on the outlap when the tyres are cold.

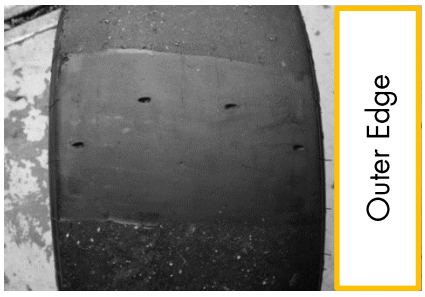
### 4.1 TYRE WEAR PATTERNS

Decisions based on handling should always be preceded with thorough examination of tyre working surface.

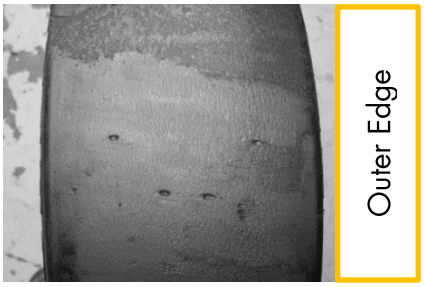
Use the temperatures, pressures, data and driver feedback with the visuals of the tyre to get the best all round view of car and tyre behaviour.

Measure the tyre temperatures and pressures as often as possible straight after a fast lap, get the driver to do a full pace in-lap, in order to get the best readings.

### 4.2 TYRE CONDITIONS




When examining a tyre, always check both sides. The unloaded side can drag the inner wheel, causing excessive negative camber and overheating in the inner edge.
When measuring the temperature spreads start from the inner edge then work to the outer edge.
The picture in the left is an example of a rear tyre in good condition, more camber can be added if the rear is lacking grip.




This is an example of a well-worn front tyre, judging by the wear indicators and the level of graining it suggests the car has been suffering with understeer.
This could also be run with more camber. If a tyre is graining on either side, this can be used to judge whether the right level of camber is being used.

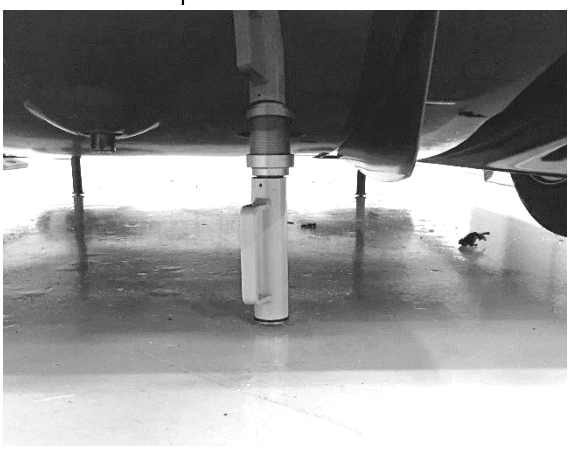
## 5. WORKSHOP CAR MAINTENANCE

After every day the car has run the car should be inspected thoroughly in a workshop environment.

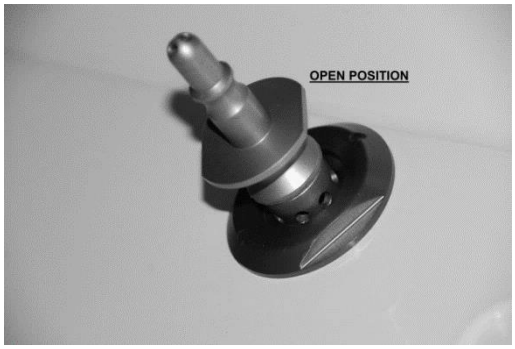
### 5.1 AIR JACKS

In order to raise the car, insert the 'air jack lance' into the fitting as shown in the picture below. Slowly build up the pressure in the regulator, until the car is fully off the ground. (300-400psi)

Before working on the car, the air jack safety clamps must be inserted, to do this simply push the open side of the yellow clamp around each of the three air jacks as shown.

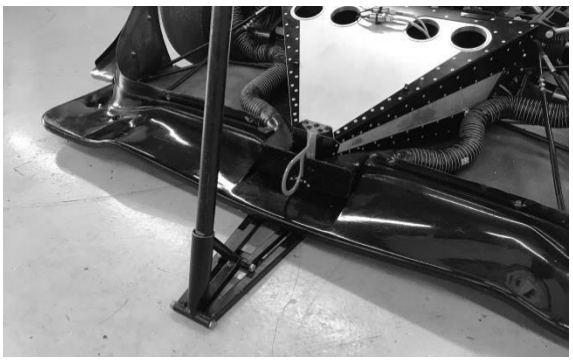


To release the air jacks, pull back on the fitting shown in the picture. Slowly pull the fitting to gradually release the pressure in the system, pulling it quickly will result in the car dropping to the ground rapidly. The air system will bleed out and the car will slowly lower onto the ground if it is released correctly. You must leave the fitting on the open position when it is empty so that the system cannot re-pressurise.

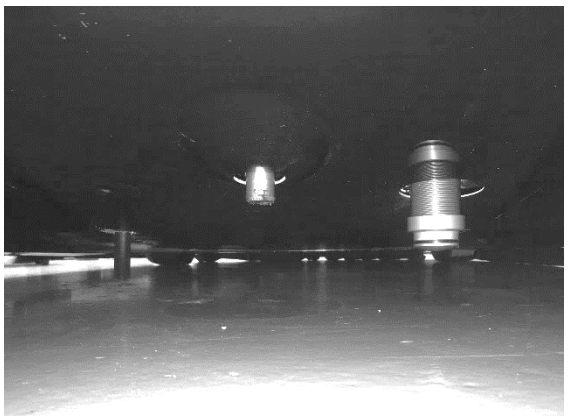


## *JACKING POINTS*

The front jacking point is in the centre of the front diffuser, just under the central diffuser mounting point. As shown in the picture.



The rear jacking point is under the rear diffuser in the centre of the car, a welded bar protrudes the diffuser around the mid-point.



## 6. SETTING UP THE CAR

When the car leaves the factory, it will have a base setup on the car which is displayed below. This is a setup which has shown to work over the years it has been adapted to suit various drivers' needs as they feel more comfortable with the car.

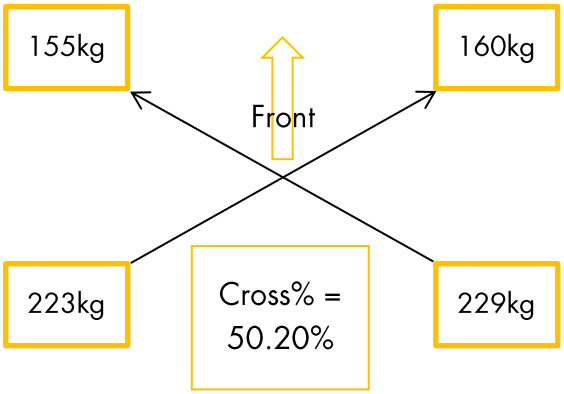
1. Check front pushrod lengths are equal & front springs have 3 turns of pre-load
2. Check rear spring platform-to-cap distance is equal (approx. 125mm)
3. Ballast with 80Kg (10Kg in footwell by the pedals, 70Kg in seat) unless specific driver weight is known
4. Lock steering to straight ahead using dummy steering wheel
5. Set tyre pressure to hot pressure from setup sheet
6. Disconnect front & rear anti-roll bars
7. Check dampers are set to minimum all round
8. Bounce & roll car
9. Check drop heights and adjust average of front & rear to be within 1mm of target
10. Set cambers (+ or – 0.1° from target)
11. Set toes (+ or – 0.5mm from target)
12. Roll car off platform, turn on scales and zero
13. Roll car back onto platform, repeat bounce & roll
14. Check corner weights. Target is within 5Kg across front, and within 2% for diagonals
15. Adjust using rear platforms only
16. Re-adjust drop heights equally on front pushrods and rear spring platforms to achieve target. (The drop height will probably not be equal, due to the offset seating position, so target drop height should be an average of the left & right readings.)
17. Re-connect anti-roll bars making sure there is no pre-load
18. Set dampers, they should always be set from fully closed.
19. Turn off scales

### 6.1 CORNER WEIGHTS

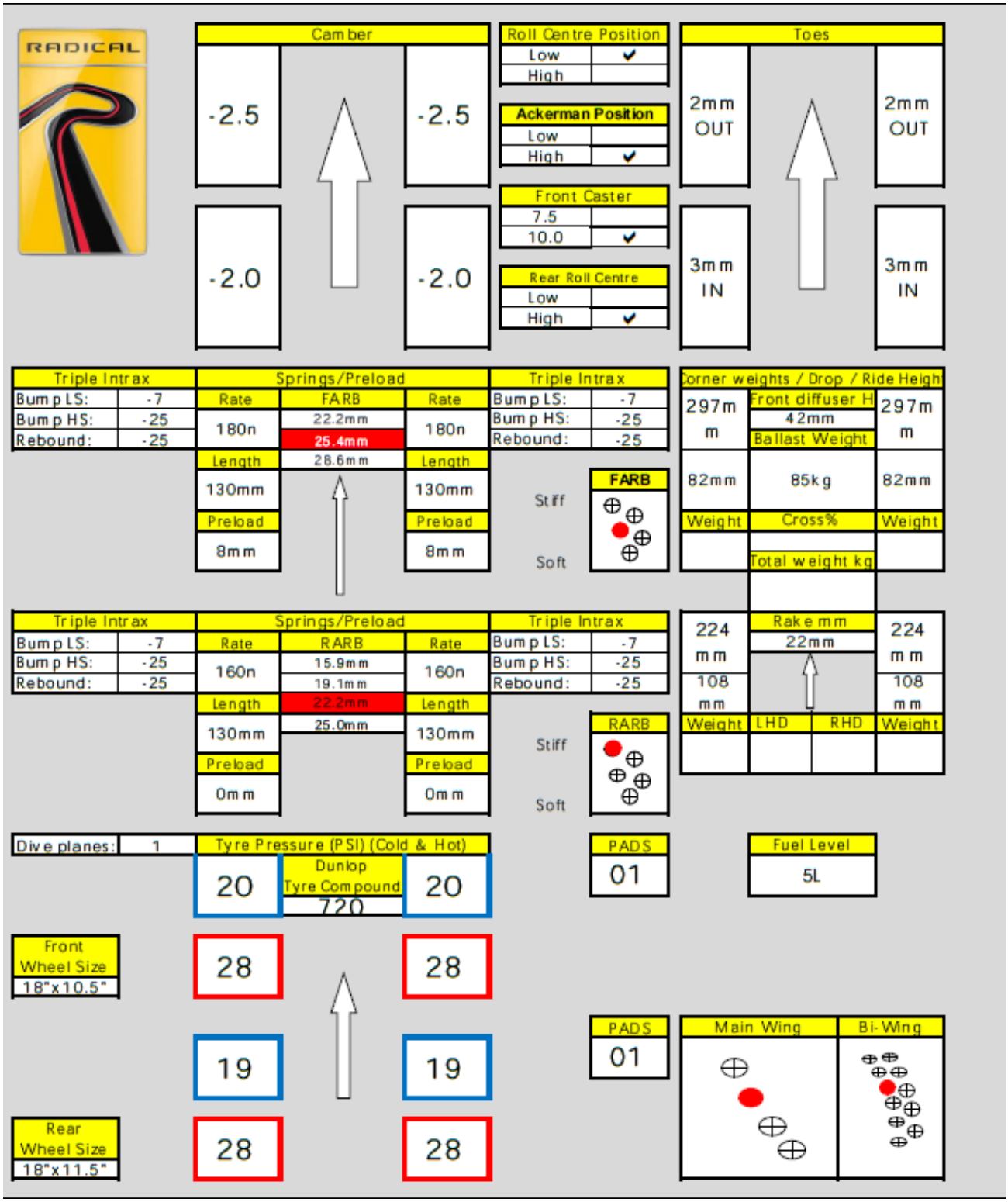
One of the most important factors is to ensure that the front corner weights are as equal as possible. The cross weight is not as crucial in comparison. (The offset driving position of the driver will usually mean that the weight cannot be made exactly equal.)

To adjust the front corner weights, raise or lower the diagonal rear.

The maximum difference in front weights should be no more than 5kg (11lb)



## 6.2 DUNLOP SETUP SHEET



# GT3 - Factory setup sheet - Hankook

**Note: When carrying out set-up on flat-patch, set tyre pressures to hot pressure. Ensure that they are returned to cold pressures after setup is complete.**

| Date | | Chassis # | | Job # | |
|---|---|---|---|---|---|
| | | Technician 1 | | Technician 2 | |

**FARB**

**RARB**

| Camber | | Toes | |
|---|---|---|---|
| -2.5 | -2.5 | 2mm OUT | 2mm OUT |
| -2.0 | -2.0 | 3mm IN | 3mm IN |

| Triple Intrax | | Springs/Preload | | | Triple Intrax | |
|---|---|---|---|---|---|---|
| Bump LS: | -7 | Rate | FARB | Rate | Bump LS: | -7 |
| Bump HS: | -25 | 180 | 22.2mm | 180 | Bump HS: | -25 |
| Rebound: | -25 | | 25.4mm | | Rebound: | -25 |
| | | Length | 28.6mm | Length | | |
| | | 130mm | | 130mm | | |
| | | Preload | | Preload | | |
| | | 8mm | | 8mm | | |

| Ride | Front Diffuser H | Ride |
|---|---|---|
| 297mm | 42mm | 297mm |
| | Ballast Weight | |
| Drop | 85kg | Drop |
| 82mm | Cross% | 82mm |
| Weight | Total weight | Weight |
| kg | kg | kg |

| Triple Intrax | | Springs/Preload | | | Triple Intrax | |
|---|---|---|---|---|---|---|
| Bump LS: | -7 | Rate | RARB | Rate | Bump LS: | -7 |
| Bump HS: | -25 | 160 | 15.9mm | 160 | Bump HS: | -25 |
| Rebound: | -25 | | 19.1mm | | Rebound: | -25 |
| | | Length | 22.2mm | Length | | |
| | | 130mm | 25.0mm | 130mm | | |
| | | Preload | | Preload | | |
| | | 0mm | | 0mm | | |

| Ride | Rake mm | Ride |
|---|---|---|
| 224mm | 22mm | 224mm |
| Drop | | Drop |
| 108mm | | 108mm |
| Weight | LHD / RHD | Weight |
| kg | | kg |

| Wheel Size |
|---|
| Front |
| 18"x10.5" |
| Rear |
| 18"x11.5" |

| BOP Ballast |
|---|
| |
| Fuel Level |
| 5L |

| Dive planes: | Y / N |
|---|---|

| Tyre Pressure (PSI) (Cold & Hot) | | |
|---|---|---|
| 28 | Hankook | 28 |
| 20 | | 20 |
| 28 | | 28 |
| 19 | | 19 |

| PADS |
|---|
| 01 |
| PADS |
| 01 |

| Rear Wing | |
|---|---|
| Holes (from the bottom) | |
| Main | 3 out of 4 |
| Bi-wing | 7 out of 11 |

**Comments:**

QD139-1

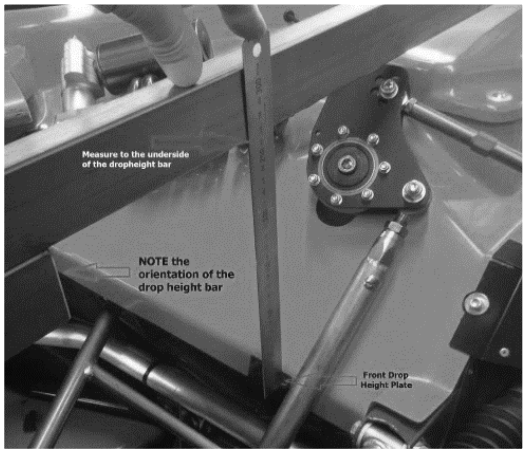
## 6.4 DROP HEIGHTS

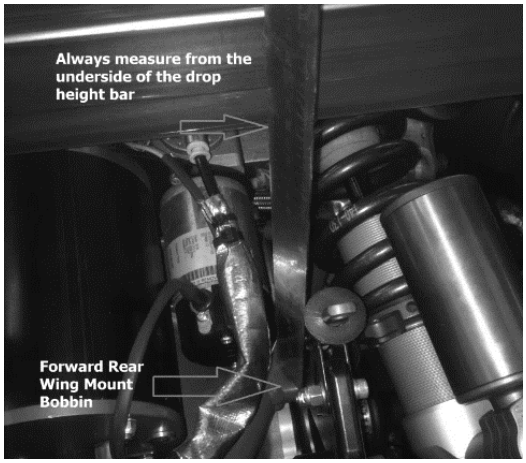
| RXC Drop Heights | | | |
|---|---|---|---|
| Front | | Rear | |
| Ride | Drop | Ride | Drop |
| 110 | 269 | 126 | 206 |
| 109 | 270 | 125 | 207 |
| 108 | 271 | 124 | 208 |
| 107 | 272 | 123 | 209 |
| 106 | 273 | 122 | 210 |
| 105 | 274 | 121 | 211 |
| 104 | 275 | 120 | 212 |
| 103 | 276 | 119 | 213 |
| 102 | 277 | 118 | 214 |
| 101 | 278 | 117 | 215 |
| 100 | 279 | 116 | 216 |
| 99 | 280 | 115 | 217 |
| 98 | 281 | 114 | 218 |
| 97 | 282 | 113 | 219 |
| 96 | 283 | 112 | 220 |
| 95 | 284 | 111 | 221 |
| 94 | 285 | 110 | 222 |
| 93 | 286 | 109 | 223 |
| 92 | 287 | 108 | 224 |
| 91 | 288 | 107 | 225 |
| 90 | 289 | 106 | 226 |
| 89 | 290 | 105 | 227 |
| 88 | 291 | 104 | 228 |
| 87 | 292 | 103 | 229 |
| 86 | 293 | 102 | 230 |
| 85 | 294 | 101 | 231 |
| 84 | 295 | 100 | 232 |
| 83 | 296 | 99 | 233 |
| 82 | 297 | 98 | 234 |
| 81 | 298 | 97 | 235 |
| 80 | 299 | 96 | 236 |
| 79 | 300 | 95 | 237 |
| 78 | 301 | 94 | 238 |
| 77 | 302 | 93 | 239 |
| 76 | 303 | 92 | 240 |

RXC drop heights are measured using the same drop height bar as all of the other models. This is constructed from 2 inches by 1 inch box section with an additional 2inch by 1 inch box section welded below to give clearance.

Note: On the RXC the drop height bar is used the same on the front as the rear. This is different to the other models (SR Models). Please see the following pictures to show where the drop heights are measured to.

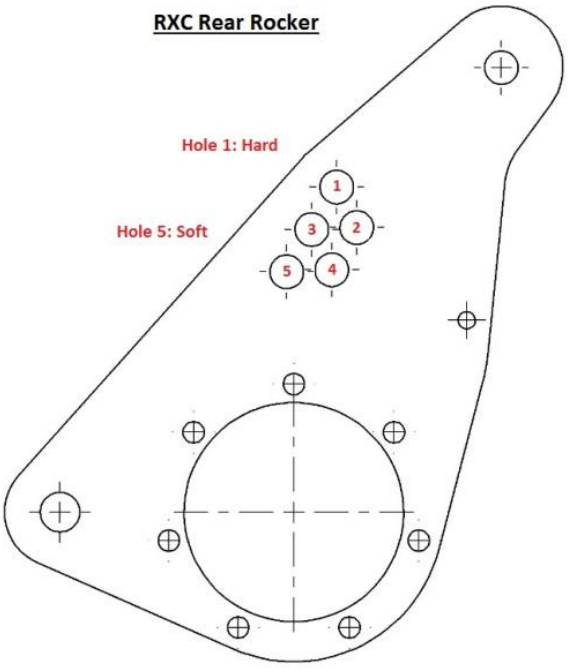
The Pushrod's are jigged from production, which is a good starting point when setting up the car. ***Front:*** 565mm ***Rear:*** 510mm

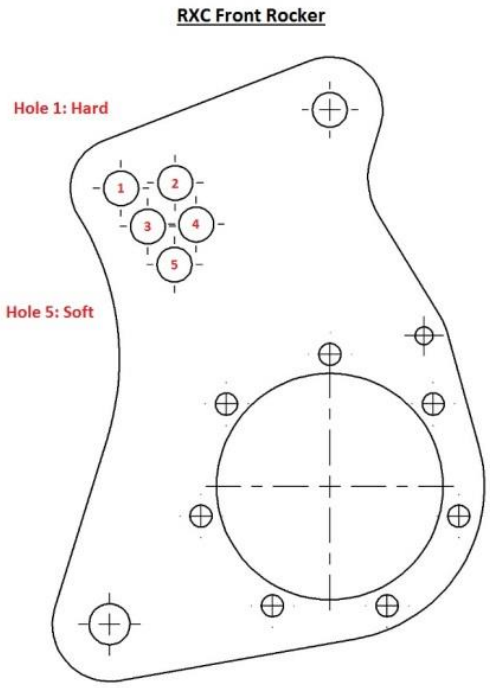


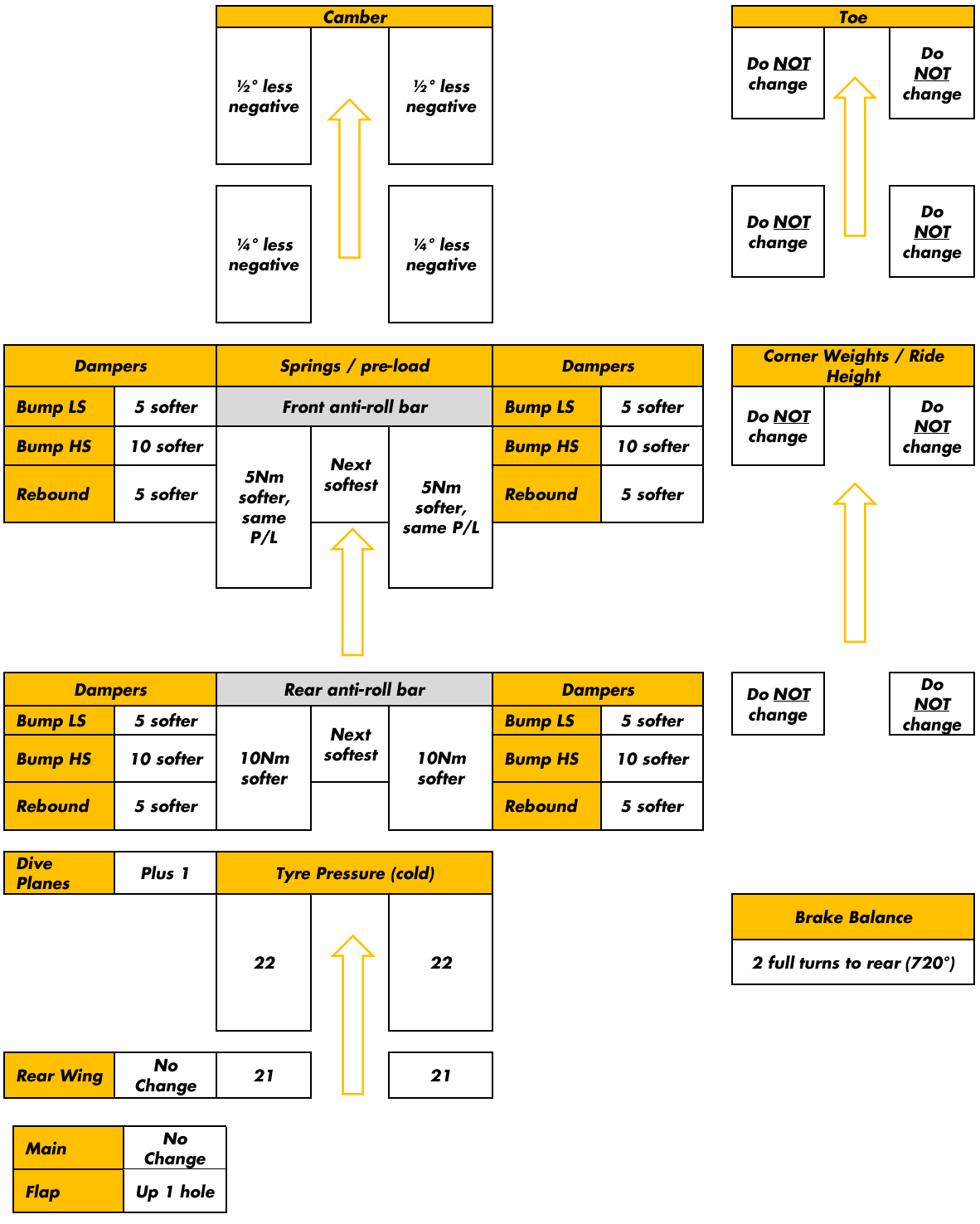
## 6.5 RXC ROCKER PLATES

Adjustments can be made for each thickness of roll-bar using the 5 holes on the rockers. This range of adjustment is shown in the pictures below. The roll-bar should always be re-connected with the driver weight in the car on a flat surface. The bolts for the roll bar should move freely when re-attaching them.

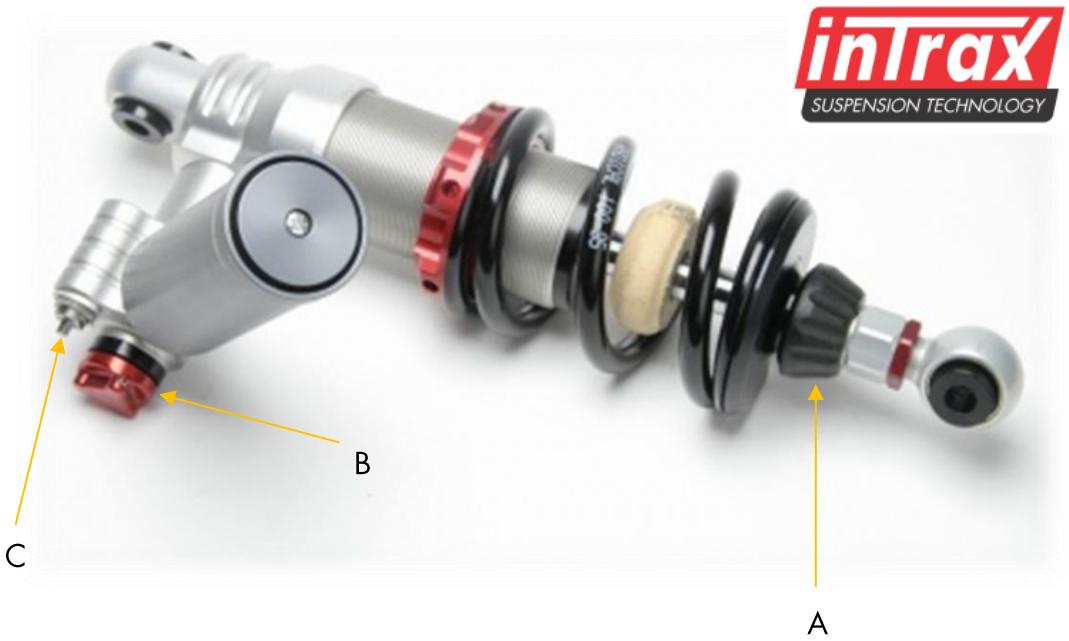


## 6.6 WET SETUP


Camber
½° less negative
½° less negative
¼° less negative
¼° less negative
Toe
Do NOT change
Do NOT change
Do NOT change
Do NOT change
Dampers
Bump LS 5 softer
Bump HS 10 softer
Rebound 5 softer
Springs / pre-load
Front anti-roll bar
5Nm softer, same P/L
Next softest
5Nm softer, same P/L
Dampers
Bump LS 5 softer
Bump HS 10 softer
Rebound 5 softer
Corner Weights / Ride Height
Do NOT change
Do NOT change
Dampers
Bump LS 5 softer
Bump HS 10 softer
Rebound 5 softer
Rear anti-roll bar
10Nm softer
Next softest
10Nm softer
Dampers
Bump LS 5 softer
Bump HS 10 softer
Rebound 5 softer
Do NOT change
Do NOT change
Dive Planes
Plus 1
Tyre Pressure (cold)
22
22
Brake Balance
2 full turns to rear (720°)
Rear Wing
No Change
21
21
Main
No Change
Flap
Up 1 hole

## 6.7 DAMPERS




***A – Rebound:***

The rebound controls the speed of the damper's extension. The more rebound resistance you add, the slower the damper will return out. This can be used on the front to fix mid-corner understeer, and on the rear to aid traction. This adjuster has approximately 50 clicks from fully closed.

***B – High speed bump compression:***

High speed bump compression (refers to the speed of the piston rod into the damper) controls the high frequency compressions of the damper. In simple terms it controls how the car reacts to small bumps and kerbs. This adjuster has approximately 50 clicks from fully closed.

***C – Low speed bump compression:***

Low speed bump compression controls how slow or fast the damper reacts under compression. Increasing the low speed bump will have a similar (though smaller) effect to increasing the spring rate. This adjuster has 15 clicks from fully closed.

# 7. CAR SERVICING

## 7.1 COMPONENT LIFING

As the performance of our cars increases and the number of hours we log racing the cars grows, we are able to more accurately predict the lifespan of a car's components. Please see below, the 'Radical Component Lifespan Chart'.
The chart gives the recommended life expectancy of components under 'normal, on-track racing conditions'. If some of your racing time is done 'off-track' or you hit kerbs, pot holes or other cars, then you will need to reduce the timescales recommended and immediately replace damaged parts.
The recommended life expectancies in no way represent a parts warranty, due to the unpredictable and uncontrolled use of these racing car components Radical will not be held responsible or accountable for any parts failure. This information is provided solely as a guide to increase the safety of the cars.

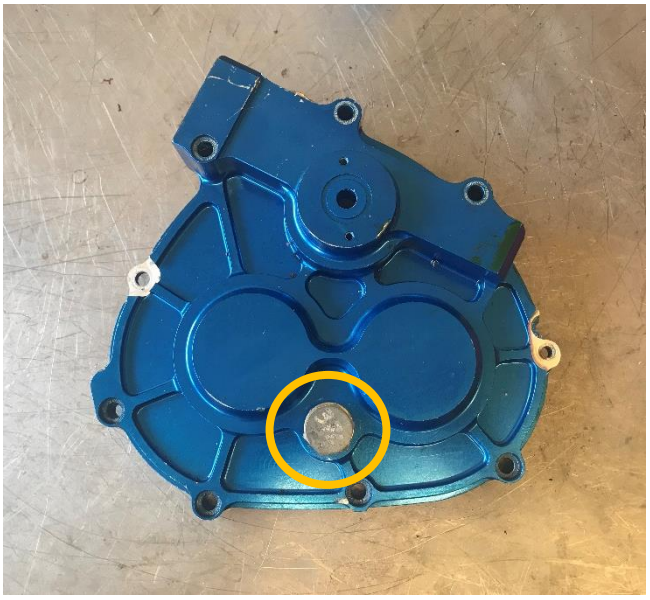
| ***Component*** | ***Action*** | ***Interval*** | |
|---|---|---|---|
| | | ***Hours*** | ***Distance (km)*** |
| Engine (warranty) | Rebuild | 80 | N/A |
| Gearbox rebuild | Inspect/ Rebuild | - | 2000 |
| Injectors | Service | 40 | - |
| Spark plugs | Replace | 80 | - |
| Valve block | Check/ Tighten | - | 4000 |
| Calipers | Rebuild | - | 4000 |
| Shock absorbers | Dyno check | - | 4000 |
| Driveshafts (complete) | Replace | - | 2000 |
| Suspension bushes | Replace | - | 4000 |
| Suspension rose joints | Replace | - | 4000 |
| Front Uprights inc. hubs | Replace | - | 10000 |
| Rear Uprights inc. hubs | Replace | - | 10000 |
| Wishbones | Inspect/ Replace | - | 5000 |
| Master cylinders | Replace | - | 8000 |
| Battery | Replace | Annually | - |
| Fuel Tank | Inspect | Annually | - |
| Steering rack | Rebuild | Annually | - |

## SERVICE SCHEDULE

The below intervals are intended as a guide to assist in components achieving full life and reliability of your engine and gearbox. These intervals are based on Radicals recommended oils which can be found in the fluid specifications section of this manual.

| ***Component*** | ***Action*** | ***Interval track (hours)*** |
|---|---|---|
| Engine oil | Replace | 6 |
| Engine oil filter | Replace | 6 |
| Gearbox oil | Replace | 6 |
| Engine air filter | Replace | 40 |
| Fuel filter | Replace | 40 |
| Gearbox inspection | Inspect / Replace | 6 |

## 7.2 CHECKING GEARBOX OIL LEVEL

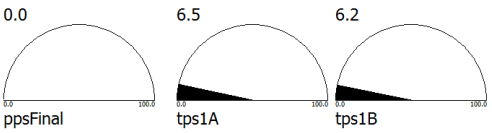


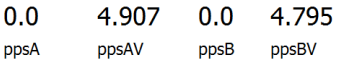
To set the level on the RXC gearbox the 'level bung' pictured above will need to be removed, this is located on the right-hand side cover of the Quaife gearbox.

Use a length of pipe and a funnel to start filling the gearbox through this bung, when the oil gets to the level bung it will need to be re fitted with the sealing washer and lock wire. There is no torque setting for this bung.

## 8.1 PEDAL POSITION SENSOR

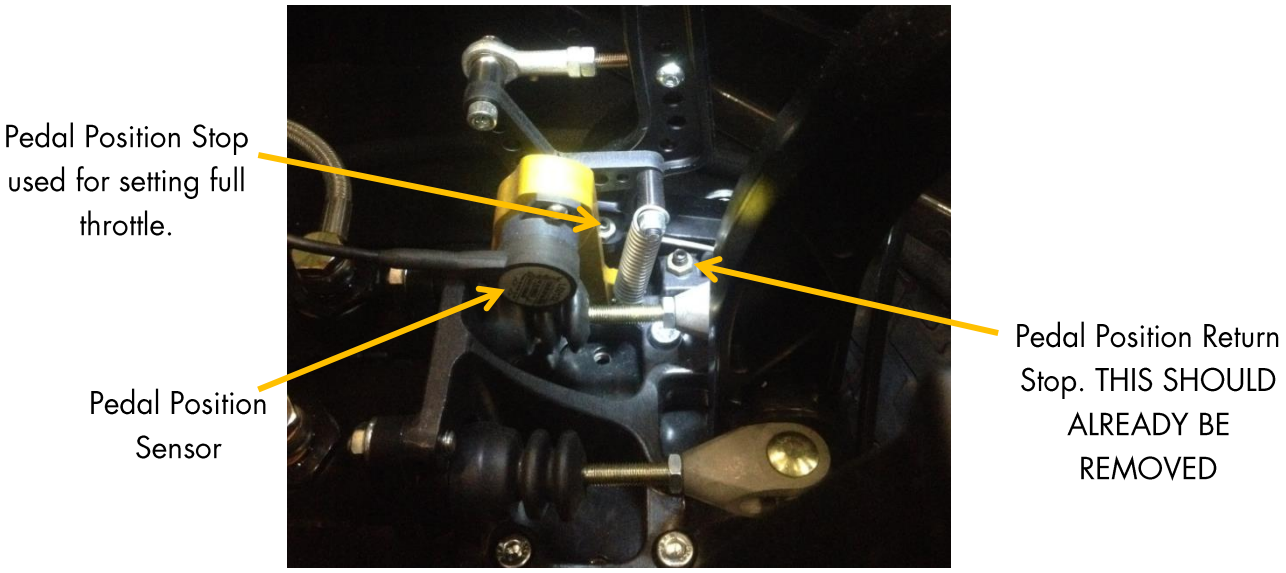
To set up the drive-by-wire throttle body, first you need to set up the Pedal Position Sensor. The Pedal Position Sensor has 2 sensors built in to one. This is a safety mechanism, if the 2 measures ever go out of alignment, the PPS defaults to zero as a safety precaution.




The pedal position sensor is located on the throttle pedal. Again, the Life Software program "LifeMon" is used to monitor the two pedal position sensors during calibration. These are found in the same way as described in Part 1.

This picture shows all of the sensors that you need to monitor in LifeMon when setting up the Drive-by-Wire throttle bodies.

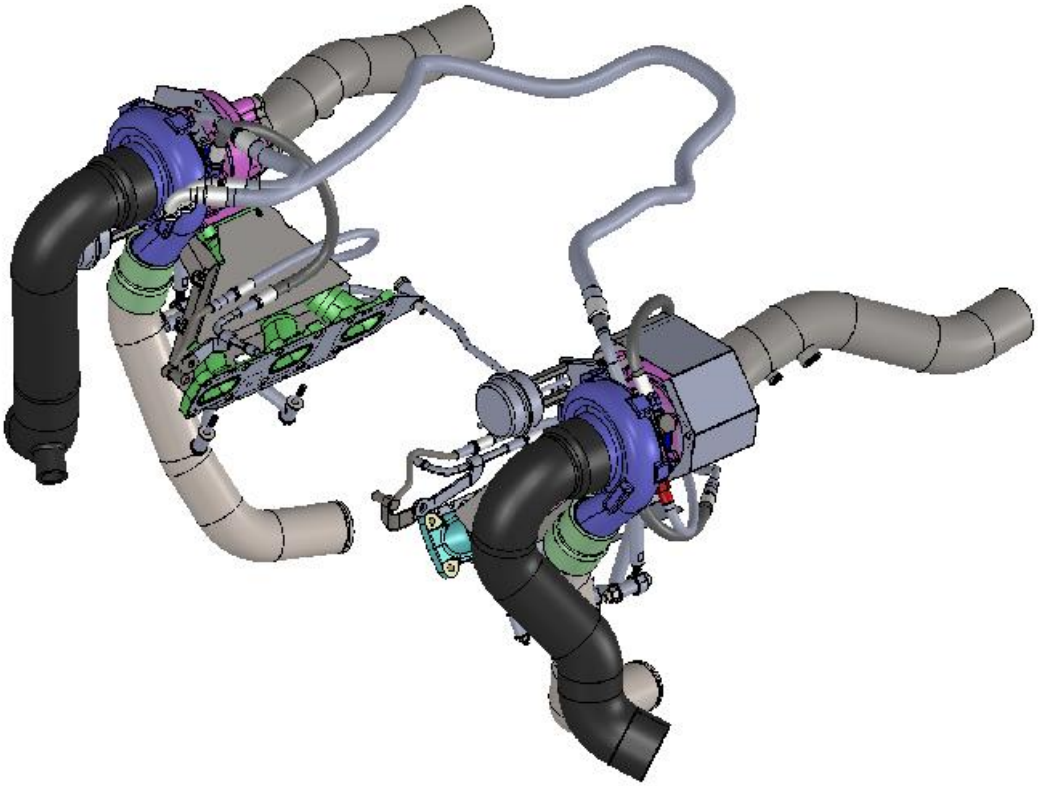


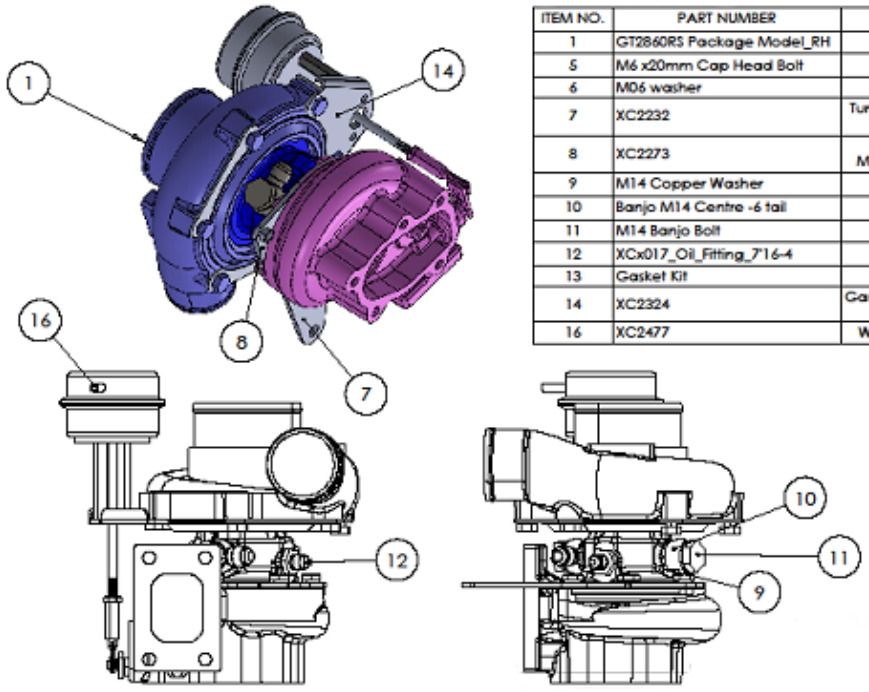

Follow the steps below to set up the Pedal Position Sensor. During this set up procedure ppsA and ppsB should match. If they ever do not match then the sensor is faulty and must be replaced:

- Remove the Pedal Position Return Stop.
- Loosen the two bolts holding the Pedal Position Sensor on the throttle pedal
- Turn the Pedal position sensor to set ppsA/ppsB to 0.0
- Tighten the bolts to hold the sensor in place and ensure ppsA/ppsB are still 0.0
- Adjust the throttle stop so that the max value for ppsA/ppsB at full throttle is 102.0
- Tighten the throttle stop.

Finally check that ppsA and ppsB match throughout the range of travel.

## 8.2 TURBOCHARGER SETUP





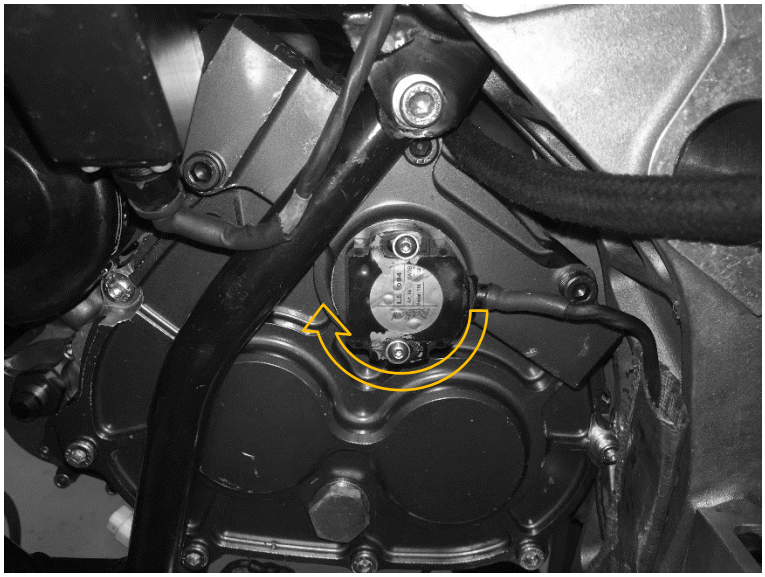

| ITEM NO. | PART NUMBER | Description | Default/QTY. |
|---|---|---|---|
| 1 | GT2860RS Package Model_RH | RH Turbo | 1 |
| 5 | M6 x20mm Cap Head Bolt | | 2 |
| 6 | M06 washer | | 2 |
| 7 | XC2232 | Turbo Hanging Bracket RH | 1 |
| 8 | XC2273 | Turbo Heatshield Mounting Bracket RH | 1 |
| 9 | M14 Copper Washer | | 4 |
| 10 | Banjo M14 Centre -6 tail | | 2 |
| 11 | M14 Banjo Bolt | | 2 |
| 12 | XCx017_Oil_Fitting_7"16-4 | ATP-OIL-021 | 1 |
| 13 | Gasket Kit | JT10340 | 1 |
| 14 | XC2324 | Garret Actuator Bracket RH | 1 |
| 16 | XC2477 | Wastegate Actuator | 1 |

## 8.3 GEAR POSITION SENSOR

To set up the Gear Position Sensor on an RXC there is not a jig. It must be set manually using the Life Software program called "PTMon" The sensor is located on the right-hand side of the Quaife Gearbox See picture below. To set the Gear Sensor, follow the steps below:

- Connect a laptop (using the Life Download Lead) and turn the master switch on.
- Make sure the car is in Neutral (By turning the wheels)
- Open PTMon and view the sensor named GearV.
- Loosen the 2 retaining bolts, adjust the sensor until GearV reads 1.100V ± 0.05
  Secure the sensor by tightening the 2 bolts and check the GearV is still set to 1.100V ± 0.05

Depending on specification this reading may be shown on the dash.



## 8.4 WHEEL SPEED SENSOR (NONE ABS)

Use the jig for setting the wheel speed sensor (AT0042). Using a pair of 13mm spanners, set the wheel speed sensor no closer to the pickup point than the thickness of the Wheel Sensor Gauge. For an RXC that is fitted with ABS, this step will not need to be done.

## 8.5 POWER STEERING

There are 3 main components to the Radical EPAS (Electronic Power Assisted Steering) these are as follows:

- Power Steering Motor (located on the steering column)
- EPAS ECU (located near the steering column)
- Steering Angle Sensor (located on the steering rack)

There are some notes to be aware of when replacing these items to re-calibrate the system to ensure correct functioning of the EPAS system:

If the Power Steering Motor and/or the EPAS ECU need to be replaced then the system needs to be re-calibrated in the central position. To do this, follow these instructions:

Lift the front of the car off the ground

Put the steering wheel in the straight-ahead position

Cycle the master switch 7 times.

The EPAS warning LED should now flash rapidly a number of times. This shows that the system has successfully re calibrated.

Please see separate EPAS manual for using the software to calibrate the system.

## 8.6 STEERING ANGLE SENSOR

This steering angle sensor has two plugs on it. The signals go to both the EPAS ECU and the Aim Datalogger dash.

When replacing the steering angle sensor, it is important to set the sensor in the middle of its 5v range with the wheels straight ahead before fitting it to the steering rack. This is done by following these steps:

- Plug the sensor in to both of the plugs
- Connect a laptop to the car using the Aim download lead plugged into the aim data port on the dash.
- Open Race Studio
- View the live values for the sensors and monitor the "Steering angle Channel"
- Show mV values
- Set the sensor to 2500mV

The sensor is now ready to install in the rack. See picture for reference. Note, the wire coming out of the sensor points down.

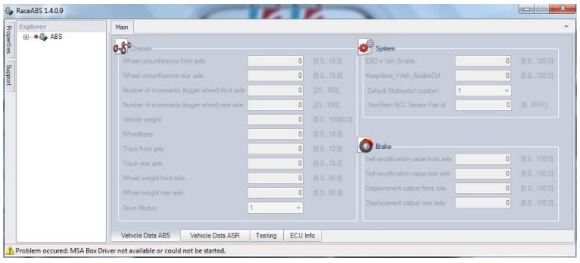
Note: After the sensor is installed in the rack, follow the instructions above to re-calibrate the system.

## 8.7 ABS SETUP

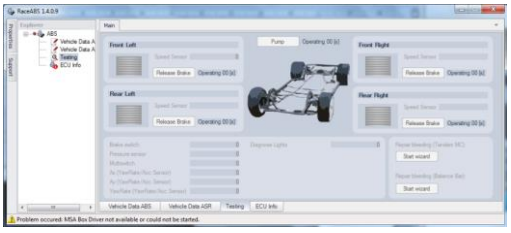
Following the implementation of the ABS , the programming and diagnostic software will need to be installed;

- The first step is to switch the ignition on and ensure the ABS system is switched on
- Once the software has been installed, plug the USB connector in to the laptop and the motorsport connector into the ABS M4 wire harness
- When the laptop is connected to the cars ABS system, open up the "Race ABS" program- if the box isn't connected and the program is open, the status bar at the bottom of the program will display an error message as shown below
- The next stage is to ensure all the "Vehicle Data" settings are all correct; this section is based on information which will have been sent to BOSCH prior to delivery and will have been programmed in to the ABS ECU.
- Following on from this, it is important to test the ABS system. When you turn the ignition or ABS M4 on, the warning light comes on briefly and then goes out again.

The warning light is on permanently as long as there is connection with the ABS M4 ECU and the RaceABS software via the MSA Box II.



- With the program open, the wheel speed sensors can be tested simply turning each individual wheel and checking the program to ensure some response from the system
- Once this stage is completed, head to the "Testing" tab and begin the "Repair Bleeding Wizard".
- It is important to note that this bleeding wizard is purely for the ABS system and not to be substituted for other parts of the braking system. Ensure the other areas such as brake lines and brake cylinders are bled separately after the "Repair Bleeding Wizard" for the ABS system. It is recommended to have three people available for this bleeding process; one bleed nipple from the front, one from the rear and one in the car operating the laptop and brake pedal.
- There are two options for bleeding available; for the RXC the "Balance Bar" option should be selected in order to ensure proper function of the braking system.

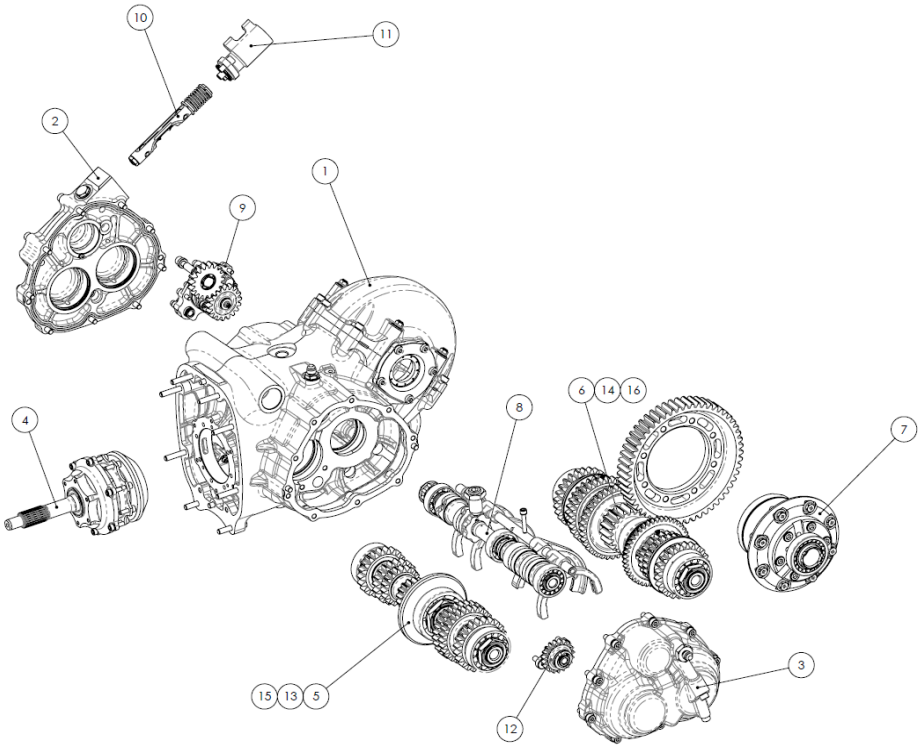


- Once the "Start Wizard" button has been clicked, the wizard will go through the whole process to ensure the bleeding process works as intended. It is important to continuously actuate the brake pedal throughout the entire process.
- At the end of the bleeding process, the system will inform the user of the successful completion of the bleeding process.

# 9. REFERENCE MATERIAL

## 9.1 RXC GEARBOX (6 SPEED)

For specific gearbox information please contact gearboxes@radicalsportscars.com



## 9.2 ENGINE CONTROL PARAMETERS

| Feature | Parameter |
|---|---|
| Coolant Fan On | 92°C |
| High Coolant Temperature Trip | 120°C |
| Low Fuel Pressure Trip | 3.2bar |
| Low Oil Pressure Trip | 50psi @ 7,000rpm (RPM Dependant) |
| Rev Limit | 7000rpm |

## 9.3 COMMON PARTS

| Description | Part Number |
|---|---|
| Front/Rear Brake Pads | BD0/101 |
| Front/Rear Brake Discs | BD0121/131 |
| Wheel Nuts L/R | WN0003/4 |
| Front Master Cylinder | BM0116 |
| Rear Master Cylinder | BM0116 |
| Clutch Master Cylinder | BM0116 |
| Brake Disc Front | BD0125/6 |
| Brake Disc Rear | BD0104/5 |
| Oil Filter | EF0020 |
| Fuel Filter | FF0005 |
| Driveshaft | TQ0457 |
| Starter Motor | LM0042 |
| Alternator | LB0109 |
| 2 Way Valve Block | TP0110 |
| Brake Caliper Seals | BS0002/6 |

## 9.4 SPECIALIST TOOLS

| Description | Part Number |
|---|---|
| C Spanner- adjusting air jacks | AT0021 |
| Wheel Speed Sensor Jig | AT0042 |
| RXC Dipstick | GT0044 |
| Dzus Tool | AT0060 |
| Slide Hammer | AT0049 |
| Air Jack Lance | AA0005 |
| Air Jack Clamps | AA0037 |
| Steering Lock Stop | AT0057 |
| AIM Download Lead | AD0109 |
| Life Download Lead | LH0168 |
| ABS MSA Box 2 Wire | BA0014 |
| Power Steering Wire | LH0131 |

## 9.5 RATIO CHART

| Radical Part | Description | Input | Output | Overall Ratio |
|---|---|---|---|---|
| TQ0627 | Input Shaft | 13 | 36 | 8.8859 |
| TQ0629 | 2nd | 17 | 32 | 6.0401 |
| TQ0630 | 3rd | 19 | 27 | 4.5599 |
| TQ0631 | 4th | 19 | 22 | 3.7155 |
| TQ0632 | 5th | 25 | 24 | 3.0804 |
| TQ0633 | 6th | 26 | 23 | 2.8386 |
| TQ0628 | Output Shaft | | 18 | 4.067:1 |
| TQ0521 | Crownwheel | | 55 | 4.067:1 |

| Overall Speed | | |
|---|---|---|
| Gear | MPH | KPH |
| 1st | 60.33 | 97.07 |
| 2nd | 88.75 | 142.85 |
| 3rd | 117.56 | 189.22 |
| 4th | 144.28 | 232.23 |
| 5th | 174.02 | 280.10 |
| 6th | 188.85 | 303.97 |

## 9.6 ROLL BAR SIZES

| Front | | |
|---|---|---|
| Soft | 7/8" | 22.2mm |
| Medium | 1" | 25.4mm |
| Hard | 1 1/8" | 28.6mm |
| **Rear** | | |
| Soft | 5/8" | 15.9mm |
| Medium | 3/4" | 19.0mm |
| Hard | 7/8" | 22.2mm |

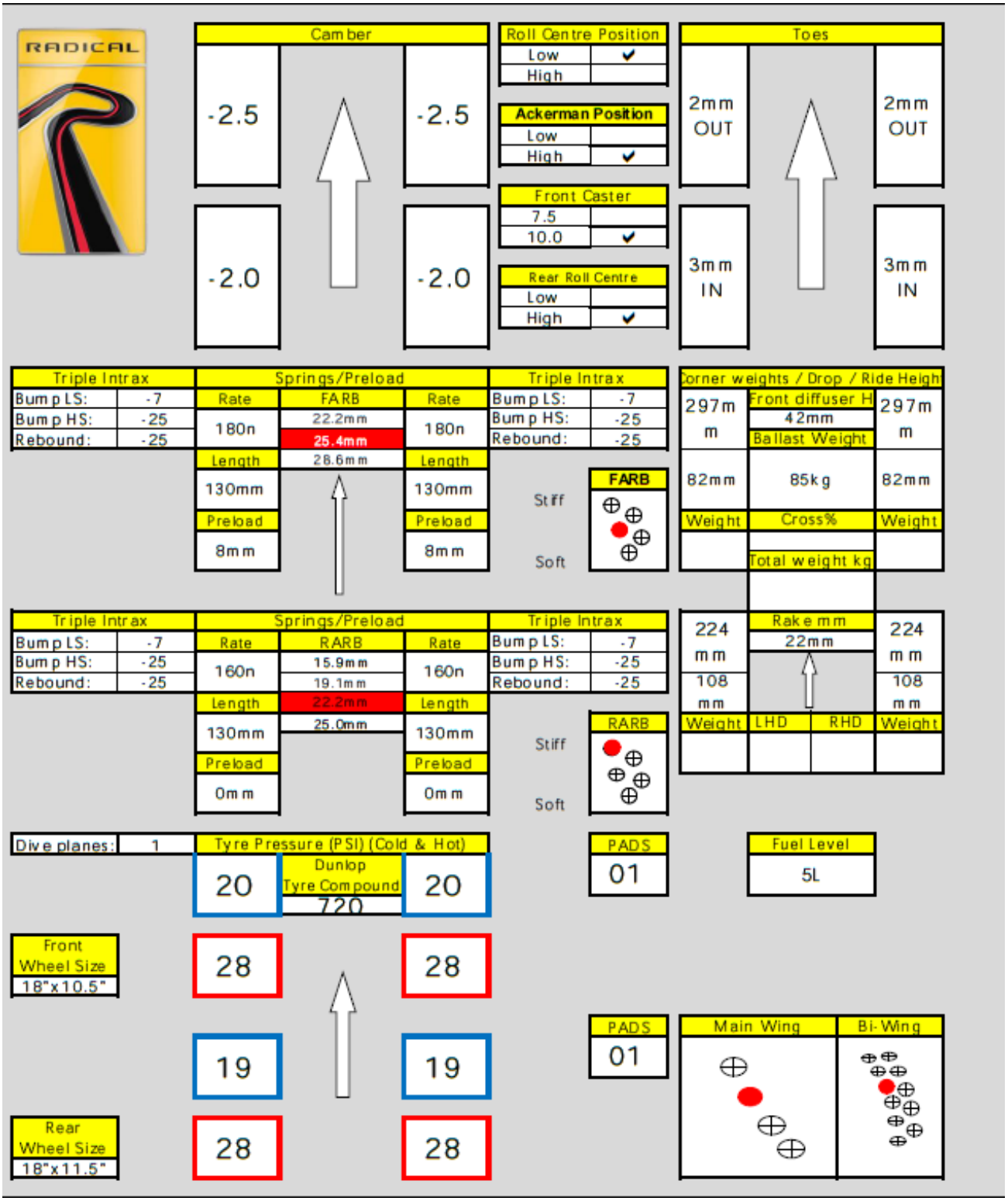
## 9.7 FLUIDS

| Oil Type | Part Number | Amount | Brand | Viscosity/Type | Required |
|---|---|---|---|---|---|
| Engine Oil | EO0054 | 10 | Motul 300V | 5W-40 | 10 |
| Brake Fluid | BF0006 | 0.5 | Castrol | SRF | 0.8 |
| Clutch Fluid | BF0006 | 0.5 | Castrol | SRF | 0.2 |
| Gearbox Oil | TO0010 | 3.7 | Neo Synthetics | 75W - 90 | 3.7 |
| Coolant | HW001 | 1 | Triple QX | ALU ENGNIES -36°C | 13 |
| CC Coolant | HW001 | 1 | Triple QX | ALU ENGNIES -36°C | 10.5 |
| Aluminium Spray | AC0040 | Can | Tygris | Aerosol | N/A |

## 9.8 TORQUE GUIDE

| Bolt/Nut | Retainer | Torque |
|---|---|---|
| ***Steering*** | | |
| Upright Camber Bracket | - | 18 Ft/Lbs |
| Steering Bracket To Track Rod | - | 30 Ft/Lbs |
| ***Suspension*** | | |
| Rocker Bolts | K-Nut | 35 Ft/Lbs |
| RXC Upright Bearing Hub Nuts | Peened | 550 Ft/Lbs |
| Damper | Nyloc | 26 Ft/Lbs |
| Pushrod | Nyloc | 30 Ft/Lbs |
| Roll Bar Pushrod | Nyloc | 18 Ft/Lbs |
| Rear ARB Mount | Nyloc | 26 Ft/Lbs |
| Wishbone Clevis To Casting | - | 12 Ft/Lbs |
| Front ARB Bracket To Chassis | - | 18 Ft/Lbs |
| Steering Rack To Chassis | - | 25 Ft/Lbs |
| Drive Pegs | K-Nut | 44 Ft/Lbs |
| Wishbone To Chassis | Nyloc | 30 Ft/Lbs |
| Wishbone To Upright | Nyloc | 48 Ft/Lbs |
| Rear Toe Link Stud | Loctite | 59 Ft/Lbs |
| Rear Toe Link K-Nut | Roll Pin | 30 Ft/Lbs |
| ***Gearbox*** | | |
| Engine Cross Brace | Nyloc | 65 Ft/Lbs |
| Gearbox Top/Bottom Pin | Nyloc | 65 Ft/Lbs |
| Gearbox Rear Frame | Dowels/Loctite | 65 Ft/Lbs |
| ***Braking System*** | | |
| Brake Bell Bolts | Hi-Temp Lock Nuts | 6 Ft/Lbs |
| Brake Bleed Nipples | Tapered Seat | 7 Ft/Lbs |

## 9.9 DUNLOP SETUP SHEET



# GT3 - Factory setup sheet - Hankook

**Note: When carrying out set-up on flat-patch, set tyre pressures to hot pressure. Ensure that they are returned to cold pressures after setup is complete.**

| Date | | Chassis # | | Job # | |
|---|---|---|---|---|---|
| | | Technician 1 | | Technician 2 | |

**FARB**

**RARB**

| Camber | | Toes | |
|---|---|---|---|
| -2.5 | -2.5 | 2mm OUT | 2mm OUT |
| -2.0 | -2.0 | 3mm IN | 3mm IN |

| Triple Intrax | | Springs/Preload | | | Triple Intrax | |
|---|---|---|---|---|---|---|
| Bump LS: | -7 | Rate | FARB | Rate | Bump LS: | -7 |
| Bump HS: | -25 | 180 | 22.2mm<br>25.4mm | 180 | Bump HS: | -25 |
| Rebound: | -25 | Length | 28.6mm | Length | Rebound: | -25 |
| | | 130mm | | 130mm | | |
| | | Preload | | Preload | | |
| | | 8mm | | 8mm | | |

| Ride | Front Diffuser H | Ride |
|---|---|---|
| 297mm | 42mm | 297mm |
| | Ballast Weight | |
| Drop | 85kg | Drop |
| 82mm | Cross% | 82mm |
| Weight | Total weight | Weight |
| kg | kg | kg |

| Triple Intrax | | Springs/Preload | | | Triple Intrax | |
|---|---|---|---|---|---|---|
| Bump LS: | -7 | Rate | RARB | Rate | Bump LS: | -7 |
| Bump HS: | -25 | 160 | 15.9mm<br>19.1mm | 160 | Bump HS: | -25 |
| Rebound: | -25 | Length | 22.2mm<br>25.0mm | Length | Rebound: | -25 |
| | | 130mm | | 130mm | | |
| | | Preload | | Preload | | |
| | | 0mm | | 0mm | | |

| Ride | Rake mm | | Ride |
|---|---|---|---|
| 224mm | 22mm | | 224mm |
| Drop | | | Drop |
| 108mm | | | 108mm |
| Weight | LHD | RHD | Weight |
| kg | | | kg |

| Wheel Size |
|---|
| Front |
| 18"x10.5" |
| Rear |
| 18"x11.5" |

| BOP Ballast |
|---|
| |
| Fuel Level |
| 5L |

| Dive planes: | Y / N |
|---|---|

| Tyre Pressure (PSI) (Cold & Hot) | | |
|---|---|---|
| 28 | Hankook | 28 |
| 20 | | 20 |
| 28 | | 28 |
| 19 | | 19 |

| PADS |
|---|
| 01 |
| PADS |
| 01 |

| Rear Wing | |
|---|---|
| Holes (from the bottom) | |
| Main | 3 out of 4 |
| Bi-wing | 7 out of 11 |

**Comments:**

QD139-1

## 10. VERSION HISTORY

2018-01-05 v1.0 Initial public release

2018-01-31 v1.1 Motul part numbers added, Hankook tyre information and setup sheets.

2018-02-22 v1.2 Hankook updated.

2018-07-16 v1.3 Gearbox oil check added. Pushrod lengths. Torque units added. Master cylinder part numbers added.

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