



RADICAL SR3 XXR **OWNERS MANUAL**



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Peterborough
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INTRODUCTION



Dear Radical Owner,

Thank you for purchasing your Radical SR3 and welcome to the worldwide Radical family.

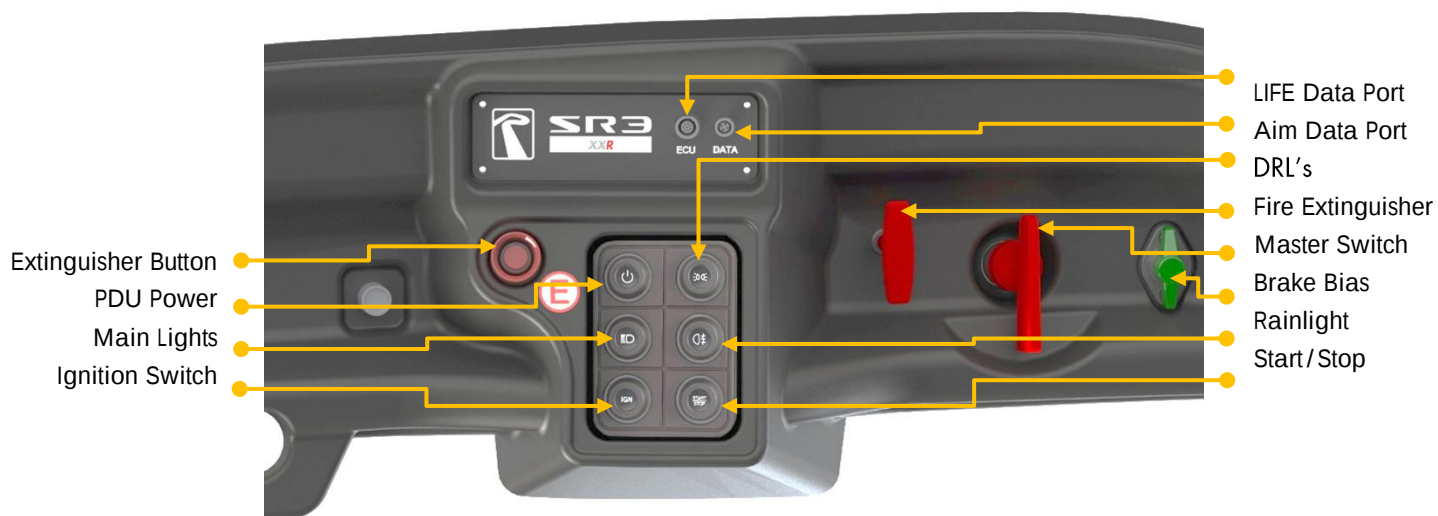
Since its launch in 2001 we have continually developed, refined and improved the SR3 into a truly unique Sportscars. Now in its 5th generation the SR3 has sold over 1500 units cementing its place as the world's most widely produced and successful prototype style Sportscar.

If properly maintained your SR3 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.

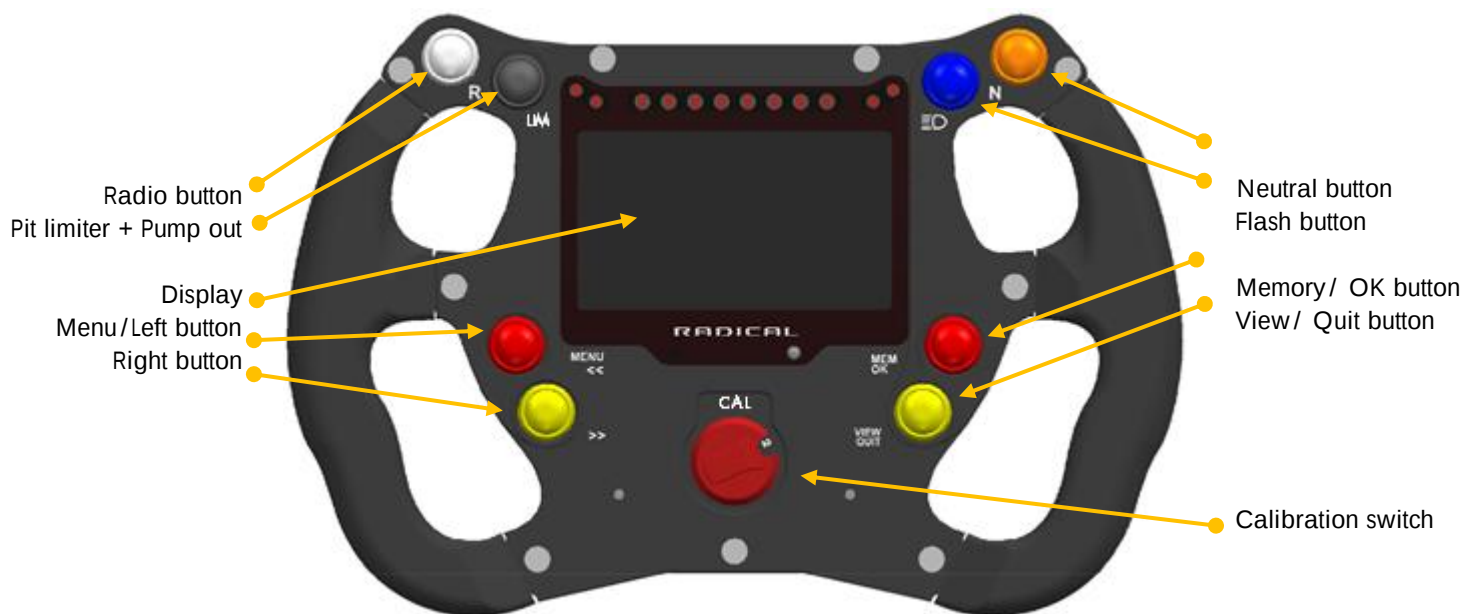
You will find any further help and support via our website www.radicalmotorsport.com or alternatively please contact your local dealer. Parts and consumables can be purchased through our online store, whilst any race series information, sales or technical advice you may need is just an email away.

1. INTRODUCTION TO YOUR CAR

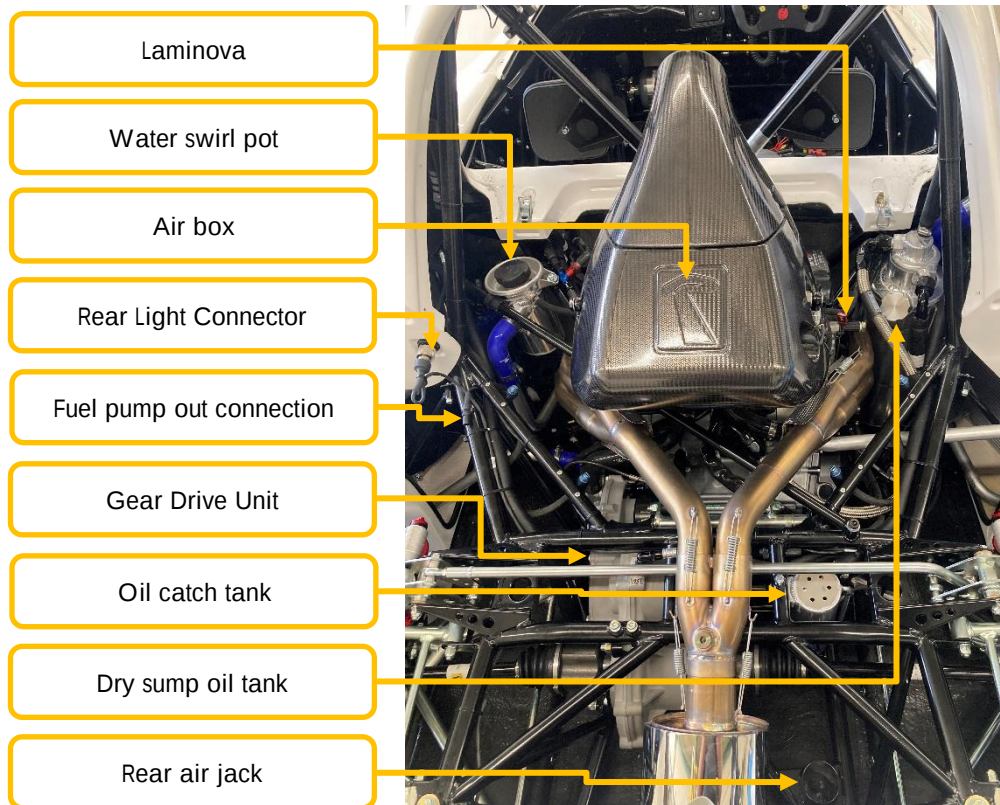
1.1 COCKPIT LAYOUT



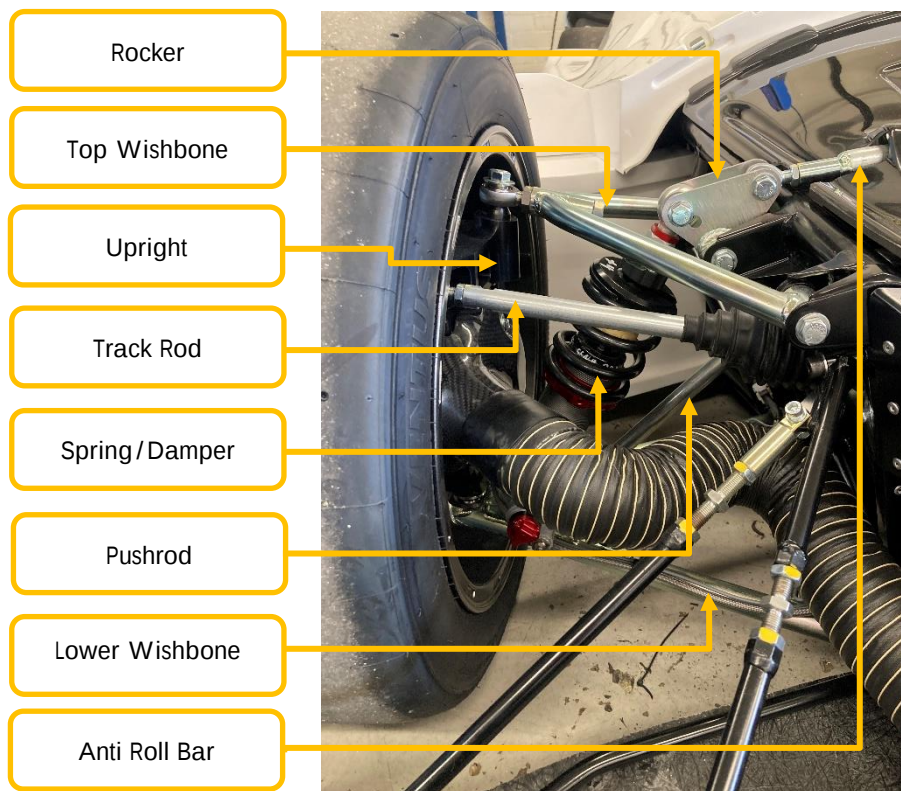
1.2 STEERING WHEEL LAYOUT



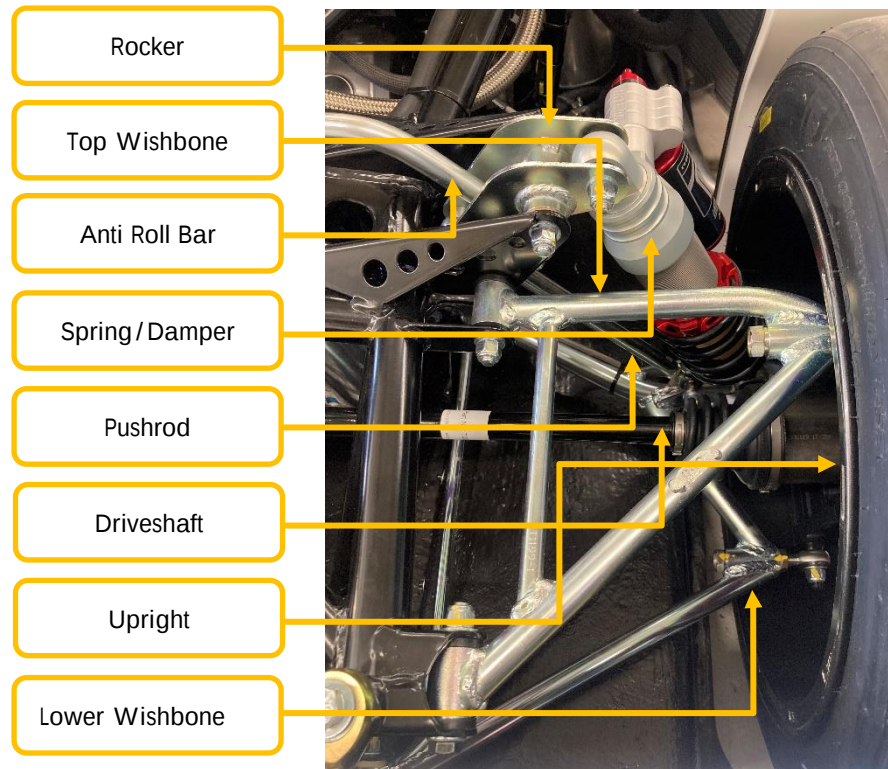
1.3 ENGINE BAY LAYOUT



1.4 FRONT SUSPENSION LAYOUT



1.5 REAR SUSPENSION LAYOUT

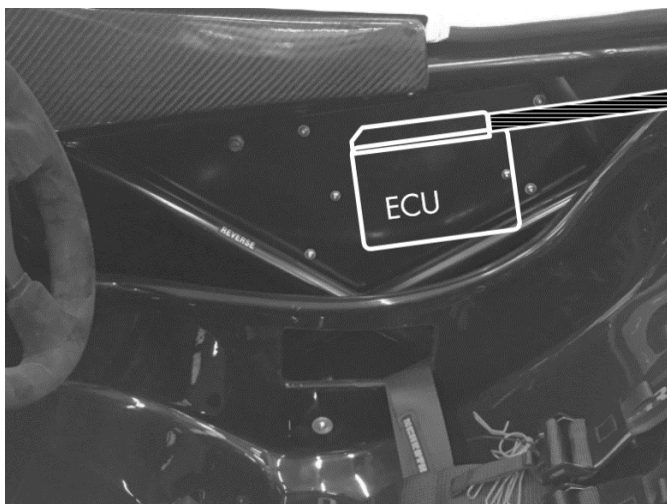


1.6 ELECTRICAL HARDWARE LOCATION

On the right-hand side of the SR3 cockpit you will find an access panel, behind this are the following items:

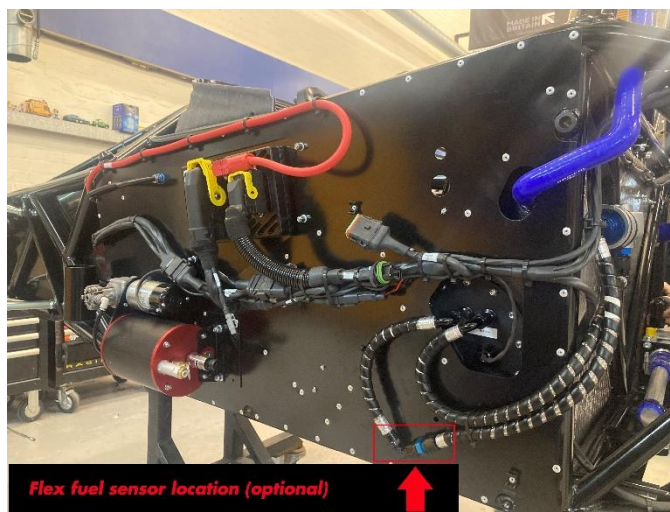
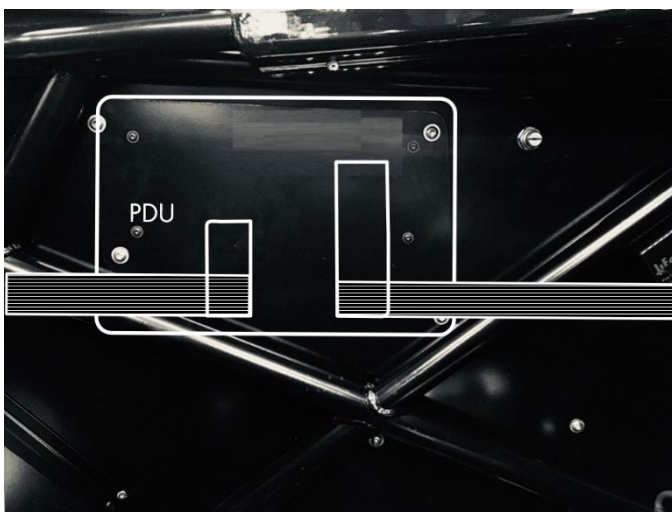
- ECU
- Barometric pressure sensor
- Lithium Battery
- Starter relay
- Charging relay
- Charging fuse 40A Maxi
- Rectifier

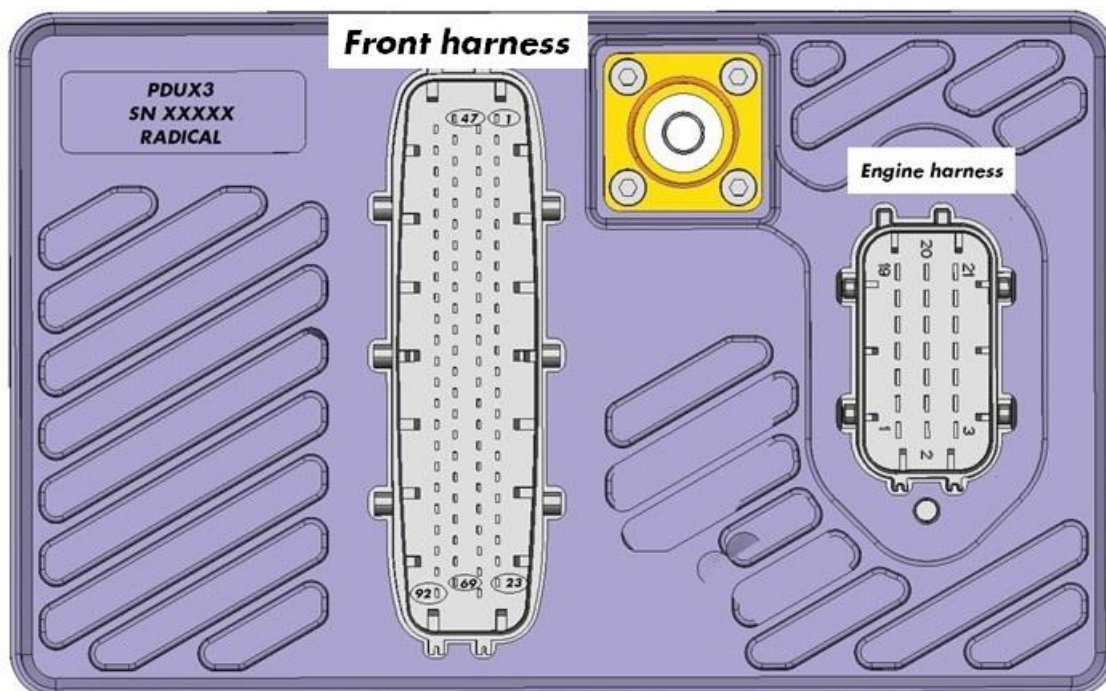
To remove the ECU, undo the 4 bolts holding the plate on, then the two bolts in the bracket for the ECU. Then pull the silver clip upwards to an upright position. The connecting hairbrush can then be rotated off the ECU. To refit repeat these steps in reverse. This should not be removed unless there is an issue, or the engine is being returned for rebuild.



On the left-hand side of the SR3 cockpit you will find an access panel, behind this are the following items:

- Life Racing PDU
- Compressor
- Flex-fuel sensor (optional)



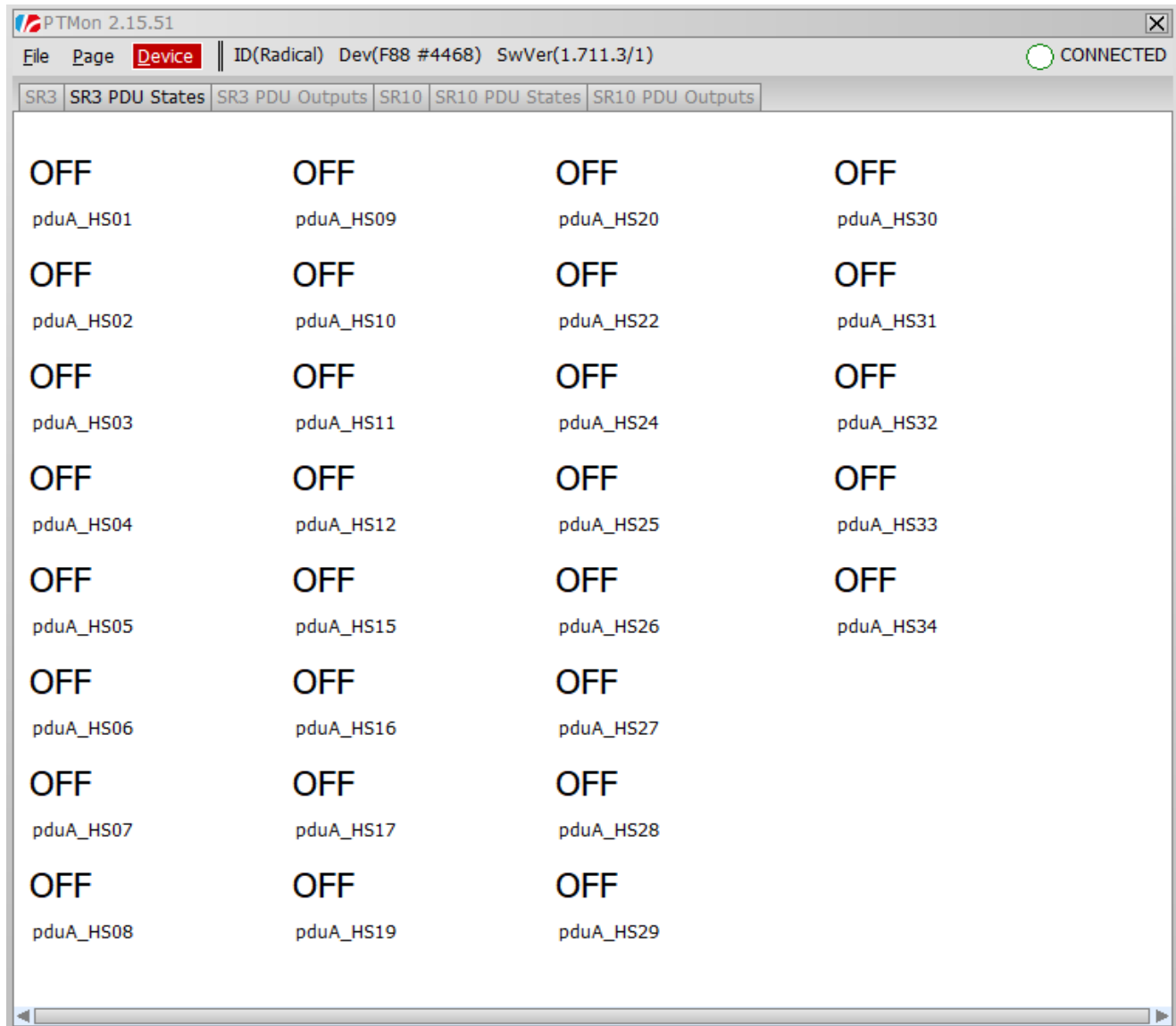


To be able view live PDU live data, use PT-Mon available for download from www.radicalmotorsport.com

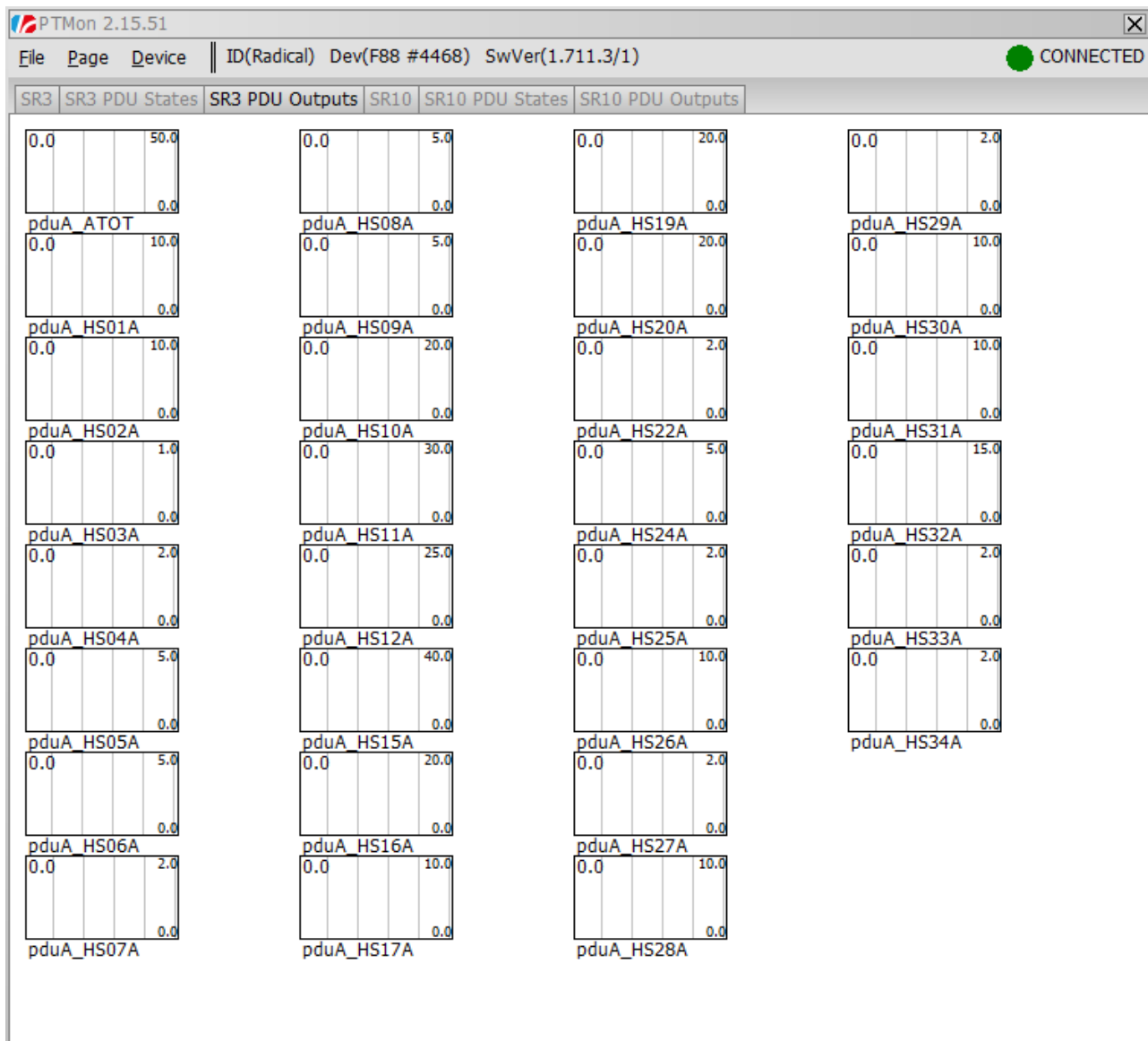
For wiring harness and pinout information email technical@radicalmotorsport.com

PDU STATUS EXPLAINED

Status	Meaning
On	System is turned On and functioning
Inrush	Output is in the specified inrush phase of power delivery
Alarm	Steady state output current has risen above the specified alarm limit for the specified period of time
Soft Fuse	Software controlled output fuse
Trip	Output has tripped due to rising above the specified steady state current limit for the specified period of time
Inrush Trip	Output has tripped during the inrush phase due to rising above the specified inrush current limit for the specified period of time
Low Current Trip	Output has tripped due to be falling below the specified current low limit for the specified period of time
Power V Low	Output has tripped due to be falling below the specified current low limit for the specified period of time
Board Temp High	Output has tripped due to the PDU board exceeding its temperature limit
Hard Fuse	Hardware controlled output fuse
Team Trip	Trip on multiple outputs working together as one



Channel	Allocation	Channel	Allocation
pduA_HS01	Lambda Heater	pduA_HS19	Auxiliary Supply
pduA_HS02	Gearshift Valve	pduA_HS20	Auxiliary Supply
pduA_HS03	Wheel Speed	pduA_HS22	TPMS
pduA_HS04	Alternator	pduA_HS24	Radio
pduA_HS05	Brake Light	pduA_HS25	Transponder
pduA_HS06	24V charging module (optional)	pduA_HS26	Driving Lights LH
pduA_HS07	Sensors Engine	pduA_HS27	Sensors Optional
pduA_HS08	Taillight	pduA_HS28	Driving Lights RH
pduA_HS09	Rain Light	pduA_HS29	Sensors Chassis
pduA_HS10	Fuel Pump	pduA_HS30	Main Beam LH
pduA_HS11	ECU	pduA_HS31	Main Beam RH
pduA_HS12	Radiator Fan	pduA_HS32	Auxiliary Supply
pduA_HS15	Starter Solenoid	pduA_HS33	Switch Panel (Keypad)
pduA_HS16	Gear Compressor	pduA_HS34	Steering Wheel
pduA_HS17	Ignition Coils		



Channel	Allocation	Channel	Allocation
pduA_ATOT	All Outputs combined	pduA_HS17A	Ignition Coils
pduA_HS01A	Lambda Heater	pduA_HS19A	Auxiliary Supply
pduA_HS02A	Gearshift Valve	pduA_HS20A	Auxiliary Supply
pduA_HS03A	Wheel Speed	pduA_HS22A	TPMS
pduA_HS04A	Alternator	pduA_HS24A	Radio
pduA_HS05A	Brake Light	pduA_HS25A	Transponder
pduA_HS06A	24V charging module (optional)	pduA_HS26A	Driving Lights LH
pduA_HS07A	Sensors Engine	pduA_HS27A	Sensors Optional
pduA_HS08A	Taillight	pduA_HS28A	Driving Lights RH
pduA_HS09A	Rain Light	pduA_HS29A	Sensors Chassis
pduA_HS10A	Fuel Pump	pduA_HS30A	Main Beam LH
pduA_HS11A	ECU	pduA_HS31A	Main Beam RH
pduA_HS12A	Radiator Fan	pduA_HS32A	Auxiliary Supply
pduA_HS15A	Starter Solenoid	pduA_HS33A	Switch Panel (Keypad)
pduA_HS16A	Gear Compressor	pduA_HS34A	Steering Wheel

PDU OUTPUTS

Output	Function	Terminal Output Limit (A)	Main Trip (A)/(s)
1	Lambda Heater	40	10.00/0.100
2	Pneumatic Shift	40	10.00/0.100
3	Wheel Speed	40	1.00/0.100
4	Alternator Excite	40	2.00/0.100
5	Brake Light	40	5.00/0.100
6	DC/DC Charge (Optional)	40	5.00/0.100
7	Engine Sensors	40	2.00/0.100
8	Taillight	40	5.00/0.100
9	Rain Light	40	5.00/0.100
10	Fuel Pump	40	20.00/0.100
11	ECU	40	30.00/0.100
12	Radiator Fan	40	25.00/0.100
13	Unused	40	N/A
14	Unused	40	N/A
15	Starter Solenoid	40	40.00/0.500
16	Gear Shift Compressor	40	20.00/0.100
17	Ignition Coils	40	10.00/0.500
18	Unused	40	N/A
19	Auxiliary Supply	40	40.00/0.100
20	Auxiliary Supply	40	40.00/0.100
21	Unused	15	N/A
22	TPMS	15	2.00/0.100
23	Unused	15	N/A
24	Radio	15	5.00/0.100
25	Transponder	15	2.00/0.100
26	LH DRL	15	10.00/0.100
27	Optional Sensors	15	2.00/0.100
28	RH DRL	15	10.00/0.100
29	Chassis Sensors	15	2.00/0.100
30	LH Main Beam	15	10.00/0.100
31	RH Main Beam	15	10.00/0.100
32	Auxiliary	15	15.00/0.100
33	Switch Panel	15	2.00/0.100
34	FSW4	15	2.00/0.100

LIFE VIEW - PDU

Use Life View to view saved PDU data in same fashion as engine data.

PDU Workbook template is available for download from <https://www.radicalmotorsport.com/technical-downloads>

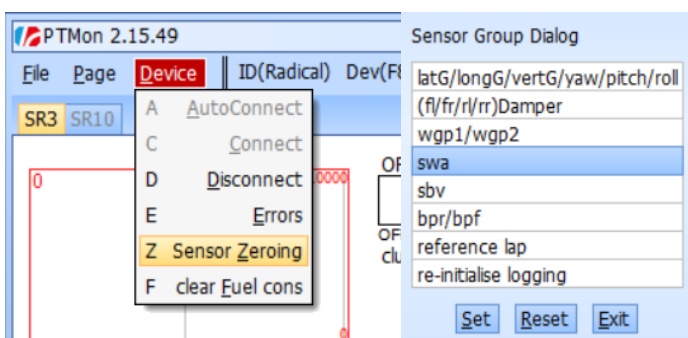
1.8 ZEROING TELEMETRY SENSORS

Telemetry sensors can be zeroed using PT-mon application.

Follow –
PT-mon – Device – Connect – Device – Sensor Zeroing

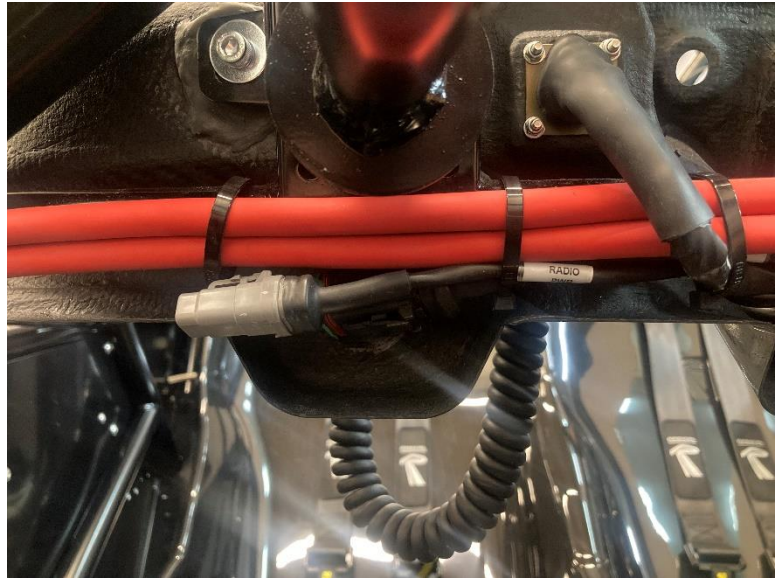
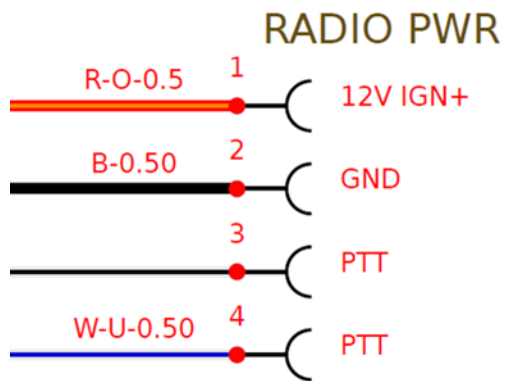
Choose required channel and press Set

To view live values, use Life-mon application.



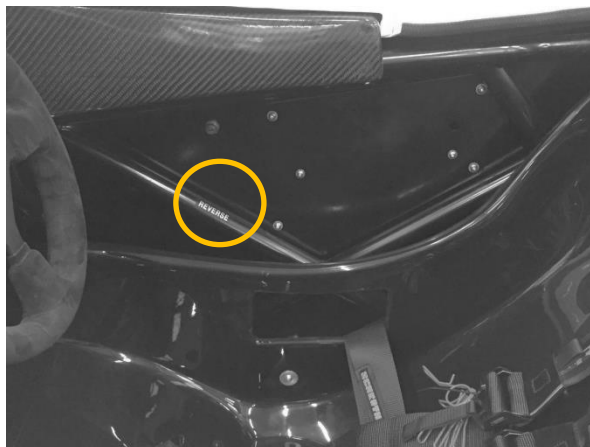
1.9 RADIO WIRING DIAGRAM

To power up the radio system, locate DTM06-4S connector labeled Radio PWR underneath the dashboard and follow attached wiring diagram to power up your radio system.



1.10 REVERSE LEVER LOCATION

The reverse lever is located between the driver's seat and the edge of the cockpit as shown below:



The lever moves a gear in the Gear Drive Unit putting the output drive into reverse.

To engage reverse gear the car must be stationary and in neutral. Push the lever forwards until the gear is fully engaged. Put the gearbox into first gear as normal and carefully reverse.

2. RUNNING YOUR CAR

Upon delivery of your new car, it is recommended you check the following items:

- If the car has been shipped, be sure to check the tracking of the front and rear wheels, it is possible that the securing straps may have been overtightened and pulled the car out of alignment.
- Make sure the master switch was not left on during transit and the battery hasn't run flat.
- Check that the driver is comfortable in the car. The seat can be adjusted forwards and backward by loosening off the 3 bolts either side of the seat. The pedal stops can also be adjusted. If the pedal adjustment is not enough a short pedal box is available, please contact your local dealer for more information.
- Remove the fire extinguisher safety pin prior to starting the car.
- Check all fluid levels; coolant, brake, clutch and engine oil. Fluid specifications can be found on page 38.
- Ensure there is a sufficient amount of fuel in the car. We strongly advise a minimum of 98 RON octane.

Minimum Fuel Octane Rating		
RON (Europe)	MON	PON or R+M / 2 (USA)
95	87	91
96	88	92
98	90	94
100	91	96
105	95	100

Customers are advised to pump out their fuel tanks at the end of each day, between periods of use. Phase separation can occur in some fuels, resulting in a high concentration of some substances which can cause damage to the bladder material or components. Whilst not infallible, draining the system will minimise this risk.

Only cars with the Bio-fuel upgrade kit can run ethyl alcohol-based fuels. The kit consists of a fuel composition sensor, lambda sensor and lambda extension. Flex fuel and lambda operation must be enabled within the ECU via LifeCal. This only needs to be done once prior to installation or in the event ECU Re-flash or replacement. The fuel composition sensor measures the percentage of ethanol within the fuel being delivered to the engine. The ECU will alter the fuelling requirements dependant on the Petrol (Gasoline) to Ethanol ratio with a maximum of 85% Ethanol (E85). The exact ratio can be viewed via LifeRacing applications under the channel name 'fuelcomp'.

Ethanol fuels provide a higher knock resistance allowing for more aggressive ignition timing, in conjunction with a high oxygen content and high latent heat of evaporation, this provides around a 5-8hp increase in output throughout the power curve. Due to a different stoichiometric value from regular petrol additional fuel is required to ensure the correct air/fuel ratio and power is produced, a 35% increase in fuel consumption can be expected.

CRITICAL: High ethanol connect fuels MUST not be stored in the vehicle for prolong periods and should be pumped out after each use. Petrol (gasoline) should then be flushed through the system before storage. Ethanol is hygroscopic and will absorb moisture, it is important to store ethanol-based fuels in a suitable sealed drum.

Should you consider upgrading your car with Bio-Fuel upgrade kit contact engines@radicalmotorsport.com or technical@radicalmotorsport.com

To ensure the reliability of your car and engine we would strongly recommend following this procedure every time you start running your SR3:

Dry cranking - Before starting the car ensure the oiling system is well lubricated, 'dry crank' the engine in neutral, 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 - Check the water level, then start the engine and allow it to idle until the water gets above 80°C and the oil has started to warm 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. Optionally you can use an engine oil pre-heater to warm the oil prior to starting the engine, for more information please contact our stores department.

Oil Check - When the oil temperature is over 55°C raise the RPM to 4,000 for 5 seconds to fully scavenge the oil, then 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 4,000 for 5 seconds, to re check the oil level.

2.1 PRE-SESSION CHECKS

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.

- Torque the centre lock wheel nuts to 260lb/ft. Fit the safety retaining clips.
- Use the tyre guide to get a rough idea on cold starting tyre pressures and ensure these are set correctly.
- Double check the fire extinguisher system is set to active (electrical specification) and the pin is out of the lever.
- Ensure the mirrors are all in the correct position for the driver
- Dependent on weather conditions, you may need to blank off the side-pod intakes in order to maintain recommended engine running temperatures. Running outside these temperature ranges can be harmful to the performance of your engine.

2.2 ENGINE CONTROL PARAMETERS

General Running Parameters	
These are some of the engine vitals, they should remain within the range listed below.	
Fuel Pressure	3.8 – 4.2bar
Oil Pressure	70psi @ 80°C @ 10,000rpm
Battery Voltage	13.8v – 14.2v
Oil Temperature	95°C – 105°C
Water Temperature	70°C – 80°C
Throttle Position	0.5% – 102%
Engine Trips	
The engine will be turned off by the ECU if any of these conditions are met. The master switch will have to be recycled to restart the engine.	
Low Oil Pressure	65psi @ 100°C @ 10,000rpm (RPM + Temperature Dependant)
Low Fuel Pressure	2.5bar
Limp Mode	
The rpm will be limited to 4000rpm if any of these conditions are met. If they fall back into specification the limp mode will be turned off automatically.	
Warmup Limp	ECT not reaching over or dropping below 57.5°C after 30 min. of running
High Water Temperature	ECT over 97.5°C
High Oil Temperature	EOT over 135°C

STARTING THE CAR

To start the car, turn on the master isolator switch and the touchpad will light up. Press master switch button on the touchpad and the Steering wheel and ECU will power up. Press the ignition button to turn it on and finally you can press start/stop button to startup the car. The starter will automatically run for up to 3 seconds until the rpm is above 750rpm.

Please note that your SR3 XXR would not start without the steering wheel connected whilst in gear.

IMPORTANT NOTE

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

PADDLESHIFT CONTROLS

- To pull away, depress the Clutch, hold the neutral button in and shift down to get to first (remember the engine is from a motorbike). Once you have pulled away in first gear you can then shift up as normal all the way to 6th.
- The SR3 is fitted with an auto blipper and automatic ignition cut. This allows you to flatshift up the gearbox and means you **do not** have to blip the throttle on the way down.
- The paddleshift system has safety controls that can override paddle requests to help prevent damage to the gearbox 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 second gear. To select neutral when the car is traveling at low speeds or has stopped; hold the neutral button and shift down from second, or up from first.

The gear order is shown below:

1 → N → 2 → 3 → 4 → 5 → 6

IMPORTANT:

Remember the engine is not designed to run backwards. If the engine runs backwards without the clutch depressed it will damage the starter motor. **Never restart the car if you did not depress the clutch.** If the starter spins backwards, the starter motor and starter clutch need to be inspected back at the pits to ensure there has been no damage.

See page 41.

STOPPING THE CAR

Upon stopping leave the engine running for at least 15 seconds if possible to prevent it from heat soaking. In hot climate, keep checking the temperatures once engine was turned off and re-start if necessary to circulate the coolant. This process will need to be repeated multiple times since the water pump is driven by engine.

Use the start/stop button to turn off the car. Do not turn the car off via the master switch, unless in an emergency.

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 57%, which is 7% biased towards the front. During wet conditions it is advisable to move the bias rearwards at around 5% (see wet setup guide).

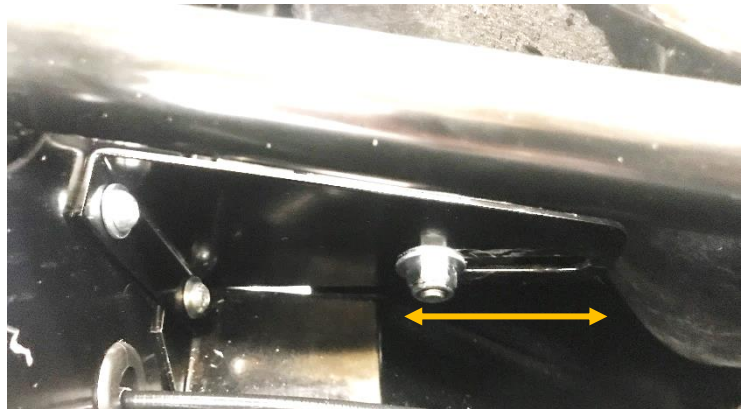
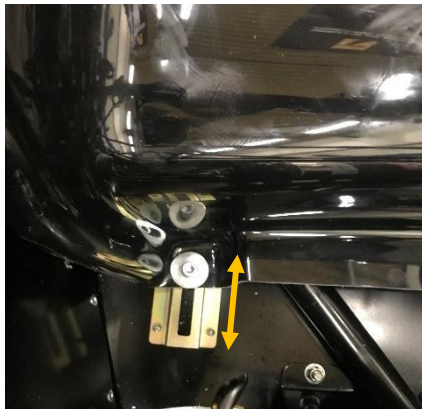
2.3 Adjusting the Seat and Pedals

2.4 ADJUSTING THE SEAT AND PEDALS

The pedals and seat can be adjusted to suit the driver.

Seat Adjustment:

The seat is fitted on sliding rails which can be adjusted by loosening the 6 bolts on the seat. There are two 13mm nylocs, one either side at the top of the seat between the chassis, two M6 button heads at the base of the seat and two M6 cap heads at the front lip of the seat. Once these are loose simply pull the seat forward or back whichever is desired, then tighten all six fixings.

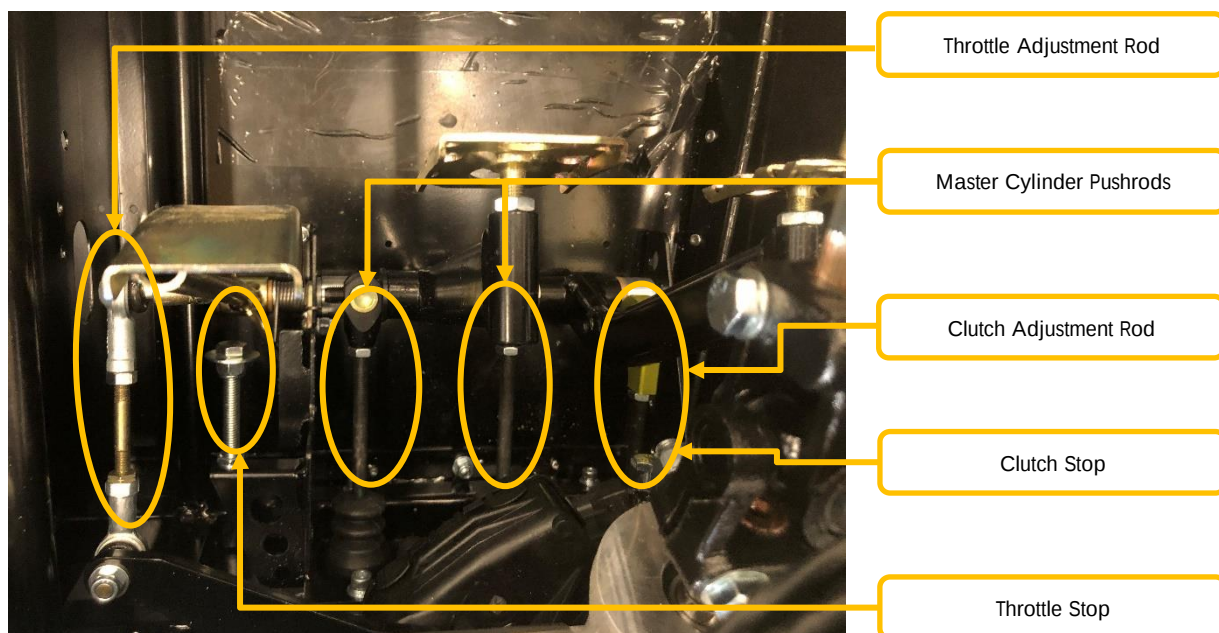


Pedal Adjustment:

The pedals can be adjusted by either loosening the locknuts on the pedal pad, or by loosening the locknuts on the **master cylinder pushrods**, then turning the rods to move the pedal. The pushrods must be moved evenly as this will affect the brake bias. The **clutch pedal stop** must be reset if the pedal is moved. Measure the gap between the pedal and the stop, once the pedal has been adjusted, move the stop until the same gap is reached between the pedal and the clutch stop. To double check this, measure the amount of travel on clutch push rod. This should never be more than 15mm. The throttle pedal can be adjusted by lengthening or shortening of the **throttle adjustment rod** joining throttle pedal and pedal position sensor (PPS). Don't forget to undo the throttle pedal return stop bolt to allow pedal movement closer to driver. The throttle stop must be set accordingly at the same time to prevent damage to PPS. The throttle position must be checked after adjusting. The PPS should display negative number when at rest, (between -0.4 and -4) and 100 on full throttle. This can be checked via PT-Mon or Life-mon

If any further adjustment is required, pedal extension kits are available. Contact our stores department:

stores@radicalmotorsport.com



2.5 ADDITIONAL STEERING WHEEL FUNCTIONS

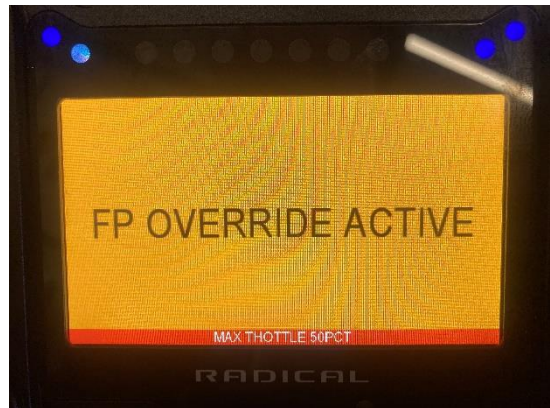
1. Fuel Pump Out

Conditions for activation:

- Master switch ON
- Keypad Power (top left only) ON
- Ignition off
- Hold black 'Mark/LIM' Button down for 7 seconds

Expected response:

- The message shown in the associated image attached will display on the steering wheel until the fuel pump override is deactivated (manually or automatically)
- Fuel pump will run for minimum 2 seconds
- Fuel pump will continue to run until deactivation – Auto deactivation will occur after 130s, expect approx. 10 litres of fuel to be pumped in this time



Conditions for deactivation:

- Momentary push of black 'Mark/LIM' button will then deactivate the fuel pump override

2. Calculated Fuel Consumption Reset

Conditions for activation:

- Master Switch ON
- Rotary 'PAGE/CAL' switch in position 1
- Engine off
- Both shift paddles pulled
- Throttle pedal held above 95% travel for 5 seconds

Expected response:

- The stored value for calculated fuel consumption will reset in the ECU and display 0L used
- The message shown in the associated image attached will display for 5 seconds before automatically clearing



3. Pit Lim it Sw itch

Conditions for activation:

- Master Switch ON
- Ignition ON
- Momentary push of black 'Mark/LIM' button

Expected response:

- Pit limiter activates in ECU
- Steering wheels LEDs 1 & 4 fast flash purple
- Steering wheel screen switches to Pit Lane page as shown in the associated image attached
- DRLs and rain light flash



Conditions for deactivation:

- Momentary push of black 'Mark' / 'LIM' button – Responses to activation will be undone

4. Calibration sw itch positions

Rotary switch 'PAGE/CAL'

- 1 – 50% Throttle Limit
- 2 – 60% Throttle Limit
- 3 – 70% Throttle Limit
- 4 – 80% Throttle Limit
- 5 – 90% Throttle Limit
- 6 – Wet Throttle Map
- 7 – Race Throttle Map
- 8 – Race+ Throttle Map – Same power output as position 7 with more aggressive throttle response



Please note that SR3 XXR will not start without the steering wheel connected.

An additional form of protection is the inability to start the engine whilst in gear. In case you need to restart the engine whilst in gear the Neutral button must be pressed.

3. NEW CAR SHAKEDOWN

At Radical, we pride ourselves on our quality control and rigorous testing procedures that we have in place for every new car. All new cars are subject to a 100 point post production inspection and track simulation on our rolling road dynamometer prior to delivery. However, it is not possible to replicate the forces exerted driving around a race track. The first time you drive your new SR3 around 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.

3.1 SHAKEDOWN GUIDE

Warm the car up and complete the pre-session checks. The first track session for a new car is also the first time the brakes have been used under load. 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.

Your 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. Additional notes on brake bedding can be found in the following section.

To help with brake bedding, initially blank the brake cooling ducts off $\frac{3}{4}$ to increase temperature build up.

RUN 1 (OUT & IN)

Driver:

- For 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 5,000 rpm. During this run only use light pressure on the brake pedal. (See 'Bedding in Brakes' below)

Technician:

- Remove the engine cover and check for leaks and for any components rubbing

RUN 2 (3 LAP RUN)

Driver:

- 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 8,000 before shifting up through the gears.

Technician:

- Check the tyre pressures
- Check the running temperatures of the oil and water and adjust any blankings in order to ensure the car runs at target temperatures
- Again, remove the engine cover and inspect the engine bay for leaks
- Re-check the wheel nut torque
- Allow the brakes to cool for a few minutes before heading back out on track.

RUN 3 (5 LAP RUN)

Driver:

- During this run build up to full brake pressure, and use the full rev range before shifting (10,000rpm).

Technician:

- Check the brake discs, they should now have started to 'blue' near the bell showing they have heated up sufficiently. Allow the brakes to cool once again and remove the blanking on the ducts for the next session
- Check the tyre pressures
- Check for play in the wheel bearings
- Re-check wheel nut torque for a final time

RUN 4 (NORMAL SESSION)

The car can now be run as normal. After this session is complete it is recommended to spanner check the whole car, again pay final attention for potential leaks and a give the car a good general inspection. When spanner checking the car, ensure suspension components are not overtightened as this will restrict the movement of these components.

3.2 BEDDING IN THE BRAKES

This procedure should be followed each time new discs are fitted to your car:

- The brake ducts should be $\frac{3}{4}$ blanked off in order to allow the brakes to warm up through the bedding in period, previously bedded pads should be used if possible.
- 3 lap run - use the brake lightly (<20bar application) on the slow down lap and allow brakes to cool for 5 mins (be sure to not sit stationary in the pits with the brake pedal depressed)
- Next run 5 laps – increase brake pressure to build up temperature in the discs (with a peak of around 40bar). The braking potential of the car will start to fade and any potential 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 during this first full heat cycle they continue to build up brake pressure and heat in the disk. Do not 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.
- 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.

IMPORTANT NOTES

With cast iron discs, brake pressures should not exceed 20bar during the out lap, 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. TYRE MANAGEMENT

The table below shows the suggested running pressures and pressures for race tyres:

Hankook Cold Starting Pressure			
Slicks		Wets	
22	22	22	22
21	21	22	22

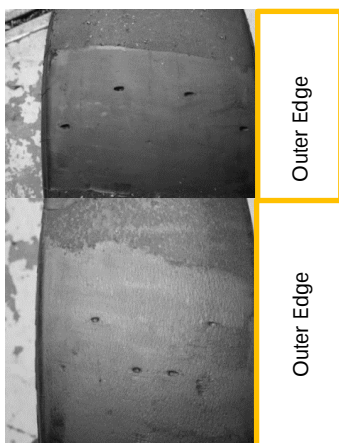
Hankook Hot Pressure			
Slicks		Wets	
28	28	28	28
28	28	28	28

- 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 out-lap when the tyres are cold
- It is important to take advice from your tyre manufacturer to ensure you are following their recommended setup parameters.

TYRE PERFORMANCE ANALYSIS

- 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.

TYRE CONDITION FEEDBACK



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 on 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.

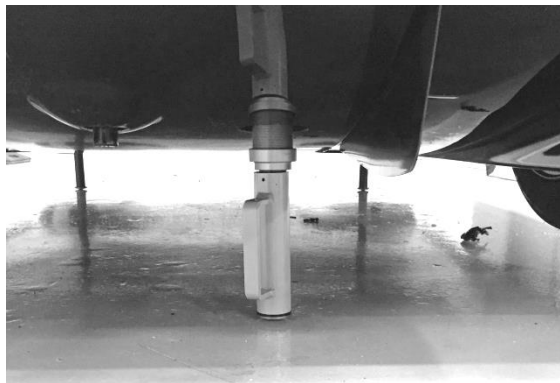
5.1 LIFTING YOUR CAR

AIR JACKS

In order to raise the car, push the 'air jack lance' onto the fitting as shown in the picture below. Slowly build up the pressure in the regulator, until the car is fully off the ground. (250-300psi)



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 until they click on.

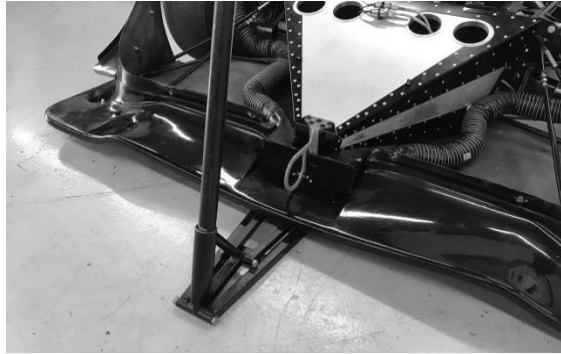


To release the air jacks, ensure it is safe to do so, then pull back on the fitting shown in the picture. Slowly pull the fitting to gradually release the pressure in the system, pulling it quickly will result in the car dropping to the ground rapidly. It is advised to leave the fitting on the open position when it is empty so that the system cannot re-pressurise.



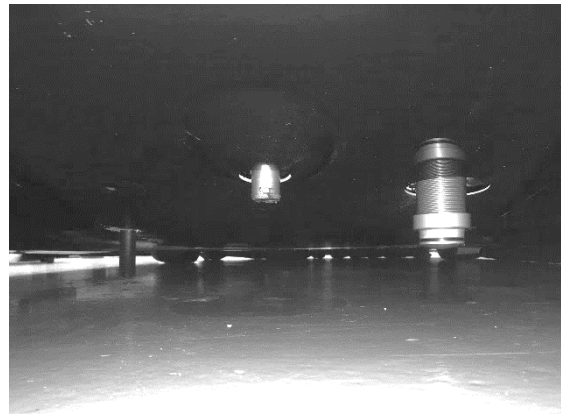
JACKING POINTS

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



The rear jacking point is under the car, a welded bar protrudes the

rear diffuser in the centre of the diffuser around the mid-point.



LIFTING POINTS

To lift the car onto a high stand we recommend lifting the car with a crane, rated to at least the weight of the car. To lift the car, mount a strap around the very top of the forward-facing stays, as shown. Be careful not to damage the bodywork. This is the advised lifting point for track extration too.



6. CAR SETUP

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.

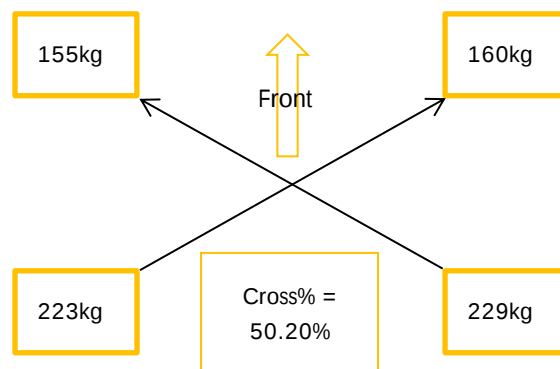
6.1 HOW TO SET UP THE CAR

Setting up the Radical may seem a daunting task at first; however, adjustments are incredibly simple with everything being of easy access allowing for fast setup changes whenever you feel the need to adjust certain areas. Below is a step by step guide of how to work with the car on the flat patch.

1. Check front pushrod lengths are equal & front springs have the correct turns of pre-load. The front pushrod is jigged from production at 230mm.
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 full soft all round, bounce & roll car to settle suspension
8. Check drop heights and adjust average of front & rear to be within 1mm of target
9. Set cambers (+/- 0.1° from target)
10. Set toes (+/- 0.5mm from target)
11. Roll car off platform, turn on scales and zero
12. Roll car back onto platform, repeat bounce & roll
13. Check corner weights. Target is within 5Kg across front, and within 2% for diagonals
14. Adjust to correct using rear push rods
15. 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.)
16. Re-connect anti-roll bars making sure there is no pre-load
17. Set dampers, they should always be set from fully closed.
18. Turn off scales
19. Check the diffuser is level side to side and front to back.

6.2 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 (11



 SR3 - 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 #	
Technician 1	
Job #	
Technician 2	

Camber		Toes	
-3.2	↑	-3.2	↑
-1.8		-1.8	
2mm out	↑	2mm out	↑
2mm IN		2mm IN	

Triple Intrax		Springs/Preload		Triple Intrax	
Bump LS:	-14	Rate	FARB	Rate	Bump LS:
Bump HS:	-25	110	Soft 15.8mm	110	Bump HS:
Rebound:	-5		Medium 19mm		Rebound:
Single Intrax		Length	Hard 22.2mm	Length	Single Intrax
-25		100	X Hard 22.2mm	100	-25
		Preload		Preload	
		4 turns		4 turns	

Triple Intrax		Springs/Preload		Triple Intrax	
Bump LS:	-10	Rate	RARB	Rate	Bump LS:
Bump HS:	-35	110	Soft 12.7mm	110	Bump HS:
Rebound:	-17		Medium 15.8mm		Rebound:
Single Intrax		Length	Hard 19 mm	Length	Single Intrax
-25		100	X Hard 22.2mm	100	-25
		Preload		Preload	
		0		0	

Gearing		Tyre Pressure (PSI) (Cold & Hot)		Fuel Level	
2.770:1		↑	Hankook	↑	
2.917:1					
3.071:1 (STD)	✓				
3.235:1					
3.409:1					
3.594:1					

Ride		Rake mm		Ride	
77mm	↑	18mm		77mm	↑
Drop				Drop	
163mm				163mm	
Weight		LHD	RHD	Weight	
kg				kg	

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

Rear Wing	
Holes (from the bottom)	
Main	3 out of 4
Bi-wing	6 out of 9

Comments:

6.4 HANKOOK DROP HEIGHTS

The drop heights are measured with a 4" bar, the bar is inverted for the front, as shown in the picture on the left. Chassis rake will be the difference between 'Calculated Ride Height' and 'Rear Ride Height'.



FRONT		
Measuring to Rocker Pivot		
Front Drop Height (mm)	Chassis Height (mm)	Calculated Ride height under lowest point on chassis (mm)
153	87	67
154	86	66
155	85	65
156	84	64
157	83	63
158	82	62
159	81	61
160	80	60
161	79	59
162	78	58
163	77	57
164	76	56
165	75	55
166	74	54
167	73	53
168	72	52
169	71	51
170	70	50
171	69	49
172	68	48
173	67	47
174	66	46
175	65	45
176	64	44
177	63	43
178	62	42
179	61	41
180	60	40
181	59	39
182	58	38
183	57	37
184	56	36
185	55	35
186	54	34

REAR	
To Front Bush on Rear Top Wishbone Bolt	
Rear Drop Height (mm)	Chassis Height (mm)
210	78
211	77
212	76
213	75
214	74
215	73
216	72
217	71
218	70
219	69
220	68
221	67
222	66
223	65
224	64
225	63
226	62
227	61
228	60
229	59
230	58
231	57
232	56
233	55
234	54
235	53
236	52
237	51
238	50
239	49
240	48
241	47
242	46
243	45



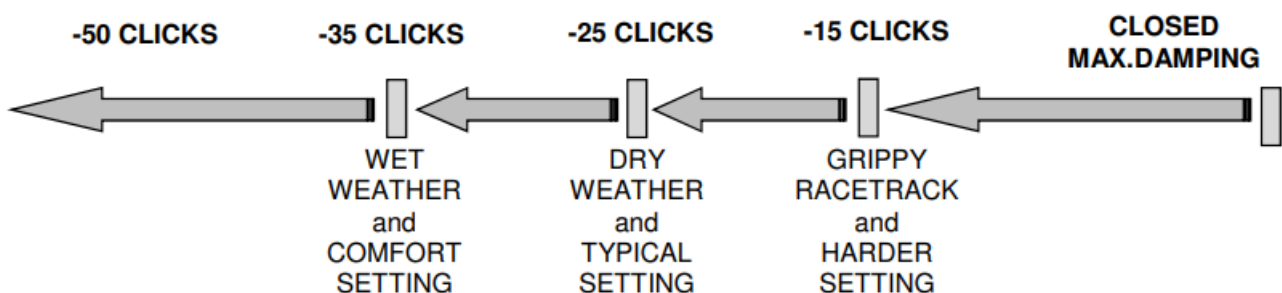
Step one – Close the Damping

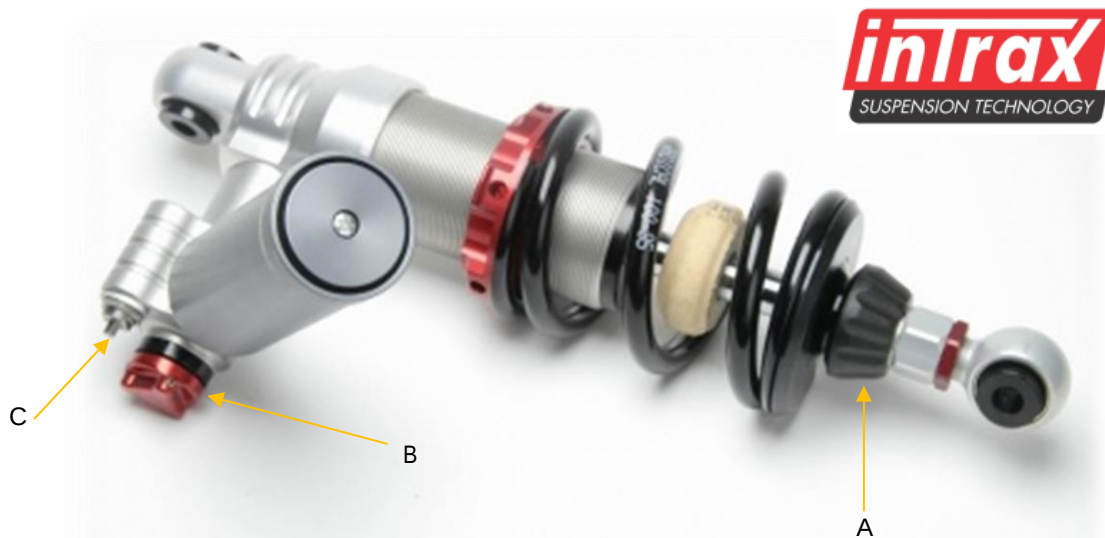
Damping is best set from fully closed position, as this gives most consistent and accurate results. Closing the damping means turning the adjuster knob clockwise (like closing a water tap), seen in the direction from the adjuster knob to the damper body. This means the adjuster knob is facing you and the damper body is facing away from you. The damper adjustment knob controls a complex damping system. As with all adjustments, take care not to use over-force. The adjustments are prone to damage when over tightened. Tighten only until resistance can be felt, then release one click.

Step two – Set the Damping to the Required Setting

The damper is now at its maximum damping force. Turn the adjuster anti-clockwise to reduce the damping force. The Intrax dampers are designed to work best for your application in the middle of the damping range. It can be that due to personal references, tires, wheels, track, weather, springs, etc. the damper must be run harder or softer.

A typical example –



**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 curbs. 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 approximately 15 clicks from fully closed.

Part number	Description
SS0076	Coil Spring - 100mm/ 70Nm (4"x400lb)
SS0049	Coil Spring - 100mm/ 80Nm (4"x457lb)
SS0066	Coil Spring - 100mm/ 90Nm (4"x514lb)
SS0077	Coil Spring - 100mm/ 100Nm (4"x571lb)
SS0025	Coil Spring - 100mm/ 110Nm (4"x628lb)
SS0026	Coil Spring - 100mm/ 120Nm (4"x685lbs)
SS0027	Coil Spring - 100mm/ 130Nm (4"x743lb)
SS0028	Coil Spring - 100mm/ 140Nm (4"x800lb)
SS0029	Coil Spring - 100mm/ 150Nm (4"x857lb)
SS0030	Coil Spring - 100mm/ 160Nm (4"x914lbs)
SS0031	Coil Spring - 100mm/ 170Nm (4"x971lb)
SS0129	Coil Spring - 100mm/ 180Nm (4"x1029lb)

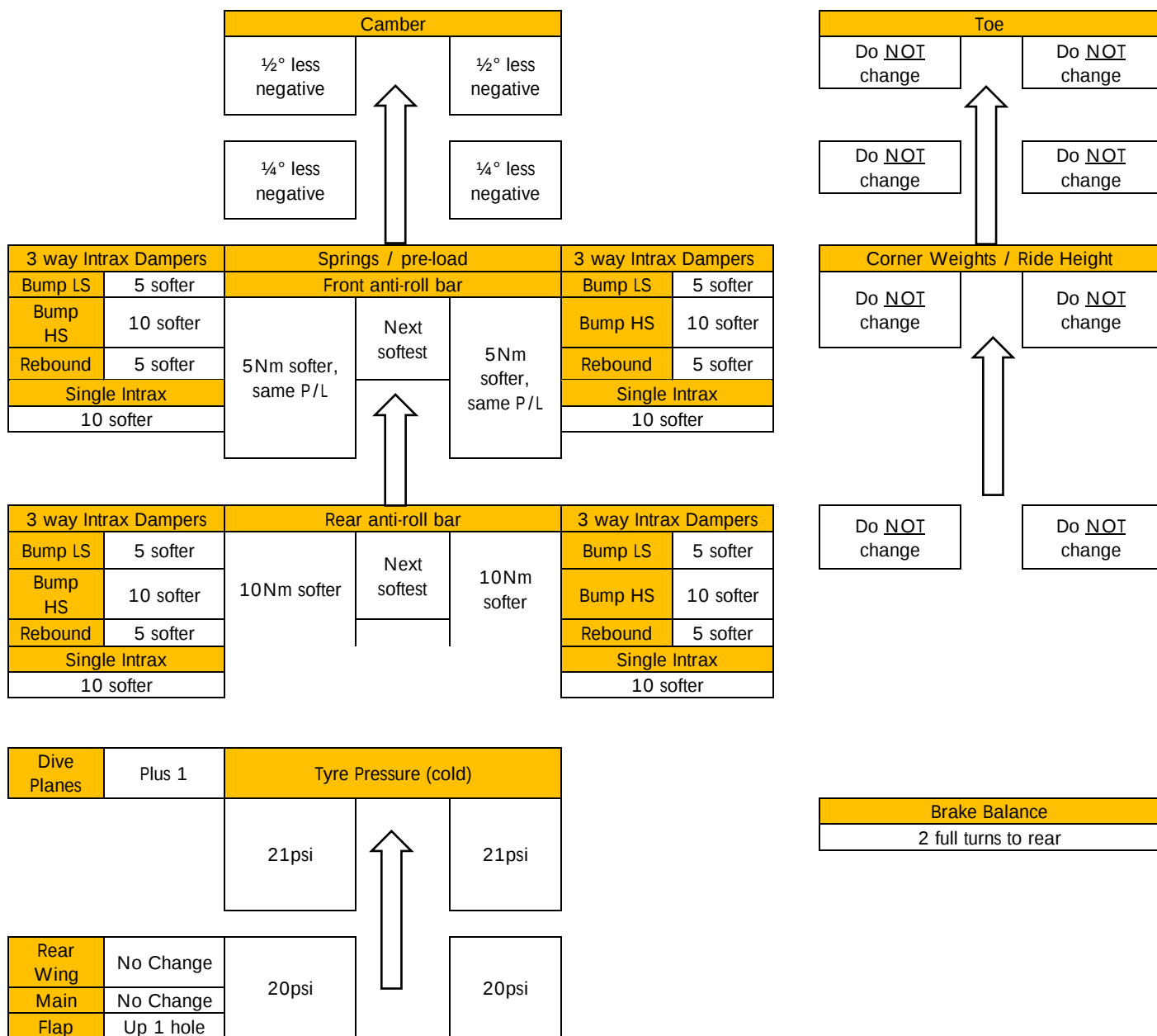
Spring Preload –

Spring preload is set in full droop (damper fully extended) by spring platform from neutral position. Neutral position of a spring platform is set when spring is touching top collar and platform without any load and spring can rotate freely. Preload is set by turning platform towards spring. This will increase tension (load) of the spring so the spring will become pre-loaded. Preload is set as a full rotation of a spring platform against the spring form neutral position.

Example: 4 turns preload means 4 full rotations of spring platform against spring counted from neutral position.

6.7 WET WEATHER SET-UP

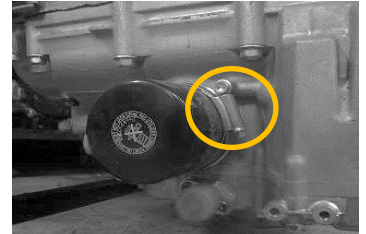
When you venture into the wet conditions, the car setup can be altered in order to give the driver the best chance of staying on the circuit. Shown below is a guide to the changes to make to the car in the wet.



7.1 FILTER SERVICING

Oil Change - We recommend changing engine oil every 10 hours. To do this remove the large oil pipe from the bottom of the oil tank, located in the right-side pod, underneath the engine cover. There will be a small amount of oil left in the engine, to drain the last bit of oil remove the 17mm sump bung on the side of the sump pan. It is recommended that this is fitted with a new crush washer and torqued back up to 17Nm, make sure it is Lockwired around the unused oil pressure switch.

Oil Filter Change - When the oil is changed, we recommend changing the oil filter at the same time to comply with our engine warranty conditions. Remove and discard the old filter. A thin film of oil should be applied to the o-ring on the new filter, use the Suzuki oil filter tool to torque the filter to 20Nm. Fill the engine back up with fresh oil to the correct level. A 50-70mm jubilee clip should be fitted as shown in the picture so it rests against the M6 oil gallery bung to stop it loosening.



Fuel Filter - The fuel filter should be changed every 40 hours. It is located in the fuel regulator housing which is on the left-hand side of the car underneath the engine cover. The unit also houses the pressure sensor and the regulator itself which is in the centre of the unit. The filter is located on the right of the picture. It is secured by a circlip that when removed, the fuel filter can be removed. The o-rings must be replaced every time.



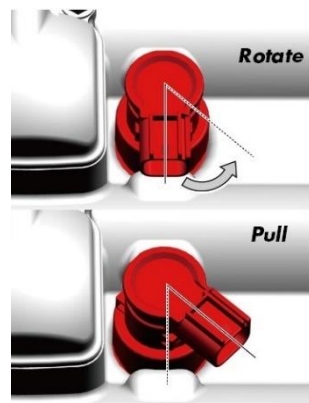
Fuel Filter: FF0005 Fuel Filter O-Rings: FR0006 x 2

Air Filter - The air filter should be inspected and cleaned before each race weekend/test day. When cleaned it should be oiled to the manufacturer's instructions.

GDU Oil Change – We recommend changing GDU oil every 10 hours. To change the GDU oil, remove the oil pump pickup hose and fitting at the bottom of the GDU and allow the oil to drain, check magnet for debris. Should an excessive amount of filings or metal fragments be found, proceed with a thorough inspection. GDU oil filter (rock catcher) should also be checked during every oil change. Once all the oil has drained remove the oil return pipe and fitting to fill the GDU. Then remove the level bung in the side cover until the new oil begins to drip out of the level bung. Re fit the level bung, fitting and return pipe. This must be done on a level surface.

7.2 IGNITION COIL REMOVAL AND INSTALLATION –

1. Turn the Master switch OFF.
2. Remove ignition coil retaining plate.
3. Disconnect the ignition coil connectors from the ignition coils.
4. Turn the ignition coil counter clockwise about 45°
5. Pull out the ignition coil.
6. Should the terminal on the spark plug be worn out as per attached picture, install new spark plugs.
7. Push coils onto spark plug without rotation.
8. Make sure all ignition coils are installed correctly before retaining plate installation. Incorrect ignition coil installation will result in retaining plate damage.



Do not pry up the ignition coil with a screw driver or a bar to avoid its damage.
Be careful not to drop the ignition coil to prevent short / open circuit.
Do not hit the ignition coil with hammer when installing it.

Coil stick common issue –

If the coil stick wasn't removed correctly or was forced onto an old worn out terminal, there is a very high potential for damage.

As per attached image the springs assuring correct connection between the spark plug and the coil stick can get jammed in the way of the terminal. This can not only create an insufficient connection to the spark plug but also result in damage to the cam cover.

Spark Plug Replacement –

In the event of Spark Plug replacement always assure the area around the spark plug inside the cylinder head is dry and clean. Should any debris be found this needs to be removed before spark plug extraction to avoid contamination and potential damage to internal engine parts.

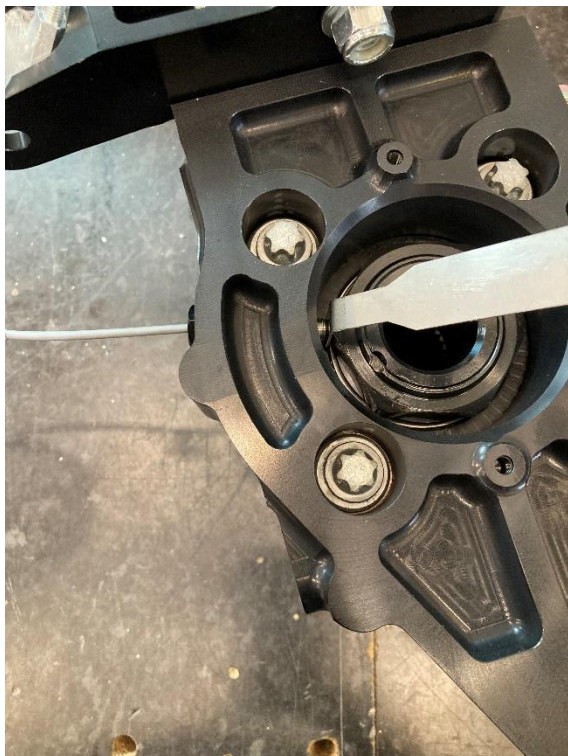
New Spark plugs should be lowered back in position with care to avoid any damage to electrode.

Spark plug tightening torque is 11Nm. Use calibrated torque wrench to avoid cylinder head damage



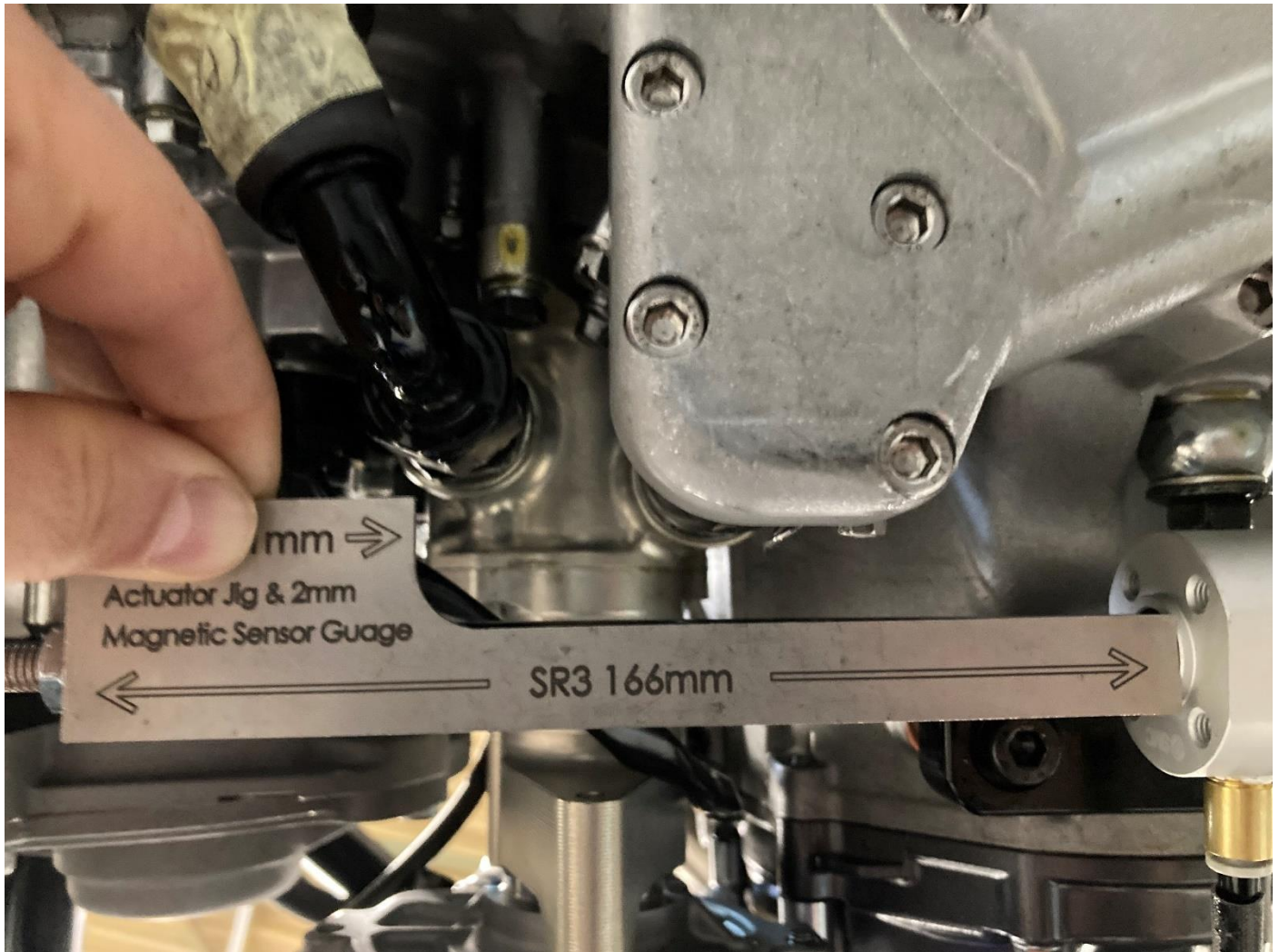
7.3 WHEEL SPEED SENSOR SETUP

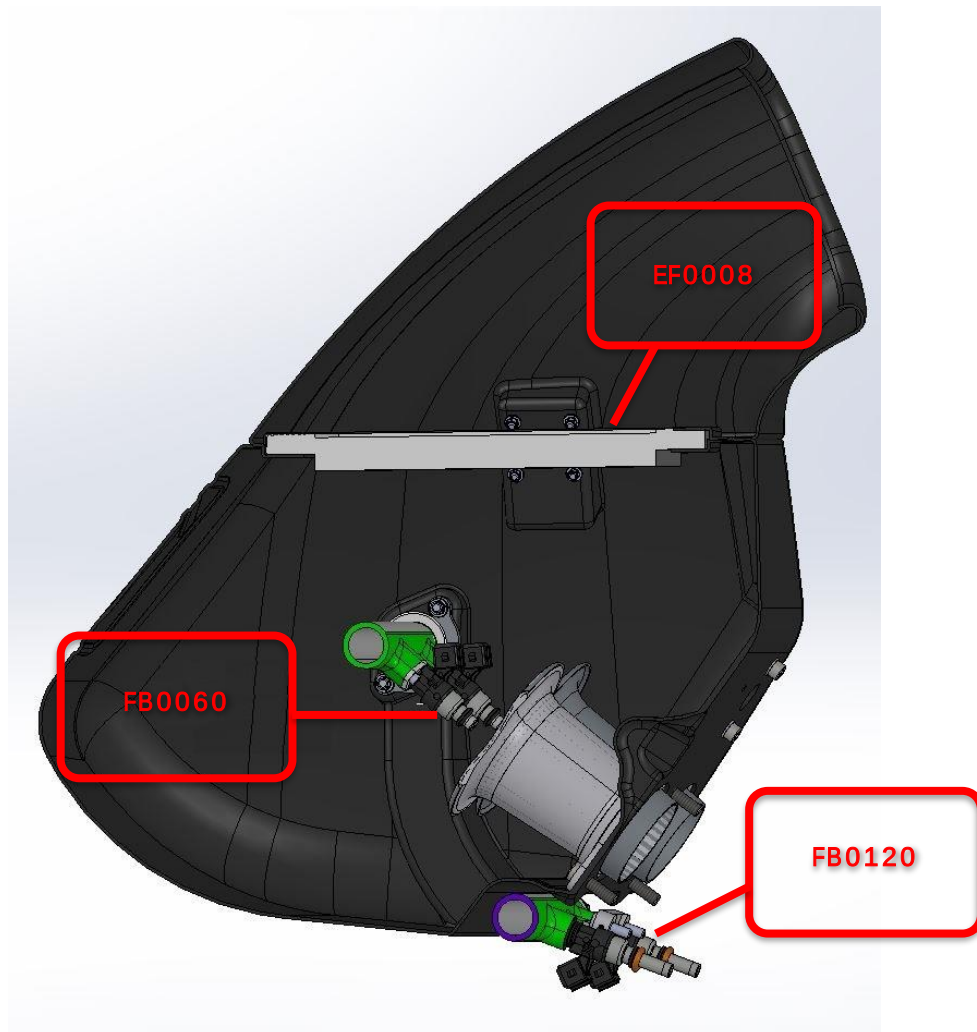
Use the jig for setting the wheel speed sensor (AT0042). Using a pair of 13mm spanners, set the wheel speed sensor no closer to the pickup point than the thickness of the Wheel Sensor Gauge (2mm). The pickup point is the crown of the hub nut. When fitted, check the sensor is working by ensuring it is plugged in, then turn the power on and spin the disc, the sensor should light up when it sees each pickup point.



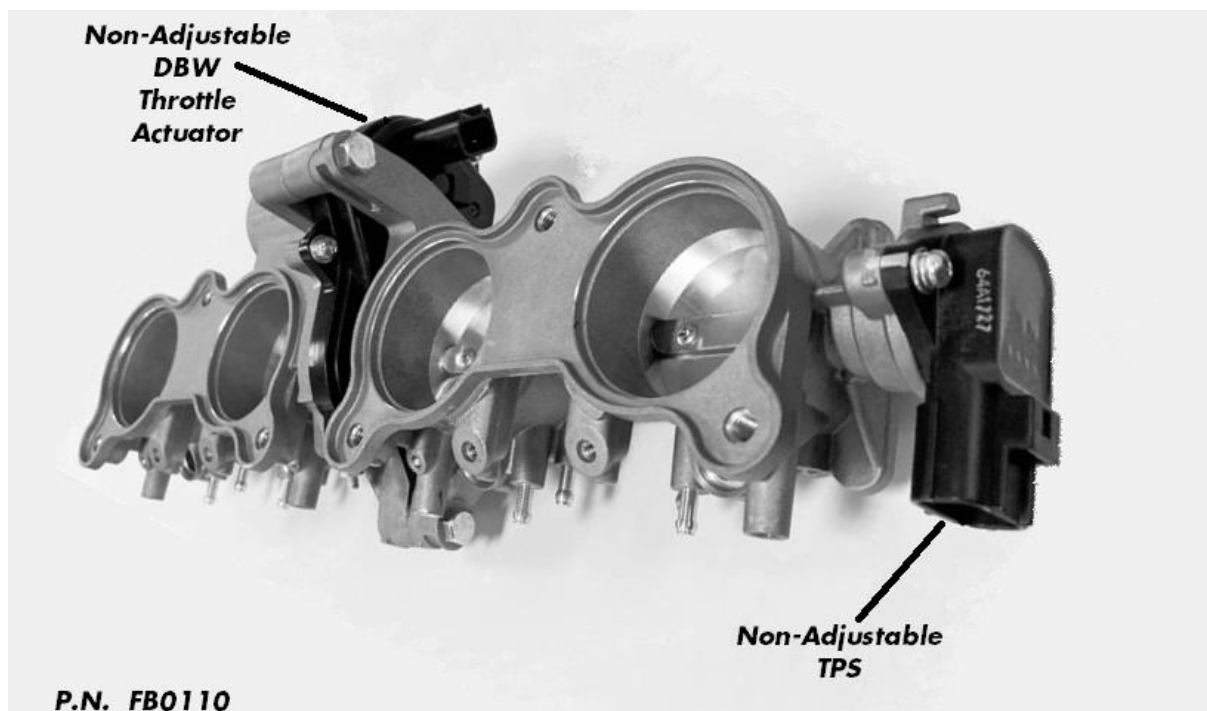
7.4 GEARSHIFT ACTUATOR SETUP

The actuator is a key part in changing gear in the SR3, if the actuator length is set incorrectly it can cause gear shift issues and has the potential to damage the internals of your gearbox. While checking the length, check both bearings for excessive play and wear. Use the jig (AT0033) for setting the Actuator length on the SR3. The total length of exposed piston from the casing to the bottom of the lock nut should be 166mm.





The SR3 XRR uses (DBW) throttle. This means that no adjustments to any throttle body components are required.



7.6 SERVICING THE GEAR DRIVE UNIT

The Gear Drive Unit contains the final drive for a SR3, there are 6 ratio options to choose from depending on the nature of the circuit. These can be found in the appendix of this manual. Below is a step-by-step guide to help with changing the ratios in the GDU:

Tools Required:

- Drain Tray
- 1/2" Impact Gun/Breaker Bar
- 33mm Socket
- 42mm Socket
- 5mm Hex Head Socket
- 1/2" Torque Wrench
- 1/4" Torque Wrench
- Gear Locking Device

Additional Parts Required:

- Different Ratios
- GDU Oil
- Hylomar Universal Blue Gasket Sealant

1. The first step with changing the ratios on the GDU is to place the drain tray under the car for the GDU oil to drain into. Whilst changing ratios it is important to check the conditions of the ones removed.
2. Once the drain tray is in a suitable position, begin removing the M6 cap head bolts on the GDU side casing. As the side casing is being removed, be careful as to not damage the rubber O ring. Whilst the case is being loosened, the oil will begin to drain out of the GDU
3. Once the casing has been removed, insert the locking device between the two gears in order to stop rotation
4. It is important to remember that each shaft has opposing threads; main shaft has a left-hand thread, and the input shaft has a right-hand thread. Using the 42mm socket on the impact gun, remove the nut on the main shaft.
5. Using the 33mm socket, remove the nut on the input shaft
6. As both of the nuts are removed, it is advised to remove each part individually in order to make the rebuild process simpler
7. It is strongly advised to check the gear teeth as the gears are being removed; it is important to check for pitting on the gear teeth as this can sometimes occur over time
8. Before fitting the new ratios clean the threads and inside the GDU- be sure to look out for any metal fragments

9. Once the GDU has been inspected and cleaned, it is time to fit the new ratios. Simply slide the gears, bearings and spacers on the shafts
10. Re fit the two locking nuts with Loctite on the threads before peening over the edges as a locking method. These locking nuts should be torqued to 80 ft/lb
11. When all of the components are refitted, it is recommended to apply sealant to the O ring for re-fitment along with the edge of the side casing
12. Re-fit the side casing before re –inserting the M6 cap head bolts and torque to 5 ft/lb
13. Once all the side casing bolts have been fitted, the GDU oil will need to be replenished as normal (1.5 litres)

7.7 FILLING THE GEAR DRIVE UNIT WITH OIL

Dry fill procedure: (Laminova, flushed oil lines and dry rebuilt GDU)

The GDU oil should be filled through the top oil pipe (heat exchanger return). The adapter must be removed.

1. Fill GDU up with 1.25L of gear oil
2. Prime Laminova (heat exchanger) with gear oil
 - a. Remove the Laminova oil return pipe from top of the GDU
 - b. Remove the Laminova oil return pipe fitting from top of the GDU
 - c. Remove the oil IN pipe from GDU oil pump
 - d. Use Syringe to back feed the Laminova, oil feed pipe and GDU oil pump (approximately 150ml of gear oil) through the open Laminova fitting.
 - e. The process is over once the oil appears on the oil pump IN fitting.
 - f. Reattach Laminova and GDU oil pump pipes
 - g. Run the engine in first gear on idle whilst checking the oil return pipe from Laminova.
 - h. Once you can see continuous flow of oil the priming is completed, and oil return pipe can be reattached to GDU.

Wet re-fill procedure: (after inspection / ratio change)

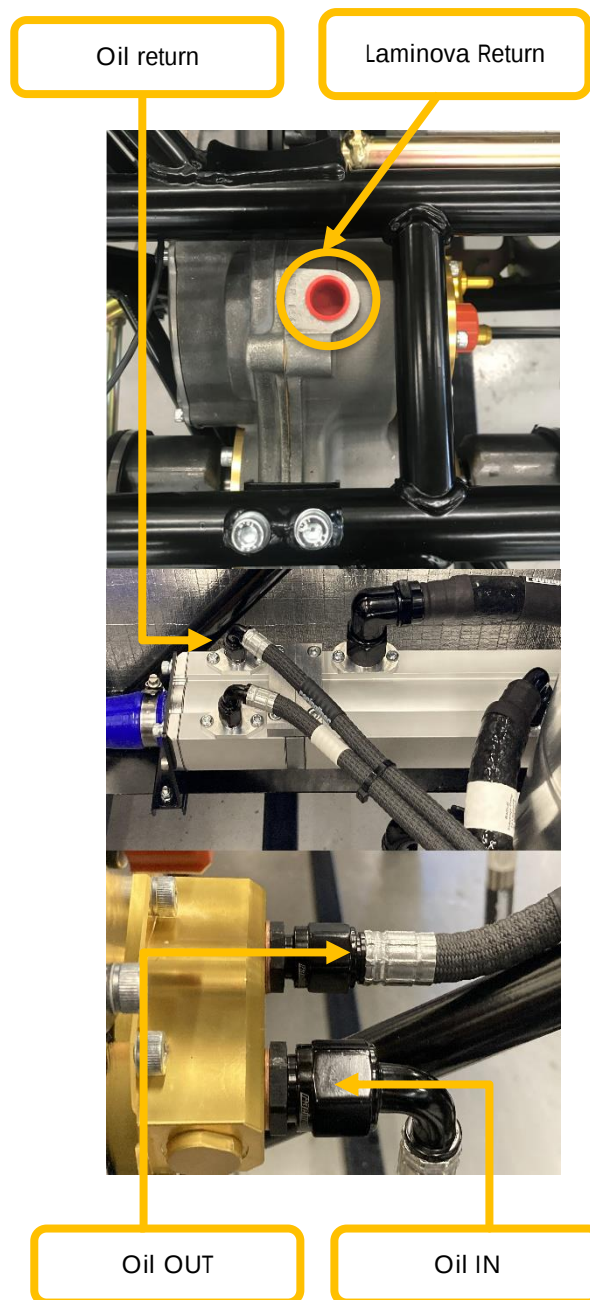
1. Fill GDU up with 1.25L of gear oil
2. Flushing the Laminova and oil pump with fresh oil as per priming procedure above is advised but optional
3. Run the engine in first gear on idle whilst checking the oil return pipe from Laminova.
4. Once you can see continuous flow of oil the priming is completed, and oil return pipe can be reattached to GDU.

Radical part number for oil:

TO0024 – GDU Oil 75W140 (1L package)

TO0025 – GDU Oil 75W140 (20L package)

The level bung must be fitted with the sealing washer and lock-wired as a safety measure



7.9 GEAR DRIVE UNIT ROCK CATCHER –

GDU coarse oil filter or Rock Catcher is protecting the heat exchanger from contamination with large metal particles in case of GDU failure. It is still recommended to inspect and clean the heat exchanger core if the failure occurs to avoid any unnecessary issues in future.



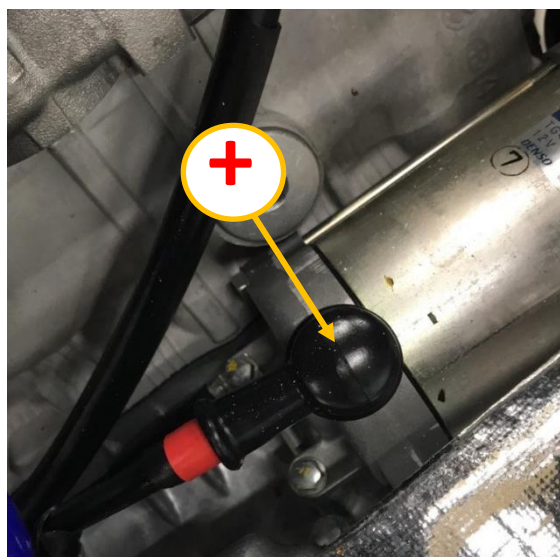
7.10 CHECKING THE STARTER MOTOR AFTER A SPIN

In the event of a spin, if the clutch is not depressed and the engine spins backwards, there is a chance that the starter and opposing gears can get damaged. If there are any doubts over whether the engine is damaged after a spin, it should not be started again prior to inspecting the starter motor.

The first stage in inspecting the starter motor is to remove the positive terminal under the black cover, once it is removed cover it in tape. Then remove the two bolts going into the engine cases.

The starter motor can then be pulled from the starter cover, the first check is to turn the shaft on the starter motor, this should turn normally. If it doesn't this will need to be replaced.

It is imperative to check the starter idler gear if the engine has turned backwards and damaged the starter motor, the gear will only turn one way, so they teeth may be stripped in the event of a spin. If the gear is damaged, you must consult a 'Radical Authorised Engine Builder'



VERSION 1

Overview:

Each wheel sensor is coded to an individual car receiver.

Each sensor is also coded to a specific position (FL, FR, RL, RR).

Wheels need to always be fitted to the programmed corner for the system to work.

You can use alternative wheels on each corner, but they need to have sensors fitted with the same programmed ID for that corner.

To program an additional sensor:

Step 1 – Hold the programmer next to a working sensor you want to replicate (set 1).

Step 2 – Press POWER to power on

Step 3 – Press READ to read the ID number from the sensor.

Read ok

ID:XXXXXXXX: Y.YV

P:Z.ZBar T:WW°C



Note down this ID number.

Step 4 – Press EXIT

Step 5 – Hold TX for 5 seconds, this takes you to the programming screen.

Step 6 – Enter the ID number you have just taken down.

In D1 enter **13**

In D2 enter the **first two numbers/letters** of the ID

In D3 enter the **3rd and 4th numbers/letters** of the ID

In D4 enter the **5th and 6th numbers/letters** of the ID

In D5 enter the **7th and 8th numbers/letters** of the ID

Leave D6 blank.

Step 7 – Hold the programming tool next to the new sensor you want to program (set 2) and press the TX button. It will say reading but it means transmitting! Once transmitted the screen will change to show the programmed ID.

Step 8 – Press Exit to exit this screen and exit again to get to the home screen.

Step 9 – Check the ID is programmed correctly by re-reading the new sensor.

There is on the back of the receiver a white label with 4 hex digits on it.

For the purposes of this procedure the digits will be ABCD.

The sensors have a location code FL=01 FR=02 RL=03 RR=04

Using a handheld reader

Press the Power button to turn it on

Press the Tx button until a screen like this appears.

D1:00H	D2:00H
D3:00H	D4:00H
D5:00H	D6:00H
Exit	

Using the left and right buttons to navigate and the up and down buttons to change the values put the following data into the locations.

D1: 13H

D2: 01H

D3: ABH Replace AB with first 2 digits from Label.

D4: 01H Programming Front Left FL=01 FR=02 RL=03 RR=04

D5: CDH Replace CD with last 2 digits from Label.

D6: 00H

Then press the TX button.

This will change the screen to reading but it will program any sensor near the Handheld reader (keep the other sensors half a meter away)

When it programmes the sensor, It will say read ok and show the values from the sensor

If you press next you can program another identical sensor (multiple sets for spare wheels)

If you press exit you will go back to the programming screen where you can change the D4 info to work on another sensor.

When finished press the exit button repeatedly until TPMS is on the middle of the screen.

Individual receivers are allocated unique identification serial numbers ensuring that only sensors with these serial numbers can be read.

Any number of additional sensors can be programmed with serial numbers to make them compatible with a specific receiver

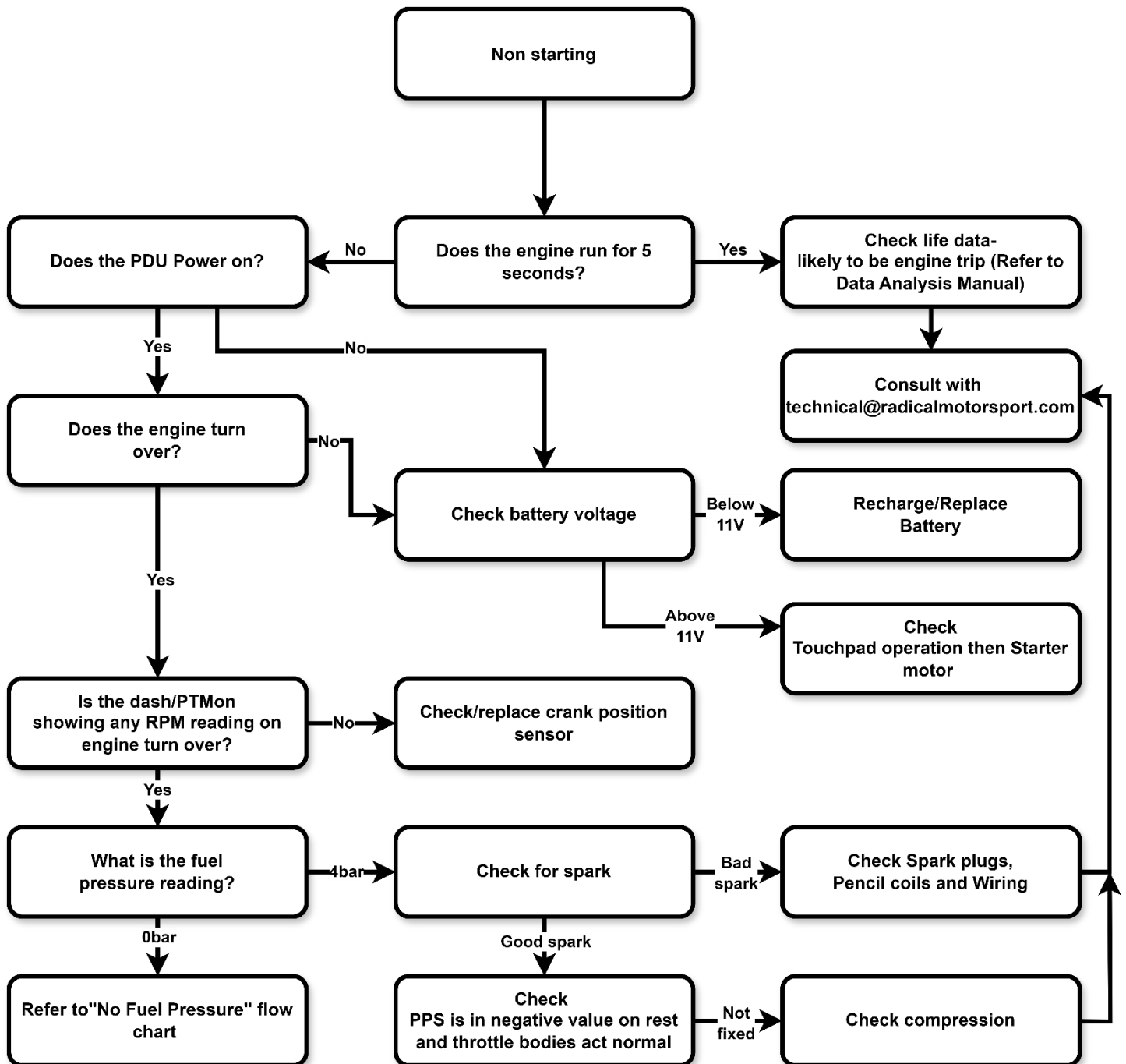
. A second receiver can be setup with the same sensor serial numbers and used on the same car if it not possible to locate a single receiver in a location that is in range of all 4 sensors. Both receivers can use the same CAN IDs for each sensor.

AASL function is enabled as follows:

- Press and hold the receiver button until it flashes twice then release. This puts the receiver into learn mode where the 4 sensor locations are waiting for sensors to be assigned.
- Using the TPMS handset 'Read' function activate all 4 sensors in the correct order (FL,FR,RL then RR.) The receiver LED will flash a number of times in quick succession as each sensor is allocated correctly. A display of the sensor serial number on the TPMS handset does not guarantee it has also been allocated a position within the receiver.
- Once a sensor serial number has been allocated to the first position (FL) the receiver is now ready to accept the next sensor to be assigned as a (FR) then the (RL) and the (RR) As the receiver learns each sensor serial number it will not allow it to be repeated in the next position.
- Finally press and hold the receiver button until it flashes 4 times to indicate the AASL is completed.



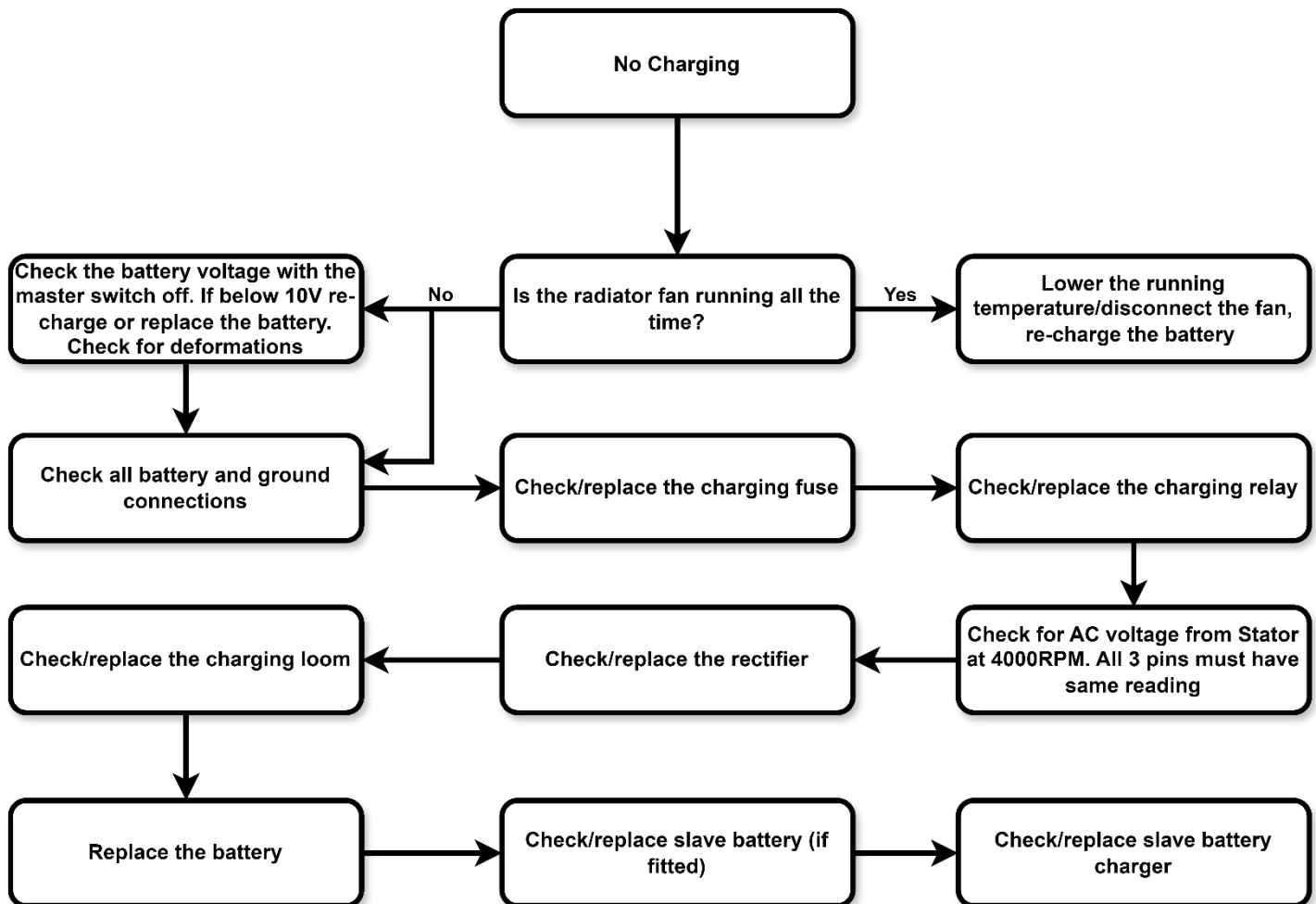
AASL – Automatic Assignment of Sensor Location



8.2 CHARGING ISSUES

Your SR3 should be charging between 13.5-14.5 V when running on circuit. If you see it running below this, it's likely you have some sort of issue with the charging of your car. After each run it is important to check the data on all areas with "vbat" being included; you'll notice the charging voltage in this section. Follow the below guide on how to diagnose the problem and decide on the solution. When checking the car is charging, make sure the RPM is held above 3000rpm

The battery is charged by the stator on the engine. Problems with this battery can be diagnosed by following the below chart.



8.3 GEARSHIFT ISSUES

When first discovering a gear shifting issue, it is important to first follow a few steps before attempting any remedy for the issue.

- First of all, plug into the car and using the 'Data Analysis Manual' as a reference and download the data. Once the data has been downloaded, review the 'GearShiftDecision' channel to see if any shifts have been disallowed due to a breach in the cars normal parameters, TPS Too High/RPM Too High etc. The shift will not be allowed if it sees any of these.
- Next step is to open up LifeMon and check whether there is any output from the paddles. Do this by viewing the 'PaddleSwitch' channel, this will give a live reading of the paddle inputs, check the switches are registering on this channel by displaying up/down. If there is no output, check the wire from the steering wheel is still plugged in and has no breaks or tight bends.
- Is it shifting through all gears? Or just having trouble with one specific gear? If one specific gear this suggests it may be a mechanical issue and it is strongly advised to contact an authorised Radical engine shop for details and more advice on what to do. If you have carried out the first two steps and are still having issues shifting through all gears, take a look below for more help.

DOWNSHIFT ISSUES

Ensure the blip is working. Check actuator bearings for play, check actuator length using the jig, check the TPS is operating normally, check the ECU data for 'GearShiftDecision' which shows any dis-allowed shifts.

ISSUES GETTING OUT OF NEUTRAL

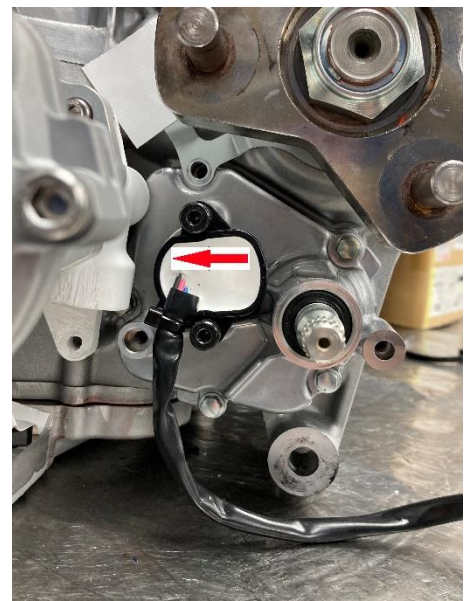
Lift off the clutch for a second and then depress the clutch again and retry. Check actuator bearings for play, check actuator length using the jig, check the clutch switch is sending a signal, check the clutch pushrod travel is set to 15mm at the pedal.

UPSHIFT ISSUES

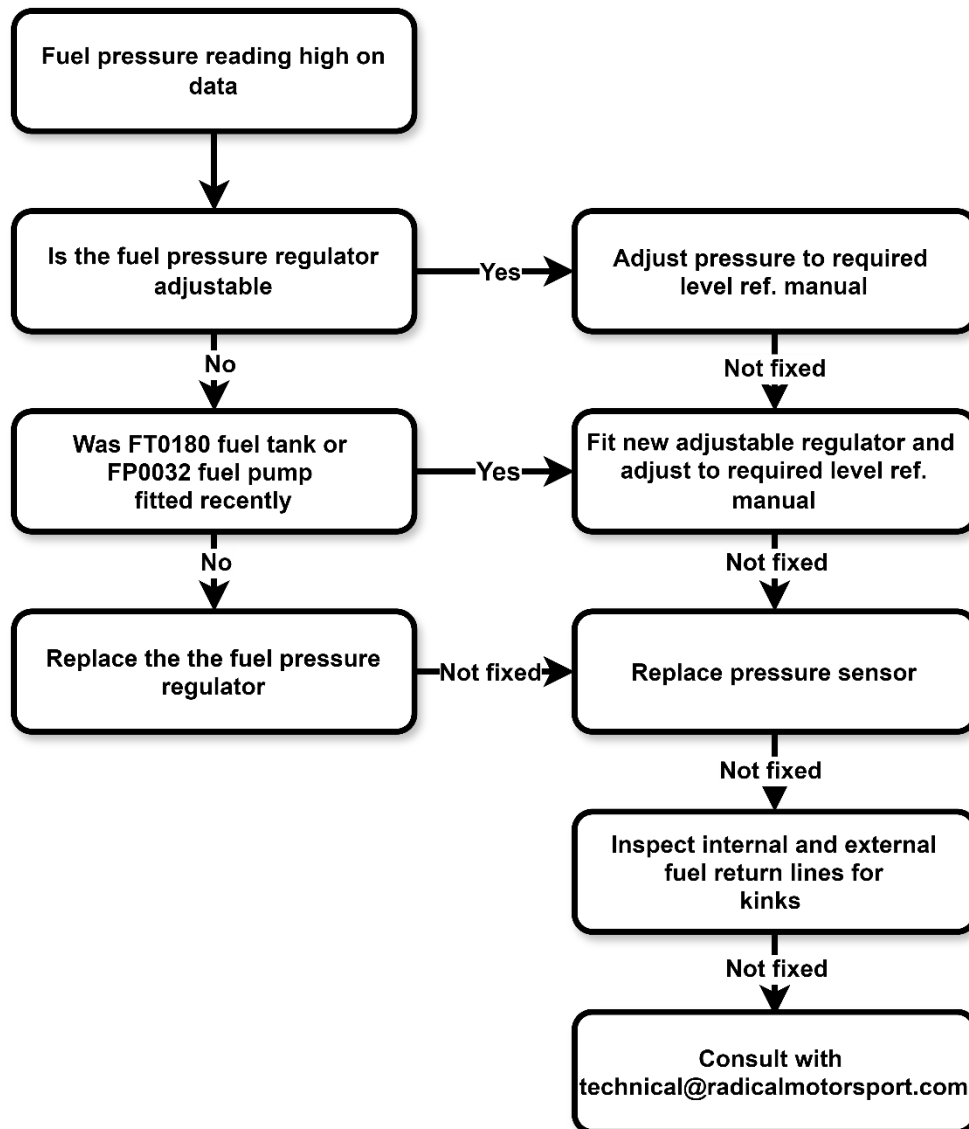
Check actuator bearings for play, check actuator length using the jig, check shifter arm for play, check the valve block for correct operation and inspect actuator pipes and fitting for leaks, check 'GearShiftDecision' for any dis-allowed shifts.

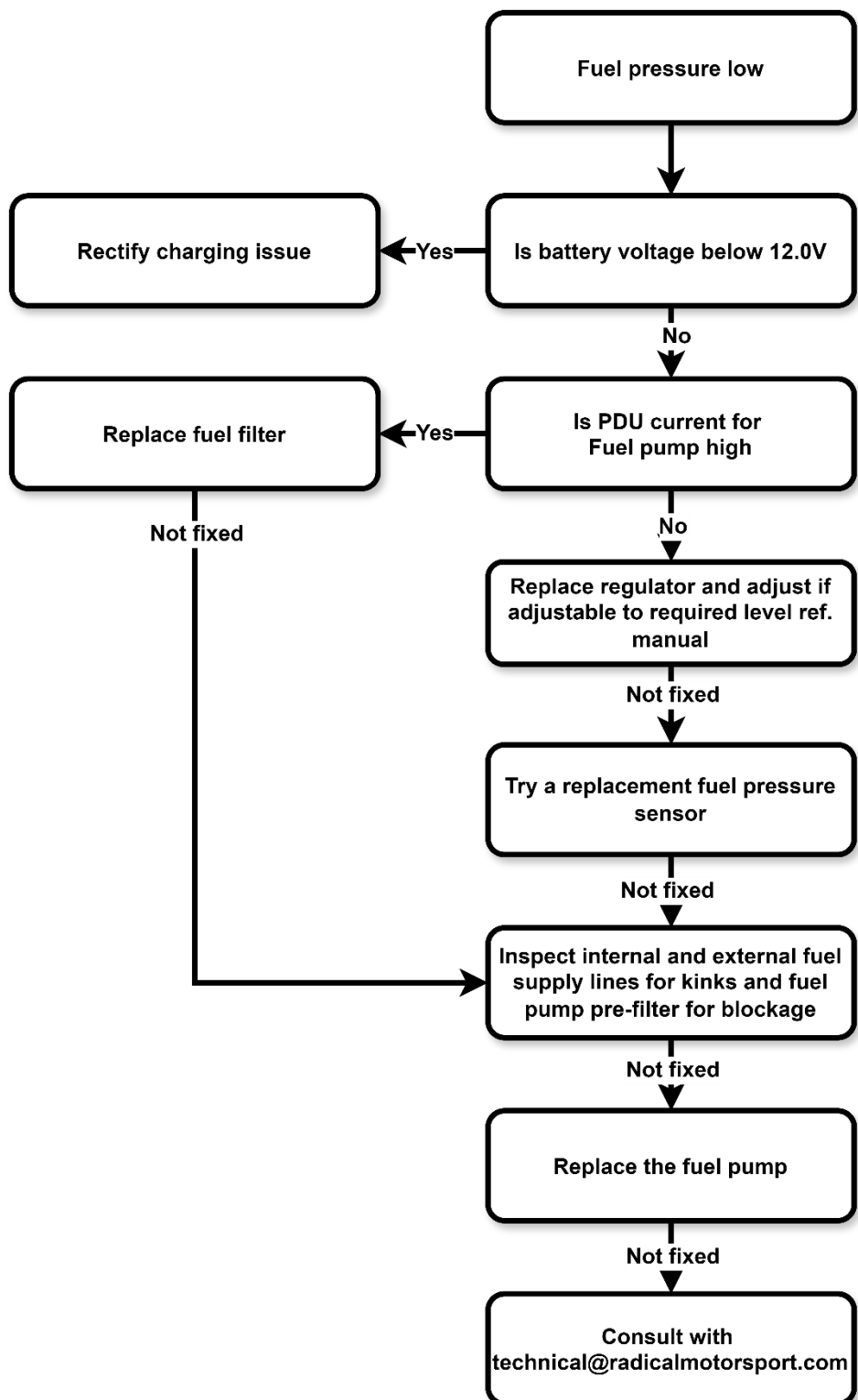
GEAR POSITION SENSOR

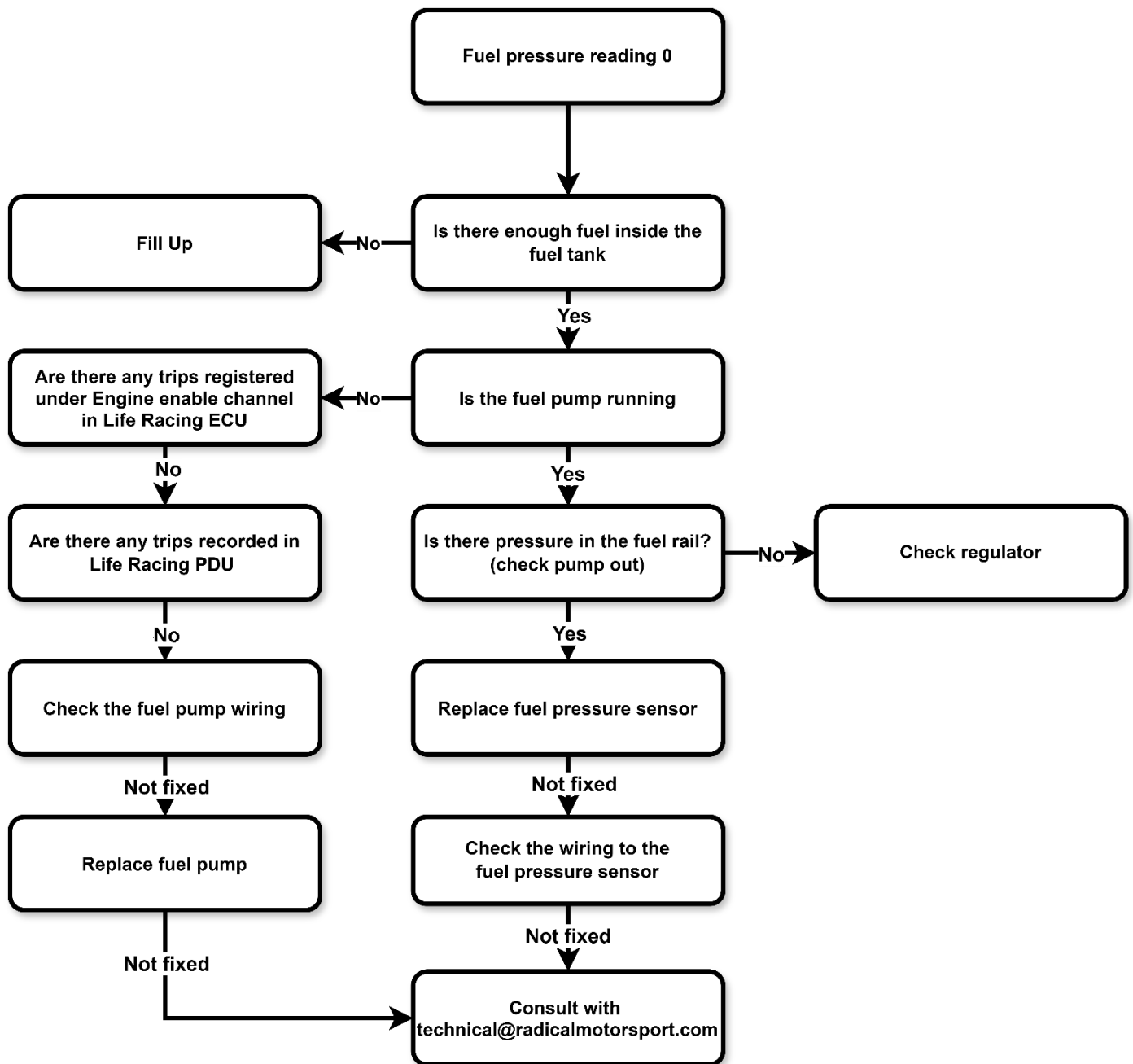
A faulty or damaged gear position sensor could also cause shifting issues. The gear position sensor is mounted on the outside of the engine below the drive coupling. The sensor is not adjustable but has to be fitted as per the attached images.



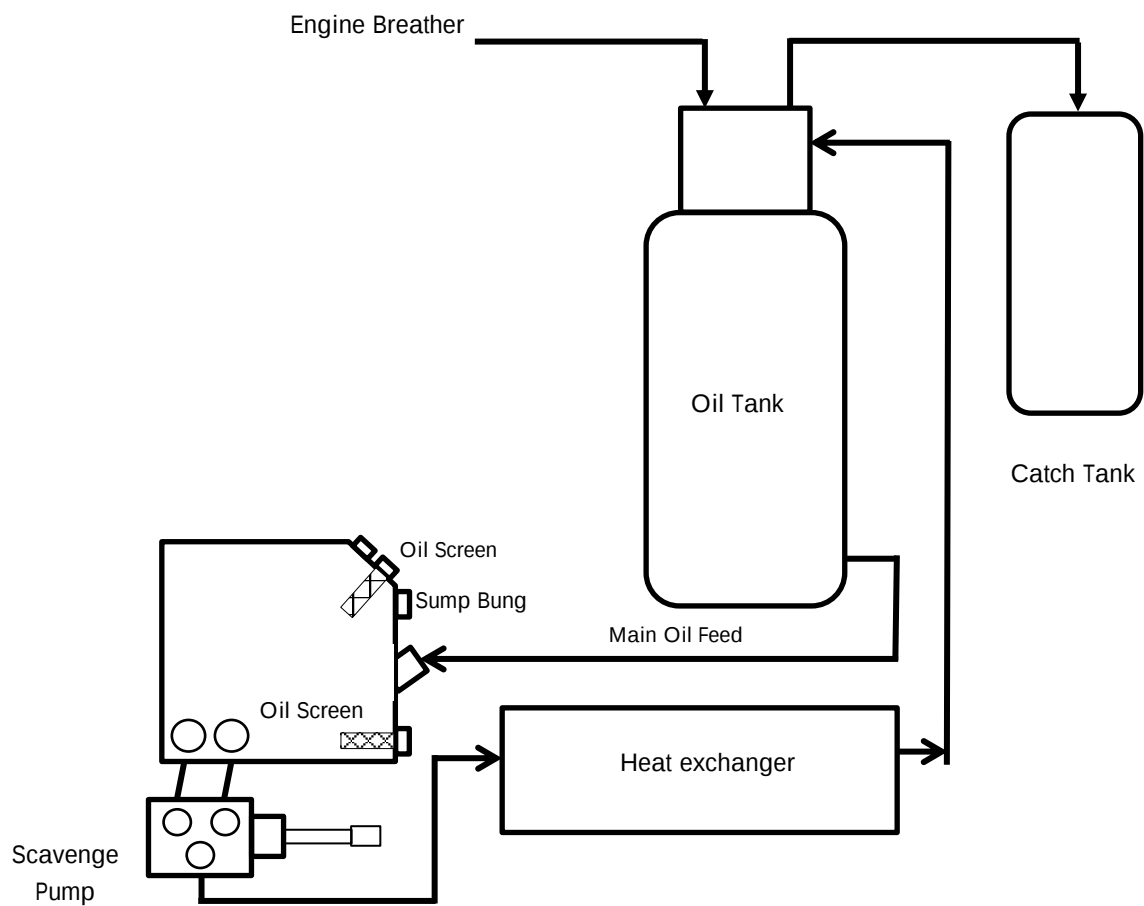
FUEL PRESSURE HIGH



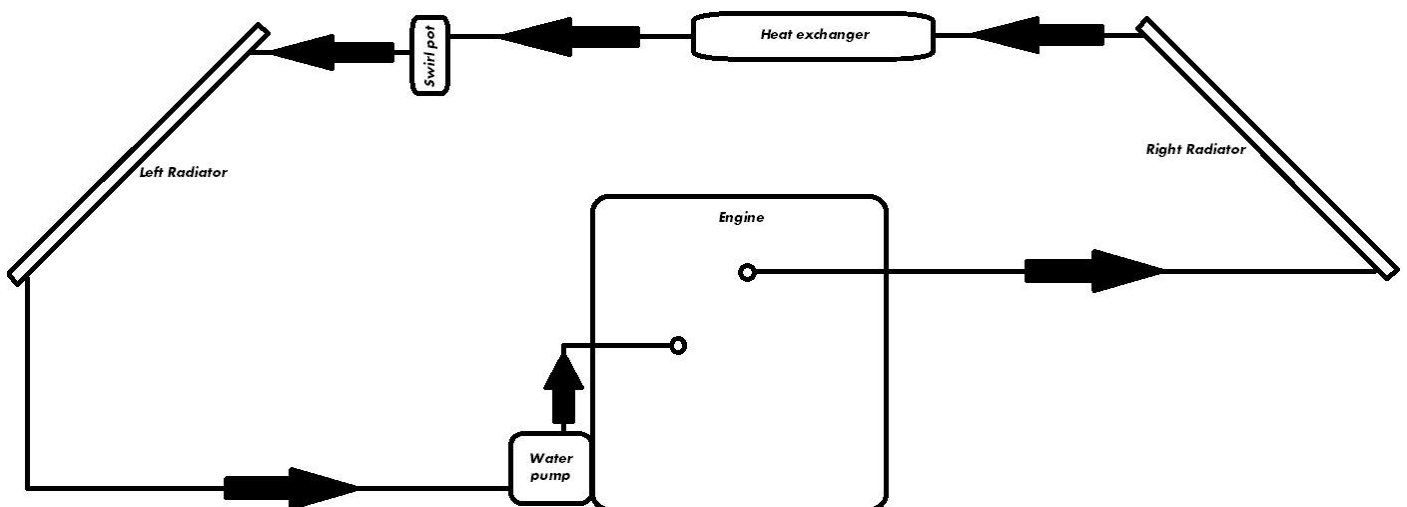




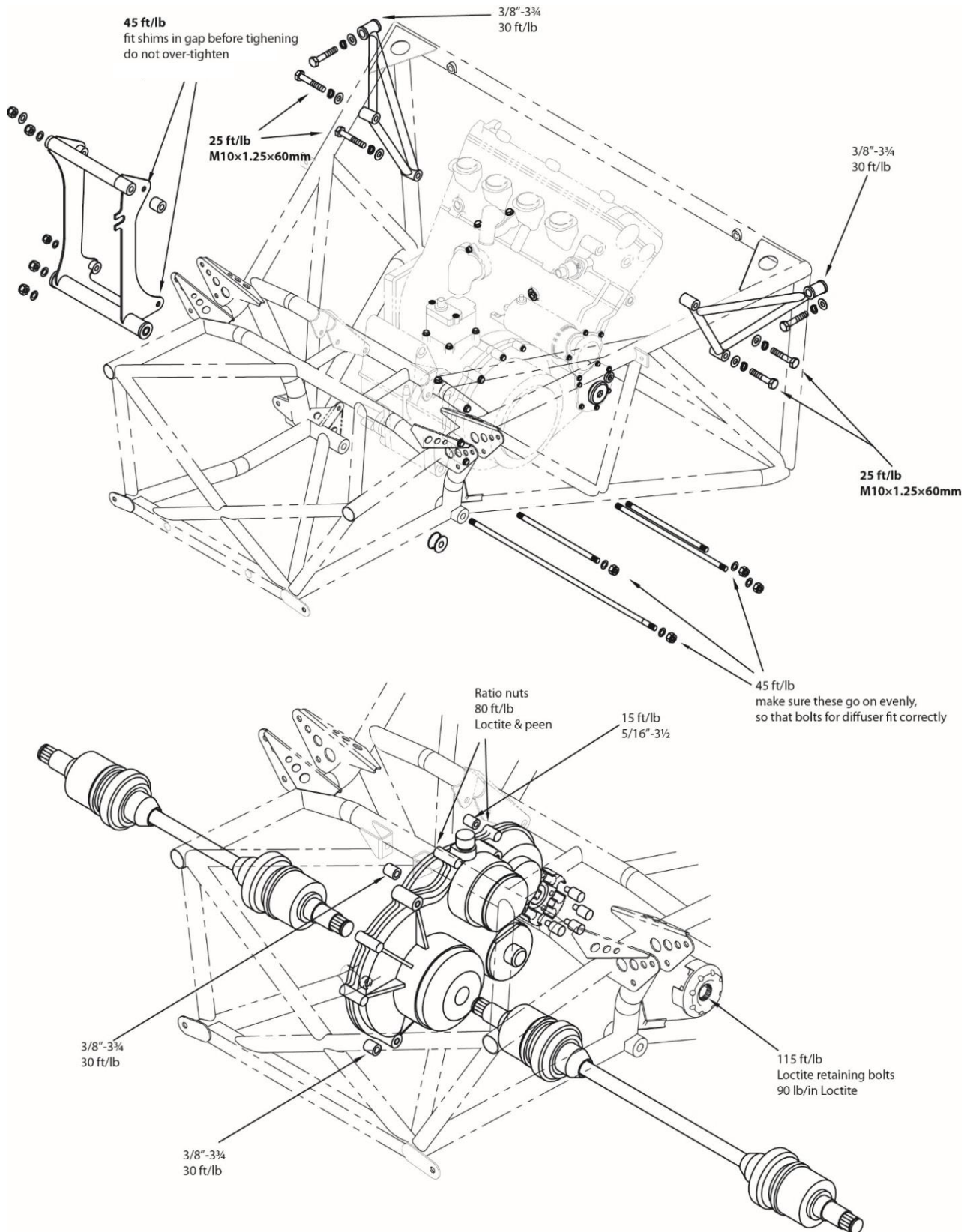
9.1 DRY SUMP LAYOUT



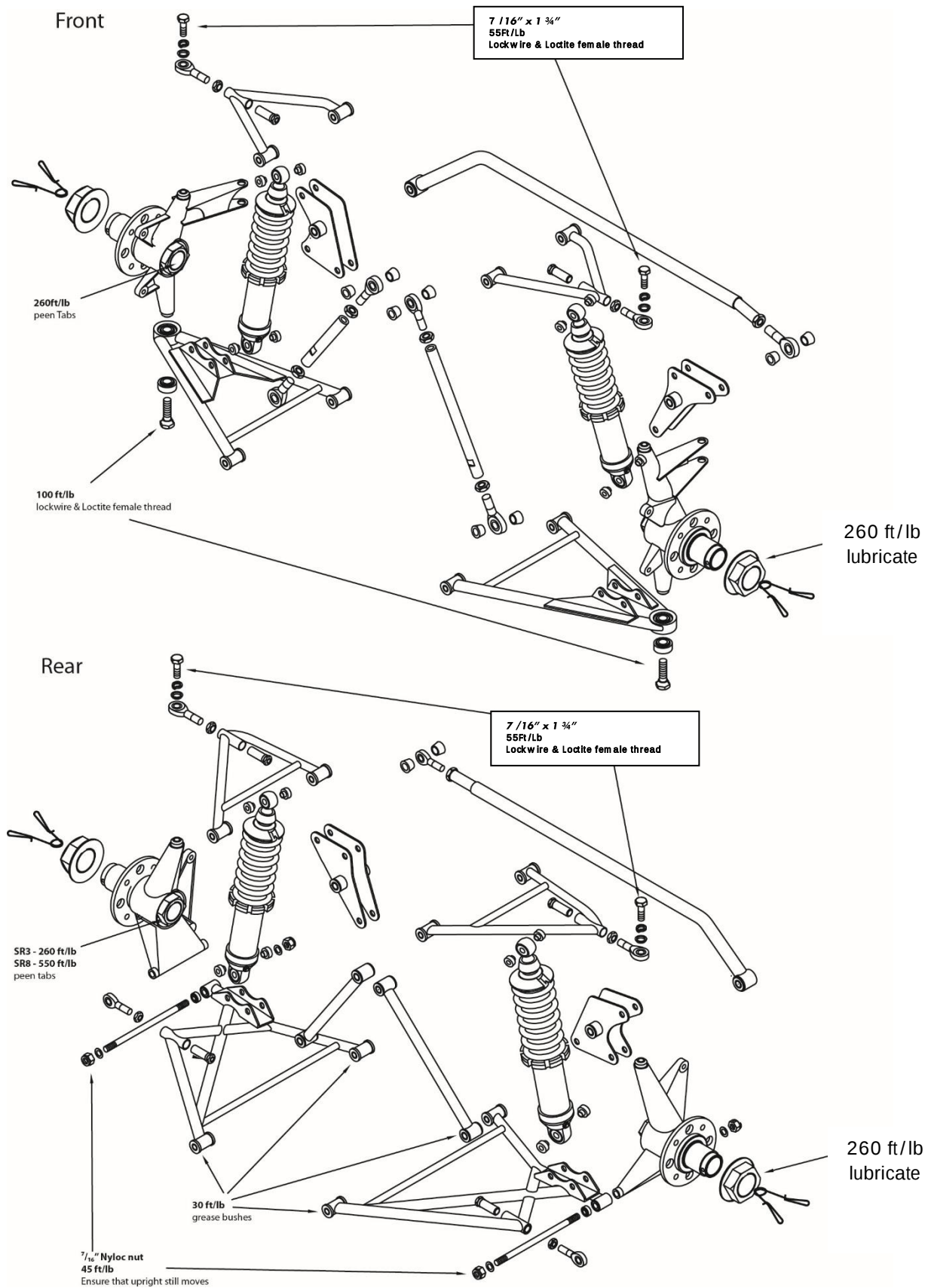
9.2 COOLING LAYOUT

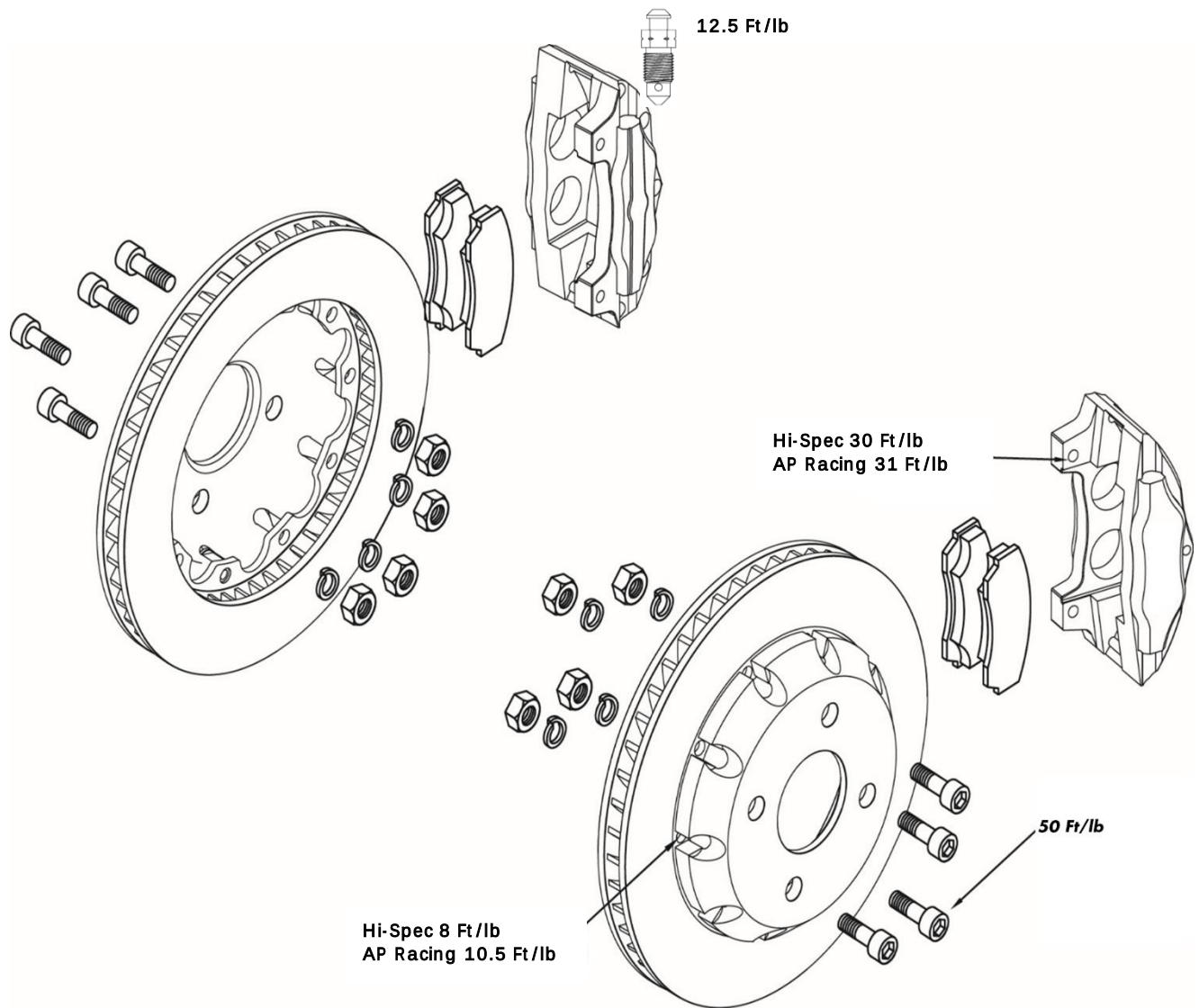


9.3 ENGINE AND GEAR DRIVE UNIT

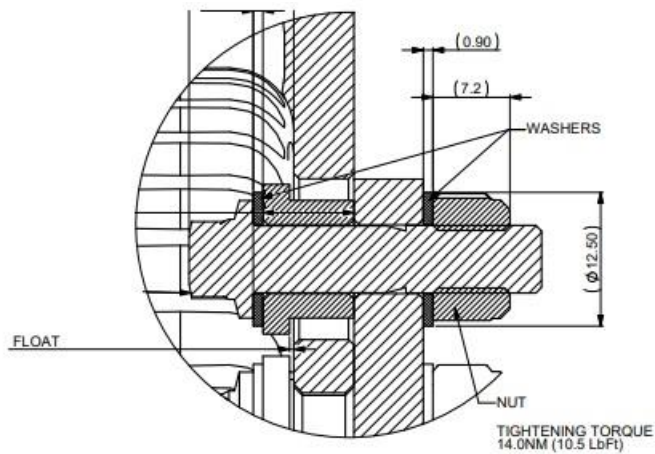


9.4 SUSPENSION COMPONENTS





AP Racing Brake Disc Assembly Detail



DRIVE SYSTEMS

To be used as a guide only, nuts and bolts should be checked often and tightened as necessary.

Gear Drive Unit (GDU)		
Drive Unit Ratio Nuts	648 Loctite/Peened	80 Ft/Lbs
Drive Unit Crown wheel Bolts	648 Loctite/Lockwire	60 Ft/Lbs
Drive Coupling	648 Loctite	115 Ft/Lbs

SUSPENSION

Wheel Nuts		
Centre Lock Nuts	Retaining Clip	260 Ft/Lbs
Braking System		
Hi-Spec Floating Disc To Bells	Plane Washer and Nut	8 Ft/Lbs
AP Floating Disc To Bells	Plane Washer and Nut	10.5 Ft/Lbs
Brake Disc To Hub Bolts	Spring Washer and Nut	50 Ft/Lbs
Hi-Spec Caliper Bolts	Spring and Plane Washer	30 Ft/Lbs
Hi-Spec brake pad retaining bolt	2 x Schnorr washer	14Ft/Lbs
AP Caliper stud to caliper bracket	Loctite 648	28 Ft/Lbs
AP Caliper K-nut	M10 K-nut	31Ft/Lbs
TPMS Sensor Nut	Nut	3 Ft/Lbs
Billet Uprights		
Steering arm to upright	M10 K-nut and bolt	37 Ft/Lbs
Front upright to top rose-joint	7/16" UNF Nylock and bolt	47 Ft/Lbs
Brake calliper bracket to upright HiSpec	M8 Cap head bolt into billet aluminium upright (Loctite 648)	23 Ft/Lbs
Brake calliper bracket to upright AP	M10 Cap head bolt into billet aluminium upright (Loctite 648)	44 Ft/Lbs
Front upright lower stud into upright	M16 (Loctite 648)	100 Ft/Lbs
Front upright lower stud locknut (rose-joint)	M12 K-nut (split pin)	59 Ft/Lbs
Rear upright upper stud into upright	M16 (Loctite 648)	100 Ft/Lbs
Rear upright upper stud locknut (rose-joint)	7/16 K-nut (split pin)	47 Ft/Lbs
Hub bearing assembly into upright	E14(socket) M12 Bolt	81 Ft/Lbs
Rear upright lower spindle	7/16" UNF Nylock	47 Ft/Lbs

ENGINE

Engine (RPE)		
(4Cyl) Drive Coupling	648 Loctite	115 Ft/Lbs
(4Cyl) Engine Cradle	Nyloc	45 Ft/Lbs
(4Cyl) Spark Plugs	-	8 Ft/Lbs
Water Pump Bracket	246 Loctite	9 Ft/Lbs
Oil Pump	-	9 Ft/Lbs

Laminova bolts (All)	-	9 Ft/Lbs
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Advisory generalized bolt torques:

Bolt size/Thread pitch	Grade 2	Grade 5	Grade 8
1/4 UNF	3.5 Ft-Lbs	8.25 Ft-Lbs	11.6 Ft-Lbs
5/16 UNF	7	16	23
3/8 UNF	13	30	42
7/16 UNF	20	47	66
1/2 UNF	31	72	102
9/16 UNF	44	103	146
5/8 UNF	61	144	204
3/4 UNF	107	253	357

Bolt size (mm)	Grade 4.6	Grade 8.8	Grade 10.9	Grade 12.9
6	2.6 Ft-Lbs	6.6 Ft-Lbs	9.4 Ft-Lbs	11 Ft-Lbs
8	6	16	23	27
10	12	32	45	53
12	21	55	79	92
14	34	88	126	147
16	53	137	196	229
18	73	189	270	316
20	104	267	382	446

*All settings above are listed in Ft/Lbs.

9.7 ENGINE CONTROL PARAMETERS

Feature	Parameter
Coolant Fan On	92°C
Coolant Fan Off	90°C
High Coolant Temperature Trip	120°C
Low Fuel Pressure Trip	2.2bar
Low Oil Pressure Trip	50psi @ 10,000rpm (RPM Dependant)
Rev Limit	10,500rpm
Fuel Pressure Target	4.0 Bar
Coolant Limp	97.5°C
EOT Limp 4000rpm	Below 50°C
ACT Default	10 °C
BAP Default	1013 Mbar
Warmup Limp	ECT not reaching over or dropping below 57.5°C after 30 min. of running
Cold Idle Speed below 50°C ECT	2000rpm
Warm Idle Speed over 50°C Cal1 – Cal7	Max.1850rpm – Min. 1550rpm Temperature dependant
Cal 8 Idle Speed (Race Plus)	2000rpm

9.8 COMMON PARTS

Part	Description	Part Number
Hi-Spec Brake Disc Rotor LH Floating	280mm	BD0062
Hi-Spec Brake Disc Rotor RH Floating	280mm	BD0062
Hi-Spec Brake Disc Bell	-	BD0060
Hi-Spec Brake Disc Bobbin Kit	-	BD0061
Hi-Spec Brake Setup Brake Pads		BD0011
AP Brake Disc rotor RH	-	BD0145
AP Brake Disc Rotor LH	-	BD0144
AP Brake Disc Bell	-	BD0146
AP Brake Disc Bobbin Kit	-	BD0147
Brake Pads SR3 AP Option A	-	BD0150
Front Master Cylinder	7 / 10	BM0092
Rear Master Cylinder	3 / 4	BM0093
Clutch Master Cylinder	5 / 8	BM0091
Drive Pegs	Greased	TQ0100
Dzus Clips	-	MF0182
Wheel Speed Sensor	2mm airgap	LS0236
Oil Pressure Sensor	-	LS0076
Water Temp Sensor	-	LE0182
Oil Temp Sensor	-	LS0028
Spark Plugs	Without Caps	LP0011
Injectors Airbox	Ford Injectors	FB0060
Injectors Head	Bosch Injectors	FB0120
Air Temp Sensor	-	LS0093
Mirror Glass	-	AM0022
Side Skirt	Black	MA0006
Shift Paddle Set	-	AD0218
Fuel Pump Aluminium Tank	-	FP0030
Fuel Pump FIA Tank Proflex	-	FP0036
Valve Block	-	TP0180
Driveshaft LH	-	TQ0260
Driveshaft RH	-	TQ0061
BAP Sensor	-	LS0082
Fuel Regulator Assembly	-	FR0022
Fuel pressure regulator 4bar	-	FP0005
Oil Filter	-	EF0003
Air Filter	-	EF0008
Fuel Filter	-	FF0005
Fuel Filter O-ring	-	FR0006
Pencil Coil Stick	-	LE0103
Compressor Motor	-	TK0004
LF Billet Upright Assembly	-	SU0196
RF Billet Upright Assembly	-	SU0197
LR Billet Upright Assembly	-	SU0198
RR Billet Upright Assembly	-	SU0199
0.5 Deg. Camber shim	-	SU0178
0.25 Deg. Camber shim	-	SU0206
LF Upright Bearing Assembly	-	SU0204
RF Upright Bearing Assembly	-	SU0205
LR Upright Bearing Assembly	-	SU0202
RR Upright Bearing Assembly	-	SU0203
Gear Position Sensor	-	LE0101
Throttle Body	-	FB0110
Heat exchanger (Laminova)	-	HR0092

Heat exchanger (Laminova) seal kit	-	HR0093
Heat exchanger (Laminova) GDU oil core	-	HR0094
Heat exchanger (Laminova) Engine oil core	-	HR0095
Charging Loom	-	LH0414
Rectifier	-	LE0104
SR3 Lithium Ion Battery	-	LB0163
Water Pump	-	ERT0063

9.9 FLUIDS

Below is a list of all the fluids that you will need to run your SR3, including part numbers and quantities required: Radical recommends the use of Motul engine oil.

Type	Part Number	Packaging	Brand	Viscosity / Type	Required
Engine Oil	EO0049	4L	Motul	300V 4T 15W / 50	7L
Brake / Clutch Fluid	BF0007	0.5L	Motul	Dot 4 – 660 Factory	1L
Gearbox Oil	TO0024	1L	Motul	Gear Competition 75W140	1.4L
Coolant	HW0009	5L	Motul	Inugel Optimal Pre-Mix	8L
Aluminium Paste	AC0040	Can	Tygris	Aerosol	N / A

9.10 GEAR RATIOS

Gear Ratio	Part Number
3.594:1	TQ0049
3.409:1	TQ0048
3.235:1	TQ0047
3.071:1	TQ0046
2.917:1	TQ0045
2.770:1	TQ0044

				Ratio	3.594:1	3.409:1	3.235:1	Standard factory fitted ratio 3.071:1	2.917:1	2.770:1
				No. Teeth / Part No.	32 A-3R 1-20	33 A-3R 1-22	34 A-3R 1-24	35 A-3R 1-26	36 A-3R 1-28	37 A-3R 1-36
				No. Teeth / Part No.	46 A-3R 1-21	45 A-3R 1-23	44 A-3R 1-25	43 A-3R 1-27	42 A-3R 1-29	41 A-3R 1-37
Gear	No. Teeth (input)	No. Teeth (output)	Ratio	Rev drop at 10,500 rpm	Speed in MPH drop	Speed in MPH drop	Speed in MPH drop	Speed in MPH drop	Speed in MPH drop	Speed in MPH drop
1st	13	34	2.615:1	2721.50 2228.35 1655.17 1219.70 858.26	49.61	52.30	55.10	58.05	61.13	64.36
2nd	16	31	1.938:1		66.96	70.59	74.38	78.36	82.51	86.88
3rd	19	29	1.526:1		85.00	89.61	94.42	99.46	104.74	110.29
4th	21	27	1.286:1		100.91	106.38	112.09	118.08	124.34	130.92
5th	22	25	1.136:1		114.17	120.36	126.82	133.60	140.69	148.13
6th	23	24	1.043:1		124.34	131.08	138.11	145.49	153.21	161.32
Primary reduction ratio				1.596:1 (83/52)						
Rolling tyre circumference				1.901m (0.605m dia)						

9.11 ROLL BAR SIZES

Front				
Soft	5/8"	15.8mm	Gold	SN0006
Medium	3/4"	19.0mm	Gold	SN0005
Hard	7/8"	22.2mm	Gold	SN0004
Extra Hard	7/8"	22.2mm	Black	SN0071

Rear				
Soft	1/2"	12.7mm	Gold	SN0018
Medium	5/8"	15.8mm	Gold	SN0017
Hard	3/4"	19.0mm	Gold	SN0016
Extra Hard	7/8"	22.1mm	Gold	SN0066
XX Hard	7/8"	22.1mm	Black	SN0073

9.12 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, potholes 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	50	N / A
GDU rebuild	Inspect/Rebuild	-	4000
Injectors	Service	50	-
Spark plugs	Replace	50	-
Valve block	Check/Tighten	-	4000
Callipers	Rebuild	-	4000
Shock absorbers	Dyno Check	-	4000
Driveshafts (complete)	Replace	-	10000
Driveshafts (complete)	Rebuild	10	-
Suspension bushes	Replace	-	4000
Suspension rose joints	Replace	-	8000
Front Upright Bearings	Replace	-	6000
Rear Upright Bearings	Replace	-	6000
Wishbones	Inspect/Replace	-	8000
Master cylinders	Replace	-	8000
Battery	Replace	Annually	-
Fuel Tank	Inspect	Annually	-
Steering rack	Rebuild	Annually	-

9.13 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	10
Engine Oil Filter	Replace	10
GDU Oil	Replace	10
Engine Air Filter	Clean	10
Engine Air Filter	Replace	50
Fuel Filter	Replace	40
GDU Gear Inspection	Inspect	10
GDU	Rebuild	50

9.14 REPACKING DRIVESHAFT GREASE

The driveshafts should be stripped, cleaned and re-greased every 10 hours of running. To do this, remove the driveshafts from the car, then remove the CV boot clips and slide them back away from the housing. Remove both housings and clean all the old grease in a wash tank. When re-assembling the driveshafts a set amount of grease should be applied to each end of the driveshaft, the amount is listed below. New clips should be fitted to the CV boots to prevent them from coming off.

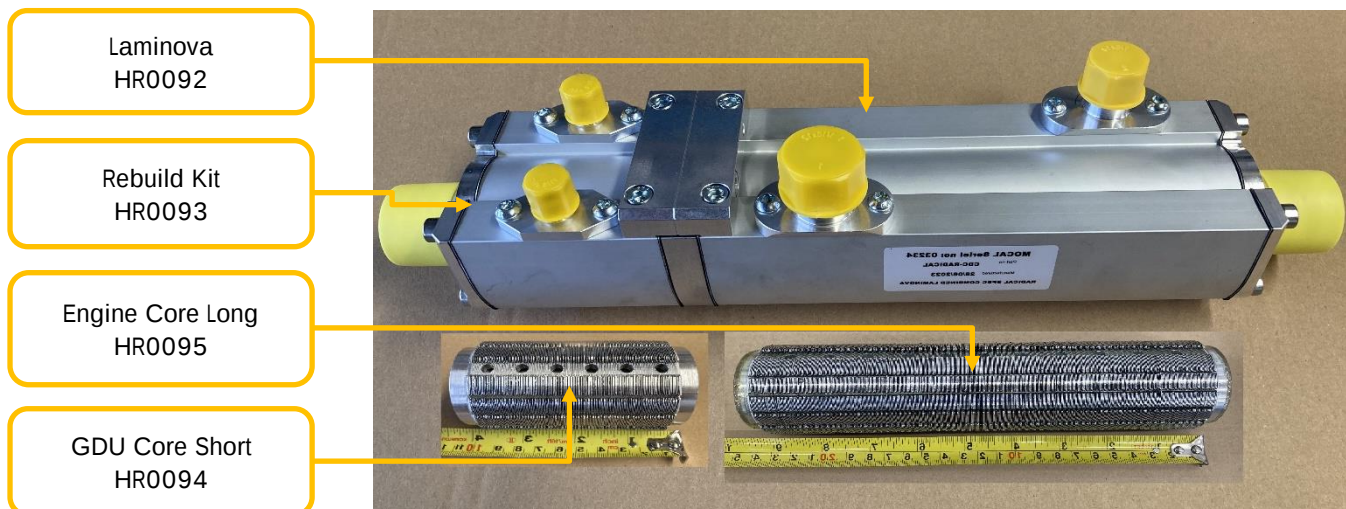
SR3 Driveshaft Grease (Per Joint): 70g

Total 400g Driveshaft Grease Part Number: TO0008

9.15 LAMINOVA – HEAT EXCHANGER SERVICE

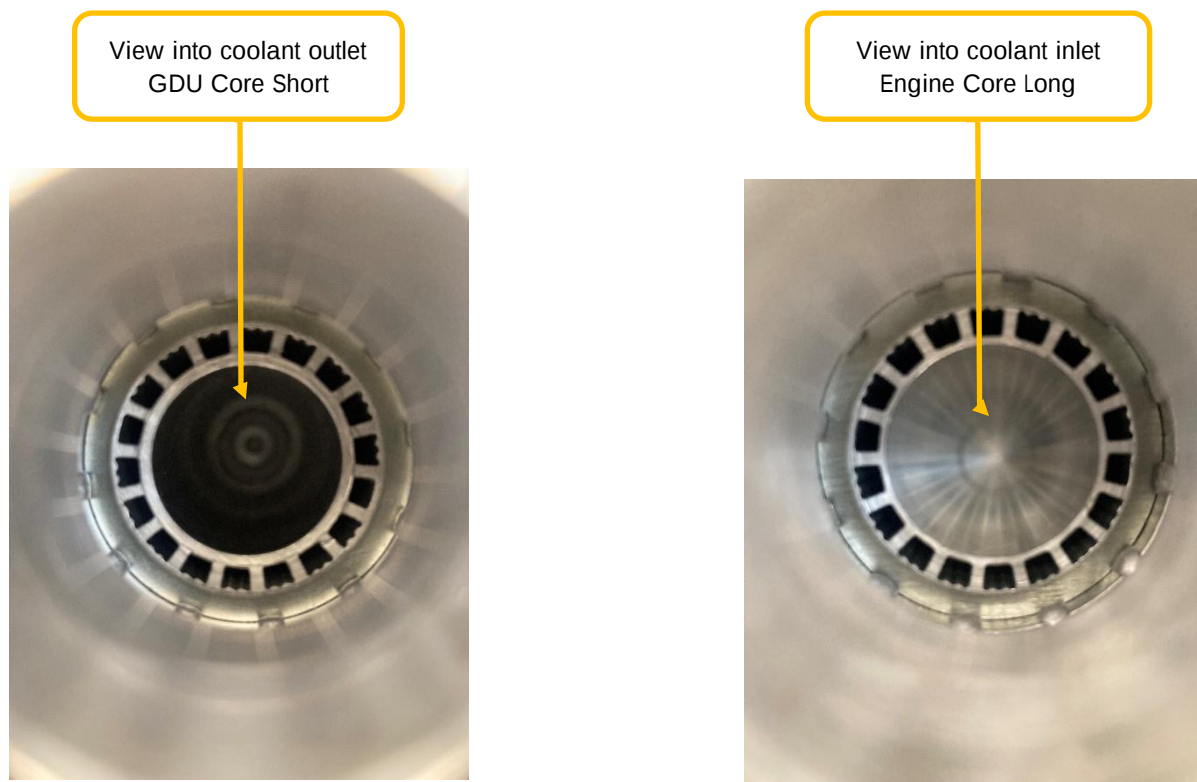
In the event of an Engine or GDU Failure where swarf contamination could occur it is important to flush or replace oil lines and replace related Laminova core.

Both cores and rebuild kit containing all gaskets and seals are available from Radical parts store.



Note:

The Long (engine side) core must be fitted with a cone forcing incoming coolant away from the centre. This cone is not part of the replacement core and must be swapped over from the original core



9.16 REPLACING BRAKE CALIPER SEALS

The following guide is the supplier's recommendation for replacing the seals in their calipers:

1. Extend pistons for easy removal – unbolt calipers, take out brake pads and place a block in the caliper to prevent pistons from falling out. Then pump the pedal until all pistons are extended 10-15mm (or carefully use an airline in the fluid inlet if the calipers are off the vehicle).
2. Remove calipers from vehicle.
3. Remove pistons by hand – do not use pliers or any kind of tool that could damage the outside of the piston.
4. Remove old seals from the calliper body.
5. Clean and inspect the pistons. You are looking to remove all contaminates from the outside of the pistons and ensure that there is no scratches/damage. You can polish the pistons to get the surface perfect.
6. Thoroughly clean the calipers – use an airline to blow out any contaminates from piston bore and fluid ways,
7. Grease the new seals and pistons, recommended product for this is: Rocol Sapphire Aqua-Sil

Alternately soak the seals in brake fluid for 24hrs prior to installation and lubricate the pistons with brake fluid.

Do not use petrol, gasoline or mineral oil-based cleaners / lubricates as these will damage the seals.
8. Install the new seals in the caliper body – ensure that the seal is seated correctly to prevent damaging them when pushing the pistons in.
9. Push the pistons in by hand, the seal should offer minimal resistance when the piston goes in square. If resistance is high, the seal is not seated correctly.
10. Install calipers and bleed brakes. Make sure the outside of the calipers are dry then leave overnight. Check brake calipers after they have been left overnight for any leaks.

Part Description	Part Number
AP Brake Caliper Leading Piston Ø34.9mm	BC0133
AP Brake Caliper Trailing Piston Ø41.3mm	BC0134
AP Brake Caliper Piston Seal Repair Kit	BC0135
AP Brake Caliper Wear Plates RH	BC0136
AP Brake Caliper Wear Plates LH	BC0137
AP Brake Caliper Bleed Screw Kit	BC0138
Hi-Spec Brake Caliper Leading Piston Ø34.00mm	BC0103
Hi-Spec Brake Caliper Trailing Piston Ø41.00mm	BC0104
Hi-Spec Brake Caliper Piston Seal Repair Kit	BS0002
Hi-Spec Brake Caliper Abutment Plate Set	BC0030
Hi-Spec Brake Caliper Bleed Nipple	BC0001

9.17 STANDARD PRE-RACE/ TEST CHECKLIST

The below checklist is intended as a guide only. This checklist is an expansion of the prep sheet which is on page 53.

1. Bodywork	
Check all bodywork for damage	
Check all the lights function	
Check the underside of the sidepods, diffuser and front splitter skid blocks	
Put the car on a stand	
Disarm the fire extinguisher	
Drain the fuel and measure the amount	
2. Shake Test	
Check all corners for play in wheel bearings and rose joints	
Check all steering components for play	
Check rockers and dampers for play	
Check the front diffuser	
Fit new tyres if necessary, clean and fit valve caps	
3. Data Check (See Data Manual for further information)	
Check engine hours and overrevs	
Check the data the following:	
High water temperature	
Oil surge, Low oil pressure	
Gearshift decision's	
Charging trace	
Full throttle, 4% on idle	
Faulty sensors	
4/5. Differential and Driveshafts	
Inspect and grease the driveshafts	
Check the clutch is working correctly	
Check the GDU oil level	
Check the GDU ratio's for pitting etc.	
6/7/8/9. Suspension and Brakes	
Clean the corners whilst checking for cracks on the following components:	
Uprights, wishbones, Anti roll bars	
Chassis	
Wishbone pick up points	
Wishbone bushes	
Clean and lube wheel nuts	
Bleed the brakes and clutch	
Check the condition of the brake pads	
Check the balance bar	
Repack the silencer if needed	
10. Engine Bay	
Clean the engine bay	
Check wiring for signs of heat or chaffing	
Check all oil pipes	
Check all fuel lines	
Check engine mounting bolts	
Check all hose clamps	
Check GDU mounting bolts	
Check exhaust primary bolts	
Drain the catch tank	
Clean the air filter and check the airbox bolts	
Check all coolant pipes	

11. Wiring	
Check wiring in the engine bay for chaffing and signs of heat	
Check the condition of all connectors	
Check the wheel speed sensor, gap (all six lights)	
Check wiring behind the dash	
Check all wiring is away or shielded from the exhaust	
12. Paddleshift	
Check paddle shift actuator bearings and length	
Check shifting lines for leaks	
Tighten valve block	
13. Oil Filter	
Drain the oil and remove the filter	
Remove the 17mm drain bung and check the magnet for debris	
Fill the car with new oil and fit new filter, re-Lockwire the bung when finished	
Ensure the hose clip is fitted correctly onto the new filter	
Dry crank the car to circulate the new oil	
14. Run Up	
Check coolant level	
Start the engine	
Warm the oil to 55deg	
Hold the rpm at 4000rpm for 5 seconds and then turn engine off	
Check the oil level and top up if needed	
Check for any other signs of leaks	
15. Spanner Check	
Check all the following components:	
Uprights, Wishbones, Pushrod's, Rocker's, Steering, Callipers, Pedal Box	
Front Diffuser	
Hose clips, Oil lines, Fuel lines, Water pipes	
Air Jacks (Check for leaks)	
16. Safety Systems	
Check the seat belts are in date and are free from cuts and tears	
Check the fire extinguisher is in date and full	
17. Set Down/Set Up	
Measure the car as it left the previous track and record	
Set up the car for the next circuit	
18. Clean The Car	
Clean the interior, hoover the pedal box	
Clean the bodywork	
Polish the car	
19. Re-fit Bodywork	
Fit diffuser and bodywork ensuring lights are connected and working	
Check cockpit controls	
Check all the latches and dzus fasteners on the bodywork	
Fit the rear tie downs	

SR3 XXR



Technician:

Customer:

Chassis Number:

Engine Hours:

Mileage:

Pre/Post Event:

Date: / /

SR3 WORKSHOP PREPARATION SHEET

SR3					
Description	Faults/Advisory	Parts Fitted	Initials	Hours	+ Hours
1. Check for any loose bodywork or damage				0.5	
2. Shake Test remove wheels inspect for damage				0.75	
3. Check Life Data				0.5	
4. Inspect Drive Unit and change ratios if necessary				1	
5. Check and grease CV joints				1	
6. Check condition of braking system				0.5	
7. Bleed Brakes and Clutch				0.5	
8. Clean corners, checking for cracks and worn out bushes				1	

RADICAL		SR3 - 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.																																																																																																																																																																																																														
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10. VERSION HISTORY

2023-03-06 V1.0 Initial public release.

2023-04-11 V1.1 Coil stick information, GDU rock catcher, heat exchanger part numbers, single Intrax info, sensor zeroing, fuel filter interval amendment.

2023-07-21 V1.2 Additional information regarding heat soaking, additional part numbers, GDU oil capacity and spec. change

2023-08-01 V1.3 AP racing brake caliper torque setting change, added spring preload info, updated pictures, Laminova info, updated TPMS info, Limp modes and Trips, GDU filling procedure change

2023-11-16 V1.4 Brake pad option change

2024-03-12 V1.5 Additional torque specifications, additional Laminova information, additional idle speed information

2024-04-19 V1.6 Additional Troubleshooting flow charts

2024-09-08 V1.7 Drop height photos, Torque guide update, Loctite spec. update

