

# Sydney Radio Control Car Club

September 2009 Newsletter

## President's Report

Let me start by thanking all the members for making this a great RC club to be at every meeting. Thanks also to the Committee members, Sean Chapple, Shane Edwards, Nick Máté, Dave Ryan, Trent Johnson, and Steve Carnt.

Financially the Ryde Club is doing very well with around \$8000 in the bank as I write this. We still have some major expenses to be paid this calendar year, most notably the 5 year lease to Ryde Council, but it is our intention to use the bulk of this money to make improvements to the track and facilities.

As part of this expenditure we have submitted a proposal with Ryde Council to have permanent lighting installed at the track. We are confident that this will be finalised in time for next year's twilight series, and we can have track lighting with the flick of a switch.

In the near future we would also like to see a new driver's stand with wheelchair access and maybe even storage facilities underneath, as well as being a little higher and of a more solid construction.

On the racing front we are doing very well in the Club Series, sitting in 2<sup>nd</sup> position overall; this is due in no small part to the excellent support for this series from our members.

Some particularly good results from Ashley Anthony with 3 wins out of 3 and in 1<sup>st</sup> place in 2wd Stock with Shane Edwards in 3<sup>rd</sup> position; Sean Chapple is in 1<sup>st</sup> place in the Modified Truck class, and Edwin Ip is in 2<sup>nd</sup> position in Stock Truck.

It's also good to see representation at the Club Series by some of our junior members such as: Nathan Russell, Stephen Weakley, and Lucas Baldacchino.

We should also mention Jackson Ryan, Eugene Frizza, Reuben Widjaja, and Rhys Mangan as names to remember as the up and coming champions of the not too distant future. The club will be acknowledging our juniors at the end of the year presentation with exciting awards just for them and a special prize for the most improved juniors.

Apologies to members for current placings in our club competition series not always being up to date, but with a new and exciting website due to launch soon we will endeavor to be on the ball and up to date with all relevant information and in a format more pleasing to the eye.

The year is winding down with Ryde to hold two more major events before the Christmas break: the vintage meeting in November, which we plan to run as a combined vintage and current class's event; then at the end of the year, the 4 Hour Enduro Race meeting and awards presentation.

The track will need some work as it is getting quite a bit of use not just at race meetings but by members and the general public for practice during the week.

Sean Chapple, our Vice President and head of the track committee has been doing constant maintenance throughout the year, and for that we all owe him our thanks, but he cannot do it all alone so we will have to have a track maintenance day soon with all members pitching in to help if they are able. We will email out the date of this maintenance day and it will be advertised on our website as well as on the RC Tech forums.

Our plan is to use some of the clubs resources to purchase a traction compound such as Dustex, as used by Councils to seal dirt roads. After track work has been done this chemical will be saturated into the track and prolong the life of the surface as well as give great traction so that you can even use old tyres and still get great grip.

This has been a very eventful year and the future looks bright for the Ryde Club.

Roman De Simone  
President

## **Adjustments to the calendar**

### **Bob Burbage Memorial Vintage Meet**

Due to the re-run of the Maitland round we have had to move the Bob Burbage Memorial Vintage Meet from 8<sup>th</sup> November to 22<sup>nd</sup> November; as this is also the Knox Vintage Enduro day and also a normal club points day we will be running this as a combined vintage and club day.

### **Club Series NSW – Round 2, Maitland Re-run**

This round of the Club Series will be held on 8<sup>th</sup> November at the Maitland Off-road R/C Car Club. We need a big turn out for this event if we have any chance of taking

first place from St Ives. For further details or to enter online please go to:

<http://clubseriesnsw.com/>

### **NSW State Titles**

The NSW State Titles will be held at Castle Hill off road track on the weekend of 10<sup>th</sup> and 11<sup>th</sup> October. For further details or to enter online please go to:

<http://nswstatetitles.castlehillraceway.com/>

### **Sunday 11<sup>th</sup> October Club Day**

Due to the State titles being held on this day there will be no racing at Blenheim Park, so you may as well enter the NSW State Titles.

## **Saturday Twilight Races**

Attendance for Saturday Twilight racing has been very low recently so we have decided to trial a new arrangement for Saturday Twilights starting this month.

- The first is to reduce the number of days we will be holding Saturday racing from the first and third weekend of the month to the first only.
- The second is that we will be trialling a reverse track and races will be 6 minutes in duration.

We will review this arrangement at the end of this calendar year to see how it has progressed and we may make changes for summer and winter series.

## **Donation to Diabetes Australia**

We are pleased to announce that we raised \$610 from the 2009 Anniversary Vintage Meet which we have donated to Diabetes Australia. This money was raised from the race entrance fees and canteen takings alone so we were quite pleased with the result. Plus we all had a blast on the day.

## **Some Changes to General Club Racing Rules**

Lipo (7.4V) now legal in all classes. They do not need to be ROAR legal but must be hard case and approved by the race director. Lipo sacks and/or balancers must still be used.

All 1/10 540 based brushless motor systems are legal to run in mod classes. So this includes Mamba / Traxxas and many other RTR systems that were not deemed to be legal previously.

This is the last year 13.5 BL motors will be legal in stock, illegal for stock in 2010, but ok for mod.

## New Slash Rules

There have been some changes to the Slash rules which we will add to the Slash Tech Rules soon, but essentially they are:

- **Spec Class** is a box stock Traxxas Slash only and must use stock motor and stock tyres.
- **Pro Class** is open to all Short Course Racing type cars including Traxxas Slash and SC10, motor limit of 13.5T brushless and tyres are limited to those specifically made for Short Course cars.
- Both classes will be run together but you must state what class you are running when entering.
- Hard case LiPo's are acceptable in both classes. If batteries are not ROAR approved then they need to be passed by the race director.

## New Members

We would like to welcome the following new members:

- Brendan Speechley
- Sebastian Voll
- Daniel Burrough
- Brendan Neal
- Manuel Correia
- Waz Bourke
- Ruben Vezoso
- Shane Girdham

# Shane's Tech-Talk

## The Basics of Brushless by Shane Edwards

Brushless motors are otherwise known as 3 phase motors in the electrical world, we don't use AC power to run them but the ESC has basically 3 power controllers inside, one to control each coil (or coil pair) and hence make an imitation 3 phase supply (not sinusoidal for you buffs out there).

They have few parts, the shaft or in DC terms the armature is called the rotor and is just a solid magnet on a shaft. It can be bonded or sintered, describing how the magnet has been formed. Sintered has a stronger magnetic field and can sustain higher temperature and rpm before the magnet breaks down. There is also the ability to tune your motor by installing different diameter rotors, the larger the diameter the smaller the distance from the coil and the more torque that can be generated at low/mid RPM, but with the trade off of more back EMF generated at high RPM limiting top end. For stock the maximum rotor diameter is 12.51mm.

The three coils are wound around a former and this is called the Stator. The coils can be wound in 2 ways, either a 'Star' (Y) wind or a 'Delta' wind, this just alludes to the configuration the stator is wound. The two patterns have different characteristics in terms of power as because a Delta's current path flows predominantly through one coil at a time whereas the Star wind always has two coils connected at a time. So you can never compare Delta and Star by the number of turns.

A big advantage of a brushless over a brushed motor is because the coils are mounted against the can this leads to better cooling. You no longer have to have holes in the can to help cooling since the coils are your main heat generator, preventing debris entering the motor.

Despite this you should still open up your motor to oil the bearings every few months, especially if you have run excessively hot or have thermaled.

Continuously running your motor over geared creating excessive heat will lead to a greater reduction in your rotors field strength over time reducing your power, or worse can de-solder the sensors from your motor which can lead to motor and ESC failure from the ESC not having the correct feedback from the motor.

There is **no physical difference** in the inner workings of either a Sensored or Sensorless motor. Attached to the sensored motor are 3 Hall Effect sensors positioned near the rotor to assess rotor position (they measure magnetic field strength). This is for the benefit of the ESC not the motor.

A Sensored ESC will run only Sensored motors where as a Sensorless ESC will run Sensored or Sensorless motors (read recommendations below).

### **Sensored ESC**

A sensored ESC uses the Hall Effect sensors to tell it what the rotor position is. This is so it knows which coil (or pair) to apply power to first, then second and so on. This is why to change the direction of your motor you just swap 2 wires as this then changes the order of the coil switching.

If you disconnect or break any of your sensor wires it will get false information to rotor position which can be fatal for the motor. Depending on the ESC software this could hold power on one coil for too long and either melting the insulation or splitting a coil.

*Not that we have seen this to date but a sensored ESC is simpler to design and should be cheaper!*

### **Sensorless ESC**

To get moving a Sensorless ESC must send a timed pulse to one or two of the coils to just move the rotor. This rotor starting to turn induces voltage (back EMF) into the idle coil(s) and that is how it can tell if it has pulsed the correct coil and direction. If it's pulsed the wrong coil first and gets the wrong or no feedback then it will continue to pulse the next coil and so on until it does. So if you see your car stuttering from a standstill or moving backwards and forwards before you take off this is what is happening, otherwise called cogging. Cogging will not happen once the car starts to move as it is a problem with not getting a full rotation to induce enough back EMF for the ESC to be able assesses position. In general the lower power your motor is the more chance of cogging because the lower the power means the smaller the back EMF that can be generated. The only other time you can be exposed to cogging is if the vehicle is traveling backwards which can sometimes happen whilst spinning out.

### **Which is better Sensored or Sensorless?**

Sensored are better at starting and slow motor control where it may be common for the motor to have to start from any direction. They are also generally better on low power motors.

Sensorless ESC's can be better at high rpm and have been known to rev out a little better.

We are now starting to see hybrid ESC's to get the best of both worlds, this is definitely the more reliable way to go.

Both designs will always struggle a bit up top because this is where efficiency goes down due to the back EMF (increases with rpm) and increased switching. The faster the motor is going the more the ESC has to switch, so the time of on power is reduced vs switching time, this is where a good ESC will stand out.

*What is important to take note of here is that there is no real reason why either design cannot perform in all areas well, it's down to the software and hardware of the ESC and its ability to switch the coils (timing) at the right time depending on speed, throttle position and load, just like engine management does on a real car. This is where the advances will be made, in the ESC, not the motor.*

## **Recommendations**

If you are going to be running 13.5 or higher turn best to stick with a sensed ESC otherwise you are likely to have cogging problems because the motor is too low power.

I have experienced stationary cogging problems with a 13.5 with a Castle ESC but not on a Hobbywing ESC, so it seems that lower than 13.5 is the number I would consider when choosing to run sensorless. The rotor also affects this as a sintered will provide better feedback than a bonded rotor.

## **The Off-road Handling Basics by Shane Edwards**

This is meant to be an informative set of articles on suspension tuning primarily aimed at those new to the sport or who just need a few basics to get their car to suit their driving style. Remember one change at a time and if you get lost go back to the kit setup!

### **4) Anti- roll bars (sway bars)**

Not available on all cars anti roll bars can be a good tuning tool with some interesting effects. From the outside it is a piece of wire/bar that links either the two rear or two front wheels, so when one wheel is pushed up (the outside wheel during cornering) it increases the spring tension on that side by trying to push up the inside wheel at the same time, making that end of the car lean or roll less.

The real effect is a little different. The resulting effect of an anti-roll bar is to redistribute load to the opposite corner of a car, so when cornering there is force redistributed from the outside rear to the inside front, and from the outside front to the inside rear. This is how you must think when tuning with anti-roll bars. (see pic)

#### **How does this work in the real world?**

If you add a bar to the back of your car you should experience less understeer mid corner and exit but the car will be looser (less effect under corner entry).

If you add a bar to the front of your car you should experience less oversteer mid corner and entry but the car will push more (less effect under corner exit).

Now if you add a bar to one end and you get more grip at that end then that generally means you are sprung too soft, so try removing the bar and going up one spring rate at that end, you should find the grip improved over the original springs with no bar, if not go back to the sway bar.

Roll bars work better on smoother grippier tracks, where they can prevent traction rolling whilst make the car more responsive. The extra spring tension through corners does not lose you traction like on a looser bumpier track.

Next issue... Shock Dampening