

25

Radio Control Cars for

NUMBER 4
February -
March 1988
AUSTRALIA: \$2.70

DIRT & TRACK

BEYOND
Thunderdome

BOOMERWIG
OR
BIGERANG

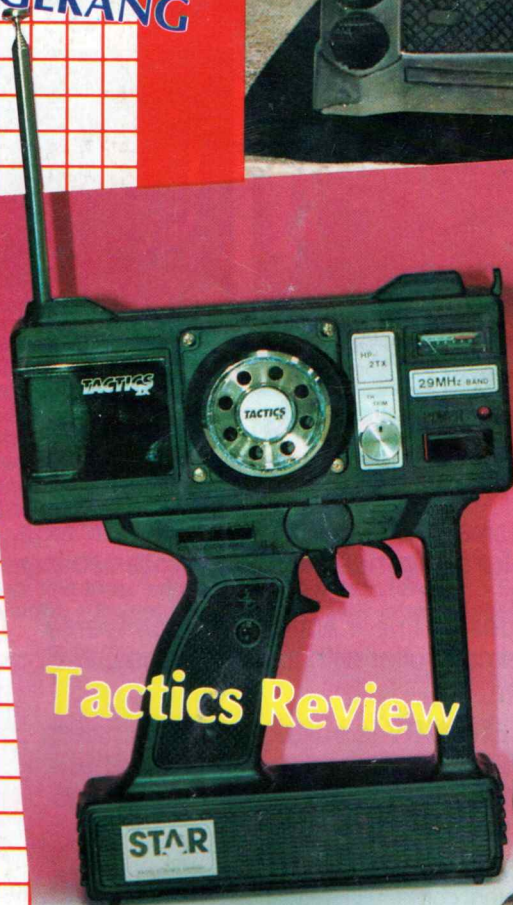
Nicad
Discharge
Tests



SPEED SECRETS



Tactics Review



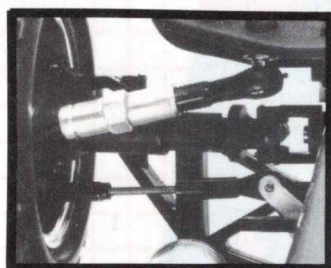
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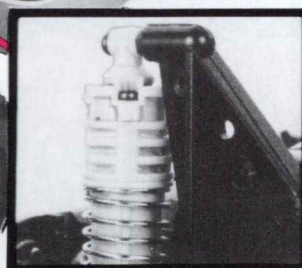
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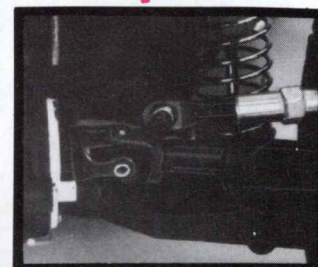
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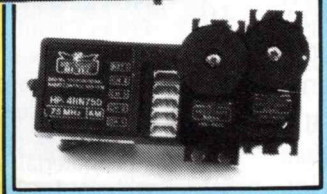
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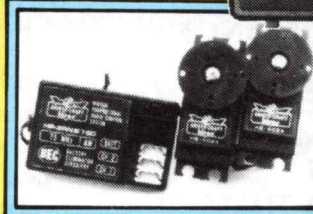


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- Charger connector for optional Ni-Cad. • Adjustment for steering rate, wheel angle, wheel tension, throttle neutral (3 position).

RECEIVER

- 4 channel extended range AM receiver. • Narrow band design to eliminate adjacent channel interference. • Small and light weight. • Rugged structure. • Easily interchangeable crystal.



SERVO

- Indirect drive for gear train protection.
- Water resistant.
- High impact case.
- Output torque: 42 oz/inch (3KG/cm).
- Dual oil-less bearing.

TRANSMITTER

- Super-heterodyne digital proportional. • Pistol-grip 2 channel, AM radio. • Torque-trol strain resistant steering wheel. • Reversible control for left or right handed steering.
- Charger connector for optional Ni-Cad. • Throttle neutral adjustment. • LED indicator for RF output. • LED indicator for battery. • LED low-power flashing indicator. • New gear type steering movement for accurate control.

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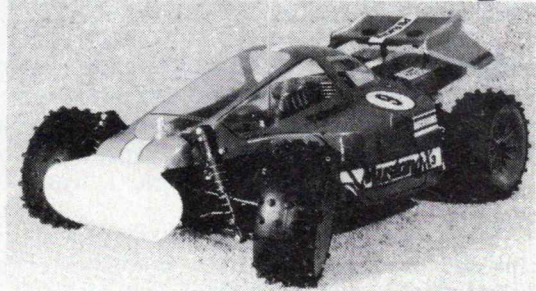
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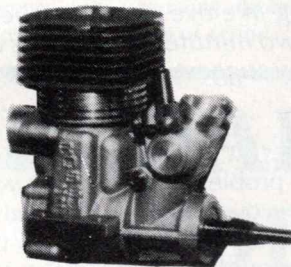
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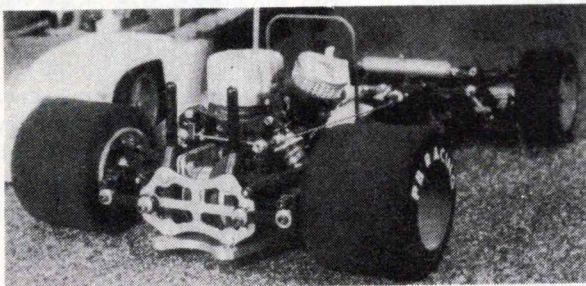
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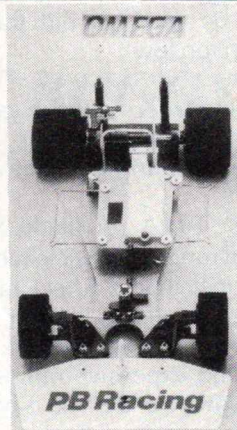
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FROM THE EDITOR

Welcome to a new year of **Radio Control Cars for Dirt & Track**, and some new features in the magazine.

Starting this issue, a section where you ask the questions, and our staff of 'experts' try to provide the answers. If you have any question about buggies and racing, radio gear, technical problems, and so on, drop us a line and we'll try to give you an answer through the pages of this magazine.

Coming up in issue No. 5, we will start publishing some of the letters that you send in. They can be about anything, including criticism or praise, and suggestions for us and for other readers. Keep those letters coming in.

Thanks for your support in 1987, and I look forward to your company throughout 1988. Happy reading and modelling.

You Wanted to Know

OFFICIAL MAIL

Q: *I'm very interested in getting into radio controlled cars. What car do you recommend that I start with, and what is the difference between a two and a four wheel drive car? Can I use any type of car for off-road racing?*

Peter J., Ivanhoe, Vic.

A: We don't recommend any particular car or buggy, Peter, but we do suggest that you read the reviews in this magazine as a way of finding out about different vehicles. When starting out, it's a good idea to get going with what's called an 'entry level' machine; something like a Challenger Kangaroo, a Tamiya Frog, or a Marui Hunter. The Kangaroo comes ready to run, so you'll be underway as soon as you charge a battery, but most other buggies are in kit form and require assembly.

The main difference between two and four wheel drive is that, because the 4WD puts power to the ground through all four wheels, it can be easier to drive. Driving a 2WD buggy is a bit like driving the family car.

If off-road, or dirt track racing is your bag, then you'll need to get an off-road buggy. These can be raced on carpet or bitumen by changing the suspension and tyres, but an on-road car can't be used on dirt tracks, because the suspension is set much too low!

Q: *I've got a stick radio, but I've seen a lot of guys using transmitters with steering wheels on them. Are these any better than the stick radios, and are they any more expensive?*

Tim A., Adelaide, S.A.

A: There's absolutely nothing wrong with stick radios at all; it's just that some drivers feel that a wheel radio gives them better control. I wouldn't say that one or the other is better, it really is a matter of personal choice. As for cost, there are budget radios and expensive radios in either configuration. It all boils down to the old saying that you get what you pay for.

Q: *How many times will I be able to recharge the 7.2 volt Nicad packs used in RC cars; and will just one pack be enough for regular racing?*

John R., Castlecrag, NSW.

A: Nicad packs have a nominal cycle life of somewhere between one and 1,000 recharges. It all depends on how fast you charge and discharge the pack, but performance will certainly be maintained by discharging the pack (after use) on a 33 Ohm, 5 or 10 Watt resistor, which ensures that all cells will discharge evenly, and track together on re-charge.

In answer to the second part of your question: no, one pack really isn't adequate for regular racing, as the pack won't have time to cool down between races, before getting hot again. Fast charge and discharge rates generate battery heat, and the pack won't last long if it's not allowed to cool off, so buy yourself at least one more pack.

Q: *I think that I have a motor problem, and I'm hoping that you can help me with it. I run an RC10 which is ball raced and very free rolling. I'm using a Reedy Modified with a 13 tooth pinion on a 54 spur, and I can't get anything like five minutes. The motor runs strongly for about two minutes, then slows down and stops. Do you have any suggestion that might help?*

James B., Ormond, Vic.

A: James, it sounds more like a battery problem than a motor problem, although you haven't mentioned whether your motor is cleaned regularly. A dirty commutator will lead to substantially reduced performance.

You should check to make sure that your charger is doing its job. If you are using a peak detection charger it may be shutting off before the peak is reached. Check to see if the battery is warm after it has been charged. If it isn't, chances are that the charger isn't doing its job properly. It is also possible that your nicad has reached the end of its useful life; this does happen. One way of finding where the fault lies is to borrow another nicad and charger, using one at a time in the system and seeing if you can manage a longer time. If the problem continues with a different nicad and charger, then it's probably the motor.

Q: *I have a Tamiya Fox which I race off-road, but I don't seem to be able to beat an RC10. What would I need to do to make my car more competitive?*

Barry Y., Mt. Barker, S.A.

A: I hate to say this, but it might not be your buggy, Barry. The best buggy in the world is no substitute for racing experience, and it takes a while to gain that experience. That aside, the Fox is a very good 2WD buggy without any modifications. You need to look at the costs involved, as it may be cheaper to buy a different buggy than 'hot-up' the one that you have. May I suggest that you continue with the Fox, and boost your skills while you save for an RC10 or an Ultima or similar.

Q: Is there any easy way of keeping dirt and moisture out of speed controllers and receivers? I'm asking for any easy way, so that it's still possible to change crystals quickly.

Peter K., Bundaberg, Qld.

A: The easiest way is to slip a balloon or a rubber bag (Tamiya make rubber bags specially for this purpose) over the receiver, then secure the end around the wires with a cable tie. Electronic speed controllers can be protected in the same way, as can mechanical units, but with the mechanical controllers make sure that the bag doesn't touch anything which gets hot. By the way, a balloon over the shock springs, tied at each end, will help shock shafts last longer by keeping the dirt out.



Three out of five ain't bad! Mel Gillott's Olympus DM10 camera catches a 5 car group, with 3 showing daylight under the wheels. 400 AJA film used for this type of action.

Q: How can I tell if my suspension is set right?

Chris W., Glenelg, S.A.

A: One simple way is to slip an O ring onto your shock shafts (make sure it's a firm fit), and slide it hard up against the shocker body. Put your car on the track for a couple of laps, then check the position of the O ring. If it has been pushed hard up against the shaft end then your suspension is probably too soft, but if it has hardly moved away from the shock body then the suspension is too hard. Change the shock oil or spring tension to remedy the problem.



How high can you fly? Modded Bulldog of Simon Blayney is set up to fly the best way, horizontally, over the Illawarra jump.

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BIRD TORQUE

I was out racing the other night when someone said to me, "You've told us how important battery charging is, and how good peak detection chargers are, but what about giving us a circuit for one?". So over the next couple of issues of the magazine I'll try to show you how to build your very own peak detection charger, for considerably less than \$100. (And there aren't too many peak detection chargers available at that price!)

THE FEATURES

The charger can be made to give a fast charge output of up to 4 Amps, but without any control over the output current (the simplest circuit); or with a controllable output of up to 5 Amps; or with a constant current output of up to 5 Amps.

Standard features will include polarity protection and a trickle charge circuit. Options which can be added, if you wish, are an ammeter to measure output current, a voltmeter to measure nicad voltage, and a buzzer which will sound when peak voltage has been reached.

HOW IT WORKS

The circuit that we'll use is very basic, but it can be modified to suit your needs. Essentially it revolves around the use of an Operational Amplifier Integrated Circuit (IC or Chip) as a voltage comparator. Sounds complicated, but it's not. Put simply, the chip that we're going to use (called an LM741) has eight little legs. Two of them are for input voltages. The chip compares these two voltages, and, when one is lower than the other, the IC reacts. In our case it's set up to turn the power off.

So, the heart of our charger is this little LM741 Op-Amp (about \$1's worth), which will measure the voltage of the nicad being charged, and, as long as that voltage keeps increasing, the IC won't do anything, but, as soon as peak voltage is reached and the nicad voltage starts to drop, the Op-Amp will switch the power off.

CONSTRUCTION

Construction is limited only by your skills. If you want you can design and make your own printed circuit board, or you can build any of the circuits up on Veroboard. All the components should be readily available from places such as Radio Parts, Radiospares or similar shops in your state.

For ease of explanation I'll divide the charger into sections, dealing with each separately. Build what sections you want and combine them together to suit your needs. For example, the peak voltage detection module can be used to convert a set of quick-charge leads or a clockwork charger to a peak voltage detection unit.

Care will need to be taken to ensure correct orientation of certain components such as capacitors, diodes and transistors, but I'll try to make this as clear as possible as we come to it.

TOOLS NEEDED

You'll need a fine-point soldering iron of about 25 watts, some wire cutters and a pair of fine-nosed pliers. Of course, when you fit the unit into a box, you'll need a drill and so on.

THE PEAK VOLTAGE DETECTION UNIT

This is the heart of the charger, and can turn virtually any nicad fast charging system into a peak detection charger. The circuit diagram is not complicated, but, to be on the safe side, there's an explanation chart showing what each of the symbols on the circuit diagram means.

How It Works

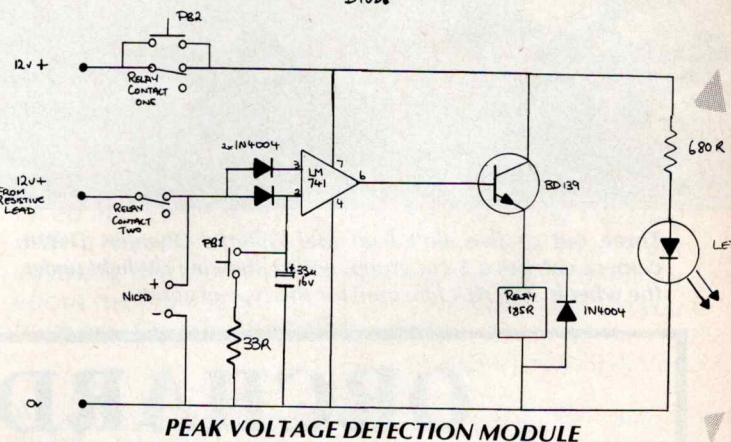
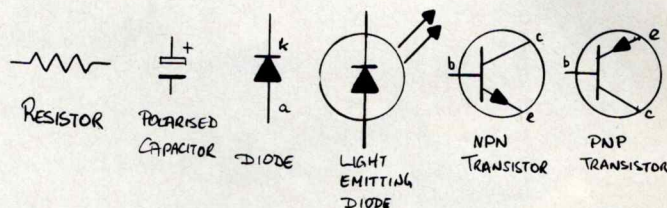
Pushing switch 1 causes the capacitor C1 to discharge, which in turn sets the 741 Op-Amp, allowing it to send sufficient voltage to transistor Q1 to turn on the relay

by Paul H. Bird

Parts List:

- 1 x LM741 IC and socket to suit;
- 3 x 1N4004 Silicon diodes;
- 1 x 33 Ohm resistor;
- 1 x 680 Ohm resistor;
- 1 x 33 micro Farad 16 volt Tantalum capacitor;
- 1 x BD139 transistor (or similar);
- 1 x 5 mm red Light Emitting Diode (LED);
- 2 x normally open push button switches;
- 1 x double pole, double throw relay, with a 12 volt, 185 Ohm coil.

CIRCUIT SYMBOLS



when switch 2 is pressed. As the nicad charges it stores voltage in C1, which feeds pin 2 of the IC. As long as the voltage on pin 2 remains lower than, or equal to the voltage on pin 3 of the IC, the relay will stay switched on, allowing power to flow to the nicad. When the nicad reaches its peak, and its voltage starts to drop, the voltage on pin 2 of the IC will become greater than the voltage on pin 3, causing the Op-Amp to stop supplying current to Q1, and turning off the relay. The red LED serves only to show that current is going through the peak detection circuit.

Take Care

In building this circuit, make sure that the 1N4004 diodes are orientated the correct way. The band on the component itself **must** match the way that the band is drawn on the diagram. In the case of the LED, the shorter of the two leads usually indicates the band end.

It is also important to make sure that the IC is put in the right way round. These usually have a notch, or a spot, on the top of the chip, near pin number 1. The tantalum capacitor must also be installed the correct way round; this will usually have something to indicate the negative lead.

To Use

The circuit can be connected to any 12 volt supply operating from a car battery. The supply to relay contact 1 should be a straight 12 volts, as this operates the peak detection circuit, while the supply to relay contact 2, which charges the nicad, should have some form of current limiting, e.g. quick charge leads.

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To start peak voltage detecting, press button 1 for a couple of seconds, then press button 2. If all is well, the relay will click on, the red LED will light, and your nicad will start to charge. When the nicad reaches peak voltage, the relay will click off, cutting off the power supply to the nicad, and the red LED will go off. Your nicad should be fully charged, and slightly warm to touch.

TRICKLE CHARGE

The normal way to have the trickle charge circuit wired into the system is so that when peak voltage is reached the fast charger switches off, and it reverts to trickle charge. This keeps the nicad topped up and ready to go.

The circuit is very basic. The green LED indicates that the nicad is being trickle charged, while the BD140 transistor supplies a 115 mA current to the nicad.

Parts List:

- 1 x BD140 transistor, or similar;
- 1 x 5 mm Green Light Emitting Diode (LED);
- 1 x 10 Ohm resistor;
- 1 x 1 Ohm resistor;
- 1 x 2K2 Ohm resistor;

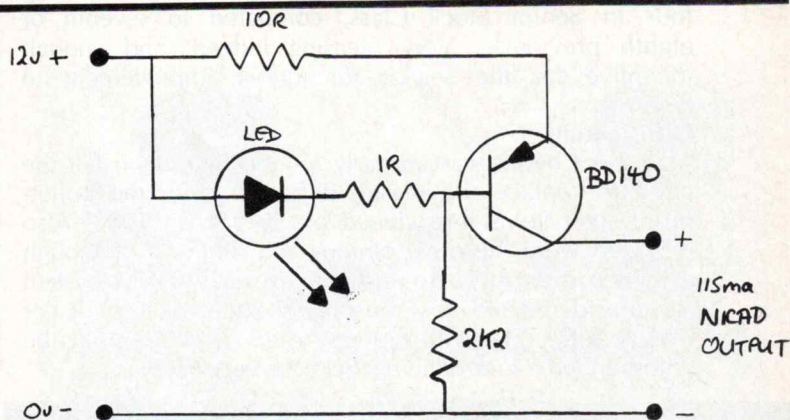
Construction

Putting the circuit together is very easy, and can be done using Veroboard. The parts for this module can be obtained from Dick Smith Electronics, Radio Parts, or similar.

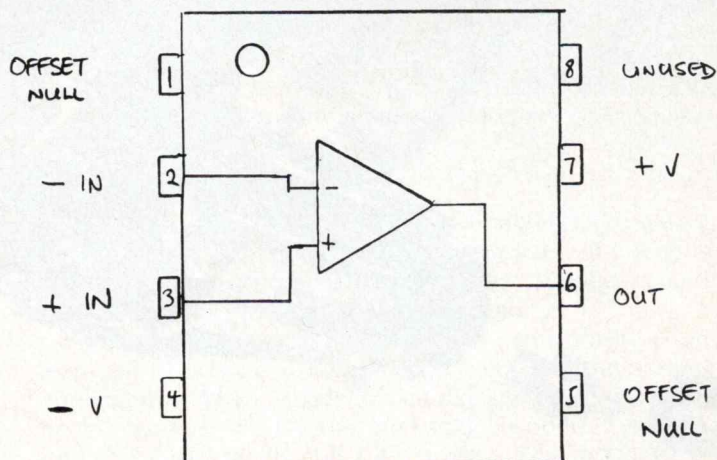
COMING UP NEXT

In the next issue I'll give you the circuits for the three fast charge modules, and show you how it all goes together to make a complete Peak Voltage Detection Charger.

If you don't want to wait until then, you can make the peak detection module, and use it with quick charge leads or some other form of fast charger.



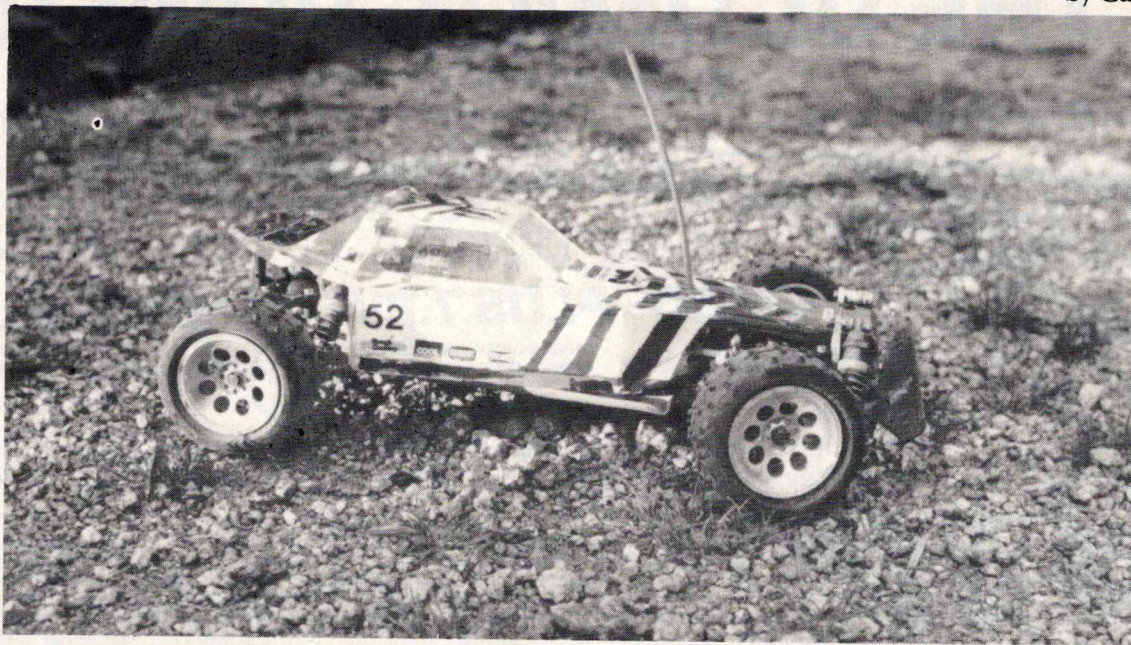
TRICKLE CHARGE MODULE



LM741 OPERATIONAL AMPLIFIER USED AS VOLTAGE COMPARATOR

S.G. COYOTE TWO-SPEED SPECIAL

by Gary Davey



The SG Coyote is a fine buggy with many innovative features. Although not as popular as some other marques, the Coyote has a number of enthusiastic followers. One keen owner, John Schweitzer in Canberra, has carried out extensive modifications, including the installation of a PB Mini Mustang two-speed gearbox.

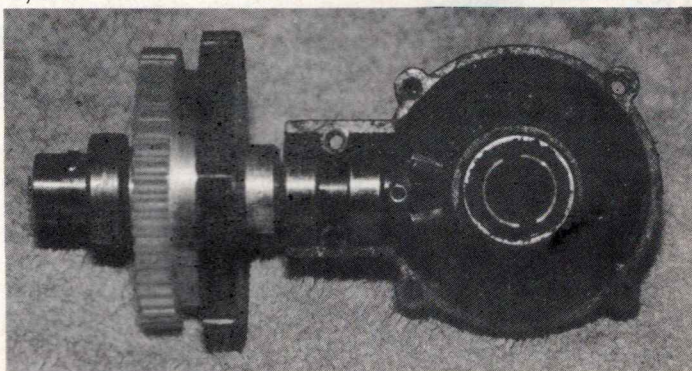
John was initially attracted by the Coyote's direct drive-train and superb 50:50 weight distribution. Compared to his Supershot, the Coyote displayed superior handling, and John was immediately finishing in the top four in Senior Stock Class, compared to seventh or eighth previously. Very pleasing indeed, and enough incentive for the search for further improvement to begin.

Differentials

As his Coyote was an early model, John soon felt the need to replace the plastic diff gears with the bullet-proof steel items introduced by SG late in 1986. Also replaced were the drive pinions and ring gear. Although a rather expensive exercise, the resulting drive-system is considered to be absolutely unbreakable. Later Coyote kits come with the new gears, and SG are to be commended for introducing the mods very quickly.

Shock-Absorbers

The stock items have been replaced by Race Associates, still considered by many to be the absolute best. See photographs for the neat D.I.Y. mounts made from Kydex.



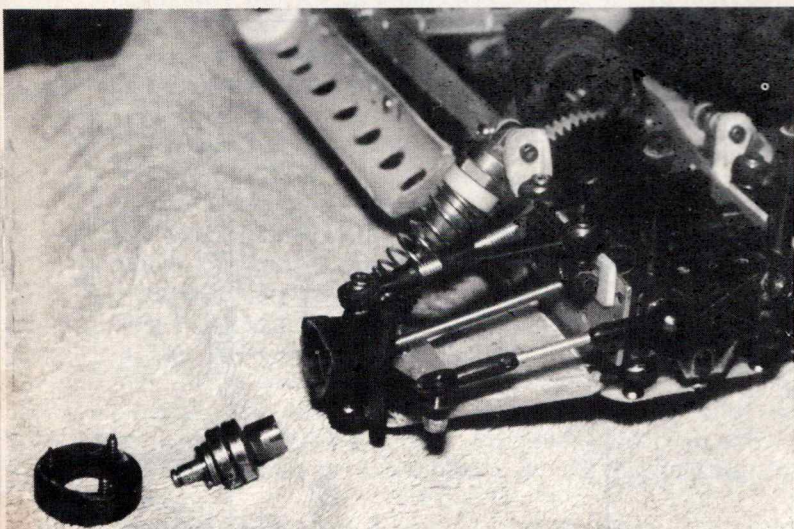
Assembled 2-speed gearbox.

Wishbones

As can be seen in the photographs, all lower wishbones have been re-inforced with fibreglass, to overcome a serious flexing problem. This flexing leads to premature wear in shock absorbers, and affects handling on bumpy tracks. John's mod has resulted in a rigid yet light wishbone with the modified arms a very acceptable 13 grams each. By using front wishbones and hub carriers at the rear, with PB tie-rod connectors, the Coyote now has adjustable rear toe-in. As a result of this work, suspension operation is smooth, and the buggy's handling is vastly improved.

Wheel Bearings

Coyotes, like Bulldogs and Zerdas, have only one bearing per wheel carrier. As the plastic carriers wear, it isn't long before wheel wobble affects handling. A neat mod by Chris Johnson of Performance Buggy Supplies in Canberra incorporated nylon bearing holders and re-worked stub axles to switch to double wheel bearings. As a bonus, the Coyote now runs Tamiya rims which enables the use of CAT tyres. On the Roses Cottage Raceway in Canberra at least 95% of 4WD competitors are using Schumacher hards. John is currently using Optima rims to take full advantage of the new 250 mm limit.



Rear suspension showing RC10 shocks, fibreglass re-inforced lower wishbones, use of PB tie rods and Coyote front suspension components for adjustable rear toe-in, plus double wheel bearings mod.

FAST CHARGE
INDICATOR
LIGHT

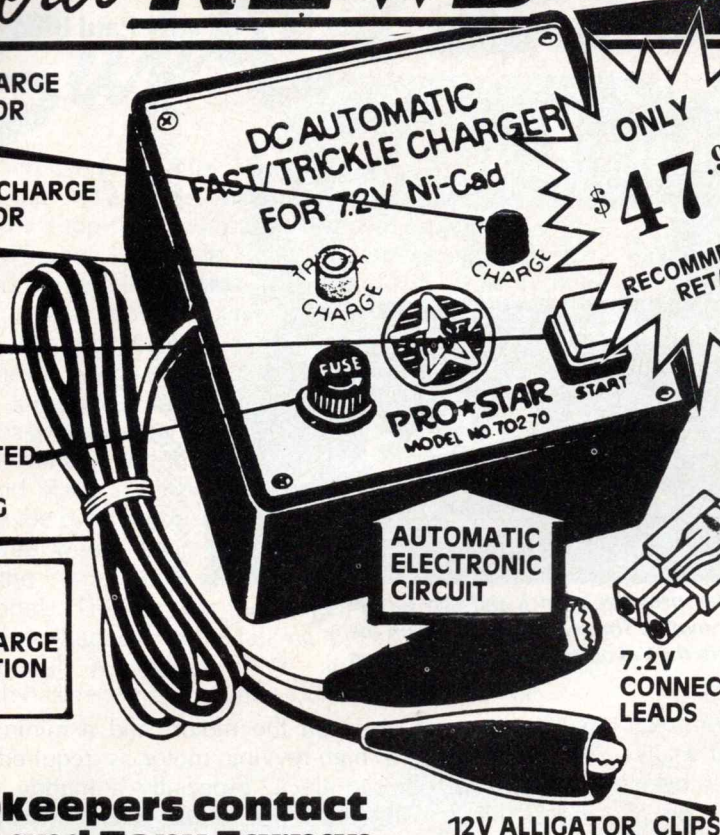
TRICKLE CHARGE
INDICATOR
LIGHT

AUTO
START
BUTTON

SAFETY
FUSE
PROTECTED

5FT LONG
LEADS

UNIQUE
NICAD
OVERCHARGE
PROTECTION
CIRCUIT



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MODEL ENGINES

TWO SPEED GEARBOX —

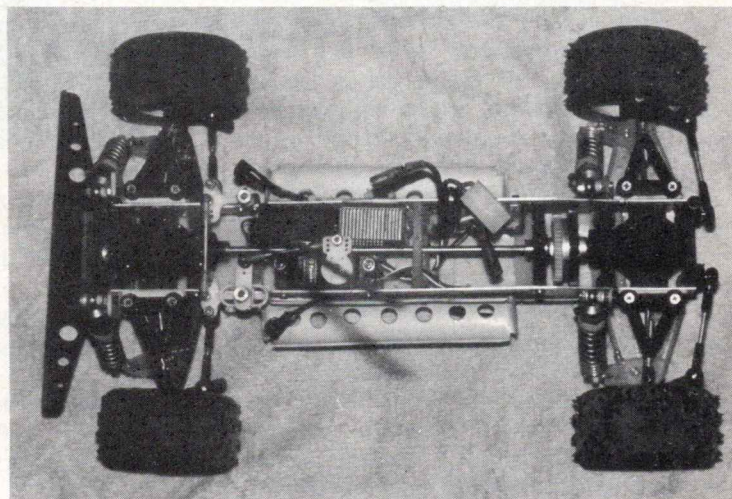
— or how a Coyote became a Mini Wolf

Tired of being blown away by Mini Mustangs and CATs, John came up with the idea of grafting a PB two-speed gearbox into the Coyote. Although John says that the conversion was relatively simple, the attention to detail is a credit to human ingenuity and the machining skills of Chris Johnson. The prime problem overcome in the project was the adaptation of the Coyote 5 mm layshaft to take the PB 4 mm diameter mechanism. As can be readily seen from the photographs, the end result is very neat. A new shaft was made from hardened steel, and this allows for the retention of Coyote bearings and drive pinion. The shaft is 4 mm at one end for access, and 5 mm at the other for the diff. A bearing at the forward end is spaced with a fabricated collar of 5 mm outside diameter and 4 mm inside diameter. An original drive cup is held onto the new shaft by a grub screw. The largest usable spur gear, without slotting the chassis, is 54t, and a modified floor plate was made to allow adequate clearance for the gearbox.

For Stock Class John uses 54/48 spur gears with 12/18 pinions. Observant readers are correct, as the 48t spur gear is not PB in origina; either a CAT or an Associated gear can be readily adapted. A new gear formula has been calculated on the following basis:

Spur Gear (e.g. 48) divided by pinion (e.g. 18)
multiplied by 2.9

For Unlimited Class, using the two-speed box, further modification of the chassis is required, and the new SRM Racing 2-step pinions are utilised. John is currently trialling a single speed mod with a slipper clutch made by RPM Engineering.



The two-speed gearbox installed. Note 25 mm conduit battery trays.

Information

Other Coyote owners wishing to undertake the above modifications can contact John Schweitzer. If there is sufficient demand Performance Buggy Supplies could manufacture the necessary gearbox adaptors.

As you can see, the Schweitzer Mini Wolf is an example of what can be achieved with imagination and application. When asked why he did it all, John said that he believes in the Coyote, and that he doesn't want to join the ranks of PB and CAT drivers. You just have to admire individuality like that.

YOUR MOTOR TORQUES

by Paul Bird



The Shinwa Torque Checker provides a quick and easy torque reading of the RC electric motor. The reading is shown on the scale in Kg-cm. In this photo the Yokomo 05R under test has an output torque of 1.6 kg-cm.

It's all very well being able to set your motor for great performance at free-run revs and amps, but what really counts is on-track performance. Up until now it's been possible to determine that only on the track or on a dyno. It's possible to go part of the way with the Shinwa Motor Dresser (see review in *Dirt and Track* No. 3), but now Shinwa has made it possible to measure motor torque with the **Torque Checker**; a companion unit to the motor dresser.

HOW IT WORKS

The motor to be tested is fitted onto the motor mount, and the shaft is clamped into the brass fitting under the mount. A 7.2 volt nicad is connected to the Checker, and the motor is hooked up using the leads with crocodile clips. Simply holding down the Start button for about one second results in a torque reading in kilogram-centimetres (the metric equivalent of foot-pounds) being given when the motor reaches maximum torque. At the same time the amp reading is given, which shows the current that the motor is drawing at maximum torque.

The Torque Checker uses a system of a tension spring to load the motor, and also to pull round a measuring weight which stops when the motor reaches its maximum torque pull on the spring. The weight is fitted with a screw which protrudes through the Checker's face plate, and gives a reading against a marked scale to indicate the torque of the motor under test.

WHY MEASURE TORQUE?

Why indeed! The type of motors that we use in buggies and cars have two main characteristics which govern their use: revs and torque. For example, a motor in an on-road car will be predominantly a high revver, as the track surface offers particularly good traction, allowing the car to pull away from rest, or out of a corner, with

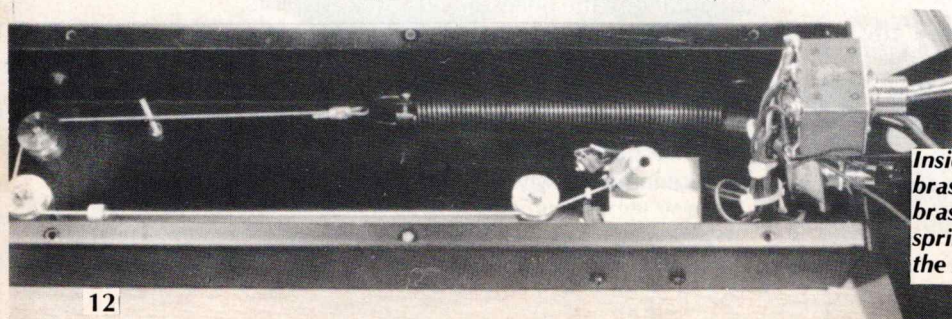
a minimum of stress on the motor, and a minimum of wheelspin. So, a high-revving motor is required here. But, on the off-road track, especially a muddy one, a motor needs to have a lot of torque (also known as pull or grunt) to get the buggy moving. However, too much torque on a dry or sandy track will result in lots of wheelspin and tail-slide, so you can see that it is a case of different motors for different applications.

So, how do you find out which motor will suit your application? It's impossible to tell just from looking at the motor can. This is where Shinwa's Motor Dresser and Torque Checker come in. As explained in *D&T* No. 3, the Motor Dresser will show the revs and amps that your motor will draw, running freely, but it won't show the effect on torque of advancing or retarding the motor. However, the Torque Checker does this.

For example, a brand new stock Yokomo 05R was tested on the Torque Checker, and gave a reading of 1.6 kg-cm. (The revs, measured on the Motor Dresser, were 16,000 at 1.5 amps.) After advancing the motor by twisting it, the revs had gone up to about 20,000 at 1.9 amps, but the torque had dropped to 1.1 kg-cm. From that you can see how all changes to motors are inter-related, and can change the motor application. Looking at it another way, it's possible to alter a motor to suit your application.

The Shinwa Torque Checker is still no substitute for on-track testing, but it will help you to tune a motor for the track conditions. Running on the track is how you'll find out if you can get the time from your batteries, and if your gear ratio is correct.

The Shinwa Torque Checker was supplied for review by Pitstop Hobbies in Sydney.



Inside the Torque Checker. The motor shaft clamps into the brass holder on the right of the box. When power is applied the brass holder twists around and pulls the string attached to the spring. The small metal collar on the string (left of box) moves the indicator on the face plate.

MUGEN *Super* TEMPEST

by Jonathan Borthwick

When Dennis Beilby took second place at the 1987 Victorian 1/12 Titles, behind Rodney Denning and in front of a top field, with a little-known Japanese car from a firm better known for their exploits in off-road, there would have been some that dismissed it as a fluke. Dennis is a very competent driver, having been the 1/8 scale National Champ a few years back. However, he has never excelled in 1/12 scale. Dennis is great at one hour long finals in 1/8 scale, where he is very smooth and easy on the car; but 1/12 scale, where the final is an eight minute sprint, is a different matter. Perhaps his second place at the Vic Titles was just a flash in the pan; or maybe everyone else had problems!

Three weeks later, against an even tougher field, he did the same thing again, this time at the 1987 1/12 Nationals. The car was the Mugen Super Tempest, and it certainly had everyone talking by all but trumping the traditional Associated, AYK and Schumacher clash, which has become a hallmark of Australian 1/12 Nats.



Mugen front end draws heavily on monoshock system developed by Associated for the RC12i. Again, lots of adjustment for camber.



After talking to Eric Beilby (father of Dennis) and his employers at Model Engines (the Mugen importers), a car was despatched to 'Tweaked & Dumped' for review. Eric was also very helpful in detailing some of the changes that they had made to get the car to Nationals class.

The chassis is a very stiff monocoque, which really allows the car to work through the suspension and not chassis flex. This makes it easier to set the car up, as the shock absorbers and suspension points are very adjustable.

The radio gear fits easily in the chassis, and is well protected from the elements.

Suspension is fairly conventional, featuring a front end very similar to that of the monoshock Associated RC12i. This is comprised of a single shock absorber taking the load from the wishbones, to which the steering axles are attached.

Camber adjustment is obtained via the upper control arms, and is easily achieved.

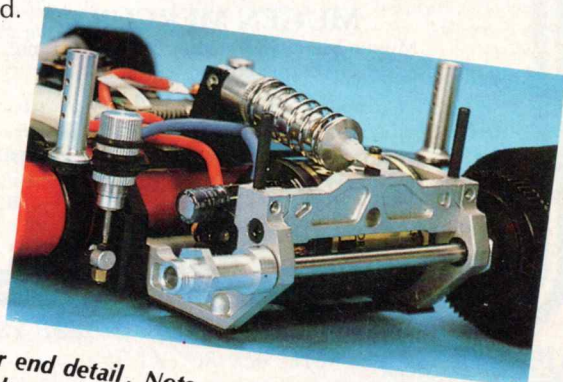
The rear end uses the ubiquitous T-bar, damped by one large shock absorber over the motor, and a smaller unit to one side of the chassis to take up any lateral loadings. Interestingly, the Beilbys discarded this second shock from their Nationals car. However, that may have been more because of the circuit than anything else. Further damping is through a clever system of coned rubber grommets at both ends.

The car features some nicely molded wheels, which are both light and very true. Unfortunately, the tyres are not pre-glued to the rims.

Assembly is quite straightforward. Even though the instructions are in Japanese, they are diagrammatic and generally quite good. Eric recommended the use of threadlock on all metal threads so as to avoid the frustration of something working loose after a while.

The differential is based on the Delta Super Diff. This unit works well, and is located on a steel axle. A carbon fibre replacement is available, and is recommended.

The lexan body shell is of the Sports GT type, and sits smartly on the chassis, as well as giving good downforce all round.



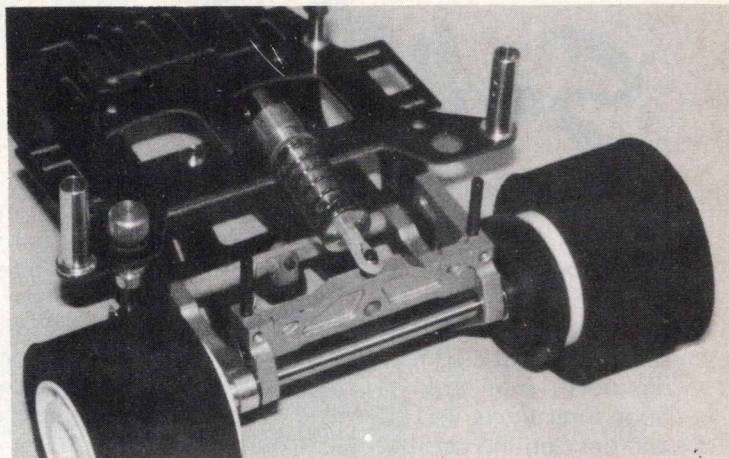
Rear end detail. Note small damper in front of rear wheel to damp sideways roll. This feature discarded on Beilby's Nationals car (see article).

On the track the car was quick, although a bit excitable. I talked to Eric, who recommended running a very thin oil (10W) in the front shocks and 40W in the rear. I followed his advice, and removed the small side mounted shock as well, and tried again. The car was definitely better, but needed a bit more traction in the rear, and more steering.

After conferring with Eric again I replaced the front conewashers with light springs to obtain more steering, and trued up some Green Compound fronts and Yellow rears. (I used Associateds, but Frewers would do the trick.) The front tyres were set up with neutral toe-in (pointed straight ahead) and three degrees camber to get the tyres to wear evenly. Next time out the car was much better, turning nicely, and feeling stable coming out of both fast and slow corners. It has a tendency to lift the front wheels, which is alarming at first, but it doesn't seem to affect the lap times, and it looks spectacular. As the track lost some of its coating of dust I put on some Green rears, with a bit of suntan lotion, and found the car to be very predictable and easy to drive.

In conclusion, Mugen have put together a nice car which will give good results if properly set up. It is a bit fiddley to build without instructions in English, and one can become a bit confused by all the available adjustments. However, by trying one thing at a time, it is quite easy to have an even-handling car, at least as far as outdoor tracks are concerned.

I think that on carpet the car would try to tie itself in knots, unless the setting up was very different from the outdoor setting that I used after conferring with the Beilbys. No doubt, with the number of carpet tracks popping up around the country, and the 1988 Nationals



Rear end again of Mugen Super Tempest featuring coil-over shock and lots of adjustments.

to be held on carpet (more next issue), we will see if the Super Tempest can retain its obviously competitive pedigree on the higher traction surface.

Thanks to the Beilbys and to Model Engines for the test car and advice. Model Engines have available all spares for the Super Tempest, so check with your local hobby shop.



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Focus on CASTLE HILL HOBBIES

by Mel Gillott

To operate a model shop successfully requires more than just business credentials. You need to have used many of the products you sell, or at least be involved with the users. Becoming friendly with customers and being involved with their activities is a good way of earning their respect and patronage.

All this requires energy, enthusiasm and hard work, qualities than Alan McLeay of Castle Hill Hobbies knows well. In addition to opening his shop 7 days a week, Alan is an active President of the Castle Hill Off-Road RC Club, and also a model aeroplane flyer of many years standing; and if that isn't enough, he also flies full size planes!

Raising four children (Alison, Linda, Jillian and Christopher) imposes on Alan's busy schedule, but this has the benefit of providing, in addition to his wife Coralie, three extra shop assistants!

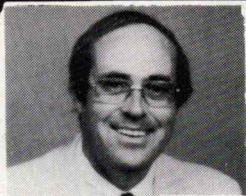
Castle Hill Hobbies is situated in one of the more affluent suburbs of Sydney, but this hasn't stopped them from giving some of the best prices around. Teaming up with Sheridan Hobbies and Kellett's Hobbies to form The Dynamic Trio has given them increased buying and selling power which enables them to keep prices down.

Alan's smallish but well-stocked shop has now been open for 3½ years. He specialises in off-road gear (races an Optima too), keeping abreast of all the latest in motors, batteries, speed controllers and, of course, cars. Parma and Tamiya are two brands of which he holds good accessory stocks.

Amidst all this, Alan and his family still don't forget the smile, plus friendly and courteous service. Tell him that **Dirt & Track** sent you, and see if I'm right!



Alan McLeay and part of his friendly tribe behind the counter of Castle Hill Hobbies, Sydney. Good stock is evident.



NEWS and VIEWS

Rob Reade



Hi,

Here we are back again for our first "News and Views" of 1988. I would like to thank everyone who supported us during 1987, and I certainly hope that this year is going to be as exciting for you as it is for us.

What's new? Firstly, I am absolutely delighted with the response to the **Maxima**. This new model 1/10 buggy from PB is a winner! It is directly aimed at the serious buggy racer, and already reports are coming in of some very happy owners. It is proving to be very competitive right out of the box, and it is FAST! (All the latest technology in efficiency certainly works!) Some of our major competitors have been around a while, but consider this: this is a new model, it does feature all the trick bits as standard, no expensive add-ons are needed, but best of all, it is an easy buggy to build and work on. Service time to keep it in its prime is low, and it doesn't need constant replacement of parts. Check **Maxima** out now at your local friendly PB dealer, or contact us direct for more information.

Oh, by the way, for all you PB **Mini Mustang** owners out there, PB haven't forgotten you,

because the other great feature of **Maxima** is that all the new parts can be fitted to a **Mini Mustang** in several easy stages or, with the purchase of a conversion kit, you can have an instant **Maxima** suspension. So you can upgrade your existing car if you wish, and not have to purchase another complete buggy kit. Your PB dealer can advise you now on conversion parts, or contact us direct for details. I am always more than happy to help wherever I can with advice on PB or any of our other products.

What else is new? Well, what about a 1/4 scale racing motor bike that uses a 3.5 cc engine! Yes, we have them now from **D.W.A. Models** of Italy. These exciting machines are very popular in Europe where they actually hold organised race meetings for them on purpose-built tracks. A leaflet about this superb model is available on request.

From Kevin **Frewer** in New Zealand we now have available a full range of his excellent 1/10 body shells, and from **S.R.M.** in England we have excellent availability of the previously very hard to obtain **Laser**, **SC** and **SCR** battery

packs. These are probably the most carefully computer matched battery packs that you can buy, and are rated by most who have tried them as simply "the best". Not cheap, but then the best never is.

Now for 1/8 scale. No, I haven't forgotten about this very exciting category of radio control model cars, be it circuit racing or off road dirt burning. Kit prices are still in the bargain basement area, with a **PB 31 Nova X5E 4WD** circuit racer still available at \$495 (only a few left), and the incredible **X3 Mustang 4WD** off roader at \$745. The **X3** was the major winner in 1987 in the highly competitive UK racing scene, and is now considered by most of the senior racers there to be 'the' buggy to have. If you are serious about 1/8 scale off road, do yourself a favour and check out the **X3 Mustang**. While the kit price may seem to be a little high, compared to its European competitors it is cheap!

Next issue I will tell you a little about the new 'high efficiency' circuit racer coming from PB, code-named **Phoenix**.

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MICROMOTOR
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NOVAROSS!

Mini Mustang

A WORTHY STEED INDEED

by Paul H. Bird

The Japanese have dominated the field, when it comes to buggies, for a long time now, but the Brits are certainly fighting back with cars like PB's **Mini Mustang**, a good 'horse for the course' (or track). The Mini Mustang is available in two basic formats: the single speed, and the two speed, which is the buggy under review.



FEATURES

- The two speed Mini Mustang features:
- * an automatic two-speed gearbox which can be adjusted to alter the gear change point;
 - * belt drive with adjustable belt tension;
 - * lightweight, high strength drive shafts;
 - * oil-filled shocks inside coil springs;
 - * four-wheel drive;
 - * front and rear differentials;
 - * adjustable toe-in, castor and camber;
 - * centre mounted motor;
 - * fast change battery pack system.

A unique feature of the Mini Mustang is the fast change battery system. In the centre wishbone, just above the nicad position, is a plate fitted with two small springs which are wired through to the radio gear. These act as a housing for a pin and plastic arrangement, which is fitted to the nicad pack. The springs not only keep the pack firmly in place, but also act as the connectors, making all those fiddly plugs and sockets obsolete.

OPENING THE BOX

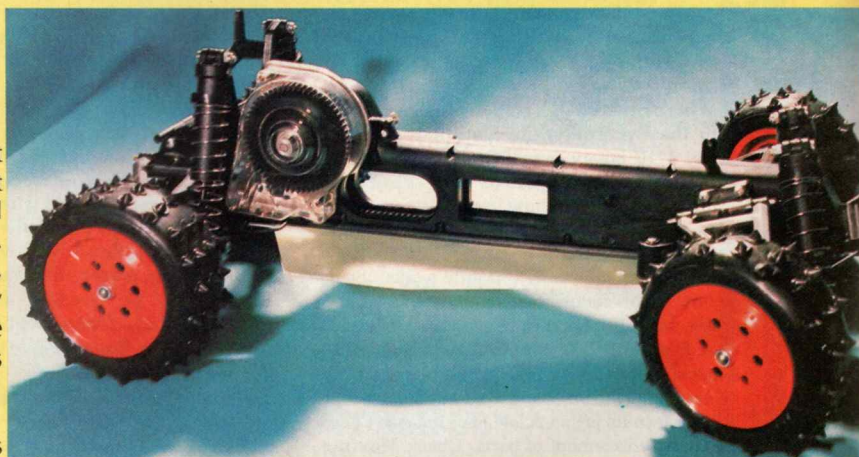
Kit presentation is good, with all the components neatly sealed in well-labelled bags so that they are easy to identify during assembly.

All components appear to be made from high strength, glass-filled nylon, ensuring that they will endure the rough and tumble of buggy racing with a minimum of damage.

The instruction manual is well laid out, with sharp, clear, black and white photos showing how everything goes together, and text passages which explain which

bags the necessary parts are packed in, and how to go about putting it all together.

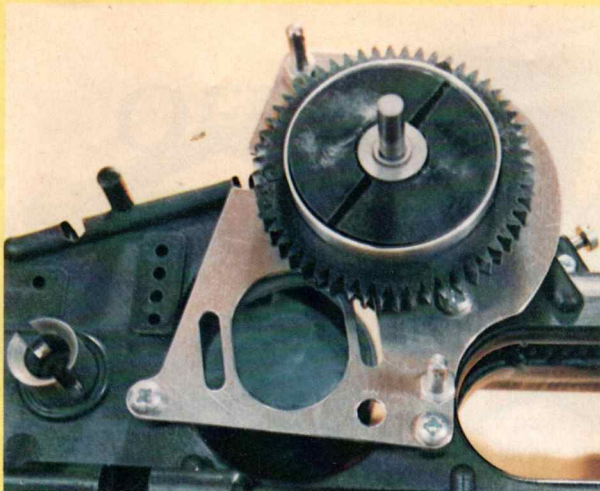
Construction is straightforward, provided that you take your time and **read the instructions**. This is not a kit for the complete novice, however, it should not be hard to build and drive for someone with average buggy-building experience.



PUTTING IT TOGETHER

General construction is based around the central back-bone, which houses the front and rear differentials, the belt and the belt tensioner. The back-bone is strengthened by a fibreglass bottom plate, which also serves to secure the wishbone pivots.

The suspension assemblies are attached to the back-bone, which also acts as a housing for the radio gear, the motor and the nicad pack.



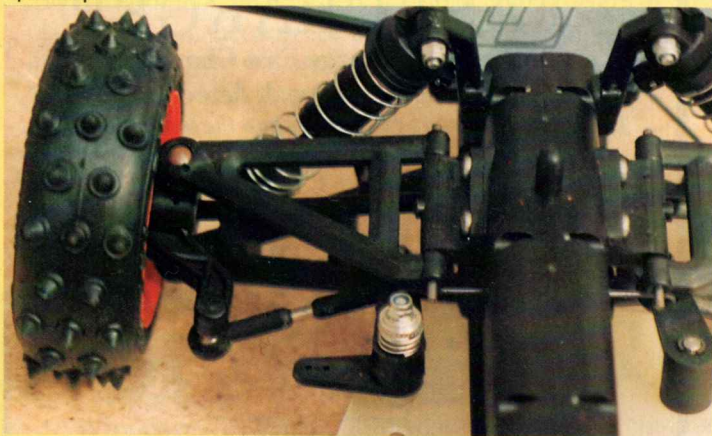
Inside the two speed gearbox. Two centrifugal clutch plates spin outwards when the motor revs increase, locking up the outer casing, and allowing the second, high speed gear, to take over the power transfer.

The differentials are first up, with each unit housing three sun-gears or counter gears. These go together very easily, and are ball-raced at their mounting points in the backbone housings.

Assembling and fitting the belt tensioner is next. While this allows adjustment of the belt as it slowly stretches from wear, it also provides the drive from the motor to the belt itself, via a gear secured to a shaft with a grub screw.

The two backbone sections are closed up, and the steering servo is fitted into its mounting hole. Depending on the size of your servo, this hole may need to be enlarged.

Following the instructions, the suspension arms are made up and fitted next, and the bottom plate is attached. This also secures the lower wishbone arm pivot pins.

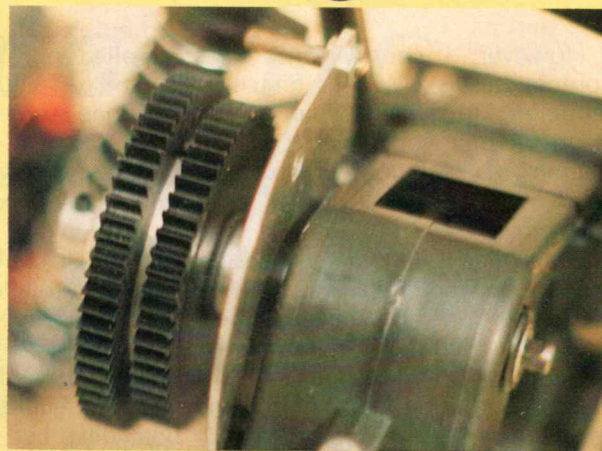


The front suspension, showing the ball jointing of the wheel hubs and the substantial servo saver.

Be careful fitting the main ball joints into the wishbones. The instructions indicate that you need to use a vice to press the balls into place, and this must be done very gently, but it is not difficult.

Keep following the instructions and the Mini Mustang will be completed in next to no time!

Shocks and mountings are fitted towards the end of construction. The shock mounting positions can be altered to suit track conditions. The upper mounts are screwed to the backbone and can be set either high or low. This, coupled with changes in ride height via the spring positioning, means almost infinite adjustability in the ride height of the Mini Mustang, making it suitable for every type of track.



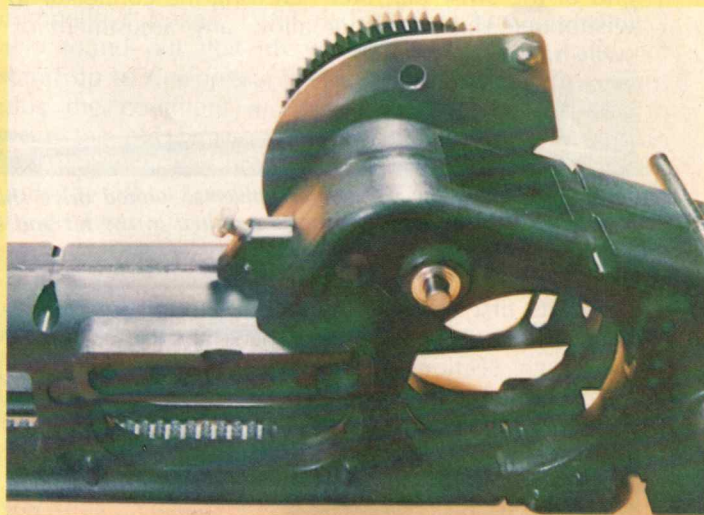
The outer gear is first, or slow speed. It is fitted with a one-way clutch so that when the inner, or high speed gear engages, the outer gear free-wheels.

OPTIONS

The standard bushed belt tensioner can be replaced with a ball-raced version, which will help to reduce friction and provide for smoother running.

The standard drive shafts supplied with the kit appear to be carbon fibre, with a metal pin which you install in the ball at each end of the shaft and secure in place with cyano-acrylate adhesive. The front lower wishbone arms are fitted with a special block which serves to stop the front drive shafts from being thrown out of place during power turns on full lock.

The original drive shafts can be replaced with a full-length universal jointed metal shaft, which also replaces the axles. A one-way style shaft is available for the front drive shafts, and, as this shaft is a single unit, it cannot pop out of place.



Tension is put on the belt by the screw which is threaded into the backbone, just above the battery mounting.

CRITICISMS

One problem encountered during construction was that the hex drivers supplied were a dubious fit in some of the grub screws used, particularly in the two-speed gear box assembly. This meant finding some other drivers to use. I suspect that part of the problem was a combination of metric and imperial grub screws.

The combination of metric and imperial also flows through into the instructions. Just one example, and I quote; "47 mm long x 3/32 inch diameter wishbone pivot pins". While this isn't a serious problem, it can be a little confusing to chop and change between units of measurement.

However, I consider that tools supplied not fitting components is a serious difficulty. It can lead you, the modeller, to believe that you have done something wrong, when you haven't. In turn, this can lead to a definite construction mistake, so, when building the Mini Mustang, double check both grub screws and the Allen keys.

I feel that the system of tensioning the belt could be improved. The system involves a screw through the backbone pressing against the tensioner arm. This screw thread in the backbone could be stripped quite easily, and if that happened, all belt tension would be lost. Belt tension does not provide a front-rear torque split, it only affects motor drive to both diffs, but without the tension you have no drive; just a slipping belt.

I was disappointed that no grease was supplied for use in assembly of the differentials, even though the instructions suggest greasing the gears. Also, the kit did not contain any oil for use in filling the shocks. I know that there are many different grades of oil which can be used, depending on track and weather conditions, but it is nice to be given a starting point.

The shock bodies are made from ABS resin, rather than metal. The end cap of the shock, which contains the seals, is held into the shock body by using two roll-pins which are squeezed into their holes using pliers. This makes oil changing a rather difficult operation, and, of course, the shock body is rather more at risk from distortion caused by the removal and insertion of the roll pins. However, the seals are good and the shocks work well and do not leak.

Sway bars are provided, but I wasn't impressed with the method of installation. The bar is attached to each wishbone by sliding a small nylon connector over the end of the sway bar, then screwing the connector to the wishbone. This does not allow any adjustment of the sway bar tension.



One option is the full length universal jointed drive shaft, which replaces both the shafts supplied in the kit and the standard axles.

ON THE TRACK

On its first test run the Mini Mustang handled quite well. It was predictable in corners, and very stable, even on rough sections of track. Set up according to the instructions, the two-speed gearbox changed well, allowing good torque at low speed out of corners, then changing to allow the motor to push out maximum revs and speed on the straight.

CONCLUSIONS

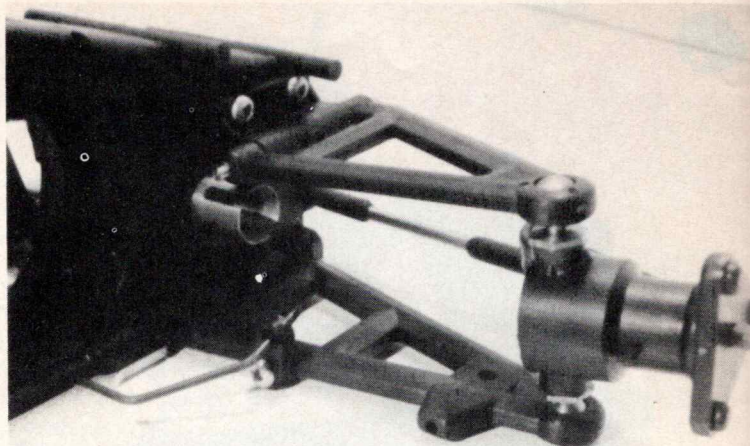
All in all, the PB Mini Mustang two-speed is good value for money, and is a good buggy for the serious racer. It can be set up for virtually any type of track, indoor or outdoor.

Providing that the instructions are read and followed, construction should not cause any major problems, and setting up is fairly straightforward.

The Mini Mustang should be a durable buggy, providing that it is looked after and properly maintained.

If you're a beginner, I'd suggest that the Mini Mustang is not for you; but if you have some experience, and are starting the chase for those elusive first place trophies, why not try riding with a two-speed PB Mini Mustang?

Review buggy and optional parts were supplied by Rob Reade of PB Model Cars Australia. Thanks Rob.



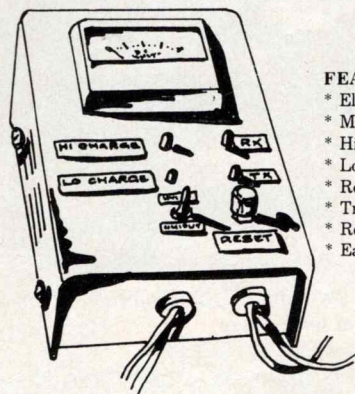
The rear suspension, showing sway bar fitted to the bottom wishbone. The rear track rod allows toe-in and toe-out to be adjusted.

REVIEW AT A GLANCE

Quality of Instructions:	★★★★★
Ease of Construction:	★★★★★
Quality of Materials:	★★★★★
Motor Supplied?:	No.
Chassis Type:	Backbone.
Suspension Type:	
Shocks Type:	Oil filled coil over.
Sway Bars?:	Yes.
Ball Races Supplied?:	Yes.
Motor Accessibility:	★★★★★
Battery Accessibility:	
Speed Controller Supplied?:	No.
Steering Servo Saver:	★★★★★
Body Shell:	Lexan; you paint.
Balance of Car:	★★★★★
Handling on Track (as tested):	★★★★★
Ease of Setting Up:	★★★★★

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OFF-ROAD BUGGYING

from a beginner's point of view.

by Lawrie Barber

My first buggy was a second-hand Tamiya Wild One. It was a battered wreck, and I bought it only to join a few friends and run it down at the local BMX track. When I got it home I found that I had to replace a few parts, so I went to the nearest hobby shop. While I was in the shop I saw a poster advertising the Nunawading Skate Ranch, an indoor skating rink, explaining that radio control off-road racing was being run over the next couple of weeks, so I went along to one of the meetings. While I was there I talked to a few people and learnt that, in fact, this was not the only racing circuit: there were other tracks around, both indoor and outdoor.

My first race was a shambles; a combination of not enough preparation and a lack of knowledge. I asked a few questions and listened to what I was told. With this information, and a lot of trial and error, I started to improve. Although I still had a long way to go before I was as good as the other drivers, with constant advice about improvements to my buggy, and tips on how to drive it around the different tracks, I was getting better.

After the first few races I decided to join a club. Once in the club the other members had more tips and more advice on what to do to the buggy. These tips are certainly helpful to the novice. One of the hardest things to decide about racing is whether to run 2WD or 4WD. Once you've made that decision you have to decide which class: Stock or Modified. My choice was 2WD Modified, and I soon learnt that this was a hard class to be in, because of the power of the motors, and also the difficulty of handling a 2 wheel drive car at high speed.

While racing you get to meet people from other clubs, and learn about other types of racing. Also, being in a club means that you can hear about other races, like Championships, not only in your own state, but all over Australia and the rest of the world. For example, while racing one day, it was mentioned that the Victorian State

Champs were coming up, so I asked our club President what you had to do to enter. He said that the Championships were open to anyone who wanted to enter, so I got an entry form and entered. I had a lot of fun but didn't do very well!

At the Championships all competitors and their equipment had to be available at the track for scrutineering by 7.00 a.m. on both days. That meant that I had to get up at 6.00 a.m. to be at the track on time. This was a great effort after working on my buggy the previous two nights, repairing damage which occurred at a club meeting three days before the big event. The Championships were great because so many people turned up, which was especially interesting for me because I had never been to a Championships before. There were people from NSW, SA and country Victoria. Once the racing got underway everyone helped each other sort out problems with their buggies and radios. I would like to thank those people who helped me out at the Championships: the McPhersons, Ian and Greg, Noel Pooley who supplied some tyres for me, and also Paul Bird who supplied a much-needed speed controller from Century Systems. Even though I didn't get into the finals, I still had a great two days.

One important thing that I found out from the Champs is that even though I didn't have a very competitive buggy, I still had a lot of fun competing. I also found out that my old battered buggy could not stand up to the pressure of full competition racing. This, plus the continual repair expenses, convinced me to retire the old buggy and buy a new one. I bought an RC10, which has proven to be capable of keeping up with the other buggies; all I have to do now is improve my driving skills.

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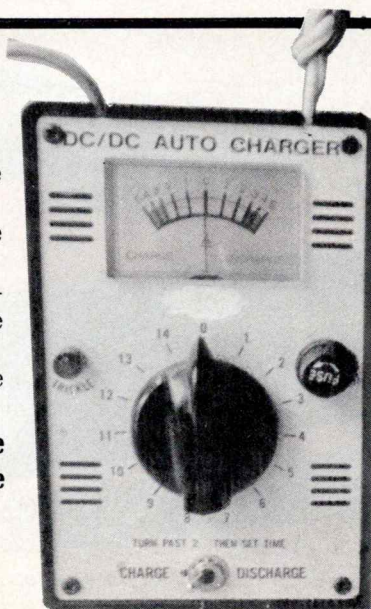
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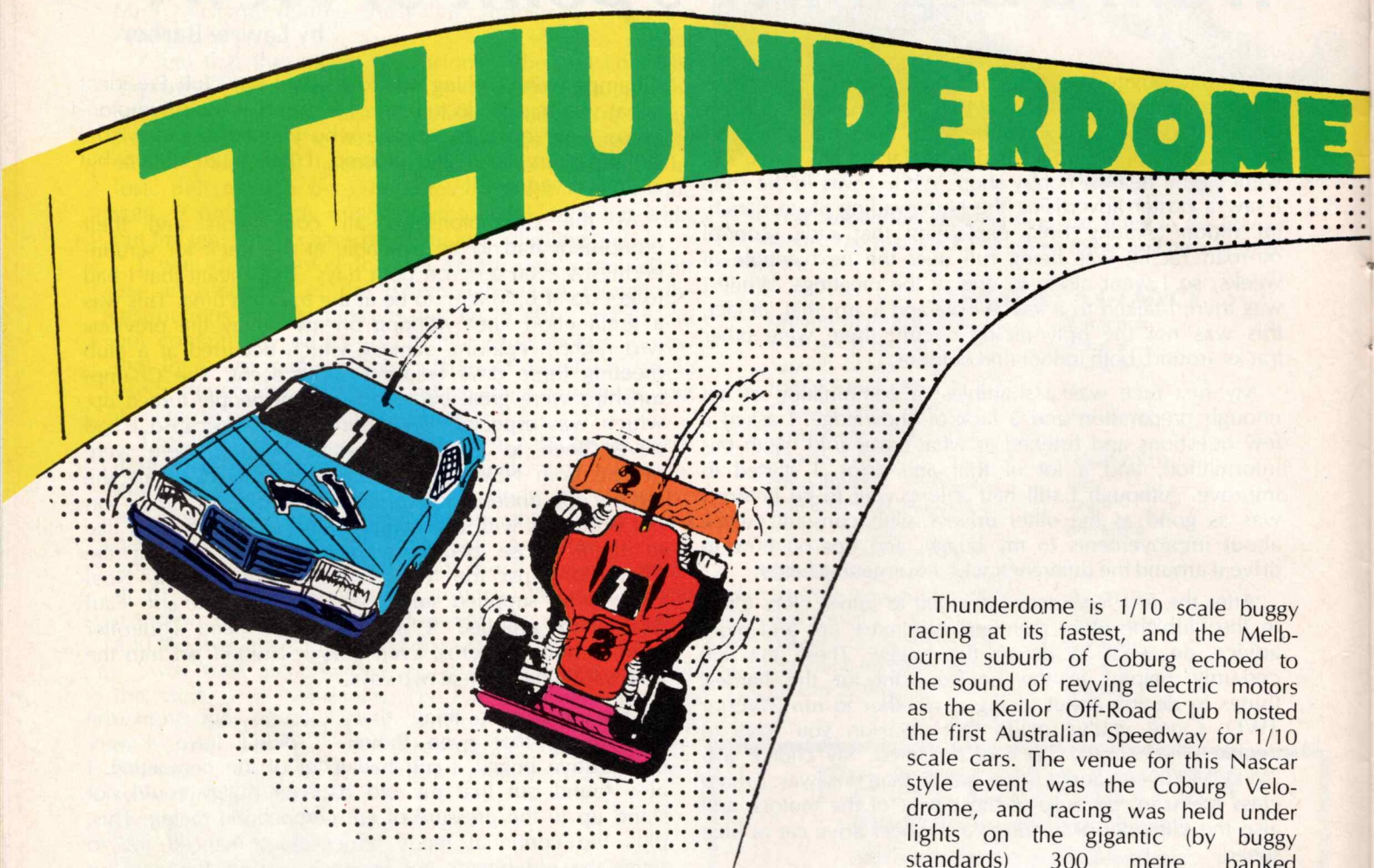
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BEYOND

from Lawrie Barber



Thunderdome is 1/10 scale buggy racing at its fastest, and the Melbourne suburb of Coburg echoed to the sound of revving electric motors as the Keilor Off-Road Club hosted the first Australian Speedway for 1/10 scale cars. The venue for this Nascar style event was the Coburg Velodrome, and racing was held under lights on the gigantic (by buggy standards) 300 metre banked concrete circuit.

Three classes were scheduled: Mabuchi 540 Stock; Modified; and International (7 cells); but nobody entered the latter class. Multiple class entries were allowed, and there was no separation of two and four wheel drive cars. Each entrant was allowed three heats of three minutes, with the fastest lap times being the basis for grading for the finals in each class.

In addition to the 1/10 scale buggies, there was a small contingent of 1/12 scale drivers, and naturally, someone who just had to be different: Peter Orchard arrived with a 1/4 scale sprint car which didn't quite make the speed in the straight to stay on line for the banked corners!

Mabuchi 540 Class was run first. There were 10 entrants, so the class was broken up into two groups of 5, with 8 drivers qualifying for the final. This class was well contested, with only one lap separating the first three placegetters.



About 70 drivers contested the **Modified Class**, with some hot action and savage duels as the drivers fought for the 40 finals berths. Cars on the track ranged from some of the older Tamiya 1/10 on-rodgers to the much more recent Schumacher CAT.

There wasn't a lot separating the A Final qualifiers from the E finalists, as most drivers were new to this style of racing, and there was a lot of fine tuning being carried out between the heats as everyone tried for that little extra in performance.

The A Final was a very close tussle between Cliff Young, Reece Birtles, Tony Lauder and Les Bone, with Cliff showing that he had the power and control necessary to take line honours.

In the 1/12 series, six very fine drivers fought hard, with first place eventually going to Peter Orchard after a minor prang put paid to any chances Tony Lauder and Phil Johnson had.

All in all, a great night's racing, which was well organised by Tony Gray and KEORCA. Hopefully there will be more nights of Thunderdome.

RESULTS

Mabuchi Final

1. Chris Gerbert	8 laps
2. Olorenshaw	7 laps
3. Terry Dyer	7 laps
4. Craig Simpson	6 laps
5. Geoff Harris	6 laps
6. Chris Young	6 laps
7. John Willoughby	6 laps
8. Guy Gerbert	5 laps

Modified A Final

1. Cliff Young	11 laps
2. Tony Lauder	11 laps
3. Les Bone	10 laps
4. Reece Birtles	10 laps
5. Noel Pooley	9 laps
6. D. Shaw	9 laps
7. Jensen Spencer	9 laps
8. Greg Collings	2 laps

1/12 Scale Final

1. Peter Orchard	*12 laps
2. Phil Johnson	10 laps
3. Tony Lauder	9 laps
4. Charlie Vella	6 laps
5. Andrew Edwards	3 laps
6. Andy McCallum	DNS
(* fastest laps overall with an average speed of 74 kph.)	

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Introduction to the FREWER Bodypost System.

by Laurie St. John

Whilst on a trip to New Zealand recently I took the opportunity to call into Frewer International (the people who make all those wonderful body shells) to see their operation first hand, and, in particular, to make enquiries regarding a suitable body mounting system for my cars. Kevin was very happy to explain the frustrations of development, and to show off his newly developed bodypost system.

For years the Frewer people had callers asking them to come up with a simple bodypost system for mounting their saloon bodies to off-roaders. In the past keen modellers had to make their own mounts, but, although this was good for some, the majority felt that the problems with mounting outweighed the enjoyment of owning a Commodore or whatever. For quite some time the Frewer people thought about an effective universal mounting system, and came to the conclusion that:

1. 4 posts are essential to stop rocking on the chassis, tyre rubbing and so on;
2. the posts need to be full adjustable always;
3. the system needs to be strong and very light;
4. the system needs to be mounted from the highest point of the car upwards, to avoid long, heavy or floppy posts.

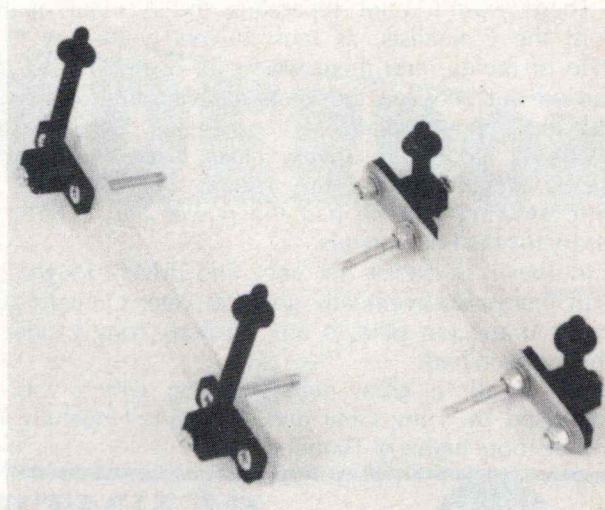
Realising all this, they still could not think of how to do it to suit all cars.

Then Tamiya released their Falcon 2WD. They thought that this was a great car at the time, and decided to make an adjustable wing wire type aerofoil for the car, as the original system had the aerofoil mounted to the body, which caused problems. They designed those little black blocks to fit onto the back of the Falcon shock towers, into which the wing wires were secured.

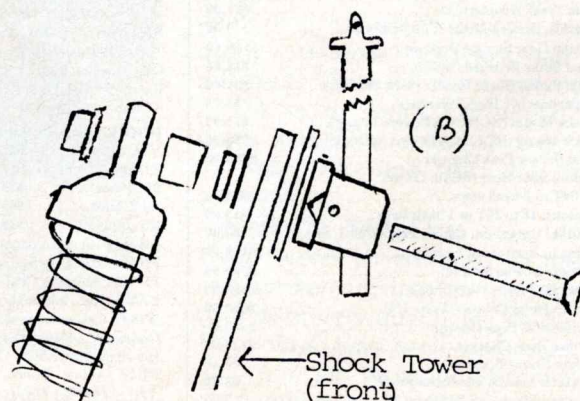
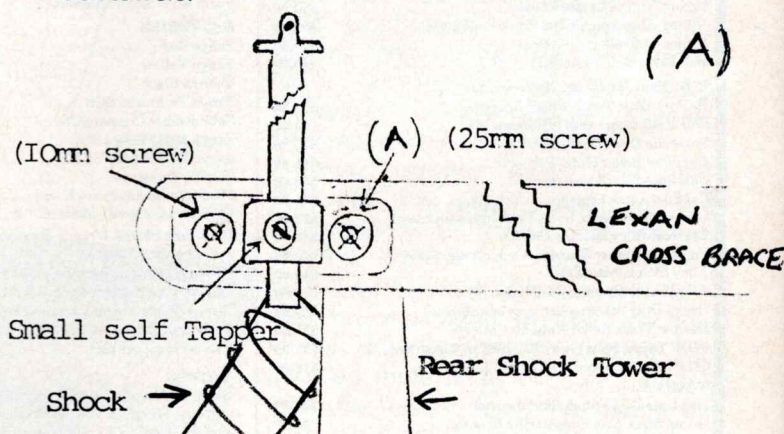
Following this they decided to market a universal wing wire kit that would fit all cars that did not use the wing wire system. This was very successful, and is used extensively world-wide. They then started to sell the wing buttons and the blocks separately, and soon discovered that they were getting a surplus of the wing wire blocks.

With this problem in mind, they again thought of the bodypost problem: if only they could somehow incorporate those leftover blocks into a base for retaining a bodypost. A few days later they came up with the design which used the blocks for the mount, and all they had to do was to produce the bodyposts themselves and get the blocks drilled out to suit the posts.

Initially the blocks were drilled out so that they could be mounted horizontally, vertically or on a flat plane such as a chassis plate. The angled block was thought of later. They left it up to the modellers to find the most suitable place to mount the blocks, but clearly the top of the shock absorbers was the best place because it was the highest point of most cars, which meant that the posts did not need to be long, and the weight was kept to a minimum. They suggested that a fibreglass brace, similar in size to an iceblock stick, could fit across the shock absorbers, with the innermost legs of the blocks being supported by the screw that also holds the top of the shocks in position. The outermost legs of the blocks would be supported by the brace. (See photo of fibreglass braces and horizontally mounted blocks as used on the PB Mini Mustang: the left hand set is for the rear and the right hand set for the front.)



This system worked very well. The only slight problem was that the front body posts, because they were mounted at the front shock towers with built-in castor, were leaning back; they were not straight up and down as the back posts were. This sometimes caused problems, especially if the bonnet of the bodyshell was leaning in the opposite direction, it was difficult to insert the bodyclips because the bodyshell was not sitting squarely on the seat of the posts. To overcome this they introduced their 4th variety of block bases: the angled horizontal post, as shown in Diagram B. This solved the problem of mounting posts via the front shock towers.



They then started to produce complete 4 post kits with adaptor plates and all the necessary hardware, the first one being for the PB Mini Mustang, as this car was popular in the UK at the time, not long after it was first released. Most of their sales were for the 2 post kits without adaptor plates, as the cost of producing the fibreglass braces was fairly high.

However, the next development was really a breakthrough, being the use of Lexan adaptor plates instead of fibreglass. The Mini Mustang needed fibreglass adaptor plates because the shock towers were a bit floppy, but all the other cars needed only to have their adaptor plates of a light material, as all that the brace is doing is supporting the outer leg of each block (see Diagram A). The factory manager, Dean MacDonald, thought of this idea, and was immediately given the day off as a reward!

They had all the equipment to produce the braces to

suit all the popular cars very easily, and even the mounting holes were punched out, with the exception of a few cars such as the RC10, which uses optional front shock mounting points. Not wishing to commit the modeller to a particular mounting point, they decided to leave the brace blank; the modeller could easily drill the 4 holes needed. As the cost of the braces was minimal, they were then in a position to sell complete 4 post kits with all adaptor plates and hardware for only a little more than the price of two 2 post kits.

Frewer will be continuing to make adaptor plates for the popular cars on sale as they are released.

That is the story behind the Frewer bodyposts. You should find them of benefit to your saloon body mounting problems. I look forward to seeing plenty of Dick Johnson Sierras and Peter Brock Commodores on the tracks around Australia this year.

OFF ROAD RACING ON THE BANANA COAST: COFFS HARBOUR

from Jonathan Borthwick

I was invited recently to this lovely part of the world to compete in the Baileys-Caltex sponsored off road race organised by the Bailey Caltex Centre RC Car Club (what a mouthful!). This was a significant event in the life of the Coffs Harbour Club, as it was to be their most important race yet, drawing racers from Lennox Head, Grafton and, of course, Brisbane.

Barry Corfe and I were invited by Craig Klingbiel to our first off road race in 12 months. To make the offer sweeter, Craig offered me the use of his second car, a PB Mini Mustang, while Craig ran his new Schumacher CAT (long wheel base) and Barry dusted off his venerable and weighty Yokomo.



A gathering of intellectuals. From left; Rob Lowe, Bob Denning, and current National and five times straight NSW State Champ, Rodney Denning. A bemused Col Grenenger looks on.

The track is in a very pretty location within the Showgrounds, and only about 1 mile from the centre of the city. Bounded by trees, the club has done a lot of work to create a top class race track with the necessary facilities, without spoiling the environment. This is totally different from the 'scorched earth' policy adopted by some clubs when putting together a track.

As this was the club's biggest race to date, they were happy to listen to suggestions on how to streamline things. The main movers on the day, Mike Swain, Fred Paskin and Larry Thornton, were very responsive to constructive advice, and the meeting was a success largely through their efforts.

Sunday dawned bright and clear, after rain had threatened the previous day. Three classes were run: Senior Modified, Junior Modified and a

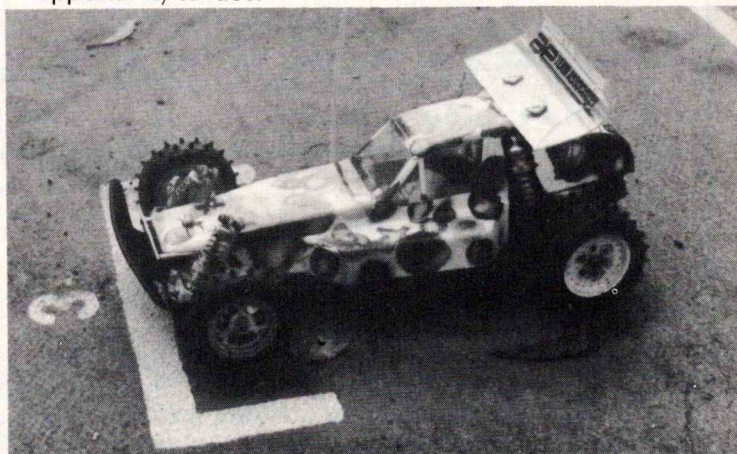
Rookie event. As there were only about 40 entries I feel that in future, when planning major open meetings, the club (and other regional clubs) should consider abolishing the Rookie class, and run Juniors and Seniors together, recognising the performances of the best juniors in an outright context. Rookie and age-based classes are great for club days, however, they do slow things down at major race meetings.

The racing was tremendous in all classes, most particularly in the Unlimited and 6 Cell class, where Craig Klingbiel just managed to beat his other car, driven by top qualifier Jonathan Borthwick. Another local racer, Steve Nielsen, drove his stock Mini Mustang to lead the first final until he dumped, showing that he has a lot of skill but that he is a little rusty on racecraft, to come home third ahead of Corfe's Yokomo. Another top local racer, Gary Paskin, had a weekend that he'd rather forget, but he managed to make the A Main all the same.

In the junior classes, a lot of top talent was on display in the form of the Thornton boys, Scott and Darren, along with Dion Barnett, David Maunder, Darren Swain and Stewart Knox, which should ensure that the club will continue to thrive.

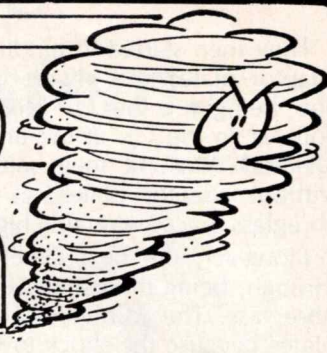
One notable drive was that of Anthony Creer, who bought a second-hand RC10 the day before the race, gave it its first run in the first heat, and managed to win the Open B Main against some of the fast regular RC10 drivers.

Thanks to Coffs Harbour Club and to Craig for the opportunity to race.



Unusually painted Associated RC10 car from one of the visiting Grafton racers. Very effective and different.

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BOB'S TECH CORNER

by Bob Roach

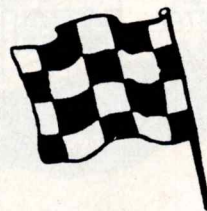
I hope, by way of this space, to bring to you, the reader, some technical understanding of the workings of a model race car. Usually the kit manufacturers make all the design decisions on cars, but there are many owners who like to alter the basic design, sometimes for the better, but sometimes making matters worse. To give you a good knowledge of how a car should be designed and built will be my aim in this and future articles. I intend to cover important things like steering geometry, suspension geometry, motor performance, and many other subjects.

In TECH CORNER this issue I will describe how to build a **simple dynamometer**. Dynamometers are essential tools for measuring if a car is set up for maximum performance. They don't tell the full story, but some information is better than little or none at all.

In the first issue of *Dirt & Track*, Paul Bird described a simple motor dynamometer. I have illustrated it here. By measuring the voltage output of the slave motor this instrument will become a tachometer. I have used an RS 540 motor and measured the output as 2,640 revs per volt, without load; i.e. 8 volts produce 21,200 rpm, and 5.5 volts produce 14,600 rpm, and so on. Other motors with different winds will give different readings. It is nice to know just how many revs a motor is turning, but it is not necessary. Usually an indication of proportional changes in rpm is what is required. To couple the motors together you can use plastic tubing as Paul described, or use a muff coupling made from rod. To keep the inertia down, this should be about 10 mm diameter and be of aluminium. Drill a 1/8 inch hole at its true centre. This is best done on a lathe. Some motors do 30,000 plus rpm, so balance is important. Tap two holes for grub screws; M3 will do fine. (These are the usual size in motor pinions. An M3 tap can be bought at a tool store for a few dollars. As a lot of screws on cars are M3 x 0.5, this is a handy tool to have, tapings size 2.5 mm.)

As Paul wrote in *D&T* No. 1, by measuring the supply amps and playing with timing, brushes and brush springs, the best performance can be accurately assessed. Most of us have a spare stock or other motor, so go to it and make a Motor Dyno.

In a similar way, a Car Dyno can be made using a spare motor, again connected to a voltmeter. Depending on the speed of your car and the diameter of the rollers, the rollers will be turning at about 3,000 to 5,000 rpm; i.e. using an RS 540 motor, about 1 to 2 volts. For best accuracy, use a digital voltmeter; most of us have one for checking our batteries on charging.



As shown, the rig is simple to build, but to do an accurate job the rollers should run true and the position of the bearings, in relation to the rollers outside, should be done in a lathe. The rollers need to be light and strong; about 350 mm long is enough. I used the cardboard tubes in which drawings are despatched, with metal end caps. Thin plastic tube is also OK. About 50 to 60 mm diameter is about the right size, because most car tyres are about 80 to 85 mm diameter.

Keep the bearing diameter small; say about 5 mm diameter. Having a high ratio between the bearing-roller diameter keeps the rolling friction down. Using ball bearings is fine if you have some old ones, but I used the plastic wheel bearings left over when I ball-raced my wheel hubs. They were 10 mm OD x 5 mm ID x 4 mm wide. These need mounting in some type of support. A piece of angle steel or aluminium is fine. Just drill and ream a hole to suit the bush OD. Aluminium is a good bearing anyway, and, providing that the angle was say 5 mm thick, drill (and ream if possible) a hole to suit the axle.

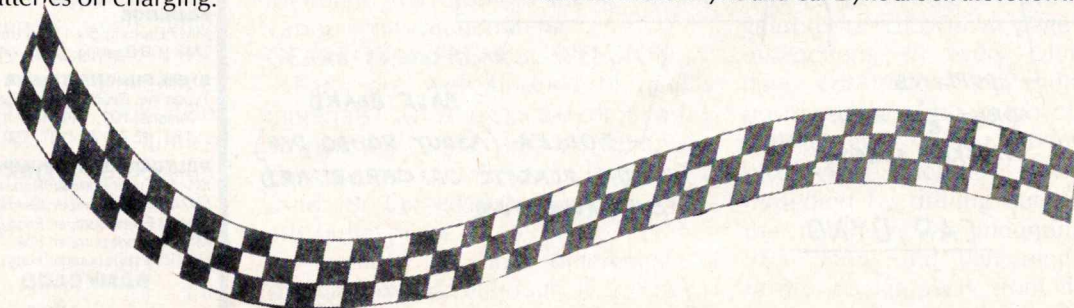
Only 7 bearings are required, as the 8th one is the slave motor itself. A coupling should be made with an 1/8 inch diameter hole and grub screw fixed to the end cover and trued to the roller. Mount the motor so that the roller spins freely. Do the same for the other 3 rollers, and Bingo; you have a dyno.

I have connected my dyno to a recording device that shows acceleration times, and I will publish results and conclusions on this in later issues.

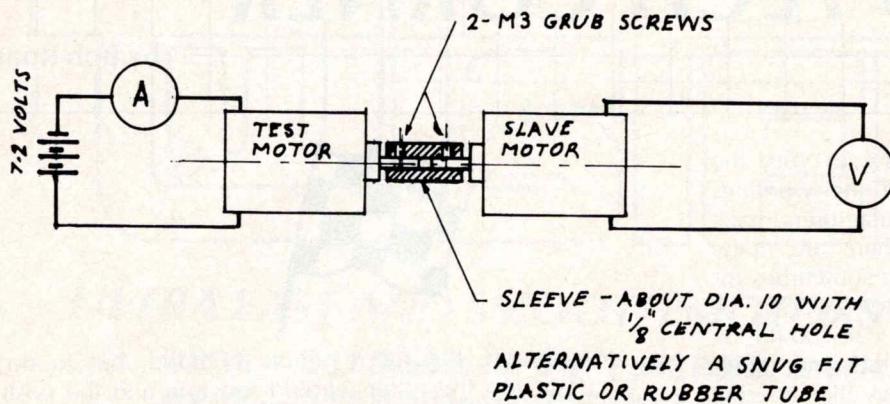
To simulate different ground conditions, a resistor (preferably 5 W or more) should be placed across the motor to provide a variable load.

The car dyno will not show the variation to the car's drive line, gear friction, various gear ratios, tyre size, and many other factors. It is easy to build, and will cost very little (the motor being the main cost), but to do a good job, keep the rollers true by using a lathe. As a modeller, it's good to know someone with a small lathe. There are many people with one in their workshop, so go out and find one, and befriend the owner!

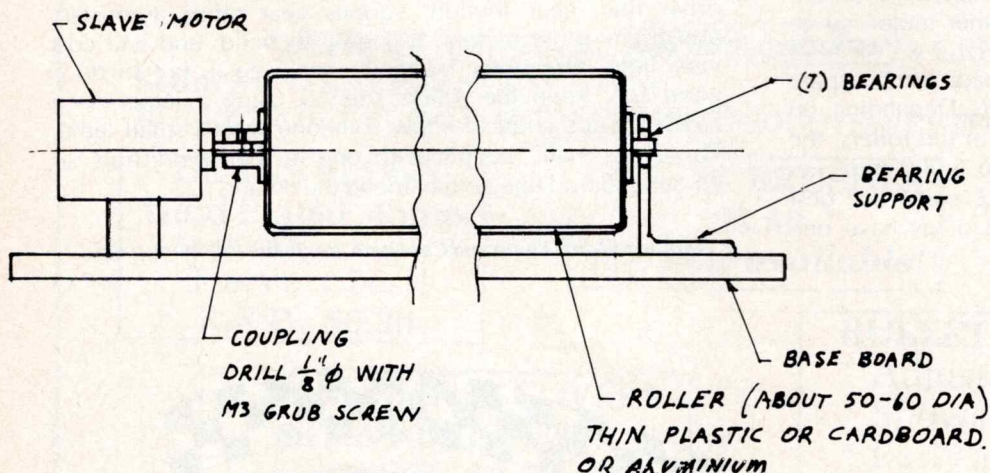
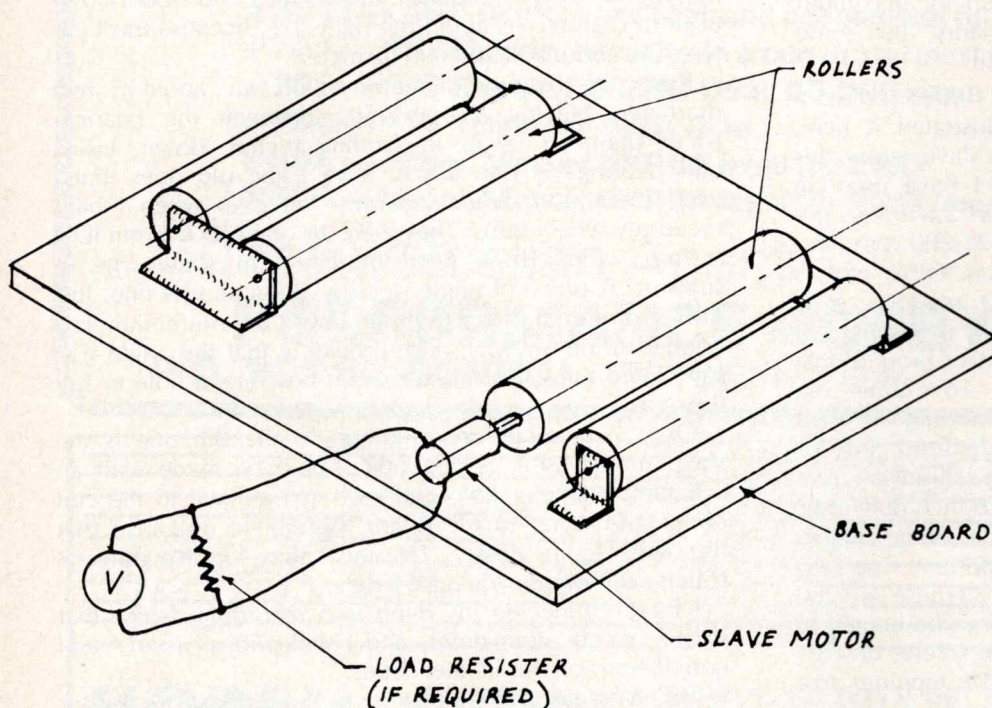
Plans for Motor Dyno and Car Dyno are on the following page.



MOTOR DYNO & CAR DYNO PLANS



MOTOR DYNO



CAR DYNO

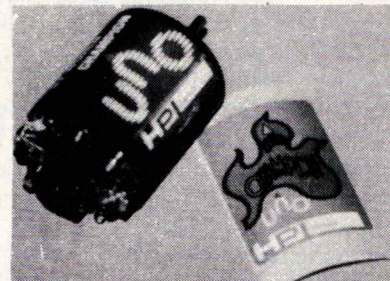
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KYOSHO ULTIMA OFF-ROAD RACER

by Chris Young



When I first saw the **Ultima**, which appeared on the Australian scene very quietly in late 1986, most probably overshadowed by the launch of the Turbo Optima, my inclination was to dismiss the car as being only a lightweight fun car. But the Ultima is a classic 'wolf in sheep's clothing'. Designed by racers for racers, the Kyosho Ultima is the ultimate 2WD performer. The Ultima's super light, super durable, monocoque aluminium frame decreases weight and increases durability.

The Ultima's many stock features include: four oil-filled Kyosho shocks to smooth out rough terrain; low-profile, pin spike tyres on Schumacher CAT size, low profile wheels; and a clear Lexan body with an aerodynamic wing for stability. The special formula EX-66 glass-filled, nylon, double-wishbone suspension used in Kyosho's 4WD champion Turbo Optima has been adapted and improved for the Ultima, making it a virtually unbeatable racing buggy. Notwithstanding, the Ultima is eminently suitable for the novice, both to build and drive. For the more advanced driver the car can be easily modified to become a race winner at the highest possible level. And a winner the Ultima really is, taking out the first three places in the 1987 World Championships.

The Ultima will always be compared with Associated's RC10. Based on external appearance it looks quite a different car, but when you study the Ultima closely, it is apparent that Kyosho have designed, with little fuss and fanfare, an amazingly versatile 2WD which has a wheelbase identical to the RC10 and look-alike suspension geometry. The Ultima's advantage is in its longer suspension arms, which enhance its handling, and in its lighter weight.

I have previously described the Kyosho's 'hot-up' mods for the Ultima (Dirt & Track No. 2, pages 30 & 31). This time I will go back to basics

2WD World Champion:

and describe construction of the Ultima straight out of the box, with as much useful information for the novice as possible. In this way a lot more satisfied drivers should be able to hit the campaign trail in the 1988 season, with less of the frustrations so common for those without any previous experience in building and driving a new buggy.

PACKAGING & INSTRUCTIONS

The kit comes extremely well presented, and parts are beautifully packaged in separate plastic bags. A Mabuchi 540 stock motor is supplied, but Kyosho Le Mans 'Hot-up' motors can be installed for race-winning performance. Not supplied are a 2 channel radio and 6 cell, 1200 mAh battery and charger. Apart from a few drops of super glue and a small can of Holt's touch-up spray paint, there is nothing else needed to get the buggy onto the race track. Instructions are copious, with only the occasional word mis-spelled in translation. On pages 30 to 32 of the instruction manual are scale diagrams of all bolts, washers, screws, etc. It is important to use this chart carefully. Kyosho obviously want you to become familiar with all the packets of screws and bolts early on, because you continually have to go from packet to packet to obtain the required fittings for the various construction steps!

GEARBOX and REAR SUSPENSION

Parts are well finished of quality materials, as is expected of Kyosho. Suspension arms, for example, are constructed of the same hard nylon used for the gearbox, and are virtually bullet proof.

Assembly of the differential is straightforward, although it is wise to check the die cast gears for casting burrs. If any are found they can be

removed with a Stanley knife. Be sure to fit the nylon gear case with the inner flat surface against the rear of the sun wheels. If you find, after assembly, that there is undue roughness inside the diff, the die cast sun wheels can be lapped using fine valve-grinding paste and spinning with an electric drill. But, unless everything is thoroughly cleaned after this treatment, the diff will soon be useless; so be careful! Production clearances for the bushes are a little wide; fitting optional ball bearings is recommended. If you do decide to fit ball bearings, this should be done during initial assembly. Once there is any wear on the shafts and axles they will be too sloppy if ball bearings are fitted.

Work the half shafts onto the diff carefully, making sure that the spacing washer is properly centred. Then tighten the grub screw fully and lock with thread cement. Do not grease the swing shafts as shown on page 7 of the instructions; this only allows dirt to collect which causes more rapid wear than in a dry, loose fitting.

Warning! Bolts and screws that are set into plastic should not be over tightened; there is probably no single more important factor than the care required in assembling plastic parts.

Here is a hint for setting up the gearbox as shown on page 18 of the instructions. In every Ultima that I have constructed the centre gear is positioned a fraction too close to the counter gear, giving, in my opinion, insufficient backlash. This is easily remedied by drilling out the hole for the centre gear's mounting shaft to 9/64 inch, and tightening the shaft firmly, as far away from the counter gear as possible. Finally, the centre gear is best positioned with both M4

washers on the inside, not on each side as shown.

Parts will now fit together with ease, and they really do fit smoothly. Assembly of the rear and front suspension is rapid, utilising shafts and E clips, indicative of the ease of replacement should repairs be needed during a race meeting, although this has not happened to me in a full year of racing the Ultima.

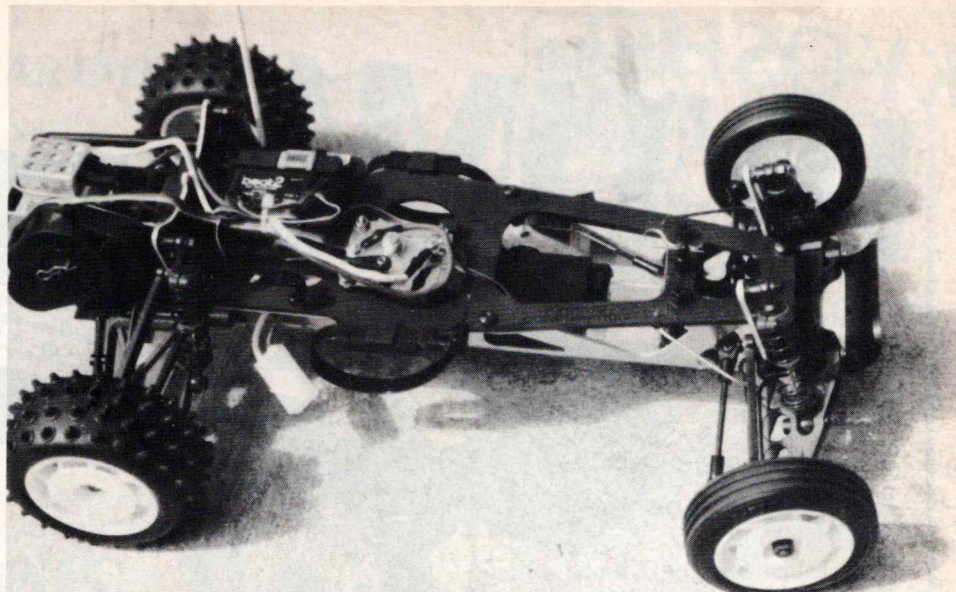
Skip the shocks at this stage; they can be assembled last. Take care with the front knuckle arm and king pin assembly. If there is any slop at all here, try a touch of super glue to locate the knuckle arm tightly. Of all the parts in the Ultima, it is only this assembly that seems to be prone to rapid wear. When assembling the tie rod ends, be sure to advance the ends equally onto the shaft, otherwise, if one end gets too tight, it will distort and bind onto the pivot ball.

STEERING and SPEED CONTROLLER

This is the time to get all the components of your radio gear together and check that everything is functioning correctly. I use a JR Beat 2 channel set with NES-505 servos.

Switch on and centre all trims. It is important that the servos are switched off in their neutral position before assembly, as it's a slow job to reach the speed control servo once it's in position. I prefer to mount servos with a little give, and used small rubber grommets around the mounting screws.

To make the car easier to steer, the ball nut in the servo saver should be fitted in the centre or outer hole, not the inner one as shown. Use the longest threaded rod, and spend some time with a heavy screwdriver, a hammer and a bench vise to get the



Suspension utilises the independent swing arm system, with the suspension and the radio plate mounted on the pressed alloy chassis.

S bend to fit smoothly in the servo horn. Mount the servo as far back as possible for a smooth throw, and make sure that there is no binding between servo and steering arm.

The speed controller is assembled as per instructions. It is similar to the Optima's speed controller, which is well proven, and has silver contacts for long life. For convenience, unsolder the wires from the motor and mark +ve and -ve for later. The M 2.6 x 6 bolt through the centre of the speed controller should be located with super glue. Fit the motor wires in a curve around the speed control horn as shown, and don't cut the wires short, as the extra length helps in the smooth functioning of the controller. You will need to cut the battery connection of your radio switch and solder to the regulator (diode). This diode gives a regulated supply for the receiver and the servos. A little heat shrink tubing can then give a professional finish to your

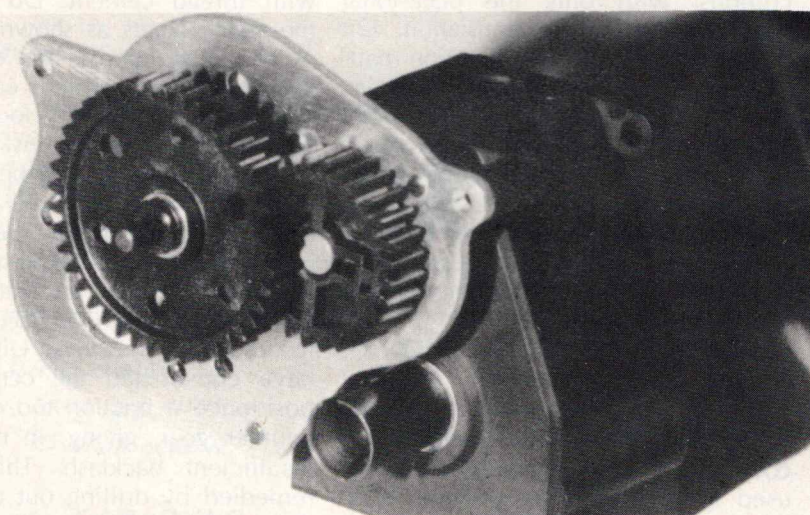
soldered joins. If you accidentally attach your battery with the wrong polarity, the regulator diode will die immediately — so be warned.

Fitting the speed control servo is not easy, but have patience: follow the instructions and it will all fit together. Remember that the connecting rod must fit smoothly; close enough is not good enough! A servo horn with 12 mm throw, not 15 mm as shown, will give full movement on the speed controller with the NES-505 servo.

FINISHING OFF

Filling the shock absorbers with oil is even more simple than shown in the instructions. I fitted the nylon cap seal without taking the piston apart, and filled the shock body up to the level of the mark just below the threads. Simply let the piston sink down into the oil under its own weight till the threaded end settles into the shock body, and tighten carefully. Watch in case the shock seal doesn't seat properly. To reduce the chance of damage I would use a Phillips screwdriver of similar diameter to the end of the shock body instead of the Allen key shown in the instruction book.

Mount the radio plate, taking care not to pinch any wires etc. To simplify attachment of the body, don't use the 'body stoppers'. Replace with a small bolt and nut as for adjoining parts of the plate. This also saves drilling holes in the lower part of the Lexan body where it is easily torn. Use a 5 mm drill for the front location hole in the body. Assembly of the roll cage looks complicated, but is straightforward due to the excellent instructions.



The motor mounting plate, transfer gears and differential are a single unit. The large central idler gear can be ball-raced, although this is an option. Another optional ball-race set can be used in the gearbox itself.

Fitting the front tyres needs the help of a little soapy water and some patience. Once the tyre is correctly seated, locate with super glue.

The motor should then be fitted, and the motor wires resoldered. Make sure that you adjust the motor to give a generous amount of backlash between the pinion and the centre gear.

The really fun part of building any car, painting the body, I left to my son. Using a spray can, after careful masking, he had the body painted in no time at all. The kit provides excellent self-stick coloured labels, so it was easy for him to make up the body to look just the same as shown on the box cover. He also agreed to test drive the car for me. Some people have all the fun!

One real advantage of the Ultima is its light weight. With battery and radio gear it's a low 1.46 kg (2 lb. 2 oz.). This is actually underweight for competition, so you will need to add about 15 gm to bring the car up to the legal weight.

ON THE TRACK

We took the Ultima for its first run on the Templestowe track, which was the venue for the 1987 Victorian Championships. This track is fairly fast, and its hard surface tends to be very slippery, particularly for 2WD. In fact, if a 2WD can hang on at Templestowe without losing it on the corners, it's a really well set-up car. The 15 tooth pinion gear supplied with the kit simply isn't suitable for this track. In fact, we would probably still be there waiting for the battery to dump!

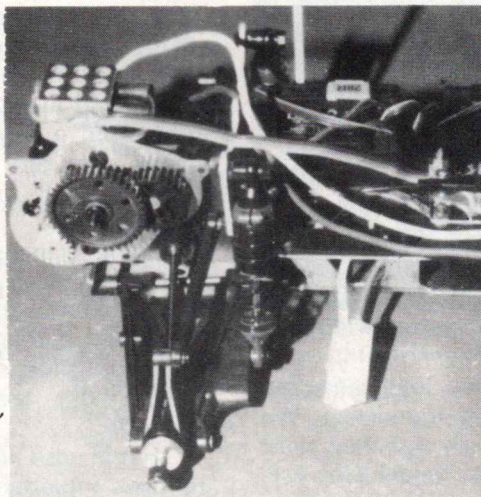
To increase speed to what we are more used to, realising that this car is running a stock standard Mabuchi 540 motor, we tried a 20 tooth pinion

The gearbox module fits into the chassis box, and also supports the rear suspension.

gear, which gives a final drive ratio of 6.2:1. Speed improved dramatically, and now was more like what we were used to. Handling was not good at first, and some rather severe suspension changes were rapidly carried out. First, to reduce the tendency to doughnut on the corners, the tie rod ends were lengthened a full two turns from the standard setting. A bit severe perhaps, but effective. Next we checked out the effect of the front torsion bar, and found that the car handled a lot better without it. So, at last we had the car tamed and able to circulate smoothly. There is no doubt that, to get handling characteristics up to competition standard, the Kyosho Option House mods are required, especially the shocks.

CONCLUSION

An excellent, well-packaged kit that has good performance and handling, and that can be raced almost straight from the box. The Ultima is eminently suitable for the first-time buyer, and is an easy car both to build and to drive. When modified with Kyosho Option House parts the Ultima is easily brought to race-winning standard. With such outstanding success at the World Championships, congratulations to Kyosho are clearly in order.



REVIEW AT A GLANCE

Quality of Instructions:	★★★★
Ease of Construction:	★★★★★
Quality of Materials:	★★★★★
Motor Supplied?:	Yes; Mabuchi 540.
Chassis Type:	Aluminium box section.
Suspension Type:	Independent arm.
Shocks Type:	Coil over oil filled.
Sway Bars?:	Yes.
Ball Races Supplied?:	No.
Motor Accessibility:	★★★★
Battery Accessibility:	★★★★
Speed Controller Supplied?:	Yes; Resistive plate.
Steering Servo Saver:	
Body Shell:	Lexan; you cut out and paint.
Balance of Car:	★★★★
Handling on Track (as tested):	★★★★
Ease of Setting Up:	★★★★★

Option House

LIST OF PARTS' ADAPTATION (WHICH REFER TO EACH MODEL)

Part No.	Part Name	W-0101	W-0102	W-0103	W-0104	W-0105	W-0106	W-0107	W-0108	W-0109	W-0110	W-0111	W-0112	W-0113	W-0114	W-0115	W-0116	W-0117	W-0118	W-0119	W-0120	W-0121	W-0122	W-0123	W-0124	W-0125	W-0126	W-0127	W-0128	W-0129	W-0130	W-0131	W-0132	W-0133	W-0134	W-0135	W-0136	W-0137	W-0138	W-0139	W-0140	W-0141	W-0142	W-0143	W-0144	W-0145	W-0146	W-0147	W-0148	W-0149	W-0150	W-0151	W-0152	W-0153	W-0154	W-0155	W-0156	W-0157	W-0158	W-0159	W-0160	W-0161	W-0162	W-0163	W-0164	W-0165	W-0166	W-0167	W-0168	W-0169	W-0170	W-0171	W-0172	W-0173	W-0174	W-0175	W-0176	W-0177	W-0178	W-0179	W-0180	W-0181	W-0182	W-0183	W-0184	W-0185	W-0186	W-0187	W-0188	W-0189	W-0190	W-0191	W-0192	W-0193	W-0194	W-0195	W-0196	W-0197	W-0198	W-0199	W-0200	W-0201	W-0202	W-0203	W-0204	W-0205	W-0206	W-0207	W-0208	W-0209	W-0210	W-0211	W-0212	W-0213	W-0214	W-0215	W-0216	W-0217	W-0218	W-0219	W-0220	W-0221	W-0222	W-0223	W-0224	W-0225	W-0226	W-0227	W-0228	W-0229	W-0230	W-0231	W-0232	W-0233	W-0234	W-0235	W-0236	W-0237	W-0238	W-0239	W-0240	W-0241	W-0242	W-0243	W-0244	W-0245	W-0246	W-0247	W-0248	W-0249	W-0250	W-0251	W-0252	W-0253	W-0254	W-0255	W-0256	W-0257	W-0258	W-0259	W-0260	W-0261	W-0262	W-0263	W-0264	W-0265	W-0266	W-0267	W-0268	W-0269	W-0270	W-0271	W-0272	W-0273	W-0274	W-0275	W-0276	W-0277	W-0278	W-0279	W-0280	W-0281	W-0282	W-0283	W-0284	W-0285	W-0286	W-0287	W-0288	W-0289	W-0290	W-0291	W-0292	W-0293	W-0294	W-0295	W-0296	W-0297	W-0298	W-0299	W-0300	W-0301	W-0302	W-0303	W-0304	W-0305	W-0306	W-0307	W-0308	W-0309	W-0310	W-0311	W-0312	W-0313	W-0314	W-0315	W-0316	W-0317	W-0318	W-0319	W-0320	W-0321	W-0322	W-0323	W-0324	W-0325	W-0326	W-0327	W-0328	W-0329	W-0330	W-0331	W-0332	W-0333	W-0334	W-0335	W-0336	W-0337	W-0338	W-0339	W-0340	W-0341	W-0342	W-0343	W-0344	W-0345	W-0346	W-0347	W-0348	W-0349	W-0350	W-0351	W-0352	W-0353	W-0354	W-0355	W-0356	W-0357	W-0358	W-0359	W-0360	W-0361	W-0362	W-0363	W-0364	W-0365	W-0366	W-0367	W-0368	W-0369	W-0370	W-0371	W-0372	W-0373	W-0374	W-0375	W-0376	W-0377	W-0378	W-0379	W-0380	W-0381	W-0382	W-0383	W-0384	W-0385	W-0386	W-0387	W-0388	W-0389	W-0390	W-0391	W-0392	W-0393	W-0394	W-0395	W-0396	W-0397	W-0398	W-0399	W-0400	W-0401	W-0402	W-0403	W-0404	W-0405	W-0406	W-0407	W-0408	W-0409	W-0410	W-0411	W-0412	W-0413	W-0414	W-0415	W-0416	W-0417	W-0418	W-0419	W-0420	W-0421	W-0422	W-0423	W-0424	W-0425	W-0426	W-0427	W-0428	W-0429	W-0430	W-0431	W-0432	W-0433	W-0434	W-0435	W-0436	W-0437	W-0438	W-0439	W-0440	W-0441	W-0442	W-0443	W-0444	W-0445	W-0446	W-0447	W-0448	W-0449	W-0450	W-0451	W-0452	W-0453	W-0454	W-0455	W-0456	W-0457	W-0458	W-0459	W-0460	W-0461	W-0462	W-0463	W-0464	W-0465	W-0466	W-0467	W-0468	W-0469	W-0470	W-0471	W-0472	W-0473	W-0474	W-0475	W-0476	W-0477	W-0478	W-0479	W-0480	W-0481	W-0482	W-0483	W-0484	W-0485	W-0486	W-0487	W-0488	W-0489	W-0490	W-0491	W-0492	W-0493	W-0494	W-0495	W-0496	W-0497	W-0498	W-0499	W-0500	W-0501	W-0502	W-0503	W-0504	W-0505	W-0506	W-0507	W-0508	W-0509	W-0510	W-0511	W-0512	W-0513	W-0514	W-0515	W-0516	W-0517	W-0518	W-0519	W-0520	W-0521	W-0522	W-0523	W-0524	W-0525	W-0526	W-0527	W-0528	W-0529	W-0530	W-0531	W-0532	W-0533	W-0534	W-0535	W-0536	W-0537	W-0538	W-0539	W-0540	W-0541	W-0542	W-0543	W-0544	W-0545	W-0546	W-0547	W-0548	W-0549	W-0550	W-0551	W-0552	W-0553	W-0554	W-0555	W-0556	W-0557	W-0558	W-0559	W-0560	W-0561	W-0562	W-0563	W-0564	W-0565	W-0566	W-0567	W-0568	W-0569	W-0570	W-0571	W-0572	W-0573	W-0574	W-0575	W-0576	W-0577	W-0578	W-0579	W-0580	W-0581	W-0582	W-0583	W-0584	W-0585	W-0586	W-0587	W-0588	W-0589	W-0590	W-0591	W-0592	W-0593	W-0594	W-0595	W-0596	W-0597	W-0598	W-0599	W-0600	W-0601	W-0602	W-0603	W-0604	W-0605	W-0606	W-0607	W-0608	W-0609	W-0610	W-0611	W-0612	W-0613	W-0614	W-0615	W-0616	W-0617	W-0618	W-0619	W-0620	W-0621	W-0622	W-0623	W-0624	W-0625	W-0626	W-0627	W-0628	W-0629	W-0630	W-0631	W-0632	W-0633	W-0634	W-0635	W-0636	W-0637	W-0638	W-0639	W-0640	W-0641	W-0642	W-0643	W-0644	W-0645	W-0646	W-0647	W-0648	W-0649	W-0650	W-0651	W-0652	W-0653	W-0654	W-0655	W-0656	W-0657	W-0658	W-0659	W-0660	W-0661	W-0662	W-0663	W-0664	W-0665	W-0666	W-0667	W-0668	W-0669	W-0670	W-0671	W-0672	W-0673	W-0674	W-0675	W-0676	W-0677	W-0678	W-0679	W-0680	W-0681	W-0682	W-0683	W-0684	W-0685	W-0686	W-0687	W-0688	W-0689	W-0690	W-0691	W-0692	W-0693	W-0694	W-0695	W-0696	W-0697	W-0698	W-0699	W-0700	W-0701	W-0702	W-0703	W-0704	W-0705	W-0706	W-0707	W-0708	W-0709	W-0710	W-0711	W-0712	W-0713	W-0714	W-0715	W-0716	W-0717	W-0718	W-0719	W-0720	W-0721	W-0722	W-0723	W-0724	W-0725	W-0726	W-0727	W-0728	W-0729	W-0730	W-0731	W-0732	W-0733	W-0734	W-0735	W-0736	W-0737	W-0738	W-0739	W-0740	W-0741	W-0742	W-0743	W-0744	W-0745	W-0746	W-0747	W-0748	W-0749	W-0750	W-0751	W-0752	W-0753	W-0754	W-0755	W-0756	W-0757	W-0758	W-0759	W-0760	W-0761	W-0762	W-0763	W-0764	W-0765	W-0766	W-0767	W-0768	W-0769	W-0770	W-0771	W-0772	W-0773	W-0774	W-0775	W-0776	W-0777	W-0778	W-0779	W-0780	W-0781	W-0782	W-0783	W-0784	W-0785	W-0786	W-0787	W-0788	W-0789	W-0790	W-0791	W-0792	W-0793	W-0794	W-0795	W-0796	W-0797	W-0798	W-0799	W-0800	W-0801	W-0802	W-0803	W-0804	W-0805	W-0806	W-0807	W-0808	W-0809	W-0810	W-0811	W-0812	W-0813	W-0814	W-0815	W-0816	W-0817	W-0818	W-0819	W-0820	W-0821	W-0822	W-0823	W-0824	W-0825	W-0826	W-0827	W-0828	W-0829	W-0830	W-0831	W-0832	W-0833	W-0834	W-0835	W-0836	W-0837	W-0838	W-0839	W-0840	W-0841	W-0842	W-0843	W-0844	W-0845	W-0846	W-0847	W-0848	W-0849	W-0850	W-0851	W-0852	W-0853	W-0854	W-0855	W-0856	W-0857	W-0858	W-0859	W-0860	W-0861	W-0862	W-0863	W-0864	W-0865	W-0866	W-0867	W-0868	W-0869	W-0870	W-0871	W-0872	W-0873	W-0874	W-0875	W-0876	W-0877	W-0878	W-0879	W-0880	W-0881	W-0882	W-0883	W-0884	W-0885	W-0886	W-0887	W-0888	W-0889	W-0890	W-0891	W-0892	W-0893	W-0894	W-0895	W-0896	W-0897	W-0898	W-0899	W-0900	W-0901	W-0902	W-0903	W-0904	W-0905	W-0906	W-0907	W-0908	W-0909	W-0910	W-0911	W-0912	W-0913	W-0914	W-0915	W-0916	W-0917	W-0918	W-0919	W-0920	W-0921	W-0922	W-0923	W-0924	W-0925	W-0926	W-0927	W-0928	W-0929	W-0930	W-0931	W-0932	W-0933	W-0934	W-0935	W-0936	W-0937	W-0938	W-0939	W-0940	W-0941	W-0942	W-0943	W-0944	W-0945	W-0946	W-0947	W-0948	W-0949	W-0950	W-0951	W-0952	W-0953	W-0954	W-0955	W-0956	W-0957	W-0958	W-0959	W-0960	W-0961	W-0962	W-0963	W-0964	W-0965	W-0966	W-0967	W-0968	W-0969	W-0970	W-0971	W-0972	W-0973	W-0974	W-0975	W-0976	W-0977	W-0978	W-0979	W-0980	W-0981	W-0982	W-0983	W-0984	W-0985	W-0986	W-0987	W-0988	W-0989	W-0990	W-0991	W-0992	W-0993	W-0994	W-0995	W-0996	W-0997	W-0998	W-0999	W-1000	W-1001	W-1002	W-1003	W-1004	W-1005	W-1006	W-1007	W-1008	W-1009	W-1010	W-1011	W-1012	W-1013	W-1014	W-1015	W-1016	W-1017	W-1018	W-1019	W-1020	W-1021	W-1022	W-1023	W-1024	W-1025	W-1026	W-1027	W-1028	W-1029	W-1030	W-1031	W-1032	W-1033	W-1034	W-1035	W-1036	W-1037	W-1038	W-1039	W-1040	W-1041	W-1042	W-1043	W-1044	W-1045	W-1046	W-1047	W-1048	W-1049	W-1050	W-1051	W-1052	W-1053	W-1054	W-1055	W-1056	W-1057	W-1058	W-1059	W-1060	W-1061	W-1062	W-1063	W-1064	W-1065	W-1066	W-1067	W-1068	W-1069	W-1070	W-1071	W-1072	W-1073	W-1074	W-1075	W-1076	W-1077	W-1078	W-1079	W-1080	W-1081	W-1082	W-1083	W-1084	W-1085	W-1086	W-1087	W-1088	W-1089	W-1090	W-1091	W-1092	W-1093	W-1094	W-1095	W-1096	W-1097	W-1098	W-1099	W-1100	W-1101	W-1102	W-1103	W-1104	W-1105	W-1106	W-1107	W-1108	W-1109	W-1110	W-1111	W-1112	W-1113	W-1114	W-1115	W-1116	W-1117	W-1118	W-1119	W-1120	W-1121	W-1122	W-1123	W-1124	W-1125	W-1126	W-1127	W-1128	W-1129	W-1130	W-1131	W-1132	W-1133	W-1134	W-1135	W-1136	W-1137	W-1138	W-1139	W-1140	W-1141	W-1142	W-1143	W-1144	W-1145	W-1146	W-1147	W-1148	W-1149	W-1150	W-1151	W-1152	W-1153	W-1154	W-1155	W-1156	W-1157	W-1158	W-1159	W-1160	W-1161	W-1162	W-1163	W-1164	W-1165	W-1166	W-1167	W-1168	W-1169	W-1170	W-1171	W-1172	W-1173	W-1174	W-1175	W-1176	W-1177	W-1178	W-1179	W-1180	W-1181	W-1182	W-1183	W-1184	W-1185	W-1186	W-1187	W-1188	W-1189	W-1190	W-1191	W-1192	W-1193	W-1194	W-1195	W-1196	W-1197	W-1198	W-1199	W-1200	W-1201	W-1202	W-1203	W-1204	W-1205	W-1206	W-1207	W-1208	W-1209	W-1210	W-1211	W-1212	W-1213	W-1214	W-1215	W-1216	W-1217	W-1218	W-1219	W-1220	W-1221	W-1222	W-1223	W-1224	
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SPEED SECRETS OF THE TEAM

*Part One in a series in which we pick the brains
of the country's top racers.*

by Mel Gillott

Troy Lysaght comes from a winning family. Father, John, was National RC **aerobatic** champion in 1975, and elder brother, Shayne (18 years old) became similarly distinguished 10 years later, in 1985. And this in an event that is the oldest, and possibly the most difficult in all radio control sport, and has many competitors with 10 or more years experience.

Now 14 year old Troy looks set to follow the family tradition; this time in Off-Road RC. His successes to date include:

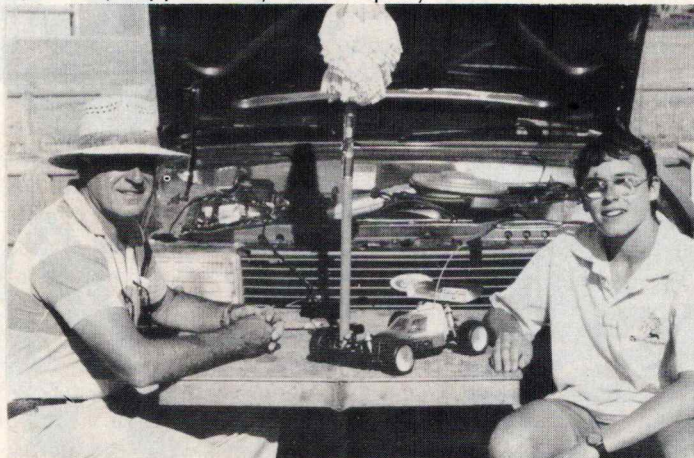
1st — 1987 ACT Titles; Junior Stock.

1st — 1987 NSW ORRCA Cup rounds 1 & 2; Junior Stock.

3rd — 1987 NSW Titles; Junior Stock

1st — 1987 NSW ORRCA Cup round 3; Unlimited.

Also, Troy is running equal first in the St. Ives Club (Sydney) points score. In other words, he is among the winners in almost every race, whether it be with stock or open motor. An enviable record so far, and one achieved with practice, preparation and good selection and maintenance of equipment. Greg Collings of Performance Hobby Supplies (Schumacher importers) recognised this talent last year, resulting in Troy now being partially supported by this company.



John (left) and Troy Lysaght make a formidable team with their Schumacher CAT. See text for how it's done. MG pic.

DIRT & TRACK interviewed Troy and John, and also observed them at ORRCA Cup meeting round four. We asked them to spill the beans and to divulge their most intimate secrets; well, at least as far as model race cars are concerned.

It all began in mid 1986 with the racing of a Tamiya Hornet. This was replaced by two Boomerangs, and then, as the racing became even more serious in the early months of 1987, a Schumacher CAT. Let's now take a look at what they are using to win.

Schumacher CAT

I know, I know! Some of you are tired of hearing about CATS. It may still be the best way to the winners circle, but in deference to those who are weary of the over-exposure of this buggy, we will keep our comments on the rolling chassis short. The Lysaght CAT has all the usual updates. They are:

- track widened and wishbones angled 5° rearwards as described in D&T No. 2 (page 51); front and rear.
- front diff and one-way drive shafts fitted. Note, use strong rubber bands and original female part of the drive shaft to prevent drive shaft from popping apart on the widened car.

- metal steering bush kit fitted.

- new, Performance Hobby Supplies carbon fibre, long wheelbase chassis used. This is stiffer than the original, and slightly lighter. At the time of writing the performance had not been optimised, and hence not properly evaluated with this stiffer chassis.

- Fewer 7 inch wing fitted.

Everything else is standard. The new, low friction (and expensive!) drive belts have not been tried.

Motor

A Peak Performance (PP), hand-made in the USA, is the current favourite for motive power. Also used are the Kyosho 240SB and Losi Insane.

Battery

Malvern Models (UK) computer matched packs are currently used. John speaks very highly of these SCR packs. He claims that no matter how hot the motor is, finishing a race without dumping is never a problem. Getting all the power down to the track is more of a problem in the Open class. He cites the example of using a very high 16/60 gearing (ratio 9.11, and open motors as above) at one track and still having a few amps left at the finish.

Speed Controller

Originally a Kitts, this item has now been changed to a Nosram. This is another item handled by Malvern Models in the UK.

Chargers

The Lysaghts use a Tekin pulse charger with peak voltage detection cut-off. When this has done its job the nicad pack is transferred to a Nosram thermal cut-off charger and the pack temperature also monitored with a probe from a separate digital thermometer. The engine on the old Ford Falcon (sending too much on RC to afford a new one John?!) is running to peak the pack.

Radio System

Nothing fancier than a Futaba Magnum Junior transmitter. Servo is the small, high-speed Futaba S130s, and Rx the miniature Futaba 2 channel.

It should perhaps be mentioned that John Lysaght has no trouble procuring the latest gear from overseas: his working hours are spent in the front office of a Qantas Boeing 747.

I should also mention that Malvern Models products are now imported into Australia by Andrew Bolton of **Bolt-On Performance**, phone (02) 451 7775. These items include the Nosram speed controllers that claim to allow **all** the power to flow through the FETS, Nosram chargers, the Tekin chargers, and the Malvern batteries. In addition to high capacity, Andrew tells me that their life is longer than the so-called pushed cells, and that he hopes to sell them direct for about \$110. Ring him for details, and also ask about his MG (the best initials to have!) and UNO motors.

Motor Cleaning

Whether you use a stock or an open type motor, the care and feeding of the little beast is critical. They all go well when new, but soon drop off after a few runs if not maintained. Troy and John, like most of us who like to go fast, treat motor maintenance very seriously. Their procedure is standard, but with a couple of twists.

Between races the commutator area is sprayed clean with CRC contact cleaner (or equivalent). The comm. is

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then visually inspected, and the motor performance evaluated on a Shinwa motor checker. Usually things are OK, and the motor is then not touched further.

Between race days, and if necessary between races, the motor is removed from the car and fully cleaned. For stock motors this includes fitting a pencil eraser down the brush holders and rotating the commutator to clean it. With open motors the endbell is removed and the commutator cleaned with Silvo. (Note: some other racers do not advocate using Silvo, and John admits to not knowing the long-term effects on the commutator, but it's working well so far.) In the workshop this is quickly done by chucking the armature in a drill press. The gap between commutator segments is carefully cleaned with a toothpick. The bearings are examined for wear: there should be no side play. The motor is then re-assembled, with a drop of Tri-flow gun oil on each bearing.

The Lysaghts' only motor modification is the now common practice of soldering the brush leads directly to the endbell. This is worth a few hundred rpm over the standard tag and screw fitting.

Emptying and Filling the tank

The tank, in the case of an electric buggy, is, of course, the battery. What we are all trying to achieve is a completely full tank; if possible an overfull tank! We all have our own theories as to how this can be achieved. The only sure thing is that we have a lot more to learn. With John Lysaght's experience and travels he's learnt more than most, so take particular heed to what follows.

Charging procedure was mentioned under Chargers, above, but before the tank is filled it must be completely emptied. As soon as the last race is over, a resistor is placed across the battery terminals. A 33 Ohm ceramic is

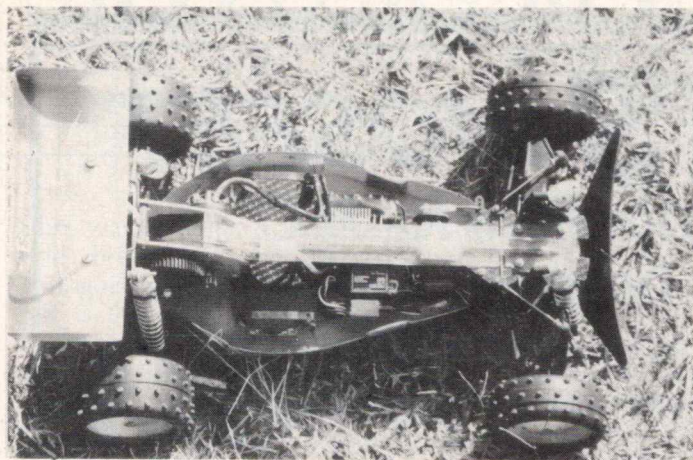
common, although the Lysaghts use a halogen light globe. Once home, all packs are stored in the fridge until next race day. On the day of use the packs are taken from the fridge and placed straight into a foam cooler (esky), together with an ice pack. This may be one of the proprietary ice gells, or simply frozen water in a sealed plastic container. At the track the cold battery packs are quickly charged to peak voltage. A few minutes before being required for the race the chosen battery is charged to the recommended temperature (about 45 degrees for normal Sanyo SCRs) then placed straight into the CAT.

Car Set Up

Some of the following applies solely to the Schumacher car, but much of it is worth remembering for all buggies.

The Lysaghts run full four wheel drive on the integrator at all times. The front diff is also set fairly tight. I checked the drive action on their car and, despite these settings, found all three ball differentials to be very smooth and free. The secret is to clean the drive train parts regularly, and to replace the 3 mm diff balls frequently. Also, John faces the steel diff plates by rubbing them on fine emery paper until they are perfectly flat and smooth.

In the suspension and steering departments they run one turn of toe out on the front, and one turn of toe in on the back wheels. The CAT wishbones can be placed in any combination to alter suspension geometry, and the Lysaghts usual settings are: front - left B over A, right A over B; rear - left B over B, right A over A. For most tracks the rear stabiliser bar is removed, and mounting positions for shock absorbers and stabilisers are as the positions found best in the examples given in the



The Lysaght Team's CAT is always neat and clean. Note small Futaba receiver, Nosram controller and new carbon fibre chassis. MG pic.

Schumacher handbook. In other words, nothing radical.

They run 30 weight oil in the shocks, but may go heavier on very hot days. Front springs are standard, but rears are Associated gold.

Holes are drilled in the wheel rims to let the tyres breathe, but these are taped over on bumpy tracks to help absorb the potholes. You can't do that if you put holes in the tyres. Troy also rotates the tyres (it's OK to have the brand name on the inside) to optimise grip and wear.

Driving Technique

At the top level of competition there is really little to choose between the cars. Maybe 50% of winning is having the right machine and 40% is in the driving. You could argue that the other 10% is luck, or that you make your own luck.

Forty per cent is a big factor, so I asked the Lysaghts for any hints on driving technique. They came up with three key elements: smoothness, care and consistency.

Smoothness. "Squeeze the throttle as if you're milking a mouse," says John. Accelerate your throttle finger at the same speed as the car; any faster on the trigger only wastes energy. Likewise, spinning tyres waste energy. Try and drive at a constant speed, since braking and acceleration use more battery.

Care. It's no good being the fastest car between prangs! Avoid obstacles like the plague. It is better to actually come to a stop to avoid a crash than to get involved in an incident which wastes more time and could cause damage.

Consistency. This is the old Hare and Tortoise theme. You might not have quite the fastest car, but by concentrating on the best possible line repeatedly lap after lap, you can beat the other bloke (providing that he doesn't read this article too, of course!).

And there you have it: all the 'secrets' of Team Lysaght. No-one said it was easy: just like any other sport, you have to work to get to the top.

Oh yes; at ORRCA Cup round four, Troy placed seventh in the Unlimited A Final. He didn't have any excuse except falling off his bike and being concussed for two hours the day before. Radio interference in the final probably didn't help much either. We all suffer the consequences of the 10% luck factor, but best of luck to them in the future, and thanks Troy and John for the interview.

PRODUCT NEWS

A QUICK CHARGE

by Peter Johns

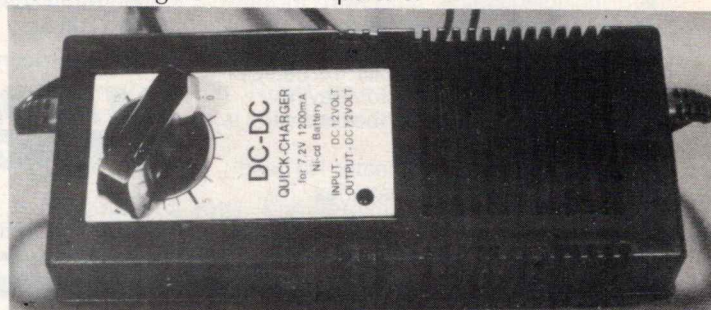
The variety of nicad fast chargers on the market these days is quite confusing, especially for newcomers to the sport, with prices ranging upwards from about \$50.00.

Model Engines of Richmond in Melbourne has introduced a clockwork charger to its range. It's a cheapy, ideally suited to the beginner as an alternative to the quick charge leads which come with most buggies.

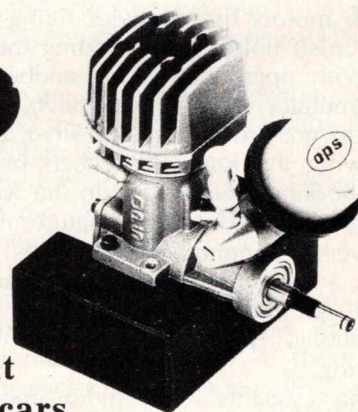
This charger is very simple. It connects to a 12 volt DC supply, the nicad is plugged onto the other end, and charging is timed by means of a 15 minute clockwork timer. A disadvantage of this type of charger is that it's difficult to get a 100% capacity charge, however, it is ideal for the beginner.

A warning is necessary, however. Never leave a battery charger unattended while it's charging. Any charger can jam, leaving you with a battery which might overcharge, with explosive results! (See the last couple of issues of this magazine for details of what happens when a nicad overcharges!)

Your local hobby shop should be able to get you one of these chargers from the importers.



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NICAD DISCHARGE TESTS

Mel Gillott performs some practical tests to check the differences between batteries and charging methods.

Much has been written about getting the most out of nickel cadmium batteries. After having read and heard many opinions, the best conclusion that I could come to was that there are many conclusions. This is not too surprising when you consider the number of different types of cells available and the conflict between the manufacturers' recommendations and what we actually do to them. To further compound the problem, things are changing almost monthly, with new technology and new discoveries relating to charging. No wonder the newcomer to electric buggy racing is confused.

This article will try not to add to the confusion or the array of mis-information already rampant, but will explain the present situation using some actual tests. What is the best method of charging? The best way to store nicads? The difference between SCR cells and the rest? Please read on

The Batteries

All batteries tested were 6 cell, 7.2 volt, sub C size. Before charging for the tests all had been kept cool and discharged to zero volts by placing a 33 Ohm ceramic resistor across the output.

Test Method

Computer programmes are available for automatically plotting graphs whilst the battery is discharging. Also, battery analysers can be bought that give capacity as a percentage of nominal. I don't have either, so all testing was done manually. This at least gives full control of each test; but it is time consuming.

Charging was done with either a Century Systems Thermal Cut-Off or the Timer Charger described in D&T No. 1. Immediately after charging, each battery was loaded with resistors to give a discharge current of approximately 1.2 amps, or 1200 milli-amps. Since all our batteries are rated 1200 mAh, in theory they should take one hour to discharge under this load. After loading, the stopwatch was started and the battery pack voltage monitored with a digital voltmeter. Readings of voltage were taken at regular intervals of time, and the results recorded. A total of 17 tests were performed on 10 batteries.

It is obvious that our batteries are loaded to more than 1.2 Amps in practice. For a pack to discharge during a 5 minute race, the average current would be about 14.5 Amps, and for a 6 minute race it would be about 12 Amps. However, a study of manufacturers' literature shows that the discharge characteristics do not change greatly with load, so the results of our tests should still be meaningful under race conditions. Just compress (divide) times given here by a factor of 12 for 5 minute or 10 for 6 minute races. For example, a pack that holds on for an extra 4 minutes (240 seconds) in the test can be expected to last an extra 20 seconds in a 5 minute race (i.e. 240 divided by 12), or 24 seconds (240 divided by 10) in a 6 minute race.

Nicad Characteristics

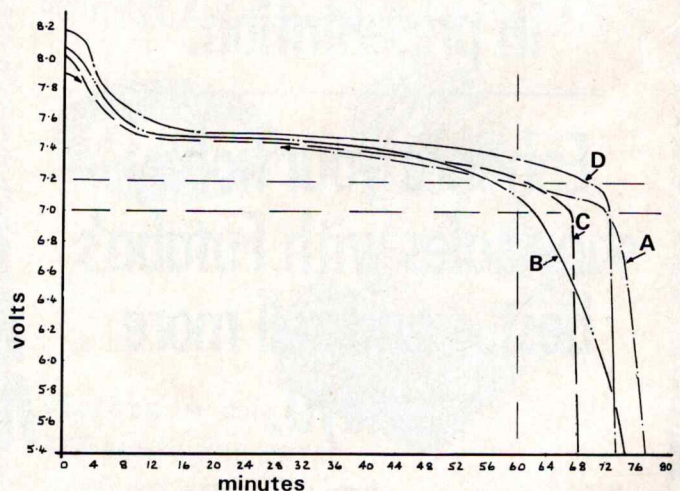
Be patient. I know that you're all itching for the test results, but before that some education on the discharge characteristics of nicads will help the uninitiated to interpret the results.

Please take a look at the accompanying graph. This plots time against voltage as the battery pack is being discharged at 1.2 Amps. Four actual test results are shown. The general shape of the curves is typical for all nicads under discharge. Voltage starts above the nominal (which is 7.2 in our case), falls quickly to just above nominal (that's why your car goes slightly faster for about the first lap), then falls only slowly until near the end of the charge. What happens then depends upon the type of cells and how well they are matched in the pack.

Curve A is a typical shape for most packs. The battery dumps (loses all the rest of its charge) in about 4 minutes, which under race conditions would allow about one lap between the car slowing down and grinding to a halt.

Curve B represents a pack that is not giving its all because the individual cells are poorly matched. Some are hanging on for quite a while after 60 minutes, but the extra capacity is wasted. If you have a pack that starts to dump early but then the car continues to run slowly for many more laps, its discharge curve would probably look like this. Not likely to win races.

Curve C is typical for matched Sanyo SCRs. Once they start to dump the voltage falls rapidly in a very short time. Your car will stop in 20 seconds or less after starting to dump. This means that battery power is being used most effectively, but it doesn't allow much margin for error in motor and gearing selection, or indeed, driving technique.



NICAD DISCHARGE CURVES - 1.2amp load

I would now like to make a personal comment regarding SCR versus other cells. The Sanyo SCRs are currently the flavour of the month, but I believe that their reputation is over-rated for our use. They are used exclusively in model aeroplanes to give top performance, but the aeromodel motors are often much more powerful, and the motor run much shorter than ours. In other words, they are demanding that the battery give up its charge much more quickly than we need. SCRs are ideal in this situation because of their low internal resistance. In theory, at least, the SCs, SCFs and their equivalent can

easily provide the watts needed for our use. On the other hand, the SCRs are capable of being charged to 45°C or more, against 35° max for other cells. The extra capacity thus gained with SCRs must therefore be weighed against the sudden death dumping of these cells. This, I believe, is the only consideration in the choice of SCRs or other good packs. Just to complicate things slightly, our tests will show that a good non-SCR battery can dump almost as violently as matched SCRs.

The Tests

Not all the tests conducted are worthy of mention here, so I will comment only on the most significant. In the following I will give the type and condition of the battery, charging method, and a table of results for voltage at various times into the discharge. Current draw (load) is also given three times for each test. Note that this falls also with time. Finally, a percentage of nominal capacity is computed. This is worked out by comparing the time the pack takes to fall to 7.0 Volts with the rated time of 60 minutes. An adjustment has been made for the average discharge current, which is actually slightly less than the nominal of 1.2 Amps.



Some of the batteries tested; from left to right: SR, home SCs, Tamiya Racing, Plessey blue and red, home SCRs, selected SCRs and Technicad Pushed.

CONCLUSIONS

I hope that the above explanations and a study of the test results will help to clarify the nicad situation. I am loathe to put too many interpretations on these results for fear of creating more rumours than already exist. However, certain facts do emerge. Based on the test results I would say that:

1. All packs should be stored with a 33 Ohm resistor across the output, and kept cool.

2. The voltage reading at the end of the charge, or at the start of the discharge, is no indication of the performance potential of the pack.
3. Slow charging (followed by a discharge) may help to restore some capacity to a poor battery, but it will not fill a battery to capacity as well as quick charging will.
4. Sanyo SCR packs offer increased capacity providing that you know how to handle them. Charging up to a temperature of 45°C and running whilst hot offers noticeably more performance than at lower temperatures.
5. SCRs benefit also from being very cold before charging, but not so other types of cells.
6. Under load, SCRs drop off very quickly at the end of their discharge (see graphs) whilst other types take a little longer. However, the difference can be quite small with the better-performing non-SCRs.
7. Pushed packs really do have a higher capacity.
8. The stated capacity of a pack is only nominal. It is pointless calling for the banning of Sub-C packs rated over 1200 mAh, since this would apply to just about all batteries.
9. It is possible to find a cheap nicad pack that performs as well as the most expensive; if you're lucky!

These tests were not comprehensive. I would have liked to perform more experiments with charging in very low temperatures, charging with pulsed and constant current chargers, and testing other cells such as the Nosram high energy and the Laser packs, but time and finance were against me. As it is, I hope that the tests have filled a gap in the knowledge of some readers.

TEST 1:

Battery: Plessey in blue shrink wrap with white end covers.

Approx. no. of previous cycles (charge and discharge): 70.

Charge method: Slow (110 mA) to just over peak voltage.

Time

(mins):	1	4	6	8	10	14	30	50	60	62	64	66	76
Volts:	8.05	7.80	7.50	7.58	7.54	7.51	7.46	7.29	7.13	7.00	6.86	6.68	4.06
Amps:	1.24						1.11		1.05				

Capacity: 97.3%

Comment: This was an old pack that is now used only for practice (see curve B). It had just been slow charged and discharged several times to try to improve capacity. This had some success as it was then nearly up to nominal.

TEST 2:

Battery: SR (USA), originally rated at 1500 mAh.

Previous cycles: 80

Charge method: Slow, then fast to just warm.

Time (mins):	1	4	6	8	10	14	30	50	60	62	64	66	72
Volts:	7.70	7.58	7.51	7.50	7.48	7.47	7.40	7.24	7.09	7.04	6.76	5.84	3.90
Amps:	1.17						1.11		0.65				

Capacity: 87.0%

Comment: Another clunker. Similar results to test 1, but pack must have more internal resistance, hence less current draw. Note original rating. This was a good battery when new, but is now over the hill.

TEST 3:

Battery: Tamiya Racing (black).

Previous Cycles: 10.

Charge method: Fast to just warm.

Time

(mins):	1	4	6	8	10	14	30	50	60	63	66
Volts:	8.00	7.81	7.73	7.69	7.73	7.58	7.50	7.33	7.17	7.05	5.04
Amps:	1.23						1.13		1.10		

Capacity: 100%

Comment: A new battery that should improve with more use. Note that current draw remained high in comparison with previous tests on old packs. A good pack for Stock Class.

TEST 4:

Battery: Sanyo SCs. Home-made pack; not selected.

Previous Cycles: 25

Charge Method: Fast to just warm.

Time:	1	4	6	8	10	14	30	50	60	65	66	68
Volts:	8.26	7.97	7.80	7.72	7.69	7.60	7.53	7.42	7.28	7.18	5.30	4.60
Amps:	1.26						1.13		1.11			

Capacity: 104.5%

Comment: Quite a good pack; used regularly in Stock. I made up two of these packs from cells bought individually. The other pack is poor: it dumped in less than 1 hour.

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TEST 5:

Battery: Same as for test 4 (above).

Previous Cycles: 26

Charge Method: Fast to very warm (37 degrees) with engine running.

Capacity: 100.5%

Comment: No advantage in peaking this pack to a higher temperature.

TEST 6:

Battery: As for Tests 4 & 5.

Previous Cycles: 27

Charge Method: Pack placed in freezer for 24 hours then charged as Test 5.

Capacity: 101.9%

Comment: No advantage. Normal SCs not affected by temperature charging.

TEST 7:

Battery: Selected Sanyo SCRs.

Previous Cycles: 50.

Charge method: Initial slow charge then fast to peak voltage.

Time: 1 4 6 8 10 14 30 50 60 62 64

Volts: 8.17 8.00 7.74 7.60 7.58 7.56 7.47 7.38 7.24 7.18 4.83

Amps: 1.24 1.11 1.08

Capacity: 97.7%

Comment: a known good pack of SCRs was deliberately charged only to peak voltage and gave only an average capacity.

TEST 8:

Battery: As for Test 7 (above).

Previous Cycles: 51

Charge Method: Fast to 45 degrees.

Capacity: 104.6%

Comment: See graph curve C. As expected, the SCRs responded to a temperature charge with increased capacity; equivalent to about 20 seconds more running in a 5 minute race.

TEST 9:

Battery: Sanyo SCRs; home-made pack, not selected.

Previous Cycles: 30

Charge Method: Initial slow charge then fast to 45 degrees.

Capacity: 84.4%

Comment: Poor result probably due to slow charge.

TEST 10:

Battery: As for Test 9.

Previous Cycles: 31

Charge Method: In freezer for 24 hours then fast to 50 degrees.

Time: 1 4 6 8 10 14 30 50 60 68 70

Test 10 continued opposite.

Test 10 continued.

Volts: 7.92 7.66 7.57 7.50 7.48 7.46 7.39 7.30 7.18 7.03 5.68

Amps: 1.18 1.11 1.09

Capacity: 106%

Comments: A surprisingly good result. These unmatched cells responded very well to extreme temperature charging. Is this what they mean by 'Pushed'?

TEST 11:

Battery: Plessey in blue shrink wrap with red end covers.

Previous Cycles: 80

Charge Method: Fast to just warm.

Time: 1 4 6 8 10 14 30 50 60 71 73

Volts: 8.19 7.89 7.80 7.70 7.64 7.57 7.50 7.41 7.35 7.14 4.55

Amps: 1.24 1.13 1.11

Capacity: 113.6%

Comment: See curve D on graph. We always knew that this pack was good, but we didn't realise that it was exceptional until this test, which was repeated twice to make sure. The pack is old and has been abused (before we knew better!) many times, but it still hangs in. I'm not sure what the cells are, but probably Sanyo SCF, although they have SCR characteristics. Other users report good results from these packs, which are now produced by Master Instruments.

TEST 12:

Battery: Technicad Pushed SCs.

Previous Cycles: 10

Charge Method: Fast to 25 degrees.

Time: 1 4 6 8 10 14 30 50 60 66 68 72

Volts: 7.98 7.78 7.67 7.60 7.50 7.47 7.41 7.22 7.12 7.00 6.79 5.76

Amps: 1.21 1.10 1.08

Capacity: 102.9%

Comment: The best capacity of the non-SCRs tested, except for the exceptional Plessey. But temperature is lower than the recommended with the pack instructions. Capacity should improve with more cycles.

TEST 13:

Battery: As Test 12.

Previous Cycles: 11

Charge Method: Fast to 45 degrees.

Capacity: 113.0%

Comment: Refer to curve A on graph. Second best result of all tests, but note that voltage is slightly less. Unlike normal SCs, the Pushed cells seem to respond to higher temperature charging; but like normal SCs they do not dump as quickly as SCRs: the best of both worlds. The Pushed SCRs should have more capacity again, but they were not tested. Wish I could afford them!

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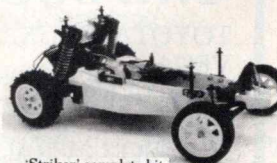
Horizontal blocks with adaptor plates for PB

Plugs into shock towers

1/10 SUPERSTAR



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'Striker' complete kit

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OTHER 1/10 SHELLS AVAILABLE: Peugeot 205 & wing; Metro 6R4; Ford RS200; Ford Escort XR3; Commodore; Range Rover; VW Baja; Ford T-Bird Wedge; Grub for Mini Mustang; Protech and Funco for RC10 etc; Dart for Hot Shot; Hornet; Mears and wing kit for Falcon; Meteor for Mardave Meteor; Progress for Fox etc.

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STOP PRESS: New 1/10 foam tyres with small I.D. holes to suit Frog, Hornet, etc.

"TWEAKED & DUMPED"

1/12 SCALE ON-ROAD ELECTRIC RACING

by Jonathan Borthwick

NEW ZEALAND NOTES

Readers of my Pitstop column in Airborne Magazine, which has now been incorporated into this column, will have heard of Ross Kiddie, from New Zealand. For a number of years now Ross has provided me with results of major New Zealand events and an update on how 1/12 is progressing in EnZed. Below is the text of Ross's letter, which effectively sums up the state of racing across the Tasman.

"Our Christchurch Club's membership has doubled over the last 12 months, so we are delighted. We seem to be getting a big spin-off from off-roaders, for whom there are three clubs that operate here. We now have 36 members, which is about as many as we had 5 years ago, before we started to struggle to keep members. We are pleased to have this resurgence; it gives us the ability to buy equipment that we've always dreamed about.

Unfortunately, the boom in 1/12 scale is confined to the South Island, with another 1/12 club operating in Dunedin doing well also. In the north they appear to struggle to keep electrics alive, whereas gas and off-roading are popular. Gas here in Christchurch has always been a struggle for the club. Although membership has picked up recently, our sister club just dawdles along.

To the subject of machinery: The 12L is here in full strength and is winning most events. All carbon fibre models, but a couple of glass ones are starting to get in the points, although well down. The 12i is still at the top of the table, with monoshocks and sprung front ends doing equally well. Japanese cars struggle on our tracks, and are not really competitive, although there are a couple of Plasmas trying hard. There has recently been an influx of Schumacher kits, but they have not had time to be sorted out, and have not made an impression yet. We are keen to see of the Mugen Super Tempest will arrive here. Judging by your reports it is an interesting kit."

As you can see, the situation is not all that different from ours. It would be interesting to see how some of our top drivers would go against New Zealand's top drivers. It seems that the Associateds are going well in both the 12i and 12L forms, and that the New Zealanders are following the Australian experience in recruiting a lot of 1/10 racers into 1/12.

Below are the results of the A Mains for the **1987 South Island Champs**, in both Can-Am Sports GT and Formula classes.

Can-Am

1. Mark Harling	Associated RC12i	TOJ
2. Terry Marshall	Associated RC12L	TOJ
3. Des Harris	Associated RC12L	Porsche 917
4. Peter Cox	Associated RC12L	Skoal Bandit
5. Darryl Marshall	Associated RC12i	Lancia
6. Dave Harris	Associated RC12L	C100
7. John Crerar	Associated RC12i	Porsche 956
8. Warrick Meffan	Associated RC12i	Sorbello

Formula One

1. Mark Harling	Associated RC12i	Ferrari
2. Terry Marshall	Associated RC12L	Lotus
3. Peter Cox	Associated RC12L	Ferrari
4. Des Harris	Associated RC12L	McLaren
5. Ian Barnard	Associated RC12i	Ferrari
6. John Crerar	Associated RC12i	Ligier
7. Daryl Marshall	Associated RC12i	Brabham
8. Dave Harris	Associated RC12L	McLaren

It sounds as though Mark Harling is one driver who could cause a few problems if he ever made it over here. It is also interesting to note the wide range of body styles used, unlike in Australia where all we ever see are Toj bodies.

As for the New Zealand idea of running Formula One as well, I think that our system of running only Sports GT (their Can-Am class) with a best two of three finals is better. For those fans of ancient history, our Nationals used to be comprised of three events (four in 1982!), featuring sedan bodies as well, all in a two day event. This really restricted set-up time and the number of heats possible. I think that our way of running three rounds for the first day then re-seeding for a second day of three more heats, with the best single heat (of the six) determining qualifying order is the best system.

LIVING WITH ASSOCIATED'S RC12L

I suppose that the car of the moment would have to be Associated's RC12L. As the World and Euro Champs winner, this is a car that was welcomed to Australia, and has proved to be a winner already, with victory in the first major carpet race in this country (see last issue).

The Associated RC12L, whether in fibreglass or carbon fibre guise, is a very 'user friendly' vehicle, which offers the driver a perfect tool for ensuring the best possible performances. That is not to say that the concept of the RC12L is perfect, however, by looking at other cars, the engineers at Associated have come up with a race car which is a successful compromise between performance and the fiddle factor that many find abhorrent about our sport.

Assembly is a little tricky only as far as assembling the T-pieces. However, once completed, maintenance is an easy matter. By far the biggest on-going hassle concerns strapping in the saddle packs. With Corally and Schumacher now using the saddle pack idea (along with Delta and Parma), this problem is not exclusive to Associated. The person who comes up with a quick, easy and reliable means of holding the pack will be very popular. While battery straps are all right for club racing, where packs have to be changed in a hurry, I cannot recommend their use in a major event where the end result could be influenced by a silly thing like a strap coming off or a wing falling out. Basically, anyone who is serious about racing will allow something like that to happen only once.

straps that we used on the Associated RC12i. My pack fell out once because I didn't do the straps up tightly enough. Since then it has been fibreglass strapping tape all the way. A lot of people have trouble getting this stuff which is really necessary for today's racers. It is great, not only for holding batteries in, but also for holding down steering servos, repairing bodies, and even holding down errant tarpaulin flaps on a windy day! In short, invaluable! If you are having trouble finding a supply, let me know and I will try to help.

Back to the Associated RC12L. I have been running this car for over 12 months now. Most of this has been on carpet, as this is where the car is in its element and at this time almost unbeatable. My testing on bitumen has been limited, owing to a restricted testing and race program, and the fact that carpet racing has spoilt me for any other type of racing. With a bit more testing, I am

sure that the car, whether fibreglass or graphite trim, will be as competitive as anything else around, particularly on a high traction circuit.

Anyway, now that I have you salivating for more, I will leave you in suspense for the full review next issue. However, we will now have a close look at another car that was very successful in 1987.

1987 QUEENSLAND 1/12 SCALE STATE TITLES

The weather was hot and windy for this event, held November 22 at the Gold Coast track, site of the 1986 Nationals. The event looked set to be a major tussle between Rick Bartolozzi, Jonathan Borthwick and Barry Corfe.

PRACTICE

Saturday was set aside for practice, and it was hot. Barry Corfe, Jim Cameron and I set about sorting out our RC12Ls with fibreglass chassis. This was only the second time that I had run this car outdoors, and the first time for Corfe and Cameron, so we had plenty of work to do. Another person trying to make sense of the whole thing was ex-Queenslander, Rick Bartolozzi, who was running his saddle packed Schumacher C Car for the first time.

QUALIFYING

Sunday was as hot as Saturday, with extremely strong winds threatening to blow us off the drivers' stand. In the first round Borthwick cleared out, but continually ran into problems with traffic, and then dumped, so this was a win to Bartolozzi.

In round two the big surprise was Rodney Best, who moved his Schumacher into second qualifier position behind Bartolozzi's Saddle Pack C Car, which confirmed the top qualifier spot with a very fast 33 lapper that was not bettered.

Borthwick turned in the only 33 lapper in round three, to move back into second spot. Best remained in third, while Trevor Kerr finally showed some of his potential to have his RC12i in fourth spot.

Graeme Day top qualified the B Main from an eager field, as well as taking yet another Concourse trophy with his nicely detailed Kyosho.

FINALS

First up was the **C Main**. Unfortunately, due to retirements (heat exhaustion??), only three cars fronted. Cameron Ellwood drove his Associated RC12L to a good win from Stephen Humphries, with a luckless Gavin Ward third (Parma). These guys were all running in their first major 1/12 scale race, and showed a lot of potential, as well as learning a lot, which is one aspect that a lot of people overlook with this type of event.

In the **B Main** Graeme Day got away to an early lead while the rest of the field sorted themselves out. What happened after that is hard to say, as I was lap counting, however, at the end of eight minutes Graeme's Kyosho crossed the line a mere car's length behind Peter Scott's Associated RC12i, which must have crept up on the leading Kyosho. Graeme was surprised that he hadn't won, but showed himself to be a good sport by accepting the result.

Three **A Mains** were run, with the best two results to count. From qualifying it was obviously going to be a battle between Bartolozzi and Borthwick, and that was the way that it worked out. In all three finals Borthwick hounded the Schumacher driver, making numerous attempts to get past, and getting knocked around a fair bit for his trouble.

In the first leg he had about five attempts to get past, and each time he had the door shut on him, coming off the worst each time, so that his cells went away in comparison to Bartolozzi's SCR Sanyos. So Bartolozzi took the first win, followed by Borthwick, Corfe, Kerr, Enticknap, Ferguson, Canfield, Turner, Cameron and Best. The last two were very unlucky. Jim Cameron was the victim of the A Main crystal swap, and got shot down in all three finals, while Best had an almost unbelievable misfortune. He picked up a staple in his motor which destroyed it and left him unable to compete in the last two legs. Both these drivers were capable of proving their qualities, so their retirement was a great shame.

In the second leg Borthwick finally got through, only to be hit hard by Bartolozzi, which left him a bit tweaked but still in the lead. Coming up to lap four cars engrossed in their own battle, Bartolozzi lightly tapped Borthwick, which got them sideways. Borthwick got away first, only to be cleaned up by another car, and that was that, although Bartolozzi and Borthwick recorded the only 34 lappers of the weekend. Corfe, who seemed to struggle all weekend, came in third.

The third leg produced a similar result to the first two, so once again Rick Bartolozzi is the Queensland State Champ with his Schumacher, at a meeting featuring some terrible weather but some good racing, which should be great for 1/12 scale in that state.

RESULTS

A Main

1. Rick Bartolozzi	Schumacher C Car
2. Jonathan Borthwick	Associated RC12L
3. Barry Corfe	Associated RC12L
4. Ross Enticknap	Kyosho
5. Willy Ferguson	Associated RC12L
6. Trevor Kerr	Associated RC12i
7. Les Canfield	Associated RC12i
8. John Turner	Turner Special
9. Jim Cameron	Associated RC12L
10. Rodney Best	Schumacher C Car

B Main

1. Peter Scott	Associated RC12i
2. Graeme Day	Kyosho
3. Peter Wyman	Associated RC12i
4. Chris White	Associated RC12i
5. Mark Nicholson	Associated RC12i
6. Shannon Fry	Associated RC12i
7. Jason Wicks	
8. Alan McGilvray	Associated RC12i



Graeme Day with Concourse-winning Kyosho Palzma Mk2.

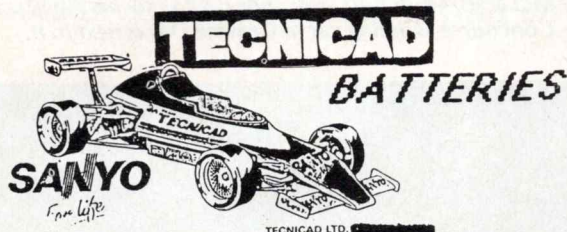
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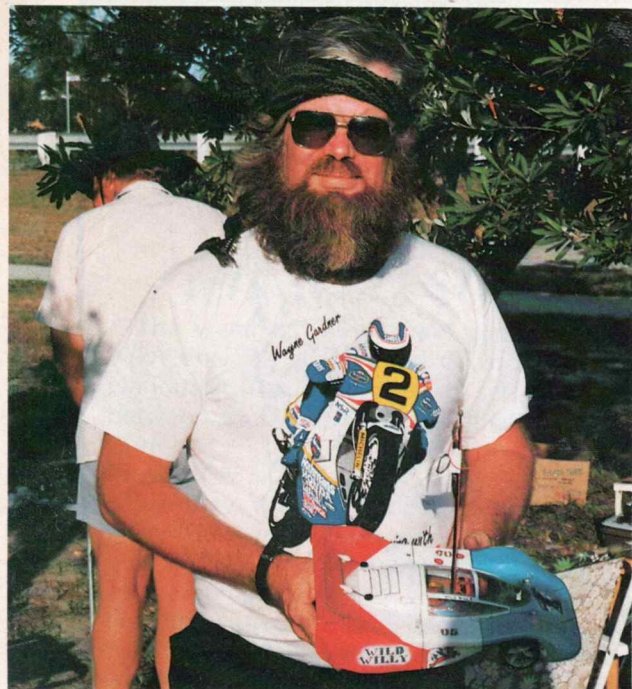
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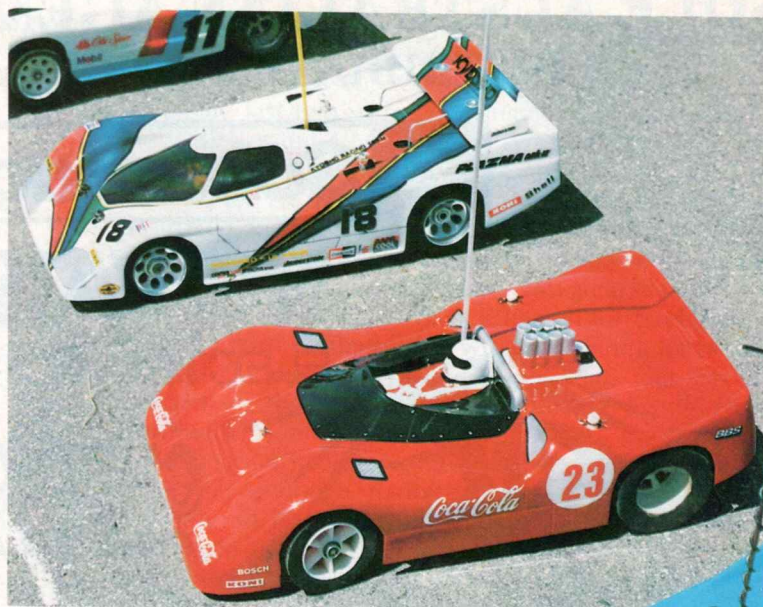
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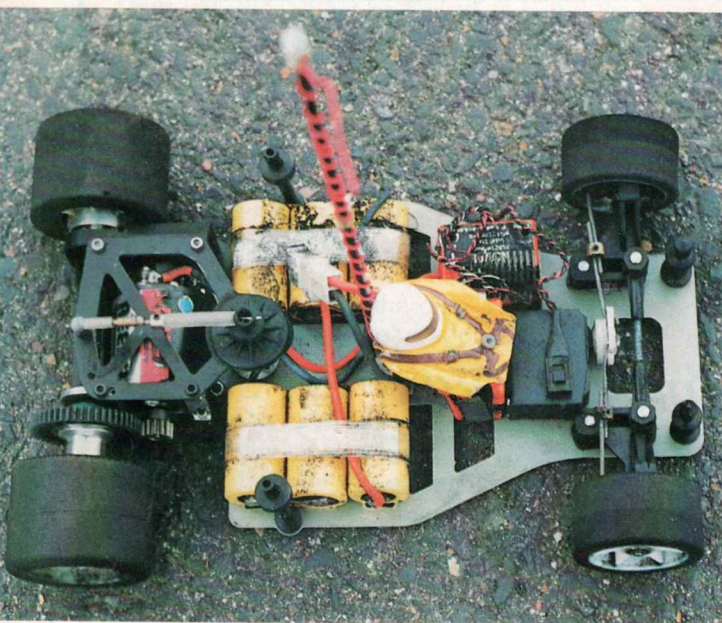
Queensland 1/12 Scale Snaps



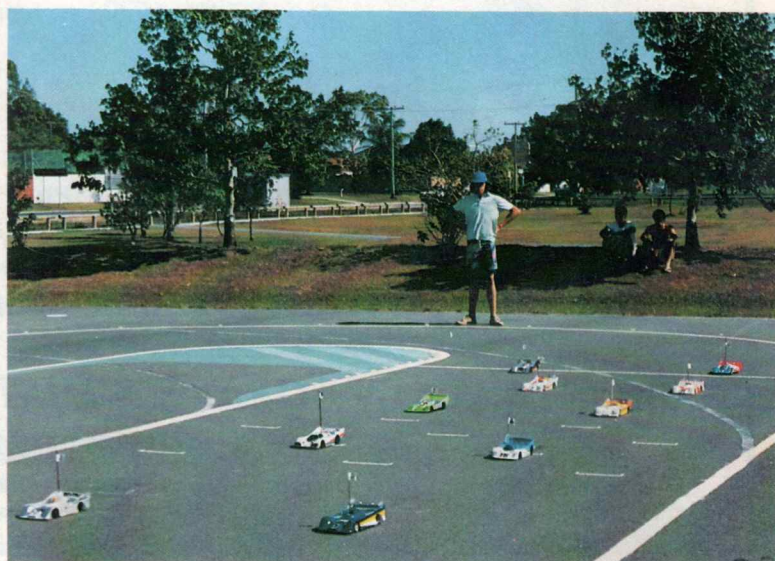
Willy Ferguson (wild Willy!) ran his fibreglass Associated RC12L with Schkee body, and got faster all weekend. 10th qualifier for the A Main; 5th after the three finals.



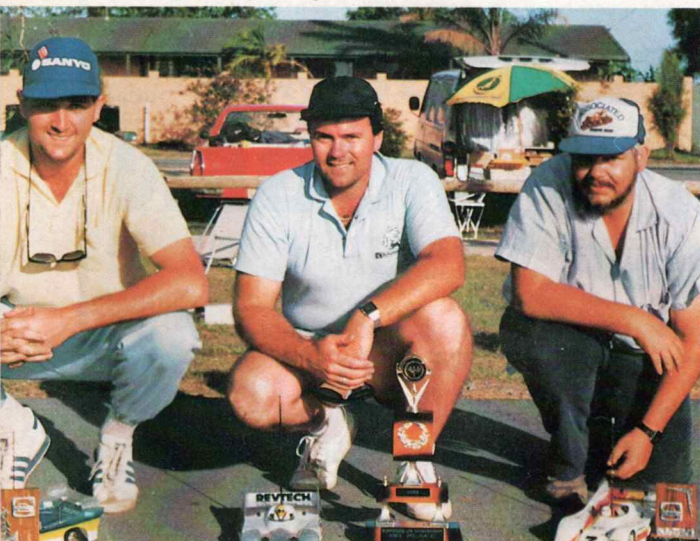
A different-looking entry. Stephen Humphries fitted this McLaren M6A Can Am body (#23) to his RC12i. Eventual Concourse-winning car of Graeme Day is next to it.



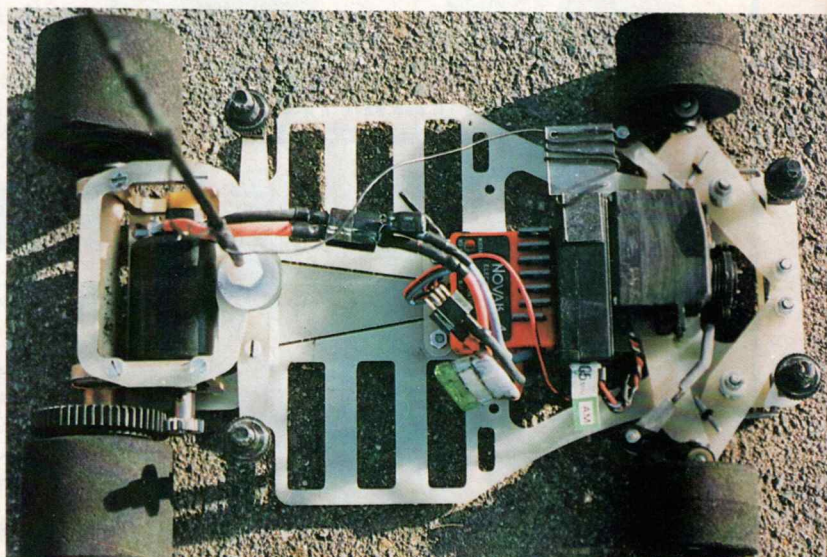
Barry Corfe had a weekend that he'd rather forget. First time out for his fibreglass RC12L netted him third place overall after qualifying in only 7th spot.



Start of the first A Main at the Qld. Titles, with Bartolozzi and Borthwick blasting off the front row. 10 cars made for exciting racing.



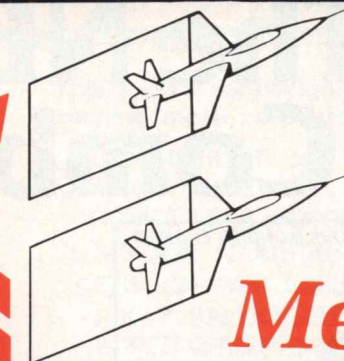
Top three at the Qld. 1/12 Titles, L to R: Jonathan Borthwick (2nd); Rick Bartolozzi (1st); Barry Corfe (3rd).



Rick Bartolozzi's Saddle Pack C Car had its first outing at the Queensland Titles. Was TQ and won the event overall.

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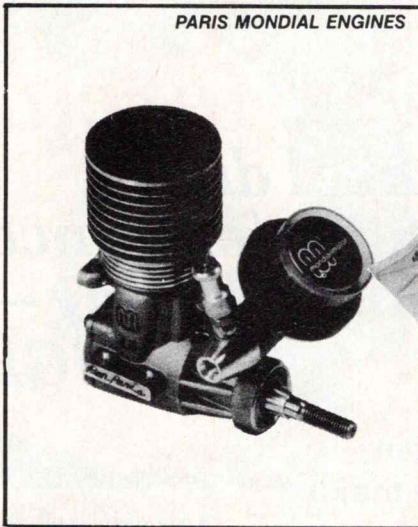
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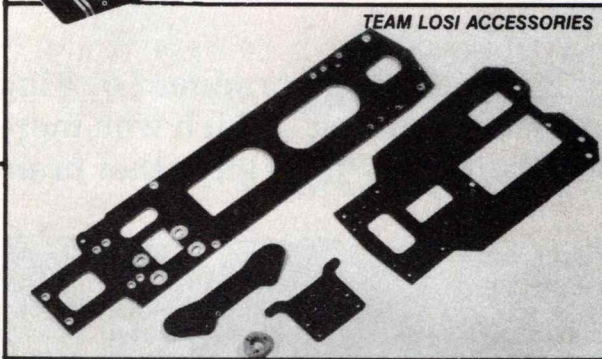
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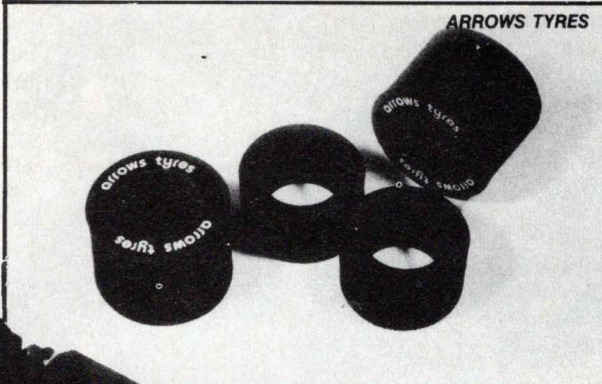
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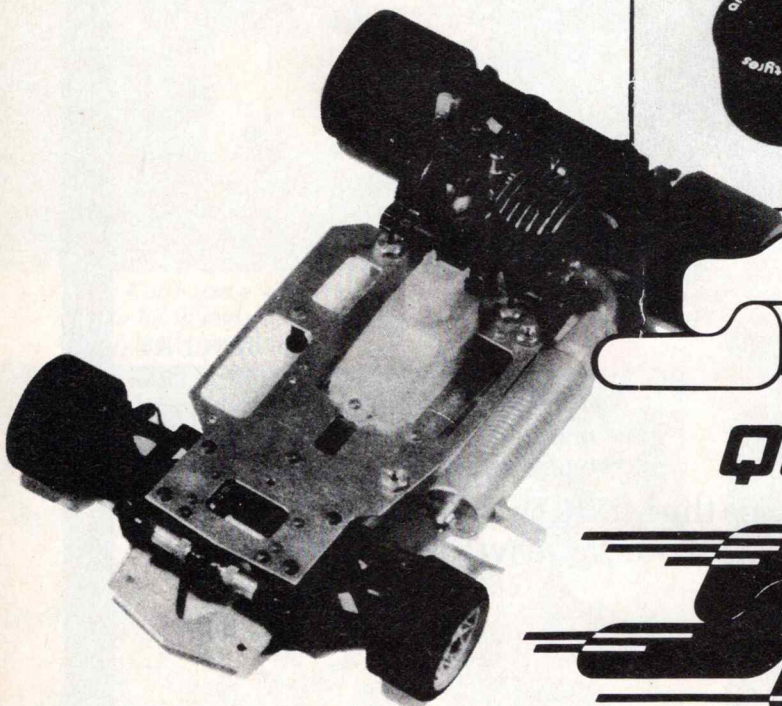


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			CHANNEL	Tx FREQUENCY	Rx FREQUENCY	COLOUR
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1.0	26.995	27.450	12	29.745	30.300	Yellow/Black
1.5	27.025	27.480	14	29.765	30.220	
2.0	27.045	27.500	16	29.785	30.240	Yellow/Brown
2.5	27.075	27.530	18	29.805	30.260	
3.0	27.095	27.550	20	29.825	30.280	Yellow/Red
3.5	27.125	27.580	22	29.845	30.300	
4.0	27.145	27.600	24	29.865	30.320	Yellow/Orange
4.5	27.175	27.630	26	29.885	30.340	
5.0	27.195	27.650	28	29.905	30.360	Yellow/Green
5.5	27.225	27.680	30	29.925	30.380	
6.0	27.255	27.710	32	29.945	30.400	Yellow/Blue
6.5	27.245	26.790	34	29.965	30.420	
			36	29.985	30.440	Yellow/White

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TACTICS 2X

A TACTICAL ADVANTAGE

by Warren Jansenn



A new wheel radio has arrived down under: the **STAR TACTICS 2X**. The outfit consists of a pistol-grip style transmitter, receiver, two S-402 servos, spare servo horns and mounting hardware.

The transmitter is well balanced and has a built-in charging socket so that nicads can be used, although a charger is not included in the basic system. Make sure that you never try to recharge any type of battery other than a nicad.

The highlights of the Tactics 2X system are as follows:

TRANSMITTER

- * Reversible control for left or right handed steering.
- * Break protection wheel - which involves the use of a special device to prevent the wheel mechanism from breaking if more force than the wheel can bear is applied.
- * Steering rate adjustment.
- * Wheel angle adjustment.
- * Neutral adjustment on the throttle trigger.
- * Servo reversing switches.
- * Level meter.
- * Available on 29 MHz Amplitude Modulation (AM).
- * Charging jack for nicad operation.
- * Crystal accessible on back panel.

RECEIVER

- * Size: 60 x 40 x 20 mm.
- * Weight: 48 gram with crystal.
- * Power requirement: 4.8 to 6 volts.
- * Current drain: 15 mA at 6 volts.
- * Range: 500 metres on ground; and up to 1000 metres in the air.

The Star Tactics 2X radio outfit from JR Remote Control consists of a wheel style 2 channel transmitter, a receiver, two servos, battery harness and mounting hardware.

S-402 SERVO

- * Control system: pulse control, 1310 microsecs neutral
- * Operating angle: rotary system; one side 45° or greater (including trim).
- * Power requirement: 4.8 to 6 volt (shared with receiver).
- * Current drain at idle: 8 mA at 6 volts.
- * Torque: 3 kg-cm.
- * Speed: 60° in 0.2 seconds.
- * I.C.: NE544
- * Size: 52 x 20 x 48 mm.
- * Weight: 48 gram.



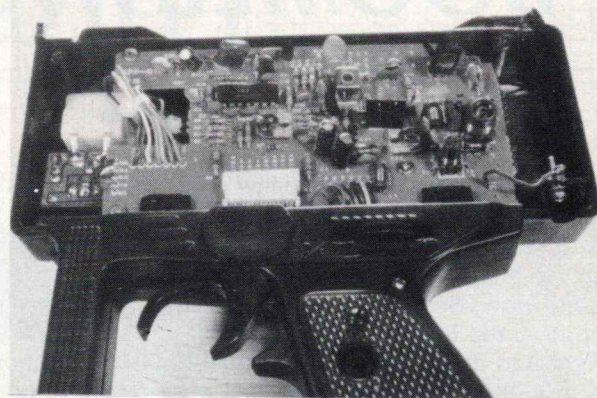
IN DETAIL

Clipped to the top of the transmitter is a seven-stage antenna which extends to 960 mm. The antenna screws into a socket on the top left of the transmitter unit.

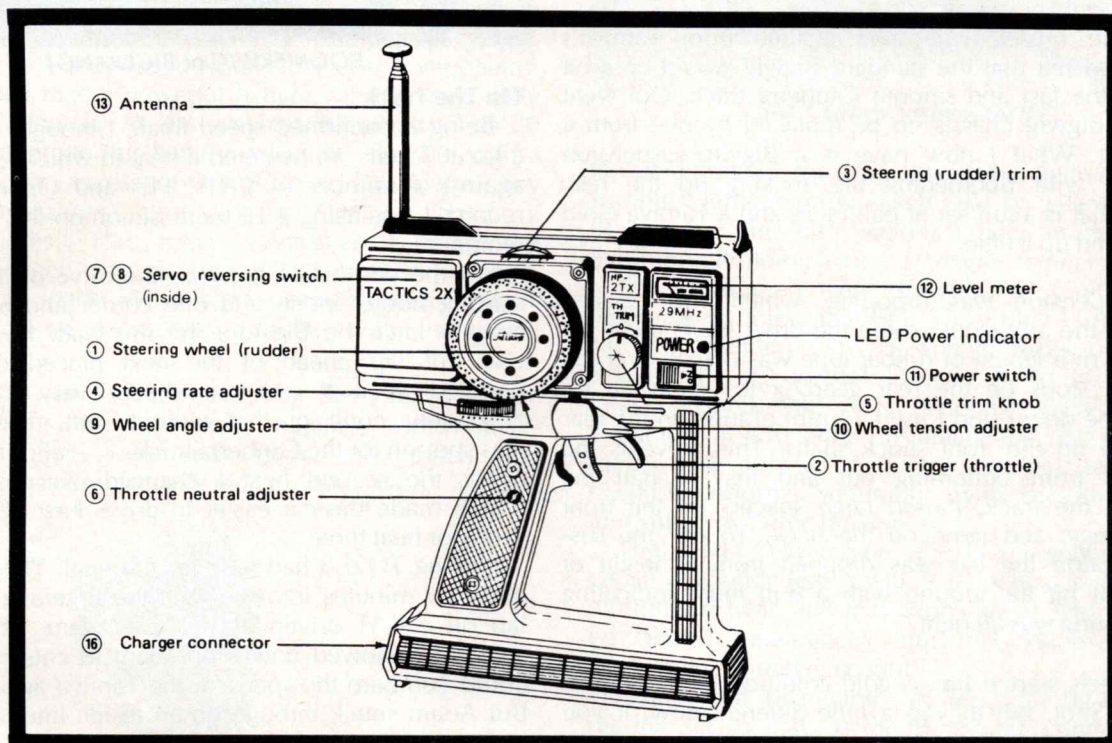
Immediately to the left of the wheel is a sliding panel which covers the servo reversing switches. Above the wheel is the adjuster for the steering trim, and below the steering wheel is a ratchet wheel which adjusts the steering wheel angle. The wheel angle adjuster allows a change in operating angle from 38° each way to 30° .

Below the wheel, and within comfortable reach of a thumb, is the ratchet to adjust the steering rate.

To the right of the wheel is the throttle trim adjuster, the power on-off switch, and the level meter.



The transmitter circuit board is well laid out, making service very easy, if it's required.



A panel slides out on the left of the transmitter to reveal the servo reversing switches.

On the pistol grip itself is an adjuster to change the throttle neutral position which enables easy setting up of braking positions. When the throttle neutral adjuster is set to position 1 the full trigger deflection angle is 40° . At position 2 the throttle throw is 27° , with 13° brake deflection, and at position 3 the throws are equal at 20° .

The battery compartment is located in the base of the transmitter, and can be fitted either with 8 standard AA cells, or with 8 AA size nicads which can be recharged. For ease of recharging with nicads the charge socket is built into the end of the battery compartment at the base of the transmitter.

Reversing this Korean-made radio for left-handed drivers is very easy. Undo two screws just above the pistol grip on the rear of the case, lift slightly, rotate, re-locate on the mounting lugs, and replace the screws.

CONCLUSION

The Tactics 2X is a relatively inexpensive wheel radio outfit which will suit most buggy and car drivers. It has the essential features, but does lack the fine tuning adjustments of some of the more expensive rigs. The radio is well balanced, easy to set up and easy to use, as well as being of rugged construction.

BOOMERWIG or BIGERANG

by Bob Beniston

"Is this Tamiya's latest buggy?" you ask. No; it's my new toy. I've been racing RC cars for 11 years now, and this just has to be the most predictable and easiest buggy to drive that I have ever had.

Until now, Scott Blair, my son Adam and I have been running three identical CATs. We all know that the CAT is light and that it takes a fair amount of concentration to get it around the track, but it's a successful buggy. I enjoy driving the CAT, but I also wanted to enter the Tamiya Challenge, so I wanted a Tamiya car which would work OK. Enter the Bigwig from my sponsor, Woden Model Shop.

From the outset I deviated a little from Tamiya's original, as I felt that the standard Bigwig would be a bit heavy for the fast and smooth Canberra track. Out went the entire Bigwig chassis, to be replaced by one from a Boomerang. What I now have is a Bigwig suspension and body, with Boomerang bits making up the rest. Added to that is a full set of ball races and a Tamiya Gold motor wound up a little.

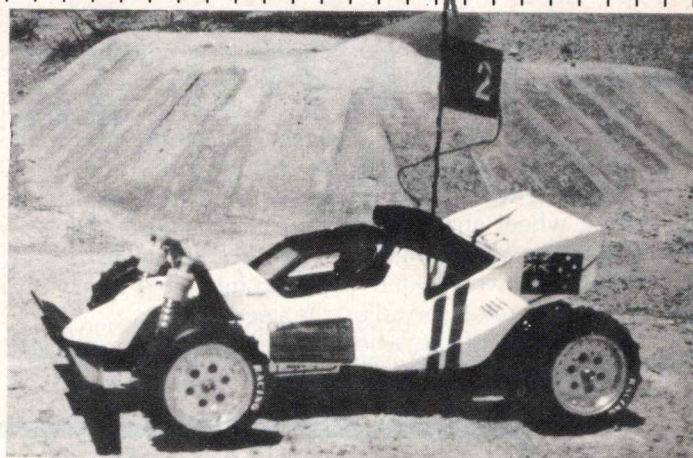
Problems

The suspension was drooping, which was causing friction on the axle cups where the drive shafts meet. To fix this a 5 mm length of rubber tube was placed over the suspension stops on the rear gearbox to act as an up stop. For the down stop I used 12 mm of tube on the rear and 7 mm on the front shock shafts. This prevents the suspension from bottoming out and leaving half the chassis on the track. I used large spacers on the front shock springs, and none on the back. To test the suspension action the car was dropped from a height of 300 mm. It hit the ground with a dull thud, indicating that everything was all right.

Trimming

The wheels started life as gold coloured, designed to fit the Super Shot, but they're a little different now. If you fill up Mum's nice new saucepan with hot water and a capful of ammonia, put the wheels in and let them simmer for 5 minutes then rinse under the tap, you can serve up nice chrome-plated wheels. The gold comes off!

The Bigwig body was painted in Model Shop colours, KO radio and 7 cell pack were installed, and off to the track for a run.



BOOMERWIG or BIGERANG?

On The Track

Being a confirmed speed freak, I thought that I'd have a go at 7 cells, so I entered a heat in which I was lined up against a number of CATs, PBs and Optimas. For the record, I was using a 15 tooth pinion on the Tamiya Gold motor.

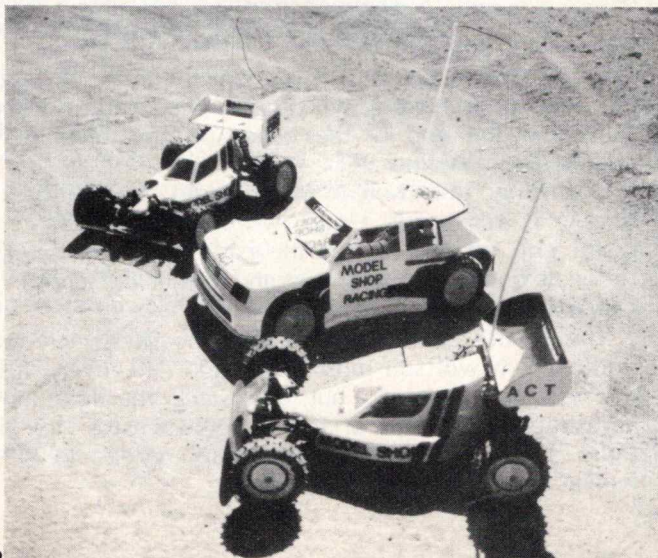
For the first heat I drew position five on the grid. The starting hooter went, and one corner and half the main straight later the Bigerang hit the lead. I won the heat one full lap ahead of the next placed car. The car handled as if it was on wheels; very forgiving, and absolutely none of that tail-out stuff. The suspension was spot-on for the Canberra track.

For the second heat I changed over to CAT tyres, which made the car easier to drive. First again; and the same for heat three.

Having TQ'd, I had pole for the final. The hooter went and two minutes into the race the Bigerang had $\frac{3}{4}$ of a lap on a CAT driven by my son Adam. At heart I'm a softy, so I slowed down for Adam to catch up so that I could compare the speed of the Tamiya against the CAT. But Adam snuck through on an inside line; and that was it.

Results

On its first run on the track this Tamiya composite took three heat wins, a TQ and a second in the final: not bad for a buggy made from two. I just hope that there aren't similar cars around at the Tamiya Challenge.



3 Model Shop C.A.T.s (all 7 cell). We are all rev-heads!

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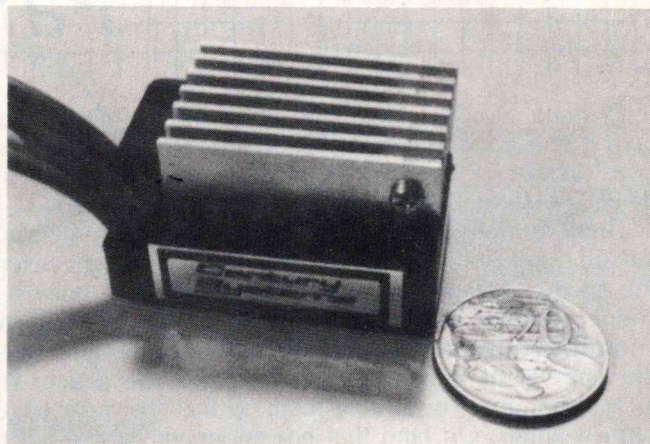
Testing the OZIFET

by Chris Young

After phenomenal success in the USA, Century Systems have now released in Australia their OZIFET, a low cost, high performance, full Mosfet speed controller for 1/10 and 1/12 scale cars. With Century Systems' manufacturing and service base readily accessible in the rural city of Bendigo, Victoria, buyers of the OZIFET and its forerunner, the MARFET, can avoid the all-too-common frustration of waiting for overseas parts and service, especially with Century Systems' policy of rapid service for their products.

It is now, as the Australian summer reaches its peak, that buggy racers need to come to grips with the really major difference between racing in Australia and in many overseas countries: HEAT. Competitive buggy racing places enormous thermal strain on components. In a modified race a powerful battery will discharge fully in just 5 minutes. At an ambient temperature of 20 degrees centigrade this battery will finish the race with a temperature in excess of 70 degrees. The motor may reach temperatures close to the melting point of soldered joints. The speed controller carrying the current between battery and motor also experiences large thermal loads. What is not generally understood is that FETs lose efficiency rapidly with increasing temperature.

In October, in Melbourne during the 1987 Victorian Championships for 1/10 scale buggies, some Mosfet speed controllers were seen to feel the pinch, and suffered considerable efficiency loss, with ambient



The Century Systems OZIFET.

temperatures in the low 20s. What will happen when summer temperatures reach 30, or even 40 degrees? (Remember the last Nationals held in the Melbourne Exhibition Building in near 40 degree temperatures?)

The Australian-made OZIFET is Century Systems' response to this challenge. The OZIFET under test was run in modified class 5 minute races outdoors in a Schumacher CAT, and indoors in an RC10 using the latest pushed MIP SCR batteries. With a whopping capacity of 550 Amp instantaneous maximum current load, and only 0.01 Ohms internal resistance, the OZIFET performs admirably, with smooth acceleration and subtle dynamic braking.

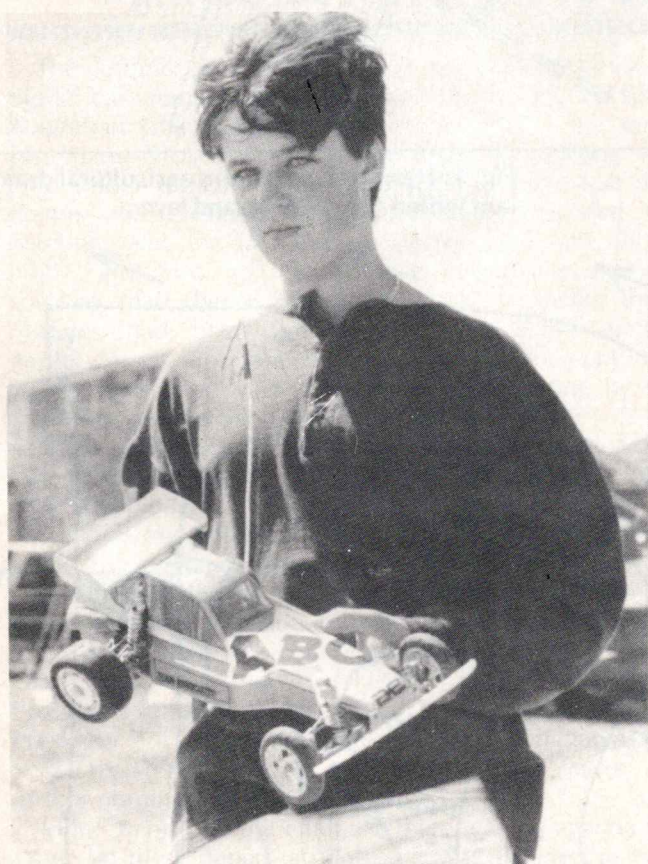
The OZIFET overcomes the high temperatures which cause efficiency losses with a large heat sink. The blocky aluminium heat sink may worry those who are concerned about appearances, but temperature control and performance are what count.

Adjustment for neutral can be a little bit finicky, but is readily set so that, as the Tx throttle control is released to its neutral position, there is a gentle braking effect. Moving the throttle to just the reverse side of neutral will activate a relay for emergency braking.

There is no reverse and no adjustment for full power; nor is this needed. Full power is set by a resistor and capacitor combination, which form the pulse stretching circuit, and provide full power as required.

The OZIFET is the evolutionary offspring of the MARFET, designed in England by Nick Marson in 1986 (Radio Race Car, July-August 1986 & Airborne Magazine, March-April 1987), and licensed to Century Systems. Nick used a well-proven design for the receiver voltage regulator, and both controllers will continue working after the battery is unable to drive the car. The MARFET was re-designed and upgraded for Australian conditions in just a few short months by the wizard research and development team at Century Systems, Gil Tipple and Rory Bell, who realised early on that they were onto something good. Sales commenced in the USA in late 1987 and outstripped production, delaying the OZIFET's release in Australia.

The OZIFET retails locally for \$170.00, and I'm told that trade enquiries are welcomed at Century Systems; 137-139 Mollison St., Bendigo, Vic., 3550.



The reviewer's son, Cliff, with the OZIFET power-controlled RC10, which out-performed the opposition at the inaugural "Thunderdome" in Melbourne, 1987.

1/10 Scale TRACK DESIGN

Part 2

by Les Bone

In issue No. 3 I gave my views on the design and layout of a good race track. I now move on to stage two: construction.

BASE DRAINAGE

There is nothing more annoying than preparing your car all week, only to discover that rain the night before the race has ruined the track. Good drainage, however, should remove all but the odd damp corner. Start by considering natural run-off in your track design. Keep the number of 'straights' that run across the natural fall to a minimum. Try turning them so that the track edges form a gutter. On land that has minimum natural fall to start with, consider importing bulk fill to increase its fall. (There are always builders about who are paying to tip excavated material. Ask; you may be surprised.) Note! If you have any choice at all in the type of imported material, try to get crushed rock; sand or loam based. These are readily compacted and act as a natural drain. Clay bases, on the other hand, are difficult to compact, and tend to settle over a period of time, as well as having very poor drainage qualities.

Given that you now have a block of land with a good cross fall, rolled and compacted, we move on to

SURFACE DRAINAGE

Depending on the finished track surface required, i.e. oil based or loose granitic sand, two types of surface drainage are possible.

The system shown in figure 1, used just below the surface and within the granitic topping material, works very well.

On heavily oiled surfaces that do not allow water to permeate, gutters must be formed. The secret with this system, however, is **not** to form gutters or channels on

the inside of a corner. Also, when the need arises for a drain to run across the track, try forming a jump at that point.

Figure 2 represents a fictitious layout using the best of the points raised so far:

- the track design complements the natural fall of the land;
- water is forced to run in channels around the outside of the track;
- where water is forced to cross the track it is 'hidden' by a jump.

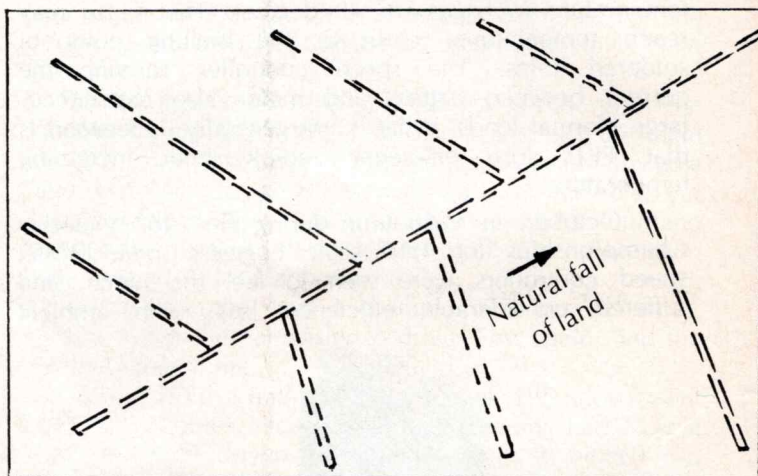
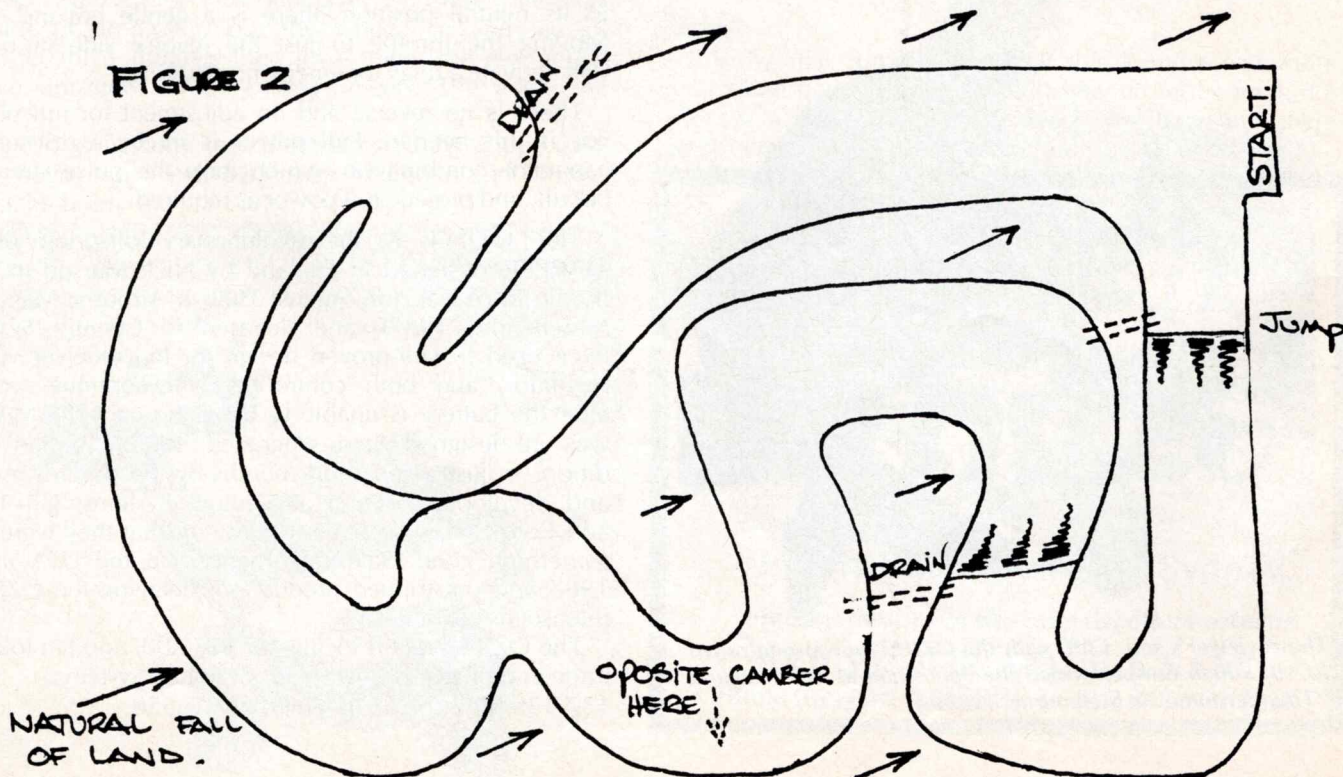


Fig. 1: Herringbone pattern agricultural drains laid within the granitic sand layer.



MATERIALS

Soil

I have driven on a few temporary tracks that were made simply by scraping off the grass and top soil. Providing that the sub soil is clay based, this material works, but only as a temporary measure. Corners wear very quickly, rain ruins race days because of the lack of drainage, and rough areas are hard to patch.

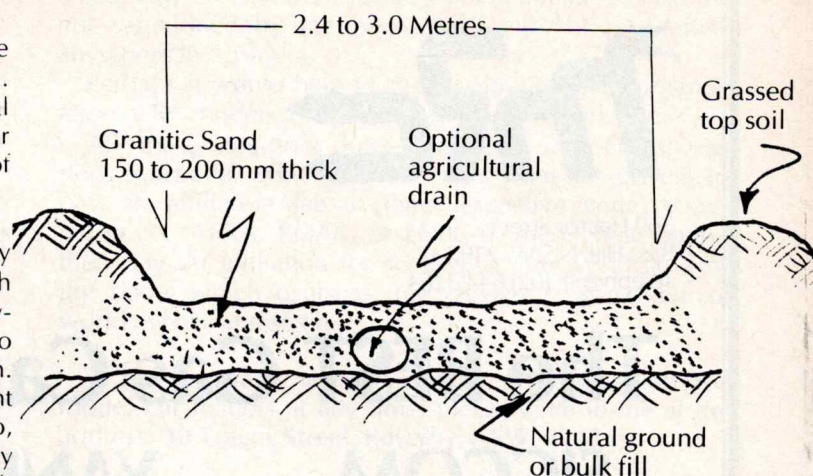
Topsoil-Cement Mix

A few clubs have used this method reasonably successfully. It provides a hard-wearing surface which can be rolled very flat. The construction involves rotavating the top soil then sprinkling cement powder into the soil. After rolling to falls it is then left to harden. However, it does have drawbacks. Unless the cement powder is spread evenly, soft patches appear, and also, after a while fine dust tends to make the hard areas very slippery. I believe that the Templestowe track, which used this method, is at present undergoing major reconstruction, mainly because of these problems.

Granitic Sand

This seems to be the most widely used material. It is relatively cheap, can be raked, rolled and compacted, and, because of its granular structure, allows water to permeate. It does, however, dry out quickly, and requires regular damping.

An alternative is the to lightly oil the granitic sand, or to soak the track surface in diesel. I say lightly oil because, although it does a fantastic job of binding the granitic sand, too much oil causes problems when hot weather makes it boggy. Remember, of course, that by oiling the track the granitic sand will no longer allow water to soak through. Surface drainage therefore becomes more important.



SECTION THROUGH TYPICAL TRACK

REMINDERS

To finish I would like to remind club committee members of a few things. The actual construction (manual work!) on a track is easy; the hard part is Council permits and grants, acquisition of land, finance, sponsorship, design and planning. A club of say 50 members would be lucky to have 10 turn up at a working bee (true?). Dare to be different. Try a new layout or surface; we've only got as far as we have now by learning from other clubs' successes and failures. Take the time to race on tracks other than your own. Not only will your driving skill increase, but you are sure to pick up some good ideas on track layout.

AUSTRALIAN ASSOCIATION OF RADIO CONTROL MODEL CAR CLUBS

The Annual General Meeting of the AARCMCC for all model car racing clubs in Australia is held at the 1/8 scale Australian Championships every year. This is the same system as is used overseas. This year the meeting was held under difficult circumstances due to the fact that neither the President nor the Secretary attended the meeting, plus the fact that no agenda was sent out to clubs, and also no minutes from the previous year's meeting had been issued to clubs, although these minutes had been prepared and forwarded to the Association's President by the outgoing Secretary last year. Some paperwork was sent to the meeting by the President, Murray Scott, through Rob Reade.

Tony Whitton took the chair and Colin Whitton did the secretarial work. The Secretary's Report was read and accepted. The President's and Treasurer's Reports had minor anomalies, and these will be corrected. It was noted that the three reports were unsigned.

It was decided at this stage to hold the election of officer bearers (President and Secretary-Treasurer) so that any further business could be carried out. John Grant, who is President of FEMCA, was nominated for President, and accepted, and Les Robinson, who is President of the NSWRCRCC, was nominated for Secretary-Treasurer, and accepted. There were no further nominations.

John Grant took the chair. As there was no agenda nor other business papers available, it was decided to continue with general business. Les Robinson instigated proceedings with comments on the 1988 Australian Nationals venue, stating that it was NSW's turn to hold

the event, as per the unwritten rule, and not Adelaide Hills, SA (both clubs has applied), and that a postal vote suggested by the immediate past-President should not be taken. The proposal that NSW hold the 1988 Nationals was made into a motion and seconded, and a vote taken. The result was ten votes in favour of the motion and one against; so NSW will hold the 1988 Australian Nationals.

A further motion was put, that Australia, although it consists of clubs in States and Territories, should have only one delegate per State and Territory to vote at the AGM. This delegate would be selected by state and territory clubs, to put forward their ideas, and to vote at the AGM. This motion was passed by unanimously.

The next motion put forward was to rationalise the order in which the States and Territories should hold the 1/8 Scale Australian Nationals; the order to be: 1987 Tasmania; 1988 NSW; 1989 WA; 1990 SA; 1991 Victoria; 1992 ACT; 1993 NT; 1994 Queensland. A further section of this motion was that, if the State or Territory did not wish to hold the event in the due year, all clubs could apply, and if more than one club applied a vote would then be put to the State and Territory delegates. The club that was successful would be notified accordingly. This would in no way alter the rotational system, and if it happened to be that State's turn the following year, this would still apply. This motion was also passed unanimously.

It was also proposed that a letter should be sent to all Australian RC car clubs to explain the situation that there is only one Australian body which is recognised by



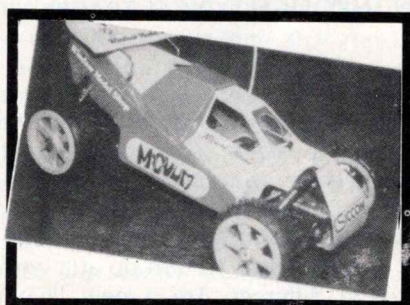
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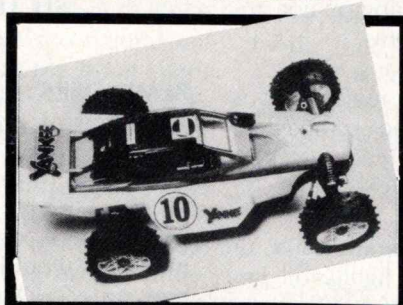
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any overseas body, and that is the AARCMCC.

At this stage it is probably appropriate to explain the situation to interested readers, that the AARCMCC consists of three sections: 1/8, 1/10 and 1/12 scale, all of which contribute fees to the AARCMCC, which is then responsible to pay affiliation fees to FEMCA, and deal with any voting for World Champs venues, rule changes, and so on. It is also the responsibility of AARCMCC to make sure that any information received from overseas or locally is forwarded to all affiliated clubs in Australia, to keep them informed of current local and overseas happenings. Another function of the AARCMCC is to sanction State and National Championships. These championships are official only if so sanctioned and run to AARCMCC rules by affiliated

clubs. Any so-called Titles run by non-affiliated clubs, or not sanctioned by the AARCMCC, are not recognised anywhere in Australia.

Perhaps it would help to show below how the organisation of RC model car racing is carried out worldwide:

All these countries have their own Association, as does Australia, which collects fees from all drivers to pay an affiliation fee to their respective zone Association, i.e. EFRA, ROAR, or FEMCA. These three bodies then pay an affiliation fee to IFMAR, the world governing body, which oversees rule changes, organisation of world events, and so on.

If readers have any queries or suggestions on RC model car matters at any time, please write to me at my address: **30 Tracey Street, Revesby, NSW, 2212.**

I.F.M.A.R.

International Federation of Model Automobile Racing

(World governing body)

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Vice-President: - Mike Reedy, USA
Secretary: - Bernard Poupeart, France

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Indonesia
Japan

AROUND THE CLUBS

A NEW CLUB IN VICTORIA

from David Dean

After a lay-off of about 2 years, a number of 1/8 scale enthusiasts came together to form a new club, the Melbourne Radio Control Circuit Racers (MRCCR). The newly formed club holds regular meetings at the ex Geelong Track at South Barwon Civic Centre, on the first Sunday of each month. The aim of this club is to establish its own Melbourne-based circuit, as the majority of the members live in Melbourne.

The club is anxious to hear from anyone interested in joining them, either to participate in the racing, or as an official for the running of race days. Spectators are most welcome, so go along on the first Sunday of each month to see what 1/8 scale fuel powered car racing is all about.

For further details about this club ring the Secretary, Ron Prince, on (03) 726 4246 AH, or David Dean on (03) 726 9821 AH.

Perth Radio Electric Car Club from Paul Baartz

The third annual Christmas Cup Race was held on 6th December at the club's home track, located in the parking area of Ean's Hardware in High Road, Willetton. Racing was conducted in three grades. The weather was fine: warm and overcast, with a thunderstorm threatening but holding off until well after racing was finished.

Alan Baartz continued his recent domination of **A Grade** with a clean sweep, winning both heats narrowly, and the final convincingly. Kim Anning made a welcome return to form with a second place in both

heat 2 and the final. Alan Hurst and Jim Beale, after challenging well in the heats, succumbed to mechanical problems in the final.

1. Alan Baartz	Associated 12i	36 laps
2. Kim Anning	Schumacher	34 laps
3. Stan Bartlett	Associated 12i	34 laps

Mark Giovannini made one of his occasional appearances, and showed that he's lost none of his driving skill to take out the **B Grade** final by a comfortable margin. Two consistent performers, Gary Grant and Hemi Anning, filled the minor placings after an extremely close tussle in both heats and the final. The hard luck story of this grade was Graeme Reddin who has been winning consistently in B grade recently, but could not keep the car mobile in the final due to mechanical problems.

1. Mark Giovannini	Kyosho	33 laps
2. Gary Grant	Kyosho	28 laps
3. Hemi Anning	Schumacher	28 laps

Justin Caffrey won the **C Grade** final by the narrowest of margins from newcomer Sean Pitt. Peter Emmerson, after winning both heats, suffered a breakdown in the final which cost him dearly, leaving Glen Vanzon to take out third place in the final.

1. Justin Caffrey	Associated	26 laps
2. Sean Pitt	Kyosho	26 laps
3. Glen Vanzon	Kyosho	

1/12 SCALE, SOUTH AUSTRALIAN STATE TITLES, 1987.

from David Seidel

The track site was a badminton court, under cover. This is a perfect combination for such an event, with plenty of pit area, a roof over our heads, together with a well-designed track. The track layout was done with PVC barriers which, surprisingly, were very forgiving to the cars.

Not much practice time was allowed, as racing started on Saturday night. The race timing was done by the transponder system, which is always excellent. The most popular local cars were the Associated RC12Ls and the Mugen Cosmics. The Victorian cars were two 12Ls, two Cosmics and two Schumacher C Cars. The most popular motors were the Reedys.

At Saturday night's racing the fastest man on the track was Andy Morphett. On Sunday morning there were re-graded heats, which was much appreciated by the top drivers. This ensured that racing was much cleaner. Top qualifier overall was Andy Morphett.

D, C, B and A Finals were run, using the Bump-Up system. Only one A Final was run. In the Bump-Up system the top seven drivers are automatically in the A Final, the next seven are in the B, the next seven in the C, and so on. The winner of the D Final has the option of sacrificing his trophy and bumping up to the C Final; the winner of the C Final may bump up to the B Final, and so on.

The A Final was won by Patrick Tougher, who won this event in SA last year. It was a very good race from start to finish, with Terry Williams, Andy Morphett and Patrick Tougher all fighting for the lead. An unfortunate accident resulted in Andy falling off the pace of the leaders, but luckily he retained the position that he was holding at the time. The finals were very cleanly run, and everybody was very happy with the whole event.

Thanks to all the race organisers for a great weekend's racing. Final placings were as follows:

A FINAL

1. P. Tougher	Vic.	Schumacher C Car	Rev-Tech
2. T. Williams	Vic.	Mugen Cosmic	Technipower
3. A. Morphett	S.A.	Associated RC12L	Reedy
4. S. Kilford	S.A.	Mugen Cosmic	Reedy
5. A. Lane	Vic.	Mugen Cosmic	Technipower
6. D. Seidel	Vic.	Associated RC12L	Reedy
7. R. Morphett	S.A.	Associated RC12L	Reedy
8. K. Grossman	S.A.	Associated RC12i	Technigold

B FINAL

1. B. Paine
2. D. Popplewell
3. M. Rowden

C FINAL

1. N. Kastrappi
2. M. Chase
3. L Taylor

D FINAL

1. L. Nichols
2. R. Carfan
3. P. Rosenthal

PB Mini Mustang Competition Winner:

L. Noble, Woolahra, NSW.

Congratulations to you from the team at
RC Cars for Dirt & Track.

Check this issue for another great prize to be won!

PRODUCT NEWS

FOR THE TOOL BOX

Every once in a while you come across little things that, once used, you wonder how you ever got along without them. These two items from the Pic range fall into that category.

Firstly, on the left, is Pic's thread-lock material, called Vibra-Jam, and it lives up to its name. It prevents screws, nuts and bolts on buggies and cars from vibrating loose. However, although Vibra-Jam locks up nuts and bolts, they can be easily undone using normal tools.

On the right is Pic's Metal Max. This stuff is amazing. It's used on motor commutators to keep them clean, and an application of Metal Max on the brushes of a new motor will help in the running-in process. In other words, it's Pic's version of commutator drops.

Metal Max can also be used on slot car and model railway tracks to clean them and to improve electrical contact; and it does work! I've used it on my son's slot car set with great results. According to the bottle, Metal Max can also be used in gas car and model plane engines after running, as part of the cleaning and maintenance programme.

Pic products are imported and supplied to the trade by Model Engines, 57 Crown St., Richmond, Vic., 3121; phone (03) 429 2925



PRODUCT NEWS

SAFETY FIRST

Most modellers are familiar with **Cyano-acrylate glues**, or **Super Glue**. Some common brand names are CA, ZAP and Hot Stuff. But how many people are aware of the dangers of using this type of adhesive?

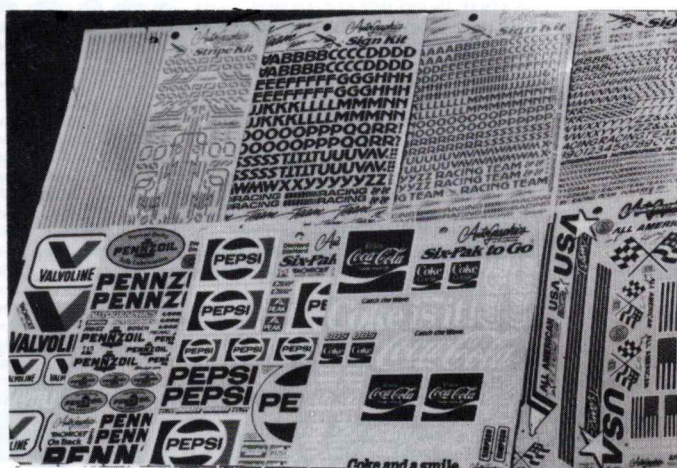
In the past few months I have come across several reports from America of serious accidents involving cyano-acrylate glues, and they were accidents that could have been avoided with a little care. Most of us have managed to stick our fingers together with this fast-setting adhesive, and getting them apart involves the use of either a de-bonder, or a very sharp knife (with subsequent loss of skin!). But these reports from America relate to the use of the glue on materials which react violently with it, and with serious results.



In two of the cases that I read about the modellers were trying to join pieces of material, and had applied liberal amounts of cyano-acrylate. It reacted with the material, and formed a bubble which burst, spraying adhesive in all directions. In both cases the modellers got cyano-acrylate glue in their eyes, gluing the eyelids shut, and requiring a trip to hospital to enable them to see again.

The lesson is clear: make sure that you read the instructions on any adhesive, and use it only with the materials for which it was designed.

As for sticking fingers together, why not use a protective cream? The PIC company makes '**Skin Shield**' which, when applied to the hands, prevents not only cyano-acrylates from bonding your fingers together, but also acts as a barrier to prevent epoxies, resins and paints from sticking to your hands. Skin Shield washes off, and is non-toxic. I tried out the product by rubbing it onto my hands (as per the directions on the tube), then applying some ZAP adhesive between two fingers: the ZAP didn't stick my fingers together! It's another case of prevention being better than a cure. PIC Skin Shield should be available at most good hobby shops, and is imported by Model Engines of Richmond, Victoria.



Plumtree Models, (042) 26 1555, have these excellent auto-graphics (USA) for off-rovers. Ten sponsor sheets, 3 sign and 2 stripe sheets in a choice of 5 colours, on quality 3M film. For less than \$10 per sheet you can now customise your own buggy.

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Castle Hill Hobbies, Castle Hill, 2154	(02) 674 5818
28 Opan St., Dubbo, 2830	(068) 82 3896
9 Cumberland St., East Maitland, 2323	
39 Karalt Rd., Erina, 2250	
39 Arthur St., Hornsby, 2077	(02) 476 1017
4 Iruga Ave., West Wollongong, 2500	(042) 56 3141
11 Perrins Lane, West Kempsey, 2440	(065) 62 8209
6 Powell Place, Cherrybrook, 2120	
Toronto Toyworld, Toronto, 2283	(049) 59 3548
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123 Tarcoola Drive, Boyne Island, 4680	(079) 73 7182
106 Chainey Avenue, Miami, 4220	(075) 52 8444
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c/o 22 Sidney St., Nundah, 4012	
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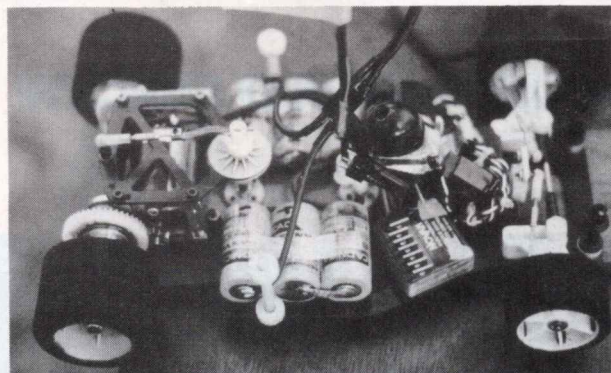
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ASSOCIATED DOES IT AGAIN!



Associated continues on its winning way:

- Associated was the winner of the 1987 Australian 1/12 Scale Titles;
- Associated's **new RC12L** won the 1987 NSW Titles;

Associated has won **ALL 8**
Australian 1/12 Scale Titles!!
(i.e. 1980 to 1988 inclusive)

ULTRA SERIES

A new motor from the motor labs of Yokomo and Reedy, the **ULTRA SERIES**, incorporates the following:

- ★ all new, high strength magnets;
- ★ built-in brush heat sinks for cooler running and longer life;
- ★ new can for greater magnet strength;

Available for 1/12 and 1/10 scales, with winds developed by **MIKE REEDY & TEAM ASSOCIATED**.

1/10 SCALE

"SILVER DOT"

Standard off-road motor.

This is the **original** 'Silver Dot' wind that won several National Championships in both 2 wheel drive and 4 wheel drive.
#6521

"RED DOT"

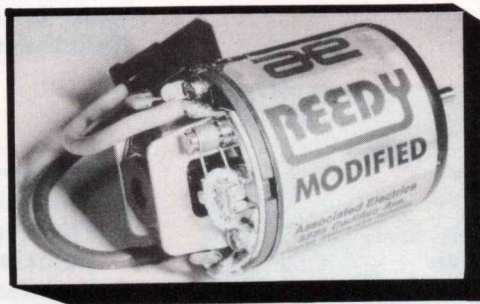
For high speed tracks.

This motor delivers top-end power with both 6 & 7 cell battery operation.
#6522

"PINK DOT OVAL ENFORCER"

NOT for the weak hearted!

Requires good batteries, and on 6 cell use it is **"awesome!"**
#6523



1/12 SCALE

"BLUE DOT"

Standard 1/12 on-road motor.

Broad power band which adapts to any type of race track.
#3520

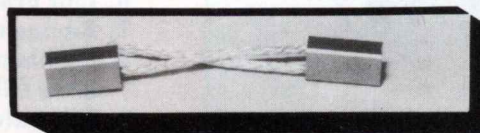
"GREEN DOT"

Developed from the 'World Wind'.

This motor is made for medium to long tracks where a lot of power can be used.
#3521

"ULTRA BRUSH"

This brush has been improved with a new compound that delivers more power to the commutator. It is primarily for 1/12 scale. It may be used in 1/10 scale but requires frequent replacement.
#6513



DAWN TRADING

"The House of Hobbies"

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NSW Mid West & ACT: Frank Gilroy (02) 389 7563

Victoria:
Queensland:
South Australia:
Tasmania:

Terry Dodds (03) 899 0370
Ian Wilmott (07) 359 0911
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4WD OFF-ROAD RACER

OPTIMA MID

RADIO CONTROLLED ELECTRIC POWERED SPECIAL RACING BUGGY

- FOUR-WHEEL DRIVE BY LIGHTWEIGHT EFFICIENT TIMING BELT.
- EXTRA-LONG WHEEL TRAVEL FOR TOP HANDLING.
- MID-SHIP MOTOR POSITION FOR BEST WEIGHT DISTRIBUTION.
- STRONG, LIGHT ALUMINIUM-ALLOY PLATE CHASSIS.
- OVERSIZE PRESSURE SHOCKS, POWERFUL 240ST MOTOR, AND SPEED CONTROLLER INCLUDED IN KIT.
- GLASS-REINFORCED SUSPENSION ARMS FOR STRENGTH WITH LIGHT WEIGHT.
- LOW-PROFILE, HIGH-GRIP TYRES.
- HIGH PERFORMANCE, LIGHT WEIGHT, TOP SUSPENSION ACTION.
- EASY ASSEMBLY AND ADJUSTMENT. SIMPLE MAINTENANCE.



18
BALL BEARINGS
Included

TECHNICAL DATA ● LENGTH/350mm(13.8in) ● WIDTH/240mm(9.4in) ● HEIGHT/130mm(5.1in) ● WHEEL BASE/255mm(10.0in) ● FRONT TRACK/200mm(7.9in) ● REAR TRACK/202mm(7.9in) ● GROUND CLEARANCE/35mm(1.4in) ● TOTAL WEIGHT/1600g(56.4oz)
● MOTOR/LE MANS 240ST(INCLUDED) ● TYRES/FR85e X 37mm(3.3 X 1.5in) ● GEAR RATIO/9.78:1 ● BATTERY/7.2V-1200mAh NICAD(NOT INCLUDED) ● RADIO CONTROL SET/2-CHANNEL(NOT INCLUDED)

1:10 SCALE

TURBO OPTIMA MID

- ★ Sway bar — front and rear.
- ★ Thicker chassis for greater rigidity.
- ★ GFP shock mounts.

also

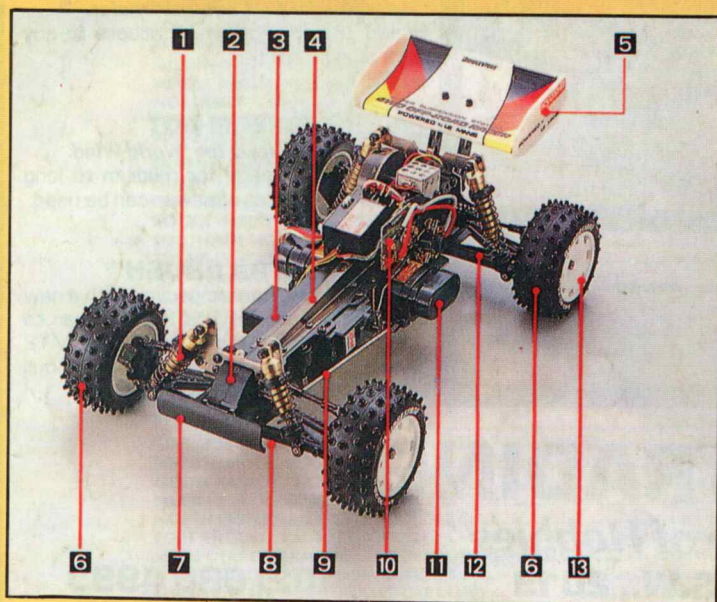
RAIDER 2WD & SHADOW 4WD

The perfect buggies for beginners.

- ★ Easy construction.
- ★ Ruggedly built
- ★ Superb reliability.
- ★ Outstanding performance

THE BEST OPTIMA YET

The Optima has just become even better! In addition to the maximum-performance long-travel suspension that made the first Optima famous, the Optima Mid now has an even more efficient way of transferring power to front and rear wheels: a light and non-slipping cogged timing belt, re-inforced to reduce stretch. All specifications are top-of-the-line: ball bearings (18), powerful Le Mans 240ST motor, speed controller, oil-filled, oversize, pressure shocks, low-profile tyres, strong aluminium alloy chassis and glass re-inforced nylon suspension parts. A few hours of assembly using the clear instructions and you have a winner on the track! In the 1987 World Championships, 5 of the 10 finalists were Optima Mids!



1. Pressure-type, oil-filled shock absorber (x4).
2. Front differential metal gears.
3. FRP upper chassis plate with belt shield (total enclosure)
4. Re-inforced material toothed drive belt.
5. Aerodynamic adjustable wing.
6. Low profile tyres with high-grip spike thread.
7. Racing type front bumper.
8. Wishbone/parallel arm front suspension glass filled EX68 nylon
9. Alloy aluminium chassis plate.
10. Speed controller (3 speeds, included in kit).
11. Battery (7.2 Volt, 1200 mAh nicad not included).
12. Long travel wishbone/parallel arm rear suspension.
13. Lightweight nylon wheels.

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THE FINEST RADIO CONTROL MODELS

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