

MODEL CARS

RACING SPECIAL

1990



CONSTRUCTORS AND BUYERS HANDBOOK

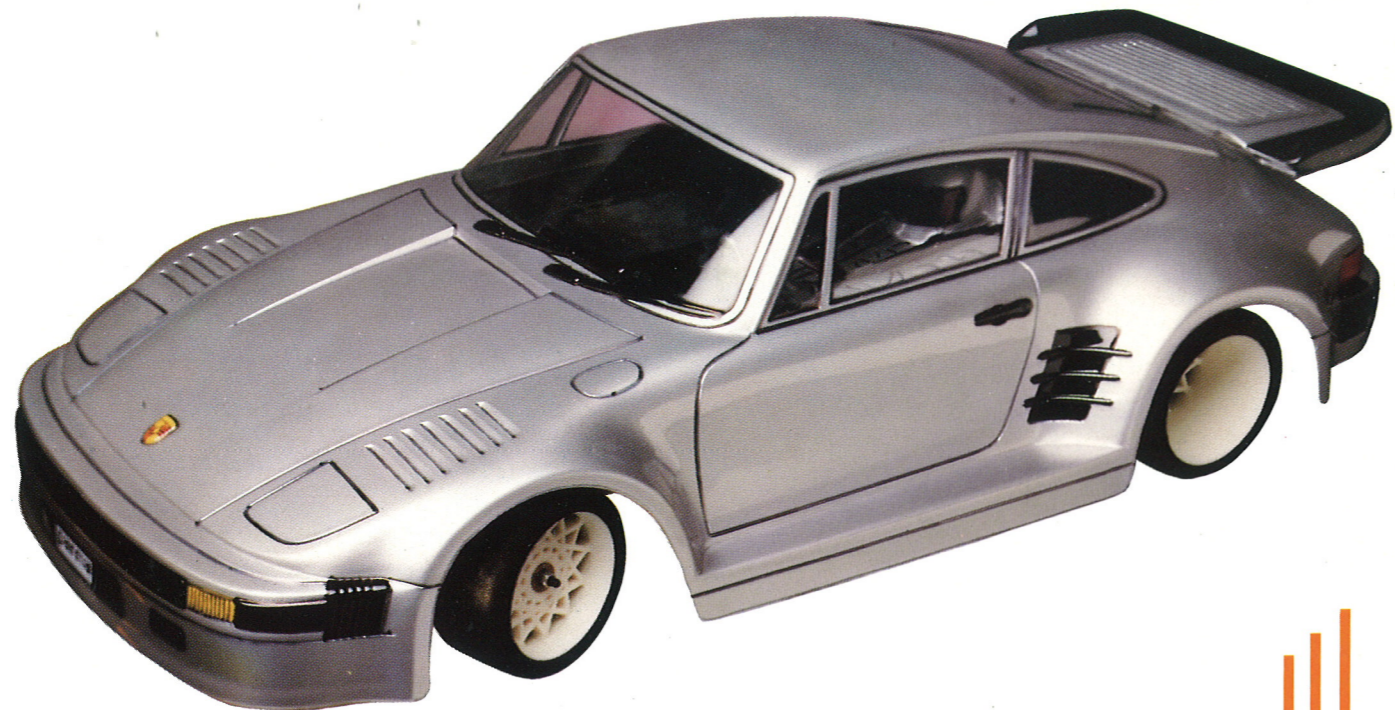


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RACING SPECIAL

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AN **ARGUS**
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LEAD FREE

The Ultimate in 1/10th electric motoring with three new models for 1990 HIROBO gives YOU the choice.

If offroad is your speciality try the ALIEN (so advanced could it really be conceived on earth!). With mid-ship mounted motor, four wheel drive with gearing set for greater drive on the front wheels to give crisp sharp cornering, 14 bearings, Kydex bumpers and new aerodish wheels you're assured of a winning formula.



But if ready built scale turns you on try the TOYOTA CELICA or the PEUGOT 205 TURBO 16



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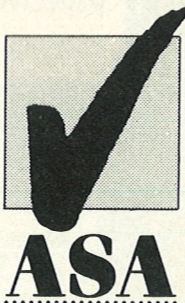
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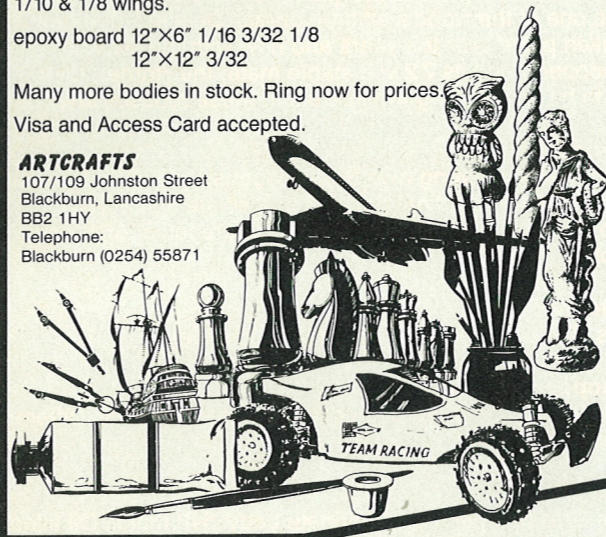
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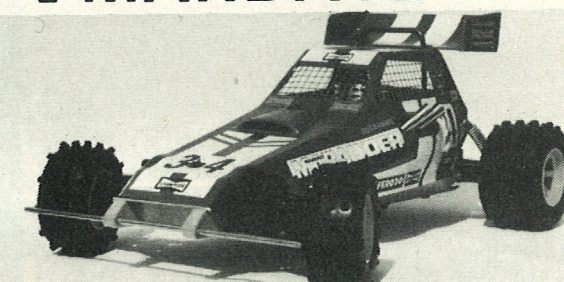
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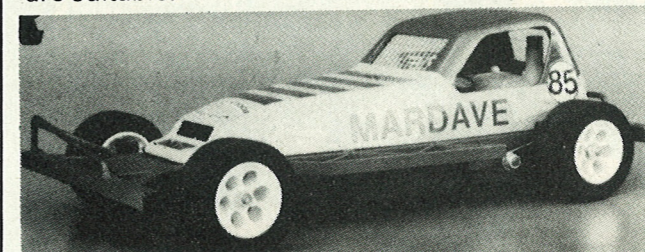
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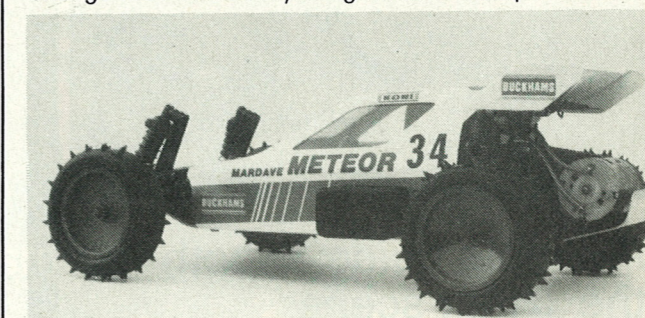
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Tamiya

Richard Kohnstam Ltd., 13-15a High Street, Hemel Hempstead, Herts HP1 3AD.

Tamiya is the world's largest producer of RC electric cars. A prodigious producer of new kits, barely a month seems to go by without Tamiya introducing a new model or modification to their vast range. Ironically until 1990 Tamiya never seemed particularly interested in pushing for international race honours. 1990 has heralded a new era for Tamiya with a works driver, two first class cars the Egress (4WD) and the Astute (2WD), a lot of factory support and an apparent determined effort to win high level races. Already success has been achieved in this area and continual development of the product range will no doubt assure further success. At the entry level to the hobby the Grasshopper must be one of the world's all time greats. Detailed changes have taken place over the years and now with the six volt Grasshopper II and its 7.2 volt stable mate; the Hornet, their seems to be no stopping the interest in these robust starter cars.

Grasshopper

2WD independent swing axle front suspension. Rear suspension is motor, gearbox and final drive all in a single unit. Plastic bathtub chassis. Minimal dampers are upgradable. ABS body. 380 motor.

Grasshopper II

2WD as Grasshopper. New smoother body lines.

Grasshopper super G

2WD as Grasshopper. Smoother body lines. 540 motor. Different style friction dampers.

Hornet

2WD as Grasshopper. Polycarbonate body. 540 motor. Oil filled dampers.

Astute

2WD Top of the range Tamiya single driven axle car. Ball diff. FRP chassis with independent all round with oil filled shocks. Polycarbonate body.

Fox

2WD Plastic moulded chassis with double wishbone front suspension featuring a single transverse shocker. Rear suspension is double wishbone with adjustable shocks. Complete with eight ball races. Polycarbonate body.

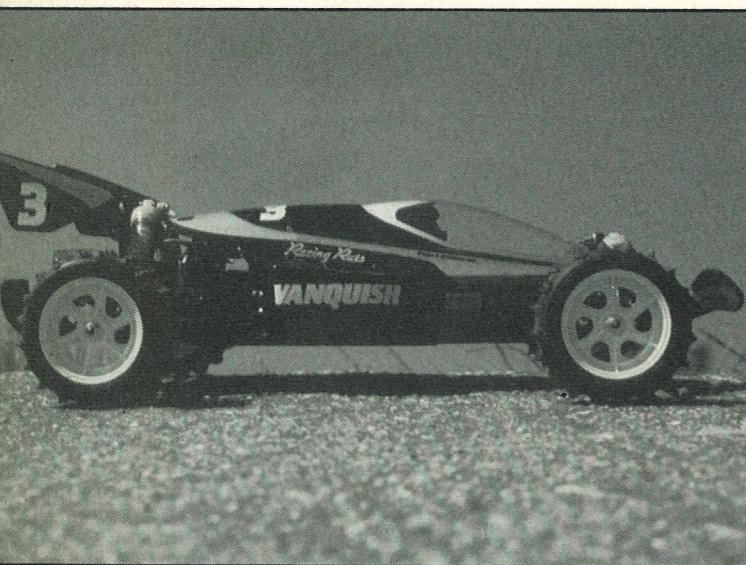
Falcon

2WD A competitive entry level 2WD car with fully damped independent suspension, front double wishbone and rear suspension is trailing arm. Polycarbonate body.



A simple guide to both the manufacturers and kits available on the 1/10th scene

Kits Galore



Sonic Fighter

2WD Swing axle front suspension and independent trailing arm rear suspension. Easily accessed tub type chassis. Oil filled shocks all round. Body styrene.

Striker

2WD Strong similarity to the Sonic Fighter but without oil filled front shocks. Body styrene.

Vanessa's Lunch Box

2WD Big wheeled fun car. Chassis is moulded specifically for the van, but suspension and transmission imported from the Hornet/Grasshopper range. Body styrene.

Midnight Pumpkin

2WD Basically the same mechanics as Vanessa's Lunchbox. Body styrene.

Blackfoot

2WD Great favourite in the USA. The 2WD chassis started life as the Tamiya Subaru BRAT some years ago. All independent suspension with long travel shocks. Front is double wishbone, rear trailing arm type. Body styrene.

Monster Beetle

2WD The Beetle body has been chopped to fit the same chassis as the Blackfoot. Detailed changes but basically the same type of fun vehicle as the Blackfoot. Body styrene.

Mudblaster

2WD The original Subaru Brat from Tamiya was the first car to feature the distinctive triangulated chassis. The other noticeable feature was the horizontal mounted rear shock. Body styrene.

Madcap

2WD Next step up from a starter car, a simplified Astute. With independent suspension all round and oil filled shocks, ball diff. and polycarbonate body.

Saint Dragon

2WD As Madcap.

Nissan Kingcab

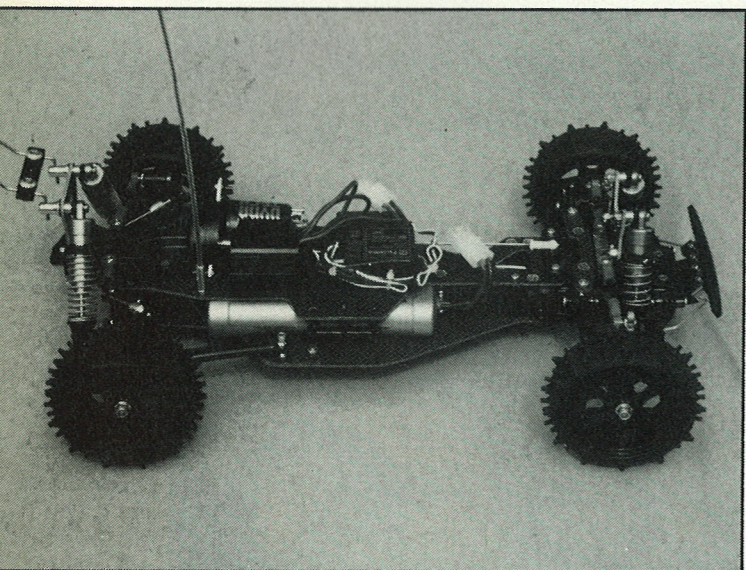
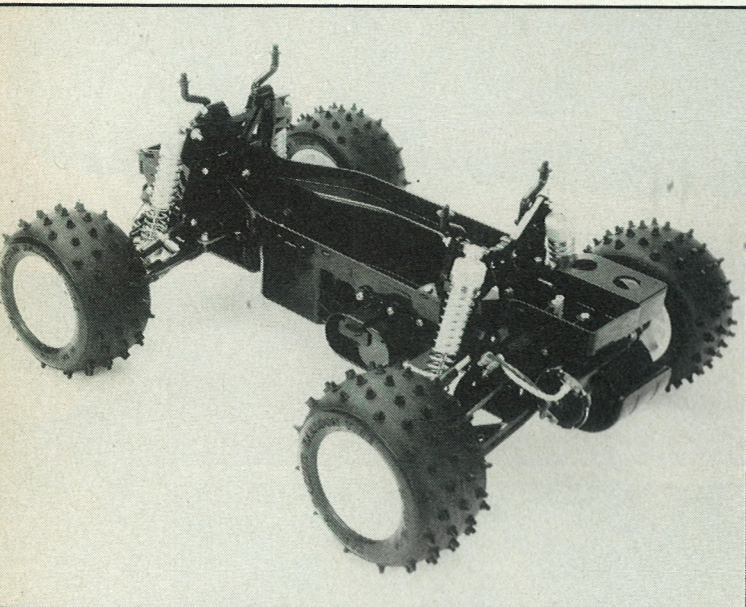
2WD Polycarbonate truck cab, oil filled shocks and ball diff. Double wishbone suspension all round. Uses transmission Astute.

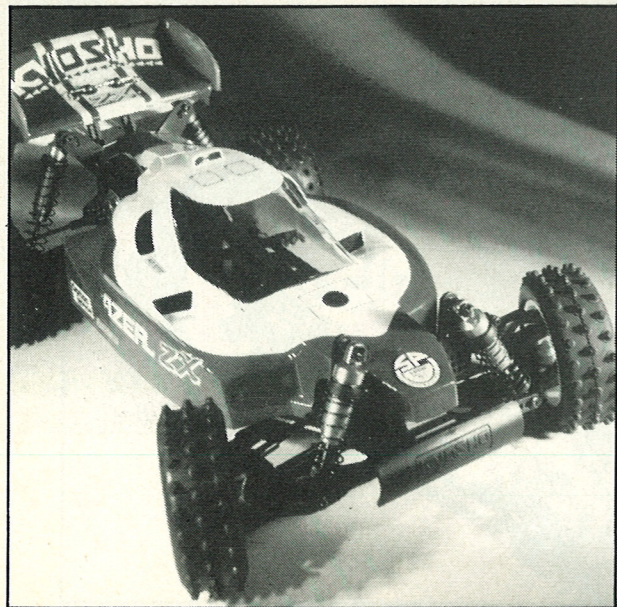
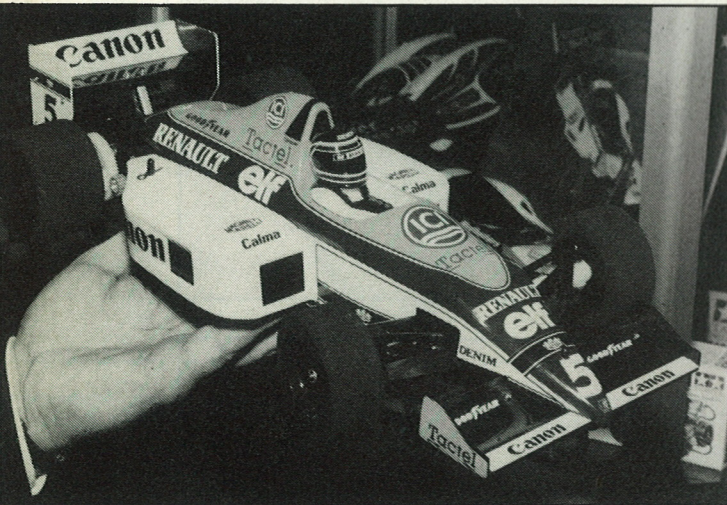
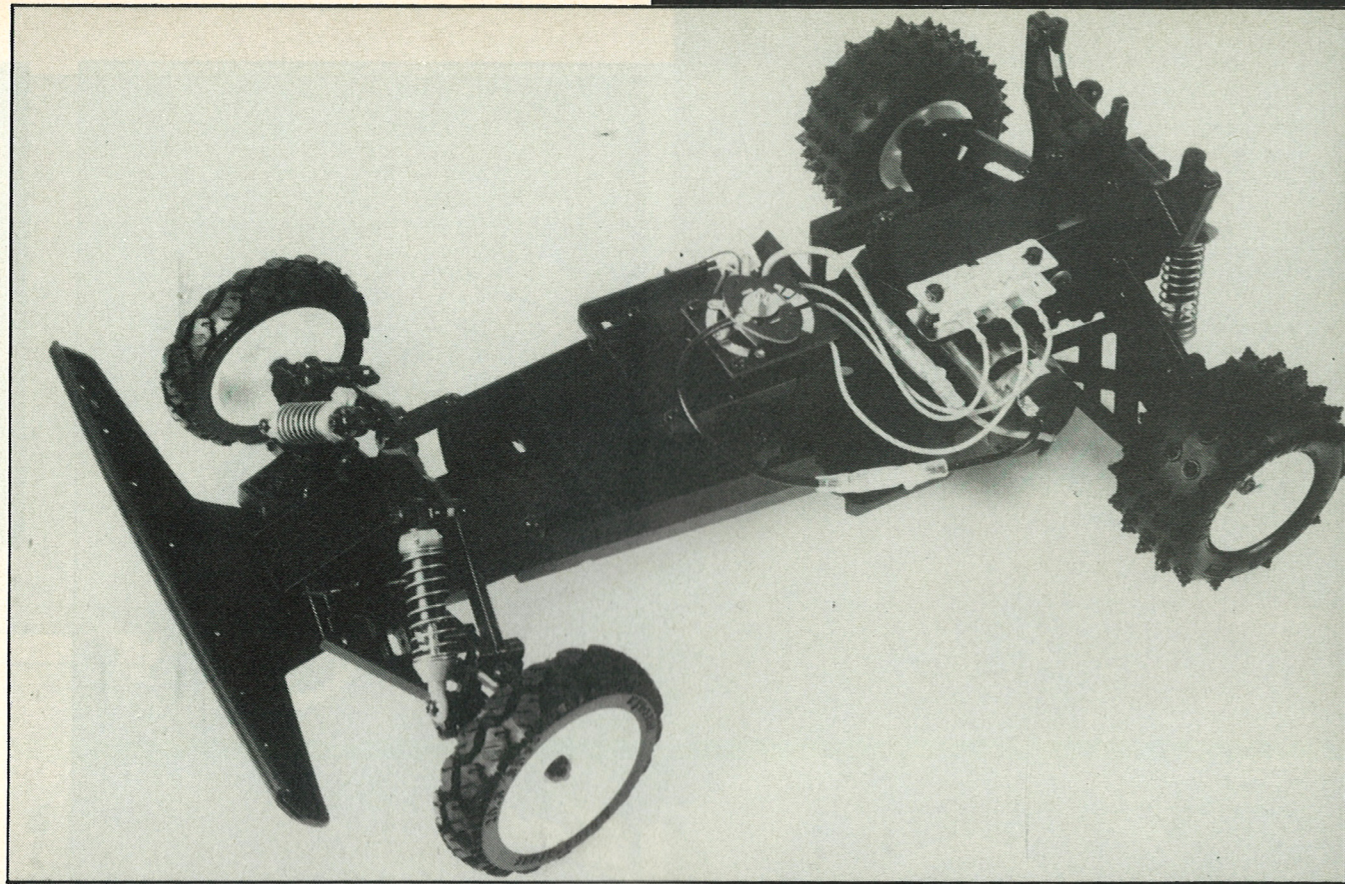
Avante 2001

4WD Second edition of Tamiya's initial entry into high level 4WD competition. Since the first issue of the Avante a slimming of the specification has occurred. Much of the vulnerable steering parts such as the ball joints have disappeared. Longitudinally mounted motor. Polycarbonate body.

Vanquish

4WD Simplified version of the original Avante. ABS chassis and polycarbonate body. Mechanics very similar to Avante.





Egress

4WD Top level entry into the 4WD competition. Similar in principle to the Vanquish but with carbon fibre chassis and other parts. Shaft drive, ball diffs. front and rear. Going through a process of race development.

Clodbuster

4WD Massive wheels, two motors and 4 wheel steering. Lots of car crushing fun. Two shocks at each wheel. Body styrene.

Hot Shot 2

4WD Shaft drive to the front axle. Single front transverse spring/shock unit and double wishbone front and rear. Chassis is moulded box type section with hatches for maintenance.

Terra Scorcher

4WD Shaft drive transmission with ball races included. Front and rear independent suspension with oil filled dampers. ABS plastic bathtub chassis with polycarbonate body. Comes with anti roll bar.

Thunder Dragon

4WD Shaft drive from rear mounted motor. Independent wishbone suspension with single crossframe damper at the front and two at the rear.

Fire Dragon

4WD

Thundershot

4WD As Thunder Dragon.

Boomerang

4WD Shaft drive from rear mounted motor. Independent wishbone suspension with single crossframe damper at the front and two at the rear, but not the same as Thunder Dragon. Suspension layout/geometry quite different.

Super Sabre

4WD Basically as Boomerang.

Bigwig

4WD Designed in Japan by a leading body stylist. Shaft drive, rack and pinion steering and coil over oil filled shocks. ABS chassis and polycarbonate body.

Toyota 4x4 Pickup

4WD. Not a racer but perhaps the most sophisticated electric RC car on the market. Mechanical gearshift giving 2/4 wheel drive and high and low speeds in 2WD. Transmission by exposed prop shaft to leaf spring mounted axles. Something a bit special!

Kyosho

RIPMAX Ltd., 241 Green Street, Enfield, Middx. EN3 7SJ.

Kyosho a leading Japanese model producer with a vast range of kits from cars to boats, planes and helicopters have had tremendous success at International race level for years with their Optima and Mid Optima range of 4x4 cars. The Mid Optima although still widely available is giving way for its eventual replacement, the Lazer. Superficial similarity to the Mid Optima in fact hides some significant differences between the two cars including chassis and transmission configurations. In the area of two wheel drive the Ultima and its derivatives have been the Kyosho flagship, taking awards at many national and international meetings. Kyosho has led the way with the Maxxum a front wheel drive two wheel drive car, although this lead has not had much of a following with other car producers. Mid Optima's come disguised as Optima Mid Custom or Custom Special or Aero Streak each with a different level of equipment.

ZX Laser

4WD Latest in a long line of race winning cars. Double belt drive transmission. Oil filled shocks all round. No motor supplied. GRP chassis and polycarbonate body.

Optima Mid

4WD single toothed belt to drive the front axle, gear train to the rear axle. Many different versions with different amounts of extras and equipment. Custom, Special, SE, etc. etc. Some with aluminium chassis some GRP/Carbon chassis. All cars use the same basic transmission, independent suspension and layout. Motor mounted in front of rear axle.

Optima

4WD Virtually disappeared from the shelves. Predecessor to Mid but with motor at the rear.

Rocky

4WD Independent suspension all round with oil filled shocks. Uses ladder chain transmission. Entry level to 4WD.

Maxxum

2WD One of the few front wheel drive off road race cars made.

Ultima

2WD Has captured many race successes world-wide. Rear mounted motor with gear transmission. Oil filled shocks. Upgraded model is the Turbo Ultima, with ball races, ball diff and Platinum shocks. Followed by the top of the Kyosho line of 2WD off road racers the Ultima Pro. Features different chassis and a host of upgrades.

Super Bomber (ready built)

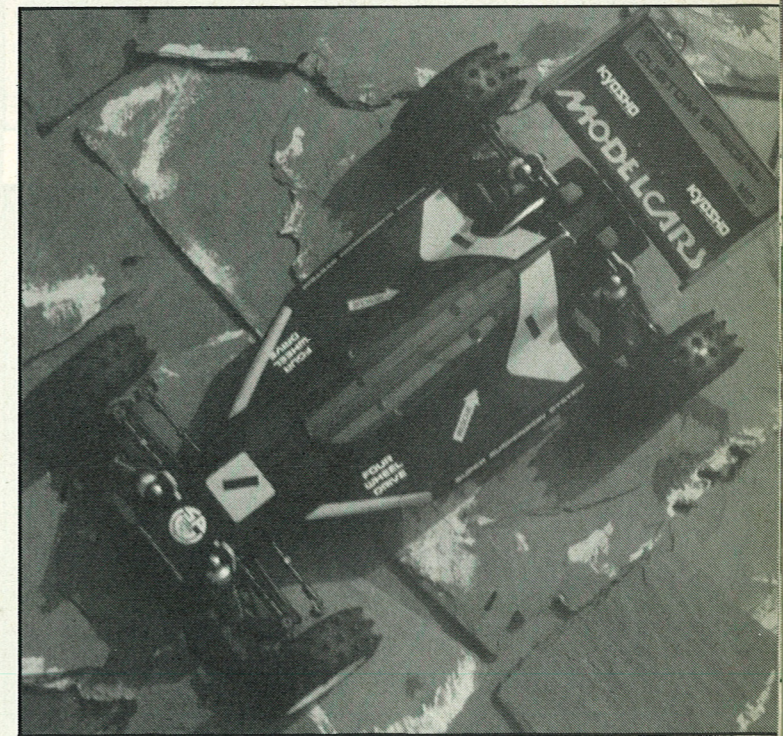
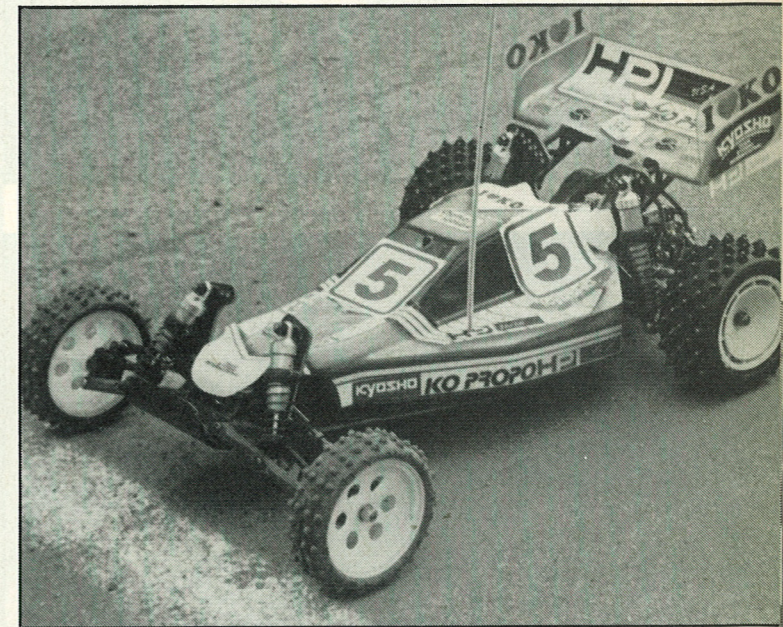
Aero Streak (ready built)

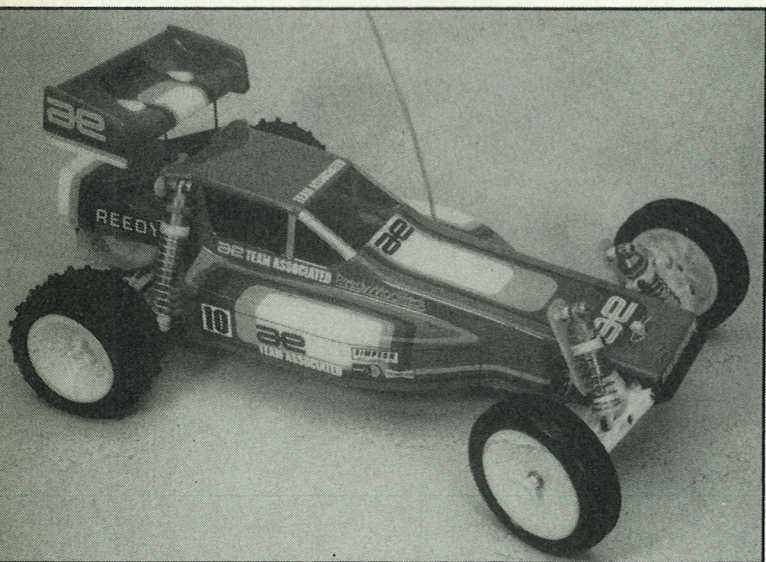
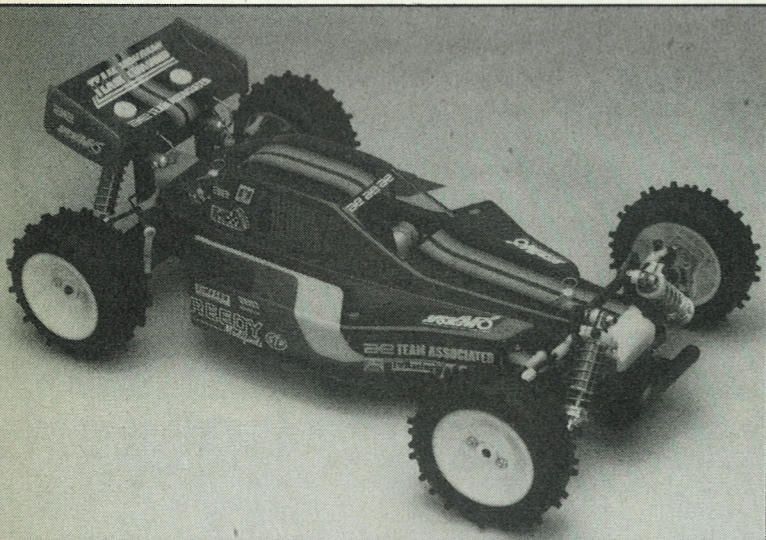
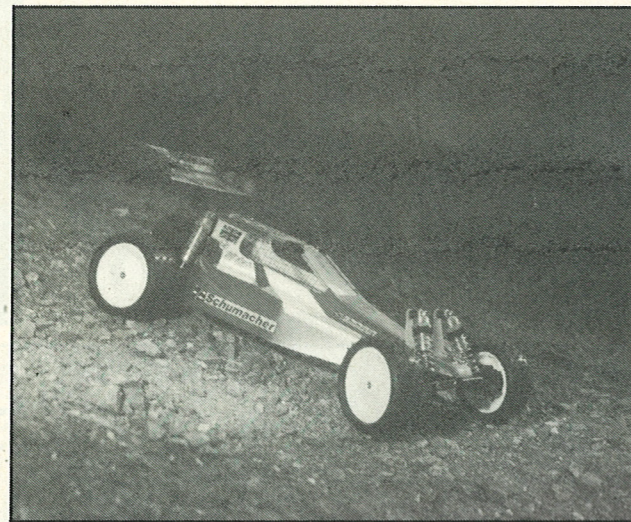
Raider

2WD A ready built entry level off roader.

The Big Tyre

4WD As the name suggests it is all wheels. 4 wheel steering and twin motors.





Big Boss

2WD based on a Ford F250 design. Independent suspension all round with double wishbone.

Big Brute

2WD Big wheels, limited slip diff and double wishbone suspension.

Hi-Rider Corvette

2WD Big wheels to join the latest range of car crusher. Different body but same mechanics as Big Brute.

Double Dare

4WD Twin motor and 4 wheels steering. Double shocks at each wheel.

Sideways

2WD oval racer Ultima mechanics.

Ferrari F40

1/10 scale bodies using traditional 1/10 off road mechanics 4WD.

Porsche 911

2WD Ultima chassis.

Nissan Skyline

4WD as Ferrari.

Chevrolet Lumina

4WD as Ferrari.

Nissan Saurus

2WD Rear wheel drive. Flat pan chassis with independent suspension and coil over shocks.

Yokomo

CML Distribution, 1684 Bristol Road South, Rednal, Birmingham, B45 9TZ.

One of the smaller Japanese companies, headed by Mr Yokomori, it is now the most successful 4x4 off road 1/10 race company in the world in terms of international race success. This success is owed to not only the single car produced by the company (the Super Dogfighter) but equal accolades must go to works driver Masami Hirotsuka who has taken and kept Yokomo at the top of the winners rostrum for years. A deal with Associated of the USA makes the Yokomo/Associated organisations a force to be reckoned with at international level.

Super Dog Fighter

4WD Flat pan chassis, belt drive with centre adjustable torque split. World championship winner.

Associated

Ted Longshaw, P.O. Box 89, Orpington, Kent.

The RC10 has become a legend in its own time. Race winning, robust and reliable this aluminium tub 2WD car has recently moved into the area of Graphite chassis as an alternative version. Distribution of the Yokomo Super Dogfighter in the USA had allowed Associated to customise the kit for the US market, it instantly became a sought after item around the rest of the world. The 1/10 RC10L circuit car is based upon the successful Associated 1/12 circuit car. Now the RC10L has become established as one of the world leaders in 1/10 circuit racing.

RC10

2WD aluminium tub chassis with nylon suspension and transmission components. A few steering geometry changes over the years but the car is basically the same as when it was released on the RC market. Now available with carbon chassis.

RC10L

2WD Based on the successful 1/12 chassis the RC10L has been suitably beefed up for 1/10 racing. Available in either fibreglass or graphite chassis form. Holds a speed record of 70.1 mph for a 1/10 electric car.

Schumacher

Schumacher, Hansons Business Park, 71-73 Tenter Road, Moulton Park, Northampton NN3 1AX.

Cecil Schumacher has risen from a producer of 1/12 carpet racers and Bolink importer to a major designer and manufacturer of 1/10 on and off road cars. The CAT 4x4 off road car spelt success at International Championship level with its innovative suspension and transmission systems. Followed by the two wheel drive Top Cat which was equally as innovative and successful and most recently by the Cougar a revised version of the 2WD Top Cat. During the nine lives of these felines from the fast lane a continual flow of improvements and modifications to the products has managed to keep the Schumacher range on the leader board world wide.

Top Cat

2WD Aluminium tub chassis. Independent suspension all round with horizontally mounted front shocks. Very successful racer.

Cougar

2WD similar spec to Top Cat but front shocks have been lifted to vertical position.

Pro Cat

4WD Schumacher's highly acclaimed championship winning off roader. Started life with fold back front suspension, unique transmission involving integrator device to transmit drive to front wheels by belt. Numerous modifications over the years based on race experience.

Traxxas

To be announced

Yet to appear in the UK in any great quantity the Traxxas range of RC cars will provide interesting competition for the UK race tracks. Success in the US has been considerable and as soon as the manufacturer secures a deal with a UK importer we will see a lot of the Traxxas cars on the circuits of the UK and mainland Europe.

Sledgehammer

2WD (big wheels) Rear wheel drive, double shocks at each wheel. Plastic tub chassis spring mounted body.

TRX-10 Bullet

2WD Full blooded off road racer. Coil over shocks, tub chassis.

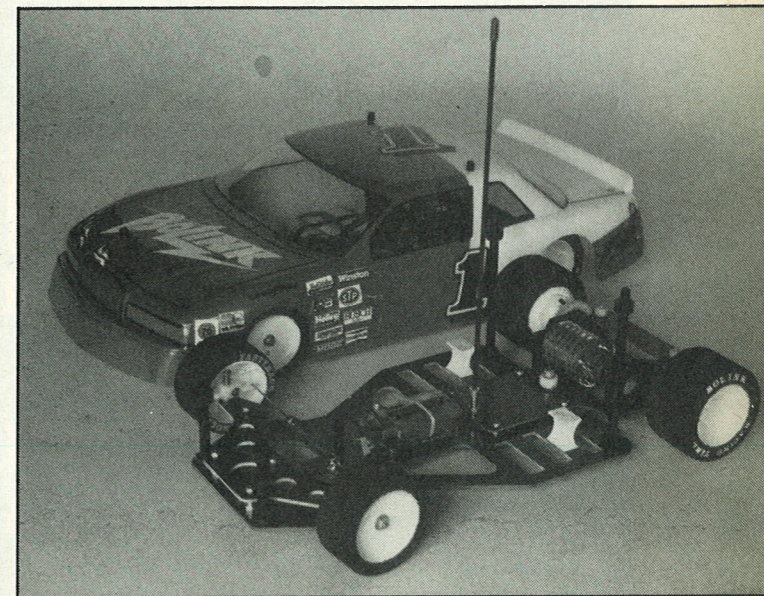
Radiator

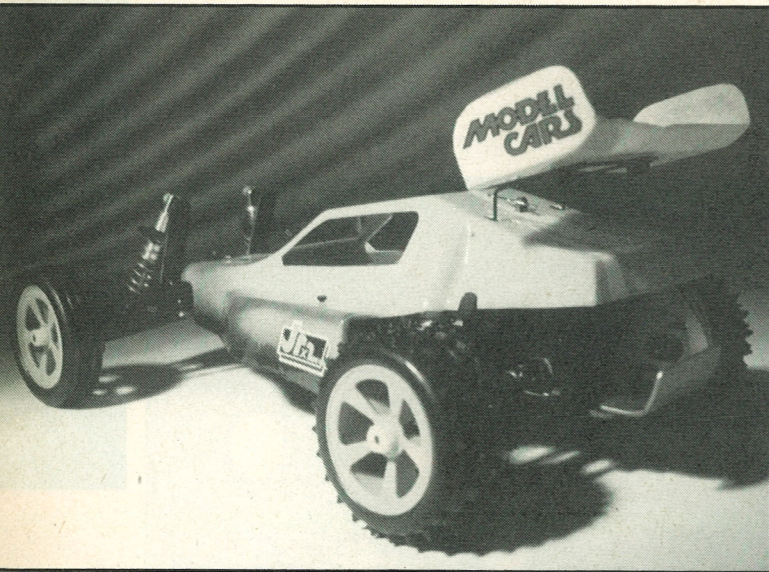
2WD Entry level off roader

Bolink

Ted Longshaw, PO Box 89, Orpington, Kent.

Bob Rule has been in the RC car game for many years, and apart from the occasional digression of winning Yo Yo championships has concentrated on a range of good value for money 1/10 on and off road cars and accessories. The Eliminator is now the mainstay of the Bolink production and with daughter Kim Rule being brought into the company to promote the products Bolink are determined to make a great impact on the European 1/10 circuit race tracks during the 1990s.





Eliminator

2WD Circuit racer. Well proven design, tough and fast. Alloy sides for rear motor pod. Rear dampers mounted horizontally. Front suspension independent rising blocks.

Eliminator Gold Edition

2WD circuit racer. Top spec Eliminator.

Losi

CML Distribution, 1684 Bristol Road South, Rednal, Birmingham, B45 9TZ.

Designed and produced by Gil Losi Jr. Using experience gained in world class championships.

JRX2

2WD off road racer. Independent suspension all round on a carbon fibre chassis. Rear suspension is a unique arrangement of links and incorporates a sliding drive shaft. Specially designed gear drive made from self lubricating materials.

PR010

2WD circuit car

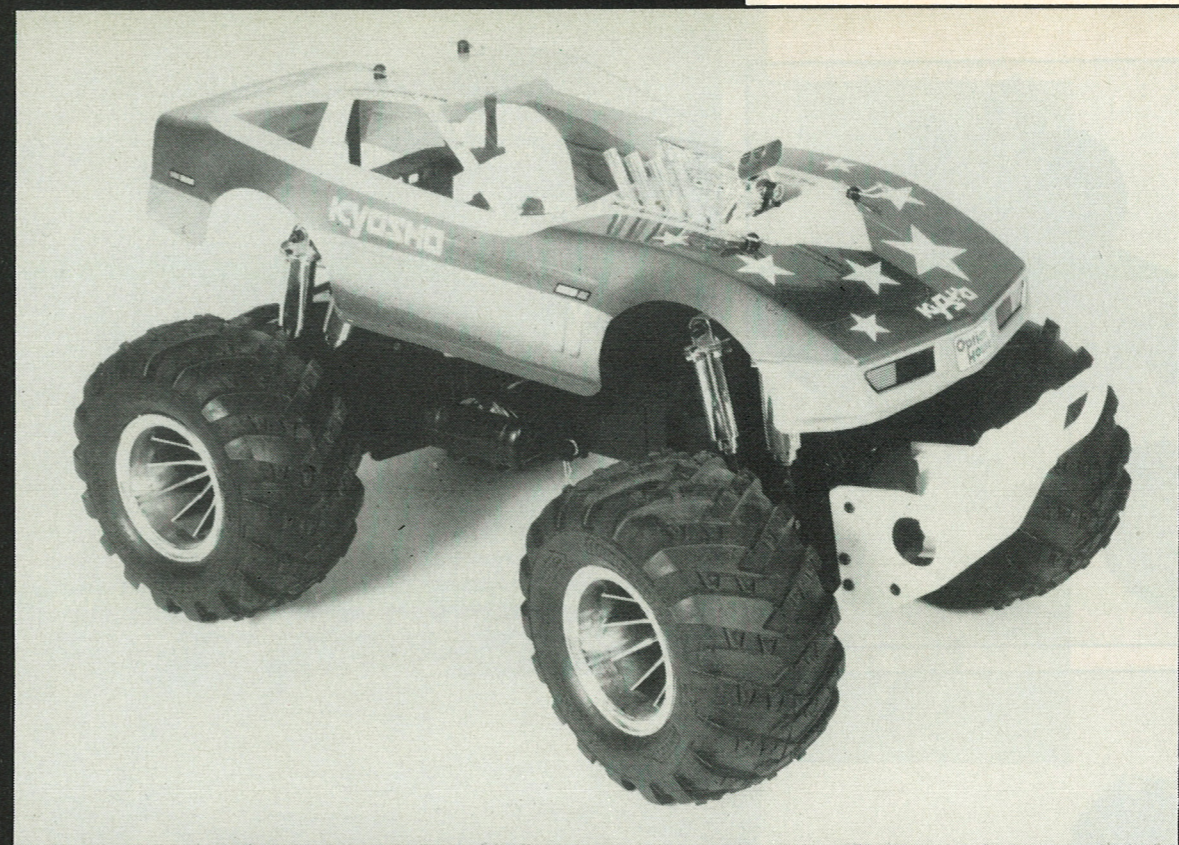
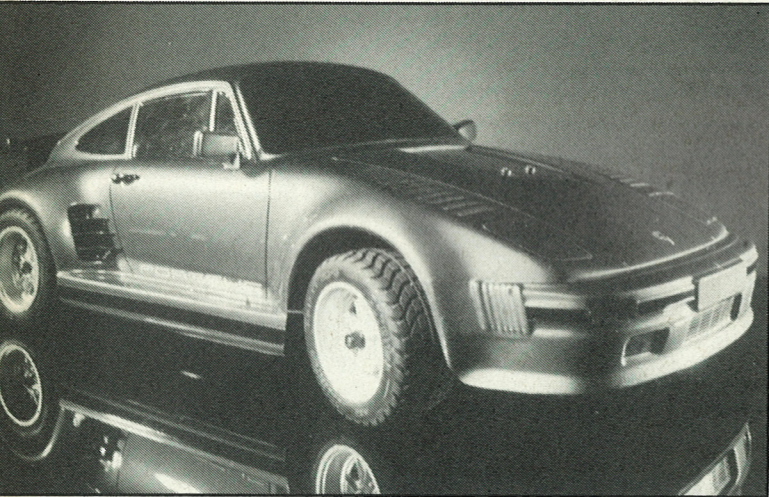
Hirobo

MacGregor Industries Ltd., Canal Estate, Langley, Berks SL3 6EQ.

Better known for helicopter production Hirobo entered RC car production around seven years ago. Limited interest from the buying public coupled with minimal marketing by the UK importer meant that Hirobo have never enjoyed great success over the past few years. Considering that the Hirobo company were the first to use toothed belt drive in their cars it is a shame that they have not had the sort of exposure that might have allowed sales to blossom. Now with a new car importer (MacGregor Industries) Hirobo cars are all set to have a go at the UK market.

Alien

4WD Midship mounted motor. Belt drive transmission to front and rear. Comes with many ball races.



Peugeot 205

4WD ready built for Hirobo. In line mounted motor with shaft to the front axle. Independent suspension all round with coil over shocks and ride height adjusters.

Toyota Celica

4WD ready built for Hirobo as Peugeot.

Marui

Amerang Ltd., Commerce Way, Lancing, West Sussex.

Tokyo Marui moved away from toy guns and boats to enter the field of RC car production with some very interesting and nicely presented kits. Keeping pace with RC car developments the company have some very attractive kits on sale.

Big Bear

2WD Big Wheels version of a Datsun pickup. Chassis ABS moulding and body is also an injection moulding. Independent front suspension rigid rear axle all on coil spring suspension.

Ninja

4WD off road racer. Coil spring all independent suspension. Transmission is shaft drive front to back.

Shogun

4WD of road racer. Spec as Ninja.

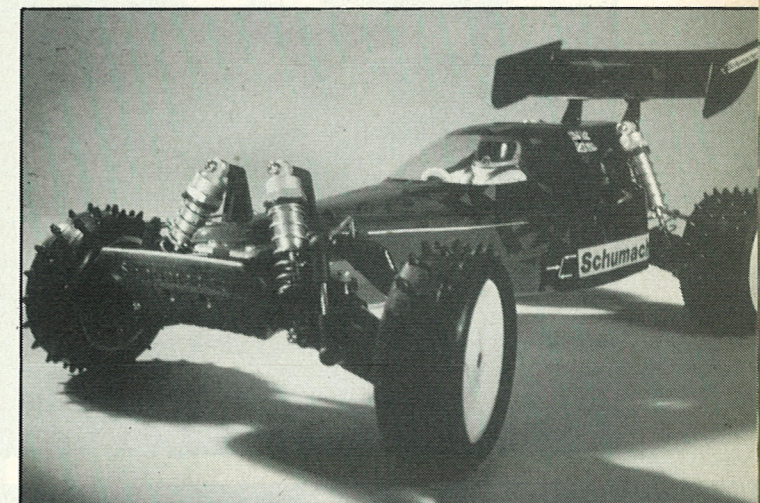
Thunderbird

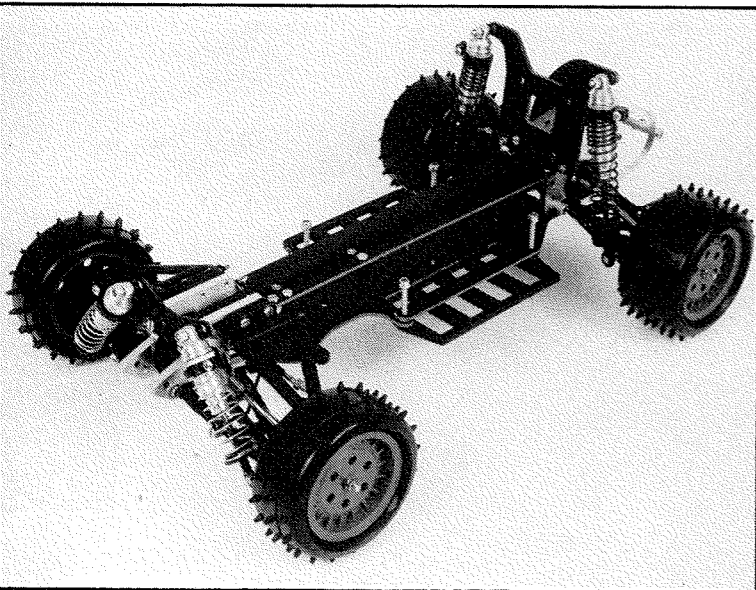
4WD on/off road racer. Spec as Ninja but with alternative ride height adjustment.

Mardave

Mardave Leicester

One of the few UK producers of RC cars. Les Rayner has been keeping the Mardave company moving nicely along with 1/12, 1/10 and 1/8 RC models. The Meteor is the mainstay of the company's 1/10 off road effort. A robust, cheap and excellent value for money kit, the Meteor is to be found all over the UK turning in first class race results as well as providing hours of fascination for garden drivers everywhere. Do not make the mistake of thinking that the Meteor is anything less than a top grade 2WD racer, it incorporates all the design features of more expensive imported models, and it is built in Britain.





Meteor

2WD Economic robust kit. Independent suspension all round. Ready built gearbox for fitting to aluminium chassis. Body needs to be painted on the outside. Ball differential.

Meteor Comp

2WD Competition version of Meteor. No motor but ball races included.

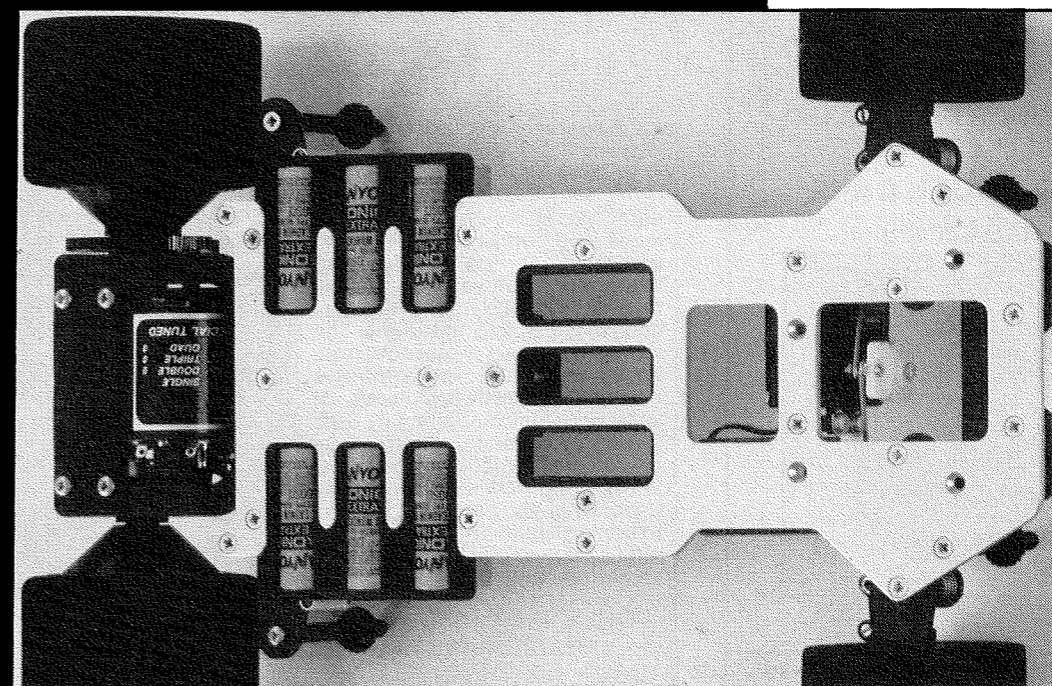
Corally

Intronics

From Holland the Corally company have had outstanding success with their beautifully engineered and finished car. The company has made limited expansion into parts for other cars and a revolutionary electronic speed controller.

SP10

2WD circuit car. Based on the SP12 circuit car. Chassis made from machined aluminium alloy. Front suspension front beam flexes to give front wheel suspension movement. Motor pod pivots on a special ball joint mounted on the chassis.



Brimod

Brimod Engineering Developments.

A small west midlands company that have concentrated on fine quality engineering of RC component parts and expanded into the 1/10 circuit world. The top of the range Talisman features a unique fully floating rear suspension layout and swing arm front suspension. The budget priced provides an entry level car without breaking the bank balance, but with a lower specification.

Advanced Racing Technology

Holcomac Marketing Ltd., Britannic House, 17a George Street, Stroud, Glos. GL5 3DP.

Agitator 2

2WD circuit racer. Incorporates unique load actuator system claimed to improve handling and traction. High level specification including triple rear shock system. Adjustable camber and castor. Uses a lot of machined Delrin.

Junior

2WD circuit racer. Entry level car. Graphite components, similar back end to Agitator 2. Upgradable to full Agitator spec.

Parma

via Helger Racing available from all good Model Shops. Cars all feature simple neat chassis excellent for both beginner and racer, chassis design by Andy Dobson World Class Driver working for Parma.

California Sports truck

2WD fun on road.

Panther Pro 10

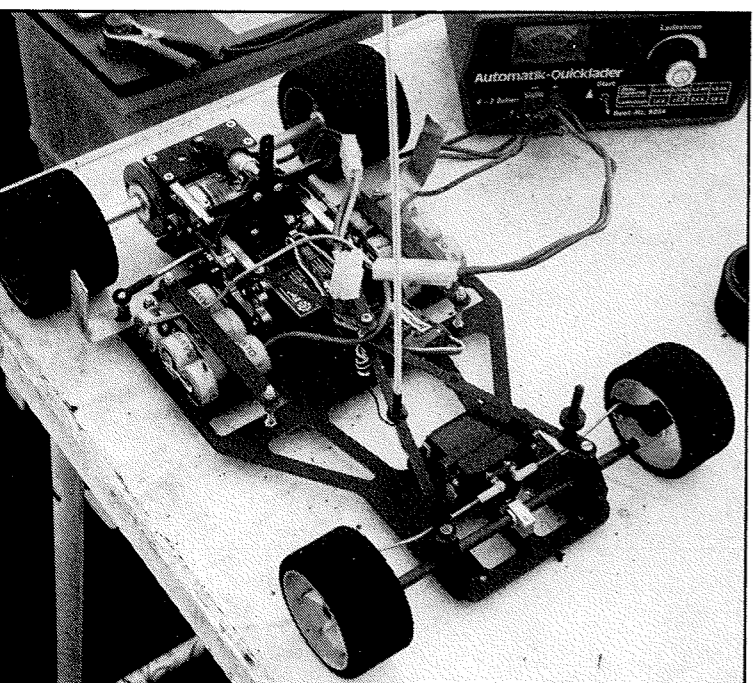
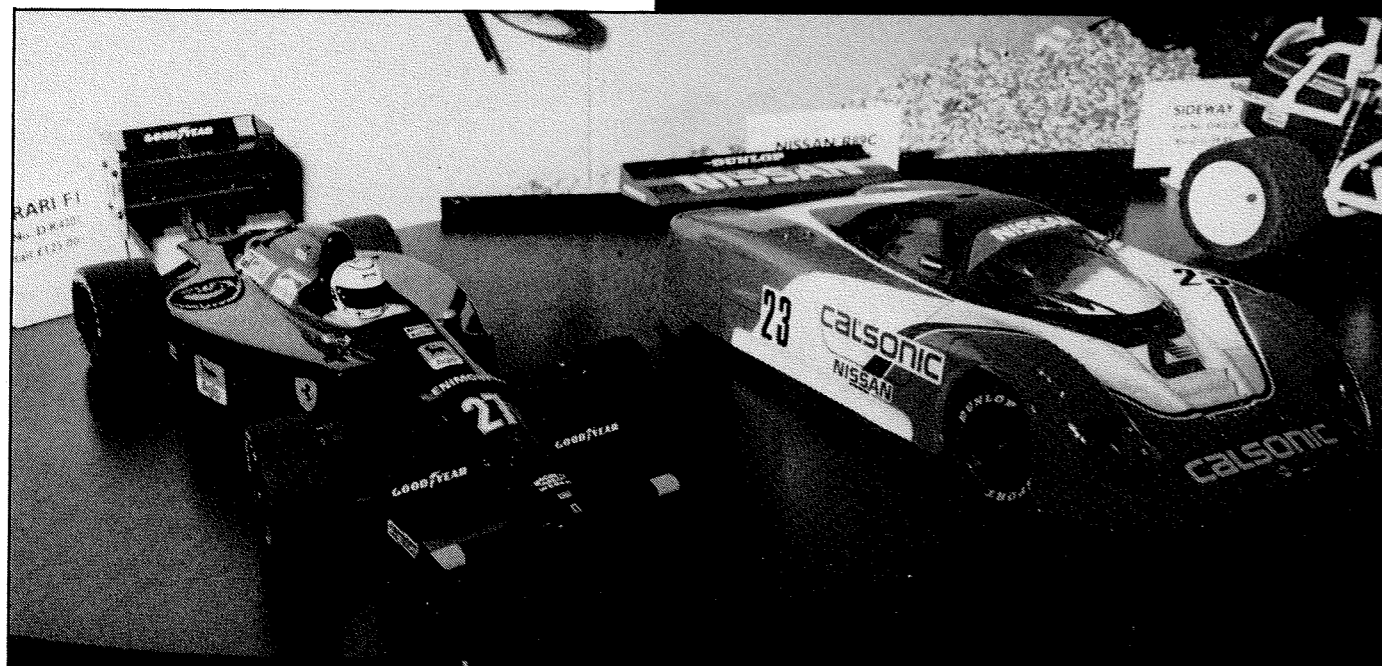
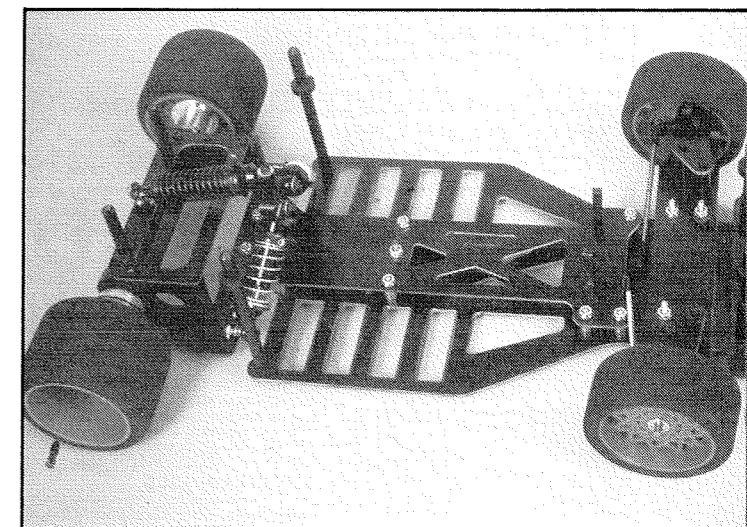
on-road racer in two forms basic and complete with electrics available with Mercedes, Porsche or any Group C body.

Nascar

kit as above but with saloon bodyshell funny car 1/10th on-road drag car again available in two versions basic and complete.

Sprint car

Oval sprint racer also in two forms. All kits complete with Parma bodyshell, wheels, tyres etc.



PB Racing

PB Racing Products Ltd., Downley Road, Havant, Hampshire PO9 2HJ.

For years Keith Plested concentrated on 1/8 cars, both on and off road. The leap into 1/10 off road was completed with introduction of the Ace, a car developed from the early Mini Mustang and its derivatives. Early co-operative ventures with Schumacher came to nothing, and PB went on to develop their own version of a toothed belt drive. The Sizzler, a 1/10 circuit racer came onto the market and caused a stir with its all new and unique rear suspension system. Featuring a parallelogram action, it is the only car to use a rear suspension configuration of this type.

Sizzler

2WD circuit racer. Composite chassis and carbon fibre rear axle with ball diff. Machined alloy rear pod side plates. 5 link rear suspension system with single shocker. Full ball raced. Front coil spring suspension.

Ace

4WD off roader. Three belt transmission with adjusters. Ball differential and U.J. drive shafts. Double wishbone suspension with coil over oil filled shocks. Backbone chassis which houses the transmission system.

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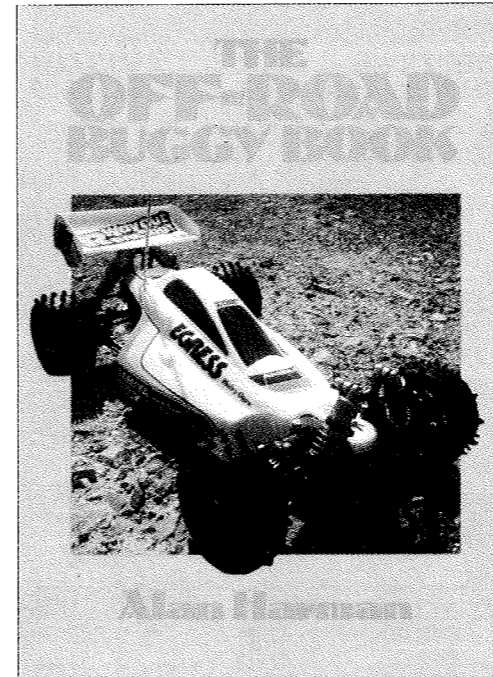
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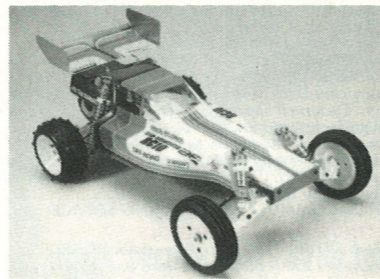
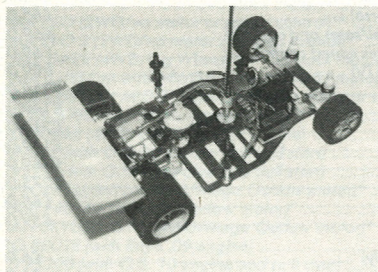
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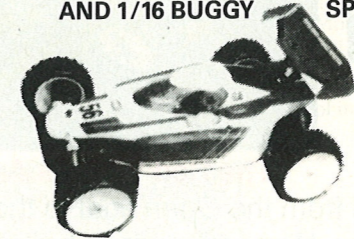
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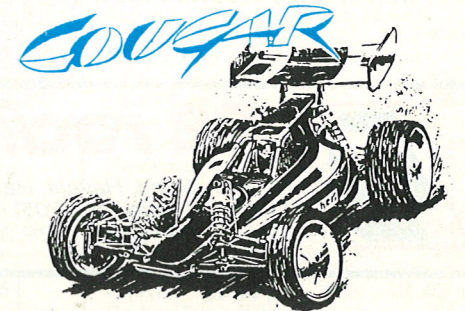
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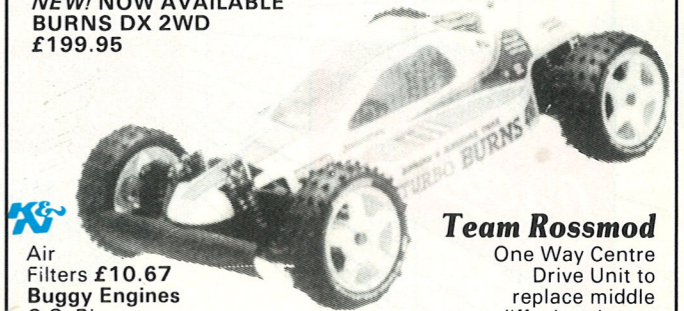
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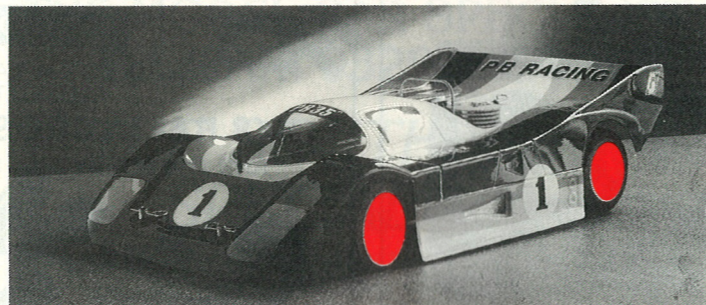
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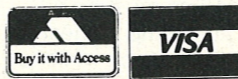
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There is a very old saying — “you cannot get a quart out of a pint pot”. This was never more true than when discussing

batteries for R/C electric cars. So many people believe that the way one charges the nickel-cadmium batteries used to power our cars, is directly proportional to the performance of the car. To a very limited extent, this is true, but it is so limited that providing one follows the basic rules, any variation of the theme will bring almost no extra performance.

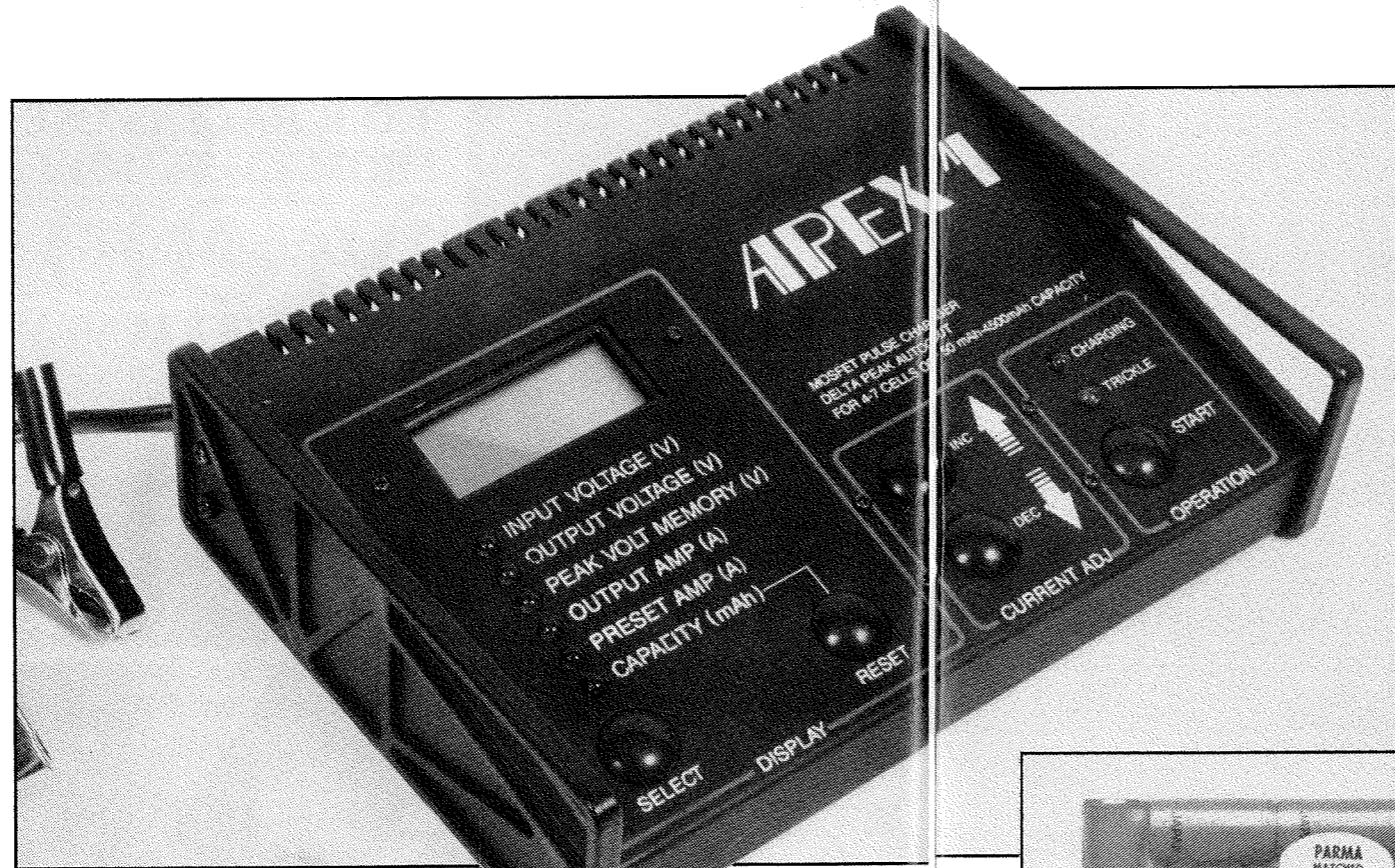
As the owner of a radio controlled car, there will be various parts you can buy to make the car go better, or last longer. Probably the only item you buy which comes from the same company irrespective of its label is the battery pack. Almost all R/C cars are powered by nickel-cadmium (ni-cad) batteries. In Europe, the standard is six cells made into a pack to fit across the car (stick packs) or on either side of the car

stored. We take this energy out in the form of dc electricity when the car is moving on the track. Once the cell has completed its energy intake, the chemical reaction continues. Instead of increasing the amount of energy in the cells, it just heats them up. If this process continues

any on immediately chemicals yourself, flush with water.

Cell Rates

The individual cells are rated at 1.2 volts nominal voltage. This means

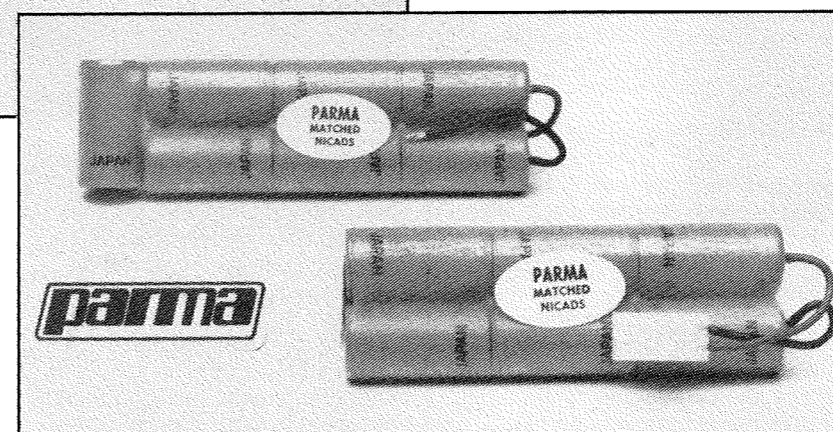


sockets. One can use a mains unit, which plugs into the household electricity supply to provide the correct voltage, or another battery. The mains unit is not easily available, and is only any use if you charge indoors at home, or at an indoor race meeting. The mains unit has one singular disadvantage. It takes its energy (electricity) from the mains which is in the form of alternating current. This passes through a transformer (to reduce the voltage to about 16 volts from 240 volts), and then through a rectifier to turn it into direct current. However high the quality of the rectifier, and any capacitor also used, there is almost always some trace of alternating current coming through to the cells. This can damage the cells. A car battery charger is even worse in this respect. Although it is a convenient source of energy to

Tricky Trickle

Another source of charging is the trickle charger, which also plugs into the mains. There is nothing wrong with this type of charge, except that it takes about 12 hours and does not give the pack a full charge. Those charging at race meetings will not be able to use a trickle (or slow) charger since there is not enough time between heats. The trickle charger remains the safest and easiest method of charging for the beginner since the cells will never overheat and leak, and the slightly lesser amount of charge (energy) in the pack will not be noticed. Trickle charging is the only method where the cells can be charged unsupervised.

Which leaves us with the battery. Any battery will do, a ni-cad, or a lead acid battery. By far the most convenient is the lead acid type which is typified by the battery used in a road car. Conveniently, this battery has a supply voltage of 12.5 volts when in good condition and fully charged, and can be used safely if certain precautions are taken. The battery is portable, if slightly heavy, and can be used over and over by recharging between meetings. Almost everyone who races cars outside uses a 12 volt car battery. Buying one is expensive, so quite a few people will open the bonnet and use the battery which is actually in the car. Again, there is nothing wrong here, but such use does shorten the life of the battery, and if you use it too often during the day, the car might not start when it is time to go home!! Don't use the



will probably reach about 12.5 volts. Ni-cad cells must never be charged direct from household mains

charge cells, a mains unit is best avoided, and a car battery charger should never be used.

Keep in Charge

(saddle packs). In America they often use seven cells in a pack, but they only race for four minutes. Far and away the best ni-cads for R/C car use are those made by Sanyo. Whether the label on your pack says Parma, Schumacher, Technicad, or Tamiya, the chances are that they were made into a Sanyo factory somewhere in the world. The cells we use for our R/C cars are designated 'sub-C' size, and Sanyo make about 30,000,000 (yes 30 million) every year of this type. We shall not go in to the details of the cell construction, or the chemistry of the charge and discharge cycle, in detail, but there is one important fact about cells you must know. Whilst charging, a chemical reaction takes place inside the cell which allows energy to be

unabated, then the cells will literally explode. all cells have built-in vents, which allow gas from the reaction to escape in a controlled manner, but this is not sufficient at the charge rates we use, and eventually the chemicals will spurt out of the cells. The chemicals are corrosive and poisonous. Whenever you are charging cells, especially indoors, never leave them to their own devices, always supervise them. If the worst should happen, immediately disconnect the power to the charger, stand well clear, and do not attempt to move the cells at all. Throw an old towel over the cells, and leave them alone for at least 30 minutes. Throw the cells away with the towel, and scrub the area where the cells have been lying with detergent and hot water. If you get

that in normal use, when fully charged, the cell will have an output of 1.2 volts. When we connect the six cells together in series to form a pack, the total pack voltage is 1.2xsix, or 7.2 volts. This has nothing to do with the capacity of the cells, and we will deal with this subject later on. There are a number of ways to charge cells for R/C car use. In all that follows we shall assume that the user is charging a six cell pack, either saddle or stick type. The configuration of the pack makes no difference. First we need a source of energy. This can take two forms. Whatever source you use, the output voltage of the source must be at least two volts above the highest voltage the cells will reach whilst on charge. In our case, the ni-cad pack

SCE, SC, or SCR

There are three cell types available. They are defined by the letters and numbers written on the cell. The numbers tell you what capacity the cells have. 1200 means 1200 milliamps, or 1.2 amps, per hour. This means that the cells will deliver 1.2 amps for one hour from a full charge. You will see 1200, 1500, and 1700 on cells in the UK. The letters following this number tell you about the cell construction, SC cells are the standard types used for many years. The SCR type are specifically designed to relate the rise in temperature to the drop in voltage (see main article). SCR cells will normally deliver a slightly higher voltage during discharge than the SC or SCE, but do not have as much duration. SCE cells are currently only available in the 1700 milliamp capacity, and these are becoming the most popular. For

general use the SC cell is quite acceptable, and the SCR cell will last a longer number of cycles. For racing, the 1700 SCE is probably the best cell since it gives plenty of duration in a race, and will last an acceptable number of cycles. Always check which type you are being offered. Prices vary wildly, but for a standard pack of cells one should be paying around the £20 to £25 mark.

Matched Cells

There are any number of companies claiming to match cells for better performance. If this work is done properly, then you will get a pack of cells in which each one is matched to the other, resulting in better performance and longer life. Matched does not mean longer duration (greater capacity) in a race. However, some of the claims are dubious to say the least. It is not our intention to recommend any one

matching process, since most companies will not tell you how it is done. What we can say is that the cells sold by Tamiya and Parma come from huge orders placed by these companies with Sanyo, and thus will always be the freshest and most likely to be from the same manufacturing batch. The best matched cells, if results are anything to go by, come from Associated and Parma. That is not to say that the others are no good, it is to say that these are the best. Be very careful about claims for computer matched cells, they often come from companies who do not buy enough cells to get the sort of close matched cells which make the difference between a standard pack and a really good pack. Frankly, the average club driver will get as good a result from a standard pack of Parma, Tamiya, or Schumacher cells as they will from any number of computer matched cells.

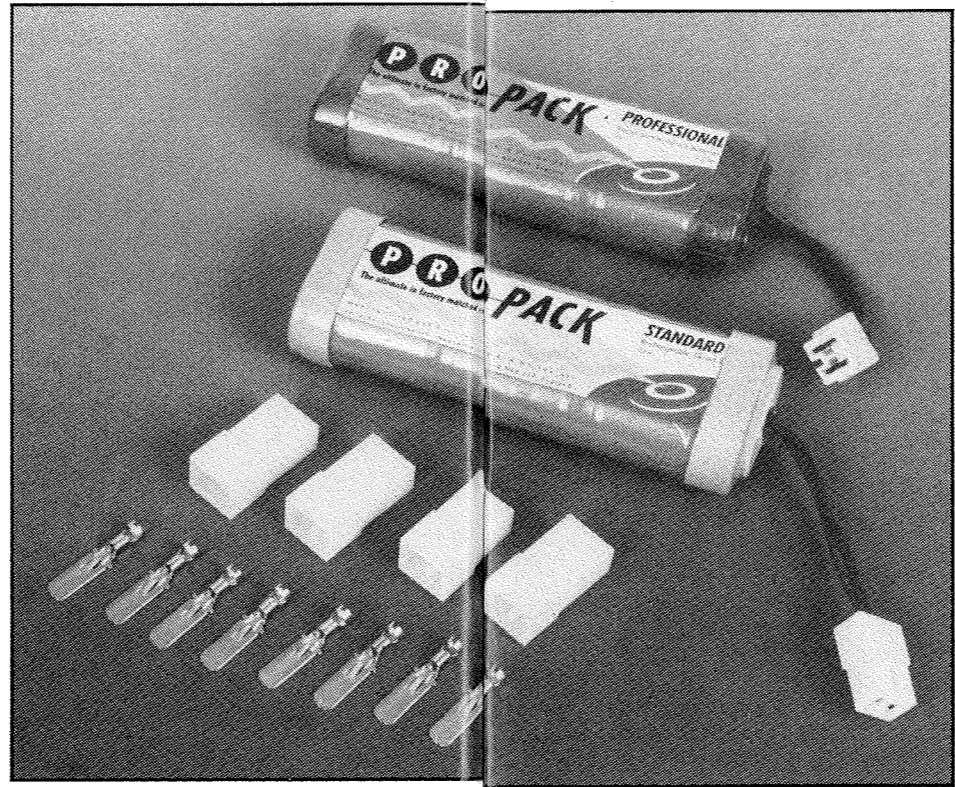


charger while the engine is running, since the car charge voltage is much higher than 12.5 volts, and this may damage your charger. If you do buy a battery, you get what you pay for. A cheap one for a small family car will cost about £40, but probably only last about a year. The two/three year guarantees on these batteries are not valid if used outside the car. A battery for a larger car (about three litres or so) will cost more, about £65, but it will last longer due to its heavier construction, maybe two years. The best batteries are those designed for prolonged deep discharge, called semi-traction batteries. They are sold for use in boats and caravans, but cost about £100 and are much heavier and bulkier. Mine cost £80 with discount, is very heavy, but has been going strong for three years now. The other

advantage of this type of battery is that for a normal club meeting, it will support two people charging at the same time. Having acquired, or identified, your energy source for charging, the next thing is to choose the right charger. If your first car is bought from a model shop and includes a fast charger in the "deal", then chances are you have one with a timer on, or with a resistor in one lead from the battery. The timer type are best, since they cut off the supply from the battery when the time has expired. However, they do not always fully charge the cells in the time available on the dial. Using a timer for the charging is OK, providing you know when to stop. There are two ways of achieving this. The easiest is to place the back of your hand on the cells. They will be correctly charged when the cells feel slightly warm to the touch. It is acceptable to keep putting the timer on again and again until this state is achieved, but you must never leave the cells unattended while charging.

When to Stop

The other way of knowing when to stop is to connect a digital volt meter to the cells as close to the plug as possible, and watch the voltage throughout the charge. Again, it may be necessary to start the timer more than once during the charge. If you watch the volt meter, you will find the voltage rises during the charge until, for no apparent reason, the rise in voltage stops. Shortly after this, the voltage starts to drop. It is at this point, as the voltage starts to drop, that the cells are fully charged. The drop in voltage coincides with a rise



in temperature, so once the voltage has dropped back by about 0.1 volts, placing the back of your hand on the cells will show them to be getting warm. The volt meter must be a digital type so you can notice the small (0.1) volt drop, and it is more accurate than sensing the temperature with the back of your hand. (We use the back of the hand because it is more sensitive than your fingers or palms which have thicker skin) However, either method will give you excellent use from your ni-cad packs, and if you run R/C cars for fun, there is no real need to buy a better charger. A timer on the charger together with the use of a digital volt meter or the 'back-of-the-hand' test is the simplest and cheapest method of charging. Those who like to take their car to race meetings and compete should try to step beyond this method for a number of reasons. The first is that the time taken to charge a pack of cells with these chargers is slightly too long, and the second is that specialist chargers do have features which will give better performance from the cells. Also, most specialist chargers will always have automatic cut-outs to signify that the charge is complete. This does not mean you can leave the cells completely unattended, especially indoors, but it does remove any 'human error' in deciding when to stop charging.

Peak Performance

Interestingly, the specialist chargers will use one of the two methods described above. Watching the voltage on a meter is called

watching for the 'peak' voltage, and sensing the temperature with your hand is called — temperature sensing!! Thus you will find two types of charger on the market called either peak detect or temperature sensing types. Before deciding which type to buy, let's say that the type of charge monitoring (peak or temperature) is far less important than the output from the charger. These days, most chargers use what is called pulsing to carry the current from the battery to the ni-cad pack. Basically, the charger pushes the energy into the cells in pulses of high current, rather than in one continuous delivery of current. The pulse is a very high frequency, but it is known to help in getting the best from the ni-cad pack on the track. However, some pulse chargers are thought to do more harm than good because of the way the electronics in the charger deliver the pulse to the ni-cad pack. It is very difficult to know what the pulse is like before you buy a charger. All the UK built one's are very good, but some of the American and Japanese ones do not have such a good reputation. When buying a charger ask if it has a soft pulse, and if the answer is yes, you will be OK. We shall not name names here because the market does change, and this advice will last longer than just the next three months. Chargers that can definitely be recommended are made by Laser, Tekin, Schumacher, Intronic.

The Price is Right

Charger prices vary wildly, and it is

not a case of getting what you pay for. Bear in mind that these things can go wrong in time, either through old age or misuse, and that a service capability in the UK is important. A target price should be around £40 to £50 for which you can get the temperature sensing charger of good quality to suit your needs.

Peak detects chargers come dearer. If you are using SCR cells (more on this later) then a temperature sensing charger is recommended. For SC and SCE cells, either type will do providing the temperature sensor has a cut-off around 30 degrees C. Now we get to the easy bit — charge methods. For every serious racer in the country there is a charge method. To take a charitable view, some of them might have a good method which really does give them more power — somehow I doubt it. There are a few basic facts to remember. It is not possible to get something for nothing. Of the ni-cad packs you buy pushed, or matched, or whatever, they still only have a finite capacity. However you charge them you will never persuade them to hold more energy than they can, and thus you cannot get more out than they have in them.

Connect the charger to the energy source, your 12 volt car battery probably. Connect the ni-cad pack to the charger. Always make sure that you have connected the positive leads to the positive terminals of the charger and ni-cad pack, and the same with negative leads. Never connect them the wrong way round. Some chargers prevent you doing this anyway. Select a charge rate suitable for the cells you are charging, if the charger allows this. SC cells should be charged at about 3 to 4 amps, SCE cells at about 4-5 amps, and SCR cells at up to 7 amps. These rates can be varied, but anything below 2 amps in any case will not give the best performance. SC and SCE cells will last longer if they are charged at about one amp below the rates given. In both cases, never use a temperature cut-off level above 30 degrees C. SCR's can accept temperatures up to about 45 degrees C. Charge rates above those given will shorten the usable life of the ni-cad pack, that is the number of times it can be charged and discharged in racing conditions.

This charge and discharge is known as a cycle, and carefully looked after, a ni-cad pack should last about 200 to 300 cycles. It will be lower than 200 if you use high charge rates, and above if you use low ones. After about 150 cycles in both cases, the performance of the ni-cad pack will be lower than it was when new.

Keep Look Out

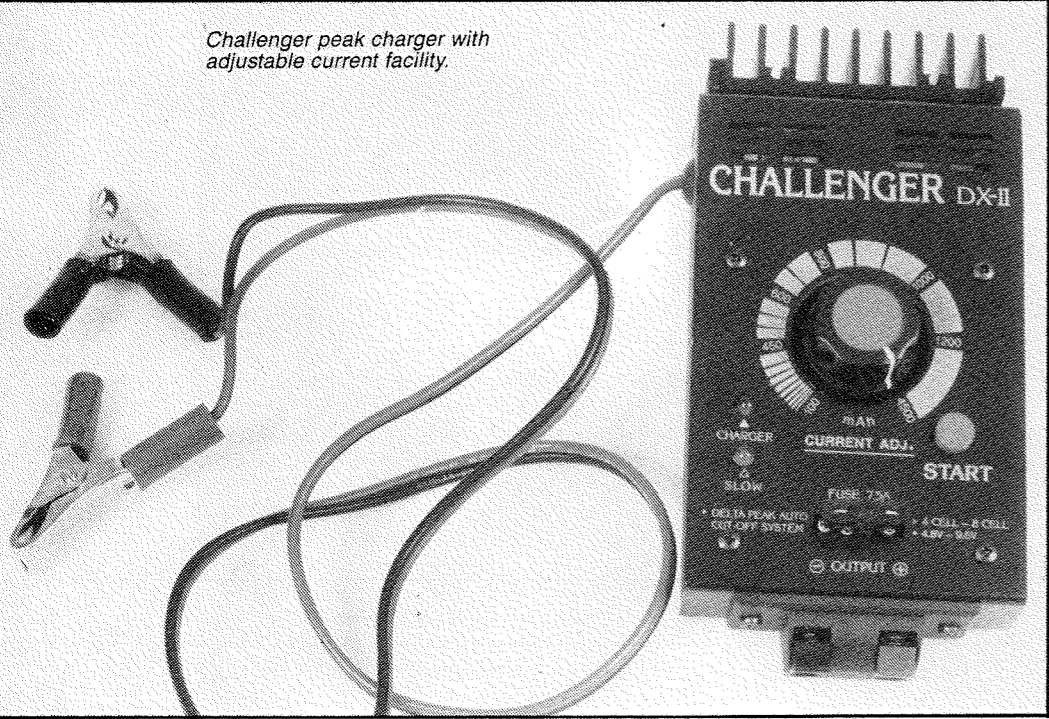
During the charge cycle, keep an eye on your cells. Outdoors in the summer, keep the charger and the cells in the shade, especially if you are using the temperature sensing charger. The sun can give 30 degree readings on its own, without the help of the heat in the cells. If this happens, the charger will cut-off without charging the cells at all!! Similarly, the outside temperature affects the amount of charge the cells will accept, and can distort the cut-off for a peak detect charger too. Most chargers will give a visual indication that the charge has finished (all the ones mentioned will cut-off automatically anyway) and the cells should be disconnected at this point. That is all there is to charging a set of cells. Select the right charger, connect the cells, and when the charge is finished, fit the cells in the car. For the majority of racers, this will give long life to the cells, and excellent performance to your car. However, someone is going to tell you that you can try this, that, or the next thing, so here are the right ways to get a little bit more from you ni-cad packs.

Firstly, if you can, time the charger so the cells complete charging just a few minutes before your race, you will find that the car is a bit faster under acceleration. However, this is not always easy, so most people charge their ni-cads in advance of the race. If you re-connect the ni-cads to the charger about ten minutes before your race, and allow the charger to charge the cells again until it cuts out, you now have the very maximum amount of energy in the ni-cads. Under these circumstances, the car will probably last a little bit longer on the track before the cells go flat, but will not have that little extra bit of acceleration. Many people will not notice the difference, but there is one.

Keep em Cool

At all times, you should try to keep the ni-cad cool whilst charging. Many drivers at the top level of racing get their cells quite hot when charging, and this does give a bit more duration in the race. However, it does kill off the acceleration, and it shortens the usable number of cycles the ni-cad pack will last. This does not worry most of the top drivers, since they can either afford frequent replacements, or have a sponsor who can! It should worry you, so do not get the cells too hot. The same thing applies when the cells have discharged in the car. They will come off the track very

Challenger peak charger with adjustable current facility.



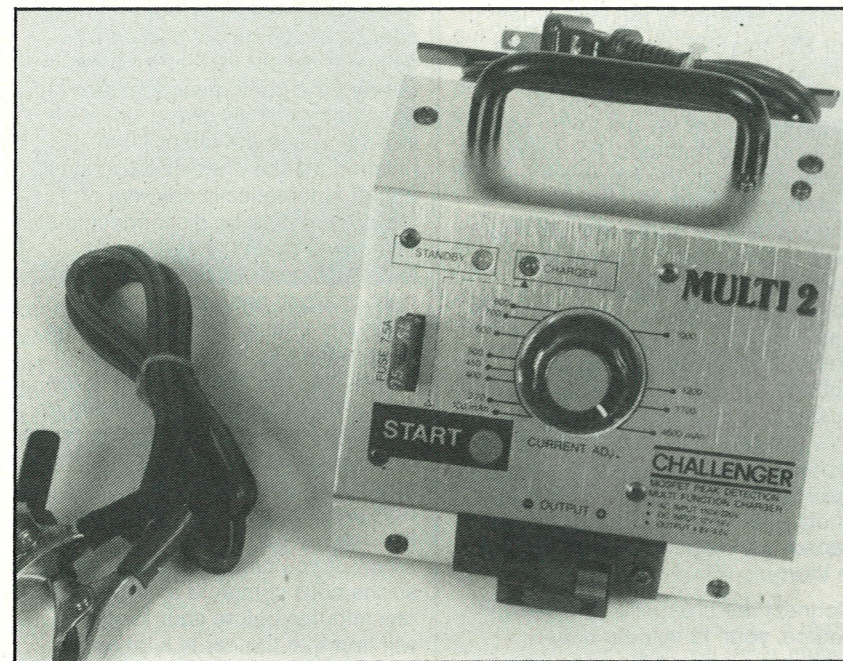
much hotter than they went on, often too hot to clasp in the hand. Providing that the plastic wrapping the cells does not split or melt, you have a serious problem with the motor, the car, or the electronics in the car; and you have shortened the life of the ni-cad pack. Once the cells have been used in a race, they should not be recharged whilst

warm. This is particularly important if you are using a temperature sensing charger. Ideally, cells should be allowed to rest for 24 hours before being used again. However, this assumes you have one ni-cad pack available for each race, which is not always within the reach of the average racer. The best cells to use more than once in a day are the

SCR type, but they are getting difficult to come by these days. SC cells will be the next best, with the SCE cells coming in last. However, if you can buy just two packs of cells, this will be much better than using only one pack for a whole day, since the cells coming off in round one do not have to be used again until round three, and should be cool enough to charge by then. Even SCE cells will accept this level of daily recharging.

The secret to proper charging of ni-cad packs is to use an energy source in good condition (a 12 volt car battery fully charged), a good quality charger using either a peak voltage detection, or temperature sensing, cut-off, and to keep the cells cool both during and after the completion of the charge. However hard you try, it is not possible to get more out of a ni-cad pack than it is able to deliver. Try not to use the same pack of ni-cads in consecutive races, and do not allow the wires from the battery or the charger to touch each other at any time. Lastly, remember that the reason your car is not as fast over a five minute race as the next mans' is rarely because he has better ni-cads, or a better charge method. It is almost always because he drives better than you. As we said at the beginning, you cannot get a quart out of a pint pot.

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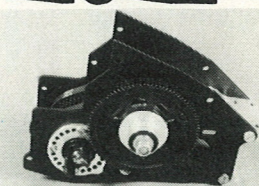


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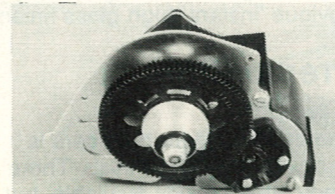
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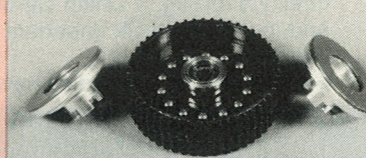
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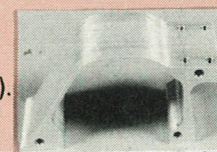
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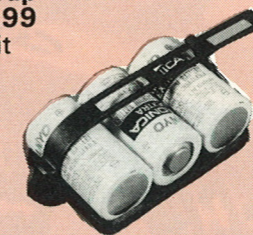


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Brush Strokes

To produce an attractive paint scheme on a model car, there are a number of items you will require; these include paint, masking medium, a reasonably high quality airbrush, a Lexan car body and, by far the most important ingredient, patience! For this article, two bodies have

been painted, showing stage by stage how to reproduce a simple 'box-top' type scheme and a different, although no more difficult, custom flame finish. Both bodies shown here are the clear Lexan type and hence require all painting to be carried out on the *inside*. This has a number of advantages including the protection of the paint from chipping

Bob Petrie shows how to produce two classic paint jobs; box top and custom flames

or scuffing when racing and the obvious 'instant' high gloss finish.

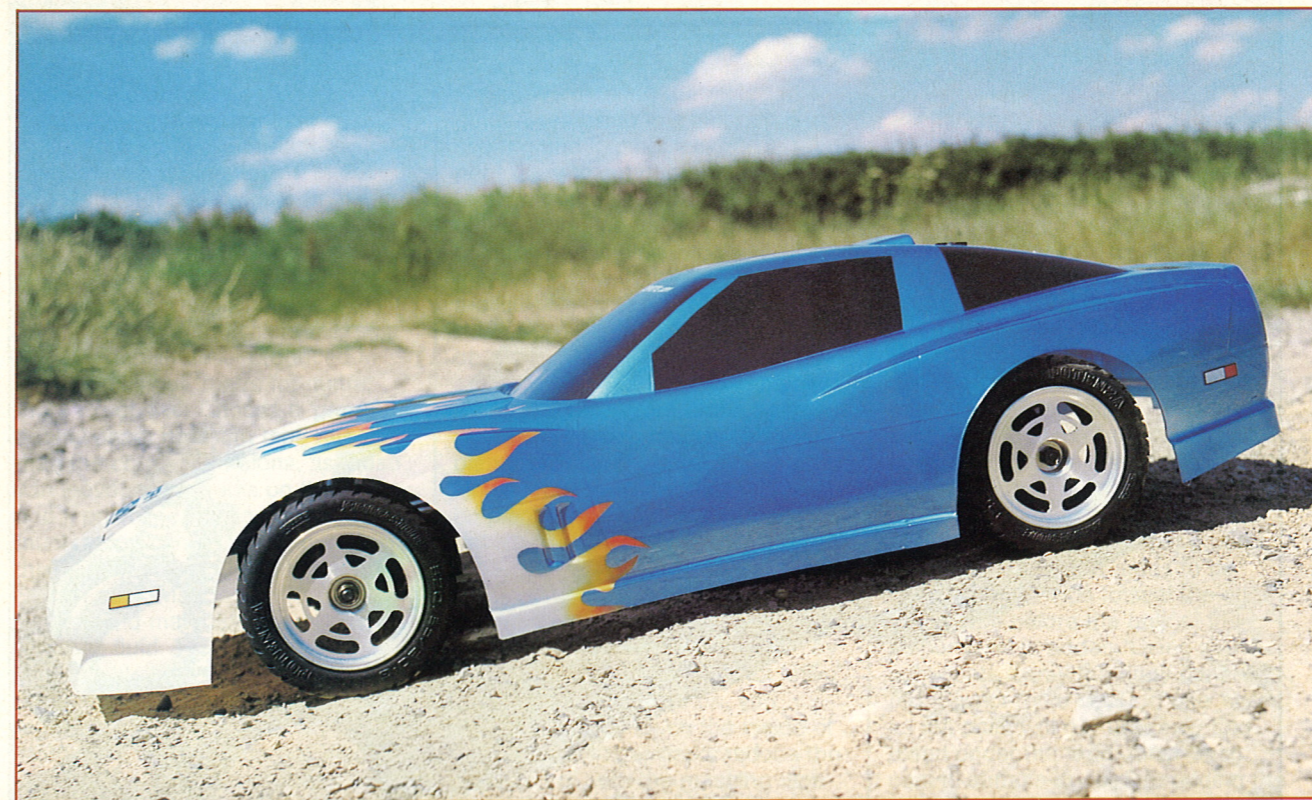
Preparation

1. Paint

The paint used for both cars is Pactra R/C Racing Finish. There are many other brands available, but having tried most, this particular make is the one I find the easiest to use and produces the best results.

2. Masking

To mask bodies, I use one of two methods. The first, used on the Cougar, is the more 'traditional'





Top: Cougar shell is finished with the Schumacher decals. Right: Kyosho Corvette shell is an excellent subject for the classic custom flame job.

using a thin, plastic tape for all edges and lines, backed with normal, paper masking tape for filling in. The thin tape I use is manufactured by 3Ms under the brand name of Fine-Line. It is supplied on rolls in widths from $\frac{1}{16}$ in to 1 in; the most used sizes being $\frac{1}{8}$ and $\frac{1}{4}$ in. As this particular tape is sufficient to paint a whole fleet of cars, the Pactra equivalent makes a suitable substitute — produced in smaller rolls but, metre for metre, more expensive. Choose a 'graphic' quality paper masking tape rather than the cheaper versions, as these can leave sticky marks on the body and if provoked, by applying too much paint, can let the colour bleed through. The best I have found are Scotch and 3Ms.

The second material I use is masking fluid. This is a liquid, usually pale blue or purple in colour that is brushed on, allowed to dry, recoated and again left to dry thoroughly. Using a sharp scalpel, the dry masking fluid can then be cut and peeled off leaving the lexan exposed, ready to paint. The beauty of this system is that hard-to-get-at areas and intricate details can be masked far more easily than when using tapes. Curves are also a breeze! The one used here is made by the American company Metallflake and is called Spray Mask. This is primarily used for custom painting full-size cars and is hence supplied in litre tins. Undoubtedly the best I have ever tried, Spray Mask is available from all good car paint suppliers. Try the Yellow Pages for your local stockist.

3. Airbrush

Again, the better quality airbrush you choose or own, the better the results. Twin action types that enable the quantity of paint being sprayed to be adjusted whilst in use are not essential but are desirable. Familiarity with your airbrush is almost as important as the quality. Practice, practice and then practice some more! Read up the subject; Ian Peacock's Airbrushing and Spray Painting (available from ASP) is particularly recommended. When using an airbrush for the first time, use water based paints or inks as these are easier to clean-up afterwards. When you are happy that you can pick up your airbrush and spray without painting the cuff of your shirt — read on!

How to paint — the Cougar

Firstly, cut the body shell and wing from the 'spare' lexan. Use a scalpel

to score the body, then gently fold the score line to free the body. Carefully cut along the moulded guide-lines using this technique of scoring and folding; it is not necessary to cut right through the lexan with the scalpel. If either side of the score line turns a 'milky' white colour when folding, stop and score more deeply with the knife before the 'cut' line runs off course and ruins the body! Straight lines should be cut with the aid of a ruler, or use an off-cut of Lexan as it can be bent around the curvature of the body. Always use sharp blades and take plenty of time.

Holes for body fixing pins should not be pierced yet, as these can allow paint to be oversprayed through. When you are happy with the results, wash the body thoroughly — inside and out — with washing up liquid and plenty of warm water. Dry using paper towel that will not leave tissue dust. From now on, you should try not to touch the inside of the body, as fingermarks reduce the adhesion of both the masking tape and paint.

Having decided on a scheme, the outline of the windows are masked with Fine-Line tape, overlapping all joints, cutting off the excess using the overlap to guide the scalpel. Press hard enough to cut the tape but not mark the Lexan, as all deep scratches weaken the body. Practice by sticking some spare tape on a sheet of paper, then cut the tape without cutting the paper underneath. Difficult at first but with practice, the pressure required becomes second nature. Again, always use sharp blades — blunt ones leave ragged edges that show up beautifully when painted!!

Now, rub down the tape firmly, not with a finger but with the back of the knife. Pay particular attention to the overlaps, as these will allow the paint to creep. Back-mask the windows using paper tape overlapping the Fine-Line, then trimming the excess to cover half with width of the Fine-Line. Rub down all edges carefully. Using $\frac{1}{8}$ in Fine-Line, mask the breaks between the two main colours and all lines that will eventually be painted white, using the photographs as a guide. Gently pull the tape as you apply it to obtain straight lines. Do not be afraid of pulling a length of tape off the body and replacing it if you are not happy with its positioning — masking tape is cheaper than the body. Because we will paint the darker colour (red) first, apply paper tape to mask the yellow areas in the same manner as the windows. Double check all overlaps are pressed down firmly with the back of the scalpel and prepare to paint.

Thinning paint

As supplied, most paints are too thick to spray straight from the bottle. Thin the paint using the recommended thinner until the approximate consistency of milk. Experiment on a scrap piece of lexan to get the mix right for the particular airbrush being used. A word of safety at this stage. Always paint in a well ventilated room when using paints such as Pactra, or its equivalent, and always use a face-mask. Charcoal loaded types are best, but a cotton mask should be considered as the absolute minimum requirement.

Load the airbrush with thinned red paint and spray a light coat around the edges of the red areas to be painted. This helps to seal the edge of the tape before the bulk of the colour paint is added. Using many light coats, spray the body panels red. Do not try to cover in one 'shot' as the paint will run unevenly and bleed under the tape. Allow each coat to surface dry before adding the next. Done correctly, only a matter of seconds should be required before recoating.

Hold the body the right way up over a white surface to check that all areas have been evenly painted. If you hold the body up to the light you should still be able to see through the paint. Leave to dry, whilst you clean the red paint out of the airbrush.

Remove the paper tape from the areas that will be painted yellow, using a scapel to gently ease the first corner from the Fine-Line. Do not remove the Fine-Line at this stage and avoid touching the red as, although the surface is dry, the underlying paint may not be and is easily marked. Spray yellow paint to cover the unmasked and the red areas as, this will give a better density to the colour. Again, use light coats, allowing to dry between each. Clean the airbrush, then remove the paper tape, followed by the Fine-Line. Always pull the tape back on itself to produce crisp lines. When picking up the corner of the tape, be careful not to dig the freshly painted areas with the knife!

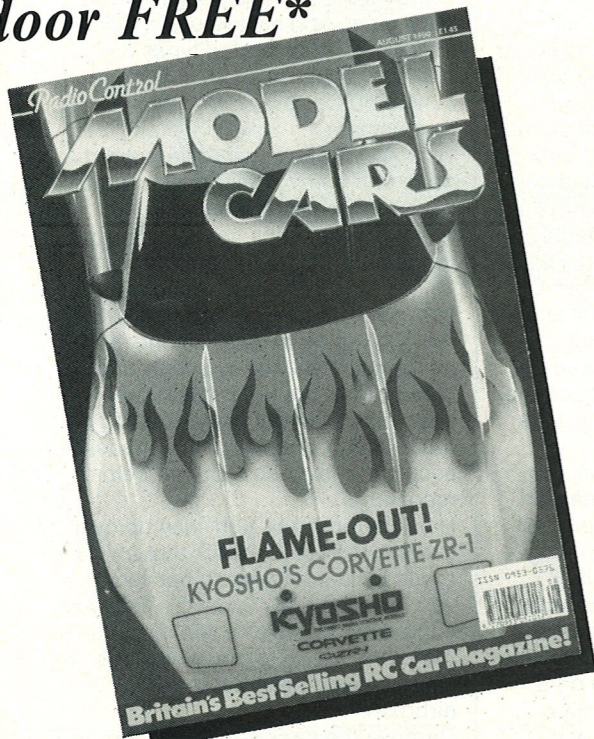
Load the airbrush with white and spray all over the inside with paint. Light coats are still needed as wet paint on the dry red or yellow may cause it to 'blush' the white with colour. Allow to dry, then turn the body over and admire your handiwork. If there are no red or yellow marks in the white — well done!

Remove the paper tape and Fine-Line from the windows. If the car is for racing, you have finished; if it is for show and for driving-for-fun, paint the windows with metallic black for a

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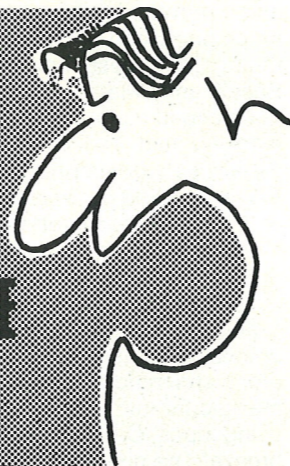


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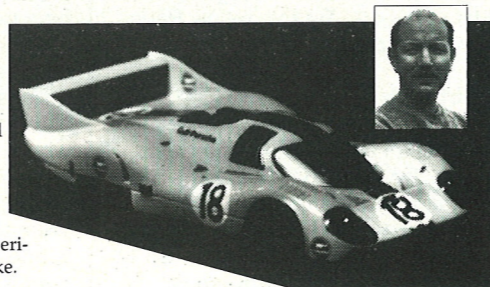
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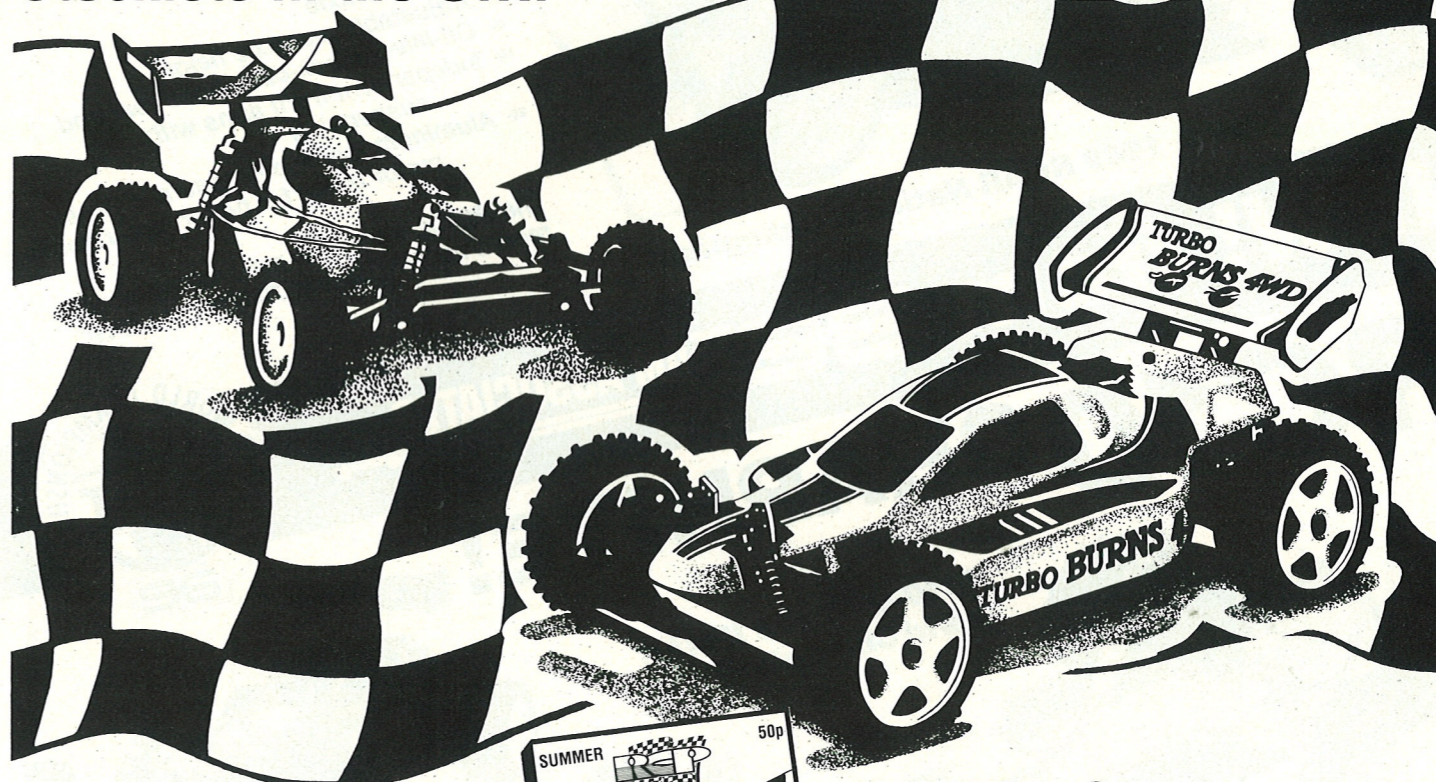
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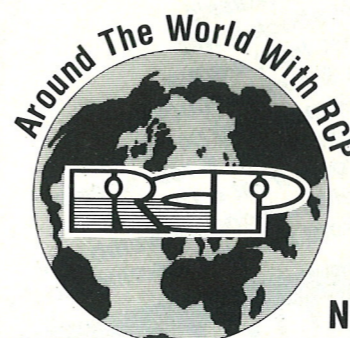


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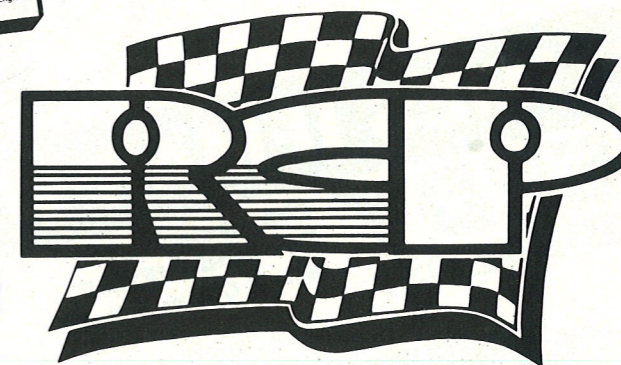
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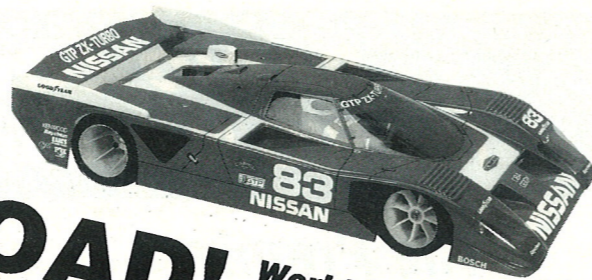
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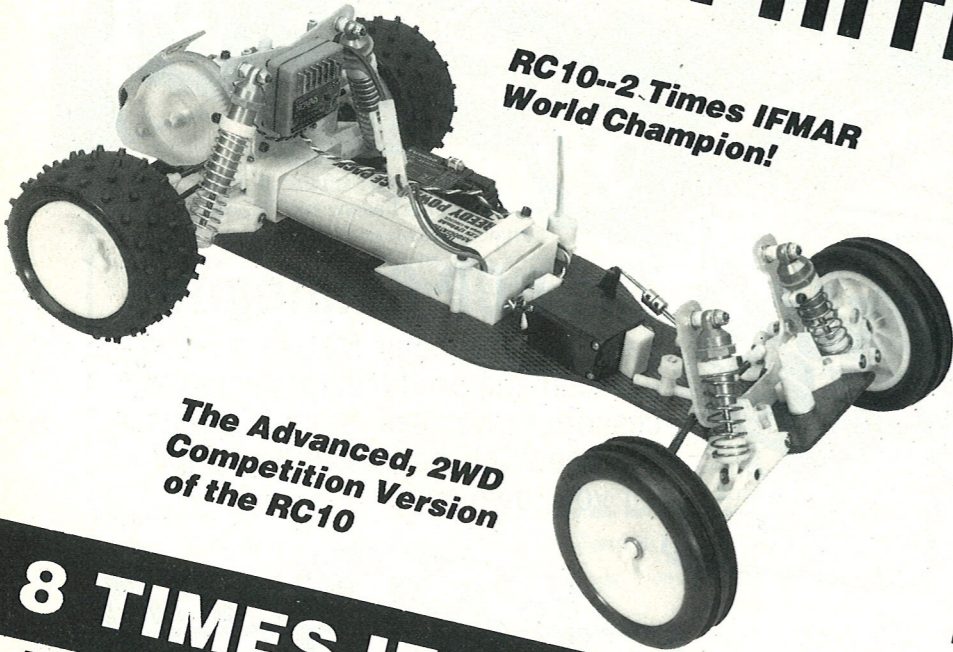
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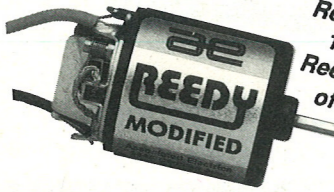
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