



# ASSOCIATED RC500-4WD

Backed by success at last year's world Championships

Associated have provided all-wheel drive for their RC500

1/8th scale Track Racer. Colin Leake has been building it

sufficiently far enough through the housings. There were insufficient washers to prevent the circlip fouling on the aluminium housing.

I can't believe that Associated are going to stick with this arrangement. It just has to be a temporary solution, whilst they tool up for a better one. With this system if you were not satisfied with the front tyres in the warm up for a final it would be hard luck, there would be no time to change them. Equally there would be a problem if it suddenly rained. Associated should be looking at *Serpent's* method of fixing the front wheels.

We have looked carefully at what would be involved in fitting *Serpent* front wheels. To make up adaptors would be quite easy and no doubt some budding entrepreneur will have some for sale if the Associated Car became popular.

To make matters worse the wheels themselves provide a

problem. They are of a smaller diameter than the wheels used on European kits and slightly tapered. This makes it difficult (but not impossible) to fit MRC pneumatic front tyres. No problem this in America where they very rarely race in the rain but a very definite one in the UK where we race in all weathers.

The track width at the front is 245mm which makes it considerably narrower than its competitors.

Castor is adjusted by moving washers on the top wishbone suspension pins. Quite an easy and quick operation and of course very positive with no possibility of a shunt changing the setting. Interestingly Associated suggest moving the arms back and increasing the castor to provide more steering bite. Quite the reverse of *Serpent* and SG's recommendations. Given time I look forward to checking this on the track. My guess is that this is aimed at reducing power on

understeer.

Finally on the front-end the suspension pins also come in for criticism. On the detailed photographs of the works cars I have seen these cars located by 'E' clips. No such provision is made on the kit car. This type of thing always annoys me. If it's done on the Works Cars then clearly Associated know it is necessary and on a kit as expensive as this one it should be done.

## Chassis

The chassis is made of thick fibreglass joined to the radio plate by spacer posts to provide a very rigid yet lightweight structure.

The only problem I could find was that if Associated are going to drill this out to save weight then they might at least make sure one of the holes is positioned to provide access to the *Kimbro*.

The radio plate is one of the least thought out aspects of the car. The servo's are held in by tie wraps. The throttle servo is trapped by the radio post (which has to be undercut to clear the servo) and the post which supports the rear brace. We needed to take one out to reset the belt tension. To take it out and replace it took two of us 20 minutes.

The steering servo is even worse. To change this the whole radio plate would have to be removed.

**O**n a world wide basis the Associated 'RC500 4WD' looks to be one of the few cars capable of challenging the present dominion of the popular *Serpent* cars. On its first serious outing it took four of the ten qualifying places at the recent World Championships, eventually finishing fourth, fifth, sixth and seventh.

Thus it was, that when we heard that Ted Longshaw was intending to import a few of these cars and provide a proper spare parts service, our interest was aroused. A phone call to Ted revealed that the first few kits had been imported to order but that Mike Spurway would be prepared to lend us his part built car to finish off and take to a couple of race meetings. Our thanks accordingly go to Mike. How many people do you know who would lend out a new car and motor before they had even completed it?

## Converted

Basically Associated have taken the already successful

and much loved 'RC500' and converted it to four-wheel drive. The conversion is achieved by using one single long *Uniroyal* HTD drive belt. This runs from the rear lay shaft, past the engine, behind the flywheel either side of the crankshaft housing, down through a well made tensioning device to a large diameter front pulley secured to a lay shaft supported in small aluminium bearing blocks.

It looks and sounds complicated, but in fact it is not. Should a belt need to be changed the rear lay shaft is easy to slide out freeing one end of the belt. The complete front suspension assembly is released by undoing two bolts and the steering ball joints. Once this has been done all that is necessary is to undo the four cap screws on top of the bearing housings and the two lower ones. The motor bolts also need to be undone to allow it to be moved backwards so that the belt can pass between the flywheel and the side moulding.

Associated have followed the lead of their fellow American Company, *Delta*, and have over geared the front-end in relationship to the rear. That is to say the front wheels are tending to pull the car along. As in the case of the *Delta* this produces a very stable car and yet does not provoke the understeer that one would expect.

Associated have also taken the opportunity to change the drive to the rear wheels from a chain to another *Uniroyal* HTD belt. This time using a much wider belt, reinforced with fibreglass rather than Kevlar.

The use of large diameter pulleys, correct tooth form and a well made tensioning device on the long belt all combine to ensure long belt life.

## Front-end

The front suspension features unequal length wishbones the lower ones being extremely long. The actual suspension is provided by coil springs over

Associated's beautifully made shock absorbers. These are arranged in a cross over form at the front and act on extensions of the lower wishbones. The ride height and suspension stiffness is adjusted by nylon nuts which run up and down the threaded barrel of the shock. Movement is surprisingly short but the suspension appears to work very well.

An anti-roll bar is fitted at the front end, mounted in blocks on the top of the front bulkhead and operating on the lower wishbones via short ball jointed pushrods.

Drive to the front wheels is taken from the centre layshaft to the stub axle by long slender looking drive shafts. These look delicate but have given no trouble so far.

The instructions tell you to grind the pin in the outer end to 12mm so that 2.2mm protrudes each side. I take great exception to this. If they should be to these dimensions then they should be delivered ready ground. Just imagine if you need to replace one in a final.

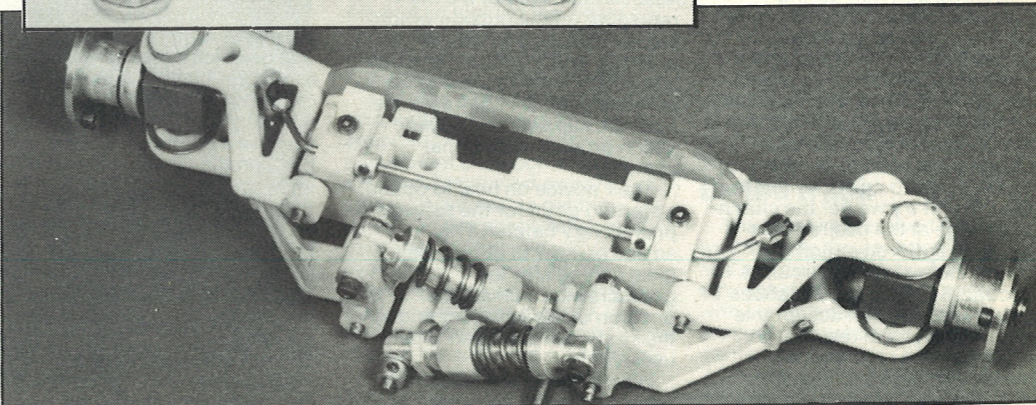
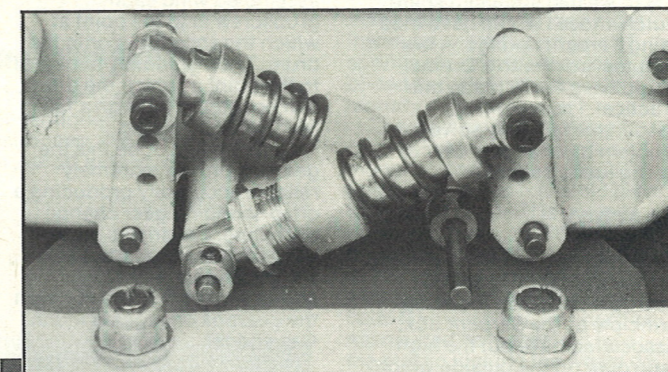
Rip open the packet containing a new shaft then reach for the Dremel and Vernier gauge. Come on Associated you won't get away with this approach in Europe.

The front wheels are a crazy arrangement. The most complicated system we have ever come across making changing a front wheel a very slow affair.

Working from the inside out we have, a small washer, a bearing, a turned aluminium mount, the wheel, the outer mount containing the one way bearing, four or five small washers and a circlip. Drive to the front wheels is by the heads of two cap screws that poke through the front wheel spokes.

On our example the one way bearings had not been pushed

Top: a modified paint job by Bob Williams adorns the 'RC500 4WD' chassis. Right: the converted front-end moulded in chunky white nylon and close-up of the diagonally opposed dampers. Adjustment of the plastic nut could be tricky.



The other problem with the radio plate is that there is insufficient room on the front left hand corner to make adequate provision for rigidly mounting the pipe.

A number of drivers are talking of running *Associated* cars next year, all say they will make a radio plate of their own and incorporate a *Serpent* tank.

The fuel tank is the same as the one I criticised in the *Delta* Car — long and thin with no internal baffling. It's a poor effort by today's standards. The pressure point connects to a tube which runs to the bottom of the tank causing difficulty when refuelling. It also blows any excess fuel left in the tank at the end of the run into the pipe.

We tried to use this set up just to see what it was like. After my second lap full of fuel I sealed the *Associated* point and tapped into the thick part of the neck where it flares out to accept the hinge in normal European fashion.

Additional problems do occur because the tank top is hinged the wrong way for use in Europe and is held shut with a coil spring which passes down the tank neck to the bottom of the tank. This obstructs the neck and makes the use of a wide spouted quick filler difficult.

Moving further towards the back of the car no provision is made for a roll over bar. Once again it is simple enough to make and fit one but it really should not be necessary. *Associated* should take note that such a device is expected to be fitted as the norm in Europe. If *Delta* can fit one I am sure *Associated* can.

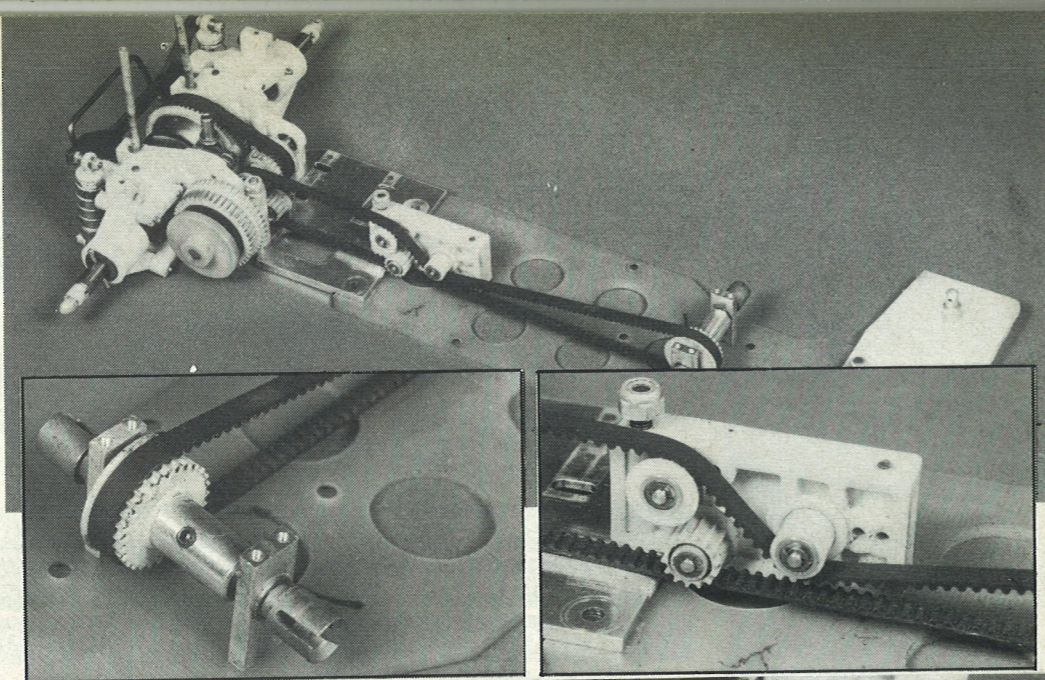
## Clutch

Next, following our pattern of working from the front to the back of the car we come to the clutch. Once again *Associated's* late entry into the four-wheel drive market shows.

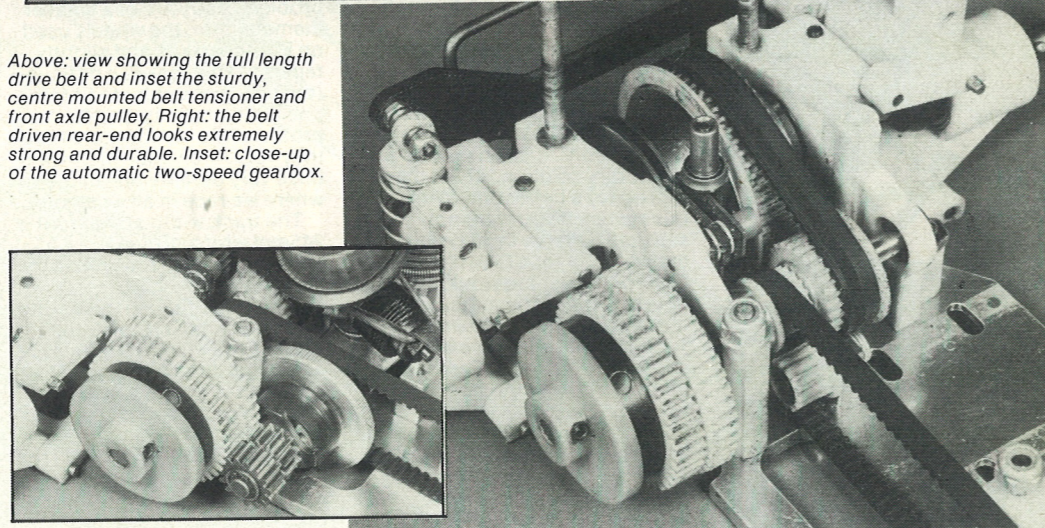
With a four-wheel drive circuit car it is essential to have a clutch which does not engage until fairly high engine revs. have been obtained and which disengages cleanly in slow corners. It's a problem which plagued *PB*, *Serpent* and *SG* in the early days but which each company has now overcome.

The two pin, non-spring loaded *Associated* clutch has a very long way to go in this respect. Our car was slow off the line as the clutch engaged too early and the engine could be heard bogging down badly as the car came out of the slow corners. We tried to cut the shoes down to correct matters. On the first try we got the clutch to engage at the desired revs but then suffered clutch slip round the rest of the circuit. A second try at cutting the shoes down produced an acceptable but far from ideal result.

No doubt *Associated* are aware of the problem and actually working on it. I noticed



Above: view showing the full length drive belt and inset the sturdy, centre mounted belt tensioner and front axle pulley. Right: the belt driven rear-end looks extremely strong and durable. Inset: close-up of the automatic two-speed gearbox.



that one of the photographs used in the instructions actually shows three pins on the flywheel!

Had we had sufficient spare clutch shoes I would have tried using *Serpent* springs. A few minutes' work with a Dremel would have easily made this practical. I suspect that *Associated* will only solve the problem by changing over to spring loaded shoes.

## Gearbox

Moving further back we come to the excellent two speed gearbox. Based on the same principle as the *Serpent* box, *Associated* have put the high ratio gear on the outside which means that the one way bearing is on the inside where it is much less susceptible to the ingress of dirt and water. They also use a plastic cap over the outside which provides additional protection.

Their advice on how to obtain a starting point for the settings proved very helpful. Their advice on how to obtain the ideal settings for the grub screws which set the position of the balls locating in the shaft recess proved totally useless.

We tried to follow it several times and failed miserably to

obtain a crisp gear change. In the end we opted for the method used by most European drivers. With the clutch fully assembled wind each grub screw in to the point at which the shoe locks onto the drum. Then gradually back it off to the point at which the drum can be rotated through a full 360° without fouling.

Once we had done this the gearbox proved extremely reliable accurately producing a crisp sounding gear change each time. For drivers more used to *Serpent* gearboxes it's worth noting that the adjustment of the revs at which the gearbox changes is much less critical.

We are still checking to see what gear ratios are available. The gearbox supplied with the review car had the ratios much closer together than we normally use. On our *Serpent* we have a difference of four teeth on the plastic gears and three on the pinion. The *Associated* had a difference of two teeth on each. Once again this was reflected in the car being out accelerated both off the line and coming away from hair pin corners.

## Weighty

The rear-end of the car is a completely self contained

assembly held on with massive steel bolts that would not be out of place in the tracks of a tank. These bolts are one of the causes of the car being overweight. It actually weighs 4oz more than a *Serpent*.

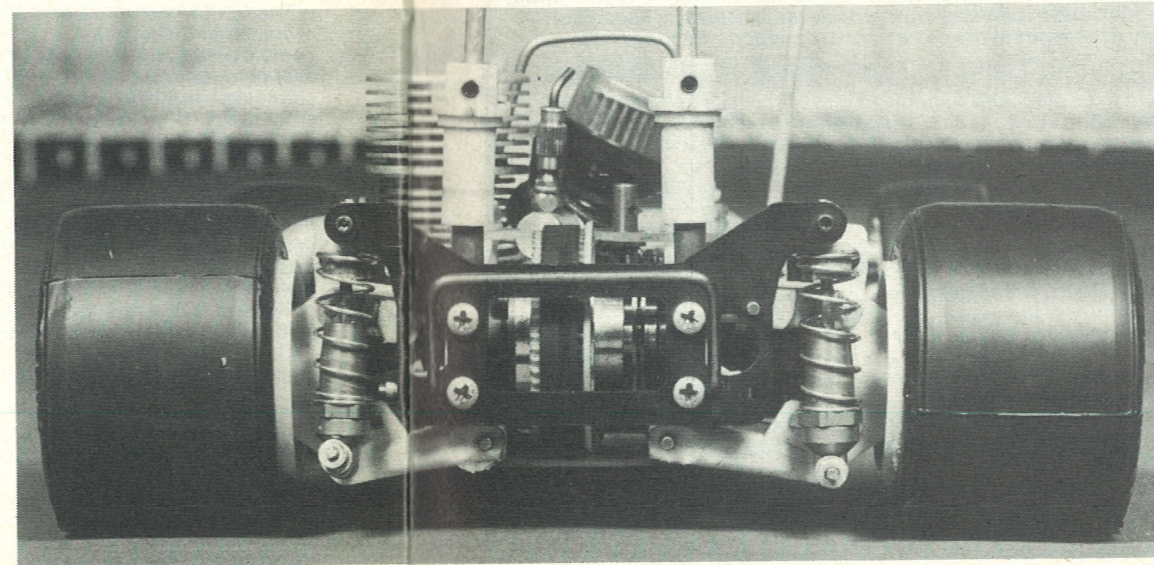
*Associated* tell me that to really get the best out of the car it is necessary to shed 8oz and that this can easily be achieved by reducing the weight of the metal parts. Well possibly it can but easy it is not. I know where I could get lightweight bolts made to replace the heavy steel ones supplied but it would necessitate a trip down to Hastings for me and they would cost a considerable amount of money to have made.

If one purchases a racing car kit, especially an expensive one like this, one is entitled to expect that it will be ready to race in its most competitive form and that it will not differ markedly from the team cars. If the European manufacturers can achieve this, and indeed so can *Delta*, then *Associated* should be able to follow suit. The provision of these bolts in aluminium alloy would surely not add greatly to the component cost and would provide a very worthwhile saving in weight.

The ball type limited slip differential is one of the best and smoothest units I have ever come across. Very easy to adjust and silky smooth in operation. Even after the considerable pounding we gave the car it still retained its original smoothness. It's streets ahead of the ball diff in that other car.

When the diff is installed the instructions say that if there is any side play, shims should be added to eliminate it. In our kit none were provided so we had to make one by hand. I really cannot see why *Associated* do not machine the shaft to give a correct fit without the aid of shims. It's not necessary to carry out this laborious process, which involves assembling and disassembling the rear-end at least twice on any other make of car we have every built.

Below: from behind showing the vertically mounted rear dampers. These are the front, short stroke type as used on the *Associated* 'RC10'. Rear wire bumper prevents damage from a rearward collision.



## Brakes

The brakes are carried on the rear axle and consist of two ground steel discs running between *Ferodo* type pads. The pressure on the pads is provided by a very heavy square section steel cam mounted top and bottom in ballraces.

These ballraces were the only thing to fail on the car whilst it was in our hands. The lower one fell apart as we installed it! Since all the other ballraces used throughout the car appear to be of first class quality I can only assume that these came from a faulty batch.

Why *Associated* use such a heavy steel cam when *Serpent* have shown that an alloy one is adequate beats me.

In action the brakes were amply powerful and super smooth. We did notice afterwards that the brake discs had run so hot that the metal had turned straw colour with the heat. This did not appear to affect the brakes' performance but it must mean that some drag was taking place.

A close examination of the photographs of the team cars reveals that they have triple discs with little steel pins at the back to keep discs running true. Another example I'm afraid of *Associated* knowing of a problem but not bothering to cure it in the kit.

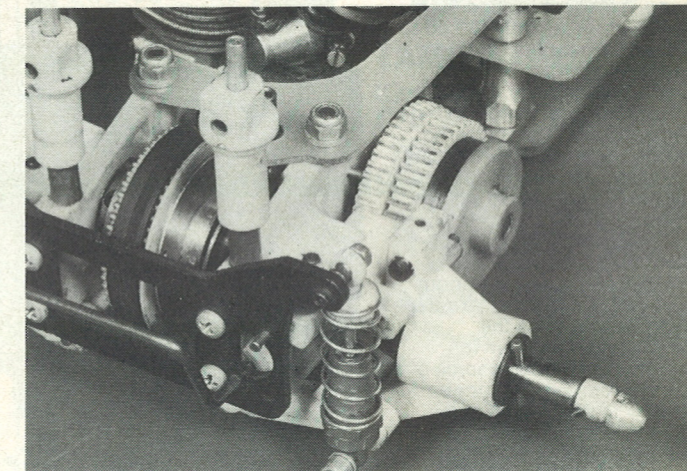
The only provision made to adjust the brake is by having a collet on the rod. Hardly a precise or convenient way to adjust it. This arrangement makes it virtually impossible to adjust the brake during the warm up before a race or should the conditions change. The end of the rod needs to be threaded so that a plastic knob can be fitted to make possible adjustment from the back of the car in *SG* fashion.

## Rear suspension

The rear suspension is by conventional unequal length wishbones, the top ones being very short indeed. A great deal

of work has to be done in removing plastic from this upper arm to clear the vertically mounted shock absorbers.

Once again no method of retaining the suspension pins is provided. Ours worked loose first time out so I attempted to secure them with hastily installed grub screws. Unfortunately the plastic used is soft and the use of grub screws proved only partially successful. A much more secure method would be to drill a small hole just off the centre line of the pin. Then remove the pin and grind a substantial amount off the side



Above: quick release wheel fixing for the rear hubs. Rear hub carriers also act as wing mounting points.

to coincide with the holes. Finally replace the pins and screw a small pointed self tapping screw into the holes securely locking the pins in place. This method ensures that any forces applied to the fixing screw push sideways rather than upwards, thus not tending to push the screw out.

*Associated* have used the legendary shock absorbers from the 'RC10' Off-Road electric car. No provision is made for adjusting ride height instead three different sets of springs are provided, colour coded to make them easy to identify.

The stub axles themselves carry a quick release device modelled on that used by *SG*. Someone should have told them that whilst the pawl is moved down when you start to remove the wheel it has to be released as the wheel comes off and slides along the inside of the hole. If you leave them sharp as *Associated* have they cut into the plastic locking the wheel on. Once I finally managed to release the wheel I took the sharp edge off with a Dremel.

The rear wheels are carried on small plastic adaptors. I suppose that this is very convenient and economic for existing *Associated* owners but I found it difficult to get the wheels to run absolutely true. I trust that *Associated* will eventually bring out a new purpose made wheel. If they do there is sufficient room to replace the present rather narrow rim with one made to the full legal width without making the car too wide.

The wing is mounted directly on the rear suspension and is meant to be held in a hole in the rear bearing housings by a grub screw in the plastic. A final example of the difference between the works cars and the kit this. The soft plastic has no chance of holding the grub screws without stripping the thread. *Associated* clearly know this as the works cars have aluminium inserts held in by 'E' clips to take the grub screws.

*Associated* have followed the lead set by *Serpent* and have issued the standard 'RC500' instructions with a section

updating it to four-wheel drive specification. Bearing in mind the slating I gave the *Serpent* instructions I received many assurances from the importer that a new set were being prepared. As it turns out these did not create much of a problem. It was mildly inconvenient to refer to different sections but this was more than made up by the clarity and meticulous attention to detail of the text which ensured that every aspect of building the car was fully covered, including instructing you to do things that the factory really should have seen to.

All this was backed up by what can only be described as two picture books. These beautifully and thoughtfully taken photographs are clearly printed and cover every detail of the car at every stage of construction (*Serpent* please take note). No one should have any difficulty in building this car, even a raw beginner should be assured of success.

## On the track

The most impressive thing was the way the car handled straight out of the box. Arrow straight stability on the straight with smooth easily controlled braking and precise accurate cornering.

Results speak for themselves. We put the car on the track at

Right: above and underneath the finished car. Top view shows criticised fuel tank and radio plate. Under view shows praised rear motor pod and chassis. Below: a potential world beater but not a kit for the inexperienced.

the Welsh GP to practice on the Friday afternoon. After two laps Steve had a big grin on his face. We spent 30 minutes running the engine in, adjusted the brake and put the car away ready for the next day's racing.

On its first day, with Steve driving, it made the Open Final and was unfortunately forced to retire with a manifold problem when laying third.

On the second day it qualified for the Open again and this time finished fourth. The following weekend with the softest spring fitted to the back end and the front lowered it blasted round the Crystal Palace track to finish second only seconds behind the leader.

All this with a new car about which we knew little in terms of setting it up, with all the problems mentioned in the review, a very limited choice of tyres and a driver who does not normally make Open Finals, shows that the car has considerable potential.

## Conclusion

A car that is very soundly constructed in terms of basic engineering, handles very well on the track but is badly let down by poor attention to detail.

In its present form it will be driven by a few enthusiasts who are prepared to add the necessary finishing touches to the car. We have not made our minds up yet what cars we will run next year but are certainly giving serious thought to the *Associated*.

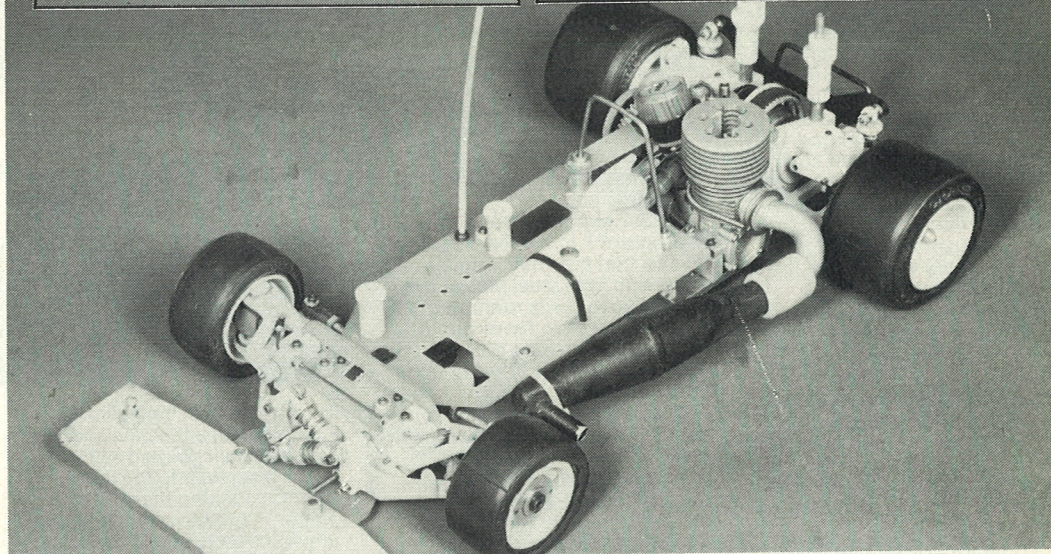
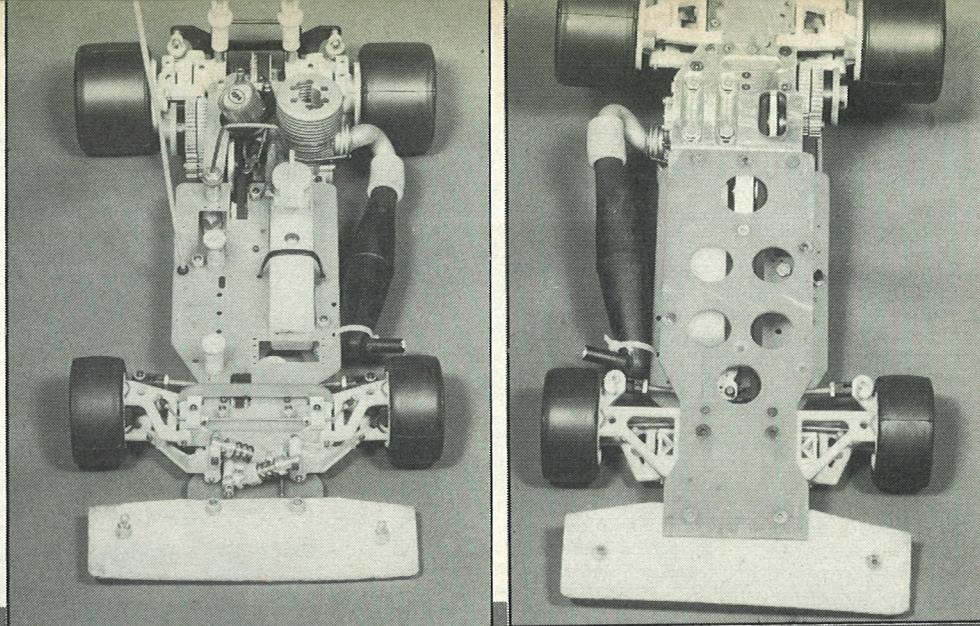
Its handling is such that many mid to upper order drivers might well find themselves going quicker simply because they will make fewer mistakes. In the hands of such drivers the tendency to power on understeer is more than compensated for by the basic stability of the car.

If *Associated* wish to make serious inroads into the vast European Market, and indeed they want to stop the *Serpent* encroaching on the American Market then they must set to and finish the car off, in particular with regard to the wheels and the radio plate layout.

The car is so potentially good that I for one would sincerely like to see the finishing touches put to it which would make it a very enjoyable car to own and race.

**Available from:** Ted Longshaw Model Cars, PO Box 89, Orpington, Kent. Phone 0689 55313.

**Price:** £350 including gearbox.



## Associated reply

**N**ormally when I review a product the manufacturer is not invited to comment. However in this case I decided to make an exception. I felt there was much more to come and that this car represented only an interim solution.

Since I am more than a little interested in the possibility of running and *Associated* next year I wanted to know what changes were on the way and more especially which of the shortcomings I criticised would be corrected. Gene Hustings of *Associated* has asked that his reply be printed verbatim so here goes. I don't know where he gets the idea that I drive. I wouldn't dare, they are too fast for me.

"These comments are about the article on the *Associated* 'RC500' four-wheel drive car by Mr. Colin Leake.

To begin with I would most certainly like to commend Mr. Leake on his thoroughly honest comments about the 'RC500.' he criticised where it was necessary and also praised where it was due. We couldn't have asked anything fairer.

We know the 'RC500' is not perfect but we also know there is no other car that can outperform it on the track.

We are continually upgrading the car. New front wheels, new rear wheels, new fuel tank and

new 13-16 tooth clutch bell are all on the way as well as other new ideas.

We have noticed some interesting traits in scale racers over the past 17 years. One twelfth racers seem to be mostly younger and prefer to run their cars 'as is straight out of the box.' There are very few exceptions to this rule.

One tenth Off-Road racers combine the young with a little older racers and we start to see a little more experimenting by way of changes to the basic cars.

One eighth scale gas racers tend to be older and a couple of interesting things happen. They like to work on their cars more and like to experiment with more new things. This of course can be good or bad.

Delta uses the thinking that for the most part it's bad because most of the changes that the driver might make actually hurt the car's performance. Delta strongly suggest that drivers run the car as it is straight out of the box. They have certainly been successful so I am not going to argue whether they are right or wrong.

However we at *Associated* look at it a little differently. We know that no car is perfect. We encourage drivers to try new things using their own ideas. If only ten per cent of the new things improve the car's performance and 90 per cent do not effect an improvement or actually hurt the car's

performance then it would seem that the overwhelming odds would favour Delta's approach. We look at that ten per cent and these odds look great to us as the more things we try the better chance we have to improve the car.

It is surprising to see how many racers enjoy the challenge of coming up with something new that actually improves the car's performance. It's like a moral victory. I wonder what would have happened if somebody had told Dave Preston that he could not try anything new?

Mr. Leake certainly sounds like he would be an ideal *Associated* racer (I'm only the mechanic - C.L.). He understands what the car is supposed to do. He's listed a number of important and logical changes to the car some of which he intends to do. I think he's our kind of racer."

Gene Hustings  
In Gene's dictated reply no mention is made of a new radio plate but a subsequent conversation reveals that one is planned. Likewise guide pins for the brake discs are also to be included in the new kits. No mention is made of a roll over bar but I have been given to understand that if *Associated* do not provide one then Ted himself plans to have the necessary simple parts made up. I gather also that kits of lightweight bolts are available in the states so presumably Ted will bring these over as well.