

DELTA

Eagle

Track Test

BY BILL BURKINSHAW



THE FIRST R/C MODEL CAR that I built was a *Delta*, a 'Super J' to be precise, and since that first 1/8th scale experience both R/C cars and I have moved forwards several places. That first experience of *Delta* engineering impressed me immensely, the car is still running well, the only repairs ever done to the 'Super J' concerned the engine. Several piston/cylinder assemblies have just worn out, *nothing* out of the original kit has ever broken, and there is remarkably little wear on most of the moving parts.

Delta don't always do things the conventional way, certainly not the easy way, more of an attempt to produce what they see as perfection. Many of the parts in my 'Super J' were machined from solid aluminium alloy, few plastic mouldings were used, those that were incorporated

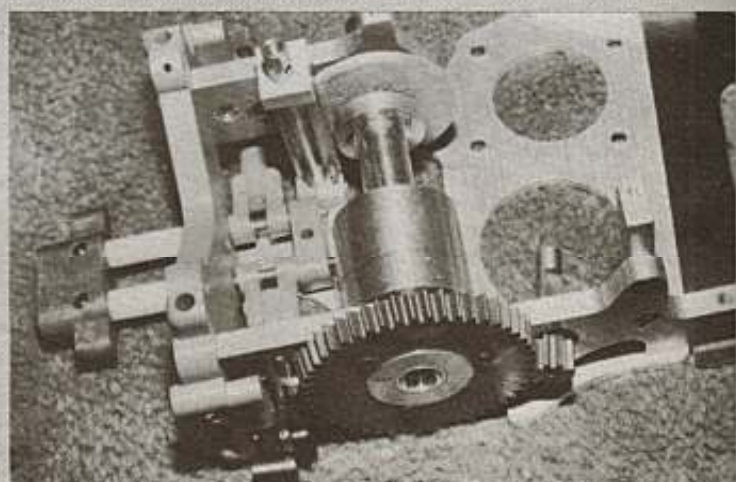
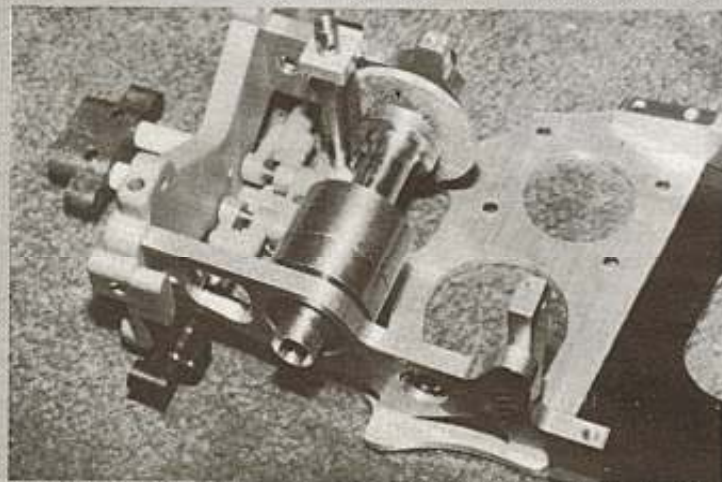
had a solid, chunky feel to them, giving the impression that they would take plenty of punishment.

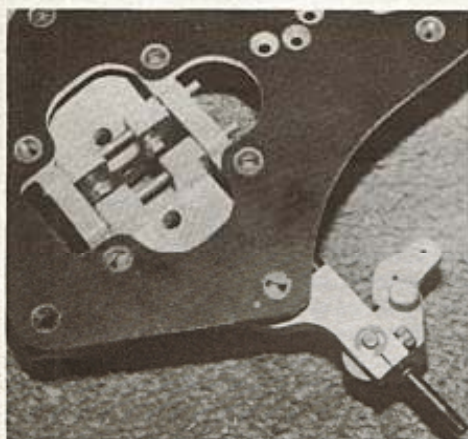
Several detail changes were gradually made to the 'Super J' which produced a car which in the hands of Arturo Carbonell won the 1981 World Championships held at Indianapolis, USA. During conversations with *Delta* designer and manufacturer Bill Campbell at Indy, Bill intimated that a fully independent suspension successor to the 'Super J' was under development, but just

Below left: rear end starts to take shape, differential parts are beautifully made. Below right: drive gear fixed to carrier with three screws. Note drive pinion slipped into place to show anglewinder drive system and out-board bearing.

how far forward it was took me by surprise, for little more than three months after the event, the 'Eagle' was unveiled. Considering the complexity of a fully independent car, the project must have been well towards completion at the time of the Indy event.

The *Delta* philosophy of looking for the best way, not the easy or cheap, has resulted in a car markedly different from all the other competing marques, both from the design and manufacturing standpoint. First and foremost the suspension system. Breaking away from the twin wishbone set-up, *Delta* have chosen to use a 'split-axle' system at the front. Long, single wishbones



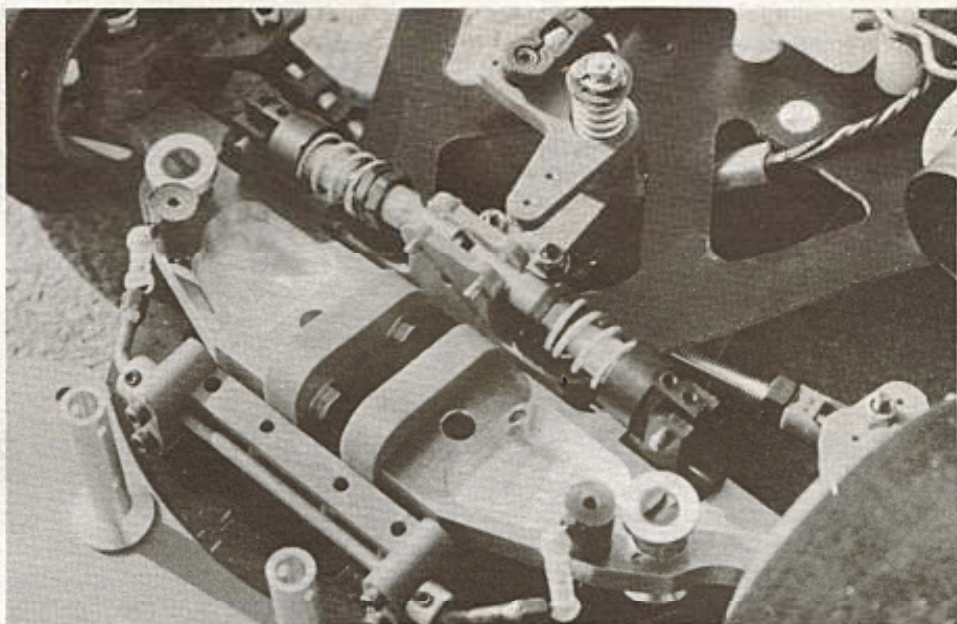


Above: underside view of front wishbone pivots. Note special hardened countersunk screws. Right: front-end top view, fully assembled protective covers for the shock absorbers are added after final setting up.

pivoting near the centre of the car, produce comparatively small camber change. Carefully chosen pivot points also minimise camber changes with roll of the chassis. These wishbones are of massive size, obviously very strong, but with metal removed in order to reduce unsprung weight. Both front and rear suspensions are controlled by coil springs over dampers, which are of the compressed gas type (see Model Cars Bi-Monthly Aug/Sept 1982 issue for article on 'Delta Dampers'). Anti-roll bars are also fitted front and rear, two different rates are available as are two different rate springs.

Rear suspension is very unusual, for *Delta* have dispensed with the intermediate layshaft reduction gear and chain drive to the rear axle. The engine drives directly onto the main gear which is a compound of conical and hypoid type. *Delta* credit the gear design to Ron Moody, christening it the 'Moodypod'. The gear sits inside the drive-side wishbone which is of necessity broad-based, much more so than the 'nearside'. Lower element of the rear suspension is in the form of an adjustable for length, single, tie-rod which allows adjustment of rear wheel camber to be made.

The engine, which incidentally has to be rear exhaust, is at an angle of 10° across



the rear pod. The drive pinion being supported at the outboard end in a combined rear differential and suspension mounting, in a ball race. Clutch is a clamp-on type, pioneered by *Delta* in the 'Super J'. Three rear ratios are currently available, the gears have to be changed in pairs as the centres are fixed. This system certainly ensures accurate mesh and consequently the gears are very long-lived. A single 'Ferodo' type disc brake is fitted on the opposite side of the car to the drive gear. Differential is *Delta's* version of the ball-type adjustable slip variety.

So much for the broad design concept, what is the kit like?

The Kit

Like very many other US model kit manufacturers *Delta* could learn a lot from the Europeans from the point of view of presentation and packaging. The box is devoid of fancy colour labels, etc., in fact a stout plain corrugated cardboard holder for

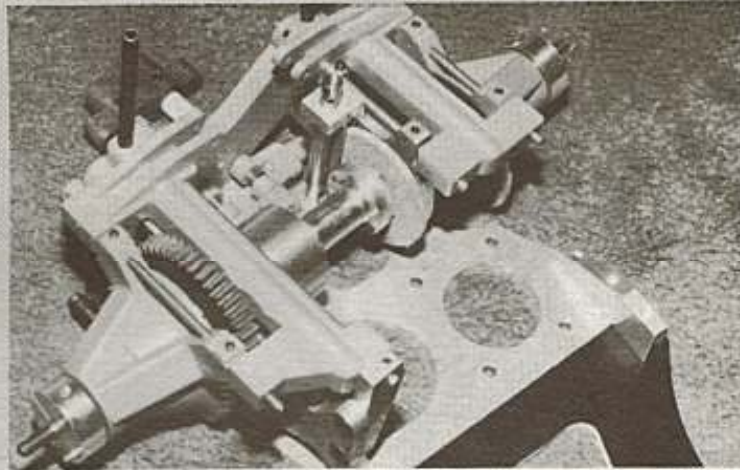
Below left: lower adjustable rear suspension links, these adjust rear wheel camber. Below right: rear up-rights and wishbones assembled onto hangers. Rear springs are inboard mounted and work on the cantilever principle.

a mass of polythene bags. Several of the bags contain additional small construction note sheets, but the main instructions take the form of six large highly detailed 'exploded' drawings. Copious notes on the drawings provide step-by-step instructions covering the various stages of the car's assembly in numerically ascending order.

A master sheet outlines the sequence of tackling sub-assemblies and, joy of joys, a sheet listing all the mistakes or alterations (except one!) on the main drawings, with the sound advice to amend all instructions and drawings *before* starting work. Finally a page of hints and tips to make life a little easier on some of the trickier areas of assembly. In addition to the standard 'Eagle' kit, *Delta* provided an MRP 'Budweiser' bodysell, a 6 volt Ni-Cad pack suitable for the 'Eagle' radio plate and a range of *Delta* polycarbonate wing sets.

Assembling the Eagle

As soon as I started I felt that this was to be pleasure all the way, for with no exceptions, everything fitted, all holes lined up and each part was easily identifiable.



Shock absorber assembly was quick and easy (let's call them dampers shall we — the word is shorter and more descriptive anyway!) followed by differential assembly. Beautifully machined alloy parts and precision screws, etc. soon fell together to produce a working diff which was offered up to the carbon fibre epoxy and alloy chassis.

The clamp-on clutch with totally unsprung 'Rulon' (a red, fibre-like material) shoes was popped on to the *Picco*, in turn bolted on to the ready drilled and tapped engine blocks and the power unit added to the chassis.

The front suspension soon fitted together and along with the up and down stops, dampers and steering linkage was added to the front end. At this point the exception to the complete list of amendments came to light, for after several fruitless searches through the box of bits, no servo saver mount could be found. Just before stripping the old faithful 'Super J' for her part, I decided to assemble the servo saver and immediately realised that the mounting system had been altered from that detailed on the instruction sheets. One very small black mark! This proved to be the only snag, for although one minor hiatus in the rear suspension assembly resulted in my car having dreadful toe-in of the rear wheels, I had inadvertently assembled the knuckle joints on the lower tie rods, the wrong way round. Suspension and drive shaft assembly followed on rapidly to produce what was at last appearing very like a racing car.

Very little actual 'craft-work' needs to be done, in fact only a small amount of trimming of stops on the steering arms, and soldering work on the anti-roll bars caused me to use anything other than the Allen keys provided, small spanners and the special $\frac{1}{4}$ in. square drive socket provided for the chassis screws. Don't worry, if you haven't a $\frac{1}{4}$ in. sq. drive socket set, the socket is drilled for a Tommy bar, attention to detail, I like it! When soldering the ball joints on to the pianowire anti-roll bars, clean parts thoroughly with emery cloth, then use acid core solder or *Bakers* fluid

otherwise the joint may not be too good. I made up both light and heavy anti-roll bars and fitted the heavy type all round.

R/C Equipment

The R/C equipment is all fitted to a carbon/fibre epoxy plate which is secured to the chassis with six screws allowing easy servicing and providing the opportunity to make a neat and tidy job of installing the R/C package. Centrally mounted is a 125cc fuel tank with a generous sized neck, well sealed cap and an internal fuel filter. The radio plate fits very low down on the chassis giving a compact appearance to the whole car. Holes for all equipment mounting are pre-drilled and everything necessary for fitting the equipment and coupling everything up is provided, including a handsome aluminium alloy fork-end for the steering linkage.

Delta illustrate an odd system of coupling up the carburettor, the push rod goes right over the engine and connects to the slide of the carb at the rear. The carburettor is shown mounted in the reverse position to normal. This system means that both throttle and brake should be coupled to the same side of the servo arm and a very neat arrangement is shown. As so often happens, the carburettor chosen could in no way be coupled up as shown, so I had to revert to the more conventional set up. The connecting hardware supplied proved adequate for this alternative set-up. A particularly neat part of the brake override system was the provision of miniature 'top-hat' bushes to centralise the brake cushion springs over the pushrod. Tie-wraps are used to hold both silencer and receiver on to the R/C plate, whilst nylon brackets and standoffs are used for servo mounting.

Setting Up

A comprehensive leaflet details the suspension adjustments, but as there are so many variables including the spring rates and anti-roll bar settings, not to mention variable camber rear wheels, and

Below left: engine, clutch assembly bolted in place. Engine blocks are drilled to take Picco or K&B. Below right: brake override and cushion spring and rear suspension strut seen here.

adjustable castor front wheels, I decided to set everything up as true and straight as possible in a neutral position and then experiment at leisure.

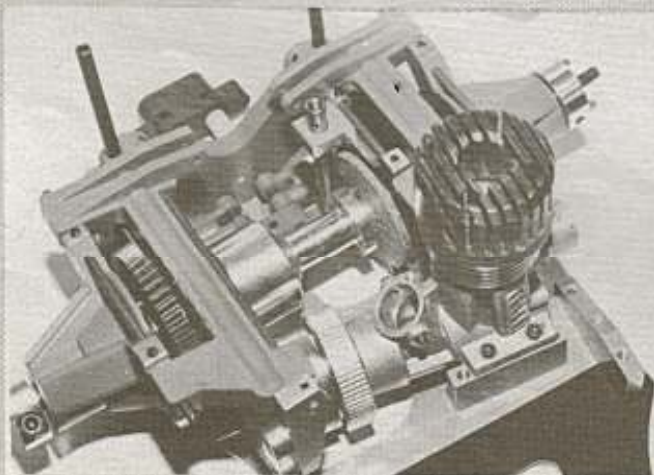
I set up the front suspension so that the springs just dropped the wishbones to the down stops, then made fine adjustments on my tweak board. Anti-roll bars are easy, lift each wheel in turn and make sure it raises the opposing wheel just the same amount. This applies to front and rear, and is down with springs and dampers connected. Rear suspension setting was achieved by blocking the chassis up until the upper wishbones were at mid-travel point and the lower tie-rods horizontal, then adjusting the lower tie rods until the rear hubs were vertical. Theoretically, the tyres will then have maximum contact patch at the mid-point of the suspension travel.

Finally, a small amount of toe-in was fed into the front wheels. The ride height of the 'Eagle' is high by accepted standards, hopefully the generous chassis clearance will prevent the abrasion of the underside usually expected with $\frac{1}{8}$ th scale cars. Finishing touches to the chassis included plumbing up the carburettor, fitting body mount posts, etc. and then only the body remained to be trimmed and painted.

Body Shell Painting

The MRP 'Budweiser' shell fits the *Delta* nicely, leaving the whole of the driver figure intact. Wheel arch markings are almost made to measure and the shell was soon nestling over the chassis ready for paint. Body-blow number one was the total non-availability of proper masking film at 10 p.m. on the chosen evening! Remembering the results of using the *Tamiya* paints I had purchased on *Sellotape*, I was forced to use conventional masking tape. I devised a logo combining the *Delta* and 'Eagle' symbol and cut this out using a sharp scalpel from several pieces of masking tape stuck on to a smooth shiny surface (the underside of a dinner plate actually!) and applied this, and the rest of the masking tape, to the shell. (50 words to describe but $3\frac{1}{2}$ hours to complete!)

Spraying took barely $1\frac{1}{2}$ hours and soon



the car was resplendent in claret and pale blue awaiting photographs.

On the Track

With a car of the value of the *Delta* 'Eagle' I was more than a little wary of damaging something, and it was thus, with more than my usual caution, that the early experiments were made on a small tarmac car park during the Primrose Valley Hobby Holiday week. Steering was incredibly powerful and a rapid resort to the transmitter rate switch was called for. Once tamed in this area, the car was run up and down for a few minutes whilst adjustments were made to the carburettor. By this time Hobby Holidaymakers had turned up for a 1/8th scale IC car sprint which I reluctantly agreed to take part in. The result was FTD! — not bad for the first ten minutes of the car's track life.

The next opportunity for test driving came at the opening meeting of the new Crystal Palace circuit. Practice indicated a carburettor setting problem, but once sorted out the car began to circulate. Initial feelings about the steering response were rapidly altered as the speed rose. At racing speeds steering response felt right, and full throw was re-introduced.

The 'Eagle' runs very smoothly and is not the least bit twitchy, it can be thrown into corners without any tendency to break away, over enthusiasm just promotes understeer. After four heats, rear tyres

wear indicated too much negative camber on the rear, one turn of the lower links put this right. As the handling seemed so good, the basic 'everything straight and square' set-up must be just about right. Braking is powerful and smooth and the clutch is smooth and progressive. Do make sure the ball diff. is properly adjusted, too loose a setting will soon flatten the balls. At the end of the day, a C Final 5th place trophy rewarded my efforts.

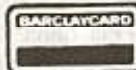
Car complete and almost ready to run, tyres have still to be trued up but who can resist putting it all together for a look!

Is it worth the money? If you want quality, and something that is different, yes. If you want a piece of racing machinery which is sure to attract a crowd for some time to come, yes.

The *Delta* 'Eagle' is a good performer too, I hope that I can do it justice during the 1983 racing season.

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