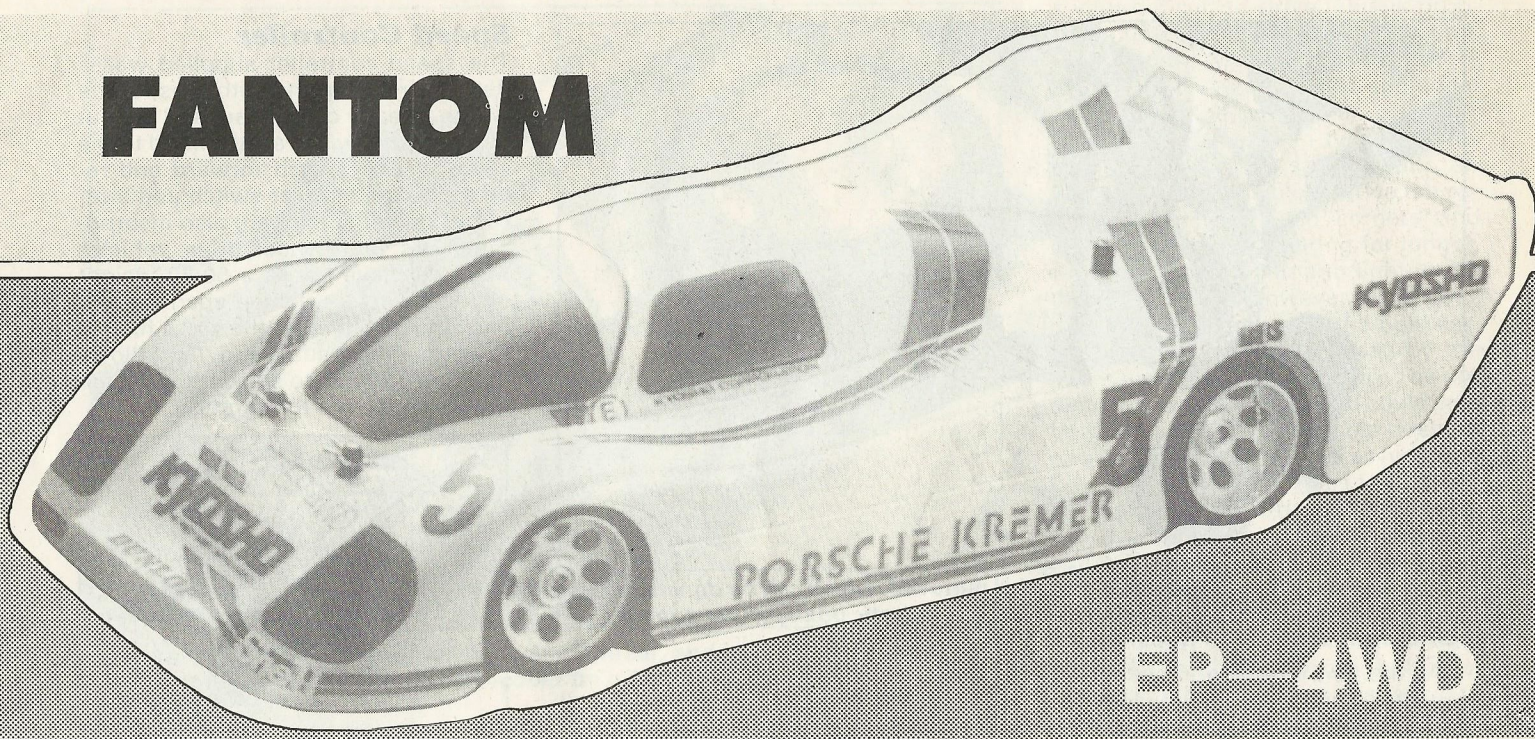


# FANTOM



## EP-4WD

### *Kyosho's 4 wheel drive racer is tested by PAUL HOBBS*

The Fantom EP-4WD comes in the usual Kyosho box, covered in tempting full colour photographs of the completed car, which reveal it to be a quite fair attempt at producing a practical racing machine rather than the more scale like models hitherto hailing from the Land of the Rising Sun. Delving inside the box uncovered the chassis which had already been partially assembled, a body shell and various bags of small parts. The instruction manual proved to have an English cover, but it was all Japanese elsewhere!

#### **4WD Kyosho Style**

In order to minimise the losses inherent in a four wheel drive transmission system, Kyosho have opted for a chain drive arrangement with only one differential. Roller clutches are provided in the front wheel drive mechanism to compensate for the lack of a front differential. The drive to the front wheels is by a chain which is driven from a sprocket pegged to the rear of the spur gear, and as the size of the front sprocket is the same as the rear, it looks as though the only time that full four wheel drive is in operation is when the rear wheels are spinning, especially as the rear tyres are larger than the front ones.

Chain drive certainly has some advantages, compared to say toothed belts, such as low bearing loads. No adjustment (other than adding or removing links) is built in to allow for correcting the tension of the chain, which must not be too tight causing extra friction, or so loose that it drags along the ground. The chain itself

actually scrapes across the underneath of the battery pack, relying on a piece of insulating tape to prevent the insulation being worn through.

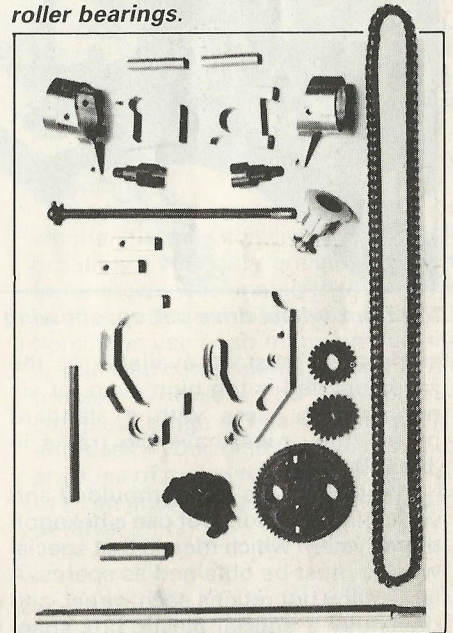
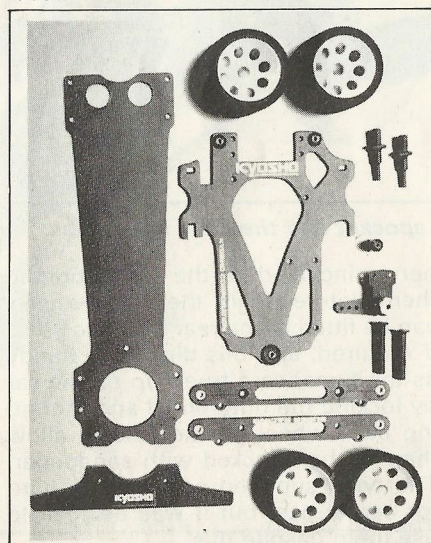
#### **Construction**

A look at the mostly pre-assembled chassis takes one back to the 1980 season — when model car drivers were real model car drivers and overweight model cars were real overweight model cars. The full length glass fibre chassis is fitted with alloy rear blocks (with good provision for motor adjustment, but the ride height is fixed)

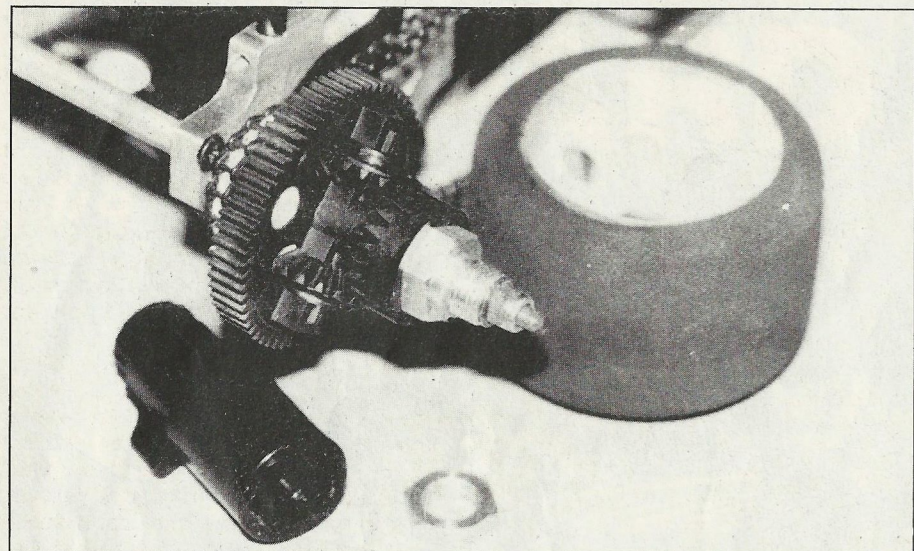
*Considerable use is made of epoxy glass in the chassis, which means the Fantom is no lightweight. The wheels and tyres are suited to polished surfaces.*

which are ready fitted with ball races. Unfortunately these are a non standard size (at least they are in the UK!). The radio plate is mounted on rubber grommets between the blocks and the servo saver pillar at the front, there being no provision for the rear end to 'float' as is the norm these days. The front wheel drive hubs are neatly machined from alloy, as are the front beam mounting blocks — castor is preset at 'lots' and cannot be easily changed.

*The power pod is built up from injection moulded aluminium components and the rear axle includes the gear differential. Ball and socket couplings drive the front wheels via one-way roller bearings.*





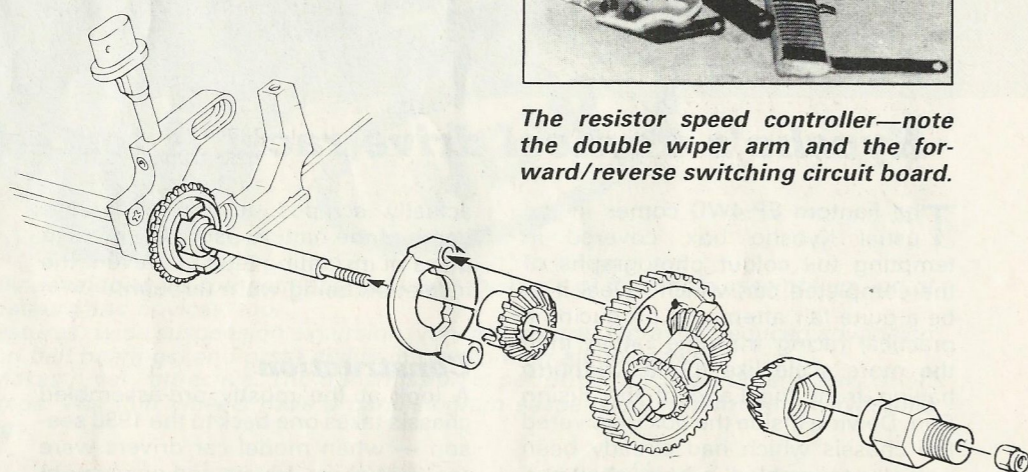


The bevel gear differential with the wheel removed, which can be done without disturbing the setting. In the foreground is the plastic box spanner supplied to remove the large alloy wheel nuts.

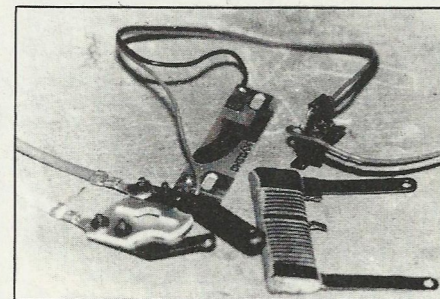
All the fibre glass parts were a little ragged around the edges, giving a hint that the kit has been in production some time and may not be the very latest model anymore, even in Japan.

Although the instructions are in Japanese the illustrations are easy to follow, and the car is not at all difficult to build as despite the four wheel drive system it is relatively uncomplicated.

The differential unit supplied is of the bevel gear type built into the main spur gear which features an enormous number of teeth on it — 63 to be exact, to match the 17 tooth pinion. No alternative ratios were in the kit, but I as-



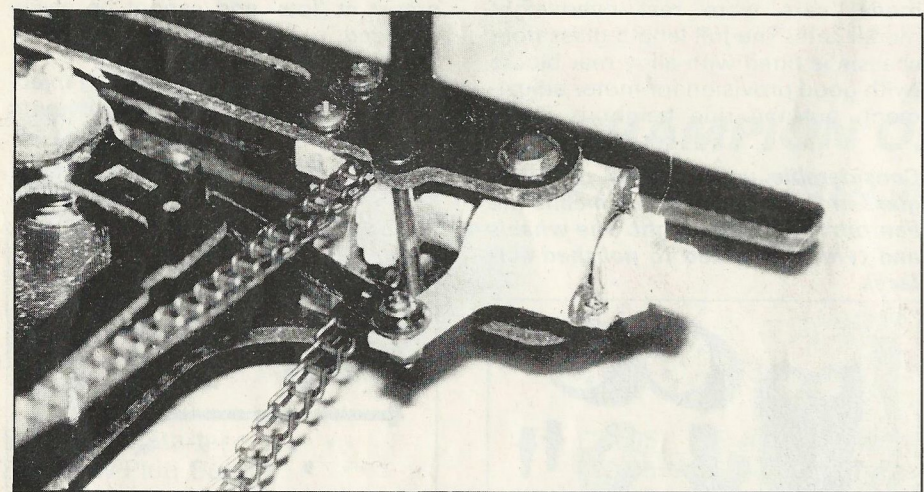
The resistor speed controller—note the double wiper arm and the forward/reverse switching circuit board.



Exploded view of the rear axle shows the chain drive gear already fitted and the way in which it is slave-driven from the driven gear.

### Radio Installation

The steering servo is buried under the radio plate and hangs from a couple of alloy posts attached to it — it is not really possible to change this as the servo saver supplied must be used (it holds up the radio plate!). This arrangement means that the servo pokes out of the side of the chassis, and could prove a bit vulnerable to the odd 'T' bone — it certainly would not be my first choice of location if it could possibly be avoided! The receiver is intended to fit alongside the steering servo underneath the plate, and the throttle servo as already mentioned is located between the motor and the battery pack. An electronic speed controller could of course be taped to the top of the radio plate if required.

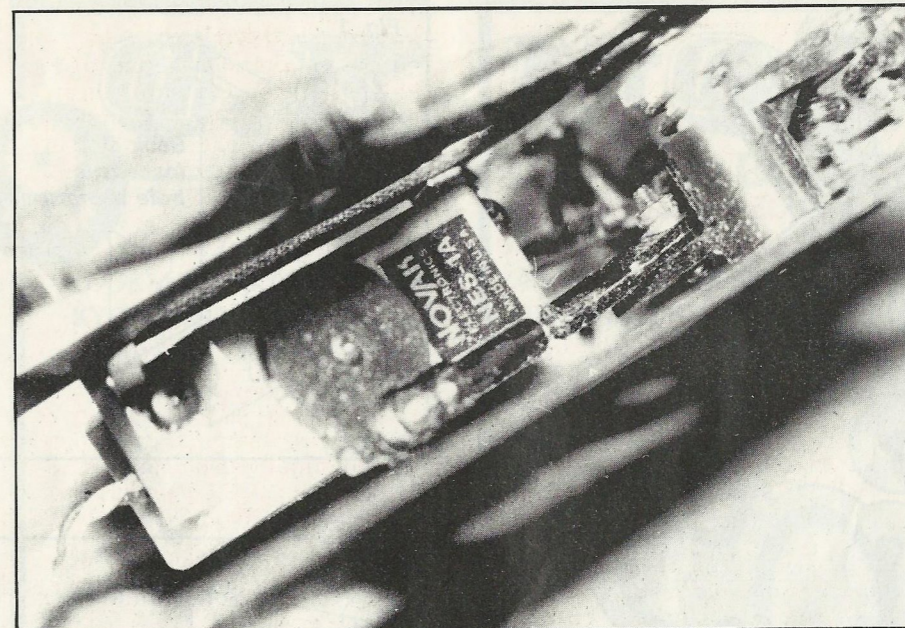


The front wheel drive set up, showing the spocket and the alloy front hubs.

sume they must be available as the ratio supplied is too high even for six minute club races with a standard motor (they must have big tracks in Japan!).

The wheels are nicely moulded and very thin in section, but use a hexagon drive system which means that special wheels must be obtained as spares. A large alloy nut retains each wheel, and thankfully a special plastic span-

ner is included in the kit to tighten them. Interestingly the front wheels can be fitted to the rear and vice versa if required, and this did prove handy as the tyres were trued up on the car by locking the differential and mounting each wheel on the axle to allow them to be attacked with sandpaper. The tyres supplied seemed too hard for carpet use, but it was decided to use them despite this.



The steering servo pokes out of the side of the car, and is mounted on two alloy posts attached to the radio plate—could be a bit vulnerable!

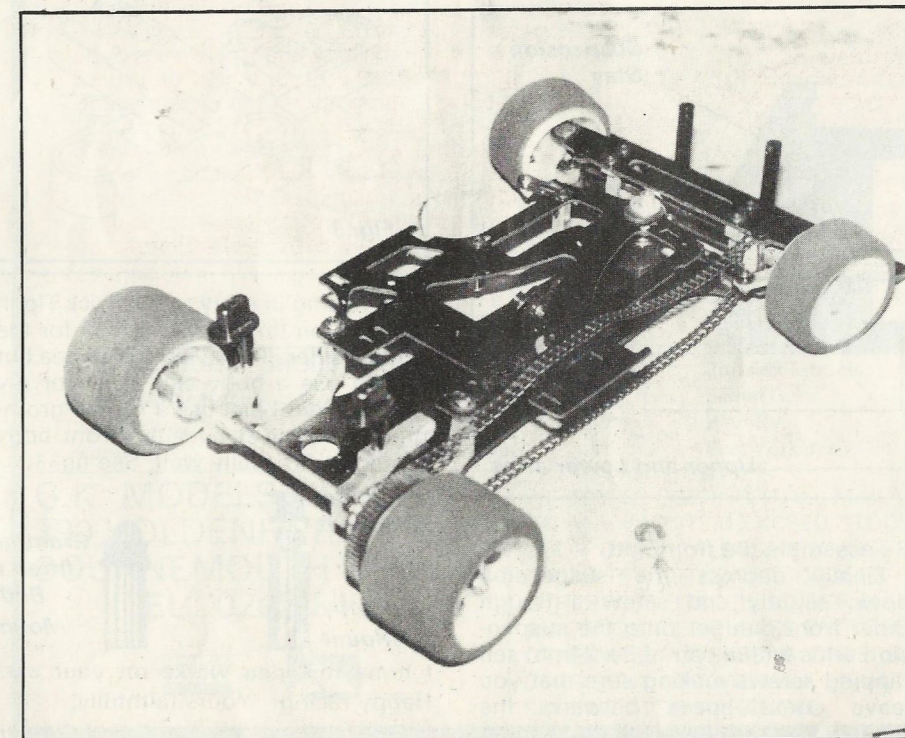
### The Body Beautiful!

As can be seen from the photographs the front wheel drive system is very high and will restrict the choice of bodysells that can be fitted — you won't squeeze a TOJ over this one! The kit apparently offers a choice of two bodies, the Kremer Porsche (Yuk!) and the oddly named 'Racing Mate', which is the typical open cockpit Sports/GT shell shown in the photographs.

### Running Tests

Considering the gear ratio supplied a Parma Renault Turbo Standard motor was judged to be suitable for the test runs, and was duly fitted. The acceleration on carpet, even without tyre additives on the kit tyres was very good indeed, but the cornering left something to be desired! The car appeared to suffer from oversteer when under power, which switches to terminal understeer as soon as you lift off, making

An overall view of the rolling chassis showing everything you get with the kit—except the speed controller and the body. I suspect from the instruction leaflet that a motor is usually included as well, but it appears to have gone AWOL from this kit!



it very difficult to drive. This is probably a function of the freewheel clutch in the front wheel drive system — when the car is coasting the additional drag causes the understeer.

Trials on carpet with tyre additives produced much the same results, although it was possible to drive the car much harder into the corners and thereby retain the steering for longer. Another problem came to light under these conditions, however, which was the rear end hopping on the tight corners. This is probably caused by the relatively rigid chassis set up. The understeer/oversteer problem could well be solved with more suitable tyres for carpet racing — as long as you can keep the power on it goes fairly well.

Unfortunately during this test the car chewed up the chain and spat it out the back as one of the links fractured. It had lasted for a total of four six minute races with a standard motor. Some spare chain is provided, but this would quickly be used up at this rate, although it was interesting to note that the handling problems mentioned above virtually disappeared following the demise of the chain....

One other test was tried before the chain gave up, on the wooden floor before the carpet was laid! This was great fun as when the rear wheels are spinning the car has full four wheel drive, and the wheels were certainly spinning! Under these conditions opposite lock cornering was easy to do and very spectacular, and grip and acceleration were good considering that the hard kit tyres were still fitted.

### Conclusions

Four wheel drive only comes into its own when grip is low, and as most racing, at least in the UK is now on carpet, this car has no advantages. It is heavy by current standards and the chassis design appears to be outdated. In a situation where tenths of seconds separate drivers at meetings the additional friction introduced in the transmission would be totally unacceptable.

Outdoors on tarmac, or indoors on wooden floors with siliconed tyres it is probably a very different story, but unfortunately I was unable to test the car on these surfaces, under racing conditions. The use of so many unique and specialised components is another big problem — unless you can obtain a complete range of spare parts quickly and easily you might as well give up any idea of racing the car seriously. All in all an interesting model, but uncompetitive. □