HI-TECH HIROBO

Pete Winton experiences Hirobo's unique brand of R/C car design with their 1/12th scale, 4WD 'Ashura'

The common solution to racing on low grip surfaces in the 1980's is four-wheel drive. Little surprise then that the Japanese have produced 4WD 1/12th cars on occasions since much of their racing is outdoors on tarmac. This latest in the line is from *Hirobo*, makers of the (once) all conquering 'Zerda' 1/10th car. The 'Ashura' follows much the same drive train principles, but is unique to 1/12th in several key areas.

The kit comes in two forms, build-it-yourself or ready assembled.

Since this kit was flown from Japan for *Model Cars*, it seemed sensible to take the ready-assembled version. Inside the box are just two major items, the car and the body. Spray the body, fix to the car and the kit is complete! This is not the challenge normally expected, so the next step was to take the car apart to see how it works.

The motor is placed across the car in front of the axle in the normal fashion, and requires the right rear wheel to be removed for access.

Sitting in a plastic moulded motor pod, there are four pinions to choose from for selecting gear ratios. Being belt-driven to the rear axle, pinion is a bit of a misnomer, pulley would be more accurate.

The differential is all gear-driven, with no facility to alter tension beyond taking up the backlash in the gears. The diff. sits on a one-way bearing, more of which later. Drive is then carried across to another pulley, this in turn drives a belt which runs the whole length of the car to a pulley mounted on the front axle.

Another geared differential shares power out to both front wheels via a layshaft and two very short drive-shafts. These ball and pin type drive-shafts allow limited steering lock and a short 5mm suspension movement. The drive-shafts are plastic running in steel cups — we shall see how long they last!

The rear axle runs in ball-races and wheels are fixed by a large nut. The whole rear motor pod sits on a fibreglass T piece, governed by a very neat parallelogram suspension system moulded in plastic.

The vertical suspension movement is controlled by a central spring with limited damping, but there is no damping of the car in roll. The combined effect of this is to make for very soft rear suspension, essential when the grip is low.

A centre bulkhead serves to stiffen the top and bottom pieces of the chassis between its front and rear mountings. All screws are recessed into the glassfibre chassis plates to give a completely smooth surface top and bottom. This bulkhead severely limits the room available for an electronic speed controller, a resistor would fit neatly in the hole provided. For test purposes the controller, a *Laser* FET, went on the top plate. There is plenty of room for a *Futaba* FPS-132H servo, if you don't mind the receiver going on the top plate too!

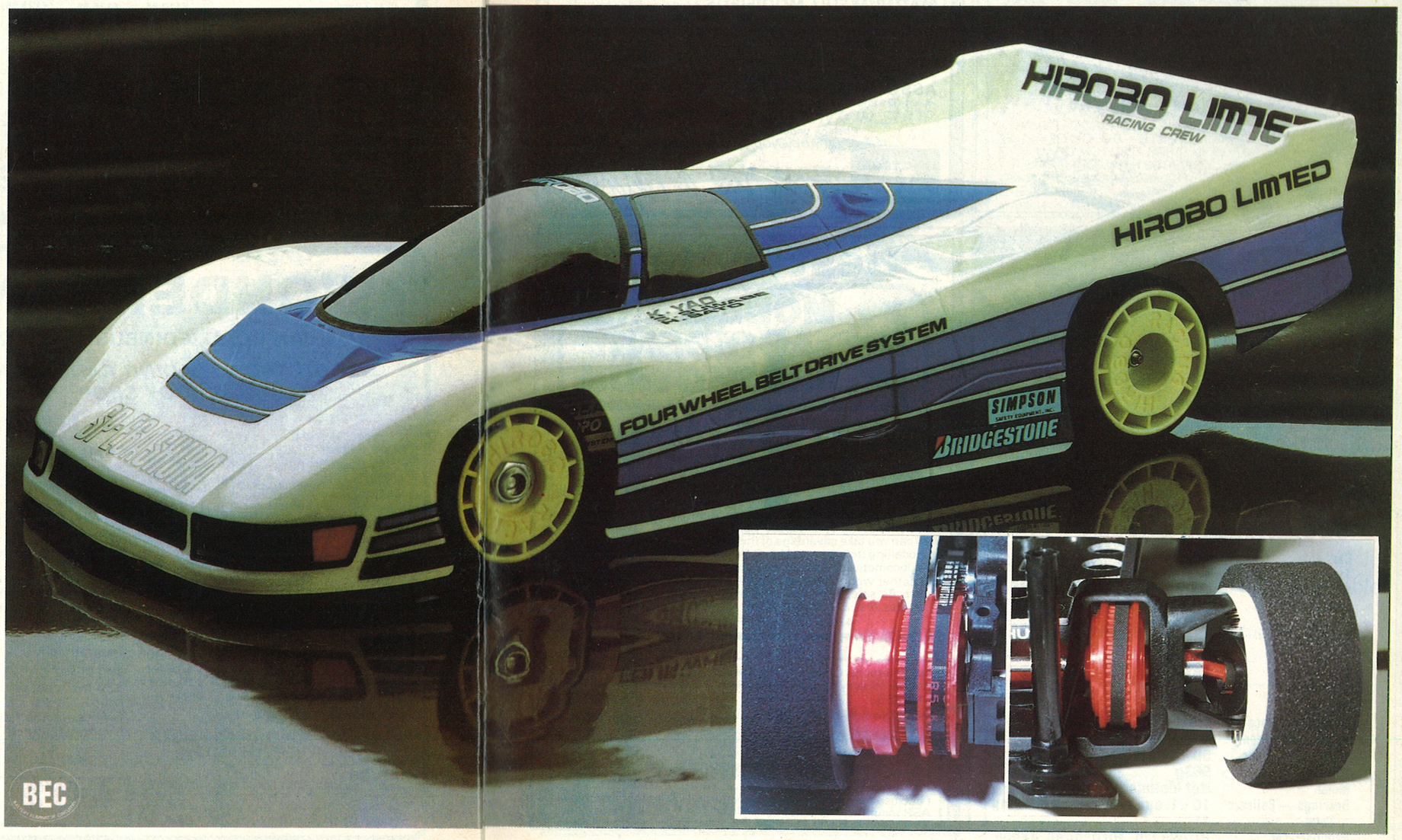
The steering arms seemed perilously close to the drive belt, but that's how it is shown in the instructions so they were left alone. Tyres are pre-trued, carefully glueing to the nice plastic wheels left them quite round, but way over the size recommended in the instructions. Since the difference in tyre size was said to influence handling, I left them alone being within the 4-6mm range recommended.

As soon as the motor is running the belt drive makes its presence known purely through lack of noise. Checking the car over brings the first surprise.

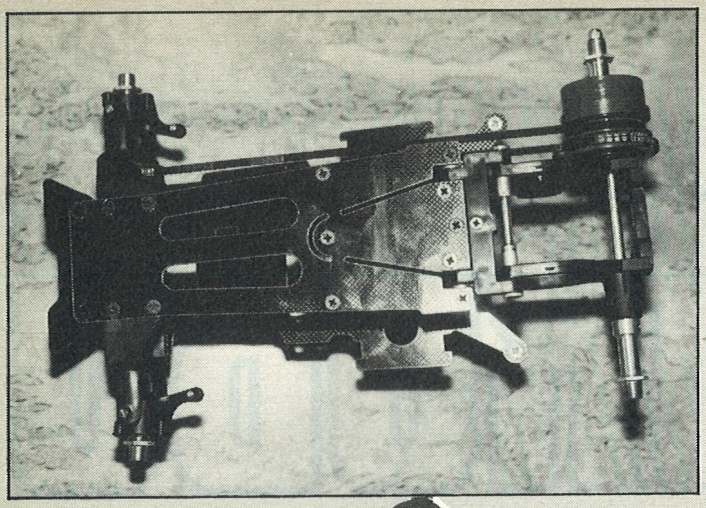
Using a one-way roller clutch is, *Hirobo* tell us, the way to attain stability on the straight. Presumably this means their gearing is such that the front wheels are driven *faster* than the rear. This should mean the car is front-wheel drive on acceleration, until grip is lost and the rears take over. Once speed is attained the front wheels take over again and the rear wheels idle. If the rear tyres are taken to a diameter closer to the front tyres, this effect is lessened and the car should understeer less. The problem is that the front wheels do all the braking and steering (which could make life interesting) since on the over-run or under brakes the one way clutch disconnects the rear wheels from the motor.

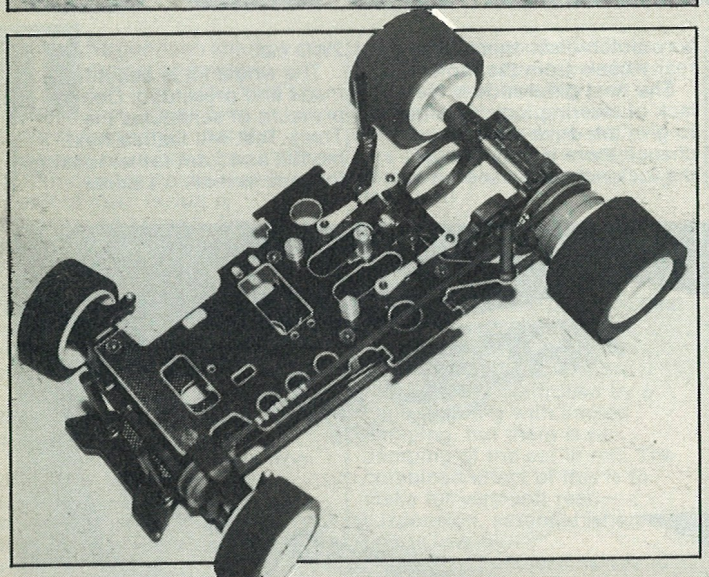
The next difference is the lack of steering lock. In order to give the drive-shafts a chance there is only 80% of the lock normally used on a 2WD car.

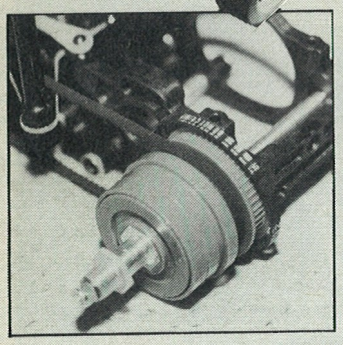
The whole kit is beautifully made and presented. Due to pressure of schedules the Track Test will feature next month, and I am rather looking forward to that ... I think!

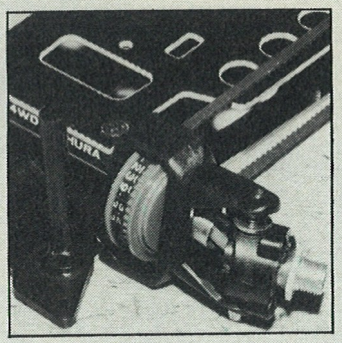


Inset left: close-up of the rear plastic moulded drive belt pulleys mounted on the rear axle. Inset right: the front drive pulley and short plastic drive shafts connecting the front axle to the steering blocks. The shafts are plastic, running in steel drive cups and the steering blocks are sprung to give suspension movement.





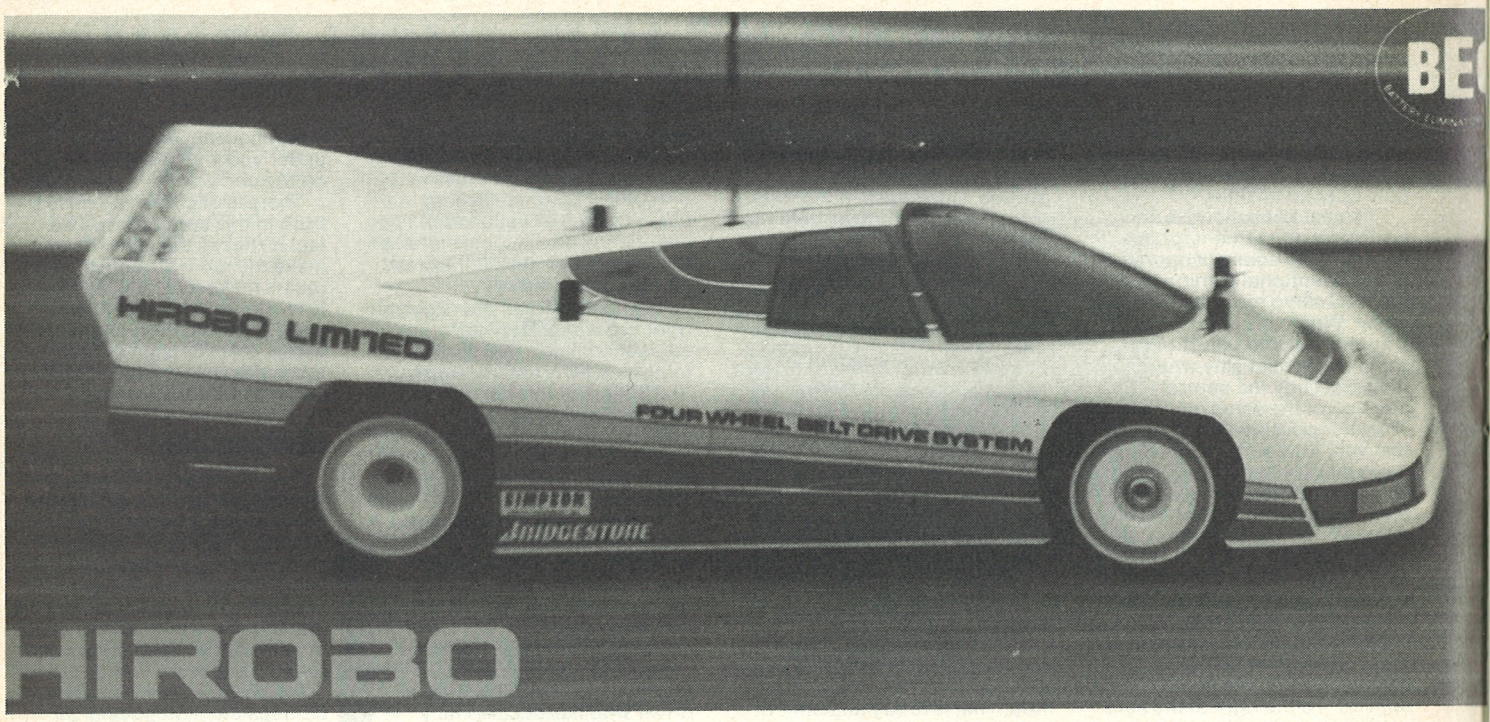




Top: underside of the chassis showing 'T' piece connected to the motor pod. Centre: top view showing the full length drive belt and parallelogram rear suspension system. The drive belt may need protecting from underneath for outdor racing. Above left: the geared differential is fully enclosed within the rear hub carrier. Above right: the front drive pulley also contains a geared differential.

Specification check

Car	**Ashura**
Type	**1/12th scale circuit racer**
2WD/4WD	**4WD**
Differentials	**2**
Length	**255mm**
Width	**168mm**
Height	**37mm**
Wheelbase	**197mm**
Front track	**142mm**
Rear track	**131mm**
Ground clearance	**8mm**
Tyre sizes — Front	**44 × 19mm**
Rear	**50 × 34mm**
Weight	**963g**
Motor	**Not included**
Bearings — Ballrace	**10 + 1, one way clutch bearing**
Total	**11**
Manufacturer	**Hirobo Ltd., Hiroshima, Japan**
Importer	**Dave Nieman Models**
Price	**N/A**



FOUR-WHEEL DRIVE ASHURA – DRIVING

The Japanese have done so much to contribute to the advancement of R/C car racing. Their cells, motors and radio control systems are used across the world. Strangely, with the exception of 1/8th Track racing, no Japanese driver has ever featured strongly in a World Championships.

Indeed, with the exception of 1/10th, their cars are not winners either. The opportunity to test their cars is useful to try and assess that anomaly, and when that opportunity is with a four-wheel drive 1/12th car, it is not to be missed.

The construction and assembly of the car is as detailed last time. Finishing off the body was easy, the body post holes are premarked and the wheel arches cut to size. Tyres were glued on in time honoured fashion, but proved to be well over the recommended sizes.

The ultimate ratio, taking tyre size into account, is well documented. 4WD means having all four tyres the right size. Hirobo recommended a difference in diameter of 0-4mm front to rear. The nearer the tyres are to the same diameter, the more oversteer it is claimed will result.

After making a fixture to hold the wheels, tyres were trued to 46mm front, 50mm rear. Using a 28 turn single wind motor on test from *SRM Racing*, and the smallest (13 tooth) pinion available, the first driving was conducted on smooth asphalt.

Acceleration is no different from my normal *Schumacher* outdoor chassis, except for noise. *Hirobo*'s all belt drive is totally silent! Hearing the steering servo working above the noise of the car when turning close to the driver is disconcerting to say the least! Although much less than current 1/12th practise, the steering lock appeared adequate.

In a straight line the car was fast and very stable, even large amounts of lock whilst under full power failed to upset the car badly. Turning into a bend was slow, and then came the crunch.

Hirobo use a one way clutch between the rear axle drive pulley and the axle. On deceleration the rear axle is decoupled from the motor, and all braking is effected on the front wheels. Trying to cope with steering and braking is too much, the car understeers very badly making even moderate turns a very difficult juggling act.

The best technique found was to slow down, turn in, coast round the apex, and then full throttle to pull away. 4WD makes acceleration easy. The rear wheels can spin, but the front wheels take over and avoid any tendency for the car to spin out.

This faultless acceleration is the most stunning aspect of the car. Only abusive cornering and acceleration would provoke oversteer, and then for only a fraction of a second. The car would not spin out however driven.

The first available event was outdoors on tarmac at a small track in Watford. The corners were really too tight for genuine results to be obtained, but they did represent a normal club circuit. Up against two 'C-cars', the 'Ashura' acquitted itself well, but it was hard work in the tight turns. Then, disaster struck.

Being slow into the corners, the car was hit from the rear. No damage was apparent, but acceleration became hesitant, as did top speed. Being inexperienced with belt drive systems, the symptoms were of interference. The car stuttered on acceleration and at speed.

Returning to the pits, the car was examined carefully but nothing appeared out of place to me. Halfway through the next heat the car stopped completely. Examination revealed the the motor had slipped in the shunt allowing the belt to slacken. This had in turn led to belt slip and the pinion had ripped several teeth off the belt. End of test.

My inexperience had led to the failure, but there were some mitigating circumstances. The motor is mounted on a plastic moulding. Although the instructions on belt tension were closely followed during the build, the motor screws caused indentations in the plastic when tightened. This made fine adjustment difficult, so I resolved to tighten the screws just enough to hold the motor, but no so much as to damage the plastic.

Both screws are recessed into the mounting plate, precluding the use of washers to spread the load. I suspect that the screw/s settled in the plastic and came slightly loose. The collision to the rear moved the motor and that started the rot.

The car itself is strong and well made. It rides bumps with ease, and was never thrown off line badly when clipping corner dots. On a large outdoor circuit I think it could easily prove hard to beat. Indoors on carpet is another matter.

Although four ounces over the minimum weight limit (31oz.) there is scope for a lighter shell and speed controller (mine a *Laser* Buggy spec, forward only with large heatsink). The reliability should not be in question when the car is treated correctly.

There would be a problem with gear ratios. One 'spur' and four 'pinions' is inadequate. I suspect that the car could be made to turn well with the increased grip on carpet, and the wheelbase is only 5mm more than current two-wheel drive cars. But we do not need more grip on carpet. There is ample traction to roll a car, and have zero wheelspin on acceleration.

The *Hirobo* 'Ashura' is technically competent (except the one way clutch at the rear which I question) and superbly made. Its reliability problems would be worth noting in the motor drive belt area, but only if I had taken more care and still had the belt fail.

In the end it comes out as an also ran which will not have any great relevance to the 1/12th scene in Europe at the moment.

My feeling is that an independant suspension rear-end is the next vital step, not 4WD. In this respect the *ABC Hobby* car we tested some time ago was better than the *Hirobo* for 1/12th use.

Nice try, but not yet *Hirobo*. I can 'Ashura' you that the Japanese will keep trying to produce a winning car, but this is not it.

Reviewed by Pete Winton