

Pete Winton

builds the MIP

4WD conversion

for the

Associated RC10

Rarely does Radio Control Model Cars review an off-road electric buggy which has no definite name. The car under review this month is neither fish nor fowl as a complete car. (The chassis is 'RC10', the transmission MIP). But as a conversion for an existing 'RC10', it is very easy to categorise the MIP as an important addition to the range of 4WD cars available.

MIP is an American company founded and run by one of the most likeable characters ever to come out of Model Car racing. Eustance Moore is a tall, thin American with a Kojak hairstyle, (none at all) Katle Boyle grin (wide and toothy), and an effervescent personality. His company initials stand for *Moore's Ideal Products*, (marketing and making a wide range of 'go faster' goodies for Radio Control cars) which says it all!

The MIP conversion came to my attention at the World Off-Road Championships last August. Eustace (no mean driver himself) and Mike Christiansen qualified in the A finals for both classes using MIP gearboxes on modified 'RC10's'. The 'RC10' is still a 2WD car to beat, and it's combination of simplicity and excellent handling prompted MIP to make a conversion for use in 4WD. The main reason for this review was a personal desire to try something new, and that should the BRCA introduce a 2WD class for 1988, I for one did not like the thought of having to run a two car



MIP 4W



WDRRC10



stable. The review sets out to test two points. Is the conversion worth considering as a lower cost means of entering the four wheel drive arena, and is it possible to use one car in two different classes?

What you need

The first thing one requires is an Associated 'RC10'. There are plenty around on the second-hand market for between £40 and £50 complete, but in reality one only needs the suspension, steering and chassis, which could be bought for as little as £30 (used). For this review I bought a new 'RC10', not having one of my own. This also tests

MIP's claim that their conversion will fit a standard car. The MIP's run at the World Champs all featured graphite chassis and special steering components.

The MIP box of conversion parts is very small, but then the components themselves aren't large! All the items are well made in appropriate materials.

The conversion consists of a replacement rear gearbox, a new front gearbox, new front uprights and driveshafts. The rear gearbox uses a ball type differential in the rear axle, and an output gear at the top to transmit drive to the front. The front gearbox also uses a differential of ball design, and

transmits power to the wheels via drive shafts having ball and pin drive at the gearbox end with Hooke joints (UJ's) at the wheel end.

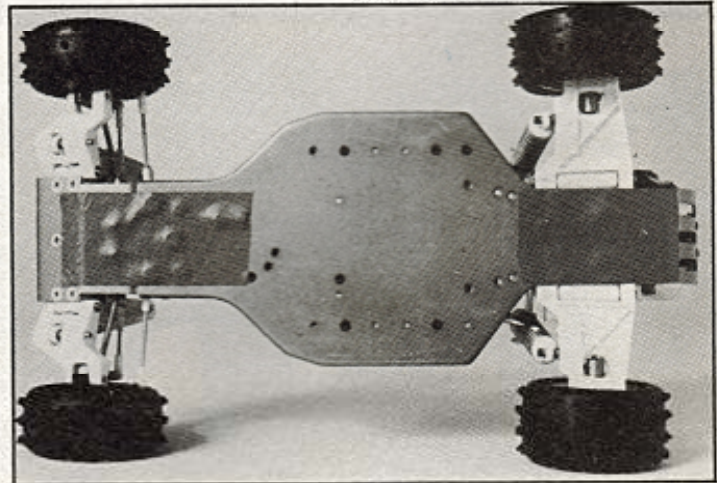
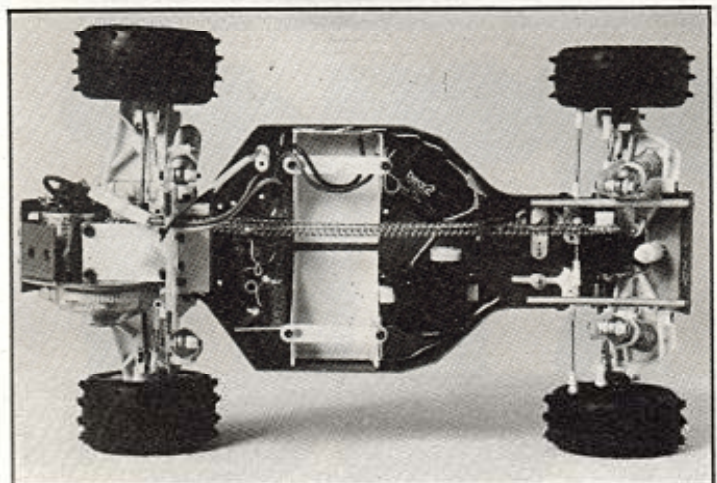
Connecting the two gearboxes is a chain drive which can be adjusted for length by adding or removing links. There is a moulded chain guide halfway down the chassis which keeps the chain 'on course', and raises it over the cells.

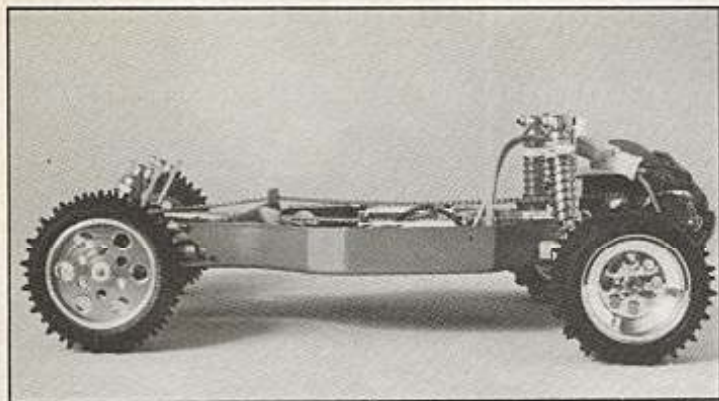
There has been considerable debate about the relative efficiencies of belts and chains as drive systems. If the evidence of Mike Christiansen's performance at Romsey in the World Champs is anything to go

by, the MIP conversion loses little to the belt driven 'CAT', 'Mustangs' and Kyosho 'Optima's'; although the latter is not available yet.

Assembly starts by looking to the 'RC10'. MIP's instructions which are not the clearest in the world, but with their bits on one side of the table, their instructions on the other, and the 'RC10' in hand, it takes only 20 minutes to figure out roughly how to tackle the job. Since the car was destined for some low key club competition, I took the

Below left: basic RC10 layout is the same but the added MIP parts make the tub slightly crowded. Below: smooth undercarriage of the RC10 chassis completed by placing tape over the screw heads.





Above: the car has the original ground clearance and the suspension remains unchanged. Right: the wheelbase of the car becomes shorter as the suspension is pushed down.

opportunity to fit some low cost 'extras' from the SRM catalogue which would improve performance, reliability, or both. These will be mentioned as we go along.

One should start by making the minor modifications to the 'RC10'. Bearing in mind this was a new 'RC10' kit, one can imagine the trepidation I experienced when asked to cut small pieces out of the chassis and rear bulkhead! I decided to assemble and position the gearboxes first before performing with drill, hacksaw and file.

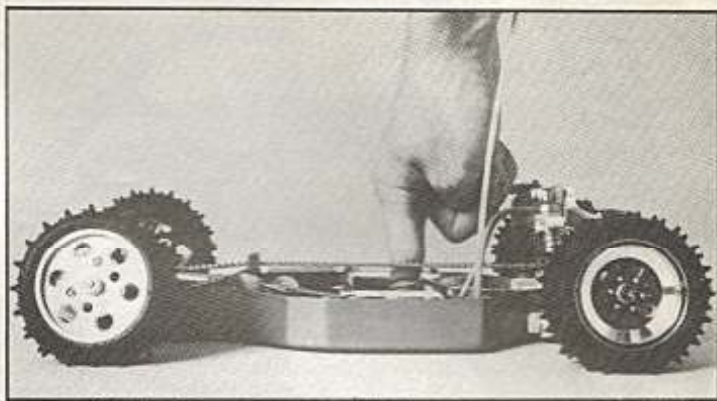
Assembly of the rear gearbox is very straight forward, and the whole assembly is fully ballraced. The only minor problem was that the gearbox oil (supplied) leaked out over a period of hours — on to the dining room table! I reasoned that the amount recommended (10 drops) in no way represented a reservoir (or

sump) which the gears would run in, so that provided all the gears were liberally coated with oil the gearbox would survive — and it has. After attaching the 'RC10' motor mount the gearbox was loosely positioned in the chassis with the screws provided.

The front gearbox is even easier, but in this case held all the oil required!

The output cups to the ball end of the drive shafts were roughly positioned but not locked into place until the driveshafts were in position.

The moulded plastic chain guide was assembled and put aside. In order to position the guide and the gearbox it was now time to drill holes! With the chassis tub completely stripped of all transmission, steering and suspension it was carefully clamped in a *Black and Decker 'Workmate'*. I cut out the template provided in the instructions, only to find that diagrams needed subsequently were printed on the reverse side! This is not a disaster, merely annoying. Since the printing of the instructions has probably scaled the template



verso slightly, the standard chassis holes were lined up with the template as well as possible, and hole centres centre punched through the paper into the chassis. It pays to be careful here. Holes were drilled as stated on the template, all Imperial sizes.

Up the front

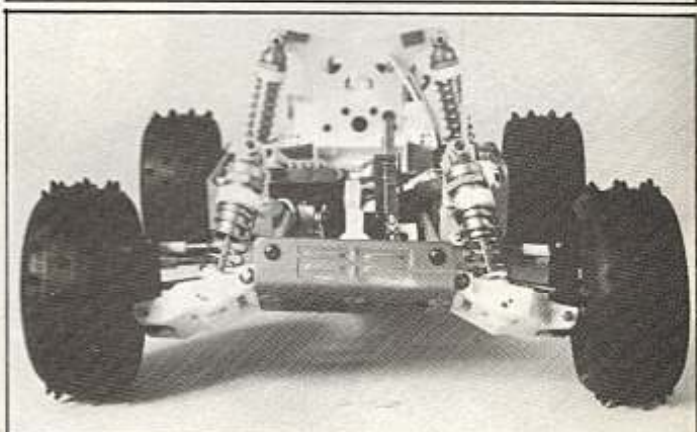
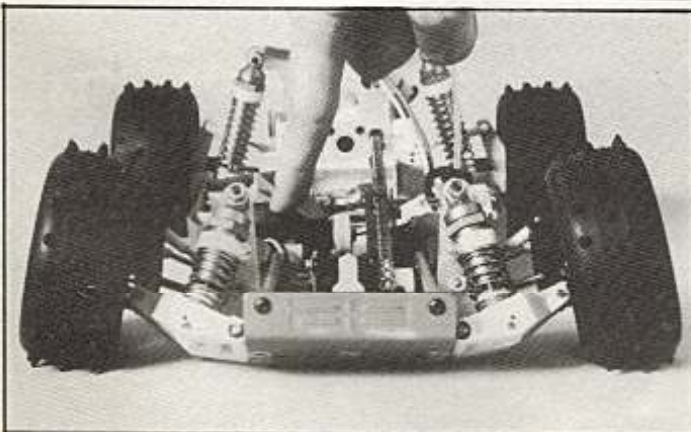
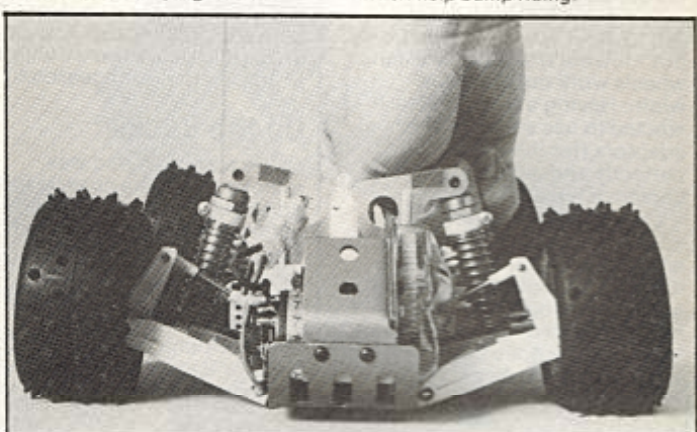
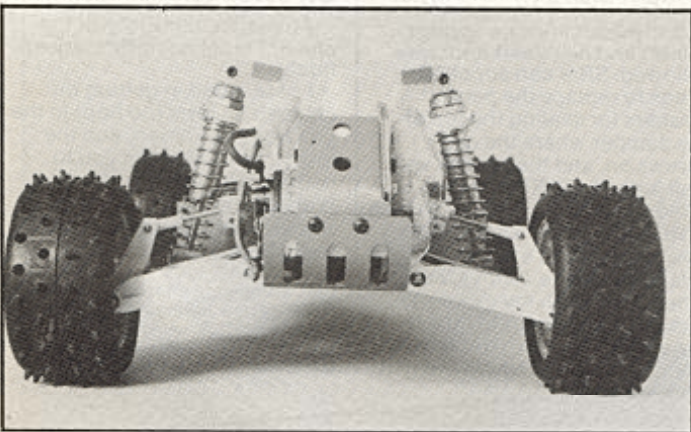
The original steering pivot screws have to be cut down flush to the chassis (not in the instructions). A set of SRM hardened and ground steering pivots were used, a distinct improvement on the 'RC10' system. SRM (via CRP) also sell tough 'O' Rings to increase the stiffness of the 'RC10' servo saver, and these were fitted. A small triangle is removed from the sides of the standard 'RC10' chassis tub (with a hacksaw — no problem) to clear the steering arms. All steering parts from the 'RC10' fit, although the centre link between the servo saver and idler must be shortened (screw the ball joints inward) and the track control (or steering) arms lengthened.

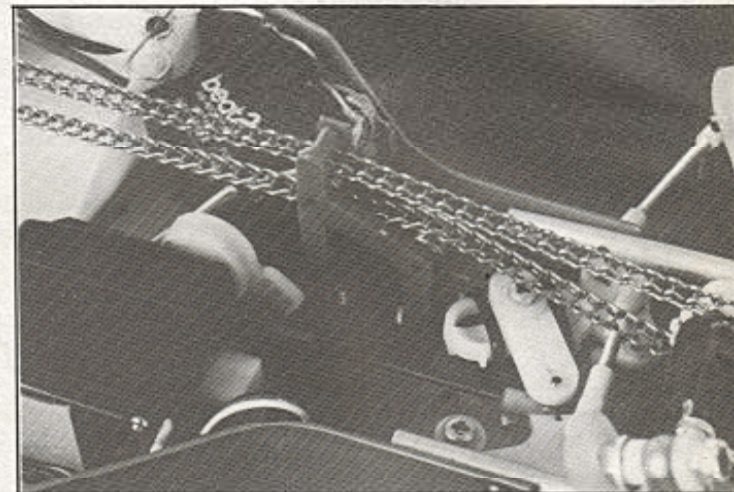
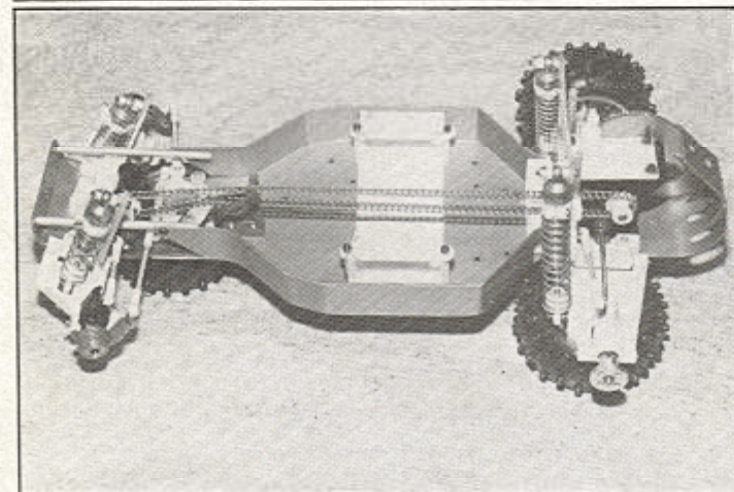
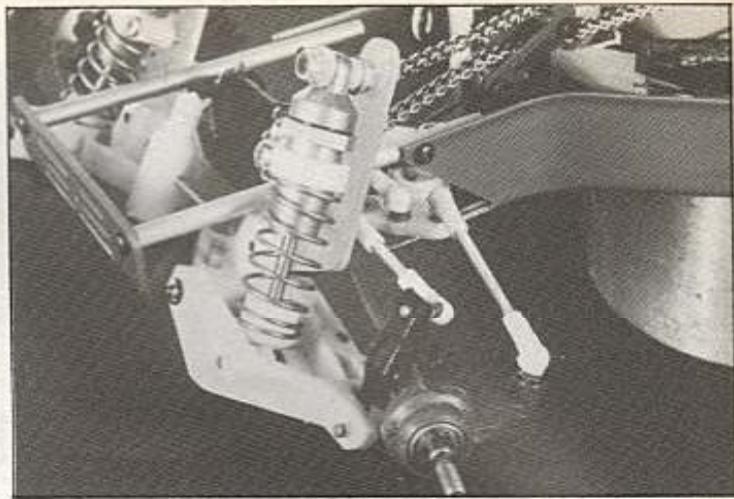
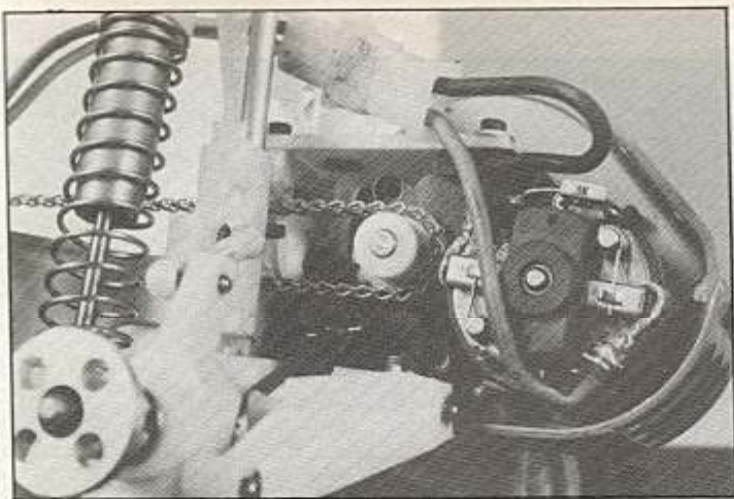
The new axle uprights and

hubs were assembled and fitted — both are labelled 'Left' and 'Right' (looking from the rear of the car) so no problems. A small amount of material needs to be removed from the 'RC10' suspension arm with a sharp knife. Again ball races are provided for the front hubs, and all items fitted accurately first time. All the remaining 'RC10' suspension items were reassembled to the chassis MIP recommended *Associated Gold* Front springs and 40wt shock oil — these were fitted despite personal doubt as to their suitability for UK tracks. It is worth repeating that unless one sets the car as the manufacturer recommends to start with, any assessments will be inappropriate.

The front gearbox fitted perfectly, clearing the front shock mount and the steering

Top left: with the rear suspension down the rear camber increases. Top right: large ground clearance and upright damper positions allow for good handling. Bottom left: also front end camber increases with depression — all suspension angles are adjustable. Right: note angled front chassis and suspension arms which help bump riding.





arms — but not by much! It is a tight squeeze, one may need to shave a very small amount off the steering arms if one's hole drilling is slightly out. Assembly of the front drive shafts is equally simple, again machining accuracy of the Hook joints was first class. All the driveshaft items are hardened steel. *MIP* recommend thinning down 'RC10' Rear wheels for the front, but 'Hotshot'/'PB' 'Mini-Mustang' wheels work out the same width. Having a few of these, I elected to use some *SRM* wheel adaptors (for the *PB*) which fit perfectly and allowed me a choice of tyres for testing.

Lastly I adjusted the output cups from the gearbox to ensure the ball and pin driveshafts could not come out, and locked down the grub screws with threadlock.

Our 'RC10' does not have a front bumper, but one will be

fitted for BRCA events.

One small point, the grub screw which holds the chainwheel onto the gearbox input shaft looks much too long, until one realises that it goes right through the shaft and out the other side! Make sure that when finally positioned the screw sticks out of the chainwheel equally, otherwise it fouls the grub screw holding the output cup of the ball and pin drive (told you it was all a tight fit around the front gearbox!)

Up the Back

The rear bulkhead was removed from the chassis to drill holes for the front gearbox, before refitting it was drilled in two places for the chain to pass through. I failed to find the exact positions with the result that the chain fouled on the edges. Opening the hole out to $\frac{3}{16}$ in. or $\frac{7}{8}$ in. solved the problem.

The rear suspension, gearbox, bulkhead and top gearbox plate were all reassembled to the car. Tackle the suspension first, then the bulkhead followed by gearbox and top plate. Ballraces were fitted to the rear wheel hubs, and the standard 'RC10' driveshafts were used. All suspension settings are standard 'RC10' kit, again *MIP*'s recommendations on springs (Gold) and oil (30wt) and were followed. *SRM* can supply O Rings to replace the plastic washers for sealing the top of the damper where the cap screws on, and these work very well indeed. 'O' Rings were fitted to the tops of all four shocks.

RCMC's 'RC10' kit had no wheels/tyres, so a set of adaptors to take *Tamiya* 'Fox' wheels (some in my pit box!) were used. The centre hole in the wheel is opened out to $\frac{1}{4}$ in. diameter and the whole thing

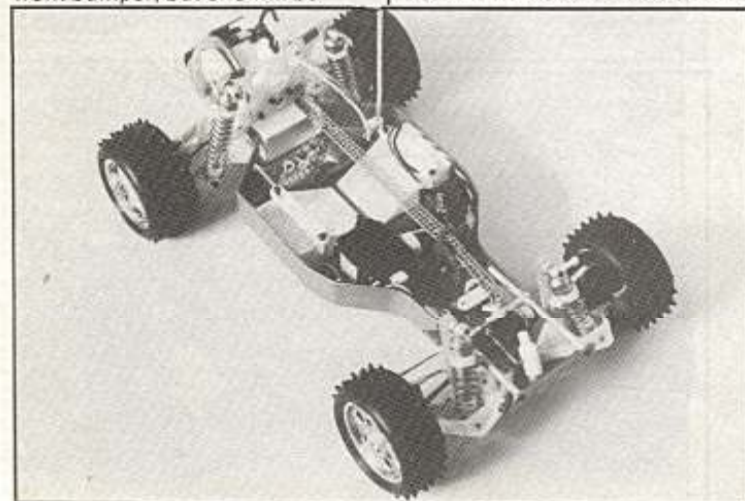
works very well. Standard 'RC10' wheels work perfectly of course.

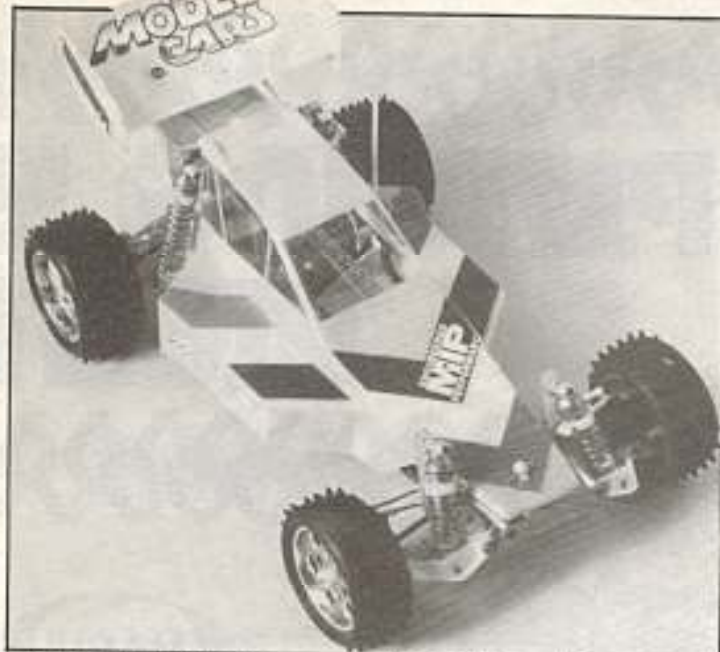
On with the chain

All that remains is to fit the chain. This is not difficult, just fiddly.

I succeeded in getting the chain to be level (no flop) in the unloaded condition, and the instructions do warn you to recheck tension after 10 runs. Without a motor in place the whole drive train is wonderfully free. Right from the bench, with

Left: completed chassis ready for the track — a new bumper will need to be fitted for BRCA races. Below: the two important boxes the big one RC10 the small one *MIP*.





The car complete including a monster rear wing and RC10 bodyshell, also aluminium wheels from SRM.

or may acquire one in the next few weeks, should note that the recommended spring/damper oil combination could prove a bit hard for UK tracks. If your car is twitchy or bouncy change to Associated 'silver' springs with 30wt oil (front) and 20wt oil (rear).

Track Test B

Of our two objectives one is easy to discuss. It is not practical to regard this as a potential car for 2WD and 4WD. Part of the problem is that MIP have done such an excellent job on the conversion that it turns the 'RC10' into an MIP 4WD car — not a compromise. The quality of Associated's original design and production is amply matched by MIP's quality in the conversion, and the net result is a car deserving of its own name. Whilst Associated's input and design is noted, I have no hesitation in calling the car an 'MIP'.

SRM will do a deal which gets you a new 'RC10' (less items not required) and the conversion for around £240 that misses the point. MIP sell the kit as a conversion to existing 'RC10' owners. It is better to add the cost of a second hand 'RC10' to the MIP price, and I suggest a target figure of £135 (kit) plus £60 for the 'RC10'. That total is not unreasonably above a 'CAT'

wheels fitted, the car runs without any binding or notchiness which is ample testament to the high quality of manufacture and, I like to think, careful assembly.

Running gear was my normal tried and trusted components — Futaba '131SH' servo, JR 'Beat 2', PRO radio, Laser 'Bug' forward only speed controller, and for this test, a Twister '4D1' motor. An 'RC10' type shell was fitted with the rear wing from my 'CAT', an extra large Parma item with side plates. The track test got washed out in those severe storms of October 16/17th last. The nearest I did get was a quick whiz round the local park using a 'CAT' for

comparison — which was interesting.

The MIP is quick — no doubt about that. But interestingly it was easier to drive than the 'CAT' in that it braked better and was less inclined to understeer under power. Turning in was not so good, and I was all set to do a second comparison run when the rain came down — again.

At home I suddenly realised that the 'CAT' has roller clutch drive shafts and the MIP does not, tending to confirm its tendency to understeer slightly than I am used to. Having said that the car was very responsive and, I repeat, easy to drive.

Those who have got an MIP,

or belt drive 'Optima', and I firmly believe the MIP will compete with these two at the higher levels of club racing once sorted. As a conversion for existing 'RC10' users it confirms our second objective — it is a 'cheap' way for 'RC10' owners to competitively enter the 4WD arena. It handles well and is reliable.

On first sight those instructions and the DIY element dulled my enthusiasm for recommending the car. Having seen the layout for this review, and the wealth of photo's now available, I feel that any skilled club racer could make a successful attempt at building the MIP. It certainly boosts the ego by the attention it attracts at club meetings! If you enjoy something different and rewarding then take a serious look at the MIP — it will not disappoint any investor.

All available through: SRM Racing, 140 West Street, Fareham, Hants.
 MIP 'RC10' Conversion £135.00 + p&p.
 SRM Hardened/Ground Steering Pivots £5.25/set
 CRP Servo saver O Rings 90p/set
 SRM 'RC10' Shock O Rings £1.25/set
 SRM 'Hotshot' wheel adaptors £4.25/pair
 Ballraces for rear hubs £2.25/each (4 required)
 SRM 'Fox' rear wheel adaptors £5.95/pair

Below: after showing well at the recent Romsey World Championships the MIP 4WD RC10 is now being used by both Pete Winton and Glyn Peglar for the 1988 season.



If the interest generated by the MIP at its first outing could be harnessed to power the car, then an A final win would have been certain. As it was, fourth in the B final reflected well as early stages of development - first outing - and timidity on my part with the horsepower.

The West London Racing Centre is a small track tucked close to the A40 near Northolt Aerodrome in West London. Chris Robinson and his excellent helpers contrived a tight circuit on grass which gave plenty of grip and rewarded good driving. It was most helpful of them to allow me a race despite turning up at the last minute for a pre entry event.

To recap on the starting specification for the MIP, we fitted a 19 turn single motor, LASER COMFET forward only FUTABA '131SH' servo (which now costs a frightening £50, but one lasted the hole 24 hour Donisthorpe race after a long career in my hands, and is still giving sterling service to Adam Winton Jnr.)

JR 'Beat 2' PRO radio CAT tyres, and no car should be without them - a clutch of the new model car stickers!

Suspension wise the original MIP instructions were followed - Gold springs and 40wt oil at the rear. The settings for suspension top links both front and rear were as per the RC10 settings found in Associated's original instructions. Despite the abnormal amount of bump steer with the MIP set up this aspect was left as standard. The motor was geared 9.54 (6:1) and the MIP gearboxes give an additional 2:1 reduction. The overall ratio was 12:1, considered conservative by those that know.

Having turned up late and being given early heat (two), round one was the classic disaster of arriving after the race start with the wrong numbers on the car! Rightfully the organisers disallowed the

direction without losing control, and powerfully progressive under braking for the hairpin corner which followed the Turn into the hairpin. Early application of power pushed the car a little wide, but without dire results, and there was prompt acceleration down a short straight to an open 200 degree left hander. I never did get this corner right, being too wide on every occasion with noticeable understeer. The immediate following long hairpin right showed more understeer into a very short straight, a right/left 'S' bend (more of which anon) up to a hairpin right leading to the main straight. The correct line for this hairpin had a nasty bump, so it was a case of going in tight and slow which gave no cause for concern.

An early heat gave plenty of time to watch the fast boys in heats 8 & 9.

and more stable, and were noticeably softer on spring/damper combinations. Acting on advice from Mick Langridge the MIP was changed to 20wt oil/silver springs at the front, 30wt/silver springs at the rear.

Round 2 was a giant leap up the scoreboard due to starting on time and having the right numbers! The car was also geared up to 10:1 and showed more speed, but frankly a single wind was wrong for track - being slow suited me better however! The springing was wrong, understeer built up excessively on the entry to turns, and when the power was removed the car 'fell over' onto the outside front wheel leaving the inside rear waving in the air - a Gold GTI driver's worst nightmare! Having said that a clean run put me in the top ten so all was not lost, the car rode the bumps well under power and along the straight.

proved much too stiff, the car bouncing badly leading to directional instability. Another late start and some wayward driving left the round 2 score to count - it was 14th fastest, not bad for first time out.

By this time I was regretting not having the front anti-roll bar available, and wondering whether a roller clutch in the system to disconnect the front wheels on the overrun would improve the speed. Drivers running the 'Optima' belt drive cars at this meeting had discarded their roller clutch front drive shafts in favour of full time 4WD claiming



improved handling. After some head scratching I decided to revert to the Round 1 set up of spring/dampers (gold/40wt front, Gold/30wt rear). Whilst re-setting the car after this change the amount of negative camber on the front wheels was changed. In full bump suspension fully pressed down the negative looked frightening, so the top suspension links were lengthened 2 turns of the ball joint which gave the front wheels the same camber as the rears at the rest position.

Now geared 10:1 overall, the car acquitted itself very well in the B final.

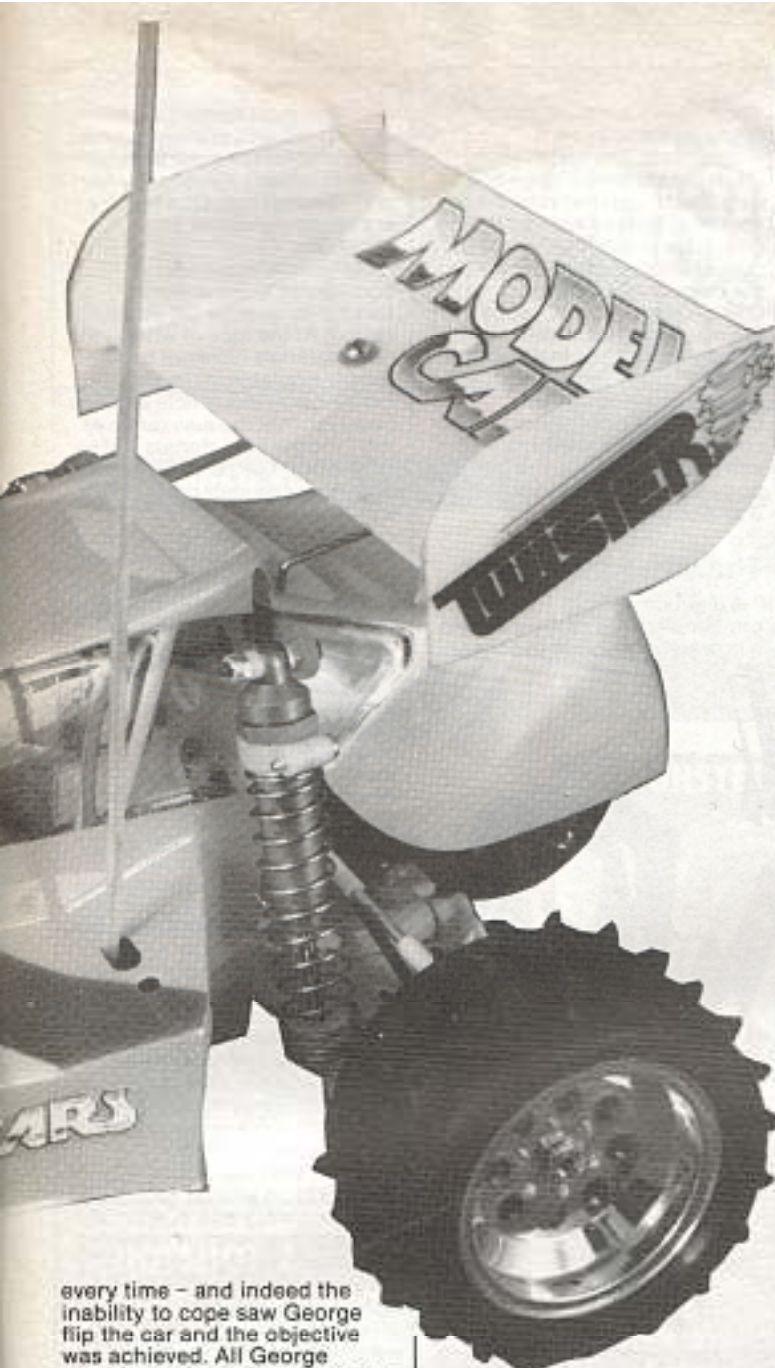
Once again I was noticeably slower than drivers using TWISTER '201' or PARMA double winds, but the understeer was now all but tamed, and the car was easier to push out of the turns. The left/right 'S' was now a breeze, we caught many cars here. My sole objective for the final was to beat long time friend George Land, but that proved difficult. Basically his car was a missile in a straight line, without doubt the fastest car on the track. Around the turns the MIP was easily his equal - on the right/left 'S' we were inside him

MIP On the Run

time, but the car was reasonably fast and technically I won the race. Down the long and bumpy straight the MIP was very stable, easy to change

If I was worried about understeer it was nothing compared to some of the Optima's and CAT's. However, their cars looked a lot faster

My limited knowledge of suspension pointed to a lack of roll stiffness in the rear of the car. For Round 3 rear oil was changed for 40wt, but this



every time – and indeed the inability to cope saw George flip the car and the objective was achieved. All George would say about the motor was that it came from PARMA, but expect to see newly supported driver Steve Brace exhibiting an awesome turn of speed next year.

As MIP predicted in their instructions the chain stretched slightly in the first few runs, not enough to remove another link, but it now sits slack on top of the cells at rest. There was no damage to the cells by having the chain rub on the shrink wrap. All other aspects of the car ran faultlessly, and the grip was so high that a wing was unnecessary. There is a considerable amount of scope left in the car to improve the handling. Anti-roll bars and camber alterations will be next on the list together with some increased horsepower.

Overall an excellent conversion which adds to the already sound 'RC10' design.

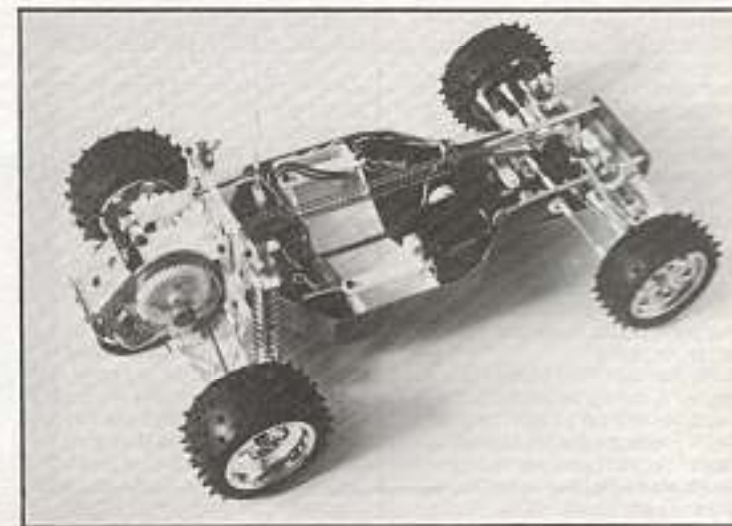
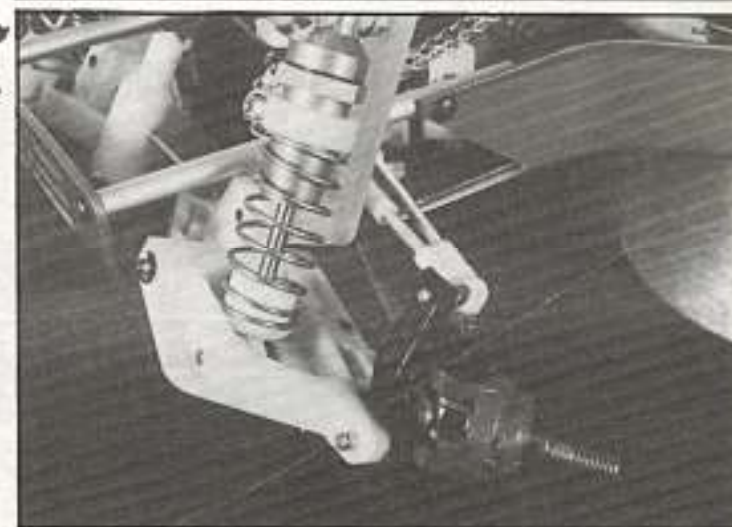
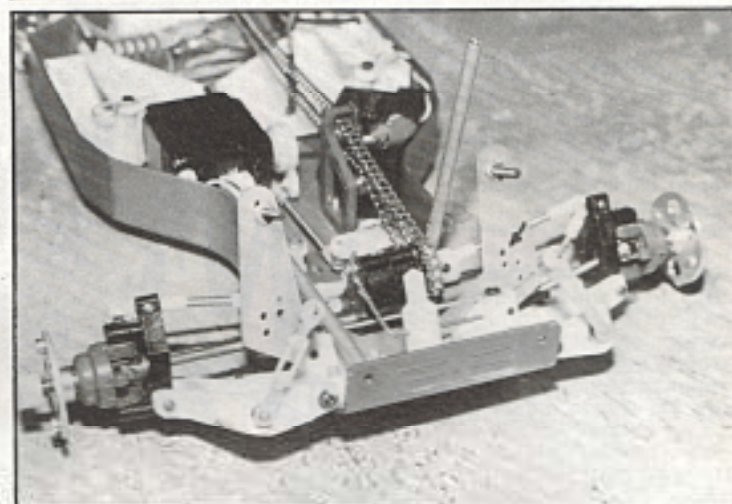
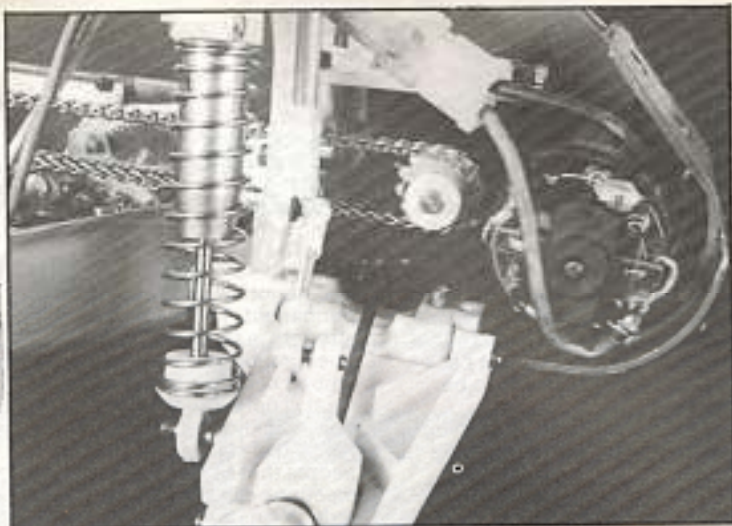
The MIP is an easy car to drive, responding well to changes in suspension settings. Whether there is enough reserve of potential to get on terms with the 'CAT' at National level remains to be seen. Certainly the dedicated

club driver will find all the competence required to do an effective job every weekend. For existing 'RC10' owners £135 for the conversion is a very affordable way into 4WD racing. However, as the PB 'Maxima' and "World Champ" 'CAT' prices breast the £200 tape, the MIP + used 'RC10' formula gets more attractive.

Above all it is different from the herd (or pride?) of 'CAT's', and the soon to be released 'Mid 4 Optima' will surely be thick on the ground. It is nice to be different, and owning a MIP could be successfully different.



From right upwards; the completed chassis ready to go less cells. Front dampers should be set as described in text to give a starting point. The front end, before the fitting of the dampers. Make sure the suspension moves freely. Motor installation showing the 'dogbone' driveshaft.



P's, 4WD RC-10 a super conversion from Eustace Moore.

