AMPS RAPIER

WHATEVER ELSE can be said of the AMPS Rapier one thing is certain, the company has secured a world 'beat' in being the first such car ever to be offered as a construction kit!

The Rapier story is really remarkable in that from its first public appearance it looked a winner in the hands of its team drivers. One was the experienced and already successful Dave Martin, appearing during his last year at university and likely to be oppressed with exam results and job opportunities; the other Gary Culver a far less experienced driver who had never been in the limelight before. Between them, on a strictly equal basis (rather than a team leader and a follower situation), they can be said to have been in the running for a win on every occasion, defeated only by engine failures or other problems outside the sheer excellence of the car.

Others are following the same lines. As so often happens, a good idea springs into being in a number of places without any aspect of copying at about the same time. Thus, the year will see a real independently sprung battle between the world's leading manufacturers. AMPS have a season's lead and well deserved it is.

I very much hope that I too have something of a lead in offering the first comprehensive feature on building up one of their kits. It has certainly given me immense pleasure and will, I hope, tip the scales for some drivers hovering on the brink of joining the spring-heeled fraternity.

Like all good kits the parts are separately packed in numbered parcels. Assembly should follow in strict rotation since early sub-assemblies are required for later main assemblies. So first task must be — and this is very important — to read the 25-page instructions through quietly, looking at the separate illustrated sheet (numbered pictures do **not** relate to numbered packages) and getting some idea of the detail work involved.

Next stage, and this again I think is essential work, is to open each package and check and tick off each item against the list provided, getting some idea of what it is all about. Since many parts will be quite new to the modeller or to anybody else a number of new descriptions appear. It may take a little time to identify each item. Put the bits carefully back and seal the package with sellotape to ensure contents do not get mixed up between numbered lots. A list at the very beginning gives descriptions of all abbreviations used.

Three thread systems are used BSF, Whitworth and BA. I trust builders have some of these taps and dies as sometimes, with series produced items, it helps to be able to run a tap through or clean up a bolt with a die. It must be emphasised that any production run will need such minor attentions by the user, or he must expect to pay very much more for the goods if it has all been done for him.

My old friend 'Curly' Lawrence made model locomotive building within the grasp of almost everyone by insisting that work be brought down into very small steps and encouraged the builder by saying in effect, ''Surely you can do a little job like that!'' Here the instructions proceed very much on those lines.

Before starting real work you can, as I like to do, get the tyres on the wheels and a dirty sticky job over. No problems here. Rear wheels are in three segments and will be stuck together before putting on the hubs.

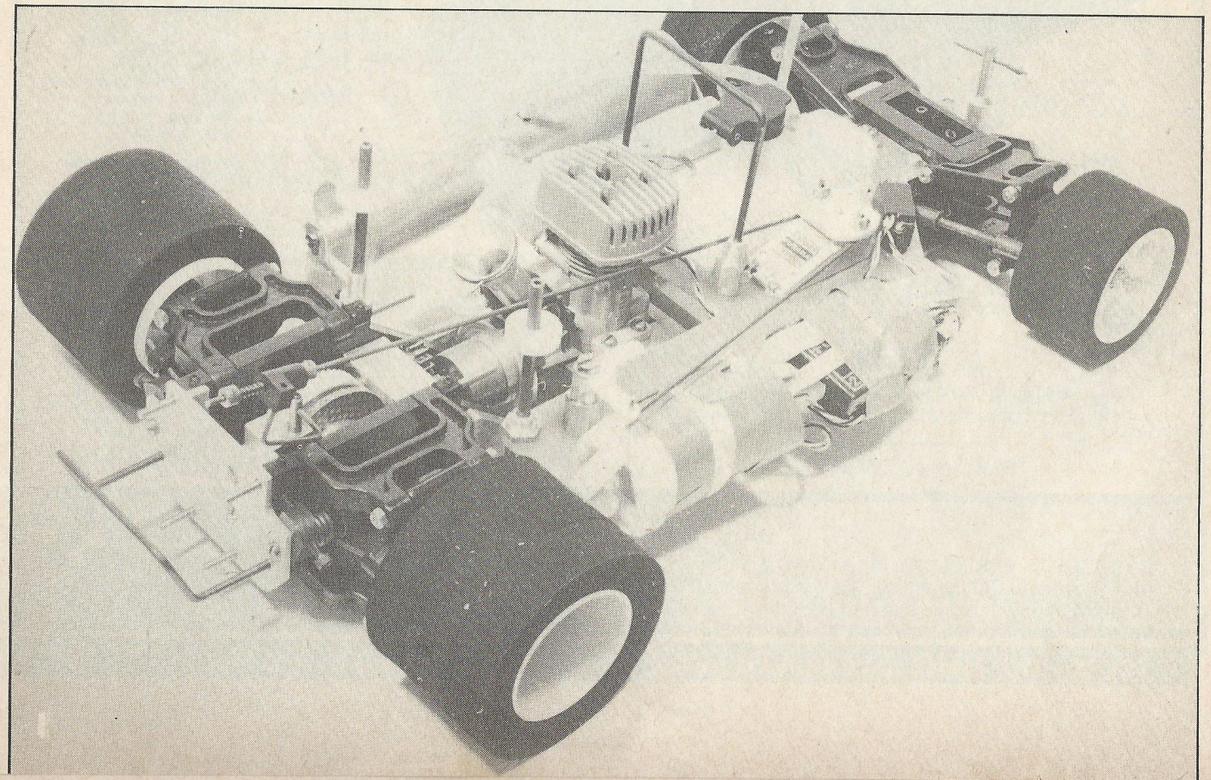
Section 2, Rear hub axle sub-assemblies:

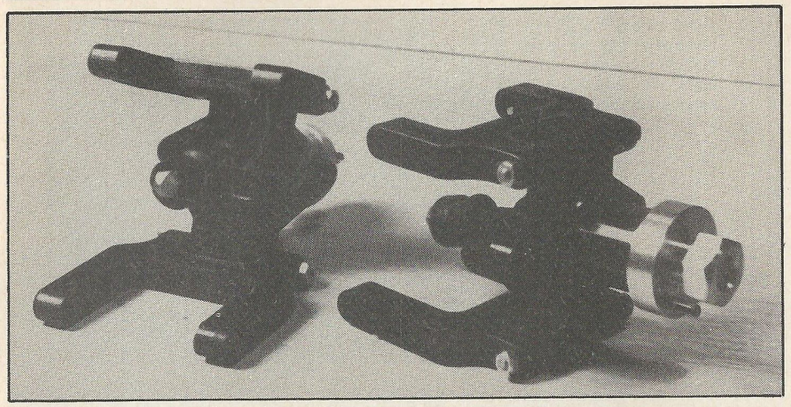
Pictures show plastic parts as white, as they were in the prototype cars, but here they are all black and very elegant. This is a nice easy put-together for starters. Main parts are the two suspension uprights through which the two rear stub axles go, and four wishbones, two upper and two lower, which are assembled for right and left hand.

The wishbone pins, which form the hinges, are held in place with small hex nuts. A tube of Loctite 'Lock & Seal' is provided and should be used straightaway to fix these nuts in place. Otherwide during building operations some will become detached and a nuisance to find or replace.

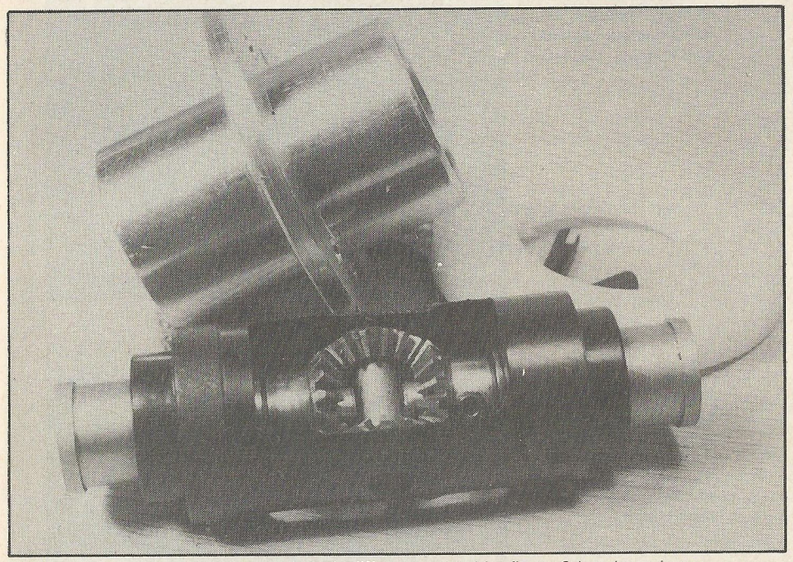
Final job here is to slip the rubber coupling boots on the stub axle ends.

Completed Car.

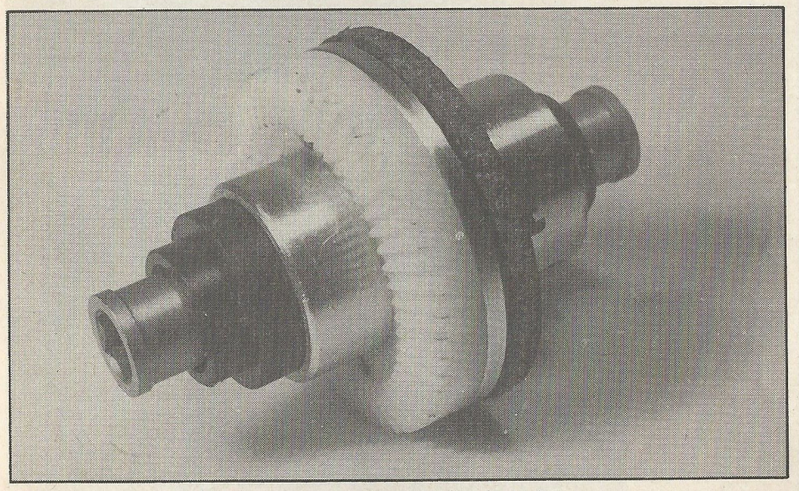




Rear hub axle sub-assemblies and rear wishbones.



Differential bevel gears with output shafts in diff. case, with drive flange & bevel gear in rear.



Differential in case with drive flange outer case bevel and fibre brake disc.

Section 3, Differential sub-assembly:

This the crux of the whole operation! Start fresh and full of patience. First the four ballraces are pressed into place (two outer and two inner) in the differential casing. They need a little more than finger pressure, or my fingers are very weak, and I tapped the outer ones in with a very light hammer using a small block of wood protecting the race. The inner ones are more of a problem, but I used a thin rod through each end to press again on a small wooden pad to tap them home. Do not belt them directly with the hammer, be gentle and have wood or similar in-between.

Now comes the 'patience-needed' bit! You take an output shaft gear on the hand and place neatly meshing the two cross shaft gears and slip the fingers on which they rest into the plastic diff. casing. You next push on with them through the casing to slip the other output gear in place making a rectangle of the four bevel gears. Carefully withdraw the fingers so that the four gears now rest within the casing.

Did you manage? Of course not! So try again, and again. My time for the job was 45 minutes. I don't know par for the course — perhaps builders will give me some honest times. It is not possible to get the gears in any other way — but the little beasts will topple over just when you think you are there. I am going to have a session trying to do this bit using plasticine or similar to hold the first three in place until I slip the fourth in. Simpler suggestions welcome.

With the gears encased, slip the short cross shaft through the cross shaft gears. It should go exactly through and be flush with the case outside (it must be flush or the drive flange won't slide over it). Then add the output shafts from each side. They are fixed in place with allen screws bedding on dimples, and secured with some Loctite 648, (also provided in the kit). Twist the shaft all the way round when you add the 648 to obtain maximum grip and then screw in the allen screws.

Three brake pins must be pressed into the flange of the outer case. Before slipping it in place over the diff. casing pack the gears with a good heavy graphited grease. Casing is then secured with two self tapping screws into the holes provided. My outer case lacked holes for this and they had to be drilled — they come on the longer side of the flange and are approx 3mm in from the edge, lying opposite each other (180°). Main drive bevel gear goes on one side of flange and fibre brake disc on the other. You may find the holes in the brake disc need a little easing to get the prescribed 'free floating fit'.

Final job is to seal the case against grease seepage using a little silicone rubber bath sealant. (You won't need much, so cadge a scrape from any 1/12th scale driver who uses it for his racing tyres.

Section 4, Brake Caliper sub-assembly:

This is an easy one. Only problem is getting the pressure on to fit the ballrace for the brake cam top bearing. I used a little glass paper to enlarge the opening for the ballrace so that it slipped in with minimum finger pressure, securing it with that valuable Loctite. Note that brake cam operating arm; steel (Part 4140) is NOT included in package — you cut it from one of the three lengths of steel wire in the kit and bend it up yourself.

Section 5, Lay-shaft sub-assembly:

Another nice easy one. Fit the two ballraces one at a time in the block in usual way with pressure and a little help from the block of wood and the light hammer. Note again that you will **not** find two spurgears one of 15 teeth and one of 16 teeth, but just a single spur gear of either 15 or 16 teeth. They have proved equally effective so choice is not necessary.

Don't, whatever you do, lose the tiny little metal key which is small enough to be overlooked but vital for locking the spurgear in place. I found that by filing it very slightly to a wedge shape I could get it started and then drove it down with a small plug and the light hammer.

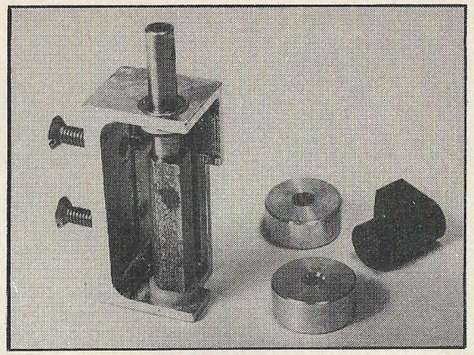
Section 6, Rear transmission & suspension assembly:

This is the first main assembly and calls, first, for the four previously put together sub-assemblies. We now bring together the rear axle sub-assembly (section 2) to attach to the plastic side pods, fit the extruded aluminium back plate. Round this assembly the aluminium engine bearers go. In this sandwich we must install the differential sub-assembly (Section 3), the brake caliper sub-assembly (Section 4) and the lay-shaft sub-assembly (Section 5).

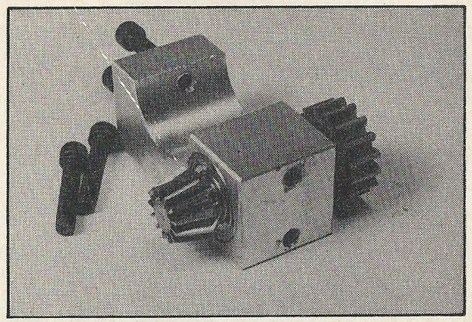
These are fairly straightforward add-ons but the details that go with them require developing. We must fit the drop-stops to adjust the suspension angle with their lock-nuts. They go on the rearmost ears of the aluminium engine bearers. Then come the rear suspension left and right hand springs with their adjuster blocks in plastic. At this stage it is not necessary to make any final adjustments to these two items — just get them in place.

Before attaching the aluminium back-plate, the brake caliper unit is screwed on with its stand-off round blocks. This, and the two plastic sidepods, must be assembled with bottom ends flush with each other. There is a hint that the side-pods may swell a little with the screws in when they must be trimmed. It did not happen with me, but some time was spent getting the appropriate holes in line, necessitating that a small part of the back plate extrusion had to be filed away to give clearance — just one of those little things that, in a perfect world, would not have been necessary and to be expected, as noted at the very beginning.

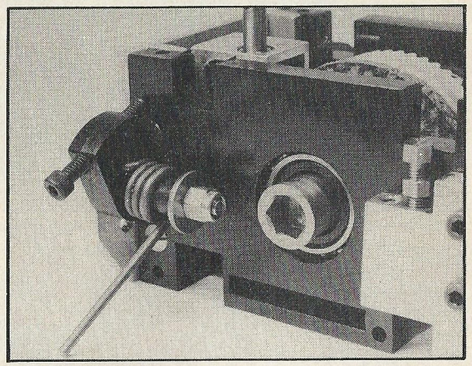
Brake caliper with cam in ballrace at top and nylon bottom bearing. Note also the spacers and servo angle block.



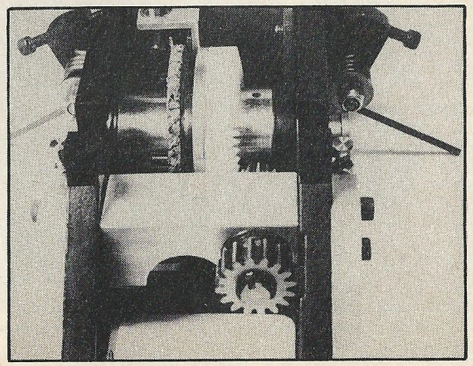
Layshaft sub assembly showing bearing block with bevel gear and spur-gear in place.

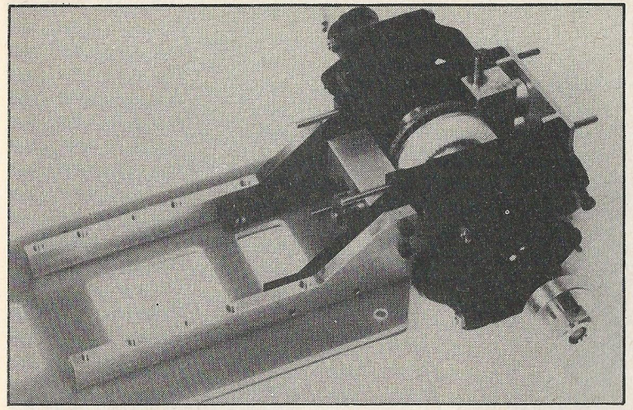


Rear transmission and suspension assembly, showing side pods joined by extruded aluminium back plate with brake caliper in position. Note also suspension spring on left and suspension drop-stop on right.

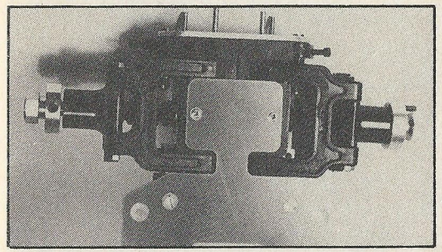


A view looking down diff assembly and the two suspension springs. Forward is the layshaft assembly, where the woodruff type key holding spur gear in place can be seen.

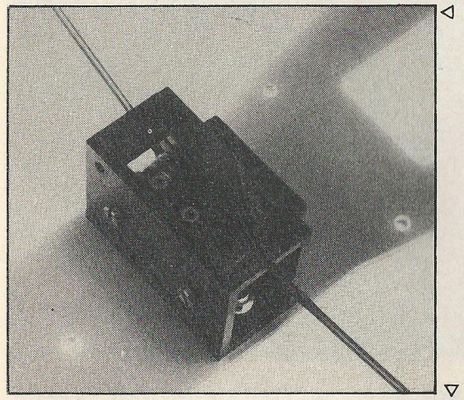




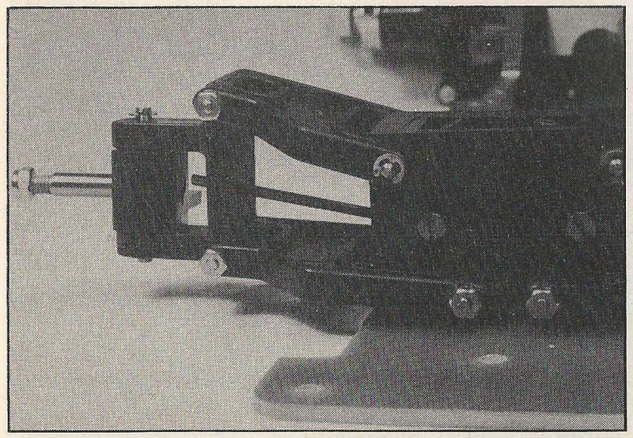
△ *A general view of rear suspension unit and engine bearers in place on GRP chassis.*



◁ *Underneath view of rear suspension assembly attached to chassis.*



◁ *Suspension front box with suspension springs in place.*



▽ *Front suspension assembled with suspension upright steering block, front axle and suspension spring.*

A careful job is required getting the layshaft bevel to mesh in exactly with the large plastic bevel. Some thin shims are provided for final delicate adjustment, but should be on stand-by until the final rear unit assembly is complete.

You will have slipped the big ballraces in the side pods, and now the suspension can be added. Bottom wishbones are added first. The hinge pins here will be found to protrude at each end. This is to facilitate taking them apart as may be necessary during the life of the car. The stub axles are now mated to the drive, not forgetting those funny little coupling end buttons, and the grease tin again. The other ends of the rubber boots are drawn over the joint making all neat and shipshape. Do be sure the assembly is good and free turning. The top wishbone connection is duly made, again with sticking out pins, and the coil springs are slipped through their respective holes in the suspension upright.

The assembly can now be attached to the GRP chassis. Start with the two 2BA screws nearest the front. They may be specially valuable in adjusting any slight inaccuracy in fitting the rear end in pulling it into line. Proceed then to insert remaining screws into chassis to hold engine bearers in place, giving them a little Loctite to keep firm. Re-check meshing of pinion gear with main drive bevel. If there is minimal backlash and no tight spots all is well and Loctite can be added to securing ACS holding layshaft sub-assembly in place. If not so then strip down this unit and re-assemble making adjustments with the shims on standby.

Section 7, Front suspension sub-assembly:

This brings us to the front of the car. The stub axles are already imbedded in the steering block — the ballraces go in the wheel hubs. The kingpins slip through the suspension uprights to secure the stub axle/steering blocks and are held in place with circlips. The front suspension block is screwed onto the chassis, narrow edge of hole facing forwards, so that the little ledge at the back can eventually support the radio plate.

The springs slip onto the suspension adjuster blocks — left and right hand — and the blocks are slipped into the suspension box. The adjuster screws face upwards and are accessible (at need) through the hole in the box.

There is a choice of three holes for the spring ends to go into which will alter the exact angle of the adjuster screws. It is a good idea to choose a different hole for them so that on springing action they do not knock against each other. It will not affect the springing balance.

With this job done the wishbones can be fitted, a process very much like the rear unit with the hinges retained by small nuts to be Locktited. Note that the two upper inboad hinges have circlips at one end. The springs go through central holes in the suspension uprights as the suspension is folded into place.

Section 8, Front suspension and steering assembly:

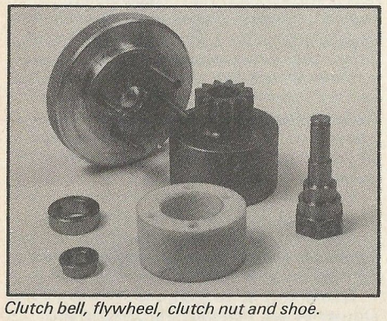
The unusual thing here is that there are two servo savers! I have not encountered this before but can only say that from the moment of assembly it was quite the smoothest steering unit I have yet put together without any running-in period!

Main servo saver follows the American pattern of having a bent-up spring slipped with its legs each side of the upper and lower servo arms. Secondary servo has only the lower arm and its servo post is slotted for a low down circlip to retain. Otherwise the rod and ball joints are put together in the usual way. They are more robust than usual — though this robustness is becoming general now.

One difference is that a further short ball jointed length joins the two servo track rod joints together. Ball caps must be slightly shaved to fit in place.

As if the smooth movement of the steering assembly were not enough there is an instructional note advising how to ball race the servo saver arms! I cannot believe that this could be necessary.

Section 9, Engine & Clutch Mounting:



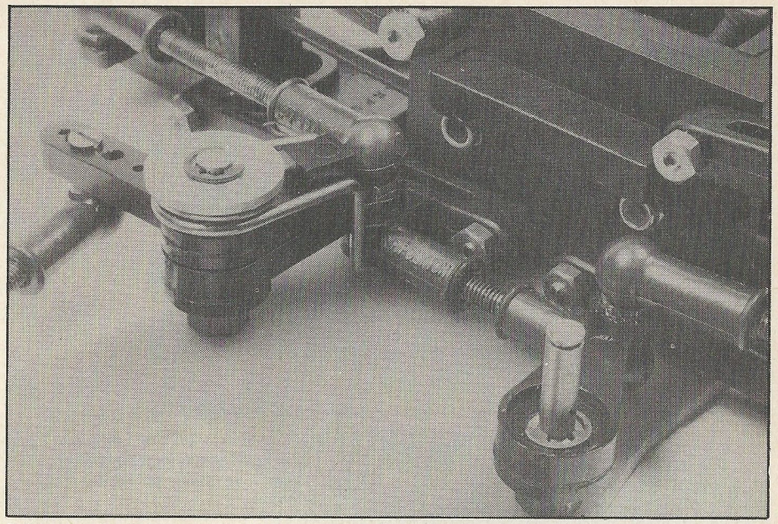
Clutch bell, flywheel, clutch nut and shoe.

Note that engine plate bolt washers (Part 4170) are not included as it has been found they do not make the engine any more secure, rather the contrary.

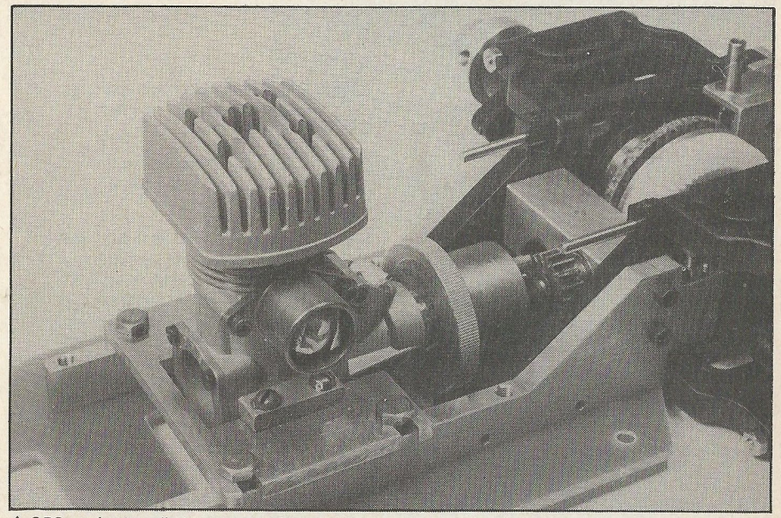
Clutch assembly offers no special problems but the OPS crankshaft will certainly have to be shortened down to about 6/7 threads left. It hurts to do this, but I have hardly ever had an engine that went in without shortening so I don't know why this one should. Engine plate is flat alloy slotted to be fixed across the engine bearers (model aircraft fashion). If you are a little wary of the four post clutch shoes, a 2-post version is available from AMPS. But give the recommended set-up a trial first!

With clutch fitted and tightened down, the engine is tried against the layshaft spur gear for accurate mesh. When satisfied mark the location of holes to be drilled in the plate for securing bolts. With a flat plate (unlike an engine block where holes must be tapped) it is better to drill through, slightly enlarge the engine mounting holes on the casting and attach with nuts and bolts.

The PFTE ring is cut in accordance with instructions. Locating holes may require to be eased a little and shoes slightly

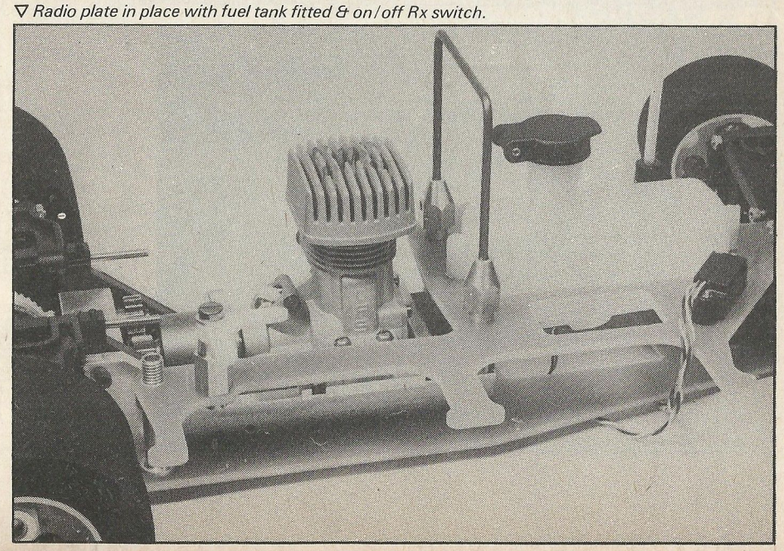


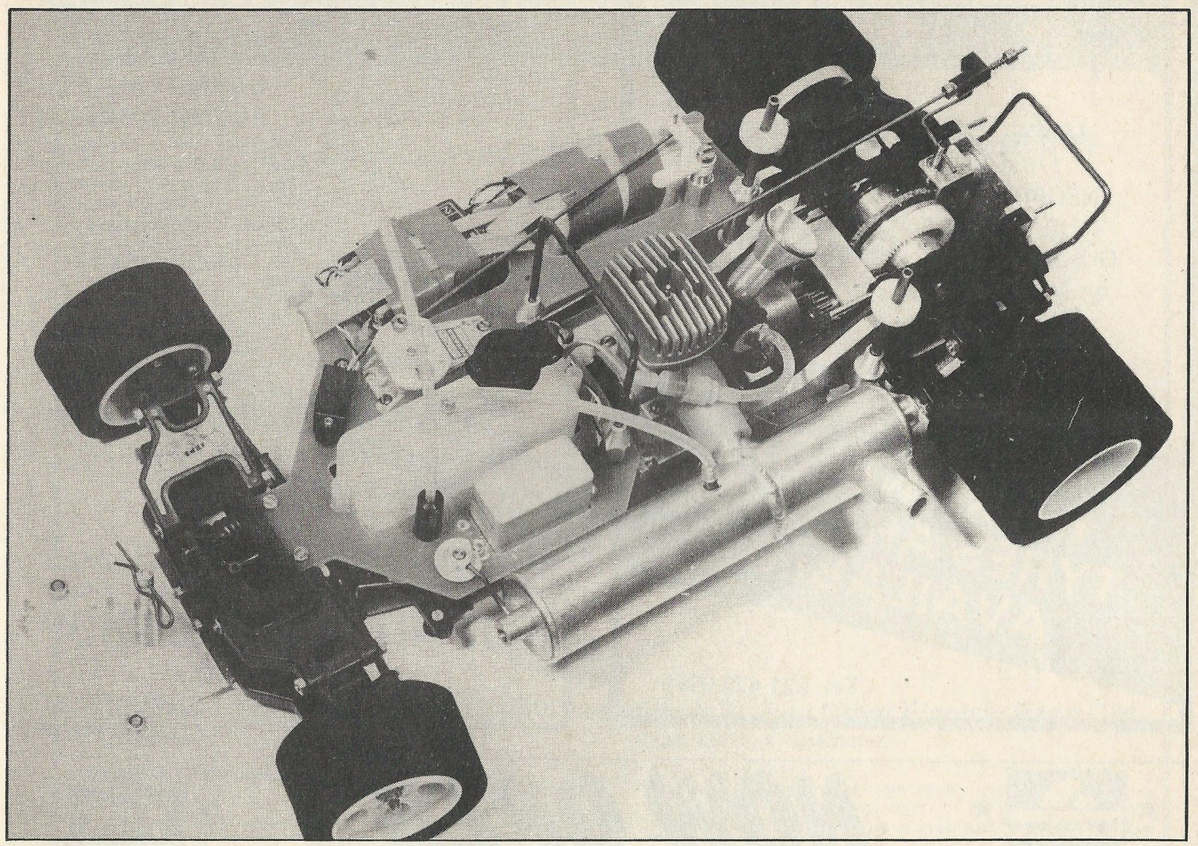
Robust steering linkage and double servo savers. Note short length of rod joining the two track rods.



△ *OPS engine installed on engine plate.*

▽ *Radio plate in place with fuel tank fitted & on/off Rx switch.*





Completed car

trimmed. This done, put the bits together again and fasten securely, noting the slight amount of side play in the plate, so as not to lose the good gear mesh previously established.

You will see in photo that manifold has been stuffed with a screw of paper, as indeed, has carb intake to avoid any odd dirt or swarf getting inside.

Section 10, Radio Plate and Radio Installation:

If you have already stuck the tyres on the hubs it is a good time to fit the wheels and see the car looking decently carlike. Radio plate is cut out to take Futaba servos and these go in place without any need to file out a nick to let the lead through. Steering servo goes in upside down throttle servo right way up. Plate must be drilled to take the fixing screws. Fuel tank fits in its designed hole and is screwed in, after cutting back the lugs, from the underside of plate.

Plate itself is dual purpose in that it forms part of a box structure to ensure true rigidity of the parts which must be firm. There are therefore a couple of special washers to secure radio plate firmly at the rear. The front also is fixed to the front suspension box as an important part of the box structure.

Note that I have fitted on/off switch on top of plate so that it is switched off from underneath. I think this is easier for marshalls sensibly wearing stout gloves.

Other fittings such as rollbar and radio aerial should provide no problems. You will need some good strong elastic bands to attach receiver and battery in the designed holes tandem fashion.

Section 11, Assembly Completion:

The odds and ends remain: A rear bumper — a wire ready bent piece which slots into place and is secured with allen screws; A front bumper which must be drilled to match two bolts and front body attachment post. Leads to brake and throttle are cut from the stout wire supplied and used with the numerous collets included. I have not made the final connection from throttle bellcrank to engine as it depends on whether Perry type carb or slide carb is your choice as to fitting.

Note that my brake connection goes inboard of rollbar. I am not sure this is the better way — adjustment of the brake arm can bring it the other side of rollbar.

Last and important task is fitting the pipe type silencer. This is very ingenious. A short length of wire goes through the front (like a ring on a boar's nose) and is held by an allen screw. Other end of wire goes through a special screw supplied and a flat washerlike plate which is then screwed to the radio plate. The usual length of silicon tube connects manifold to silencer in the middle.

We then come to fixing at the rear. Here a flat strip of alloy must be bent up to turn through 180° degrees to enable a screw to secure the back to the GRP chassis. Bending that strip may be a problem if yours is not marked (as promised in instructions) with the bend angles. I spoilt mine! But making up another strip and testing the bends with a cardboard stand-in I got it right second time. A very good fix.

Final Thoughts:

A long section is devoted to trimming the car for racing, but I hope to be able to get one of the team drivers to cover this part more expertly than I could. Meanwhile the manufacturers do recommend construction of a 'tweak board' from heavy flat wood which I will describe next issue.

Any reasonable capable driver should find it hard NOT to win races with a Rapier. Less experienced enthusiasts should by no means feel it is an 'experts only' car. Built carefully they may well find it is the ideal tool to get them swiftly on the tails of these experts. Good building **and** racing!