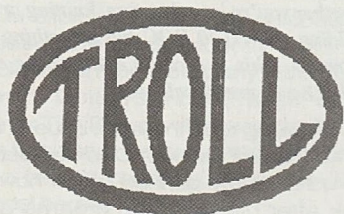
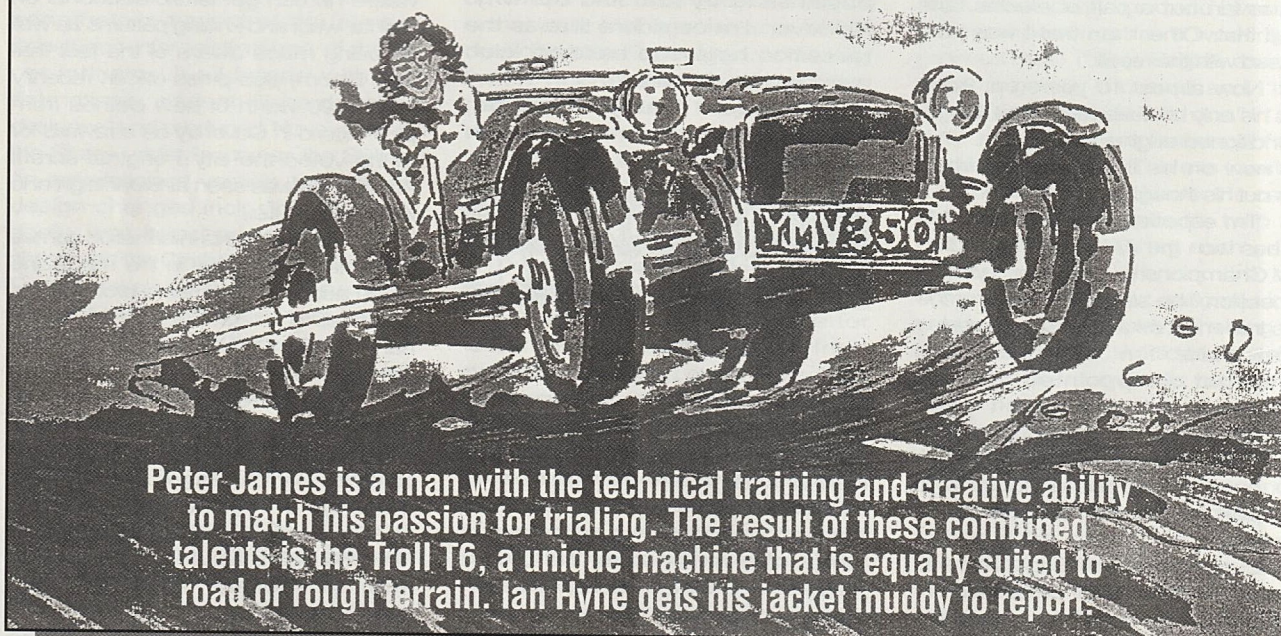


EVEN TROLLS LIKE TO ROCK & ROLL



*... mystical, magical creature
often found in the hilltops !*



Peter James is a man with the technical training and creative ability to match his passion for trialing. The result of these combined talents is the Troll T6, a unique machine that is equally suited to road or rough terrain. Ian Hyne gets his jacket muddy to report.

It is rare that a vehicle specifically designed for use in one specialised arena should excel in several others but though the Troll T6 was designed out of a need for a more efficient and effective trials car, its virtues are equally applicable to auto testing, sprinting, hill climbing and as a road going sports car. But its ability is no mere accident.

Peter's passion for trials has seen him tackling the celebrated climbs of the classic events in a succession of machines including Ford Pops, Hillman Imps and a supercharged Ford 1172 cc side valve powered Dellow. With these cars his driving skill brought him considerable success but he soon decided that they all had shortcomings that could be overcome in a purpose designed and constructed car. With a degree in mechanical engineering from Bristol

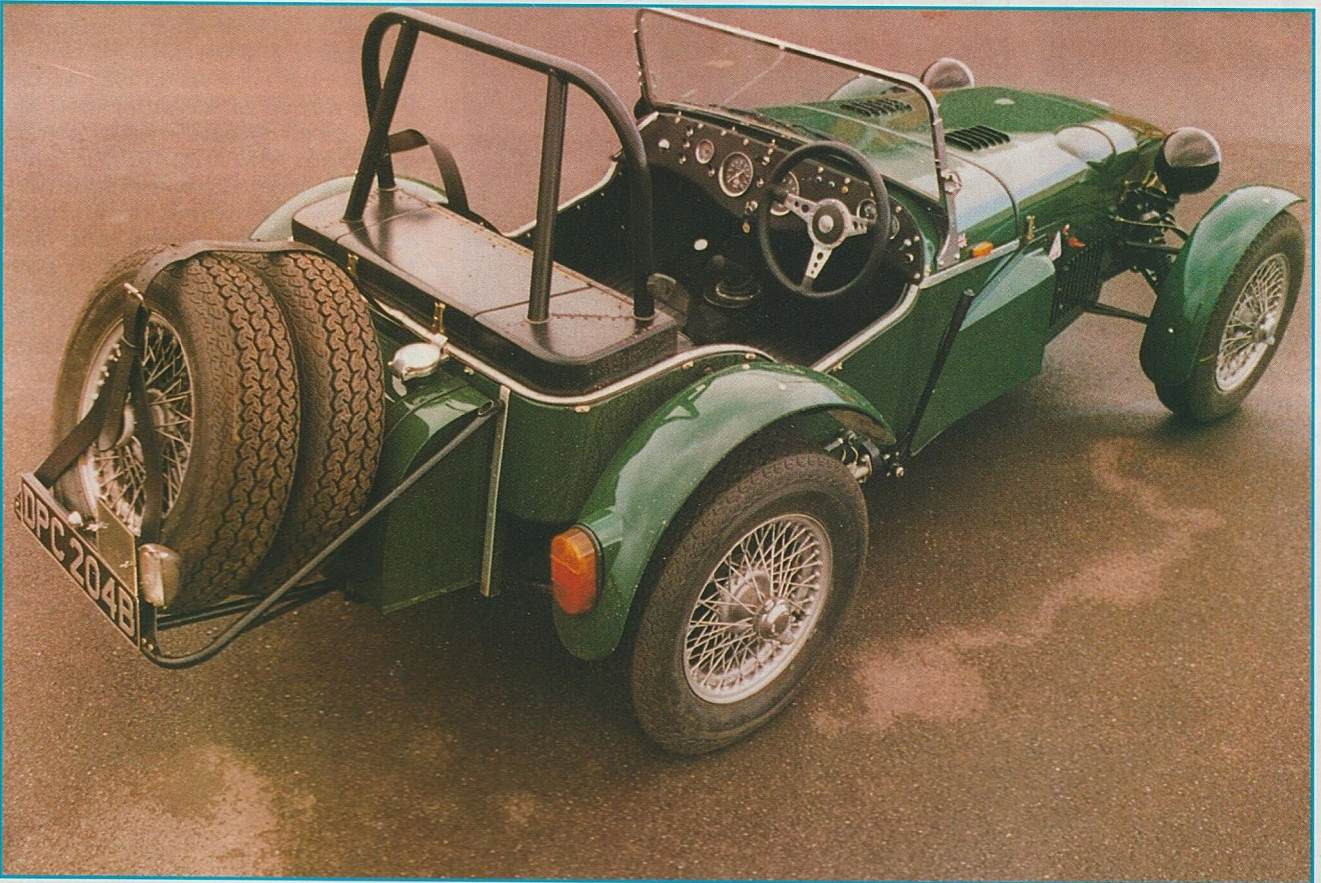
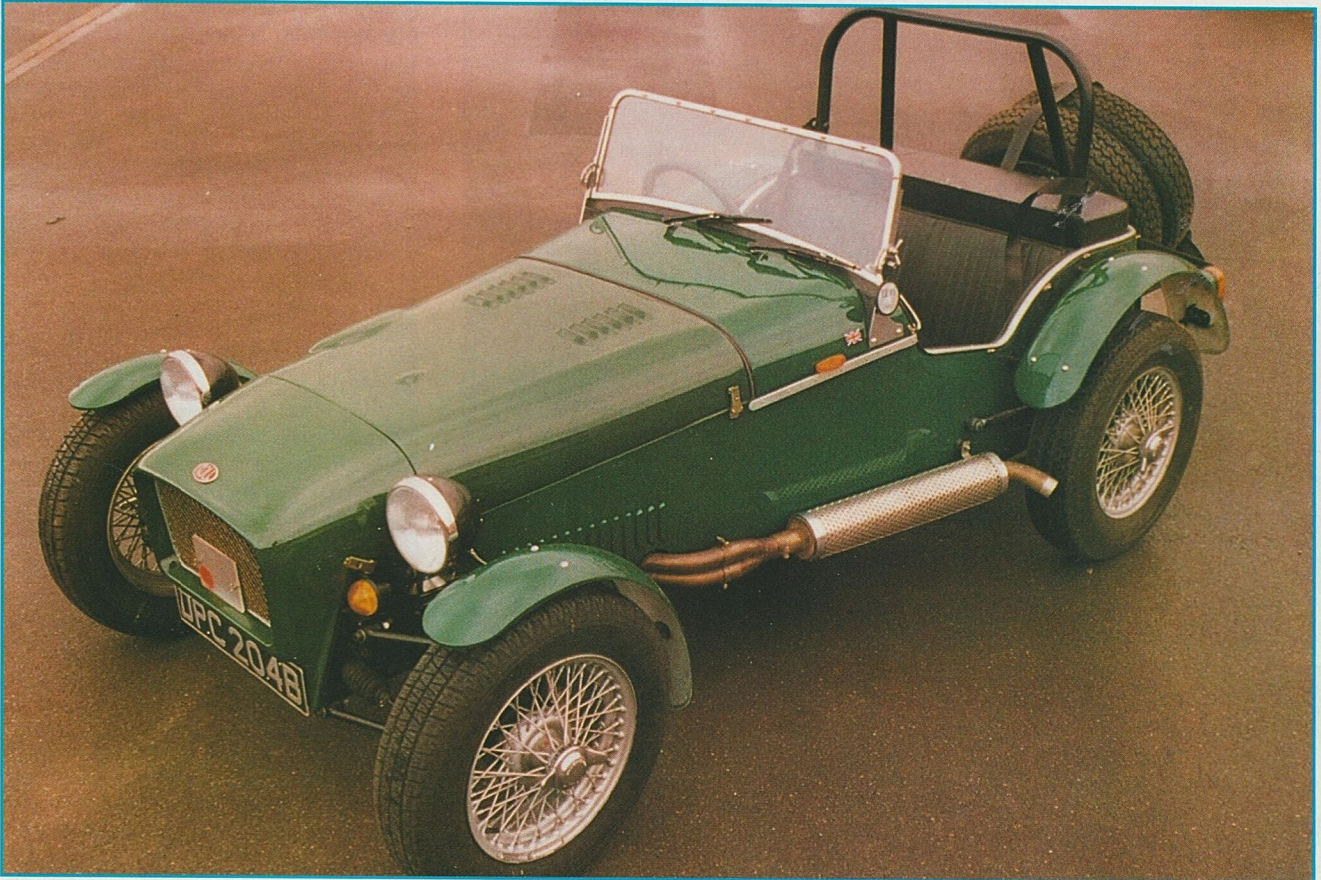
University, he also had the knowledge and ability to tackle the job and the result of his endeavour was the Troll T4 looking very similar to the current version but powered by a supercharged 1340 cc A series engine.

Further development resulted in the Ford crossflow powered T6 and T6B and, such has been the success of this model, that Peter is currently working on a pure road version that will be a serious rival for the established marques offering sevenesque rag top, two seaters. New models are given a number suffix like T4 and T6 while design variations receive a further letter like T6B but in respect of the road car he is studiously avoiding designating it the T7!

After detailed conversation with Peter James it becomes clear that a great deal of his car's dynamic

success is due to the fact that, rather than being a car designed for kit production at a pre set price and consequently affected by constant compromise between simple convenience and engineering integrity and its cost, the Troll has been intended from the outset as a one off equipped to achieve performance excellence under testing conditions and everything has been done to achieve this high aim. The result is a machine of unprecedented ability that has much to teach the budding student of vehicle dynamics. That fellow competitors have been sufficiently impressed by the car that took eight outright victories and the overall British Championship in its first full year of competition to order facsimiles despite the seemingly high price tag merely adds to its reputation. The other notable point about the Troll that again flies in the face of

Trolls



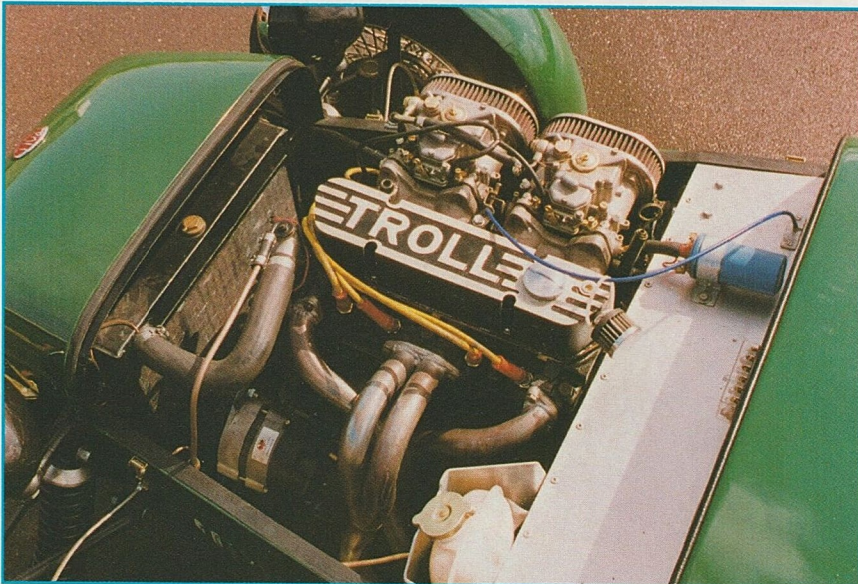
general kit car convention is the fact that the whole thing down to the finest detail was fully designed and finalised before any steel was cut.

There is no particular secret about its design, although Peter

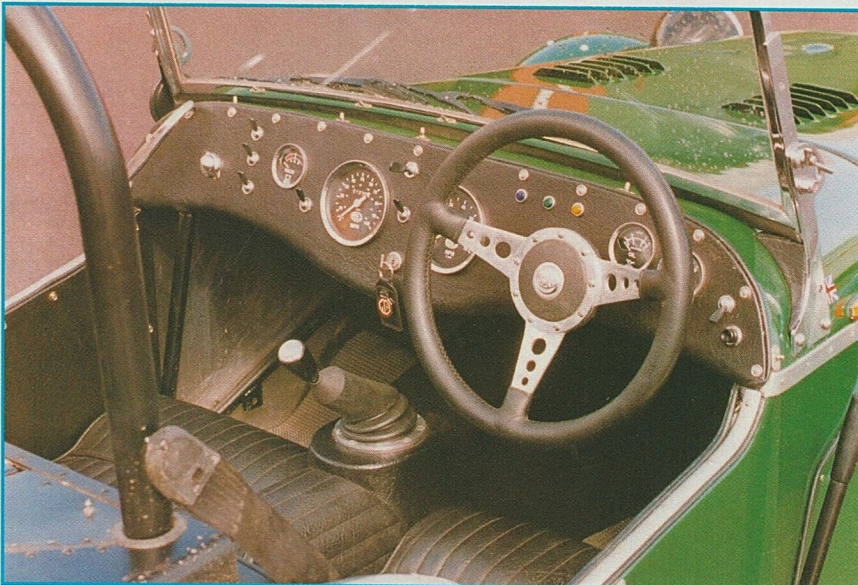
prefers to keep much of the detailed information to himself; it's just that everything has been tried and tested to the Nth. degree to ensure that it works perfectly. You won't find any donor vehicle front subframes on the

Troll. It's not that Peter condemns them but more that they are fine on the vehicle for which they were designed but far short of ideal for the Troll. Indeed, it is the suspension design that holds the key to the Troll's

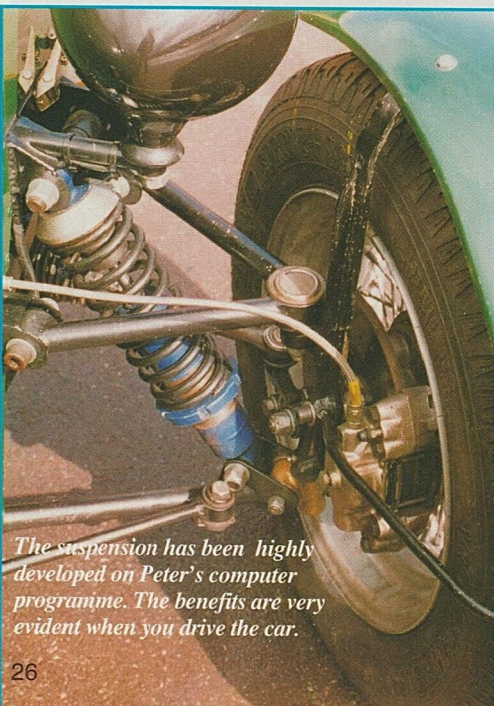
Trolls



The Troll 1700 cc crossflow gives a power to weight ratio of over 225 bhp per ton. It also has exceptional torque and pulls cleanly from 1000 rpm in top gear.



The dashboard is a stressed member and is panelled in 18 gauge NS4 aluminium. The interior is snug and offers an excellent driving position.



The suspension has been highly developed on Peter's computer programme. The benefits are very evident when you drive the car.

outstanding ability. Again, it's a fairly conventional double wishbone front end with a five link rear but every detail, mounting point, measurement, spring rate, damper length etc. has been fed into Peter's computer programme and the results carefully analysed. Thereafter trial, error and practical experience have combined to ensure the perfect set up. You may not think it makes a great deal of difference whether the top wishbone mount is at point A or as little as half an inch away at point B but it does make a difference as in movement the wishbone angles conspire to physically move the roll centre as well as altering its relationship with the car's centre of gravity which needs to be strictly controlled. Widen the track by 1" and the front roll centre rises by 1" which consequently affects cornering and a whole host of other factors governing the suspension's efficiency. Peter's self written computer programme can detail the effect of the suspension in operation as well as the effects of modifications to it and it is the fine control of details such as this that gives the car its championship winning edge.

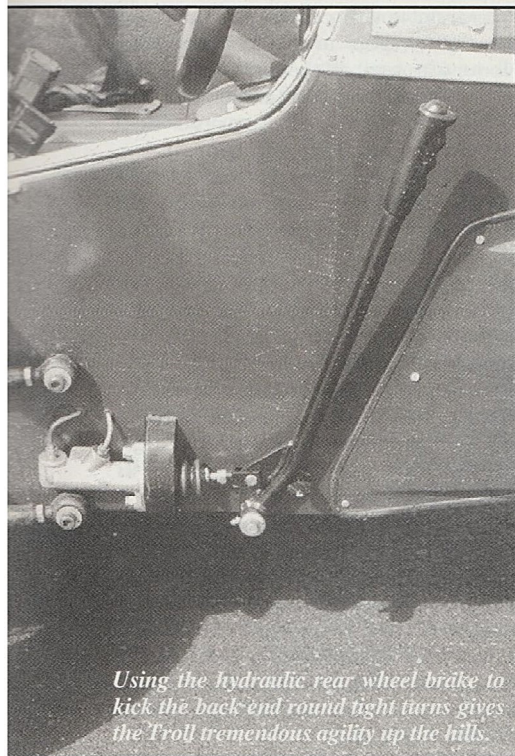
The back end has to be able to establish grip quickly on loose and wet surfaces, the front end has to maintain fast and accurate steering on similarly adverse terrain, it has to function on the level as well as up steep slopes or whilst inclined as much as 40 degrees to either port or starboard and the springs and dampers have to be able to cope with a far wider range of surface conditions than a normal road car. That the car manages it to any degree of effectiveness is a great achievement but to excel under all conditions is a thorough endorsement of the design skill invested in it.

The chassis is a true



This is Anne Templeton's Troll at the Exeter services halt on the recent Exeter Classic Trial. Note the CO2 bottle for inflating tyres after letting them down for the uphill sprints.

Trolls



Using the hydraulic rear wheel brake to kick the back end round tight turns gives the Troll tremendous agility up the hills.

spaceframe in a mixture of square and round section tube while its torsional rigidity is enhanced by the stressed NS4 aircraft quality aluminium employed on the floors, rear bulkhead and dashboard. The front suspension is by double round tube wishbones, inclined coil spring damper units and an anti roll bar and has anti dive geometry. At the back the live axle is located by four trailing arms, a panhard rod and adjustable coil spring damper units while the trailing arms are adjusted to give anti squat geometry.

The engine is the Ford crossflow driving a four speed box and before you start thinking of alternative engines and five speed boxes, the answer is NO. The Troll T6 has been specifically designed around the crossflow unit with the four speed box. Alternative engines will fit and work but differences in weight and weight distribution will affect the car and the design parameters are so critical that the effects will be adverse. As far as five speed boxes go, you just don't need them. The four speed unit drives an Escort Mk 2 van axle with a 4.12:1 differential ratio turning 15" wheels fitted with 185 section rear tyres. This gives ideal gearing for either road or rough and there is virtually nothing that will improve matters whilst maintaining every other virtue.

So what is this seeming paragon of engineering virtue like to drive?

To answer this I have two banks of data on which to draw. The first comes from an outing as passenger in Peter's own car. It's not

the most pristine example of this rare marque but a full appreciation of the testing event miles it has covered leads one to marvel that it is still in one piece. However, it most surely is and what's more, although a little scratched and dented, it still feels 100% solid with no play in any of the mechanical linkages that contribute so much to its ability.

Being mainly used for trials, the car is pretty high off the ground, its 15" wheels and tyres providing 9" of effective ground clearance. That being the case, you have to swing your leg pretty high to clamber in but once there, you drop into a seat that holds you firmly but comfortably. The car has a simple bench seat but the company do offer an alternative in individual upholstered GRP buckets.

Whatever, as you sit snug in the left hand seat the dashboard offers a chrome grab handle and a testing caress reveals that everything feels totally solid. The dashboard itself is a stressed member and as well as a round tube running around its perimeter, there is a bracing bar rising from the floor to offer additional bracing under the passenger side. Even though the cockpit is certainly cosy for two, with the seat belt on I was well held and able to offer Peter all the elbow room he would need.

The 1700 crossflow fired immediately in reaction to his most cursory prod on the button and the motor barked its glowing good health through the Troll 4, 2, 1 exhaust pipe mounted above the lower body line on the passenger side. No sooner had it fired than Peter was into first and blatting through the confused traffic of holiday makers looking for non existent parking places in Minehead High Street.

First impressions were of an unexpectedly supple and cossetting ride that was seemingly immune to the effects of quick bursts of acceleration and braking and as Peter hauled the stubby nose round the twists of the narrow streets I was also impressed by the lack of roll from a car so high off the ground. Emerging onto a steep uphill gradient taking us past a picturesque church, I was just admiring it as a possible photographic backdrop when the car's creator suddenly floored the throttle. The rear wheels spun on the wet surface before gripping to send us rocketing up the gradient between banks of overhanging trees, before he was heavy on the brakes for a hairpin. The wheel went over, the front went round, the back end slid but as the staccato bark of the exhaust bounced off the brickwork rising and falling in tune with the rear end's efforts to grip, we continued to shoot forward before bursting into the

sunlight at the crest of the climb. Belting down a shallow drop on the other side the pace never slackened as again the wheel went over and we parted company with the tarmac in favour of a rutted track leading up into the hills above this beautiful resort town. As soon as I saw where we were going I braced myself for the suspension crash as we hit the rough but it never came. The rising rate springs and adjustable dampers took it all in their stride as we sped up the climb with the front end rising, falling and bouncing over rocks and through deep ruts, the back end sliding about and Peter making constant steering adjustments whilst continuing to pile on the coals. Indeed, throughout the entire lightning ascent I never once felt a suspension crash that got through to my bones.

How is it done? Well quite apart from sheer driving skill which has to form a significant part of the equation, the engine plays an equal part. It may only develop 130 bhp but with a mere 11 cwt to carry, that equates to a power to weight ratio of around 230 bhp per ton and that's powerful. Not that you specifically need such power but its advantages lie in the fact that once grip is established on a testing hill section, power can give you speed which provides momentum which in turn assists the car in blasting over, round or straight through obstacles that might threaten its progress at a lesser rate of knots. The torque is very useful too as the engine's flexibility allows it to keep pulling strongly in a higher gear to prevent breaking the grip at the back end. In trials form, grip is enhanced by the car's weight distribution which with the twin rear spares in their special cradle hanging out behind the tank, can be as much as 40F / 60R.

Additional assistance is provided by the special Troll steering rack which uses 2 1/2 turns of the 14" Moto Lita from lock to lock. It's supremely quick but again, you need that sort of speed when you're heading for a tree with the power firmly on to avoid bogging down. You also need the steering to work and, thanks to the machine's design integrity, it does.

Peter is a very lucky lad to have such a heaven for trials enthusiasts a mere stone's throw from his front door and once on the tarmac surface of the tops, he continued his demonstration. Off the line, the anti squat geometry of the rear suspension serves the Troll well to establish grip very quickly with the minimum of power lost to unproductive wheelspin in the wet ground conditions; in the dry, traction will be almost instantaneous. Thereafter the power to

Trolls



The front footwell panel is in GRP and is easily removed to grant access to pedals and the under dash area.

weight ratio produces extremely competent acceleration but the car is just getting on the cam in third on the narrow strip of blacktop when Peter simultaneously tips the wheel and hauls back on the external rear wheel brake to spin the car through 180 degrees in a manner that any Hollywood stuntman would be proud of. Not content with one bash, he executes the manoeuvre several times, on each occasion completing the spin in a confined area and coming out to continue under power in the opposite direction. From there, it's into the woods where he can't resist a charge at a seemingly perpendicular bank. The front end has an unimpeded angle of attack and the wheels strike and rise as the power pushes the car up. With the nose pointing at the sky, the Troll climbs the short gradient before expert throttle control just pops it over the top to rest easily at the summit. This too is worth a few more bashes and successive ascents find the Troll listing at an increasingly acute angle. "How far over will she go?", I ask. "Until it falls over" comes the down to earth reply! Ask a silly question....

On the final assault, Peter really gives it some power with the result that the Troll needs an altimeter as it takes off over the ridge. Again I am braced for the jarring crash of landing that never comes. The rising rate springs again prove their worth as the Troll returns to terra firma with a supremely controlled and energy absorbing panache.

Back at the ranch, the workshop revealed a car newly built for a customer and though we were not permitted to sully its gleaming paint, we could take it for a brief spin on the roads.

My second batch of notes relates to this outing. Swinging myself into the driving seat, I arrived at a lofty

perch which was very comfortable as well as providing an excellent driving position. I was well held and supported in the seat, the seat belt added to the feeling of security, but it was still quite upright. Even so it offered the best of both worlds. You sit decently upright which allows you total freedom of movement from the waist which you often need on trials, while on road sections, you can settle back and relax.

The controls are superbly placed and my greatest praise was reserved for the pedals. Normally on this style of car the driver's footwell is cramped by the body cutting in but the Troll has a removable GRP panel which has a bubble allowing decent spacing of the pedals. With it off, access to the pedals and under dash area is far easier than lying on your back in the footwell. The only other variation on normal road cars is the external, hydraulic brake operating the rear wheels. The cable operated handbrake is in the passenger footwell.

With the motor burbling happily away, I slipped her into first and set off. Again I experienced that excellently controlled ride although from the driving seat, I was far more aware of my height above the deck. Not that it bothered me; I was merely aware of it. This car too was built to trials specification and though the rearward weight bias was not as severe as on Peter's car, I fancied the steering felt a little light. That said, come the first corner, I quickly discovered that the front end had no lack of grip and that the quick rack lived up to its name. A mere twitch of the wheel and the stubby snout switched direction through 90 degrees as suddenly as a coursed hare to such an extent that I was convinced the back end had stepped out! But once familiar with the speed, the 14" wheel gave good control. Road driving also gave me a thorough appreciation of the engine's torque; 120 lbs ft @ 3600 rpm may not sound like anything to write home about but the Troll pulls cleanly from 1000 rpm in top. The other surprise is that the gearing that is so accomplished whilst the machine is climbing muddy banks is equally accomplished on the road. You never feel you are in the wrong gear or need another at the top; the 4.12:1

As well as an outstanding trials car, the Troll is equally adept at auto testing, sprinting and hill climbing with its excellent traction, power, and manoevrability. This is Peter James at Wiscombe.

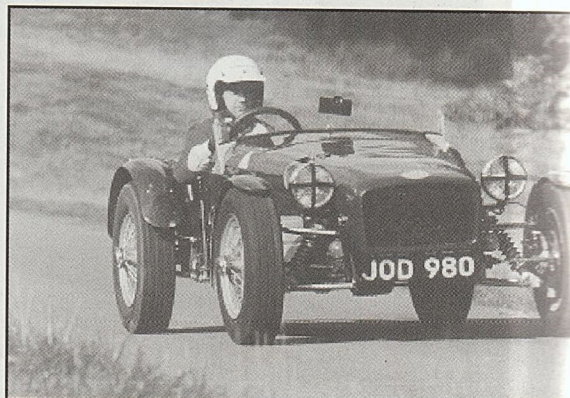
differential is well compensated for by the 15" wheels and tyres and it all works with total efficiency.

Round the street circuit, the Troll is a delightfully responsive and rewarding machine and there is no doubt that a specially developed road version of this versatile package will be a significant competitor in this popular market sector. It is oh so smooth both in the manner in which it drives as well as in its control movements and the 1700 cc crossflow is a real gem.

Once mastered, the steering allows pinpoint precision in placing the car and selecting lines through bends but it is still very stable and totally lacking in any feeling of nervousness when cruising. Round the corners, the grip is terrific and although it is easy to get the high riding, rear heavy trials version out of shape at the back as Peter had amply demonstrated, I reckon the road version with its underslung axle and wider rubber will be a stubborn machine to unstick.

The other feature of the car well worthy of note is that the front discs are spirally drilled. When a car is crashing through the drenching ruts of a rain sodden hillside, water will be in plentiful supply and though Peter doesn't claim that drilling the discs gives any braking advantage, he does claim enhanced braking response.

The theory behind it is that the efficiency of a disc brake depends upon its ability to dissipate heat and that the combined area of the holes increases the cooling area. Additionally, any water on the disc is immediately swept into the holes so the pad does not have to shift the water before it starts slowing the car although this is not a serious problem with cast iron discs. You can argue that due to the holes, the actual area of the disc beneath the pad at any given moment is reduced leading to a corresponding reduction in braking efficiency and that is so but the greater efficiency created by the additional brake cooling is reckoned to more than compensate for it. You see all the powerful motorcycles fitted



Trolls

The Troll chassis is phenomenally stiff although the torsional rigidity figure is a secret. In addition to the spaceframe, the NS4 aluminium floors, rear bulkhead and dashboard are stressed members.

with drilled discs now so there must be something in it. The only possible drawback relates to the potential reduced strength of the drilled disc but the brake pipes would go way before the disc ever disintegrated in a rotary plane and that would occur at a hydraulic pressure far greater than anything to which you could ever subject your braking system.

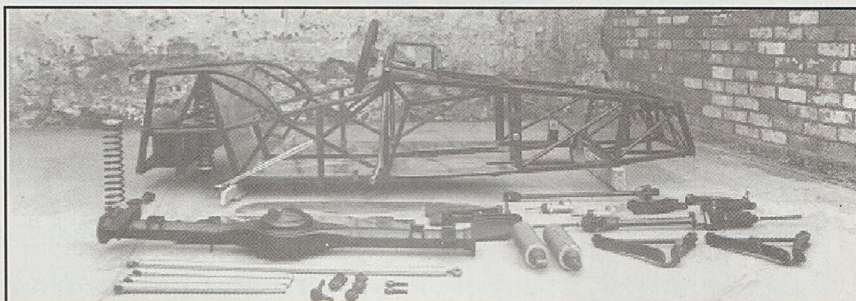
But just as trials involves getting the car up some very testing slopes, don't forget you also have to get down the other side and on these occasions, the brakes are subjected to frequent sustained applications under which circumstances brake fade can become a problem. While cast iron discs may not be greatly troubled by water, the additional cooling will be most welcome so I can quite believe Peter's experience in respect of drilling the discs.

The more you drive this car the more you appreciate its sheer excellence and every aspect of it that you take time to examine, you find has been executed to the highest possible standards of engineering. You can feel its quality just by sitting in it and when you drive it, you give thanks for people like Peter James who are able to produce such objects of delight.

Make no mistake, the Troll might have been specifically designed for getting up hills the hard way but it's just as much a sports car as anything else you will find. It's got plenty of power, oodles of torque, outstanding handling, unbelievable roadholding and phenomenal strength and the road version will be even better!

If you're in the market for something with go, grip and ground clearance that can handle the pants off most things on the road as well as off it, a Troll and a high performance driving course should do the trick.

Criticisms? Not exactly criticism but more a bit of advice. If you are inspired to visit Minehead with a view to getting Peter to demonstrate his car, wear your jeans and an old jacket because when he leaves the road for the rough, suddenly there's s__t everywhere! The rear wheels throw it up between the rear mudguards and the body, the front wheels throw it back at you and somehow it manages to rain down from above. But when you can ignore such things and revel in the enjoyment of a car, you know you have found something special.



SPECIFICATION - TROLL T 6B

Chassis.	Troll designed and manufactured spaceframe in 16 and 18 gauge square and round section steel tube. Powder coated. Stressed floor, rear bulkhead and dashboard in 16 gauge NS4 aluminium sheet.												
Body.	Unstressed 18 gauge aluminium with GRP nose and cycle wings.												
Suspension, front.	Troll designed and manufactured bronze welded, round tube unequal length wishbones, Triumph uprights, Troll stub axles and hubs in EN24 and adjustable coil spring damper units. Anti roll bar. Anti dive geometry.												
Suspension, rear.	Live axle located on four trailing arms and a panhard rod with fully adjustable rising rate coil spring damper units. Anti squat geometry.												
Steering.	Troll rack and pinion and column. Choice of ratios between 2.5 and 3.6 turns lock to lock.												
Brakes.	Spirally drilled 10" front discs with special pads, Escort rear drums. Conventional hand brake in the cockpit with optional external 'pull on', hydraulic 'fiddle' brake operating on rear wheels.												
Engine.	Troll specification 1700 cc Ford crossflow with twin 40 DCOE Weber carburettors and tubular exhaust manifold driving a four speed box with 4.12:1 Escort van differential. Approx 130 bhp @ 5900 rpm, 120 ft lbs @ 3600 rpm.												
Dimensions.	<table> <tr> <td>Overall length.</td><td>11 ft. 0 ins.*</td></tr> <tr> <td>Overall width.</td><td>5 ft. 1 ins.</td></tr> <tr> <td>Scuttle height.</td><td>2 ft. 9 ins.*</td></tr> <tr> <td>Wheelbase.</td><td>6 ft. 8 ins.</td></tr> <tr> <td>Ground clearance.</td><td>9 ins.</td></tr> <tr> <td>Weight in trials form.</td><td>11 cwt.</td></tr> </table> <p>* Length and height vary according to trials spec with double spare wheel carrier and ride height adjustment.</p>	Overall length.	11 ft. 0 ins.*	Overall width.	5 ft. 1 ins.	Scuttle height.	2 ft. 9 ins.*	Wheelbase.	6 ft. 8 ins.	Ground clearance.	9 ins.	Weight in trials form.	11 cwt.
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Wheelbase.	6 ft. 8 ins.												
Ground clearance.	9 ins.												
Weight in trials form.	11 cwt.												
Wheels and tyres.	5 x 15", 72 spoke centre lock wires with 165 front and 185 rear tyres.												
Kit contents.	Chassis with body fitted, bonnet, footwell, wings, tunnel, engine mounts, pedals, handbrake, spare wheel carrier, roll over bar, wishbones, anti roll bar, radius arms, panhard rod, damper units, springs, bushes, steering rack, mounts, column, universal joints and Moto Lita wheel.												
Trials extras.	Twin spare wheels, competition number holders, passenger foot rest, grab handles, hydraulic hand brake, CO2 bottle fittings, fire extinguisher and battery cut out switch.												
Prices.	<table> <tr> <td>Basic kit.</td><td>£4522.78 inc vat.</td></tr> <tr> <td>Trials extras.</td><td>£616.78 inc vat.</td></tr> </table>	Basic kit.	£4522.78 inc vat.	Trials extras.	£616.78 inc vat.								
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Complete cars available to special order.													
	<table> <tr> <td>Troll T6 1600 GT.</td><td>£14,887.50 inc vat.</td></tr> <tr> <td>Troll T6 1700 Sprint.</td><td>£16,487.50 inc vat.</td></tr> </table>	Troll T6 1600 GT.	£14,887.50 inc vat.	Troll T6 1700 Sprint.	£16,487.50 inc vat.								
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Full details of kit contents, specification, prices, options, extras and accessories are contained in the fully detailed information pack available from:													
Troll Engineering Company Ltd., 15, The Parade, Minehead, Somerset TA24 5NL. Tel. 0643 703721.													