

EVERY ONE A



Inspired by the success of the UK's popular 924 racing championship, Kevin Eacock did a little lateral thinking and came up with the idea of a similarly low-cost series for the 944. Paul Davies went to see how competitive cars might be built. Photography by Stuart Collins and Chris Horton

There must have been many occasions during the last 12 months when Kevin Eacock wondered if he was flogging a dead horse.

The Birmingham-based engineer had come up with the notion – obvious, really, but then so are all the best ideas – of a (relatively) low-cost racing series purely for Porsche 944s. After all, it had worked extremely well for the 924, so why not now, with the raw material becoming ever more affordable and more readily available, for its bigger brother?

Everyone Eacock spoke to about the idea seemed to like it, too. Soon he had found enough drivers prepared to commit themselves in order to create a race series, and a number of preparation specialists with road cars who were ready and willing to turn them into fully fledged competition cars once the regulations were published.

Indeed, the prototype 944 racer first turned a wheel on Tarmac as long ago as the middle of the 2000 season, whereupon it received a thorough shakedown at the hands of a number of well-known drivers, including top 924 man Keith Penman.

But then, just when it seemed as if every-

thing was about to happen, the embryonic Porsche 944 Challenge Trophy 2001 (as it was to become known) stalled on the starting grid. It had a prototype racer, it had teams prepared to back it, and it had drivers – but crucially it had no race dates.

The reason? In common with a great many other club championships during the last few months, the series had fallen foul of the extraordinarily protracted negotiations that were required in order to finalise the 2001 season's major UK race dates.

The nub of the problem was that the British Grand Prix, then Touring Cars, Formula 3, GT cars and other headline championships needed slotting in before the poor old clubman could have his say. Even the Porsche Classic series – to be sponsored this year by Michelin, of course – remained provisional until the last minute, with the official list of dates and venues not being published until mid-February.

After one false start, though (last month we had to change the list almost as the presses began to roll), Eacock's 944 series eventually found a home within the welcoming environment of the 750 Motor Club. For 2001, then, the Porsches will run as part of existing

750MC races with – or so it's hoped, anyway – their very own championship in 2002.

Now it's all systems go. Starting at Leicestershire's Mallory Park on 11th March (see the full list of dates and venues on page 81), we shall be taking to the tracks with Keith Penman behind the wheel of the same 944 you see under construction here (the yellow car), and following the Darlington driver's fortunes throughout the coming season.

The technical regulations for the 944 Challenge have deliberately been formulated to make life for the would-be race-car builder as easy as possible – and, as we've said, to keep costs within reasonable limits, while at the same time offering what should be some remarkably competitive motorsport.

Basically, standard components are the order of the day, unless the small print says otherwise. More details can be found on the opposite page, but naturally we would suggest that you refer to the official paperwork before you begin building a car in earnest.

Part of this strategy has involved approaching suppliers to create a number of tailor-

page 78 ▶

WINNER

944 race car

Read this before you begin

Eligibility

Standard-specification 2.5-litre Porsche 944. The only modifications permitted are those listed in the technical regulations. All cars must comply with the Technical and Safety regulations detailed in the current MSA Yearbook, otherwise known as the Blue Book.

Safety

Cars must meet all MSA safety requirements, which include such items as roll-cage, fire extinguishers, safety harness, electrical cut-out switch – and the sealing of the bodywork to prevent fuel leakage into the passenger compartment in the event of an accident. Roll-cages must be MSA-certified, with mandatory door bars. The attachment points of the roll-cage must not pass through the front or rear bulkheads – which means that you cannot use the cage to brace the suspension.

Bodywork

Seam-welding the body shell (for additional rigidity) is not allowed. Glassfibre front wings, bonnet, 944 Turbo-style front-bumper assembly, and one-piece front panel/headlight lids are permitted. Plastic side windows and rear tailgate are allowed, but the windscreen must be glass. The minimum permitted ride height (with the driver in the car) is 76mm.

Engine

Engines must remain essentially standard, with a maximum permitted power output of 185bhp at the flywheel. An overbore of 1.0mm (to 101.0mm) plus balancing of the rotating and reciprocating parts (crankshaft, connecting-rods, pistons and so on) is allowed. The cylinder head may be gas-flowed, but valve sizes, camshaft and injection system must remain standard, as must the exhaust manifold. The exhaust system itself is free.

Transmission

The standard five-speed gearbox is mandatory, and both it and the final drive must retain the original gear ratios. A limited-slip differential is permitted.

Suspension

Dampers and springs (the latter including the torsion bars at the rear) are free, provided the mounting points remain standard. Bushes may be changed for any material except metal (thus polyurethane is permissible), and any genuine Porsche anti-roll bar can be used. A brace between the tops of the two front struts is permitted.

Brakes, steering, wheels & tyres

The braking system must be standard in terms of disc sizes and caliper type, but both hydraulic hoses and friction materials may be upgraded. Any standard Porsche steering rack can be used. Wheels of 15–17 inches in diameter, with a maximum width of nine inches, are permitted. Any tyre which is contained in List 1A (road tyres, basically) in the MSA Blue Book may be used.

Weight

The minimum weight, with the driver on board, is 1100kg. This figure can be achieved by means of ballast, if necessary, but only if it is secured in place before scrutineering. ■



Kevin Eacock gets to work scraping the under-body sealant and sound-deadening material from the shell. It's a messy and time-consuming job, but makes it easier to achieve the minimum weight limit of 1100kg



The holes where the heater pipes pass through the front bulkhead are blocked with aluminium sheet and sealant to create the required safety wall between the engine compartment and the cockpit



Door cards and side-trim panels are replaced with aluminium sheet cut to size using the originals as templates and then riveted in place. The window operating system is removed to reduce weight

EVERY ONE A WINNER



made component packages. Leda, for instance, has devised combined coil-spring-and-damper units for the front and rear suspension, and Cambridge-based Safety Devices has developed the simple but effective roll-cage which is available as either a bolt-in or weld-in structure.

Likewise Kevin Eacock has sourced a glassfibre bodywork kit (the bonnet alone saves around 25kg, he claims) and – using the resources of his own company, EMC Engines – he has put together a comprehensive engine rebuild kit (which could be useful to any eight-valve 944 owner, of course; expect to see more on this at a later date).

But you don't have to use these packages. Indeed, it's entirely feasible to take a standard 944, build in the very minimum of safety requirements specified by the MSA, turn up at the track, and start to have some fun. If you want to win, however, you will consider the advantage provided by lightweight panels or that special suspension to be well worth the additional expense.

For those with less time on their hands, perhaps, there is also the opportunity to use an existing racing car. Indeed, the 944 Challenge regulations have been framed in such a way that any 2.5-litre 944 eligible for Class 4 of this year's Michelin Porsche Cup will be eligible for the Challenge without any modification.

A racing Porsche 944 starts with a donor car – almost any car, it seems. And Kevin Eacock believes that these can now be bought very cheaply, indeed.

'I don't think I've paid more than £600 for a 924 or 944 for converting into a racer,' he argues. 'Suitable candidates can have a huge mileage on the clock, and they can be scruffy, too – just the combination for rock-bottom prices. All you really need is one with a straight body shell, no major accident damage, and running gear that's in working order.'

The logic is obvious. It's not cost-effective to have to invest in major mechanical components, but a tatty interior, and even a superficial dent or two in the bodywork, doesn't matter one bit. Most of the trim will be thrown away, and the bonnet, the front wings, the front apron, the side glass and the tailgate are more than likely to be replaced, too.

What's more, the chances are that the new owner will be stamping his own particular identity on the machine with a new (and almost certainly sparsely applied) colour scheme, so neither is a high-gloss (for which read expensive) paint finish required.

Starting with a scruffy car that would grace not even the most down-market used-car showroom is the most sensible approach. Converting a road car that's in daily use will almost inevitably involve devaluing an asset that might be better sold to provide funds to purchase a groggy donor, as well as many of the specialist parts that are needed before it

can take to the circuits.

The first job in the EMC workshops is to strip the donor car completely, and throw away (or better still sell, if possible) that which is not going to be required. This means the front wings, front apron, side window glass and rear tailgate – and most of the interior trim can be junked, too. Mechanical components – engine, transmission, suspension, and so on – are removed for checking and/or rebuilding. See the photographs and captions starting on page 77 for the full story.

Building a competitive race car is a logical process that involves equal amounts of engineering skill and – most important – experience. Kevin Eacock has both of these attributes. We can't promise that all the information you need to build a winner is on these pages, but we reckon that our man's track record means you should certainly pay attention. ■

page 80 ►



Lateral thinking

The 944 Challenge was devised by Kevin Eacock, proprietor of Birmingham-based engine reconitioner EMC Engines. Initial support and encouragement came from Porsche 924 Championship co-ordinator Jeff May. After building, racing and maintaining 924 racers for many years, Eacock (left) was looking for what he calls 'something different', and devised the series for those who were ready for more power and wanted just that little bit more fun but who didn't want (or who didn't have the means) to spend a fortune. That was the easy bit, he says, but getting the series onto the tracks (and by the time you read this the first event should have taken place) proved a little more difficult. ■

For speed add lightness

While it is possible – on paper, anyway – to go 944 racing with a road car plus essential safety modifications, a full-race build-up will result in an ever-increasing pile of surplus items as the car is stripped in the pursuit of lightness and simplicity.

On the floor, once the process is complete, you're likely to find virtually all of the interior trim, including the carpets, the door and side-trim panels, the headlining and, naturally, all the luxuries the racing driver does not require, such as the stereo! However, the dash panel must remain – although instruments can be changed – and

and mechanism can go, but both the front-facing fog lamps and indicators must be retained. The side and rear window glass (complete with the winding mechanisms) will be junked, together with the body-side trim. Most competitors will add the standard wheels and tyres to the pile, and it goes without saying that the spare wheel and toolkit will also end up in the skip.

Mechanical parts to join our collection of redundant items include the wiring loom, the heater and air-conditioning system (the latter if fitted, of course) and the windscreen washer. The two bonnet lifting struts and the locking mechanism will also be discarded.

As the builder gets further into his task,



the centre console should stay in place.

The standard seats, both front and rear, will also be removed, as will the steering wheel and the seat-belts – all to be replaced by the appropriate (and approved) competition equipment.

Not quite so much vandalism is permitted on the outside of the car. The headlamps

and seeks to be more and more competitive on the track, the list of throwaway parts becomes even longer. Some items can be sold (or recycled) while others will doubtless be moved to the back of the garage to lie in obscurity. As has been proved many times, the best race car is the one that's light and as simple as possible. ■



The standard fuel tank is part-filled with special foam in order to reduce surge. The material is cut into strips and then fed into the bottom of the tank through the plate where the fuel-gauge sender fits



The side glass is replaced with 4.0mm polycarbonate sheet, cut out using the original glass as a template. Kevin Eacock fits the plastic using the original rubber seals because this – obviously – makes for a much neater installation than rivets



Optional glassfibre panels include a 944 Turbo nose that is fixed in place using a special Wurth adhesive and plastic bolts. The adhesive both seals any gaps and improves the car's aerodynamics



The front hubs are fitted with pre-1988 (ie longer) rear-wheel studs to allow the use of wheel rims with greater offset. The brake calipers are rebuilt with Mintex pads (1172 at the front, 1144 at the rear) and plumbed in with Aeroquip hoses

This Leda front-suspension unit (left) replaces the Porsche fitting, if required, and has an adjustable spring platform to set the ride height at the minimum 76mm. The damper is fully adjustable for rebound



The combined coil-spring-and-damper units at the rear (also by Leda, and again optional) assist the standard torsion bar set-up, which is itself uprated by the fitting of a 25.5mm bar from a 944 Turbo. Polyurethane bushes are used in both the front and rear suspension systems

The heart of the matter

There's nothing to stop you leaving your 944 Challenge car's power-plant standard (see also the panel on page 77), but the chances are that any £600 donor car's engine will be a little tired to say the least.

What you replace is likewise to a large extent entirely up to you, but there's no denying that a full-scale rebuild is a smart move, if only in the search for reliability. After all, to finish first, you have to finish...

What follows here, then, is Kevin Eacock's tried-and-tested formula for building a reliable engine developing as much power as possible within the regulations. We're assuming that not only do you know your way round these occasionally idiosyncratic motors, but also that the unit has been stripped and every component cleaned and carefully inspected.

If they are within tolerances the cylinder bores are simply polished with a fine cutting paste. Contrary to what most people will tell you the 944's block can be rebored, but because it's cast from a special silicon-rich aluminium alloy (known as Alusil) a special finishing process (available from EMC) is essential to prevent the surface quickly wearing out the relatively soft piston rings.

The standard pistons can usually be used again (unless, of course, the block has been rebored). Each is decarbonised and precisely weighed, and all four are matched to the lightest, which usually means shaving some 10–12gm from the heaviest.

Likewise the gudgeon (wrist) pins are matched for weight (the normal method is to bore material from the centres) and both the big-end bearing caps and connecting-rods receive a similar treatment. The connecting-rods are lightly polished with a flap wheel to surface-harden them, and the pistons and rods are assembled and finally weight-matched again to within 0.001gm.

After checking (only rarely will it need regrinding) the crankshaft is balanced, together with the flywheel, the clutch cover and the bottom pulley. Then the reciprocating parts are all assembled into the block, with brand-new main and big-end bearings.

The 944 engine, of course, has contra-rotating balance shafts which should mean crankshaft balancing is not quite so essential. Interestingly, though, Eacock opts for



A bracing bar between the two front-suspension struts is permitted by the series' rules. The standard engine wiring loom is mated to a custom-built harness which supplies power to the rest of the vehicle

removing the balance-shaft drive belts from a race engine. 'You gain around four horsepower from the reduction in drag,' he argues, 'and the engine's more reliable, too. I've known a balance belt flick off and jam in the camshaft belt – with very nasty results.'

The regulations allow gas-flowing of the cylinder head, and also the matching of the individual ports to both the inlet and exhaust manifolds. Kevin Eacock pays a great deal of attention to the valves, ensuring an even 1.0mm valve-to-seat contact area which, he suggests, usefully speeds up the opening and closing operation.

The standard Porsche camshaft has to be retained (and without any changes to its profile), but this is replaced with a new item

(or even a good second-hand component) if it shows even the slightest signs of wear. Likewise the hydraulically actuated followers. New valve springs are an absolute must, too.

Final assembly of the engine includes a brand-new oil pump, new timing and balance-shaft belts (the latter if required by the customer), and not least a set of new tensioners and idlers.

Apparently the 944 engine has a tendency to destroy its driver particularly hard for sustained periods, and for this reason a 10-row oil cooler is fitted (using a 944 Turbo oil-filter housing to make the connection). Likewise working on the assumption that the donor car's radiator is likely to be at least partially blocked up, a new standard item is fitted, together with a brand-new water pump.

On the induction side no major changes are allowed or (says Eacock) really necessary, with the possible exception of a high-efficiency K & N air filter. Both the throttle body and the ECU must remain standard. Changes to the mapping are permitted, but again Eacock considers this to be unnecessary. The rules demand a standard exhaust manifold, to which our man adds an Ashley competition system.

The final task is to test the car on a rolling-road. Careful fuel/air mixture adjustment is required to get the best from the engine. Eacock aims for a six per cent CO reading at full power. ■



Contacts book

Ashley Competition Exhausts

01922 720767

EMC Engines

0121-328 2225

Pro-9 01564 785161

Leda Suspension

01376 326531

Safety Devices

01353 724202/3

Wurth UK 020 8310 6666

Hartech 01204 302809

How much?

A full season's 944 Challenge racing, including building the car, can cost as little as £10,000. That's Kevin Eacock's estimate based partly on building the first 944 racer, and partly on his long experience in the 924 championship.

A complete car, built (by Eacock) to the technical regulations with all the necessary safety equipment, an engine rebuild kit, new wheel bearings and brake discs, plus a set of Dunlop SP Sport 9000 tyres, weighs in at £6600 – and

You can do it!



Can you realistically buy a viable base car for the Porsche 944 Challenge Trophy for less than £1000? So asks Chris Horton.

EMC's Kevin Eacock and Simon Evans of nearby Pro-9 clearly think so – and, what's more, in early March the latter had living proof of that seemingly extravagant claim in his yard near Hockley Heath, Warwickshire.

The pre-oval-dash car (see above) was the result of a quick trawl of the Internet (try the highly searchable, if sometimes rather leisurely, autotrader.co.uk) and cost him the princely sum of £840 including delivery.

It will need work, certainly (the left-hand side had suffered some minor accident damage), but the wheels, interior trim,

tailgate and right-hand front wing at least should (eventually) raise a couple of hundred quid towards the cost.

For his part Barry Hart of Lancashire-based independent Harteck reckons you would need to pay between £1000 and £1500 – and check carefully that the engine is good, he urges; fixing a lemon could well cost as much again – but again you stand to recoup a sizeable chunk of that by selling on the stuff you don't need.

Incidentally, it's Pro-9 that Kevin Eacock has chosen as his supplier of lightweight glassfibre body panels (see the list below), and these are available to the public at large from either company. Prices don't include carriage. ■



Bonnet	£125
Front bumper	£150
Front wing	£79
Rear bumper	£40
Slotted rear valance	£95

that includes the donor car. On top of that a season's entry fees, insurance and basic maintenance (tyres, oil, brake pads etc) are likely to cost around £3000.

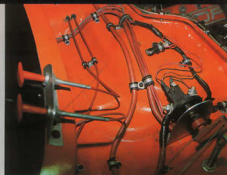
You'll also have to consider the cost of travelling to events, together with accommodation and subsistence, but these will vary enormously depending on where you live in the first place, and whether you want to rough it in a van in the paddock or stay in the nearest five-star hotel.

If this sounds like your sort of racing contact Kevin Eacock at the Porsche 944 Racing Drivers' Club, 27 Longfellow Close, Walkwood, Redditch B97 5HW; tel: 01973 817158. ■

944 Challenge Trophy 2001

Dates and venues

11th March	Mallory Park
8th April	Snetterton
5th May	Donington Park
19th/20th May	Cadwell Park
16th June	Snetterton
8th July	Pembrey
28th July	Silverstone
11th August	Oulton Park
2nd September	Cadwell Park
16th September	Lydden Hill
30th September	Mallory Park
20th October	Snetterton



Safety regulations demand that the fire extinguisher and electrical cut-out can be operated from outside as well as from the driver's seat. The 4.0kg extinguisher is plumbed-in with outlets in both the engine bay and the cockpit



Regulations also demand that the brake and fuel lines run inside the car. Aeroquip bosing is used for maximum safety, and for obvious reasons the piping is secured well out of the way of the driver

Controls and instruments are kept to the very minimum. Note the readily accessible fuses, pull handles for electrical cut-out and fire extinguisher, the roll-cage door bars, and the six-point safety harness



A K & N intake filter replaces the standard item. The standard fuel-injection system and throttle bodies must be used, but the ECU can be remapped. Careful fuel/air mixture setting is essential, says Eacock