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## A GUIDE TO BUYING AN EXPENSIVE RALLY CAR...

So you fancy yourself as the next MacRae or Burns? Or perhaps Mull legends Calum Duffy or Neil MacKinnon? You drive pretty quickly, haven't had too many 'offs' (that the insurance company know about) and if the roads were closed you could find the extra few percent to challenge for the lead.

OK; I'll indulge you on the talent front, if you indulge me on the imaginary phone call to Prodrive front...

"Hi. I'm a fantastic driver, I'd like a World Rally Car Impreza please. How much should I write the cheque for?"

"£485,000 please."

"Sorry, just the one will do."

"No really sir. £485,000 for one 2005 WRC Impreza"

"Blimey. Any demonstrators available? Or anything a wee bit cheaper?"

"We do a nice range of Group N specification cars for around the £100,000 mark"

"OK. I'll think about it. Thanks. Bye."

The reality of competing at the higher echelons of

the UK rally scene, or in the WRC, is that the cars cost a huge amount of money. Even a Mk. II Escort will set you back £70k if you are looking for outright wins straight out of the box. Why? What makes a normally £25k Impreza road car worth more than an extremely nice house or an Aston Martin? If you look just a little deeper than the sponsor covered body panels, it all becomes rather easier to understand.

We'll use the Subaru Impreza for the purposes of this article simply because it's available as a performance road car, a Group N car (Gp. N, near road going specification) and World Rally Car (WRC, full on competition specification). The 'basic' Impreza is a two litre, turbo charged, four wheel

drive car. Along with the similar range of Mitsubishi Lancer Evo's, the Impreza has revolutionised the world of affordable performance road cars, with stunning road holding and drivability developed through years of competition use.

Most Gp. N and WRC cars are built from specially supplied road cars, with some parts 'deleted' from the car's road going specification to save cost and keep waste to a minimum. It is equally possible to build a rally car from a 'normal' road car, though this increases the preparation time needed. The interior is the first item to be deleted; seats, carpets, headlining, speakers and anything else which is useless in a rally car or creates added fire risk. The entire car is then dismantled, down to the bare body shell. The first job is the crucial strengthening work; a standard road car body shell would last a matter of days flat out on the stages. The seams of the body shell are welded up and strengthening plates are attached to suspension and roll cage mounting points. For the WRC version, all four wheel arches are removed and replaced with composite material flared arches that will accommodate the increased width of the WR car. Next; the all important roll cage. In years gone by, the roll cage was installed only to protect the crew in the event of an accident. With the advent of Computer Aided Design, the cage is now an integral part of the handling of the car, specially designed to keep the body shell as stiff as possible

and give maximum protection to the crew. Every piece of tube, over 40 metres of it, is welded into place by hand.

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Over a kilometre of wiring, brake and fuel lines is removed from the car and re-routed internally. All new steel braided brake lines and the entire wiring loom are made from aircraft quality parts to ensure reliability in the harshest of rally environments. In the case of the WRC car, the thinnest possible wiring is used to keep the weight to an absolute minimum. Only limited modifications to the engine and gearbox are permitted in Gp. N Gearbox internals can be replaced for strength and ratios altered within certain parameters compared to the road car, while standard selectors must be used. Many of the rules of Gp.N are tied to the specification of the road car, which is why both Subaru and Mitsubishi are constantly updating the top of the range road going models.

WRC rules are very different, allowing for many modifications to nearly all mechanical parts. Everything in the engine is optimised for minimum weight and maximum strength and power output. The whole unit then mounted lower down in the engine bay and at a completely different angle to the road car, lowering the centre of gravity to aid the handling of the finished car. The gearbox is perhaps the most incredible part of a WRC car; certainly the most expensive at roughly £140,000. The Impreza employs a 6 speed hydraulic sequential gearbox, developed extensively since the introduction of the WRC category in '97. It can change gear in 50 milliseconds, an operation which is actuated with just a flick of a paddle next to the steering wheel, either up or down the gears. There are buttons on the steering wheel to return the car quickly to first or reverse gear in the event of an 'off'. The gearbox is so accurate in operation, that not one single 'box has been retired from a rally due to a missed gear since it was introduced.

Coupled to the gearbox is a four wheel drive system comprising of three differentials, front, centre and rear. The Gp. N car has an adjustable centre differential and uprated limited slip differentials front and rear to increase reliability and traction. The WRC car also has three differentials, but of a very different nature. Each is hydraulically adjusted many times every second the car is being driven to offer the best traction at each wheel, increasing the cornering speed on all surfaces. All these clever hydraulics require an even cleverer computer to

control them. The Impreza WRC uses a TAG electronics system with four 32 bit processors to control all the aspects of the engine, gearbox and transmission. The engine alone has some 60 sensors, supplying the TAG system with 120 channels of data. All the hydraulic and electronic systems have to be built in an ultra clean, dust free, lab-style environment to ensure 100% reliability. (Not my garage then!?) All this technical talk isn't just for show. The Impreza WRC S10 (2004, the latest car a 'customer' can buy) will at the push of a button execute a perfect start and even change up to second gear for the driver. It even has an anti stall programme, so no more embarrassment on the start line!

On with the build. Once the engine and transmission are in place it's on to the suspension. On each corner of both WRC and Gp. N car is fitted an adjustable spring and damper unit, which is far stronger than the road going unit and allows for the car to be adjusted for the optimum grip and ride settings. Any suspension bushes are replaced with ultra hard competition parts, increasing the strength of the car and accuracy of the handling. Seat's, harnesses, fire extinguishers, co-driver and driver readouts, lights and a myriad of switches are bolted in as low down as possible to keep that all important centre of gravity firmly towards the floor of the car. WRC cars are even fitted with thinner glass to further slim down! So, bearing in mind we've barely scratched the surface of the full build procedure, it takes a total of around 500 hours to bolt the Impreza World Rally Car together from completed components. Double that if you include building the gearbox and wiring from scratch. That's theoretically £100,000 in labour alone. Add a whole day just to test the electronic systems in the workshop and another 'shaking down' the finished car at a test venue. (A job for which I am available!) Intriguingly, if you

should be in a position to purchase the S10 Impreza WRC, you will have to sign a contract that insists on a Prodrive engineer accompanying the car wherever it goes. Leaving it in the garage? Fine, but it will be left in trailer mode, whereby you can only select first or reverse gear and have a maximum of 4000rpm available! So when you really look into the cost of an Impreza rally car, it does start to make some kind of sense, if that's the right word. Not enough sense for most to consider selling the family home for, mind you. I have tried to work out if I could live in a WRC car – not really on with my other half I discovered!

We are talking about the pinnacle of world motorsport technology of course; there are many people who compete in the UK in rally cars worth less than £5k, some of whom may well be out competing in Mull this weekend. The FIA is considering banning active transmissions for just this reason, an attempt to cut costs from 2006. Unfortunately for any budding MacKinnon's or McRae's, they're still going to cost as much as a very nice house, albeit with maybe one less bedroom than before!

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