



Build Guide for Junior 1000 rally cars

This Build Guide is intended to assist competitors who wish to prepare their own car for participation in the Junior 1000 Ecosse Challenge understand the work required. The aim is to enable competitors to undertake a build that is cost effective and to avoid excess expenditure.

The guide must be read in conjunction with the Championship regulations and the Motorsport UK National Competition Rules, which take precedence. A key point to remember is that if the Championship regulations do not say you can do something, then you cannot.

Of necessity the guide assumes at least a basic understanding of vehicle mechanics. If you have little or no mechanical knowledge, it is essential you seek expert advice from the outset.

Before you start preparing your car, and especially if you are new to Junior rallying, you might find it helpful to look at some existing cars, in particular those of the same model.

The guide does not prevent you from undertaking further development and expenditure if you wish, as long as of course you stay within the regulations.

While we try to ensure the guide is accurate and up to date when issued, please be aware that there may be subsequent changes outside our control that affect the content. If in doubt, please ask.

The Championship Technical Regulations can be found here:
<https://www.j1000ecossechallenge.co.uk/site/regulations.php>

The Motorsport UK National Competition Rules (NCR) can be found here:
<https://www.motorsportuk.org/resource-centre/>

The relevant NCR are shown like this: NCR Ch.13, App.16, Art.12.1 (Short for Chapter 13, Appendix 16, Article 12.1).

Choice of car

Cars eligible for the championship must have a petrol engine of no more than 1000cc and be normally aspirated with a manual gearbox. The car must have been built before 31 December 2018.

Suitable cars are usually sourced from classified advertisements, car auctions or as trade-ins from dealers/traders.

Look for a car that is structurally sound, free of any significant rust, and has a healthy engine and gearbox. Mileage doesn't matter. Consumable items such as brake pads and tyres are less of a concern as you will be replacing them. 3 door cars are generally lighter and a better base than 5 door cars.

Some competitors have bought an insurance write-off and rebuilt it. Unless you have extensive bodywork skills however, this route is not recommended.

Popular makes and models of cars

These are the most common cars currently in use in Junior rallying. This also means that there is more experience for you to draw on.

Volkswagen Group ("VAG"):
Skoda Citigo, VW Up!, SEAT Mii



Former PSA Group:
Citroen C1, Peugeot 107



Less common are the Toyota Aygo, Toyota Yaris and Suzuki Alto. The Aygo is essentially the same car as the C1 and 107.

The Nissan Micra (K11 model) was previously popular but is older in design and technically and we recommend instead a more recent car if your budget can stretch to it.

Bodyshell

The Championship regulations detail what you can and cannot do with the bodyshell. Please read them carefully before you start any work.

Essentially, the bodyshell must remain as standard although it can be strengthened. It cannot be lightened. All the windows must be the standard glass. If the side windows are made of toughened glass they must be coated on the inside with a clear transparent safety film. The dashboard, instrument panel and the heater must all be retained. You can remove certain interior trim and sound deadening.

You must fit safety equipment that complies with Motorsport UK NCR, including a full roll cage, seats, seat belts and fire extinguishers.

The importance of quality equipment installed correctly cannot be overstated. Always purchase from a reputable supplier. Be wary of cheap, low quality equipment that may have misleading, invalid or even fraudulent labelling.

To reduce the possibility of future reliability issues, it is suggested you avoid disconnecting or dismantling any parts of the car you do not need to.

Roll cage

A roll cage (also known as Roll Over Protection System or "ROPS") must be fitted.

There are various suppliers of cages, and although it is possible to make a cage, it is not recommended unless you have very specialised equipment and considerable skill. Cages can be bolt-in or weld-in, but the bolt-in cages still require some welding to fit the mounting pads. Bolt-in cages can be removed if a car has to be re-shelled. Weld-in cages require considerable welding skills, as they often come in kit form.

The design of available cages may differ and some may be more complex than others. The supplier should be able to provide professional advice on the cages available for your car that meet Motorsport UK NCR. (NCR Ch.13, App.16, Art.12.1)

It is imperative that the roll cage is the right one for the car, that it meets the requirements of the regulations, and that it is installed correctly. If you do not have the necessary level of knowledge and skill, seek expert advice and employ a specialist, experienced firm to undertake the work for you.

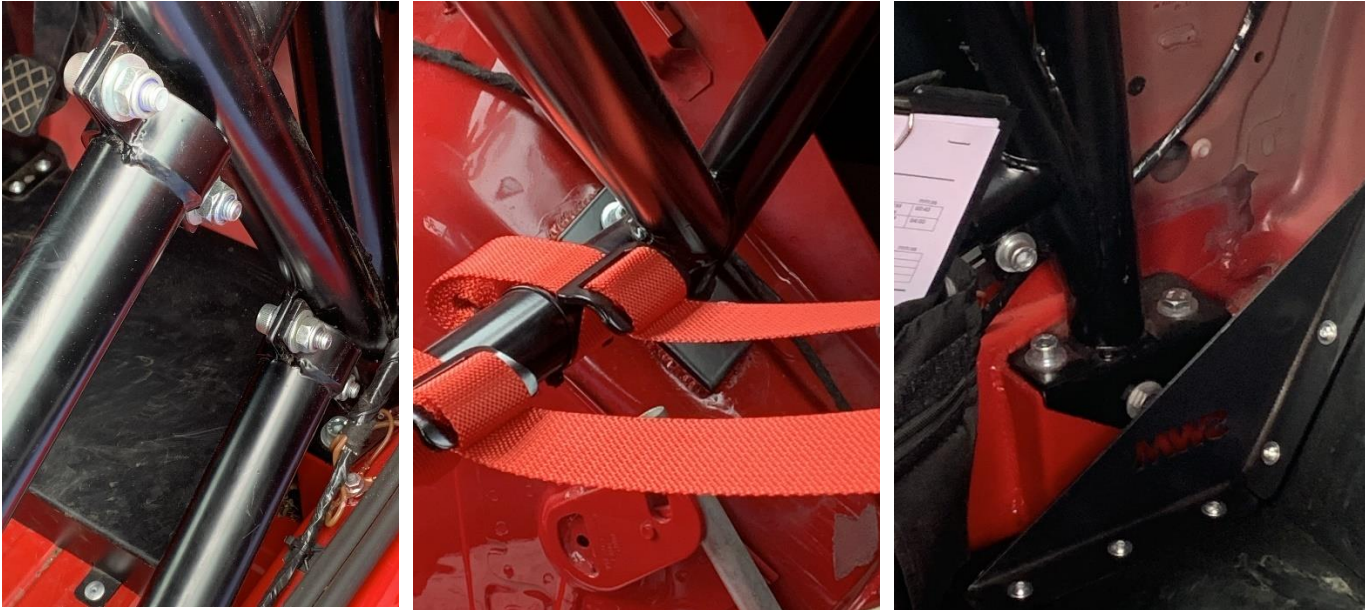
You are allowed to cut the edges of the dashboard to permit the fitting of the roll cage but do not remove any more than is necessary.

Roll cage in a Citigo shown during the build process.

This cage has been welded in.



These photographs illustrate mounting points and assembly of a bolt in cage.



Seats

You must fit competition seats that meet the Motorsport UK NCR. (NCR Ch.13, App.16, Arts.12.7-12.9)

Make sure the seats you intend to install are suitable for rallying. A good supplier will be able to advise you on suitability. Ideally, try the seat for fit and comfort before purchase. The driver must be seated in such a way that they have full control of the car and can easily reach all of the controls.

Competition seats are “liferated”, which means they have an expiry date. If you are buying new seats, the supplier will be able to advise you of the expiry date. If you are buying used seats, make sure they are still eligible. (NCR Ch.13, App.16, Arts.12.7-12.9)

It is vital that the seats are correctly mounted in the car so there is no chance of the mountings breaking in the event of a collision. NCR Ch.7, App.7, Arts.2.1-2.22 set out the acceptable types of mounting.

Using the car manufacturer’s standard seat mounting points is permitted.

Fitting replacement seat mounts correctly can be time consuming but is safety critical. No two car models are the same and, depending on the model, lengthy preparation such as the drilling out of numerous spot welds may be required. The installation process for the new mounts requires expert welding skills. If you do not have the necessary high level of skill, seek expert advice and employ a specialist, experienced firm to undertake the work for you.

Replacement seat mounts come as an approved kit, sometimes included with the roll cage. They can normally either be bolted in (meeting both FIA regulations and Motorsport UK NCR) or welded in (meeting only Motorsport UK NCR). If you might wish in future to sell the car outside the UK, you are recommended to bolt them in.

Example seat mountings



Example seat mountings



Seat belts

You must fit 5-point or 6-point safety harnesses that are FIA homologated.

They must be complete units, sourced from a recognised manufacturer and fitted in accordance with the manufacturers' instructions and Motorsport UK recommendations.

FIA homologated seat belts are lifed so like seats they have an expiry date. (NCR Ch.7, App.7, Arts.5.1, 5.2, 8.1-10.12) If you are in any doubt, seek expert advice.

Buying used seatbelts is not recommended as you do not know their history.

Example co-driver's seat showing seat belts



This diagram illustrates the way seatbelts should be installed and worn. (NCR Ch.7, App.13, Diag. 49)

Importance of correctly installed safety equipment.

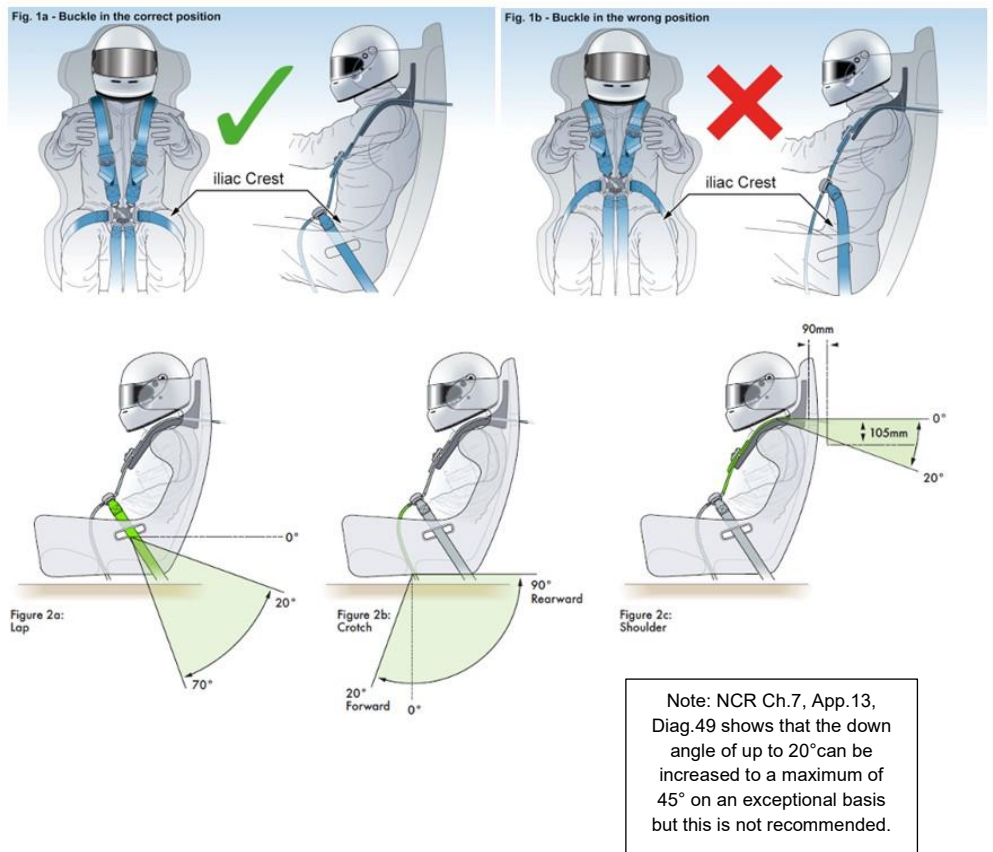


Illustration courtesy of  motorsport UK



Harness shoulder straps are often fixed to a harness bar, which forms part of the vehicle ROPS, with the straps being looped around the harness bar.

The straps should pass three times through the 3-bar slide and the strap end should protrude by at least 100mm.

The 3 bar slide should be positioned as close as possible to the harness bar.

If you are in any doubt about how to install the harness, please seek guidance from a Scrutineer.

Fire extinguishers

You must fit two types of fire extinguisher, (A) plumbed-in and (B) hand-held. (NCR Ch.13, App.16, Art.12.6) (NCR Ch.7, App.6)

A. Plumbed-in. The extinguisher canister must be installed in the car in accordance with the manufacturer's instructions. This includes fitting anti-torpedo tabs.

The system must have two points of triggering, one inside the car which both the driver and co-driver must be able to activate when normally seated with seat belts fastened, and one outside for activation by marshals. The external triggering point must be positioned close to the electrical cut off (see below). It might be a pull handle or a button; the former is the much cheaper option.

B. Hand-held. You must have at least one hand-held extinguisher fitted inside the car. This is often located under the co-driver's legs.

Fire extinguishers have an expiry date after which they must be replaced. An extinguisher should also have a label showing when it must next be checked, which must be no more than two years after either the date of filling or the date of the last check.

A reputable motorsport supplier will be able to advise on the appropriate extinguishers for your car and usually also supply all switches, brackets, pipes, nozzles and installation instructions. All pipes, nozzles and brackets must be metal, not plastic.

In the photographs below, the external triggering points are marked by the "E" decal. The decal is mandatory (NCR Ch.7, App.6, Art.1.14) and helps marshals locate the triggering point. As shown in the photographs, the usual location for the triggering points is on the scuttle below the windscreen.

Internal buttons



External buttons



Internal pulls



External pulls



Plumbed-in extinguisher



Hand-held extinguisher



Electrical cut off

You must fit a switch inside the car that can isolate all electrical circuits and completely stop the engine. The switch must be positioned so that it can be operated by the driver and the co-driver when normally seated with their seat belts fastened.

You must also install a way of activating the switch from outside the car. This might be a pull handle or a button; the former is the much cheaper option.

In the photographs above, the cut off button/pull handle is marked by the lightning flash decal. The decal is mandatory (NCR Ch.7, App.5, Art.4.1) and helps marshals locate the cut off. (NCR Ch.13, App.16, Arts.12.3 & 12.4)

Mudflaps

Mudflaps must be fitted for all four wheels. These must be of a flexible material, minimum thickness 4mm and extend to a minimum of 40mm each side of the tyre tread and to within 80mm of the ground when the car is unoccupied. (NCR Ch.13, App.16, Art.3.13)

A motorsport specialist should be able to supply the correct material and size and fitting brackets.



Battery

The battery must remain in its standard location.

You can retain the standard battery but for safety an AGM battery such as Odyssey or Varley is allowed. Seek the advice of the supplier on the correct battery for your car.

Underbody guards

A sump guard to protect the engine and gearbox is essential.

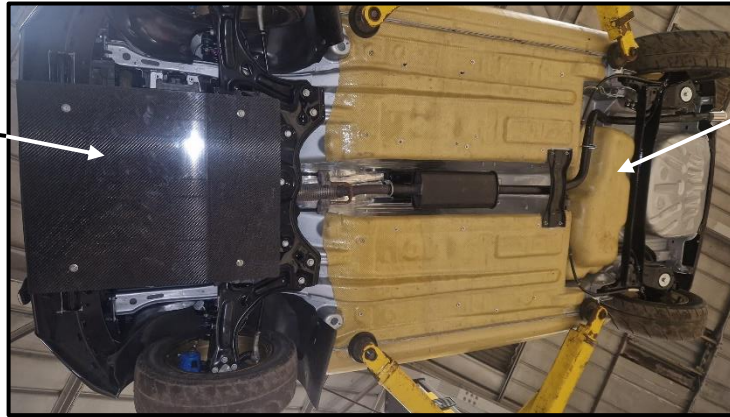
You must fit a guard to protect the fuel tank from damage (NCR Ch.13, App.16, Art.12.10).

If you do not reroute fuel and brake pipes inside the car, you must fit a guard to protect them.

If you do reroute fuel lines inside the car, use metal pipes and protect them from being damaged. Any joints in the pipes must be by screwed sealing joints or the vehicle manufacturer's approved joint. (NCR Ch. 7, App. 4, Arts. 5.1 & 5.2)

Sump guard
(engine & gearbox)

Fuel tank guard



This photograph is
of a Citigo but the
same principles
apply for other cars

Mirrors

You must have 4 rear view mirrors – the two door mirrors, an internal mirror for the driver, and an additional interior mirror for the co-driver.



The additional mirror must be securely mounted in position. Options include clamped to the roll cage (do not drill the cage itself), attached to the inside of the roof above the windscreen, glued to the windscreen, or fixed to the top of the dashboard. Whichever location you choose, make sure the co-driver has good visibility to the rear and the mirror does not impede the driver's vision. Suction type mounts are not acceptable as they are prone to failure.

Bonnet pins

Bonnet pins are essential to stop the bonnet opening while competing. There are two main types.



Tailgate / Boot lid

You should fit catches to the tailgate / boot lid to stop it opening while competing. Typical tailgate catches are shown below.



Towing eyes

You must fit towing eyes to the front and rear of the car. These must be of adequate strength and size and in a distinctive and contrasting colour. The photographs below show examples. (NCR Ch.13, App.16, Art.3.14)

Front



Rear



Horns

You need to fit high-intensity horns that can be operated by the driver and the co-driver. The standard horn will usually suffice as long as the co-driver can activate it while strapped in (eg. by their own foot or hand button). (NCR Ch.13, App.16, Art.12.11)

Belt cutter

You must fit at least one belt cutter in the car. Both driver and co-driver must be able to reach it when seated with their seatbelts fastened. (NCR Ch.13, App.16, Art.12.14)

Example seat belt cutter



Example cutter combined with a glass breaker



Intercom

You will need to fit an intercom to allow the driver and co-driver to speak to each other. The intercom control unit is usually attached to the rollcage between the crew, with cables connecting to the microphones and speakers in their helmets. Some helmets are supplied with microphones and speakers already installed.

There is a number of suppliers and their systems are not necessarily compatible with each other, although some adaptors are available to overcome this.

The best option is usually to take the advice of the specialist supplier from which you buy your helmet. Remember though to check what intercom system your co-driver has to make sure you will be able to hear each other. If you decide to buy a pre-owned unit, remember to check compatibility first.

Pedals

It is possible that after the carpet and underlay have been removed the pedals are too high above the floor for them to be operated safely and comfortably. This can be resolved by installing a box such as the one shown in the photograph below to raise the heel height to a suitable level.



Engine

The standard engine for the car must be used. This includes the fuel injection system and all the engine internals, which must not be modified in any way whatsoever.

Give the engine a thorough service per the manufacturer's handbook to make sure it is working at its best.

Keep the standard airbox as they work just fine. You could fit a performance air filter if you wish or just use a new standard filter.

Keep the standard exhaust system to start with. Performance exhausts may help the engine perform a bit better but can be expensive.

If you decide to undertake an engine rebuild, everything must remain absolutely as standard and any replacement parts must be to the original manufacturer specification.

You will need to drill some holes as described in the technical regulations to permit the fitting of Championship seals.

You will also need to fit a dry break fuel sampling coupling to enable fuel samples to be taken (NCR Ch.7, App.4, Arts.6.1 & 6.2).

Example fuel
sampling kit (fuel line
connector + hose)



Engine Control Unit (ECU)

The standard ECU for the car must be used.

Modern ECUs are extremely complex and ensure that engines are working to maximum efficiency. Essentially, leave the ECU well alone.

Gearbox and differential

The standard gearbox for the car must be used along with the standard final drive as per UK specification.

If any internal repairs are needed, you must use standard parts of the same specification.

Make sure the clutch is in good condition and replace parts as necessary. You can fit an uprated clutch plate which may help with reliability.

The standard driveshafts are fine.

You will need to drill some holes as described in the technical regulations to permit the fitting of Championship seals. Please ask for advice if you are unsure.

Brakes

Brake discs, calipers and drums to the car manufacturer's original standard must be used.

Make sure the whole braking system, including the handbrake, is working to full efficiency.

The front brake pads should be changed for competition specification pads. Popular choices are Mintex, Brembo, Ferodo and EBC.

The rear brake shoes/pads can remain as standard or be updated to competition specification.

Change the brake fluid. Competition specification fluid is advised but standard fluid replaced regularly is usually sufficient.

If your car has ABS, disabling or removing it is allowed but please ask for further advice before doing so.

If in doubt, replace the flexible brake hoses. Any hoses or pipes showing signs of deterioration should definitely be replaced for safety. Hoses on VAG cars are Kevlar lined as standard and fitting braided hoses confers no advantage.

Braided hoses



Steering

The standard steering rack must be used, but make sure it is safe and working properly.

You can replace the steering wheel with an aftermarket version.

Airbags should be removed. Removal requires great care. Please ask for advice if unsure.

Suspension

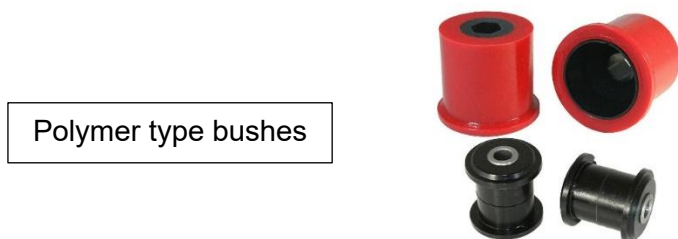
Updated suspension is recommended but it must use all the standard mounting points.

Bilstein or Koni suspension kits are recommended and are available at reasonable cost. Other aftermarket kits are also acceptable.

Ohlins, Proflex or Reiger suspension kits are a very high cost choice, are not necessary, and are of debatable benefit.

Suspension kits with remote reservoir dampers are not allowed.

Standard suspension bushes are sufficient as long as they are not worn out. It is worth replacing the bushes with polymer versions, however, for improved handling and longevity.



Wheels

If the standard car had 14" diameter wheels or greater, you should use 14" wheels. If the standard car had only 13" wheels, you should use 13" wheels.

Fitting 13" wheels to a car that had 14" wheels as standard might be possible, but if it requires any modifications to the wheels or to the car (eg. to the brake calipers) it is not allowed.

You can use the car's standard road wheels if they are of eligible size, whether they are steel or alloy.

For safety reasons, wheels should be of the correct width for the size of tyre. The ideal wheel width for the Championship control tyre is 6".

You can use aftermarket steel or alloy wheels if you wish. You are also allowed to fit wheel spacers if you wish. The thickness of the spacers must not be greater than 10mm. The complete wheel (that includes the flange, the rim and the tyre) must still be housed within the standard bodywork.

If you buy any wheels make sure they are a correct match for your make and model of car. A reputable supplier should be able to advise you on this. For safety reasons, you are allowed to use an appropriate spigot adapter ring if the centre hole of a wheel as standard is too large for your car.

You must not modify wheels in any way from the manufacturer's standard.

It is recommended that you have a minimum of 2 spare wheels and tyres available at events to allow for punctures and tyre wear. You will need to carry one of the spare wheels and tyres (together with a jack and wheel brace or equivalent) in the car during events so you will need a way of securing these in the boot.

In the photograph below left, the manufacturer's spare wheel restraint is being used with the strap used to secure the jack and wheel brace in position. Below right, the wheel is strapped down.



Tyres

Only the tyres specified by the Championship (the “control tyre”) can be used on events. The tyre is the Toyo Proxes R888R which comes in two eligible sizes - 185/60R13 and 185/60R14. They must be purchased from our authorised supplier, Wheels Around.

Toyo Proxes R888R



The purchase and use of part-used tyres is acceptable but is at your own risk. The tyres must have originally been sold and branded by the Championship’s authorised supplier.

Weight

The weight of the complete car inclusive of fuel, the crew and their crash helmets must be not less than 1000kg at all times while competing.

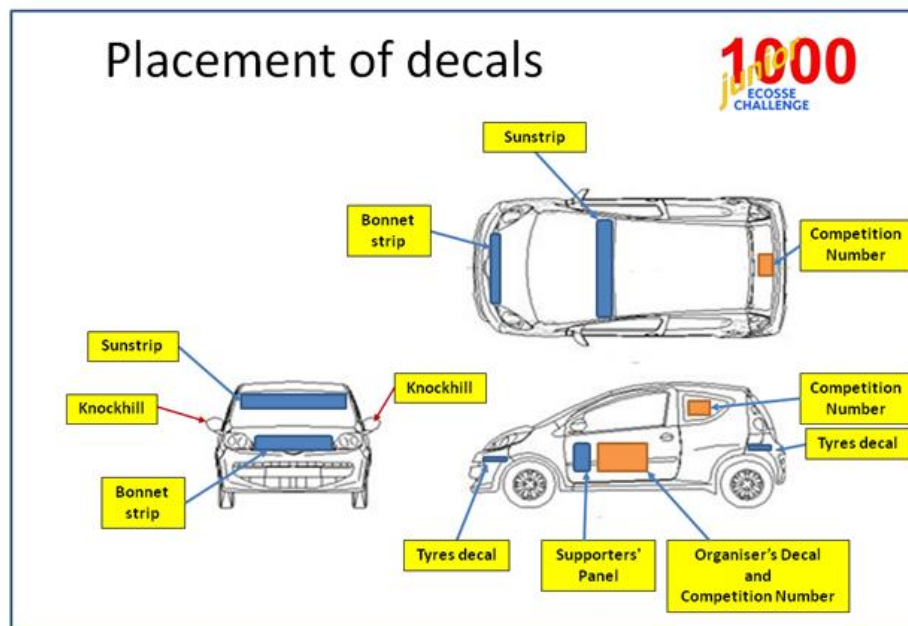
Most cars when rally ready will comfortably exceed this figure but if in doubt, you can ask for assistance in getting the car weighed before you enter your first event.

Decals

The Championship requires you to display various decals on the car in specified positions as shown in the diagram below and detailed in the Championship regulations.

In addition, you will have to display competition numbers together with decals specified by individual event organisers. You will need a white background measuring at least 48cm x 33cm for the door numbers (outlined in black if you have a white car). On the rear window you need a white square 18cm x 18cm, but make sure it does not impede the crew’s view in their mirrors. The numbers on the side windows will be 20cm high. (NCR Ch.7, App.10 and Ch.13, App.9, Art.5.4)

Bear all this in mind when designing your car's appearance or positioning your sponsor logos and make sure you leave enough space for all the Championship decals in the specified locations.



Vehicle Passport

All stage rally cars must have a Vehicle Passport.

To obtain a Vehicle Passport, you will need:

- The car's registration document;
- Three recent good quality colour photographs showing the car static, unoccupied and in tyre contact with the ground: (1) a front $\frac{3}{4}$ view from right side, (2) rear $\frac{3}{4}$ view from left side (both (1) and (2) with number plate legible) and (3) a view of the engine bay.

A Motorsport UK Scrutineer will examine the car and, if satisfied, will arrange the issue of the Vehicle Passport. It normally takes up to 30 days after inspection for the Vehicle Passport to be issued.

The Championship can help put you in contact with a Scrutineer if requested.

Car Registration, MOT, Number Plates and Tax

The car must be registered with the DVLA as with any other vehicle.

It will require an MOT to be allowed to compete. Not every MOT station may be fully aware of the MOT rules for rally cars. You might want to ask for advice from other competitors on MOT stations in your area.

The number plates must comply with the legal requirements.

You may not need to tax the car unless you intend to drive or keep it on public roads. If you do not tax it, remember to SORN it. Single venue rallies usually waive the need for competing cars to be taxed if the event takes place wholly on private land.

Equipment sources and suppliers

Tyres

All tyres must be purchased from our authorised supplier:
Wheels Around (07711 577148 or fiona@wheelsaround.com)

The following are based on previous experience preparing and running Junior 1000 cars.

All purchases are at your own discretion.

Roll cage

VAG cars bolt-in cage by SW Motorsport. Kit includes seat rails and sill jacking points.
Marc McCubbin, AM Motorsport Services, Muirkirk 07745 230902
marcmccubbin2712@gmail.com

Tank guard

Composite guard for VAG cars supplied with adhesive.
Rallytech Composites, Chorley 01254 832900 info@rallytech.co.uk

Sump guard

Sump guard for VAG cars. EvoParts 01995 679704 gpmotorsportuk@btinternet.com

Fire extinguishers

Plumbed-in and hand-held extinguishers for all cars.
Graeme Mack, Main Street Motors, Low Valleyfield 07711 351176
graeme.mack@btinternet.com

Plumbed-in and hand-held extinguishers.
Blair Motorsport, Darvel 078050 64424 service@blairmotorsport.com

Hand-held, plumbed-in both manual and electric operation.
PD Extinguishers, Blackburn 01254 954954 chris@pdextinguishers.co.uk

Brakes and clutches

Questmead. 01706 363939 <https://www.questmead.co.uk/>

Motorsport specialists

Clubman Motorsport (Rob Brook), York <https://www.clubmanmotorsport.com/>

Demon Tweaks, Wrexham <https://www.demon-tweaks.com/uk/>

McGill Motorsport, Kirkcaldy www.mcgillmotorsport.com

TripleM Developments, Dumfries [\(6\) Facebook](#)

AG Motorsport, Kilmarnock 01563 537145 [\(12\) Facebook](#)

Race & Rally, Lisburn www.raceandrally.com

Angus Lawrie Motorsport, Castle Douglas 07964 282197 [\(12\) Facebook](#)

Motorsport specific incidentals (bolts, clips, tapes, glues etc.)

Trident Racing Supplies 01327 857822 <https://tridentracing.co.uk/>

Motorsport specific incidentals and equipment

JJC race and rally <https://www.ebay.co.uk/str/jjcraceandrally>

Contacts

Junior 1000 Ecosse Challenge Coordinator
coordinator@j1000ecossechallenge.co.uk

This document is provided as a basic guide in the interests of assisting competitors understand the work required in preparing a competition car for participation in the Championship. You are responsible for ensuring that the base vehicle, the preparation undertaken, the preparation activity and all parts and equipment used meet all safety requirements and are suitable and compliant with all relevant laws and regulations, including Motorsport UK and Championship regulations.

As the competitor, you are solely responsible for the specification and condition of your vehicle and as such it is your responsibility to ensure that any third party preparing your car does so such that it is fully compliant with all applicable laws and regulations.

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