

TECHNICAL & SPORTING REGULATIONS 2018

GREENPOWER EDUCATION TRUST

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SOLID EDGE

OVERVIEW

All vehicles entered for any IET Formula 24 and IET Formula 24+ event in 2018 organised by Greenpower Education Trust will comply with the following Technical and Sporting Regulations. **All changes from 2017 Technical and Sporting Regulations are highlighted in red text.**

Remember that the project is for the benefit of the young people involved. It is important to ensure that they are as involved in as much of the design and build of the vehicle as possible, and that technology used is relevant and accessible to the age group of the category in which you are participating.



TECHNICAL

T1 - MOTOR

- T1.1. The vehicle will only be powered by one 24 volt DC electric motor supplied by Greenpower. No hybrid systems are allowed.
- T1.2. The motor is sealed and must not be opened. No machining or drilling of the casing is allowed. **Only standard unmodified motor brushes supplied by Greenpower may be used.**
- T1.3. Motor cooling is only permissible using passive or forced air, without any prior energy input or power from batteries other than the main vehicle batteries.
- T1.4. The motor must be easily accessible for inspection. Greenpower reserve the right to remove motors for return to the manufacturers for inspection.

T2 - BATTERIES

- T2.1. **Two unmodified 12v batteries supplied by Greenpower, referred to as main batteries, will be used on each vehicle. Only one set of two main batteries will be used in a race. No external energy source may be used. Energy recovery systems are permitted.**
- T2.2. Auxiliary batteries for powering devices on the car must not exceed one PP3 or six AA cells per car. Coin or button cells are



permitted as a power source for brake lights but also to allow control systems to retain settings whilst main batteries are changed. Proprietary unmodified electronics with self-contained batteries, e.g. speedometers, watches, radios are permitted so long as they're not connected to any of the car control systems. All other devices including motor controllers must be powered off the main batteries. If in doubt consult Greenpower.

- T2.3. Out of the car, the main batteries must be kept separate and lifted independently of one another.

Safety note – Batteries should be handled with care. Batteries that are dropped may sustain internal damage, fail and possibly cause injury.

- T2.4. The presence and use of battery chargers at any time at events is prohibited.
- T2.5. The main batteries must be firmly secured to the chassis of the vehicle using rigid fixings – i.e. no webbing or elastic straps, and must not be able to move in any direction in those fixings. Plastic threads on fixings are not permitted. Over centre clips must be security pinned.
- T2.6. The main batteries may be mounted upright or on any side but must not be inverted, i.e. terminals must not point towards the ground.
- T2.7. The main batteries must be separated from the driver by a bulkhead, sufficient to restrain the batteries from the driving compartment. This bulkhead must not be able to short circuit the battery terminals. Batteries must be located inside the vehicle's bodywork.
- T2.8. Batteries must have quick release connections to enable rapid disconnection in the event of an emergency. They must not be liable to disconnect or short against metal parts. **Quick release connectors must be accessible and operable without the need for tools.**
- T2.9. The main batteries in vehicles at the start of practice sessions or races

will not exceed 25°C or ambient temperature plus five Celsius when ambient is above 20°C as measured by Greenpower. Spot checks will be carried out and any vehicle found to have batteries in excess of this temperature will have its race start delayed.

T3 - WHEELS & TRACK

- T3.1. Tyres must not be less than 300 mm nor greater than 520 mm in diameter.
- T3.2. There must be four wheels located as a matching front and matching rear pair, symmetrically about the centreline of the vehicle.
- T3.3. The track of the vehicle must not be less than 500 mm front or rear. The track is deemed as the measured width between centres of tyres where they contact the ground. The track may vary front to rear.
- T3.4. Tyres must be pneumatic.
- T3.5. Plastic spoked wheels are not permitted.

T4 - CENTRE OF GRAVITY

- T4.1. The base of the main batteries must be at or below 100 mm from ground level. A 6 mm diameter hole should be drilled through any solid floors adjacent to the batteries to allow height measurement. **See Fig. 1**
- T4.2. The driver's seat including any padding must be at or below 100 mm from ground level. A six mm hole should be drilled through the base of the seat to allow height measurement. **See Fig. 1**

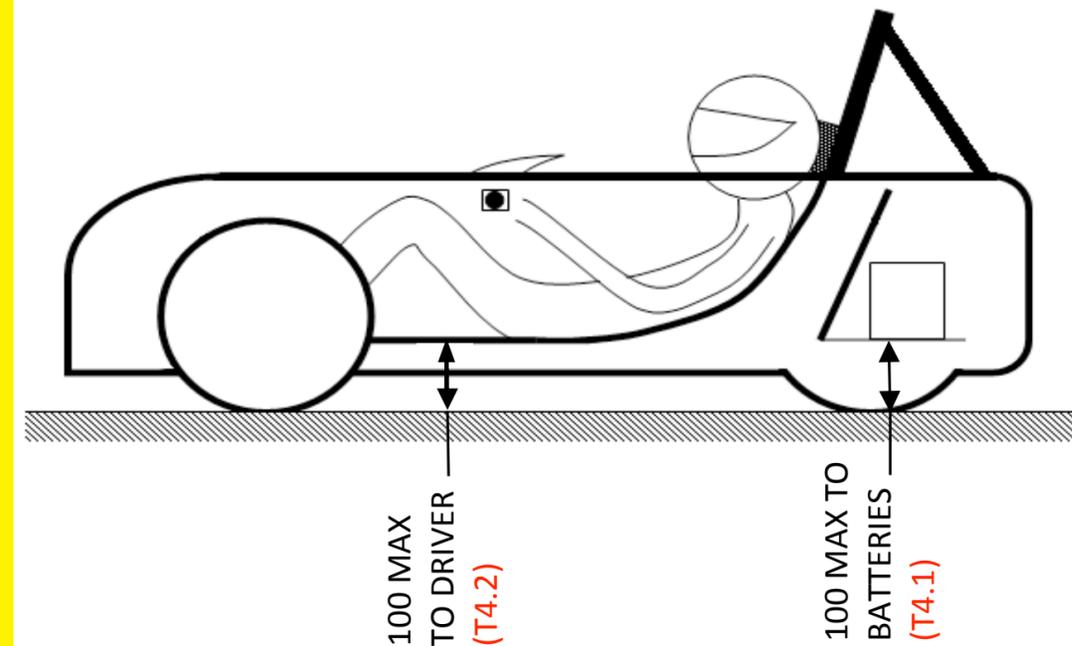
T5 - DIMENSIONS

- T5.1. The vehicle must not exceed 2800 mm in length, 1200 mm in width, and 1200 mm in height.
- T5.2. Ground clearance must not be less than 30 mm.
- T5.3. No part of the vehicle may extend more than 800 mm behind the centre point of the rear wheels.

T6 - DRIVER AND SEATING

- T6.1. The vehicle will have one seat for the driver firmly fixed to the vehicle chassis.
- T6.2. The driver must be seated in a feet forward, reclined position. Drivers may not kneel, sit astride a seat, or lie down in any way such that their chests and head are forward of their waist.
- T6.3. The driver must be able to demonstrate a clear exit from the vehicle unaided.
- T6.4. There must be a solid floor under the whole of the driver, to prevent ingress of debris.
- T6.5. There must be a padded head rest behind the driver's helmet to prevent whiplash.
- T6.6. All parts of the vehicle's seat which are in contact with the driver must have some form of protective padding.

Figure 1



T7 - BODYWORK

- T7.1. There must be a rigid structure around the driver extending from the front bulkhead to the back of the driver. It will have a minimum height of 250 mm from the seat base and must cover the elbows. Next to the legs, i.e. forward of the lap strap, it may be less than 250mm high provided it reaches the top of the cockpit.
- T7.2. It shall be of rigid material such as aluminium, rigid plastics, carbon fibre, glass reinforced plastic or other composites of at least 1.5 mm thickness. Plywood needs to be a minimum of 3 mm thick. Corrugated plastic type material or foam on its own is not permitted for this area.
- T7.3. There must be a suitable bulkhead between driver and wheels to prevent any accidental contact with the driver.
- T7.4. The cockpit opening, when viewed from directly above must be able to accommodate a rectangle 600 mm in length and 350 mm wide with no intrusions, e.g. helmet fairings, instrument covers, etc. must not overhang this area.
- T7.5. The driver's helmet must be positioned at the rearmost point possible of the cockpit, creating a clear space in front of the drivers' helmet.
- T7.6. **Bodywork, including windscreens, to the front or sides of the driver's helmet may not be higher than the bottom of the driver's helmet visor aperture.**
- T7.7. Closed cell foam of minimum 25 mm thickness must be attached down the inside of the cockpit sides to protect a substantial part of the driver's body, from the floor to the cockpit opening.
- T7.8. Any sharp edges/protrusions in the cockpit must be padded/protected.
- T7.9. There must be a solid, rigidly mounted, bulkhead forward of the driver's feet, with 200 mm depth of foam with a compressive strength of 300 – 700 Kn/m²* affixed to the front side of this bulkhead, to protect the driver from frontal impact. Any material forward of the

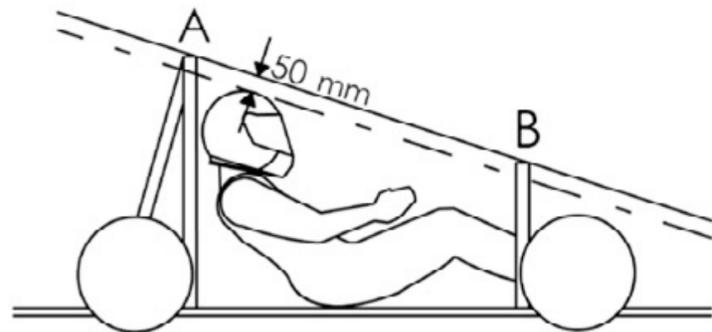
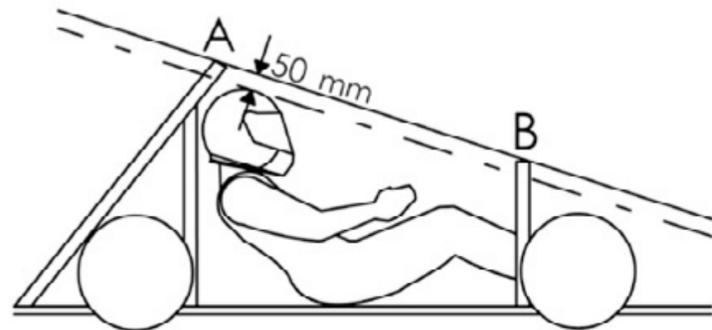
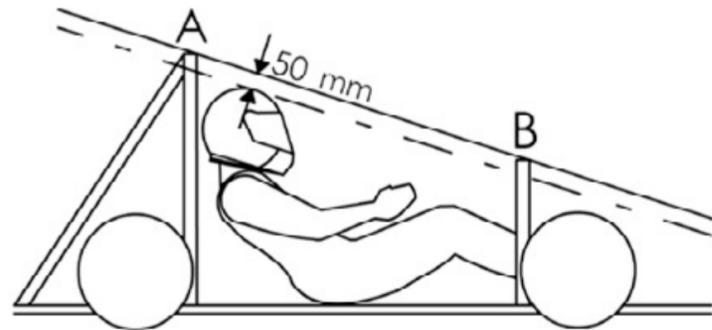
bulkhead must be easily deformable. This must be available for inspection at scrutineering.

*The foam must be an extruded polystyrene foam such as Styrofoam, Dow Floormate or Kingspan Styrozone.

T8 - BRAKES

- T8.1. Brakes will be subject to a force test of 300N applied horizontally forwards from the top of the roll bar with the car situated on a flat tarmac/concrete surface. There must be no movement of the car. All drivers must be capable of producing this braking force. This will be subject to spot checks outside of scrutineering.
- T8.2. A minimum of two independent brake systems must be fitted, such that there is still some braking if one system were to fail. **These systems may be operated by a single dual system lever.**
- T8.3. Both wheels on either front or rear axles must have the same type of brake such that the car brakes in a straight line. This is in addition to any electrical braking system that might be incorporated.
- T8.4. The driver must be able to operate the brakes without removing either hand from the steering mechanism.
- T8.5. Braking systems must be operated by hand only. Foot operated brakes are prohibited.

Figure 2



T9 - ROLL BARS

T9.1. The vehicle must have front and rear roll bars offering protection in accordance with the diagrams shown here – the helmeted head of all drivers must be at least 50 mm below the line A-B as shown. See Fig 2.

T9.2. Roll bars must be firmly secured to the chassis of the vehicle using mechanical fixings or welding. Gluing/bonding of roll bars to chassis with no mechanical fixings or welding is not permitted.

T9.3. One central triangulated brace or two side triangulated braces must be fitted to the rear roll bar. These braces should attach to the chassis of the vehicle at one end, to not more than 200 mm from the top of the roll bar at the other, and must be capable of taking loading in all directions.

T9.4. Aluminium or steel square or circular section roll bars are to be used and must be strong enough and of sufficient dimensions to perform satisfactorily. If in doubt check material suitability with Greenpower before construction. Composite roll bars are not permitted.

Advance Notice - 2019 Regulations

All vehicles entered for any IET Formula 24 and IET Formula 24+ event from 2019 organised by Greenpower Education Trust will comply with Regulation T9.5 below.

T9.5. All rear roll bars must be produced from steel, with minimum outside diameter of 25mm and minimum wall thickness of 1.5mm.

Safety note - Avoid drilling roll bars as it weakens the structure.

T9.6. Non-structural bodywork along with front and rear wheels must not be regarded as part of the roll protection. The top 150 mm of the roll bar must not have any fairing or other aerodynamic aid. See Fig 2.

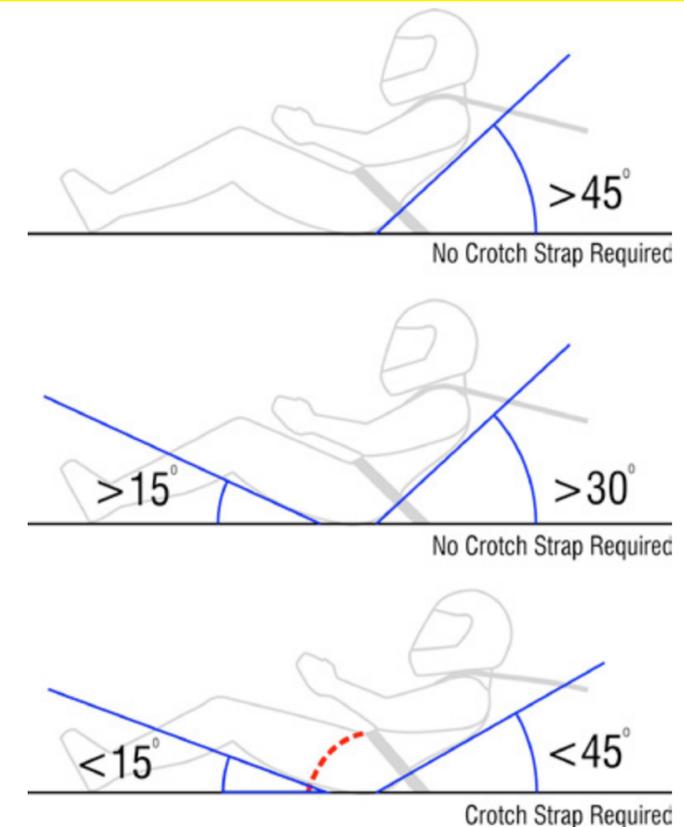
T10 - SAFETY EQUIPMENT

- T10.1. Two mirrors, each with a minimum area of 2250 mm² will be fitted in clear air outside the bodywork and must be able to be adjusted with a wide field of view. Fairings are permitted, but must only be attached to the reverse (non-reflective) side of the mirror itself. Camera systems to replace rear view mirrors are not permitted.
- T10.2. The vehicle must have a clearly audible single-tone horn.
- T10.3. A 24 volt, minimum 100 amp, rated isolation switch must be fitted. It must be clearly visible and be easily accessible to the driver, and from outside the vehicle. Two switches may be fitted if needed. On/Off positions must be clearly marked. Indirect operation of the isolator is not permitted.
- T10.4. The vehicle must be fitted with a minimum four fixing point, 50 mm width safety harness, with secure fixing points on the roll bar or chassis. Harness shoulder strap fixing points should be close to shoulder height and neck width (**approx. 150 mm**). Lap straps must be able to be fully tightened before shoulder straps and must fully tighten around the driver's lap without additional padding in front of the driver.
- T10.5. Drivers in low reclined seating positions with a raking angle of less than 45 degrees if the seat has a flat base, or 30 degrees with a front angle of 15 degrees will require a five or six point safety harness.

Safety note - Harness ends should protrude at least 100 mm beyond the buckle for all drivers, and be folded and sewn at the ends to act as a stopper.

- T10.6. A non-flashing, red brake light will be fitted so it is clearly visible to following vehicles.

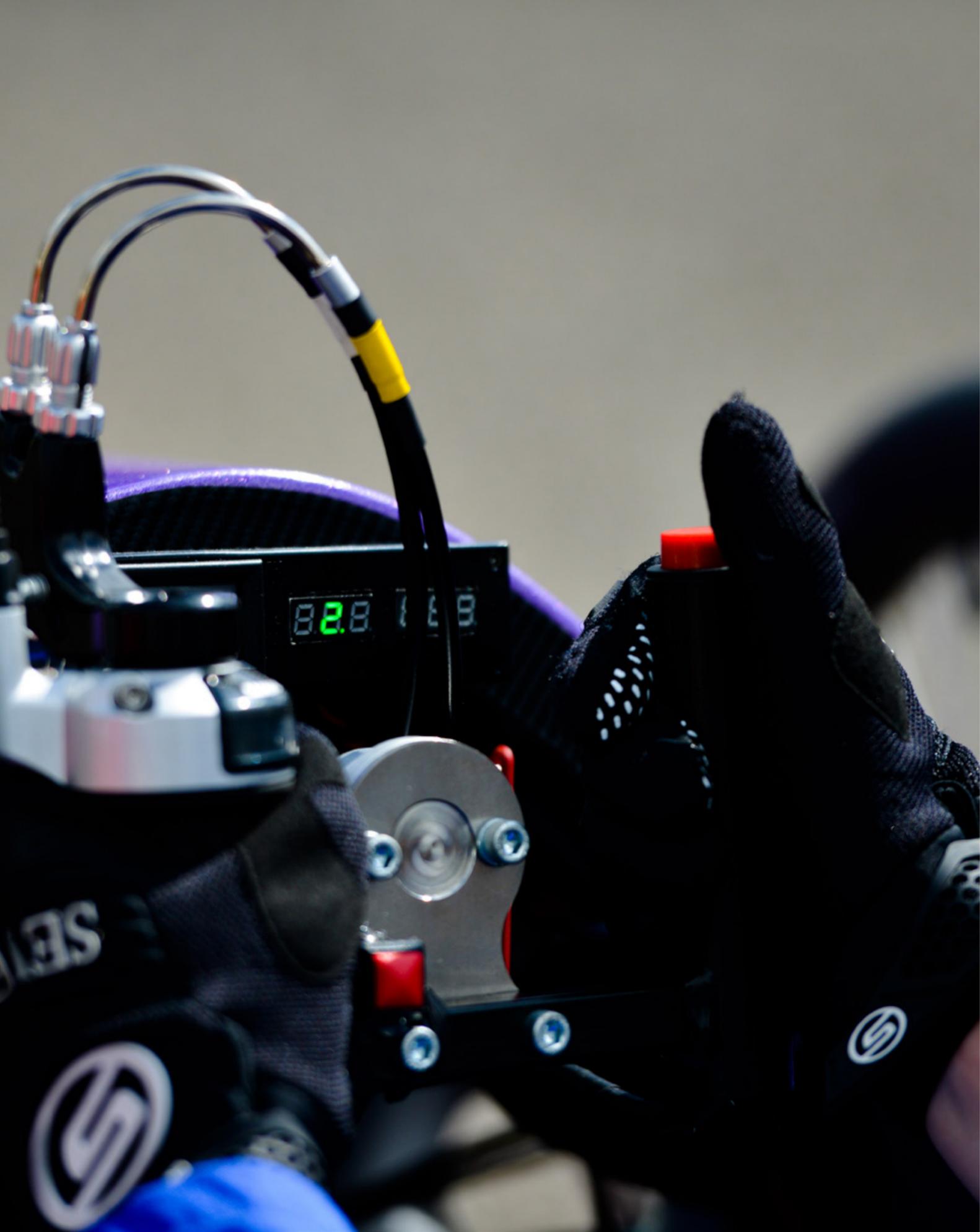
Figure 3



- T10.7. The drive train must be guarded to prevent fingers, hair and clothing becoming trapped at any time.

- T10.8. The use of locking nuts on safety critical components is **mandatory**, including but not limited to: safety harnesses, roll bars, wheels, steering and braking systems.

Safety note - if in doubt, use locking nuts.



T11 - STEERING

- T11.1. Steering systems must have minimal play.
- T11.2. Steering must be able to operate smoothly from lock to lock, without wheels making contact with bodywork.
- T11.3. Steering must be by mechanical linkages only.
- T11.4. Steering must be by front wheels only.
- T11.5. Steering must be operable by hand only.

T12 - ELECTRICS

- T12.1. The accelerator must be spring loaded to the Off position.
- T12.2. Electronic motor controllers must not be capable of boosting battery voltage, i.e. at any time the voltage across the motor terminals may not exceed the voltage across the battery terminals.
- T12.3. A fused link/cut-out must be in place in the main power circuit, rated at 70 amps or less.
- T12.4. All wires and terminals on the vehicle must be neatly run, secured and unable to chafe, away from moving parts.
- T12.5. All wiring and electrical components must be correctly rated for their use.
- T12.6. Low current ancillary circuits must have their own fuse (normally 5A or less).

T13 - OTHER

T13.1. Transmission of any form of electronic data to the car/driver by whatever means is prohibited. Communication with the car/driver is only allowed via verbal (e.g. radio) or visual (pit board) means.

T13.2. Telemetry and all communication systems must operate at national legal frequencies and power levels.

T13.3. Driver to pit audio communication systems must be hands free.

T13.4. Three racing numbers will be provided by Greenpower at the event. These must be located on the front and be clearly visible on both sides of the vehicle, midway between wheels. The stickers provided are black numbers with a white circular background of 250 mm diameter. **See Fig 4.**

T13.5. Provision must be made for the positioning of a timekeeping transponder, which will be provided at events complete with a mounting bracket. This must be mounted vertically on either side of the vehicle, on the outside of the bodywork. It must be located between the front axle and the race number, at axle height, and have clear line of sight to the ground. No fairings are permitted. **See Fig 4.**

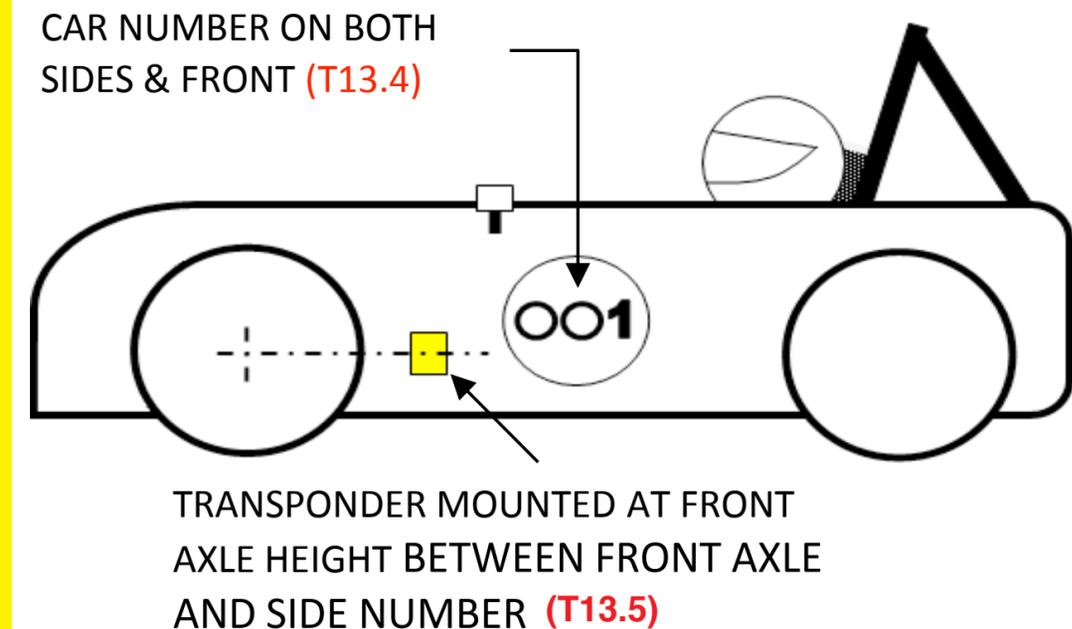
T13.6. Cameras must not be attached to the crash helmet. Cameras must be attached to the car with secure mechanical fixing. **Suction mounted cameras are not permitted.**

T13.7. Greenpower will supply national partner stickers which must be applied to the vehicle in a prominent position.

T14 - KIT CAR REGULATIONS

T14.1. The main Kit Car chassis frame must remain unmodified.

Figure 4



SPORTING REGULATIONS

S1 - TEAM CLOTHING

- S1.1. Drivers must wear a suitable motor cycle or motor racing specification full face crash helmet including chin protection. Drivers must ensure the helmet is correctly fastened before they get into the vehicle.
- S1.2. Full overalls must be used whilst driving. They must be of a suitable thickness to provide protection. Paper overalls are not acceptable.
- S1.3. Full fingered gloves must be worn.
- S1.4. All team members must wear stout closed toe footwear, ideally with toe protection.
- S1.5. Team members in the pit lane must wear overalls or long trousers.

S2 - LOGBOOKS

- S2.1. Each team already has or will be issued with a vehicle logbook on Confirmation of Entry. This must be brought to scrutineering at every event. Any Scrutineer's requirements must be completed before your next event, otherwise the vehicle will not be allowed to participate.

S3 - TEAM MEMBERS REGULATIONS

- S3.1. Drivers must be aged: IET Formula 24, 11-16 years (inclusive) at the start of the race season. IET Formula 24+, 16-25 years (inclusive) at the start of the race season.
- S3.2. (F24) - Drivers are not permitted to drive at the International Final without completing one regional event beforehand.
- S3.3. (F24) - A minimum of three drivers must take part in the 90 minute race. Drivers may only drive one car and for one team and each driver must drive for a minimum of 15 minutes in each race.
- S3.4. (F24+) - There is no limit to the number of drivers that may be used during a 60 minute race.
- S3.5. All drivers must be fully conversant with the Supplementary Regulations for each event, must be knowledgeable about their vehicle, and must attend the Team Briefing at events.
- S3.6. **It is the responsibility of the team manager to ensure all drivers are able to drive safely with adequate all round visibility.**
- S3.7. (F24) - Adults must not participate in pit stops unless by specific arrangement beforehand with Greenpower.

S4 - IET FORMULA 24 AND IET FORMULA 24+ CHAMPIONSHIP REGULATIONS

- S4.1. (F24+) - Teams must participate in two regional events to be eligible to be included in the championship points.
- S4.2. (F24+) - IET Formula 24+ Championship points will be awarded on the following basis at each round: 1st place - 25 points; 2nd -18; 3rd - 15; 4th -12; 5th - 10; 6th - 8; 7th - 6; 8th - 4; 9th - 2; 10th - 1.
- S4.3. (F24+) - The championship points will be the sum of the two highest scores of the season up to the final round, plus the score from the final round.
- S4.4. (F24 and F24+) - Cars must be able to start under their own power. Push starts for vehicles are not permitted at the start of the race.



TERMS OF ENTRY

By entering for any Greenpower Education Trust organised event in any category, the team are agreeing to the following Terms of Entry.

- 1) Published regulations may be subject to change. In the event of this happening, notification will be sent to all entered teams and posted on the Greenpower website.
- 2) All vehicles will be subject to pre-event and possible post-event scrutineering to ensure compliance.
- 3) The vehicle and required drivers must be presented at scrutineering in a race ready configuration.
- 4) Supplementary Regulations specific to each event will be published approximately two weeks beforehand and sent by email to all entrants for that event.
- 5) Greenpower's scrutineers and officials accept no responsibility for damage caused to cars whilst performing safety checks, recovery or rescue during an event.
- 6) Whilst these regulations, the scrutineers and other officials endeavour to ensure vehicles are safe to participate, ultimate responsibility lies with the entrant.
- 7) Whilst compliance with the Technical and Sporting Regulations should result in a compliant vehicle, race officials reserve the right to prevent a vehicle racing.

- 8) It is understood that all persons participating in events under these rules are doing so at their own risk and the entrant will ensure that all competitors under the age of 18 will have disclaimers (as provided by Greenpower) signed by their parents or guardians prior to competing.
- 9) Greenpower ensure that Public Liability and Personal Accident Insurance for participants is always in place for events under their control and accept no liability for events organised by third parties or team practice sessions.
- 10) As part of communications activity, Greenpower regularly uses photography for publicity purposes. Entrants must ensure all participants are aware of this and the necessary permission is obtained. If permission is not granted, Greenpower must be notified prior to every event in which the participant takes part.

Team leaders with less able students wishing to participate, who may have special requirements with regard to the regulations, should contact Greenpower who will be pleased to assist in any way possible.



SOCIAL MEDIA

For Greenpower Social Media updates please follow these handles:



/GreenpowerRacing



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MORE INFORMATION

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