Article 262 - Technical Regulations for Supertouring Cars (Group ST)

ARTICLE 1 : DEFINITIONS

1.1 Land vehicle
A locomotive device propelled by its own means, moving by constantly taking real support on the earth's surface, of which the propulsion and steering are under the control of a driver aboard the vehicle.

1.2 Super Touring Car
Large-scale series production touring cars of a minimum overall length of 4.20 metres and a maximum engine capacity of 2 litres, and having the engine installed in the front part of the car, driving two wheels and steering two wheels only. These cars must be homologated in Super Touring by the FIA.

1.3 Automobile
A land vehicle running on at least four non-aligned complete wheels, of which at least two are used for steering and at least two for propulsion.

1.4
1.4.1) Bodyshell :
The major structural part of the homologated vehicle, constructed of all parts which are permanently attached (by welding, brazing, bonding etc.) including all modifications to it allowed by these regulations (e.g. safety cage) around which are assembled the mechanical components and the bodywork.
Components or panels which are attached by means of removable fasteners are not considered to be part of the bodyshell.
1.4.2) Bodywork :
All parts homologated with the series production vehicle that are licked by the airstream, except those parts which are considered part of the bodyshell, or for which freedom of replacement is given within these regulations.
1.4.3) Subframe :
Part screwed to the bodyshell to which are attached parts of the suspension.

1.5 Wheels
Wheel: Flange and rim
Complete wheel: Flange, rim and tyre

1.6 Event
An event shall consist of official practice and the race.

1.7 Weight
Is the weight of the car with the driver and his equipment, at all times during the event.

1.8 Cubic capacity
The volume swept in the cylinders of the engine by the movement of the pistons. This volume shall be expressed in cubic centimetres. In calculating engine cubic capacity, the number π shall be 3.1416.

1.9 Supercharging
Increasing the weight of the charge of the fuel/air mixture in the combustion chamber (over the weight induced by normal atmospheric pressure, ram effect and dynamic effects in the intake and/or exhaust system) by any means whatsoever. The injection of fuel under pressure is not considered to be supercharging.

1.10 Cockpit
The volume which accommodates the driver.

1.11 Decorative strips
Any parts following the external contour of the bodywork and with a perpendicular section of less than 25 mm.

1.12 Active system
Any system that senses one or more continuously varying parameters, and uses the measured value(s) in the control of one or more actuators that influence the dynamic characteristics of the car.

1.13 Semi-automatic gearbox
One which, when the driver calls for a gear change, takes over the control of one or more of the engine, clutch and gear selectors momentarily to enable the gear to be engaged.

1.14 Automatic gearbox
One which is able to change gear without any input from the driver.

1.15 Ferrous material
A material containing at least 80% of pure iron by weight.

1.16 Tools
Items designed to help or enable the hand(s) to apply force in industrial operations (e.g. spanner, socket driver etc.)

ARTICLE 2 : FIA APPROVAL

2.1 The vehicle must comply with all the dimensional and other FIA Super Touring homologation requirements, except for those additional modifications allowed in these regulations. All modifications not allowed by these regulations are expressly forbidden. In particular, this car must belong to a family produced in a quantity of at least 25,000 units with identical external silhouettes and shells.

2.2 Homologation of a car will become null and void 7 years after the date on which the series production of the said model has been stopped.
Only engines in current production may be homologated and that homologation will become null and void 10 years after the date on which series production of the said engine has been stopped.

2.3 Homologation forms (available from the ASN) must be presented, describing the vehicle and engine used.

2.4 Dangerous construction
If an automobile is deemed to be dangerous, it may be excluded by the Stewards of the Meeting.

2.5 Compliance with the regulations
2.5.1) Automobiles must comply with these regulations in their entirety at all times during an event.
2.5.2) The FIA and/or ASN may permit cars to compete that comply with the 1998 technical regulations for Super Touring Cars and have already been used in Super Touring races in 1998. For these cars, the entrant must present, at scrutineering, a technical passport and/or a certificate issued by an ASN to verify that the car has competed in 1998. These cars will be valid until the end of 2001 on the basis of the 1998 regulations. The ASN or the FIA may require that the car is updated to comply with the latest safety requirements, and may also permit the car to be used with any homologated aero kit.

2.6 Measurements
All measurements must be made while the car is stationary on a flat surface with a minimum area of 4.5m x 2.5m with an out of plane tolerance of ±2mm .

2.7 Duty of competitor
It is the duty of each competitor to satisfy the scrutineers and the Stewards of the Meeting that his automobile complies with these regulations in their entirety at all times during an event.

2.8 Computer systems
It must be possible to upload machine code and relevant data areas from all onboard computer systems. The method of uploading must be compatible with Scrutineer's equipment. See Appendix 1.

ARTICLE 3 : WEIGHT

3.1 Minimum weight
All cars using front wheel drive only must not weigh less than 975 kg excluding the driver and 1055 kg including the driver and his equipment.

All cars using rear wheel drive only must not weigh less than 1000 kg excluding the driver and 1080 kg including the driver and his equipment.
Weight is the only controlling element between front and rear wheel drive cars.

3.2 Ballast

Ballast can be used in accordance with Art. 252.2.2 and provided it is secured in such a way that tools are required for its removal. It must be possible to fix seals if deemed necessary by the scrutineers.

ARTICLE 4 : MODIFICATIONS ALLOWED

4.1 General conditions

4.1.1) Any nut, bolt or screw throughout the car may be replaced by any other nut, bolt or screw and have any kind of locking device (washer, lock-nut, etc.). Nuts, bolts and screws made of titanium are not permitted except in the engine.

4.1.2) Apart from the parts for which the present regulation lays down freedom of modification, the original mechanical parts necessary for the propulsion, suspension as well as all accessories necessary for their normal functioning, excepting any steering or braking part, having undergone the normal machining operations laid down by the manufacturer for series production may be subjected to all tuning operations through finishing, scraping but not replacement.
In other words provided that the origin of the series production part may always be established, its shape may be ground, balanced, adjusted, reduced or modified through machining. Chemical and heat treatment are allowed, in addition to the above. However, the modifications defined by the above paragraph are allowed on condition that the weights and dimensions mentioned on the homologation form are respected.

4.1.3) Addition of material and parts:
Any addition of material or parts is not permitted unless it is specifically allowed by an article in these regulations. Any material removed is not to be reused.
Restoration of body shape and chassis geometry, following accidental damage, is permissible only using original panels or parts or by the addition of the materials necessary to effect the repairs (body filler, weld metal, etc.); other parts which are worn or damaged are not to be repaired by the addition or attaching of material unless an article in these regulations allows appropriate freedom.

4.1.4) Titanium :
Titanium is prohibited other than for components within the engine, with the exception of the conrods and crankshaft as defined in Article 4.2.7, and within the brake calipers and their fixings.

4.2 Engine

4.2.1) The engine must be of the same make as the car and must be homologated by the FIA in Super Touring. The direction of the axis of the original engine relative to the homologated bodyshell must be retained. The engine revolution direction is free.
Only 4-stroke, normally aspirated, reciprocating piston engines are permitted.
Any device to artificially limit the engine speed/power below the peak of the engine power curve will be deemed to be artificially controlling power and is therefore prohibited with the exception of a rev limiting device whose sole purpose is to control the engine below an FIA approved limit. The device may be set no more than 300 rpm below the FIA approved limit. For the purpose of changing a gear ratio only it is momentarily permitted to take the control of the propulsion system away from the driver. It is permitted to have a sensor on the gear lever to initiate a power cut, to have a single, unique timed cut for all the gears in the ECU and to have a sensor in the gear box to indicate the successful selection of the gear.

4.2.2) Engine block: :
The engine must have no more than 6 cylinders. Bore and stroke may be changed to achieve a maximum capacity of 2000 cm^3. The bore is required to be cylindrical. The axis of the cylinders may be moved, but they must remain parallel to the original ones.
Sleeving or resleeving of the cylinder bores is allowed; material of the sleeves is free. Machining of all surfaces is allowed; material may be added. Steel, or other material, main caps are allowed, as are ladder reinforcement frames, inside the block and following the bearing supports.

4.2.3) Cylinder head :
The position and the axis of the cylinders and ports must be retained, as must the axis and angle of the valves. Port sizes may be changed, but the port centres at the manifold face must remain original (± 2 mm). The addition or removal of material is allowed subject to the restrictions in these regulations (see in particular art. 4.2.11).
The cylinder head covers (rocker covers) are free, including their material, if these parts have no other function than covering the cylinder head, and possibly that of attaching the engine.

4.2.4) Compression ratio :
Free.

4.2.5) Cylinder head gasket :
Free.

4.2.6) Pistons :
Free, as well as the piston rings, gudgeon pins and their securing mechanism.

4.2.7) Connecting rods, Crankshaft :
Free, but they must be made of ferrous materials. The use of non-ferrous materials for balancing the crankshaft is not permitted.
The make, dimensions and material of connecting rod and crankshaft bearings are free; but the original type must be retained (e.g. thin wall shell or roller bearings), as well as their number (see art. 4.2.11 for exception).

4.2.8) Flywheel :
Free.

4.2.9) Fuel feed and induction system :
Free, except it is forbidden to use any type of water injection system. The use of any other substance or device to reduce the temperature of the mixture is forbidden (other than the fuel radiator permitted by art. 4.10.1). The induction system, location of the injectors, number of injectors, air filter assemblies and pipes are free to be changed or modified. Fuel electronics and injector types are free. It is not permitted to inject any fuel or additive other than that specified under art. 4.2.23.
Any system that varies the geometry (length or cross-section) of either the intake ports, induction system or exhaust system, other than the throttles, is forbidden.

4.2.10) Camshaft(s) :
Free, except position and number which must remain as for the original head. Number of bearings is free. Belts, pulleys, chains are free, as are their layout and protection. A belt may therefore be changed for a chain, and vice versa.
Any systems that modulate the valve timing or lift, while the engine is running, are forbidden.

4.2.11) Valves :
The material, dimensions and the shape of the valves are free, but the system for closing the valves must be by coil springs alone. Cups, cotters, guides and springs are all free. Shims may be added under the springs. Hydraulic cam followers may be changed for solid ones. Valve lift is free. The material of the seats is free. The number of valves cannot be changed from that homologated.

4.2.12) Rocker arms and tappets :
Free, including the respective leverages of the rocker arms.

4.2.13) Ignition :
Free, but must include the FIA approved RPM limiting device which must be installed so as to limit engine RPM to 8,500 maximum. A rev logger approved by the FIA may be used in place of an RPM limiter. In this case, it is the competitor's responsibility to ensure that the engine RPM does not exceed 8,500 under it's own power.
This RPM limiting device must be installed in such a manner as to provide direct and easy access to it, to facilitate inspection and testing procedures which are to be carried out by the Technical Scrutineer or other approved FIA personnel. It must be placed either on the dashboard, or on the floor on the passenger side if a camera is present in the cockpit. The RPM limiter or logger must be installed and wired up strictly in accordance with the limiter manufacturer's instructions and any wiring diagrams issued. The regulation wiring plug seal must always be intact. The RPM limiter or logger will be checked and certified as and when deemed necessary throughout the event.
The number of spark plugs may not be modified.

4.2.14) Cooling :

Definition of exchqnger and radiator :
- Exchanger:
Mechanical part allowing the exchange of calories between two fluids.
For specific exchangers, the first-named fluid is the fluid to be cooled and the second-named fluid is the fluid that allows this cooling.
e.g. Oil/Water Exchanger (the oil is cooled by the water).
- Radiator:
This is a specific exchanger allowing liquid to be cooled by air.
Liquid/Air Exchanger.
- Intercooler or Supercharging Exchanger:
This is an exchanger, situated between the compressor and the engine, allowing the compressed air to be cooled by a fluid.
Air/Fluid Exchanger.
The method of cooling must be as on the homologated car (i.e. air cooled/water cooled). Provided the original location in the car, is retained, the radiator and its attachments are free, as are all its connections to the engine, but it must be rigidly secured at all times apart from the provision for vibration isolation. Within these conditions one radiator may therefore be replaced by several. A radiator screen may be fitted within 20mm of the radiator face, but it must not be adjustable while the vehicle is moving. Ducting to channel air to and from the radiators is permitted, provided it does not extend beyond the periphery of the front aerodynamic device.
Cooling fans and their method of operation are free. Thermostats are free, as well as their housings and the lines situated between the thermostat body and the water pump on the one hand, and between the thermostat body and the cylinder head on the other hand. The water pump is free, including with regard to its location in its original compartment. A water catch-tank may be fitted. The expansion chamber is free.

4.2.15) Lubrication :
Lubrication is free. A dry sump system is permissible.
The position of the oil tank is free other than it must not be located within the cockpit, unless positioned in the luggage area of a hatch-back car and then enclosed within a fluid/flame-proof bulkhead. Additional oil pumps, fans and coolers are allowed, but no aerodynamic benefits may be derived from them. Air ducts and mounting brackets under the car to these coolers and pumps are allowed, but no aerodynamic benefits may be derived from them, and the external appearance of the car must remain unchanged; oil pumps and ducts must not protrude beyond the perimeter of the bodywork as seen from above. Oil coolers must be contained within the volume left free under the car when a template with an angle of 45° to the horizontal is introduced along the ground around the perimeter of the car touching the bodywork (see drawing 262-1). If the lubrication system includes an open type sump breather, it must be equipped in such a way that the oil can flow into a catch-tank of at least 2 litres capacity. This catch-tank must be made out of plastic or must include a transparent window.

4.2.16) Engine mountings :
The engine position and its mountings are free, provided the crankshaft retains its same orientation within the engine bay as in the homologated car, and the metal sheet forming the engine/gearbox bay remains as in the FIA homologated car. The bulkhead must be capable of preventing the passage of fluid or flame into the cockpit.

4.2.17) Exhaust :
Exhaust manifold and system are free but the noise from the car is not to exceed 110 dB(A) at 6300 RPM when measured at 0.5 metres distance and at a 45 degrees angle to the point of exit of the exhaust. The local (ASN) regulations governing the area in which the event takes place may supercede this requirement. No exhaust-pipe or pipes may protrude beyond the perimeter of the car's bodywork as seen from above; furthermore the outlet for the exhaust-pipe must be at the rear of the car, not more than 10 cm from the perimeter of the car. The exhaust system must incorporate one or more homologated catalytic converters, which must be functioning at all times and through which all exhaust gases must pass.
It is permitted to modify the floor pan for the purposes of providing exhaust-pipe clearance, but at no point may this result in a duct larger than 21 cm diameter, and only one such duct, which is open at the bottom, per vehicle is allowed; this tunnel must not include any closed section and must contain only the exhaust. If this tunnel passes through a structural element, this element must not be reconstituted. Any cutting of the bumper in order to provide clearance for the exhaust is forbidden. The maximum height of this tunnel must not exceed 400 mm (see drawing 262-7 and 262-9).
All measures which are taken to ensure that the maximum noise limit is not exceeded, must be permanent in nature, and must not be removed by the exhaust gas pressure. For example a butterfly valve in the exhaust manifold is prohibited.

4.2.18) Driving belts and pulleys for ancillaries :
These are free, in number, location and design.

4.2.19) Gaskets :
Free.

4.2.20) Starter :
An electric starter must be present, its make and type being free; it must be capable of starting the engine at any time using energy stored on board.

4.2.21) Supercharging :
Supercharging is forbidden.

4.2.22) Fuel :
The fuel must be commercial petrol which comes from a service station pump, without any additive other than that of a lubricant on current sale. The fuel must be approved by the ASN and must have the following characteristics:
- 102.0 RON and 90.0 MON maximum, 95.0 RON and 85.0 MON minimum for unleaded fuel.
- 100.0 RON and 92.0 MON maximum, 97.0 RON and 86.0 MON minimum for leaded fuel.
The measurements will be made according to the standards ASTM D 2699-86 and D 2700-86.
- Specific gravity between 720 and 785 kg/m^3 at 15°C (measured according to ASTM D 4052).
- A maximum of 2.8 % oxygen (or 3.7 % if the lead content is less than 0.013 g/l) and 0.5 % nitrogen by weight, the remainder of the fuel consisting exclusively of hydrocarbons and not containing any power-boosting additives.
The measuring of the nitrogen content will be carried out according to the standard ASTM D 3228 and that of the oxygen content by elemental analysis with a tolerance of 0.2 %.
- Maximum content of peroxides and nitroxide compounds: 100 ppm (ASTM D 3703 or in the case of impossibility UOP 33-82).
- Maximum lead content: 0.40 g/l or the standard of the country of the event, if it is lower (ASTM D 3341 or D 3237).
- Maximum benzene content: 5 % volume (ASTM D 3606).
- Maximum Reid vapour pressure: 900 hPa (ASTM D 323).
- Distillation at 70°C: 10 % - 47 % (ASTM D 86).
- Distillation at 100°C: 30 % - 70 % (ASTM D 86).
- Distillation at 180°C: 85 % minimum (ASTM D 86).
- Maximum final boiling point: 225°C (ASTM D 86).
- Maximum residue: 2 % volume (ASTM D 86).
The fuel being accepted or rejected according to the standard ASTM D 3244 with a confidence limit of 95 %.
If the fuel available locally for the event is not of a sufficient quality for use by competitors, the ASN of the organising country must ask the FIA for a waiver in order to enable the use of fuel not corresponding to the characteristics defined above.

4.2.23) Only air may be mixed with the fuel as an oxidant.

4.2.24) Throttle control :
Only direct mechanical linkage between the throttle pedal and the engine is permitted.

4.3 Transmission

4.3.1) Clutch :
The clutch and its control are free but automatic operation of the clutch is not allowed and, in the case of a hydraulic clutch, the liquid tank must not be situated in the cockpit. The clutch must be activated by the driver's foot.

4.3.2) Gearbox :
Considering the following restrictions, the gearbox is free.
Gears must be selected by the driver via a direct, mechanical linkage system between the gear lever and the gearbox, (electric, hydraulic or pneumatic mechanisms are not permitted).
The maximum number of forward gears allowed is 6. Semi-automatic and automatic gearboxes are forbidden. The drive train concept, i.e. FWD or RWD must be retained.
A reverse gear must be retained and be operational at all times.
Additional oil pumps and coolers are allowed, but no aerodynamic benefits may be derived from them. Air ducts and mounting brackets under the car to these coolers and pumps

are allowed, but no aerodynamic benefits may be derived from them, and the external appearance of the car must remain unchanged; oil pumps, coolers and ducts must not protrude beyond the perimeter of the bodywork as seen from above. Oil coolers must be contained within the volume left free under the car when a template with an angle of 45° to the horizontal is introduced along the ground around the perimeter of the car touching the bodywork (see drawing 262-1). Gearbox supports are free. The gearbox location relative to the other transmission/drive train components must be retained, and it will have to remain in the half of the wheelbase in which it was originally located.
The making of a hole with a maximum diameter of 80 mm is authorised in order to allow the passage of the gearbox lever, but the assembly must be impenetrable by gases.
Continuously variable transmissions (CVT) are forbidden.

4.3.3) Final-drive assembly, differentials , prop-shafts and drive-shafts :
Free, subject to art. 4.3.2 and to the following:.
Differentials with any means of varying the slip characteristics, by either automatic (including electric, pneumatic and hydraulic) or manual means, other than those inherent in the mechanical arrangement, are forbidden. Viscous and hydraulic differentials are not considered to have hydraulic slip control, provided outside control is not possible when the car is in motion.
Any outside control of the differential is prohibited whilst the vehicle is in motion. However cooling and lubrication systems external to the differential are permitted provided that there is no potential for control.

4.3.4) Propulsion :
Traction control is forbidden.

4.4 Suspension

4.4.1) Type :
The generic type must remain the same as the homologated car.
Anti-roll bars, fitted to the homologated car, may be removed. Mechanically adjustable anti-roll bars are permitted and these may be adjusted from the cockpit.
The bars, their levers and linkages may pass through the luggage compartment, engine bay and wheel arches but only the adjustment cables or rods may pass through the cockpit.
The removal or the addition of anti-roll bars must not change the generic type of suspension. The competitor must submit to the FIA a scheme and explanation of the operating principle and design layout of the racing suspension showing that the generic type is respected, and receive written approval. All existing suspensions raced prior to 01.01.97 must be submitted through the ASN for automatic approval.

4.4.2) Pivot points :
The inboard points of all linkages, McPherson strut mounting points and spring and/or damper mounting points must lie within a sphere of radius :
- 20 mm for all points below the upper line of the wheel rim
- 75 mm for all points above the upper line of the wheel rim.

With its centre at the original equivalent point of the homologated car's suspension.
If the inboard pivot is a bearing of finite length, the pivot point is defined as the centre of the bearing element about which the link rotates.
The length / diameter ratio of an inboard suspension joint must not be greater than 2 or than that of the joint of the series homologated car, if this is greater than 2.
The length of the joint is defined as the length of the rolling element or the shortest sliding element.
The diameter is defined as the mean diameter of the rolling element or the maximum diameter of the sliding surface.
The position of the wheel rim relative to the body shell (or chassis) is as per the homologated car, when at its unladen static height.
Modifications to the shell (or chassis), to accommodate the changed position of pivot and mounting points, are limited to that necessary to provide clearance for suspension components, drive shafts, and wheel and tyre.
The type and material of suspension joints are free.

4.4.3) Materials :
The materials from which the suspension components are made, and their design, within the limitations of art. 4.4.1., is free, except that composite materials are not permitted.

4.4.4) Reinforcement :
Strengthening of the mounting points, suspension parts, and running gear is allowed.
Reinforcing bars on the suspension mounting points of the body shell (or chassis) may be installed as follows : the distance between the suspension attachment point and the attachment point of the reinforcing bar must not exceed 100 mm, unless the bar is a transverse, tensile/compression member homologated with the rollcage, or unless there is an upper bar attached to the top mounting of a strut suspension. In the latter case, the maximum distance between the attachment point of the reinforcement bar and the upper articulation point of the strut must not exceed 150 mm. The attachment points at not more than 100 mm/150 mm are the only points on or within the car to which the reinforcing bars are to be fixed.

4.4.5) Active systems :
Active systems that control any part or characteristic of the suspension or steering are not permitted, except power steering systems, as defined in art. 4.7.

4.4.6) Springs :
The front and rear spring types (coil, torsion bar, rubber, pneumatic, etc.), must retain the same principle as the respective spring types on the homologated car.The number of springs is free, provided that they can be fitted without any modifications other than those specified in these regulations. Combined coil spring/shock absorber units are permissible and may be used in conjunction with the original spring type subject to art. 4.4.7.
The material and main spring dimensions are free.
The spring seats may be made adjustable and include the addition of material.

4.4.7) Shock absorbers :
The number of shock absorbers fitted to each wheel suspension must be the same as the homologated car.
The make and type are free.
It is permissible to replace the strut, including spring seats, of a strut type suspension with another make or type but this must not result in a change of working principle.

4.4.8) Adjustment of springs and/or shock absorbers :
The adjustment of springs and/or shock absorbers from inside the car is not permitted.

4.5 Wheels and tyres

4.5.1) The maximum width of the complete wheel is of 9 inches; the complete wheel diameter is not to exceed 650 mm.
The front track, measured at the widest part of the complete wheel, in the straight ahead position at static ride height, must be within the following limits :
- minimum: the homologated front bodywork width
- maximum: the homologated front bodywork width + 2%.

The rear track, measured at the widest part of the complete wheel at static ride height, must be within the following limits :
- minimum: the homologated rear bodywork width
- maximum: the homologated rear bodywork width + 2%.

The complete wheel above the hub centre-line must be able to be housed within the wheel arch. No part of the stub axle or hub assembly is permitted to extend beyond the outside plane of the complete wheel.
The internal arch may be modified minimally to accommodate the complete wheel (diameter 650 mm) as long as it does not affect the structural integrity of the vehicle does not contravene art. 4.4 and allows the normal operation of the suspension, transmission and steering, with no possible contact between the wheel and the wheel arch.
For those parts of the inside of the wheel arch which may be changed in this way, the material shall be free within the same family (steel remaining steel, plastic remaining plastic). Plastic components may be changed to composites.In order to achieve a minimum steering lock of +/- 15 degrees without the complete wheel fouling the fender it is permitted to modify the fenders as follows :
The aperture of the front fender may be increased by removing material up to a maximium radius of the maximum permitted radius of the tyre +20mm (i.e. 345mm), measured at the wheel hub centre. It is permitted to blend this radius to the existing aperture using a line tangent to both curves (see drawing 262-8). It is permitted to stretch the remaining panel, or re-manufacture or add material (provided it is in the same material and of the same thickness as the original) to achieve the

maximum allowable width, in order that the fender covers the complete wheel.
To achieve cosmetic sympathy with the front , it is permitted to modify the aperture of the rear fender in a similar fashion, excepting that the maximum height of the aperture is 80% of the maximum radius of the front aperture.
The fender modification must be homologated as part of the aero package.
All measurements permitted in this article will be taken in race condition without the driver on board.
Where the inner wheel arch is adjacent to the inner rear door skin, it is permitted to modify this door skin if the wheel arch has been modified in accordance with this article.
4.5.2) Wheels :
The design and diameter are free, as is the type of attachment, but wheels made partially or entirely from composite materials are prohibited. If the wheel is of the centre lock type using a central nut, then a safety spring must be in place on the nut at all times during the event. These springs must be painted "dayglo red" and each car must have spare springs available at all times.
4.5.3) Ground clearance :
At any time during an event no part of the car must touch the ground when both the tyres on one side are deflated.
A test may be carried out on a flat surface, in race trim, with the driver on board.
Any system or device that enables the control of the ride heights of the car, while the car is in motion, is forbidden.

4.6 Brakes

4.6.1) Drum brakes must be changed for disc brakes. Brake fluid tanks must not be situated in the cockpit.
4.6.2) Brake calipers :
All brake calipers bodies must be made from aluminium materials with a modulus of elasticity no greater than 80 Gpa.
4.6.3) Brake discs :
No more than one brake disc is permitted on each wheel.
Brake discs must be made from a ferrous material.
4.6.4) Brake linings :
Material, dimensions and mounting method are free.
4.6.5) Brake servos and brake pumps are free.
4.6.6) Brake cooling :
Only air may be used to cool brake discs and pads.
It is permitted to use closed loop liquid cooled calipers.
At the front: The openings homologated with the front aerodynamic device may be used, as may those corresponding to the holes for the additional headlamps in the original front face. From these openings, flexible ducts to bring the air to the brakes of each wheel are allowed, but its cross-sectional area must total less than 80 cm^2 per wheel and the maximum dimension less than 25 cm. The air ducts must not protrude beyond the perimeter of the car seen from above.
At the rear: Flexible ducts to bring the air to the brakes of each wheel are allowed, but its cross-sectional area must total less than 80 cm^2 per wheel and the maximum dimension less than 25 cm. The air ducts must not protrude beyond the perimeter of the car seen from above, and the air intakes must be situated within the rear half of the wheelbase of the car.
4.6.7) Handbrake :
Free.
It is permitted to install a single solenoid which operates equally on both wheels on either the front or rear axle controlled by a simple on-off switch which has no possibility of adjustment by the driver.
4.6.8) Hydraulic lines :
Hydraulic lines may be replaced by lines of aircraft quality.
4.6.9) Brake modulation :
Anti-lock brakes are forbidden.
The balance of the braking forces between the front and rear axles may only be adjusted by the driver through :
- direct intervention on the position of the centre of the joint, on the linkage lever of the hydraulic pumps of the front and rear circuits.
- direct intervention on a proportional valve, in which the intake pressure of the rear circuit is adjusted through a pre-loaded spring, variable according to the position of the manual linkage system (see the drawing of the principle 262-9).
Only one of these two systems is permitted.
All other systems are prohibited, including inertial mechanical systems.
In other words, no type of pneumatic, additional hydraulic, electric or electronic control (analogue and digital) may be connected to the braking system (e.g. simple electric switches, solenoid valves, etc). Apart from the manual adjuster mentioned above, the front and rear braking circuit must have fully closed lines without the possibility of modulating the braking pressure on one side or the other.

4.7 Steering

Free on condition that the type of steering fitted to the homologated vehicle is retained and that the steering mechanism only operates the front wheels and provided art.4.5.1 is respected. The steering wheel must be fitted with a quick release mechanism. Its method of release must be by pulling a concentric flange installed on the steering column behind the wheel. Power steering may be disconnected removed, or added, but the power steering pump must not be placed in the cockpit.
The anti-theft steering-lock device must be made inoperative.
The steering may be either right or left-hand, provided this is achieved by a simple inversion of the steering wheel controls, specified and supplied by the manufacturer, without any other mechanical modifications except those made necessary by the inversion.
A limited cutting of the bulkhead is permitted for the passage of a new steering column (see art. 4.8.4.2), with no deformation of this bulkhead.
Power steering systems which do anything other than reduce the physical effort required to steer the car are not permitted.

4.8 Bodywork - Bodyshell

4.8.1) Lightening and reinforcement :
All bodywork panels of the vehicle must be of the same shape, material and thickness (thickness tolerance ±5%) as the original homologated car. Strengthening of the bodyshell and bodywork is allowed provided that the material used is the same as the original material, follows the original shape, is in direct contact with it, and that the original material is fully preserved under the reinforcement.
Subframes may freely be removed or changed and further attachments may be added. The use of composites for these components is not permitted.
New supports and mounting brackets may be added as required subject to art. 4.4. Insulating material may be removed from under the car floor, from the engine compartment, the luggage boot and the wheel arches. Unused supports (e.g. for spare wheel) situated on the bodyshell/bodywork may be removed.
When the upper and lower front cross-rails are welded at both ends to the shell, they may be made detachable.
In so far as it affects driver protection in the event of an accident, the frontal impact, energy absorbing performance of the car must be unaffected by any modifications made to it. If parts of the structure that influence the energy absorbing performance (including bodyshell longtitudinals, cross frames and subframes) are removed or modified, justification for the modifications, showning that the overall structure's performance is equal to that of the series production car, or improves upon it must be submitted to the FIA for approval and homologated by the manufacturer.
4.8.2) Any holes in the cockpit, engine bay and luggage compartment, must be closed in such a way as to prevent the passage of fluid or flame. The use of adhesive tape on the exterior surface of the car is prohibited, except for the use of decals which must not cover, even partially, any hole and/or gap.
4.8.3) Exterior :
4.8.3.1 - Except in the case of explicit allowance by this regulation, all external bodywork must remain as on the original homologated vehicle.
It is permitted to close air intakes and exhausts, joints in front bodywork and aerodynamic device a minimum 10 mm behind the exterior surface of the opening.
4.8.3.2 - The front bumper may be incorporated into the homologated front aerodynamic device, subject to the restrictions thereof. The cutting of the bumper, limited to what is strictly necessary, will be authorised for access to the towing eye. The interior reinforcements of the bumpers may be removed, and the means of attaching the bumpers is free.

It is authorised to reduce the plastic edges of the bumpers when they protrude inside the wheel housing in accordance with article 4.5.1 and drawing 262-8.

4.8.3.3 - Windscreen wipers and washers :

The wiper is free but it must be operational and clear the screen directly in front of the driver. The capacity of the washer tank may be increased and it may be moved in position or removed.

4.8.3.4 - External decorative strips and mud flaps may be removed.

4.8.3.5 - Jacking points may be strengthened, moved and increased in number.

4.8.3.6 - Registration plates and registration plate mountings may be dismounted as well as their lighting system.

4.8.3.7 - Windows may be replaced with components made from polycarbonate or a glass polycarbonate composite. The windscreen, if replaced with polycarbonate, must be hardcoated, and appropriately marked. The minimum thickness for polycarbonate windows is : front screen 6mm, rear screen 4mm, side windows 3mm. Additional safety fastenings for the windows may be fitted provided that they do not improve the aerodynamic qualities of the car.

These additional safety fastenings must be situated at the edges of the glass or polycarbonate where it meets the bodywork. "Nascar" style supports through the glass or polycarbonate are not allowed.

The window opening mechanisms are free.

4.8.3.8 - The fitting of any underbody protection is prohibited except for undertrays installed as original equipment on the homologated car. If they are in contact with the external airstream, the engine and gearbox supports must be perforated with 50 mm diameter holes with centres 150 mm apart.

4.8.3.9 - The plastic sound-proofing parts may be removed from the interior of the wheel bays (see also art. 4.5.1).

4.8.3.10 - Pneumatic jacks are permitted, but compressed air bottles are not to be carried on board.

4.8.3.11 - "Skirts" are banned. All non-homologated devices or constructions designed so as to fill, fully or partially, the space between the sprung parts of the car and the ground are forbidden in all circumstances.

4.8.3.12 - It is authorised to remove or replace existing supports between the bodywork and the bodyshell, but it is not possible to change or add locations.

4.8.3.13 - Aerodynamic devices: Only homologated devices may be used, fitted, in their homologated positions throughout the duration of the event. Furthermore, if a front device and a rear device are homologated together, on the basic form or on a variant, they must be used simultaneously, as variations or different combinations are not permitted.

The front aerodynamic devices must have no radiators visible from outside the car. The original non-structural parts covered by the front device may be removed.

At no time during the event may the lowest point of the front device be situated less than 45 mm from the ground.

The rear aerodynamic device must be situated entirely, including its supports, with it's trailing edge between two vertical planes perpendicular to the longitudinal centre-line of the car situated 100 and 120 mm ahead of the rearmost point of the car.

4.8.3.14 - External rear-view mirrors: The reflecting part may be replaced with another possessing the same qualities of reflection and of which the basis is composed of plastic. The electrical defrosting and adjustment systems may be removed.

4.8.3.15 - Hang on body panels: All parts of the bodywork which are licked by the external airstream and are movable in relation to the bodyshell (i.e. the boot-lid, bonnet, doors, sun roof, tank filler flap) must be in the fully-closed-position at all times while the car is in motion under its own power.

The fully-closed-position of these parts relative to the bodyshell must be exactly the same in the homologated production car.

4.8.4) Cockpit :

4.8.4.1 - Seats :

The driver's seat must be homologated by the FIA (standard 8855-1992 or 8855-1999), with an extension padded with energy-absorbing and non-inflammable material around the driver's head, and must not be modified. It is recommended that the seat attachments should be homologated on the car's form. In this case, these attachments must be used. The seat must include a head-restraint. Its dimensions must be such that the driver's head with its helmet is retained and cannot move past it under rearward acceleration, or be trapped between the roll-over bar and the head restraint. It is recommended that the distance between the sides of the head restraint should not exceed 400mm and that there should be a minimum of 20mm of energy absorbing material on either side. The driver's seat may be moved backwards, but not beyond the vertical plane defined by the front edge of the original rear seat. The limit is formed by the rearmost point of the driver's shoulders. Lateral positioning as close as possible to the longitudinal centre-line of the car is recommended, but at the level of the "H" point the driver's seat must be situated entirely to one side of this centre-line (drawing n° 262-6). Passengers' seats are to be removed to reduce combustible material.

4.8.4.2 - Dashboard :

The trim situated below the dashboard, and which is not part of it, may be removed. It is also permitted to remove the part of the centre console which contains neither the heating nor the instruments. The limited cutting of the dashboard is permitted for the passage of the gear lever and steering (see drawing 255-7). If moved towards the driver, the instruments must be contained in a housing which is an extension of the original instrument binnacle.

4.8.4.3 - Doors :

On the condition that the original bodywork is respected, the door locking system may be modified.

It must be possible to remove the doors completely from the car without the use of tools.

All door interior-trim and sound-proofing material may be removed and replaced with panels of non-combustible material (e.g. aluminium carbon and/or aramid based composites) in order to obscure the door and window mechanisms.

Driver's side:

The inside of the front doors on the driver's side must be filled with energy-absorbing material, the reinforcement bars positioned inside the doors, together with the interior trim and the sound-proofing material, may be removed.

4.8.4.4 - Roof :

All padding, insulating material and roof lining are to be removed from the underside of the roof. Sun roofs are not permitted. Therefore, a sun roof may be riveted or welded, on condition that it is integrated into the structure of the car. A glass sun roof may also be replaced with a metal sheet if the thickness of the metal is the same as for the rest of the roof.

4.8.4.5 - Floor :

Insulating and padding materials and carpets are to be removed. For cars with rear-wheel drive, part of the floor may be displaced within a maximum volume of 30 dm^3 and a maximum height of 20 cm, in relation to the original floor.

Floors made from composite materials may be fitted to the driver's and passenger's side of the cockpit between the front bulkhead (but not on it) and the front of the rear seat as defined in Art. 255.5.7.3.1. These floor panels must be retained by attachments no larger than 5mm with a minimum of 150mm between each attachment point. Bonding to the shell is prohibited

4.8.4.6 - Any other padding and interior trim may be removed.

4.8.4.7 - The cockpit heating system may be removed.

4.8.4.8 - Air conditioning may be added or removed.

4.8.4.9 - Pedals :

Pedals are free, and their installation may entail a limited cutting of the engine/cockpit bulkhead, but there must be no deformation of this bulkhead. The pedals may be either right or left provided this is achieved by a simple inversion of the pedals controls, specified and supplied by the manufacturer, without any other mechanical modifications except those made necessary by the inversion.

4.8.4.10 - The removable rear window shelf in two volume cars may be removed together with its supports.

4.8.4.11 - Air pipes :

Air and ventilation pipes may pass through the cockpit if these are intended for the ventilation of the cockpit or air jacks, or if they meet safety criteria in Art: 253.3.2.

4.8.4.12 - In addition to the outside rear-view mirrors, rear vision must be ensured by an inside mirror commanding the rear window completely.

4.8.5) Additional accessories :

All those which have no influence on the car's behaviour are allowed, e.g. equipment which improves the aesthetics or comfort of the car interior (lighting, radio, etc.). In no case are these accessories permitted to increase the engine power or influence the steering, transmission, brakes or road holding, even in an indirect fashion. All controls must retain the role laid down for them by the manufacturer. They may be adapted to facilitate their use and accessibility, e.g. a longer hanbdbrake lever, an additional pad on the brake pedal, etc.
The following are allowed:
1 - All windows with the exception of the rear side windows must be capable of being demisted.
2 - Measuring instruments such as speedometer, etc. may be installed, replaced, or removed. In this last case the original holes must be sealed.
Data logging/time-keeping equipment, including the necessary sensors, may be fitted outside the field of view of any on-board camera.
3 - The horn is not compulsory.
4 - Circuit breakers and switches on the dashboard may be freely changed, on condition that the original shape and appearance of the dashboard remain the same.
Circuit breakers may be freely changed regarding their use, position or number in the case of additional accessories.
5 - Insulating material may be added to the existing bulkheads to provide additional protection for the driver from fire.
6 - It is authorized to replace the boot and bonnet hinges with ones of an alternative design provided the fit of the boot and bonnet is not compromised in any way and that the replacement hinges serve no other function. It must be possible to open the boot and bonnet without the use of tools.

4.8.6) Towing eye :
The towing eye must have a hole of minimum dimensions of 25 x 40 mm, situated 25 mm forward of the adjacent bodywork. Along 100 mm above and below this hole, there must be a clearance to enable the recovery crews to attach straps and shackles. The inner part must be flexible or deformable in order to be retractable in the bodywork.

4.9 Electrical system

4.9.1) The nominal voltage of the electrical system, including that of the supply circuit of the ignition, must be retained.
Relays, circuit breakers, fuses and cables are free.

4.9.2) Battery :
The make, number and capacity of the batteries are free. Each battery must be securely fixed and covered to avoid any short-circuits or leaks. The location of each battery is free, however if in the cockpit it will only be possible behind the front seats or, failing this, at the side of these seats. In this case, the protection box must include an air intake with its exit outside the cockpit (see drawings 255-10 and 255-11). Should the battery be moved from its original position, it must be attached to the body using a metal seat and two metal clamps with an insulating covering, fixed to the floor by bolts and nuts.
For attaching these clamps, bolts with a diameter of at least 10 mm must be used, and under each bolt, a counterplate at least 3 mm thick and with a surface of at least 20 cm^2 beneath the metal of the bodywork.
The battery, if it is not of the dry battery type, must be covered by a leak proof plastic box, attached independently of the battery (see drawing 255-11).

4.9.3) Generator and voltage regulator :
Free, including position and drive system.

4.9.4) Lighting and indicating :
All lighting and signaling devices, as homologated, must be operational (with the exception of the number-plate lights, reversing lights, front fog lights, high-level brake lights and side repeaters) in order to preserve vehicle identity. The make of the lighting devices is free. Original headlights may be replaced by others having the same lighting functions as long as there is no cutout in the bodywork, the original holes are completely closed, and the shape of the headlights and their operation remain unchanged. The operating system of the retractable headlights, as well as its energy source, may be modified. If a reversing light is operational, it must only operate when reverse gear is selected. Fog lights may be removed and the subsequent apertures must be blocked off if they are not used according to art. 4.6.6.
The headlamps must be capable of providing effective illumination.

4.10 Fuel circuit:

4.10.1) The fuel tank must be replaced by one or several safety fuel tanks homologated by FIA (specification FT3 or FT3 1999). Each tank must be placed inside the luggage compartment, or in its original location, provided that it is not in the cockpit. It is permitted to make holes in the bottom of the luggage compartment to allow the refueling pipes to reach the tank if this is situated beneath the luggage compartment.
The construction of collector-tanks with a capacity of less than 1 litre is free. A fluid/flame-proof bulkhead is to be installed between the tank compartments and the cockpit, and if needs be, suitable protection provided for the supplementary accessories (refueling orifice, petrol pump, overflow pipe). The changes of the position of the tanks should not give rise to any lightening or reinforcement other than provided for under this article and art. 4.8.1. In the case of a fuel tank being fitted below the floor of the car, it must be contained in a close fitting flame proof housing that adds no aerodynamic advantage and has no other mechanical function. This housing must include a crushable structure as defined for F3 fuel tanks and be secured using a minimum of two metal clamps 30 mm x 3 mm, fixed to the floor pan by bolts and nuts. For attaching these clamps, bolts with a diameter of at least 10 mm must be used, and under each bolt a counterplate at least 3 mm thick and with a surface of at least 20 cm^2 above the metal of the floor pan. The opening remaining after the removal of the original tank may be closed by the installation of a panel of the same dimensions as the fuel tank aperture.
Where the exhaust system passes through a fuel tank, the entire exhaust system must be visible from directly underneath the car.The position and the dimension of the filler hole, as well as that of the cap may be changed as long as the new installation does not protrude beyond the bodywork, and is effected in such a way that no fuel will leak into the interior compartments of the car. If the filler hole is situated inside the car, it must be separated from the cockpit by a liquid-tight protection.
Fuel lines are permitted through the cockpit, on condition that they are protected with a liquid-tight and flame proof cover, or comply with Art. 253.3.2.
It is permitted to fit a radiator in the fuel circuit.
The total capacity of the fuel tanks must not exceed 100 litres.

4.10.2) All cars must be fitted with a self sealing connector which can be used by the scrutineers to obtain fuel from the tank. This connector must be of a type approved by the FIA.

4.11 General prescriptions and safety

4.11.1) Cars must comply with the following requirements of Appendix J, article 252 - General Prescriptions and article 253 - Safety, as published in the FIA Yearbook and Sporting Bulletin, and which are not already covered in these regulations:
- 252.1.1 Prohibited modifications
- 252.1.3 Magnesium
- 252.2.2 Ballast
- 252.6 Wheels
- 252.9.4 Refueling procedure
- 252.9.5 Tank ventilation
- 253.1 Dangerous car
- 253.3.1 Protection of lines
- 253.3.2 Specifications and installation of lines
- 253.3.3 Automatic fuel cut-off
- 253.4 Braking safety system
- 253.5 Additional fasteners
- 253.6 Harness
- 253.7 Extinguishers
- 253.8 Safety cage: must be homologated by the FIA for any car built after 01.01.97.
- 253.10 Towing eye
- 253.11 Windows / Nets
- 253.13 General circuit breaker
- 253.14 FT3 or FT3 1999 tank
- 253.15 Protection against fire
- 253.16 Seat attachments and supports
- 253.17 Pressure control valves

4.11.2) Moreover, safety cages must comply with the following measures :

- They must be described on the car's homologation form (art. 253.8.5 of Appendix J).
- The tubes close to the driver must be padded with CF 42 or CF 45 "Confor" foam, or with foam of the "KOLBERMOOR Oldopur 1000" type. This foam must not be inflammable.
- Energy-absorbing material must be placed between the tubes on the side of the cage, to the front and to the rear on the driver's side (see drawing n° 262-5). This material must be installed mechanically, ensuring that the cage remains intact, without piercing, bonding or welding, and must not be inflammable.
- Panels of energy-absorbing material must be placed between the cage and the front and rear doors on the driver's side, and between the cage and the seat on the driver's side. This material must not be inflammable.

It is prohibited to place parts between these panels and the seat.
The lateral protection of the driver's seat must be homologated.

4.11.3) The safety harness shoulder straps homologated içn accordance with the FIA standard 8853 or 8854 must be 76 mm (3") wide.

4.11.4) The cockpit must be designed so as to allow the driver to get out from his normal driving position in 7 seconds through the driver's door and in 9 seconds through the passenger's door.

For the purposes of the above tests, the driver must be wearing all normal driving equipment, the seat belts must be fastened, the steering wheel must be in place in the most inconvenient position, the doors must be closed and the door nets in place.

ARTICLE 5 : FINAL TEXT

The final text for these regulations shall be the English version which will be used should any dispute arise over their interpretation.

Appendix 1 : Computer systems

All reprogrammable computers used on a car should have an upload mechanism that allows scrutineers to take a copy of all programmed memory areas and selected data memory areas.

The scrutineer will use a standard "IBM compatible" laptop computer running the Windows 95 operating system. Teams (or equipment suppliers) must provide cabling, interface equipment and communication software that matches these requirements. The FIA will provide procedural programs, manuals and training to local scrutineers.

"Selected data memory areas" will be specific to particular units and are to be decided in consultation with the FIA.

The mechanism chosen should be from an FIA approved list. Any other methods will be given individual approval - The system must give a complete and true upload and be simple to use.

The FIA will examine in detail all the software used on the car and the lap top computer in order to establish that the upload mechanism has been implemented correctly.

There will be an option to check that the uploaded program area is equivalent to a previously inspected and approved software version. In this case, the FIA must examine every computer program prior to use on a car.

Very small computers and some categories of programmable silicon devices may be exempted from the upload requirement provided the supplier can demonstrate to the satisfaction of the FIA that they can not be reprogrammed by the team.

The approved upload mechanisms are :
Direct copying via PCMCIA memory cards.
Cable connection by serial link with communication using the Z modern protocol.
Cable connection via parallel, CAN or ethernet link. Communication software to be individually examined.

Units with programs held in volatile memory will be subject to extra checks. In this case, the car should also provide a computer power reset switch which forces such units to clear the volatile memory.