Regulations of the
2005 World Solar Challenge

0305

1. Scope & Application

1.1 These regulations apply to the 2005 World Solar Challenge (the Event), which comprises participants' application, pre-event preparation, scrutineering, testing, on-road components and associated activities.

1.2 All persons and groups accepted to participate in the event are assumed to know these regulations and their participation in the event will constitute an acceptance of them.

1.3 The event will be conducted by these regulations and any further regulations that may be issued.

1.4 The event is recognised by the International Solarcar Federation (ISF).

2. Event Title

2.1 The name: The World Solar Challenge® is the "Correct Title" of the Event.

2.2 If a "Naming Rights" sponsor is signed, the "Correct Title" of the event may become the "(sponsorship name) World Solar Challenge".

2.3 Entrants shall use the "Correct Title" in all references to The Event.

3. Entrants & Eligibility

3.1 The Entrant is the legal entity completing the Participation Agreement.

3.2 Eligible Vehicles will be those described in the Technical Regulations.

3.3 The Entrant must register all vehicles used by the team, with the organisers (see note 1).

3.4 The Entrant must register all members of its team with the organisers (see note 1).

4. Organiser

4.1 Australian Major Events
World Solar Challenge
GPO Box 1972
Adelaide 5001
AUSTRALIA
Telephone: +61-8-8463 4690
Facsimile: +61-8-8463 4718
E-Mail: wsc@saugov.sa.gov.au

4.2 Organising Committee:
Chris Selwood, Brian Scholz, Dr David Rand. et. al.

4.3 Stewards of the Event:

The Stewards of the event shall be appointed by the organising committee, and represent a cross section of international participation.

Australia: Mr John Ward, MSc; Europe: Dr Ivor Grayson-Smith (US/Japan t.b.a.)

4.4 Senior Officials:

4.4.1 Event Director - Chris Selwood

4.4.2 Clerk of the Course - Brian Scholz

4.4.3 Assistant Clerks of the Course - Graham Jackson, David Kitching, Tony Scholz

4.4.4 Chief Scrutineer – Dr Paul Gwan

4.4.5 Chief Battery Scrutineer – Dr David Rand

4.4.6 Chief Safety Officer – Peter Schloithe

4.4.7 Chief Medical Officer - Dr Bill Boyd

4.4.8 Chief Timekeeper – Mr Barry Frost

4.5 Date and Venue of the Event

4.5.1 The event will commence with scrutineering on 22 September 2005.

4.5.2 The event is to commence in Darwin, NT and conclude in Adelaide, SA.

4.5.3 Pre-event scrutineering commences - 22 September 2005.

4.5.4 Qualifying track event, stability and brake tests - 24 September 2005.

4.5.5 Pre-event briefing - 24 September 2005.

4.5.6 Start of on-road component - 25 September 2005.

4.5.7 Presentation of Awards – 2 October 2005, Adelaide.

4.6 Entries

4.6.1 Applications for participation may be made by Entrants with eligible vehicles.

4.6.2 Applications are open with the issue of these regulations.

4.6.3 Applications must be made on the approved form and signed by the Entrant.

4.6.4 The Organisers reserve the right to accept or reject any entry at their discretion. No correspondence will be entered into.

4.6.5 Every Entrant must complete a participation agreement.

4.6.6 The (Solarcar) field will be limited to thirty (30) vehicles.

4.6.7 Entries received after the thirty (30) solarcar maximum may be put on a reserve list.

4.6.8 Entries may be invalidated if payments are overdue.

4.6.9 Entries close 30 June 2005.

4.6.10 Vehicle and battery data sheets must be lodged by 1 July 2005

4.7 Change of Entry Details

4.7.1 An Entrant may change the specification of the vehicle or drivers up to the scheduled time of scrutineering, providing such changes are notified in writing. No guarantee is given that changes will appear in printed lists.

4.7.2 Once a vehicle and its drivers have passed scrutineering, no changes will be permitted.

4.7.3 The Organisers reserve the right to determine the class of any vehicle.

4.8 Entry Fee

4.8.1 Entry fees are payable as described in the schedule.

4.8.2 The South Australian Tourism Commission will issue invoices on behalf of the World Solar Challenge.

4.8.3 All invoices are payable by the date shown thereon.

4.8.4 Any outstanding financial matters must be finalised before the start of the event

4.9 Financial

4.9.1 The South Australian Tourism Commission will issue invoices on behalf of the World Solar Challenge.

4.9.2 All invoices are payable by the date shown thereon.

4.9.3 Any outstanding financial matters must be finalised before the start of the event.

4.10 Amendments to the Regulations

4.10.1 These Regulations may be amended by the issue of further regulations.

4.11 Interpretation of Regulations

4.11.1 The Stewards of the Event are the only authority empowered to make a decision on the interpretation of these Regulations.

4.12 Route

4.12.1 The Event shall be conducted on public roads between Darwin, Northern Territory and Adelaide, South Australia, a distance of approximately 3,010 km.

4.13 Authority to be on Public Roads

4.13.1 Authority to use public roads as a participant in the World Solar Challenge will be granted by the road traffic authorities of the Northern Territory of Australia. All entrant vehicles successful in scrutineering will be issued with a conditional certificate of registration and must comply with the provisions thereof.

4.13.2 Solarcars will be issued with a licence plate which must be displayed on the vehicle in such a manner as to be visible from the rear. (size of plate is 215mm x 97mm)

4.13.3 All vehicles associated with the event shall comply with all road traffic laws (see note 25).

4.13.4 All vehicles associated with the event shall be driven in a careful and courteous manner at all times.

4.13.5 Each team must, during the course of the event, have the means of transporting the solarcar and all associated equipment.

4.14 Drivers/Passengers

4.14.1 The minimum number of solarcar drivers is two and the maximum number is four. Two seat cars may register up to four passengers in addition to the drivers.

4.14.2 The official mass of each solarcar driver/passenger, as weighed at scrutineering, shall be 80 kg, including driving clothes.

4.14.3 If the mass of the driver/passenger is less than 80 kg, ballast will be added to make up the difference.

4.14.4 No credit will be given if the driver/passenger weighs more than 80 kg.

4.14.5 Correct ballast must be carried in the vehicle when driving.

4.14.6 Observers will check that the correct ballast is in place at each driver change.

4.14.7 Ballast provided by the competitor will be subject to approval at scrutineering.

4.14.8 Additional ballast may be provided by the organisers.

4.15 Drivers and Entrants Qualifications

4.15.1 At scrutineering, all solarcar drivers must present a current and valid motor vehicle driver's licence recognised by Australian authorities.

4.15.2 All drivers shall have a minimum experience of 10 hours driving the solar car on public highways (see note 7).

4.15.3 Only the nominated drivers may drive during competition hours.

4.15.4 Any participant under the age of 18 shall be duly vouched for (see note 20).

4.16 Administrative Checking

4.16.1 Place: Royal Darwin Showground (Foskey Pavilion).

4.16.2 Date and Time: Thursday 22 September 2005 from 0800 hours.

4.17 Pre-Event testing (see note 3)

4.17.1 The Event will arrange facilities for track testing in Darwin from 91 – 23 September 2005

4.17.2 Registered entrants must not drive their solar cars on the Stuart Highway in the Northern Territory between 1 September 2005 and the start of the event.

4.18 Scrutineering

4.18.1 Scrutineering will take place at the Royal Darwin Showgrounds (Foskey Pavilion) and Hidden Valley Motor Sport Complex and such other place and time as the Clerk of the Course may direct.

4.18.2

Thursday 22 September 2005	0800 to 1800 hours
Friday 23 September 2005	0800 to 1800 hours
Saturday 24 September 2005	0700 to 1500 hours (Hidden Valley only)

4.18.3 Specific scrutineering times for each team will be posted on the Official Noticeboard at the Foskey Pavilion at 1600 hrs on Wednesday 21 September 2005.

4.18.4 All entrant vehicles are required to present at the set time from 22 September, in Darwin, in a READY TO START condition. Scrutineers will examine the vehicles to ensure they conform to these regulations.

4.18.5 If a vehicle arrives late for scrutineering, the Team may incur a fine of AU$220.00 and may be demoted to reserve status.

4.18.6 Any vehicle failing scrutineering may be re-presented at the discretion of the Chief Scrutineer.

4.18.7 No vehicle will be allowed to start the event until it has passed scrutineering.

4.18.8 Speed, stability and brake testing forms part of the scrutineering process and will be conducted at Hidden Valley Raceway on Saturday 24 September 2005 between 0700 and 1500 hours.

4.18.9 Front and rear Escort Vehicles (detailed in reg. 6.4) shall be presented for inspection at the same time as the solarcar, or such other time as directed by the Clerk of the Course.

4.18.10 Unfair Practice: Exclusion will occur if the Organisers discover that an Entrant has deliberately violated these Regulations to gain unfair advantage over other entries, or departed from the spirit of the competition.

4.19 Grid Positions

4.19.1 Grid position will be determined by performance at the speed trials.

4.20 Compulsory Signs

4.20.1 The organisers shall supply signs that carry event and event sponsor logos.

4.20.2 Unbroken, rectangular spaces, 200mm in height x 500mm in width must be provided on the right and left sides of the competing vehicle.

4.20.3 These signs must be displayed on the solar car at all times and in such a way that they are clearly visible to a person standing 5m from the car.

4.21 Competition Numbers

4.21.1 Cars will be allocated numbers upon receipt of entry.

4.21.2 Special requests for the use of particular competition numbers may be submitted. Allocation is at the sole discretion of the Organisers.

4.21.3 Competition numbers must be in an area of at least 200mm x 200mm and be clearly displayed on each side of the solar car.

4.21.4 Competition numbers shall be in contrasting colours to their background and acceptable in every way to the Chief Scrutineer.

4.21.5 Competing vehicles must carry the national flag of the country of entry, fixed adjacent to the windscreen. Minimum size 70mm x 40mm.

4.22 Advertising Signs

4.22.1 Advertising signs are permitted on any vehicle. Signs and lettering must not be of an offensive nature.

5. Insurance Cover

5.1 All Entrants will be covered by the Organiser's Public Liability policy.

5.2 The cost of Third Party Bodily Injury insurance plus Motor Third Party Property insurance is the responsibility of the Entrant.

5.3 The organisers will arrange for all team members to be covered by personal accident and ambulance cover. The arrangements for this will be advised in Further Regulations.

5.4 Comprehensive vehicle insurance is the responsibility of the entrant.

NB The additional insurance covers as described in 5.2 and 5.3 are compulsory for all entrants. The Organisers will arrange this cover. Payment of any insurance premium will be the responsibility of the entrant, and will be invoiced on or after 1 July 2005.

6. Conduct of the Event

6.1 The Start Line: The on-road component of the event will start on the Esplanade, Darwin. Time: 0800, Sunday 24 September 2005.

6.1.1 All vehicles must be in place by 0630 hours in starting grid position for final scrutineering. Any vehicle not present will be required to start from the rear of the grid.

6.1.2 The starting grid will be classed as *'parc ferme'* between the hours of 0645 and 0745 or such other time as the Clerk of the Course may nominate (see note 21).

6.1.3 Two (2) team members must stay with the car during this time to assist officials with inspections.

6.1.4 The Organisers reserve the right to change the time and/or place of the start.

6.2 The Course

6.2.1 The event shall be conducted over a single stage, on public roads, predominantly being the Stuart Highway between the cities of Darwin and Adelaide.

6.2.2 The selection of overnight stops shall be the responsibility of the Entrant.

6.2.3 At overnight stops, the solar car and all other vehicles must be parked in such a manner that they, and all and any team activities, are conducted a minimum of 10 mtr from the edge of the road.

6.2.4 If the Entrant's overnight camp is not immediately adjacent to the road, a marker cone must be placed on the roadside adjacent to the entry leading to the camp.

6.2.5 All vehicles will run to the same daily time schedule and will be required to complete the full course.

6.2.6 All detour signs erected by the civil authorities must be observed and the correct route rejoined at first opportunity. The organisers may change the course at any time.

6.3 Control Points

6.3.1 Control Points will be established at intervals along the route.

6.3.2 Control Points may or may not be disclosed.

6.3.3 All vehicles will be required to stop at control points and will be held by the control-point manager for 30 minutes. The Clerk of Course may direct any additional penalty time to be taken at a control point.

6.3.4 Observers may be changed and vehicles scrutinised at any time.

6.3.5 It is the responsibility of the team manager to check whether any updated information is available from the control point manager.

6.3.6 Teams must obey the directions of the control point manager.

6.3.7 During control point time, teams may perform basic safety and maintenance tasks with the agreement of the Control Stop Manager (see note 4).

6.3.8 No repairs or maintenance tasks, which involve dismantling or substitution of vehicle components, are to be undertaken (this provision includes wheel changing).

6.3.9 With the exception of those associated with a hand held multimeter, no cables may be connected to the solar car for any reason whilst the solar car is held at a control point (see note 5).

6.3.10 Control Points will be opened in time to accommodate the leading vehicle, and remain open during competition hours. Closing times will be calculated on the minimum speed required to remain in the event (see B.12.1) rounded to the next nearest full hour.

6.3.11 Any team arriving at a closed control point must reach the next control point whist it is open. Any team missing (or for whom it is clear will miss) two consecutive control points should contact the Clerk of the Course.

6.3.12 The Clerk of the Course may direct a team to trailer their solar car forward to an open control point.

6.3.13 Any team that has trailered their solar car forward may only rejoin the route under the direction of the Clerk of the Course.

6.3.14 Any team that has trailered their solar car forward may not rejoin the route in front of any team who has not trailered.

6.3.15 Trailering may only occur during competition hours.

6.3.16 Teams who have not completed the full course will be listed in order of km covered.

6.4 Escort Vehicles

6.4.1 Each solar car must, at all times when in motion on the highway, be accompanied by two escort vehicles (1 in front and 1 to rear).

6.4.2 At any given time, the rear escort vehicle shall be designated the primary escort vehicle, and shall have communications in accordance with Regulation 6.14.

6.4.3 Escort vehicles shall display rotating amber (yellow) flashing lights visible from all directions from a distance of at least 200 metres in fine daylight conditions, these lamps must be operating at all times whilst the vehicles are escorting the solarcar.

6.4.4 Whilst travelling on the open road, the primary escort (q.v. 6.4.1) must be greater than 10 mtrs and no more than 2 seconds behind the solarcar, and must at all times maintain a minimum safe stopping distance relevant to the speed and conditions prevailing. The lead vehicle must, whilst travelling on the open road, maintain a distance no greater than 500mtrs, and no less than 2 seconds in front of the

solarcar. The solarcar must be allowed a minimum safe stopping distance relevant to the speed and conditions prevailing.

6.4.5 A warning sign not less than 900mm x 300mm with black lettering on a yellow background, clearly visible from a distance of 25m, must be displayed on the rear of the rear escort vehicle, stating "CAUTION, SOLAR VEHICLE AHEAD"

6.4.6 All team vehicles must carry a sign, visible from 30m to the rear, stating the name of the Team

6.4.7 All vehicles equipped with CB radio (qv 6.14.2) shall carry a sign, visible from 30m to the rear, advising the selected CB channel number.

6.4.8 A primary escort vehicle (qv 6.4.2) shall not be a bus, truck, large campervan or be towing a trailer (See note 23).

6.4.9 When stopped, all wheels of all vehicles must be off the highway. Wherever possible, the overnight rule which states that all team activity shall occur at least 10m from the edge of the road should be observed.

6.4.10 The Entrant shall provide the organiser with a list of all vehicles associated with the team (see note 1).

6.4.11 All vehicles associated with the Entrant, (with the exception of those identified in 6.4.1), shall keep a minimum of 500m from the competing solar car whilst travelling on the open road.

6.4.12 All vehicles associated with the Entrant, (with the exception of those identified in 6.4.1), must not obstruct participating solarcars or escort vehicles.

6.4.13 The Entrant shall be responsible for the actions of all crew and vehicles associated with the team (see note 1).

6.4.14 Escort and team vehicles may be subject to scrutineering at any time during the event to ensure compliance with these regulations.

6.5 Timing

6.5.1 Timing is under the control of the Official Timekeeper assisted by Observers.

6.5.2 The official start time each day is 0800.

6.5.3 Official finish time each day is 1700.

6.5.4 A penalty of 1 minute will be imposed for each minute taken past Official Finish Time of 1700, up to and including 1710. After 1710, each additional minute over will attract a two minute penalty.

6.5.5 Time penalties incurred in the manner described in 6.5.4 will determine an adjustment of the official start time the following day (eg: finish 1707 = start 0807: finish 1712 = start 0814 etc.)

6.5.6 A vehicle starting before its official start time will be subject to penalty (as detailed in 8.3.10).

6.5.7 No solar car is to travel between sunset and sunrise.

6.6 Convoys

6.6.1 Teams and escort vehicles may not drive in convoys (qv. 6.4.4) and must allow easy overtaking.

6.6.2 Any event vehicle being overtaken MUST give way. This includes escort vehicles.

6.7 Cattle Grids

6.7.1 Grids and stock control devices may not be covered.

6.8 Vehicle Movement

6.8.1 Competing vehicles may only move under their own power between their start time and finish time.

6.8.2 Competing vehicles may be pushed on and off the highway for the overnight stop.

6.8.3 Push starting the car is not allowed.

6.8.4 Regenerative power systems must not be on when hand pushing or being towed under circumstances allowed in 6.8.5.

6.8.5 The vehicle may not be towed or carried forward by another vehicle unless abnormal circumstances prevail (see note 6) or under the direction of the Clerk of the Course.

6.8.6 Slip streaming is not allowed (driving closer than 10m). Whilst travelling on the open road a solar car may be no closer than 10m to the vehicle in front unless overtaking.

6.8.7 Pressure-wave pushing is not allowed (driving closer than 10m). The rear escort vehicle is not allowed within 10m of the solar car whilst travelling on the open road.

6.8.8 Driving tests may be carried out by any qualified crew member from sunrise until 0800 and from 1700 until sunset.

6.9 Servicing

6.9.1 The batteries may never be removed from the Observer's control.

6.9.2 Any component, except batteries and the chassis, may be replaced at any time except the mandatory time a vehicle is held at a control point as detailed in 6.3.

6.9.3 No artificial cooling of solar cells is allowed, with the exception of ambient temperature water sprayed from a hand held device, whilst the solar car is stationary.

6.10 Late Time Limit

6.10.1 Any vehicle which does not reach the final control in Adelaide within the time

allowed may be deemed a non finisher (see note 8).

6.11 Intoxicating Substances

6.11.1 Australian civil law applies to drugs and to driving under the influence of alcohol. Drivers, team members and officials are to maintain a 0% blood alcohol level whilst engaged in any duties associated with the event.

6.12 Safety

6.12.1 The Entrant is responsible for the road-worthiness of its solar car. By submitting an entry, the Entrant declares the vehicle's integrity and suitability for the event.

6.12.2 The Entrant acknowledges that the scrutineering process will determine only whether the solar car complies with the Regulations.

6.12.3 No warranty or representation, whether expressed or implied, is made in relation to the mechanical and/or systems roadworthiness of the entrant vehicle in providing this compliance with the event Regulations as specified above.

6.12.4 All solar cars and escort vehicles are operated and driven at the Entrant's own risk.

6.12.5 All solar cars and escort vehicles must be maintained in a safe, road-worthy condition and be operated safely and within the law at all times (See note 25).

6.12.6 A team may be excluded from the Event at any time if the team, in the opinion of the Clerk of the Course, is operating its solar car or escort vehicles in an unsafe manner.

6.13 Safety

6.13.1 Each team must provide a Safety Officer.

6.13.2 Each team must provide suitable and appropriate safety equipment, including (but not limited to): first aid kit, safety glasses and gloves for handling batteries, hazard warning cones, red warning flag, fire extinguishers, safety vests. Such minimum safety equipment shall be located in the rear escort vehicle and be available for scrutineering as detailed in regulation 4.18.9

6.13.3 It is the Safety Officers responsibility that safety equipment is correctly placed and appropriate warning is given to other traffic as required.

6.13.4 Each team is required to have at least one member holding a recognised first aid certificate current for the duration of the event (see note 2).

6.13.5 Each team is required to submit a safety plan in accordance with regulation B.10.

6.14 Communications

6.14.1 Every solar car shall have means of communicating with the primary escort vehicle, which shall be demonstrated at scrutineering

6.14.2 The primary escort vehicle of each team must have 40 channel UHF CB radio facilities compliant with Australian Standards (see note 9), and presented at scrutineering.

6.14.3 The chosen channel number shall be displayed on the rear of the vehicle as detailed in 6.4.7.

7. Observers

7.1 Appointment of Observers

7.1.1 An Observer shall be appointed by the organisers to travel with each competing team.

7.1.2 Observers will be considered as Judges of Fact.

7.1.3 Observers may be changed between Entrants throughout the Event.

7.2 Observers' Responsibilities to the Entrant

7.2.1 To record their name and the time period of their observation duty.

7.2.2 To record the start and stop time, distance covered each day, and all other incidents.

7.2.3 To secure removable battery boxes or solar vehicle at sunset.

7.2.4 To notify the Clerk of the Course at the earliest opportunity if a battery has been changed or a battery seal broken, or if any breach of regulation has occurred.

7.2.5 Observers may not interpret regulations or give advice to Entrants.

7.3 Entrants' Responsibilities to the Observer

7.3.1 To assist the Observer in his duties at all times.

7.3.2 To provide reasonable food and water for the Observer at least 3 times a day.

7.3.3 Never to leave the Observer alone with the car.

7.3.4 To send for assistance from the organiser, or call in results if requested by the Observer.

7.3.5 To provide a proper seat in the primary (rear) escort vehicle (see note 10).

7.3.6 To provide space for the Observer's luggage in the same vehicle as the Observer

7.3.7 The arrangements for hosting the Observer must be declared at Scrutineering.

8. Penalties and Protests

8.1 Entrants committing the following offences may be subject to a time penalty determined by the Clerk of the Course.

8.1.1 Obstructing an overtaking vehicle.

8.1.2 Slip streaming, hand pushing or pressure wave pushing.

8.1.3 Failure to follow the route instructions.

8.1.4 Failure to observe a request by Police or Officials.

8.1.5 Wilful damage or interference to property.

8.1.6 Failing to get off the highway when stopped.

8.1.7 Failure to report damage to stock.

8.1.8 Failure to stop at a control.

8.1.9 Exceeding any posted speed limit.

8.1.10 Starting prior to due time of departure (time prior to due time being added to penalty).

8.1.11 Failure to comply with any provision of these regulations.

8.2 In normal circumstances, time penalties shall be served on the day of issue and prior to crossing the finish line (see note 11).

8.4 Exclusion from the Event (see note 12)

Entrants committing the following offences may be liable to exclusion:

8.4.1 Replacement of battery without permission.

8.4.2 Removing battery chassis from Observer's control.

8.4.3 Charging of batteries from any source other than that scrutinised.

8.4.4 Failing the stability test.

8.4.5 Inability to maintain minimum speed.

8.4.6 Carrying or towing a competing vehicle.

8.4.7 Wilful disregard of the regulations and the spirit of the event.

8.4.8 Running without rear escort vehicle as described in regulation 6.4.2.

8.4.9 Misrepresentation

8.5 Protests and appeals

8.5.1 Any protest must be lodged with the Clerk of the Course or his delegate, in writing, within 24 hrs of the incident giving rise thereto. A protest fee of AU$100 will apply.

8.5.2 Any decision of the Clerk of the Course may be appealed to the Stewards by lodgement with the organisers of a written 'notice of appeal' outlining the grounds for the appeal, within one hour of the handing down of the CofC decision giving rise thereto. The decision of the Stewards is final. No correspondence will be entered into.

9. Determination of Winners - Finishers

9.1 The outright winner will be the first solar car to have completed the course in accordance with these regulations.

9.1.1 To be classed as a finisher, a vehicle must have completed the entire course within the time allowed.

9.1.2 The Organisers will designate a fixed point as "Finish of Timing" in order that Entrants are not in a competitive situation in the Adelaide Urban area.

9.1.3 The solar car must proceed to the Finish Line under its own power to complete the course (see note 14).

9.1.4 The route between the timing point detailed in 9.1.2 and the Finish Line will be deemed a 'transport stage'.

9.2 Provisional Result

9.2.1 The progress of solar cars may be publicised during the event. These results may not include all penalties and will, therefore, not be accurate and final (see note 15).

9.3 Final Result

9.3.1 Final results will be published once passed by the Stewards.

10. Winners and Finishers

10.1 The winning team will make itself available for a press conference if so required.

10.2 Finishing vehicles shall be made available for public exhibition up to the time of the prize giving ceremony.

11. Prizes and Awards

11.1 Outright 1st, 2nd and 3rd.

11.2 Class awards.

11.3 Certificates to all finishers.

Other trophies and prizes to be announced in the Further Regulations.

12. Advertising and Publicity of Results

12.1 All advertising, sales promotion and publicity material produced by, or in connection with, the entrants or their sponsors, concerning or referring to the Event, shall refer prominently to the Event by the correct title as defined in Regulation 1, and all entrants shall, by entering the Event, specifically agree to abide by this Regulation.

12.2 By entering the Event, the Entrant agrees to the free use of any names, photographs (or graphic interpretation thereof) of their team, vehicles and equipment in any publicity material that may be issued by the Organisers.

Section 2 - Technical Regulations

A.1. Classes

A.1.1 Open Class

There are no limitations on the technology that may be employed.

A.1.2 Production Class

Production solar cells and production batteries, Regulation 1.4 applies.

A.1.3 Stock Class

As for production class but with lead-acid batteries only, Regulation 1.4 applies.

A.1.4 For production and stock classes only

A.1.4.1 Solar cells and batteries must be commercially available to all competitors and approved by WSC (see note 24).

A.1.4.2 Manufacturers data sheets must be provided, and suppliers of solar cells and batteries for production and stock classes will be required to provide a declaration that the materials used are from a standard production lot.

A.2 VEHICLE ELIGIBILITY AND SPECIFICATIONS

A.2.1 Power

Natural solar radiation received directly by the car is the only energy that shall be used for propulsion.

A.2.1.1 Stored energy at start line limited to 5 kWh (as determined by CSIRO) Batteries are limited to 5 kWh capacity (nominal)

A.2.2 Construction

A.2.2.1 Solar cars may be constructed in any way provided they lie, at all times, entirely within a single right rectangular parallelepiped of prescribed dimensions (see note 18).

A.2.2.2 When in motion, the parallelepiped must be oriented such that A, B and C are length (measured horizontally), width (measured horizontally) and height respectively. The parallelepiped may have any orientation when stationary.

A.3 Vehicle Size

A.3.1 **ISF 5000** The solar car may not exceed : A <= 5m, B <= 1.8m, C <= 1.6m

A.3.2 **ISF 4000** The solar car may not exceed: A <= 4m, B <= 1.5m, C <= 1.6m

A.3.3 **Two-seat** The solar car may not exceed: A <= 6m, B <= 2m, C <= 1.6m

A.3.3.1 The solar car described in A3.3 must carry a minimum of two (2) persons. The nominated drivers and passengers must meet the requirements of Regulation 4.15

A.3.4 **Veterans**

Vehicles whose sizing regulations have been scrutineered in any previous ISF event may compete, providing they conform with current safety regulations, and any modification has prior approval of WSC (See note 22).

A.4 Demonstration of Advanced Technology

The WSC wishes to provide a forum to further test or demonstrate advanced technology in personal transport applications. Consideration will be given to vehicles demonstrating advanced automotive technology to prove their capabilities before the start of the event. Applicants are invited to submit details (in confidence) of their proposed vehicle for consideration. If accepted, the following conditions will apply:

A.4.1 The demonstration class will be time competitive.

A.4.2 Vehicle data (energy consumption / range etc.) figures are to be made available to the organisers to assist in planning future events.

A.4.3 The vehicle will be scrutineered according to these regulations and must meet all relevant criteria and comply with any conditions imposed by the Chief Scrutineer.

A.4.4 The progress of the vehicle will be subject to the control of the Clerk of the Course.

A.5 Vehicle Data Sheets

A.5.1 Photographs, drawings, vehicle specifications and background information for the program must be received by 30 June 2005.

A.6 Vehicle Identification

A.6.1 All solar cars are required to have a unique vehicle identification number (VIN) which must be permanently attached to a substantial part of the vehicle chassis or frame (see note 16).

Section B - Energy Storage

B.1 **Energy storage devices other than batteries** may be used, but at the beginning of the event, the total stored energy of these devices together with that of the fitted battery pack must be less than a nominal 5 kWh. This must be demonstrated to the scrutineers' satisfaction.

B.2 **The cells or battery modules** must be rechargeable by the vehicles in which they are fitted. The make and number of cells or battery modules is free. The total energy allowance is based on a nominal 5 kWh (20-hour rate) and is determined by mass.

B.2.1	Pb/Acid:	125kg	(40 Wh/kg)
B.2.2	NiMH:	70kg	(70 Wh/kg)
B.2.3	Ag/Zn:	40kg	(125 Wh/kg)
B.2.4	Ni/Zn:	75 kg	(66 Wh/kg)
B.2.5	Ni/Fe:	100kg	(50 Wh/kg)
B.2.6	Standard Li-Ion:	35kg	(140 Wh/kg)
B.2.7	Plastic Li-Ion: ('Li-Polymer')	30kg	(167 Wh/Kg)

B.3 **Mass for non-commercial or developmental battery systems** will be determined following delivery of sample specimen cell/battery to CSIRO laboratories for performance evaluation. A sample cell or battery module must be sent for evaluation to Dr David Rand, CSIRO Energy Technology, Box 312, Clayton South, VIC 3169, Australia no later than 1 May 2005.

B.4 **Manufacturer's specifications for all other types of cells** or battery modules must be received by Dr Rand's laboratory by 30 June 2005 .

B.5 **Entrants will incur a penalty** of AU$220 if the battery specification is not received by this date.

B.6 **Battery Mass**

B.6.1 **The mass of the battery pack is the total mass of the component cells and/or modules as presented at scrutineering. Intercell connectors, insulators and the battery box are not considered part of the overall battery mass.**

B.6.2 Commercial instruments such as bicycle computers and digital multimeters may use small primary batteries provided that the battery is internal to the instrument. In this case, no external connection is allowed to the instrument battery.
All other devices, including computers, telemetry equipment and all non-commercial instruments, must either use rechargeable batteries that are part of the overall battery weight and fall within the scope of regulations B.7 - B.11, or they must derive their power from the main battery pack via DC/DC converters.

B.7 **Battery Installation** in the vehicle must be constructed such that the organisers can seal the batteries to the chassis rails, box or frame.

B.7.1 The rails or box must be bolted in place securely.

B.7.2 The total battery pack must not be dispersed throughout the car in more than four (4) units.

B.7.3 Chemical spill-proof barrier(s) must exist between the occupants and all battery packs.

B.8 **Charging**

B.8.1 After the start of the event, batteries may only be charged from the vehicle solar array or regenerative braking system, as passed by the Chief Scrutineer.

B.8.2 Charging of batteries from any source other than that described in regulation B.8.1 will lead to exclusion from The Event.

B.9 **Battery replacement**

B.9.1 The vehicle must travel along the entire course with the same make and number of rechargeable batteries that were passed by the scrutineer as constituting the allowable battery pack for the vehicle.

B.9.2 Cells, modules or battery packs may not be replaced for any reason other than in the case of accident or malfunction.

B.9.3 The Chief Battery Scrutineer must approve any replacement of a cell or battery module. A time penalty will be incurred for a change of cell or battery module as follows:

B.9.4 Time Penalty (in minutes) = $\boldsymbol{100 \times (1.225)^{m-1} \times {}^{n}/_{N} \times E}$

where: ***m*** = no. of battery pack; ***n*** = no. of cells or battery modules replaced; ***N*** = total no. of cells or battery modules in pack; ***E*** = total energy (in kWh, 20-h rate) of battery pack. *(m1 is original battery m2 is first replacement battery m3 is next subsequent replacement etc*.)

B.10 Chemical Incident Contingency

B.10.1 Teams must submit a chemical incident contingency plan relevant to the battery chemistry employed and include a statement of intent with regard to handling and disposal of cells, batteries or component materials. This should include all cells used in ancillary equipment used by the team as well as that in the competing vehicle.

B.11 Vehicle Chassis

B.11.1 Between sunset to sunrise each day, the battery pack must be isolated from any external-powering source. This is to be effected by either removing the battery from the vehicle and placing in a lockable box under the control of the Observer, or the whole vehicle shall be placed under the Observer's control between sunset and sunrise, in which case no work of any kind may be performed on the vehicle during this period.

B.12 Vehicle Specifications

The vehicle design and construction is free except for the following:

B.12.1 The vehicle must be able to maintain an average speed of 50 km/hour. Allowance may be made for poor weather.

B.12.2 The following specifications are compulsory:

B.12.2.1 Vehicle size: The maximum size of the vehicle shall be appropriate to one of the specifications detailed in regulation A3. When turning corners, wheels and wheel spats are permitted to exceed this envelope.

B.12.2.2 Braking: Solar cars must have a balanced, dual braking system so that if one system should fail, the solar car can still be stopped (see note 17)

B.12.2.3 Braking Performance: The braking test will require solar cars to prove the ability to stop the vehicle with an average deceleration of 3.8 metres per second per second. The time interval over which the deceleration is averaged shall be from the first indication that the driver should stop until the solar car comes to a complete halt. To satisfy this requirement, cars must demonstrate the ability to stop in 25m from 50 km/h and in 12.5m from 35 km/h.

B.12.2.4 Tyres: All tyres fitted must be adequately designed, rated and fit for their purpose. They must be able to safely withstand the loads and forces imposed by the vehicle mass, speed capability and braking.

B.12.2.5 Vision: The driver must have vision in all directions to the satisfaction of the Chief Scrutineer. Rear vision may be electronic and/or mirror. Electronic rear vision systems must operate whenever the vehicle is in motion under its own power; minimum height for driver's eye level is 70 cm (60 cm for ISF 4000).

B.12.2.6 Turning radius: Solar cars must be able to make a U-turn in either direction within a 16m lane.

B.12.2.7 Lighting: Stop light, turn indicators and hazard lights are required. These must be visible from 30 m by other road users in sunlight.

B.12.2.8 Electrical Shock Hazards: If the system voltage exceeds 32 V, the occupants must be protected from electrical shock hazards by ensuring that it is impossible for any occupant of the solarcar to touch "live" wires or terminals.

B.12.2.8.1 High Voltage warning signs must be fitted throughout the car adjacent to all terminals where a potential of more than 32 V might be present, and to all covers which, when removed, expose live wires or terminals."

B.12.2.9 **Electrical Isolation:**
The driver must be able to electrically isolate the solar panel from the rest of the car while seated in a driving position and without releasing the seat belt. "Soft" (e.g. MOSFET) switching is permissible.

The driver must be able to able to electrically isolate the battery from the rest of the car while seated in a driving position and without releasing the seat belt. "Soft" switches are *not* permitted - the switch must be a circuit breaker, contactor, or other mechanical type.

B.12.2.9.1 For emergency use, a means of electrically isolating both the solar panel and the battery, from each other and the rest of the car, must be provided on the exterior of the car. The device must be able to be operated instantly and without hesitation by someone unfamiliar with the car, and without removing any panels or tape. "Soft" (e.g. MOSFET) switching is permissible for the solar panel. Battery isolation must be mechanical (i.e. electronic switching is not permitted), although use of a normally-open contactor is permissible.

The activation position(s) of the device must be clearly marked with a blue equilateral triangle containing a red flash, minimum side length 150 mm, and there must be a clear instruction on how to operate the device (e.g., "pull").

B.12.2.10 Driver Safety: All sharp edges, chains and sprockets must be covered when in use, and internal components or cargo must be secured.

B.12.2.11 Safety Belts: The use of safety belts is mandatory. As a minimum standard, belts shall be a commercially manufactured lap and harness type (3 point) safety belt. Installed and attached to provide adequate occupant restraint in the event of a collision or vehicle roll over. Anchorages must be designed and installed in accordance with sound engineering practice.

B.12.2.12 Roll-over Protection: All vehicles shall be constructed or adapted to protect, as far as is reasonably possible, the occupant(s) in the event of collision or vehicle roll-over. Steps should be taken to ensure that vehicle components, accessories or other components do not impinge on the occupants' space.

B.12.2.13 Occupants of the solar car must wear a helmet whilst participating in the event. The helmet must meet or exceed the Snell95 or DOT motorcycle standards (See note 19).

B.12.2.14 Egress: All drivers and passengers must be able to be extricated from the vehicle within 15 seconds. If the extraction involves permanent damage to the vehicle then the Team Manager will need to declare the method of extraction to the satisfaction of the Chief Scrutineer at time of scrutineering. The position of emergency opening points must be indicated on the exterior of the vehicle.

B.12.2.15 Any egress canopy or exit panel must be able to be opened from inside as well as outside the vehicle. The driver (and any passenger) of the solar vehicle must (without outside assistance) demonstrate, to the Chief Scrutineer's satisfaction, how the canopy or exit panel is secured and released.

B.12.2.16 Warning device: an appropriate audible warning device must be fitted and demonstrated to the satisfaction of the scrutineer. The device must be permanently mounted.

B.12.3 Adequate Ventilation must be provided to the driver's cockpit.

B.12.4 Securing of any driver egress canopy or hatch with adhesive tape is not permitted.

Section 3

Explanatory notes to be read in conjunction with the 2005 regulations

Note 1 (*concerns regulation 3.4*)

All team members are required to be registered. Notwithstanding this regulation, the Organisers reserve the right to determine if any individual or vehicle is acting *'de facto'* as a part of a team.

Note 2 (*concerns regulation 6.13*)

Entrants should be aware that fatigue and dehydration are serious problems in this event. This is especially relevant to drivers of all vehicles, particularly those of solar cars.

Note 3 (*concerns regulation 4.17)*

A condition of the Event permit issued by the Government of the Northern Territory is that Entrants will not test their solar cars on the Stuart Highway in the weeks preceding the event. Arrangements may be made for vehicle use permits for other sections of road in the NT, including the Tablelands Highway between Cape Crawford and Barkley Homestead. The Event will also arrange facilities for track testing at Hidden Valley Raceway in the days prior to the speed trials.

Note 4 (*concerns regulation 6.3.7*)

Entrants may perform any maintenance or safety checks on their vehicle during control stops. This includes checking and adjusting tyre pressures, terminal voltage and any tasks of cleaning or removal of debris. It does not include undertaking any repairs that involve dismantling or replacing components (including wheels/tyres). The array may be placed on a charging stand, as long as that does not render the vehicle incapable of being immediately moved or repositioned on request of the control stop manager.

Note 5 (*concerns regulation 6.3.9*)

It is recognised that in the event of telemetry failure, entrants may wish to download data during a control stop. This is permissible under the following condition: Permission of the Control Stop Manager must be sought in advance and connection may only be made under supervision of the incoming observer, and the details written up in the Observer notes.

Note 6 (*concerns regulation 6.8.5*)

... "unless abnormal circumstances prevail"

It is the responsibility of the Entrant to operate their car safely at all times. The Entrant may take whatever action they consider appropriate to any given situation. It is the duty of the Observer to record such matters.

Note 7 (*concerns regulation 4.15.2*)

Entrants will be required to sign an assurance that the team drivers meet this requirement.

Note 8 (*concerns regulation 6.10.1*)

In practical terms, any vehicle finishing the course (in accordance with these regulations) to arrive before the close of the finish line at 1710 on Sunday 2 October 2005, will be classed as a finisher.

Note 9 (concerns regulation 6.14.2)

Communications: UHF CB refers to equipment operating in the range from 476.025 Mhz (ch 1) –

477.400 Mhz (ch 40). 27Mhz a.m. devices and 16 channel hand held devices are not compliant with this regulation. Facilities for teams to hire the correct equipment will be available and further details will be provided to registered entrants.

It is anticipated that facilities will be made available for suitable radio equipment to be hired in Darwin and deposited in Adelaide.

Any enquiries concerning allowable frequencies for other equipment should be directed the Australian Communications Authority. http://www.aca.gov.au

Note 10 (*concerns regulation 7.3.5*)

It is expected that the Entrant will allocate the front passenger seat of the primary escort vehicle to the Official Observer. This includes fair and reasonable space, with, for example, the footwell not being filled with computer equipment such that the passenger space is rendered restrictive or uncomfortable. **Entrants are reminded that regulation 7.3.6 dictates that the Observer's luggage must travel in the same vehicle as the Observer**.

Note 11 (*concerns regulation 8.2*)

Penalties will be issued by the Clerk of Course, who may depute any other official to serve the notice to the Entrant. Time penalties will normally be served on the day of issue, by extending the time spent in a control stop. The Clerk of the Course may impose other arrangements appropriate to particular circumstances. Time penalties for cell or module replacement under regulation B.9.3 shall be served at the control point following the replacement.

Note 12 (*concerns regulation 8.4*)

Entrants who have been excluded for any reason may trailer their solarcar to the finish line, and take part in the display and closing ceremonies.

Note 13 (*concerns regulation 8.5*)

The Stewards will consider all protests at the earliest opportunity.

Note 14 (*concerns regulation 9.1.3*)

The purpose of this regulation is to ensure the course is fully and fairly completed.

In the event of two or more Entrants being in the transport stage at the same time, Entrants may not use traffic conditions to overtake each other. Should an Entrant's solar car cease to function normally, overtaking may occur. Overtime penalties (from 1710) will apply and the finish line will close at 1730. In the event that an Entrant is caught between "Finish of Timing" and the "Finish Line" they should inform the Clerk of the Course and make overnight arrangements appropriate to the circumstances, (e.g. the Observer may mark the position as normal, and the team may load their car onto a trailer and return to complete the course from 0800 the following day.

Note 15 (*concerns regulation 9.2*)

Results will not become final until the Stewards have made a determination on any protest lodged in accordance with regulation 8.5.

Note 16 (*concerns regulation reg A.6)*

The Australian Solar Sports Secretariat issues VIN numbers. A vehicle identification plate can be supplied for a nominal fee. For further details contact the Organisers.

Note 17 (*concerns regulation B.12.2.2)*

The braking systems designed for the solarcar should be designed and modelled in accordance with sound automotive engineering practice. Experience has shown that, in general, bicycle type brakes are inappropriate to the application and are unlikely to pass scrutineering.

Regenerative braking does not contribute to the requirement of a dual braking system.

Note 18 (*concerns regulation A.2.2.1)*

Supplementary panels designed to increase the area of the array when stationary have been proscribed by the International Solarcar Federation and therefore will not be allowed in the World Solar Challenge.

Note 19 (*concerns regulation B.12.2.13)*

It is recognised that there are concerns that heat exhaustion poses a greater risk than the level of protection a helmet may provide. In the case that an individual elects not to wear a helmet, a dispensation from this regulation may be granted upon lodgement of an indemnity waiver to that effect.

Note 20 (*concerns regulation A4.15.4*)

Written permission to participate in the event must be given by the parent or legal guardian of any participant under the age of 18.

Note 21 *(concerns regulation 6.1.2)*

The *Parc Ferme* (closed park) is a place where competitors vehicles can be inspected. During the nominated time, no work may be carried out on the vehicle. No persons are allowed in the area with the exception of the event officials required to be there and 2 (two) members (only) from each team, who must be available to assist officials in their tasks.

Note 22 *(concerns regulation A.3.4)*

Solar cars eligible to be classified as veterans would have met the following criteria:

Classic WSC:

Solar collectors may be constructed in any way provided that they lie, at all times, entirely within a single right rectangular parallelepiped of dimensions A x B x C, where $A \leq 4.44m$, $B \leq 2.00m$, $C \leq 1.60m$ and $A \times B \leq 8.00m^2$.

E4.2. Cut Out Class:
Solar collectors may be constructed in any way provided that they lie, at all times, entirely within a single rectangular parallelepiped of dimensions A x B x C, where $A \leq 5.00m$, $B \leq 2.00m$, $C \leq 1.60m$. Furthermore, the product of the length and width, less any single rectangular region not occupied by solar array components, may not exceed $8m^2$.

Note 23. *(concerns regulation 6.4.8)* The need for this regulation is based on the identification of the perceived hazard. If approaching traffic sees a large vehicle with a flashing light, the immediate perception is that that vehicle itself is the hazard, not the solarcar it is protecting. There have been a number of instances where members of the public have overtaken large rear escort vehicles and narrowly missed the solarcar. It has even been suggested that a motorcycle would make an ideal rear escort vehicle.

Note 24 . *(concerns regulation A.1.2).* A finite test or definition of 'production' remains under discussion. One such 'test' is that the materials are listed in a manufacturers or suppliers catalogue, and a detailed response regarding price and delivery date can be provided without undue delay. The

intention here is that these materials are produced for standard terrestrial applications and readily available to all. Competitors will note the requirement for data sheets to be provided.

Note 25. *(concerns regulations 4.13.2 & 6.12.5/6)* The tendency for solar cars to take advantage of a favourable road camber by driving for extended periods on the wrong side of the road has been noted. This is extremely dangerous, especially for teams who normally drive on the right at home. The organisers wish to stress the importance of road safety and compliance with Australian law, which requires vehicles to drive on the left except when overtaking.

Updates and Bulletins

May 2005

Concerning regulation B 2

Weight limits for the electrochemical technologies which can be used in the 2005 event were detailed in the regulations which were published in June 2004.
Since that publication, some battery manufacturers are claiming an energy density considerably higher than that which is considered by CSIRO scientists to be the industry average. It is recognised that the use of these devices may create an unfair competitive advantage. While the scientific advisors to the event agree that Li-Ion should be rated at 140 wh/kg and participants be allowed 35kg, Where a manufacturer claims an energy density in excess of 159wh/kg (at the c/5 rate), the allowance be reduced to 30Kg. Note that this refers only to standard Lithium Ion technology, (not Lithium Polymer)."

August 2005

Concerning regulation 6.1

The start of the on-road component of the event will be in State Square Darwin (Parliament House – entry from Smith Street)
