APPENDIX 4

TECHNICAL NOTES

01. ENGINE PARITY
02. SINGLE MAP ECUS RECOMMENDATION
03. CREW SAFETY
04. DRAWINGS AND MEASUREMENT
05. REINFORCED COCKPIT AREA AND CANOPY
06. OTHER REQUIREMENTS
07. IN THE RESTRAINED COCKPIT

01. ENGINE PARITY

METHOD OF CONTROL TO ENFORCE THE RULE THAT NO ENGINE IS ALLOWED ABOVE 927HP AT ANY TIME

- After initial registration and acceptance of the engines, in order to be accepted for racing, 1 of each type of engine from the individual manufacturers/tuners must be sent to the WPPA/Class 1 appointed Dyno Test Facility and perform a max torque rpm and power run with the relevant air box and restrictor fitted.
- All engines will be fitted with a simple data logger, completely independent from the engines' control system, that will record rpm, max boost pressure and air depression inside the air box; additional measurement points may be added if more control is required. The data logger will be fitted to the engines during the season and Teams may be requested to duplicate race-recorded data on the Dyno, if their engine is chosen and sent for testing during the season.
- For any race that is subject to Post-Race Engine Dyno Testing, the finish order is provisional pending the report from the Dyno Test Facility. Teams must declare the type and brand of engine oil used for the race in question.
- A minimum of 1 engine per race may be sent to the Dyno for testing; the method of choice is at the discretion of the Chief Technical Commissioner.
- Engines that are chosen to be dyno-tested and have not completed their 2- race period for bonus points, have the choice of the following with no loss of points:
    a) If the engine is returned before the next race - refit the engine
    b) If the engine is not returned in time for the next race, it can be fitted at a later date during the season with no penalty and points will be counted as if they had been awarded for 2 consecutive races. The engine must remain sealed.
    c) If the engine fails or encounters technical problems on the Dyno, the engine may be repaired and fitted at a later date during the season with no loss of points.
    d) If an engine is sent for testing on the second-to-last race of the season and cannot be fitted for the last race due to points b) and c) above, the new engine fitted will act as a substitute, and points will be given.

- In order to be fair to other Teams, manufacturers/tuners, the following must apply:

  If, during engine development work, the Team, manufacturer/tuner feels that after racing, their engine will be 927hp or above, they must declare this to the WPPA in writing for a reduction in air restrictor size. However, before the other Teams, manufacturers/tuners with the same type of engine are required to reduce their air restrictor to the new size, the team making the declaration must prove that the engine can complete at least one race weekend without mechanical failure with the new air restrictor size fitted. This is to ensure that engines are not being built and run on Dynos purely to manipulate the rules so as to disadvantage other Teams.

02. SINGLE MAP ECUS RECOMMENDATION

In order for the dyno system to work only single map ECUs are recommended. If an engine is chosen to go to the dyno, the ECU cannot be accessed after the race and may even be removed and sent separately if required.

If Teams insist on running more than one map inside the ECU, they must declare this in writing to the WPPA and will be asked to demonstrate additional maps on the Dyno during any testing of their engine.

ECU's may be subject to random testing at the discretion of the technical Director to confirm conformity to the rules.

03. CREW SAFETY

All Class 1 boats must be equipped with a Reinforced Cockpit(s) with Canopies for all riding crew members and buoyancy to ensure the boat floats. The crew, who must be seated, must have a restraint system comprising of and conforming with the following rules:

A Reinforced Cockpit with Canopies is defined as a containment area for crew and can be constructed as an integral part of the boat. This Reinforced Cockpit Area must be designed and constructed to a specification capable of withstanding the forces of a water impact when running at the highest design speed of the boat, and therefore protecting all members of the crew in the event of an accident. The various components that constitute the Reinforced Cockpit shall be properly maintained to ensure reliable operation of all components, with emphasis being placed on the canopy release mechanism, emergency air supply and restraint systems.

In any Class 1 multihull boat, Cockpits will not be allowed in the sponsons. It is recommended that Sponson Cockpits are not used in any other classes.

These rules also apply to any boat in any class using Reinforced Cockpits with Canopies.

04. DRAWINGS AND MEASUREMENT

Three view drawings (plan, side and elevation) of the design of the Reinforced Crew Cockpits(s), the Bulkheads, the type of Canopy, the Buoyancy System and the Restraint System anchorage Points must be lodged with the measurer's National Authority of the measurer and verified at the time of craft measurement.

Drawings shall be provided showing canopy aperture dimensions for full or partial canopies, single or tandem arrangements. Arrangements shall describe whether fore and aft, or side by side seating is fitted.

Drawings shall show the method and construction of release devices. Drawings should show the material specification of the transparent areas.

Prior to Boat Measurement the drawing and material specifications shall be sent to the Measurer requested to measure the boat. On completion of measurement, the drawings and material specifications called for by the designer shall be lodged with the measurers National Authority before they issue a certificate of compliance and measurement.

Reference: Also 44.01 MEASUREMENT CERTIFICATE.

05. REINFORCED COCKPIT AREA AND CANOPY

All boats with restraints must have a Reinforced Cockpit Area with a Canopy which is suitably designed and fit for the purpose of safety at the designed/expected speed of the craft and designed to ensure that the occupants are protected at all times especially in the event of a severe accident, in accordance to the latest WPPA or UIM cockpit guidelines.

The construction, strength safety and conformity to meet and exceed the recommended requirements is the sole responsibility of the boat owner and or boat builder. Any scruitineering or measurement by the WPPA officials is not condition/construction survey.

It is mandatory to close the canopy with a hatch, and for the hatch to remain closed during all racing and practice.

Canopies must be a composite structure with the following features:

Polycarbonate areas are strongly recommended to be as small as possible, while still maintaining that the pilot and co-pilot have clear, safe and undisturbed visibility ahead at sea level whilst racing. For Class 1 it is strongly recommended that these polycarbonate areas are built using 12 mm thickness, or more.

The combined visibility the pilot and co-pilot must be through a horizontal arc of 225 degrees (112.5 degrees either side of the centre line of the boat).

These polycarbonate panels are to be recessed into the composite structure and may be bonded using a suitable bonding agent, and/or "bobbins".

It is highly recommended that there is also a through bolted outer flange for the fitting of the polycarbonate panels.

Screen flanges should be a minimum of 50 mm and should be fastened every 100 mm if using "bobbins"; it is recommended to use metal "bobbins" with heads, as opposed to the recessed plastic type.

The outer polycarbonate area of the flange fitting must not be painted, so that the measurer / scrutineer may monitor any discrepancies.

These Restraint Cockpits must be fitted with an internal roll bar, two in a tandem cockpit as a minimum. There must also be, between the two single cockpits, an anti-compression strut or structure of similar strength to the roll bar.

Hatch openings shall have a minimum of 25 mm flange.

Hatches should be recessed on the front and sides.

It is recommended the hatches are constructed to the same specification as the main Restraint Area. The hatches shall be fitted with a catch which has a positive open and positive close mechanism and should hold the hatch against lateral forces. These catches shall be able to be opened from both inside and outside the cockpit and must have a second emergency mechanism to allow the rescue team to easily remove the hatch from outside if necessary.

These hatches should be fitted with hinges with short release pins. This is important, because long pins invariably bind the hinge.

There should be one or more divers' grab handles fitted to the outside of each hatch.

Canopy hatch release handles, which must be provided both inside and out, must be painted fluorescent orange or have a fluorescent orange background panel to identify them and directional arrows to indicate the method of opening.

The canopy lid hinges' and the canopy hatch cover's release mechanism must not encroach within the canopy aperture area, and these hinges and release mechanisms must not in any way hinder the exiting of crew members when fully race fitted.

Canopy openings should have the entry/exit apertures located directly above the crews' heads.

The canopy aperture openings should be at least 0.55m in length and 0.55m in width. If the crew is seated side by side, then the opening should be at least 0.55m x 0.825m wide. In tandem configuration, the opening(s) should be 0.55m x 0.55m per crew member. The canopy apertures should be cut with all corners having a radius of 0.025m minimum or 0.25m maximum. The radius should be constant and have a smooth finish to relieve stress.

The canopy aperture must have a 20 mm wide (minimum) fluorescent orange band around the opening.

It is mandatory that one single air supply (not oxygen) and a bottle will be provided for each riding crew member. The air supply must be securely fixed adjacent to, or on each one of them. It is recommended that sufficient air be provided in each individual bottle for ten minutes. Air bottles must have a pressure gauge fitted for visual checking at pre-race scrutineering. This gauge should be filled with liquid and be at least 5 cm in diameter for easy reading.

Air supply bottles shall be "Turned On" before starting a race or taking part in practice and/or testing.

Reinforced Cockpits must have flood tubes or other means of flooding the cockpit to equalise the pressure quickly in an accident. The floor of the cockpit should be as airtight as possible to help the cockpit pressure equalise far more quickly when in an upturned position. Unless a secondary escape hatch is provided.

Reference: 44.04 ESCAPE HATCH.

Boats with restraints must have stop buttons/switches located in the cockpit area, immediately accessible to pilot, co-pilot and rescue officers. The stop buttons/switches must be identified by a fluorescent colour.

These switches must shut off all fuel pumps as well as the ignition circuit.

All boats shall have a White High Intensity Strobe Light fitted to indicate "coming off the plane" but not needing assistance. The strobe light must be able to be operated by the throttleman, and should be operated by the throttleman if a problem occurs, to enable any following race boats to take avoiding action. The strobe light shall be mounted on the top rear of the canopy. When duel canopies are used, the light may be on or behind either one.

This strobe light may also be used as a substitute for the orange retirement flag when returning to port under reduced power.

Cockpits with Restraints must be fitted with rear of head protection for each crew member. This must be an integral part of the seat, which must be attached directly to the structure of the Restraint Compartment. The head protection must be a minimum of 0.2m wide and extend at least 75% of the height of the safety helmet as worn by the crew whilst in the normal seating position. There must be a minimum of 0.12m vertical and lateral clearance between the canopy and each of the crewmembers when in the normal seating position.

The Restraint System must consist of a 5 or 6 strap harness and should utilise a 75 mm lap belt, a 50 mm strap over the shoulder harness rated at 4,100kg (9,000 lb.) and grommeted to prevent chafing or cutting of the belt. Harness straps must be attached directly to the cockpit structure. Those straps close behind the driver's head and neck must be 100 mm to 150 mm apart at point of attachment. The shoulder harness should be installed at 90 degrees to the spine at shoulder line to minimise compression injuries under high "G" loading. All straps must be free to run through intermediate loops or clamps/buckles. All anchor point bolts must be fitted with backing plates of 10cm minimum width.

The driver harness attachment bolts in reinforced cockpits must consist of minimum grade EN8 bolts, with an 8 x 1.25 mm thread and locked nuts. There must be a spacer and plain washers on each bolt. The spacers must be glued to the cockpit structure. Intention of these spacers is to prevent buckling of surface material near bolts. This always leads to local delamination which easily spreads out over cockpit structure, when it is under stress.

On the sides of the structure, which has to take up the force on the attachment bolts, there must be a stainless steel plate (washer of minimum 3 mm thickness and 100 cm2 area).

When using seats with suspension, and therefore not using a bulkhead restraint anchorage, drawings must be lodged with the National Authority of the measurer and approved prior to boat measurement.

All restraint systems must have a common method of release. The single lever method (sometimes called the NASCAR type) or rotary type, are both acceptable restraint release systems.

Both types of restraint release must be examined for satisfactory operation by the scrutineer before every race.

The harness system must comply with Drawing 2.

The shoulder harness should be installed 90 degrees to the spine at shoulder line to minimise compression injuries and the high "G" loading. 75 mm minimum/maximum to Centre line of Lap Belt at Seat Back, Seat Bottom junction. Lap Belt should continue in straight line to anchorage.

A quick release steering wheel may be fitted on a boat with personal restraints, but all pilots must be able to exit the cockpit without removing the steering wheel.

Rear view mirrors are mandatory, as well as a method of cleaning the canopy whilst underway.

Two fire extinguishers, each a minimum of 2kg must be carried and be readily accessible to the crew.

Should a life raft be carried, it may be placed in the same locker.

All crew containment areas of inboard engine canopied boats must be fitted with a carbon-monoxide alarm.

Racing Vests - the efficiency of the racing vest is a matter of the exclusive responsibility of the wearer. Every crew member whilst on board, must wear a racing vest during the practice runs and throughout the race. Racing vests must be coloured high visibility orange or yellow. The racing vest must have epaulets/handles to help extract crew from the boat. The racing vest must have crutch straps or a method of ensuring that the vest does not "ride up".

It is mandatory that sufficient buoyancy is provided in the boat, or in the material used for its construction, to ensure that the boat floats if capsized or holed. If extra buoyancy is needed, the buoyancy system described by the designer should be verified by the Measurer. This added buoyancy must be in at least four separate flotation units. It is recommended that the buoyancy should float the hull as parallel with the surface of the water as is practical, to help in rescue accessibility.

06. OTHER REQUIREMENTS

Non-compliance - The Technical Director has the authority to deny entry to any race boat subject to these rules that has non-compliant cockpit safety systems. The Technical Director also has the authority to allow a non-compliant boat to compete, provided that after consultation with the Technical Director, the Technical Committee determines that the intent of the guidelines has been met and that the safety of the riding crew and fellow competitors is not jeopardised.

Intercoms - Locking boat intercom plugs connecting helmets to racing craft are expressly prohibited. Plugs must disconnect easily, placing no additional stress on competitors' necks. Inflexible metal or plastic intercom microphone booms are strongly discouraged.

Radios - A licensed ship-to-shore radiotelephone must be permanently installed in an unexposed location with a minimum power input of twenty-five watts with international marine VHF channels available and any channel designated by the Race Committee as being essential for race communications.

Bilge Pumps - Two (2) bilge pumps, at least one of which it is recommended shall be hand-operated. Electric bilge pumps are to be automatic and wired so as to maintain operation independent of the battery cut-off switches.

It is recommended that two Coast Guard Approved fully charged fire extinguishers with metal pull rings and an indication gauge showing amount of charge secured in a position are readily accessible to the crew.

Cleats - All cleats and other deck hardware must be recessed or protected.

Non-Skid - It is recommended that non-skid material be installed on the deck surface surrounding the cockpit to the satisfaction of the Chief Safety Inspector (Clear non-skid is available).

07. IN THE RESTRAINED COCKPIT

All personal flotation devices worn should meet or exceed the latest WPPA/UIM Cockpit Guidelines current published standards regarding colour and impact material. Additional inflatable flotation is strongly encouraged.

"Cool Suits" - may contain any proven safe fluid or gas cooling agent other than Freon.

Eye protections - must be constructed of shatterproof material. Eyeglasses shall not be accepted as eye protection.

The Race Director - or Technical Director may prohibit use of any equipment he deems unfit for service.

Violation - of safety rules will result in a penalty assessed by the Race Director in conjunction with the Medical and Safety Director.

Props - All propellers mounted on shafts shall be covered by heavy cloth or canvas material whenever possible and at all times when the boat is unattended in public areas.

All boats parked in the "Dry Pits" shall have propellers removed or covered by heavy cloth or materials so as to minimise injury to crew or viewing public.

During trailer firing of motors:

(a) Propellers shall be removed.

(b) A fire extinguishing system must be readily available staffed by crew or fire department when internal engine compartment fire suppression systems are not incorporated.