Royal Aeroclub of the Netherlands
Proposal for complete re-vision of the F3D rules

File name: NED07F3D

Consideration.

To make F3D ready for the future, the rules need an improved framework after being in use for a long time.
This new framework should make them more complete, clearer and less subject to (local) interpretation.
Safety issues are identified and made explicit in all rule chapters.

Added is a tool to prevent unlimited speed increase in the future due to technical development. This tool is included in paragraph 5.2.1, the definition of the pylon racing class.
In the proposed rule set presented here, all safety issues as approved in the CIAM 2006 March meeting are included without effective change. Some additions were made to bring these new rules into effect.

A new noise emission rule proposal is added as part of the technical specifications in order to bring down exhaust noise to approximately the level of propeller noise.

Guide lines for organisers and judges, descriptions of tasks of people that run a competition and requirements for flying sites are added in annexes, not as new rules, but to increase the general level of organisation and safety of the competitions.

In 2006 a start was made to monitor crashes and race accidents especially to acquire statistical information about safe and unsafe areas on the pylon race site. The conclusions of this first evaluation are included in a separate document.
A proposed layout and zoning of a pylon racing competition site, Annex 1, is based on this.
It is proposed to yearly assess all race incidents and report to the F3D subcommittee as a standard procedure for organisers in order to adjust the rules and the site lay out for improved safety.

The following new F3D rule book is proposed in two versions. One is the code itself, the other includes comments and clarifications (in *Italic characters in yellow*) in cases where the proposed rules are interpretations or modifications to the current rules where it was necessary to make them consistent.

Rob Metkemeijer

5.2. Class F3D - pylon racing

Contents

5.2 Class F3D - pylon racing.

5.2.1. Definition

F3D pylon racing is the world championship class of R/C model air racing in a closed course.

Intention: The class will be defined in such a way that it brings the highest level of development of aircraft aerodynamic design, aircraft construction, power plant, propellers etc. and the highest level of piloting, at maximum safety.
Speed control strategy. The technical rules will be developed in such a way that the average course speed will be limited to 65 m/s (234 km/h) in order to maintain future safety and controllability of models.
Average course speed to be defined as nominal race distance (4000 metres) divided by the average times of the best five competitors of the previous World Championship.

In the rules all subjects or rules that affect average course speed have been identified with **(V)** for velocity.
All subjects and rules that have a direct relationship to safety have been identified with **(S)** for safety.

5.2.2. Technical Specifications of Pylon Racing Model Aircraft

5.2.2.1. Definition of Radio Control Pylon Racing Model Aircraft:
(a) Model aircraft in which the propulsion energy is provided by a piston type motor and in which the lift is obtained by aerodynamic forces acting on the supporting surfaces, which, except for the control areas, must remain fixed in flight.

(b) The model aircraft must be of conventional design with forward wing and an aft empennage with the general lines of a full size aircraft. Unusual or unconventional features must be justified with three view drawings or photographs of similar features used on full size aircraft. No delta or flying wing type aircraft are allowed.

(c) Para B.3.1. of Section 4b (Builder of the Model aircraft) is not applicable to class F3D.

5.2.2.2 A model aircraft may not be used by more than one race team

5.2.2.3 Each competitor may process and use a maximum of three models during a contest

5.2.2.4. Noise rules

5.2.2.4.1 The motor(s) shall be fitted with an exhaust system approved by the F3D Technical Sub-committee. A list of approved exhaust systems will be made available annually by CIAM.

5.2.2.4.2 The competitor is allowed to use a different exhaust system. In that case a test will be carried out on his exhaust system or on the noise emission of his model during the model processing and at request of the technical official after a race.

5.2.2.4.3 Annex 2 gives details of the noise rules and noise testing.

5.2.2.5. Weight
Weight less fuel, but including all equipment necessary for flight shall be at least 2250 g and not more than 3000 g **(S)**. If ballast is used it must be permanently and safely affixed. **(S)**

5.2.2.6. Fuselage

5.2.2.6.1. Cross-section
The fuselage shall have a minimum height of 175 mm and a minimum width of 85 mm **(V)** , the measurements to be of the fuselage body and are to exclude any fins, attachments or spacers. Both minimum dimensions must occur at the same cross-section location. The fuselage at this point will have a minimum cross sectional area of 100 cm^2 **(V)** excluding fillets and competitors will be required to provide templates to prove this. Fillets are not considered part of the fuselage or lifting surfaces.

5.2.2.6.2. Cowls
The motor or motor(s) must be enclosed, with the exception of the silencer, cylinder head and controls that must be manipulated during operation of the motor. The cylinder head for this purpose is defined as the top (or outer) 1 centimetre of the motor, excluding ignition plug or compression screw.

5.2.2.6.3. Cockpit
A cockpit or canopy profile must be evident and capable of enclosing a dummy pilot's head 50 mm from the chin to the top of the head. The canopy need not be transparent and a dummy pilot need not be fitted.

5.2.2.7. Lifting Surfaces

5.2.2.7.1. Area of Surfaces
Total projected area of the lifting surfaces (wing and horizontal tail combined) shall be a minimum of 34 dm^2 **(V)** . With a biplane, the smaller of the two wings shall have at least 2/3 of the area of the larger wing.

5.2.2.7.2. Wing Span
Minimum wing span shall be 1150 mm for a monoplane and 750 mm for the largest wing of a biplane. Maximum wing span shall be 1800 mm. **(S)**

5.2.2.7.3. Wing Thickness
Wing thickness of the root shall be at least 22 mm for a monoplane, and 18 mm for a biplane **(V, S)**. On a biplane with different size wings, the smaller wing must be at least 13 mm thick at the root. Wing thickness may decrease in a straight line taper from root to tip as viewed from the leading or trailing edge.
Note: Root shall be defined as the innermost wing section, not counting fillets that may be measured without removing wing from fuselage.
On a completely exposed wing, such as on a parasol monoplane or the top wing of most biplanes, the root is that section of the wing that is intersected by a projection of the outline of the fuselage as seen in the top view, i.e. the root section would be 50 mm from the centreline of an exposed wing on a model aircraft with a 100 mm wide fuselage.

5.2.2.8. Motor(s)
Motor(s) must be of the reciprocating piston type, with a maximum total swept volume of 6,6 cm3. **(V)** Propellers must rotate at the speed of the crankshaft. **(V)** Total engine air intake cross sectional area is limited to a total of 114 mm^2. **(V)**

5.2.2.9. Propellers and spinners
Only fixed propellers may be used. Two-bladed wooden or two or more blade composite resin continuous fibre construction propellers may be used. **(V,S)** A rounded nose spinner with a radius of at least 25 mm and a nose radius of not less than 5 mm diameter must be fitted. **(S)**

5.2.2.10. Shut-off

The pilot must be able to shut off his engine by radio control, on the ground, or in the air, within five seconds of command, irrespective of aircraft altitude. **(S)**

The radio system used to control the aircraft must be equipped with a fail safe. This fail safe shall be set to shut off the engine if radio signal is lost for more than 0.2 seconds. **(S)**

5.2.2.11. Undercarriage

The undercarriage may have a two or three wheel design with the main wheels having a minimum track of 150 mm. The minimum diameter of the main wheels shall be 57 mm. The competitor must give the organiser the possibility to check that measurement. A tail skid may be used in lieu of a tail wheel. A positive means of steering on the ground shall be provided, rudder control acceptable. Retracting gears are allowed.

5.2.2.12. Technical control, safety requirements for models.

5.2.2.12.1. At registration of the models, motors and exhaust systems before the competition, the technical official may carry out technical control either at his own wish or at the request of the competitor to check if the models comply with the technical specifications. However, the competitor is under all circumstances responsible that during the competition his model complies with the technical specifications in 5.2.2.1 – 5.2.2.11

5.2.2.12.2. During the competition all measuring equipment will be at disposal of competitors to check their models if they want to.

5.2.2.12.3. The technical official may take any model after a race for inspection.
ABR B 15.13 applies.
For this purpose the technical official may ask the competitor to empty the tank for weight control and for analysis of the fuel. Where a fuel analysis is made, a sample of the contest fuel shall also be taken for comparison. If, after analysis of the fuel from the tank, this fuel appears to be different from the contest fuel, the competitor will be disqualified from the competition, even retrospectively if the fuel analysis result is not available during the competition.
If the model is not according to the technical specifications in 5.2.2.1 – 5.2.2.11, the competitor will be disqualified from the competition.

5.2.2.12.4. The Contest Director has the right to request any competitor to make a flight to demonstrate the airworthiness of his model aircraft **(S).**

5.2.2.12.5. Safety inspections of all aircraft and helmets before or during registration and at random as a pre-flight check during the competition shall be conducted by the contestant under the supervision of the technical official.

The list *of safety checks* should include the following **(S)**:

a. Push/pull rods or cables, control horns, and servo leads shall be installed in such a way that they will not become disconnected in flight. Clevises shall be physically held closed by short pieces of fuel tubing or similar material. Metal clevises shall be protected from deterioration of the threads due to vibration by means of a lock nut, thread treatment such as Loctite ® or Vibra-tite ® , or a similar method. Ball links shall be tight.

b. All screws holding the engine to the mount and the mount to the firewall shall be in place and secure.

c. The radio receiver and battery pack shall be surrounded by soft foam rubber or other vibration dampening material and adequately protected against contamination by engine exhaust, raw fuel, or fuel residue.

d. Batteries shall be of adequate capacity for the size and number of servos used. Minimum battery capacity shall be: 500 milliAmp-hours (mAh).

e. Servos controlling the pitch and roll functions shall be of adequate strength for the weight and speed of the aircraft. Whenever a single servo is used to control one of these functions,

it shall be designed and built to accommodate at least four mounting screws. When two or more servos are used together to control the same function, as in the case of dual aileron servos or the movable tail surfaces on a "v" tailed aircraft, each of such servos may be of the two-screw variety.

f. Control surfaces shall be firm on the hinge line without excessive play. Safety officials shall be alert to the danger of excessive play whenever electronic servo throw reduction is used in combination with a mechanically inefficient linkage.

g. All screws holding the servos to the servo rails or trays and holding any trays to the airframe shall be in place and secure. Rubber grommets shall be used on all servos designed to accept them. If the heads of the servo mounting screws are small enough to pull through the grommets, washers shall be used to prevent this.

h. Pushrods shall have only one threaded end that is free to turn. The other end shall consist of a "z" bend, an "l" bend with keeper or collar, a metal clevis that is soldered on, or a threaded ball-link that is glued or otherwise secured so that it cannot turn.

i. Wings, if removable, shall be securely attached to the fuselage with bolts or screws.

j. Wheels shall be securely attached and shall turn freely.

k. The aircraft shall be free of stress cracks and any other indications of structural damage.

l. proper functioning of engine shut-off by fail safe

In case a model does not comply with the safety items during a pre-flight check , the technical official will not allow to fly it in the race. **(S)**

5.2.3 Competitors

5.2.3.1. A race team shall consist of a pilot and a caller. All pilots must be accompanied by a caller for reasons of safety. **(S)** The caller may be the team manager, another competitor from the same National team or a third party. In all cases the caller must be the holder of an FAI licence, not necessarily issued by the NAC of the pilot, and must have paid an entry fee.

Each pilot and mechanic/caller shall be registered as a team from the beginning of the competition through to its end.

The pilot or caller of one race team may act as the caller in one or other of the maximum of the three race teams permitted in a National team. However, once registered, pilot/caller roles may not be interchanged in a race team nor may a caller registered with one National team act as a caller for any other National team.

5.2.3.2. In each race, the caller must release the model aircraft at the start and give the pilot verbal information regarding the flying course of his model aircraft and official signals. **(S)**

5.2.3.3 There will be no pilots' helpers at any of the pylons.

5.2.3.4. Electronic communication with the pilot shall be prohibited.

5.2.3.5 The contest director has the right to request any competitor to make a flight to demonstrate his ability to fly the aircraft around the course **(S)**

5.2.4 Helmets

All officials on the racecourse and all competitors must wear a crash helmet with a chin strap. Helmets must be worn during practice and during the official event. **(S)**
A quality check of the helmets will be part of the safety checks

5.2.5. Transmitter and frequency control

5.2.5.1. For transmitter and frequency control see Section 4b, Para. B.10.4. **(S)**

5.2.5.2. Heats shall be arranged in accordance with the radio frequencies in use to permit simultaneous flights, taking into account that frequency will not follow frequency **(S**)

5.2.5.3. Each competitor has to introduce two different frequencies, distant of a minimum of 20 kHz, which he must be able to use on all the model aircraft entered in the contest. **(S)**

5.2.6 Fuel

The organiser will supply fuel to a standard formula for glow plug and spark ignition motors. Its composition shall be 80% methanol, 20% castor oil. **(V)**
See also Annex 7, par A.7.3.

5.2.7. Race Course, Distance and Number of Rounds

5.2.7.1 The race course is a triangle with sides of 40 metres, 180 meters and 180 metres, marked by 3 pylons. In this triangle a circle with a diameter of 20 metres is specified, wherein, for reasons of safety, all pilots, callers and the starter have to stay during a race**.(S).**

5.2.7.2. Race course lay-out: see illustration on next page. The racecourse specification may be modified in the interest of safety or to suit existing field conditions if safety is not compromised. **(S)**

5.2.7.3 Annex 1 gives guidelines for lay-out and organisation of the flying site in order to achieve maximum safety for competitors, judges and public. **(S)**

5.2.7.4. The pylons should have a minimum height of 4 m and should not exceed 5 m height. Pylons shall be made of a rigid material at least 70mm in diameter at any point. The pylons must be finished in a bright colour in order to enhance visibility. **(S)**

5.2.7.5. The race is over 10 laps with individual nominal length of 400 m, total nominal flying distance 4000 m.
The race starts at the start-finish line. The race is terminated at the start -finish line 10 full laps later.

5.2.7.6 The number of rounds will be announced by the organiser before the start of the competition with a minimum of 3 and a maximum of 15. Due to weather conditions or other important reasons the number of rounds may be reduced during the competition, but only after consultation with the team managers or the competitors in an early a stage as possible. See also Annex 7, A.7.5, timetable and A.7.6 team manager meetings.

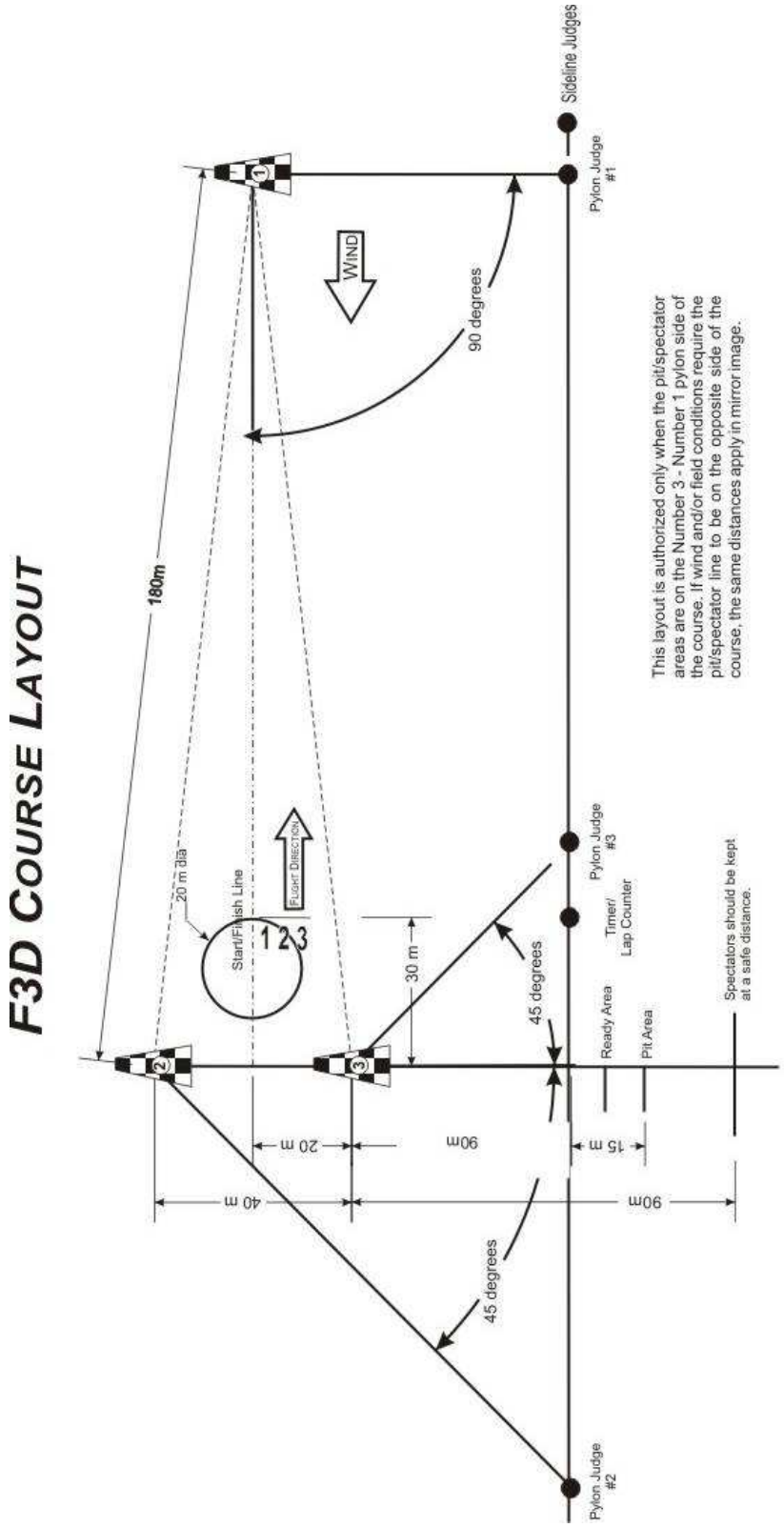


Illustration for paragraph 5.2.7.2, F3D race course layout.

5.2.8. Race from Start to Finish

Annex 3 describes the duties of the contest director, starter, judges and other personnel.
Annex 5 describes the draw of races.

5.2.8.1. A maximum of three model aircraft per heat will be allowed. **(S)**

5.2.8.2. All pilots and callers (and the Starter) have to stay within the 20m circle (see race course layout in 5.2.7.2). Since the starting line is outside the 20 meter circle, the caller shall move into this circle immediately after he released the model. **(S)** If the pilot or the caller steps out of this circle with both feet (to be judged by the starter) this will be penalised as an infringement. The Starter will take care that pilots are sufficiently separated and will take preventive action if a collision between pilots or their transmitter antennas is likely to occur. **(S*)***

5.2.8.3. Starting positions in all races will be determined by draw with the No.1 position being closest to No. 3 pylon.

5.2.8.4. The Race Starter is in charge of each heat, the starter will ensure that all competitors and Race Officials are ready to commence. Each time keeper and pylon judge will have a signal of a distinctive colour. The starter will arrange for each model aircraft to be identified by the time keepers and pylon judges before the start of any heat. A radio operation check from each competitor, judged by the starter will be made prior to starting motor(s). **(S)**

5.2.8.5. A 1 minute period will be allowed for starting and adjusting the motor(s), at which point the race will commence. A competitor whose engine is not running at the end of the 1-minute period will be disqualified from the heat. No competitor shall be permitted to take off once the first model aircraft has passed the start/finish line heading from No. 1 to No. 2 pylon on the first lap, and no time shall be given him for that heat. **(S)**

5.2.8.6. Start. All take-offs will be “Roll Of Ground”. Model aircraft shall be released from the starting line on the starting signal (flag drop or light signal) at one-second intervals with timing commencing at the starting signal for that particular model aircraft. No mechanical device may be used to assist the aircraft for take off, but hand pushing is permitted.
The main wheels of each model aircraft landing gear must remain behind the starting line until the starting signal.
An early start will be penalised as an infringement.
If the take/off path of a model is not free (e.g. because one of the other aircraft has stopped there) the Starter will not drop the flag for that competitor and the contest director will give that competitor a second opportunity to record a score in that round. In the case where a model is released without the flag being dropped, the competitor will be disqualified for that heat. **(S)**

5.2.8.7. All laps are to be flown counter-clockwise with turns to the left

5.2.8.8. Persistent flying below the top of the pylons shall be considered dangerous. **(S)**
Over-flying the side line shall be considered dangerous. **(S)**
After passing the first pylon on the first lap of the race, flying below the top of any pylon (to be judged by the pylon judges or the side line judge) and over-flying the side line (to be judged by the side line judge) will result as one infringement.

5.2.8.9. An infringement will be incurred if a competitor cuts a pylon (to be judged by the pylon judges).

5.2.8.10. At the completion of the 10 laps the Starter must immediately instruct the competitor to remove his aircraft from the course and to shut off his engine within 10 seconds. If the engine is not stopped within 10 seconds after the Starter’s command, the competitor will be disqualified for that flight (to be judged by the starter).

5.2.8.11. At the completion of a heat, all aircraft must be landed in an area designated by the contest director. No pilots or callers may enter the designated landing area until all aircraft have completed landing to a full stop. **(S)**
Infringement of this rule, to be judged by the starter, leads to disqualification from the heat. After all engines have stopped, the pilots and callers will leave the 20 metre circle and move to positions (to be advised by the starter before the race starts) close to -but not inside- the designated landing area from where they can land their models.

5.2.8.12. After the starting signal (flag drop or light signal) is given, any contact between model aircraft shall be considered a collision and the model aircraft involved must land immediately. **(S)**
If, in such instances, the Contest Director is of the opinion that the aircraft is still airworthy, or the competitor has an airworthy reserve model aircraft, then the competitor shall be entitled to a second opportunity to record a score in that round.

5.2.8.13 In the event of a malfunction of the timing, lap counting, signalling or other such equipment which is the responsibility of the organisers, any competitor(s) affected by such malfunction shall be given the opportunity to record a score for that round.

5.2.8.14. If during the race, the starter or the side line judge considers any model aircraft to be flying erratically, dangerously, or so uncontrolled as to endanger pilots, callers or course officials, the Starter shall instruct the pilot to land immediately. The pilot shall be disqualified from that heat or the contest director may disqualify him from the competition. **(S)**

5.2.8.15. The loss of any part of the model aircraft after the starting signal (flag drop or light signal) and before the engine stops disqualifies the model aircraft for that flight except as a result of a collision where Para. 5.2.8.12 applies.

5.2.8.16 The race is finished, when all models have landed and have come to a full stop.

5.2.9. Timekeeping and Judging

Annex 3 describes the duties of time keepers and judges.

5.2.9.1. Flight timers and lap counters: Each competitor shall be assigned one official during each heat. This official will time the competitor's aircraft for the required ten laps. In doing so he will count the laps flown and advise the pilot when he has completed the necessary 10 laps. He will keep the recorded time on his timing device until he has entered the time on the score sheet under the supervision of the starter.

5.2.9.2. On the start/finish line an electronic activated signal will be provided for each competitor. The No 1 pylon judges will operate these signals. These judges shall signal the competitor when the competitor's aircraft has passed the No 1 pylon. The pylon judges will be located from the course as described in the course specification drawing (5.2.7.2). Each pylon judge will have a distinctive colour allocated, and the starter will arrange for each model to be identified by the allocated pylon judge before the start of every heat.
The judges' signals will be off as the aircraft reach midcourse between No. 3 and No. 1 pylons, or earlier. At the instant the model draws level with the No. 1 pylon the pylon judge will switch his signal on. When the model draws level with the No.1 pylon on the way back the signal is switched off. When a pylon cut has been made the signal will flash on and off 5 times or an other signal will be activated to inform the competitor about the pylon cut.

5.2.9.3. At the No. 2 and No. 3 pylons, the pylon judges will place themselves in a position in accordance with the course layout (5.2.7.2) to the pylon they are judging.
The judges at No. 2 and No. 3 pylons will record a cut pylon infringement.

5.2.9.4. Two sideline judges will be posted near the pylon 1 judges on the spectator side of the racing course. The sideline judges will record as an infringement any over-flight of the sideline and any flight below the height of the pylon.
A sideline judge will be posted in front of the pit area on the spectator side of the racing course. The sideline judges will record as an infringement, any over-flight of the pit or spectator areas.

5.2.9.5. At the end of each race the sideline and pylon judges will inform the Starter of any infringement by any competitor.

5.2.10. Infringements and penalties

For reasons of clarity all infringements that are mentioned in the rules, the judges that are judging them and the corresponding penalties are summarised in the following table.
See paragraph 5.2.11 Scoring, for the effects of disqualification and infringements on the competitor's score.

Only the Contest Director may disqualify a competitor from the competition.

paragraph	subject	judged & applied by	penalty
5.2.2.12.3	At after-race processing, model is not according to technical specifications 5.2.2.1 – 5.2.2.11	technical official, contest director	disq for competition
5.2.2.12.4 5.2.3.5	Cannot prove airworthiness of model or ability of pilot	contest director	disq for competition
5.2.2.12.5	model does not pass pre-flight safety check	technical official, contest director	disq for heat
5.2.4	not wearing of helmets (pilot/caller)	starter	disq for heat
5.2.5.3	not having 2 frequencies	contest director	disq for competition
5.2.6	not using official contest fuel	contest director	disq for competition (may be applied retrospectively)
5.2.7.1 5.2.8.2	stepping out of 20 m circle with both feet	starter	1 infringement
5.2.8.5	engine not running when flag drops or too late start	starter	disq for heat
5.2.8.6	early start	starter	1 infringement
5.2.8.6	release model without start flag signal	starter	disq from heat
5.2.8.8	flying below pylon height	side line or pylon judge	1 infringement
5.2.8.8	flying outside safety line	side line judge	1 infringement
5.2.8.9	pylon cut	pylon judge	1 infringement
5.2.8.10	failing to shut off engine within 10 seconds from Starter's command	starter	disq from heat
5.2.8.11	landing outside designated landing area	starter	disq from heat
5.2.8.11	pilot or caller entering the landing area before all models have landed and stopped	starter	disq from heat
5.2.8.14	erratically, dangerous or uncontrolled flying	starter, side line judge, contest director	disq from heat or from competition
5.2.8.15	loosing part of model	starter, side line judges	disq from heat

5.2.11. Scoring and Classification

5.2.11.1. The flight of each model aircraft shall be timed with a timing device measuring to at least 1/100th of a second) by a lap counter/timekeeper. Timing shall start when the starting signal is given to the individual competitor.

The lap counter/timekeeper stops his timing device after ten laps have been completed by the competitor and, supervised by the starter, records the elapsed time from the timing device on the competitor's score sheet.

At the completion of each heat, the pylon and side-line judges shall notify the Starter as to which model aircraft, if any, have infringed. The starter then advises the lap counters/timekeepers of those aircraft who will record the total number of infringements for each competitor on his score sheet.

The score sheets are then processed by a scorekeeper who:
a) for one infringement, will add 1/10th of the flyer's time for ten laps to give the corrected time;
b) for two or more infringements, will give a score of 200.

5.2.11.2. Points shall be awarded after each race as follows: The competitor's score shall be his corrected time in seconds and hundredths of a second. If the competitor fails to complete his flight or is disqualified his score shall be 200.

5.2.11.3. The winner of the event is the competitor who has accumulated the lowest score after the conclusion of all heats. If four or more rounds are flown, each competitor's worst score shall be discarded. If eight or more rounds are flown, each competitor's worst (highest) two scores shall be discarded. If twelve or more rounds are flown, each competitor's worst (highest) three scores shall be discarded.

5.2.11.4. If the time permits and there is no frequency conflict, ties shall be broken by a fly-off race. Otherwise, the best single race score shall be considered in resolving a tie.

5.2.11.5. Team Classification
To establish the scores for the international team classification, add the final individual scores of the members of the team. Teams are ranked according to the lowest numerical score to highest, with complete three-competitor teams ahead of two-competitor teams which in turn are ranked ahead one-competitor teams. In a case of a team tie, the team with the lower sum of place numbers, given in order from the top, wins. If still equal, the best individual placing decides.

5.2.11.6 Awards
Awards will be given in compliance with ABR Volume, B.14.2. Callers will be awarded with diploma's only.

ANNEX 1

AIRFIELD LAY-OUT, SAFE AND UNSAFE AREAS, POTENTIAL LANDING AREAS

Diagram 1 overleaf gives the ideal competition site layout for F3D in order to attain maximum safety for competitors, race course personnel and spectators. The local situation may be such that a different, but as safe as possible, layout has to be applied. Two orientations are drawn for the airfield lay-out, one with No. 1 pylon at the right side as seen from the pits and an other one with No. 1 pylon at the left side.

The diagram is partly based on the 2006 assessment of ground impact in a number of major F3D competitions. Such assessment should continue as a standard routine to inform the F3D Sub-committee, which may lead to modifications for safety reasons of the preferred airfield layout in the future.

This assessment shows that the layout with No. 1 pylon at the left side as seen from the pits is preferable from the point of safety, although the number of observations may be too limited to consider this as a strong conclusion

Application of a net at the given position in diagram 2 should be considered as an extra safety measure in the case of No. 1 pylon at the right side for major competitions; the potential effect to be assessed in the coming years.

The Contest Director or Starter will designate the landing area. The diagrams give a suggestion where a landing area can be situated. In case of bad quality of this area around the racing course for landing and the presence of a tarmac strip inside the triangular race course, landing may take place on this tarmac strip. In this case all pilots and callers must go to a safe position designated by the Starter, outside the triangle, before the first model lands.

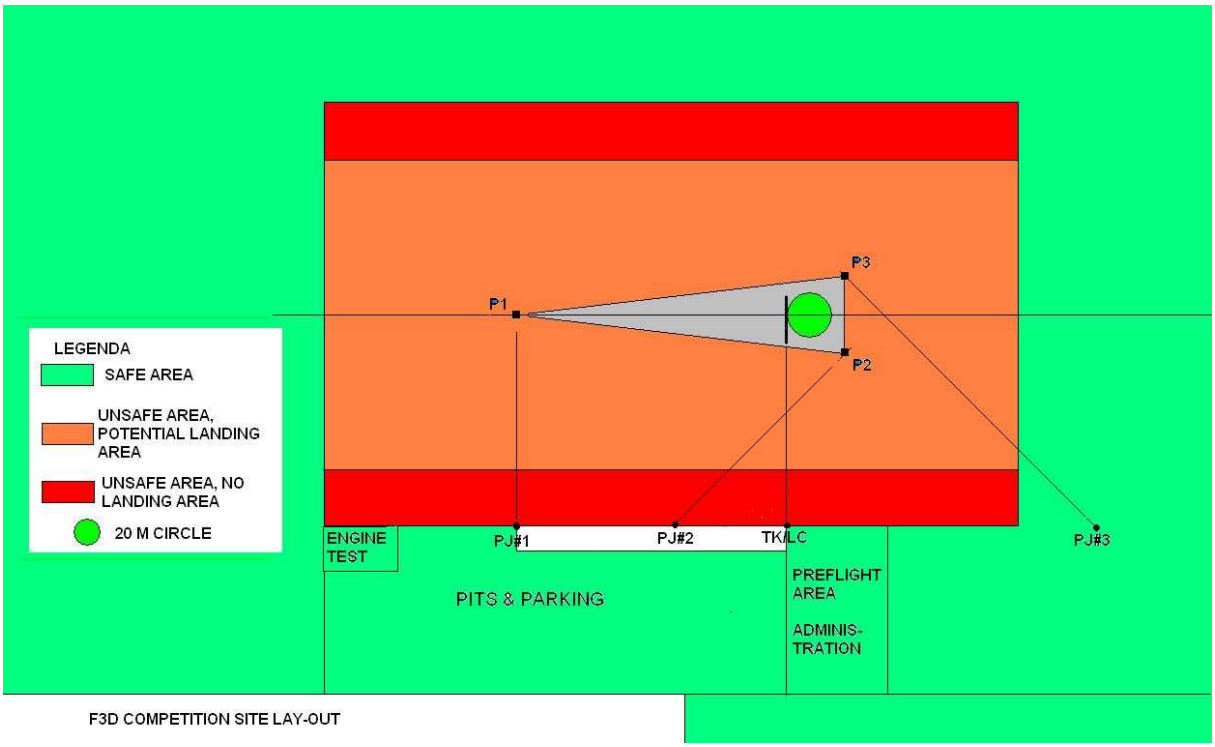


Diagram 1: Preferred F3D site layout, No. 1 pylon at left side as seen from pits

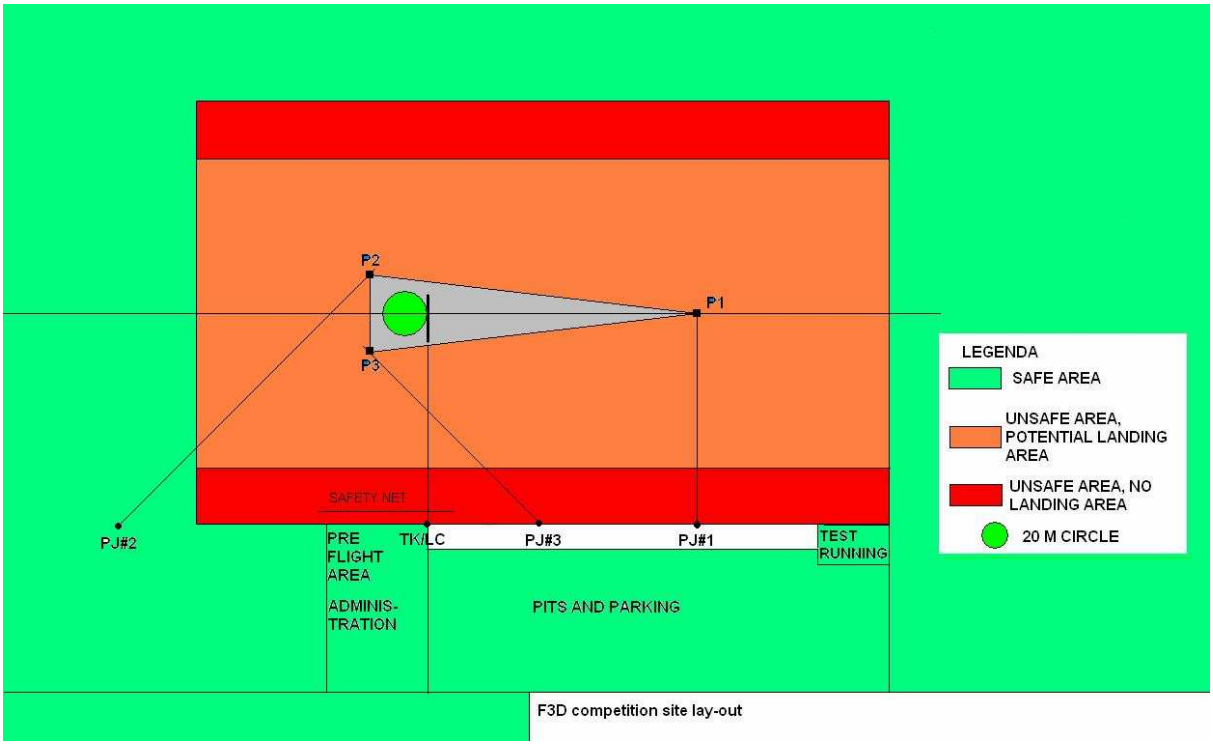
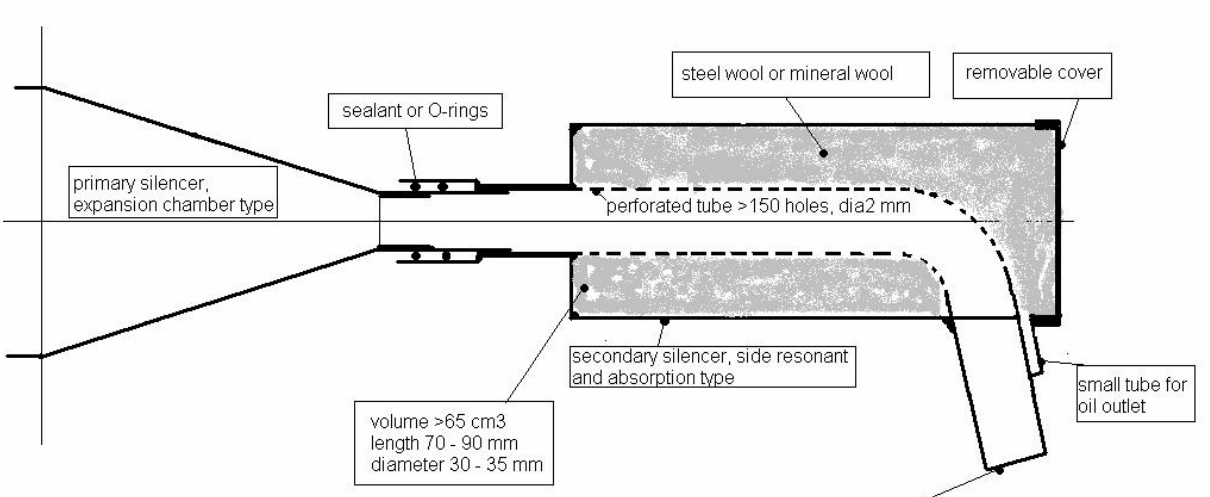


Diagram 2: Less preferred, but acceptable F3D site layout, No. 1 pylon at right side as seen from pits

ANNEX 2 NOISE RULES

A.2.1 The motor(s) has to be fitted with a silencing system on the exhaust consisting of a primary and a secondary silencer. The primary silencer should be not less than 30 mm diameter and 100mm length and should have a total exhaust outlet area of not more than 80 mm^2. It may be of the expansion chamber (tuned pipe) type.
A standard secondary silencer of the side resonant/absorption type has to be added. This silencer can be of a standard type, approved by the technical committee according to the homologation procedure as described in paragraph A.2.3. It will be fitted to the exhaust outlet of the primary silencer or integrated with the primary silencer according to one of the principles drawn in fig. A.2.1.
Note: The drawn silencers may be slightly oversized and will certainly do the job, but these are only examples. The indicated sizes are general guidelines.
The way the inner pipe is perforated (it may also be made in metal mesh) could be varied. Also the way the inner pipe is bent and positioned (it does not necessarily have to be exactly centred) may be varied. However, a bend of minimal 30° in the perforated part inside the bo dy of the secondary silencer is recommended for high frequency performance in order to reduce the "sharpness" of the sound.
There is usually no significant acoustic effect in bending or angling the pipe and silencer system to fit it into the model.
A list of approved " commercially" available secondary silencers (or combined primary and secondary silencers) will be made available yearly by CIAM.



External secondary silencer for F3D

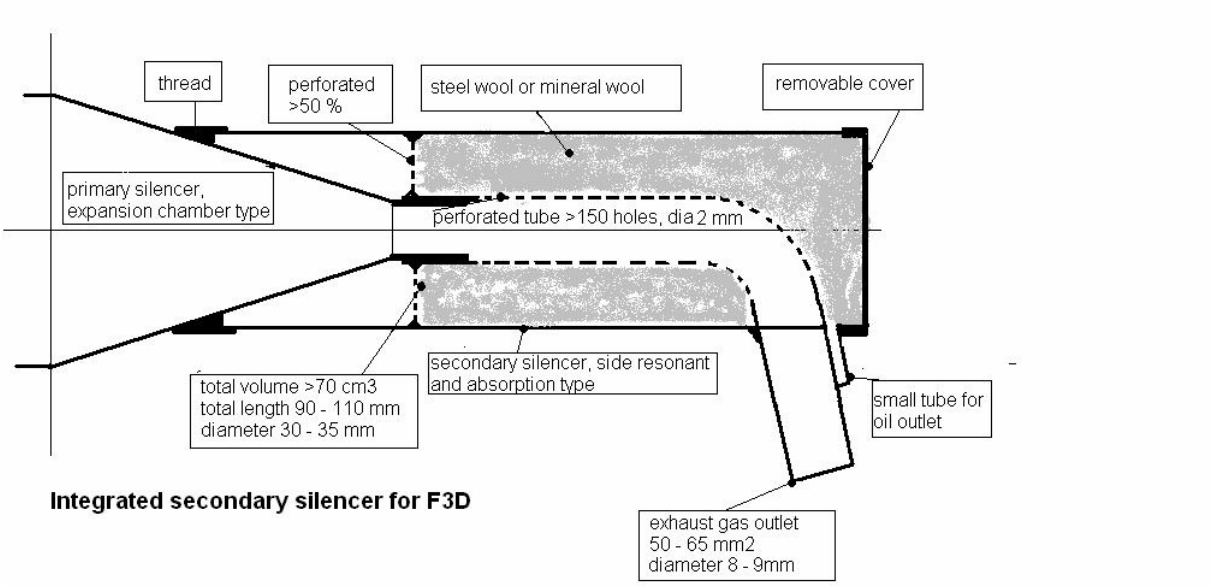


fig A.2.1 Principle of F3D silencers. All sizes indicated are internal sizes.

A.2.2 The competitor may use a different exhaust system than stated in A.2.1. In that case a noise test will be carried out during the model processing and at request of the technical official after a race. For this test two alternative methods are given in A.2.2.1 and, A.2.2.2, either of which may be used by the technical official.

The noise tests has to be carried out with a calibrated sound level meter according to IEC61672 – 1:2002 Class 1 with a wind screen. The "A" frequency weighting to be used in all cases.

A.2.2.1 Noise test with running engine. The noise level shall not exceed 96 dB(A) @ 3metres, a tolerance of + 2 dB(A) allowed for accuracy of measurement.

The noise test shall be conducted as follows:

- The engine will be running at a piston speed of 12 ± 1 m/s (this is for the most common 6.6 cc engines with a stroke of 20±2 mm equivalent to 17.000 – 19.000 rpm). To achieve such piston speed a suitable propeller needs to be installed by the competitor.
- The model will be held at a height of 1.50 m ± 0.2m above grass ground with a wing horizontal, model upright.
- The sound level meter will be held at a distance of 3 metres distance from the end of the exhaust pipe under an angle of 45 degrees to the longitudinal (fore and aft) centre line of the model at the back of the model at a height of 1.50 ± 0.2 metres, with the exhaust outlet "visible" for the sound level meter's microphone.
- There shall be no sound reflecting surfaces within 10 metres distance from the engine and/or the sound level meter.
- If the wind speed is more than 5 m/s the wind direction has to be perpendicular to the line between the model and the sound level meter.

Note: The noise levels measured with this method are only for comparison of the competitor made exhaust system with the standard approved systems. The noise levels are not representative for the noise levels in flight with a normal racing propeller at normal racing rpm.
The reason for this method of measurement, which is based on common practice in motorcycle racing (www.fim.com) is to sufficiently reduce the contribution of propeller noise and not to overheat and overload the engine in the noise test.

A.2.2.2 Test of exhaust system. The performance of an exhaust system can also be measured using an electro acoustic actuator, e.g. during the processing of models before or during a competition.

This actuator can be a 1” horn driver fitted with an adaptor to fit the intake side of the primary silencer. The actuator will be fed by white noise with a limited bandwidth of 500 – 4000 Hz and an electric power input of approximately 1 Watt.
The actuator will be placed vertically on a stand at a height of approximately 1.5 metres and the exhaust system will be connected on top of it.
The measurements will be taken at a distance of 1 metre. at the same height as the gas outlet from the exhaust system.
The measurement will determine the sound level difference in dB(A) between a silencing system approved by the F3D Sub-committee and the exhaust system presented by the competitor, both fitted in the same way to the actuator. The sound level measured with the competitors exhaust system shall be equal to or less than the sound level measured with an approved system, a measurement accuracy of 2 dB(A) allowed.
Alternatively a measurement can be carried out of the “insertion loss” of the secondary silencer in the case where the primary and the secondary silencer can be separated or a comparison can be made with an identical primary silencer without secondary silencer. In this case insertion loss is simply defined as the sound level reduction in dB(A) with and without the secondary silencer. The criterion for this method is a sound level reduction of 12 dB(A) at an ambient temperature of 10 – 35 ℃.
Note: the insertion loss at an exhaust gas temperature of approximately 400℃ will be generally 2 – 3 dB(A) less

A.2.3 Homologation of exhaust systems will be done by the F3D Sub-committee for any exhaust system that is presented by a manufacturer and that complies with the rules. A certificate will be sent back with the exhaust system with a homologation code number unique for that system. The manufacturer will mark the exhaust system with this code number. It is not allowed to modify such a system. Modified systems will have to follow the procedure in paragraph A.2.2

ANNEX 3

DUTIES OF JURY, CONTEST DIRECTOR, JUDGES AND OTHER OFFICIALS

A.3.1 FAI international jury.
Watching of the competition in general including the standards of judging. Handling of official protests.
For the appointment and specific duties of the FAI international jury is referred to the ABR Section 4B par. B.4 of the general rules for International contests.
The members of the FAI jury are invited to and, should be present at, each team managers' meeting, each briefing of the judges, the opening and the awards ceremonies.

A.3.2 Contest Director (CD)(1)
The Contest Director is the general manager of the competition. During a racing event, an unforeseen situation may arise that requires immediate controls. Therefore, the CD is authorised to initiate any special procedure he deems necessary to rectify a situation that may be considered unsafe.
Any protest shall be handed to the CD. *Protest procedures are described in ABR B.16.*
The CD will assign the landing area.
The CD is the person responsible for the draw for the heats. The FAI jury will be represented when the draw takes place.

A.3.3 Starter (1) (+ 1 Assistant Starter if necessary)
The Starter acts for the CD in all matters arising on the racecourse. Unless overruled by the CD, the Starter's actions and decisions concerning the start, finish, and operation of each heat are final.
The Starter's primary duties are to signal the start and finish of each heat, co-ordinate the efforts of the other racecourse workers, and to transmit the scores and times from each heat to the Assistant Starter or scorekeeper. The Starter should be equipped with the following:
(a) a clipboard containing the draw of the heats;
(b) a signal flag, preferably one bearing the classic black-and-white chequerboard pattern; ~~and~~
(c) a walkie-talkie or headset radio.
A helpful accessory is a large starting clock with a clearly visible sweep hand.

The Starter should stand ahead and to the right of the starting line, as viewed from the pilots' standing area facing No. 1 pylon. When the pilots have reached their assigned positions on the starting line, the Starter should direct the pilots or callers to hold up the aircraft one by one, so that all the racecourse workers can clearly see and identify them. The Starter should then communicate (via a coloured flag or a walkie-talkie) a unique identifying colour for each aircraft.
The Starter will check if all pilots and callers are wearing helmets.
After identifying the aircraft, the Starter should ask the pilots to make sure their transmitters and receivers are turned on and functioning properly. He should ask to see a "wiggle" of confirmation from one of the control surfaces on each aircraft.
After that, the Starter announces the start of the 1 minute period for starting and adjustment of the engines.

The Starter shall give the starting signal (flag drop or light signal) at one-second intervals pointing with his finger to the aircraft that is next to take off, the closest model to be started first. Timing commences at the starting signal for that particular model aircraft. If one ore more of the models is not ready to take off at the starting signal the Starter will not change his action.
The Starter will judge if the wheels of each model aircraft's undercarriage is behind the starting line for the starting signal. If not, he will give a penalty for an early start (5.2.8.6.)

During the race the Starter will judge whether the pilots and callers stay inside the 20 m circle . If a pilot or caller steps out of this circle the Starter will give a penalty.
The Starter will take care that pilots are sufficiently separated and will take preventive action if a collision between pilots or their transmitter antennas is likely to occur.

The Starter should call “up and out” to any pilot (also calling his colour or racing number) who appears to have double-cut or who is otherwise disqualified.
After the finish of each aircraft, the Starter will communicate to the competitor that his race has finished which means that the pilot has been given the command to shut his engine and has 10 seconds in which to comply. If the pilot fails to shut off his engine within the 10 seconds then, he will be disqualified for that heat.
The Starter judges the landing procedures and will disqualify competitors that land outside the designated landing area and any competitors that enter the landing area before the last model has stopped.

At the end of the race , the Starter will collect the scores, all infringements and race times from the officials and communicate them to the score keepers. Any disputes concerning the number of laps flown, times, cuts, etc., should be resolved promptly at the conclusion of the heat. If a pilot believes that a mistake in lap counting or calling of cuts has affected his time, then it can be changed only if the timer/lap counter or other racecourse officials involved freely admit to making a mistake.

Since the duties of the Starter are many, an Assistant Starter may be necessary. The Assistant Starter will be under the full authority of the Starter. The duties will be allocated by the Starter.

A.3.4 Timekeepers/Lap Counters (3)
The job of each timer/lap counter is to follow one aircraft, to the exclusion of all others, for the duration of the heat and to accurately record the laps completed and the elapsed time for that one aircraft. Ideally, the timer/lap counter’s eyes should never leave his assigned aircraft between the time it is held up on the starting line for identification and the time the Starter gives it the chequered flag at the end of the heat.
Standard equipment for the timer/lap counter consists of a stopwatch and a hand-held clicker or similar device for counting laps. At least one of the timers/lap counters should also be provided with a walkie-talkie, headset radio, or other means of communication with the Starter on the racecourse.
Each timekeeper/lap counter should start his stopwatch at the start signal from the Starter for his assigned aircraft.
Each timer/lap counter should record a lap completed each time his assigned aircraft crosses the start/finish line.
On the pilot’s last lap, the timer/lap counter should watch for the aircraft to cross the start/finish line and stop the stopwatch at the instant it does so.
If the stopwatches are capable of a “split” function, it is a good idea to get all lap times. This may help in case of protests for timing errors.
If electronic timing and lap counting are available, they can be used instead of the manual system as described above.

A.3.5 No. 1 Pylon Judges (3 + 1 Chief Judge)
Like the timers/lap counters, the No. 1 pylon judge each watch one aircraft, to the exclusion of all others, for the duration of the heat.
The primary job of each No. 1 pylon judge is to signal the pilot when his aircraft has gone the required distance to No. 1 pylon and can, therefore. turn without cutting.
The secondary job of each No. 1 pylon judge is to notify the No. 1 pylon chief judge if the aircraft turns before getting to the pylon.
No. 1 pylon judges are stationed on the sideline, looking directly out (ie perpendicular to the sideline) toward No. 1 pylon.
The No. 1 pylon judge’s standard equipment consists of
(a) a colour-coded signal light, shutter, both with a sufficiently fast response time (< 0.05 s) or flag with which to signal a turn, and (b) some form of “cut” indicator with which to signal a cut.
As viewed from the sideline, it is not possible for an aircraft to go the required distance to No. 1 pylon and also to cut inside No. 1 pylon on the same turn. Therefore, if a judge has signalled the pilot that he has gone the distance, a cut should not be called.

When the aircraft are held up for identification before the beginning of the heat, the No. 1 pylon judge for each lane should flash or waggle the turn signal device to indicate recognition of his assigned aircraft.

After launch, and after the aircraft crosses the start/finish line on each succeeding lap, the No. 1 pylon judge should do as follows:

If the signal device is a flag, hold the flag aloft so that it is clearly visible as the aircraft approaches, then drop it smartly the instant the aircraft intersects the imaginary vertical plane established between No. 1 pylon and the No. 1 pylon judge's position on the sideline. (See F3D course layout, 5.2.6.2.).

If the signal device is a shutter or light, activate it crisply at that same instant and hold it in the open or "on" position and switch it "off" again when the model crosses the imaginary vertical plane established between the No. 1 pylon and the No. 1 pylon judge's position in the other direction.

Sometimes the "cut" indicator is simply a continuous flashing or waving of the signal device. If this is the method being used, be sure to flash or wave as necessary for at least several seconds, and communicate the cut to the No. 1 pylon chief judge. If he concurs that it is indeed a cut, the chief judge will notify the Starter. Then continue signalling as before.

A turn is legitimate (ie there is no cut) if any part of the aircraft goes past the pylon. If there is any doubt about a possible cut, then the pilot should be given the benefit of the doubt.

A.3.6 No. 1 Pylon Chief Judge.(1)
The No. 1 pylon chief judge is stationed with the No. 1 pylon judges and should be equipped with a walkie-talkie or headset. The chief judge communicates aircraft identification information to the No. 1 pylon judge at the beginning of each heat, confirms any cuts called by the No. 1 pylon judges, and relays cut information to the Starter.

Other than the Starter, the No. 1 pylon chief judge should be the most experienced worker on the racecourse.

A.3.7 Nos. 2 & 3 Pylon Cut Judges. (3 + 3) The primary job of the Nos. 2 & 3 pylon cut judges is to watch their assigned aircraft in each heat and relay any cut information to the Starter. Standard equipment for the cut judges includes a chair and sunshade, a walkie-talkie or headset, and a notepad or dry-erase board on which to jot colour schemes and other aircraft identification information for each heat.

The Nos. 2 & 3 pylon cut judges should be positioned on the sideline, looking out toward their respective pylons at an angle sufficient to see whether the aircraft are cutting (see the F3D course layout, 5.2.6.2.).

Each of the cut judges may also be equipped with an ordinary transmitter antenna, fishing rod, or thin dowel mounted vertically on a stand or stake in front of his chair to help judge whether the aircraft are staying outside the imaginary vertical line extending above the pylon, and/or an air horn to "toot" as an offending aircraft passes the pylon. Each hooter to emit a different sound to aid identification of the pylon.

When the aircraft are held up for identification before the beginning of the heat, the Nos. 2 & 3 pylon judges for each lane should flash or waggle the turn signal devices to indicate recognition of the assigned aircraft.

The judge may simply put a check mark his notebook or dry-erase board during the race, and then report to the Starter the total number of cuts recorded for his assigned aircraft at the end of the heat. If electronic means are used for cut judging, this information will be recorded automatically by the computer system.
A turn is legitimate (ie there is no cut) if any part of the aircraft goes outside and around the pylon. If there is any doubt about a possible cut, then the pilot should be given the benefit of the doubt.

A.3.8 Sideline Judges (3)

The side line judges each follow their assigned model and are tasked to monitor low flying around the pylons and any flying over the side line.
Additional to their task could be to judge whether a model is flying erratically or dangerously and to inform the Starter so that he may instruct the pilot to land the model.
Since this type of judging has strong subjective elements and the decisions of these judges will lead to penalties or disqualification it is necessary that these judges are trained and experienced people and that consensus about judging is attained before the start of the competition.

A.3.9 Scorekeeper (1)
The scorekeeper collects recorded heat times, infringements and disqualifications. He calculates the scores and enters them on a master list, scoreboard or computer as the contest progresses..
The scorekeeper should, if possible, be equipped with a walkie-talkie to communicate with the Starter.
The scorekeeper may be the same person who assists the CD in making the draw for the heats.

A.3.10 Technical and Noise Official (1)

This official (and his assistant(s)) is responsible for the duties described in paragraph 5.2.7.10.
If he finds that models do not conform to technical specifications he will report this to the CD who will decide if the competitor should be disqualified for the competition. If a model does not pass the pre-flight safety check, then it will not be allowed in that race unless the necessary modifications are made to the technical official's satisfaction before the next race. During the pre- or after-flight check, the technical official will also check the FAI stickers and stamps on the models that will be flown in a heat. He will write the identification numbers on the starting list. He will also check the identification marks on engines and on the silencers. If numbers and marks are not present or they do not match the numbers and marks of the competitor, the competitor will not be permitted to fly in that heat and the technical official will report these facts to the Contest Director.

A.3.11 Safety Official (1)
The duty of this official is to record all race accidents, crashes and other situation that are potentially dangerous and report to the CIAM technical subcommittee.
He may also assist the CD in safety matters.

A.3.12 Pit Boss (1)
The pit boss calls up the pilots by heats to fuel and place their aircraft in the Ready Area. A public address system is helpful in this task. The pit boss should, if possible, be equipped with a walkie-talkie to communicate with the Starter.

A.3.13 Fuelling Station Supervisor (1)
This person runs the fuelling table. He should ensure that each pilot who brings an aircraft to the ready area drains it of fuel and then refuels it from the official fuel supply. After fuelling, the aircraft should be placed in the Ready Area and not taken back to the pits. To make the procedure of fuelling at the fuelling station possible, at least 5 metres of table should be provided. In order to speed up the fuelling process at the fuelling station, it is highly recommended that models are equipped with a tank filling system that can be operated without opening the model.

A.3.14 Transmitter Impound Supervisor (1)
This person should be provided with a large rack or folding table, protected from the sun and rain, on which to collect and safeguard the contestants' transmitters.
Transmitters should only be given to those pilots who are on their way to the Ready Area. When brought in after each heat, the transmitters should be checked to ensure that they are switched off.
The transmitter impound supervisor shall operate a spectrum analyser or other adequate radio monitoring equipment for the purpose of detecting radio interference.
He should be equipped with a walkie-talkie or headset to enable him to communicate with the Starter
In the case of detection of potential interference he will immediately notify (by walkie-talkie or head set) both the pit boss and the Starter who can then announce the interference over the public address system.

The transmitter impound supervisor may also be one of the people who helped with registration, inspection, or setting up the matrix.

A.3.15 Emergency - First Aid (1)
At least one qualified medical attendant should always be available on the site when flying is permitted. Ambulance & crew on request. On major competitions like Continental and World Championships an ambulance &crew permanently available.

A.3.16 Combination of functions
The complete set of officials as listed totals 29. For many organisations it will be hard to arrange this number of judges and helpers.
It is possible to combine some of the functions for smaller competitions. For example:

- One judge for each of the Nos 2 & 3 pylons is acceptable. In this case, these judges would need a notebook in which to write down pylon cuts and associated aircraft colours.
- The number of sideline judges could be reduced to one who would observe the flying over the side line and look out for any dangerous or erratic flying by the three competitors. Low flying near the pylons could be judged by the pylon judges.
- The technical official could also be the safety official
- The score keeper could be one of the timekeepers
- The No. 1 pylon chief judge could be one of the No. 1 pylon judges
- The pit boss could also be the score keeper, transmitter impound supervisor and/or fuelling station supervisor.

The minimum number of personnel combining functions is 17-19.

ANNEX 4

TECHNICAL EQUIPMENT

The organiser must provide the following technical equipment.

A.4.1 Spectrum analyser
See for equipment to detect radio interference ABR Section, B.10.4.
During the competition the spectrum analyser shall be operated by the pit boss and during any practice sessions by the official designated as the safety official for the practice sessions.

A.4.2 PA Systems
Two systems: one for addressing the spectators and one for addressing the entrants (calling them for flights, etc).

A.4.3 Model Processing.
A means of effectively marking registered models, motors and exhaust systems.
Spare FAI model specification certificates and stickers.
Template for checking:

- fuselage dimensions, 175 mm and 85mm
- wing thickness, 22 mm,
- wheel dimension, 57 mm
- spinner nose radius 5 mm

Ruler for checking the linearity of wing taper
Means of accurately weighing models, measuring models and computing the projected area, both on and off the flying site. A computer running an appropriate program for the latter measurements is recommended.

A.4.4 Motor Processing

Measuring Equipment

For measuring the bore a minimum of a self-centring (three-point) micrometer gauge with a minimum graduation of 0.005 mm and an accuracy of +- 0.002 mm should be used. A standard sizing ring appropriate to the instrument and manufactured to the appropriate DIN standard must also be supplied in order to calibrate the bore gauge prior to use.

For measuring the stroke a dial gauge with a minimum of 25 mm travel, a minimum graduation of 0.01 mm and an accuracy of ± 0.020 mm fitted with a suitable stop to rest on the top of the cylinder should be used. For measuring an engine which is close to top limit of capacity, a 0 to 30 mm depth micrometer with minimum graduations of 0.005 mm and an accuracy of ± 0.002 mm should be used. The dial gauge is the preferred instrument for stroke measurement because of its ease of use.

Method of Use

Engines with removable cylinder heads

On engines using removable heads, the bore should be measured at or near TDC.
The stroke should be measured using the dial gauge supported on a suitable foot and mounted on the top of the crankcase or cylinder.

Engines with integral cylinder heads

On engines, which have integral heads, the bore diameter must be measured from the bottom of the cylinder. The diameter should be measured at the point at which the piston interferes with the bore. If this cannot be established, then the bore should be measured 3,5 mm below the height of the piston crown at TDC. This point should be below any carbon band which would reduce the

apparent bore of the cylinder. Alternatively, the piston diameter can be measured. The piston should me measured at its maximum diameter point.

For the stroke measurement the entrant must provide tooling to allow the piston connecting rod & shaft assembly to be rotated through 360 degrees, using a dummy cylinder if necessary. The dial gauge can then be used in a fashion similar to that used on engines with removable cylinder heads.

For measurement of the air intake area of a circular venture, the organiser will supply a plug gauge of 50 mm long, 12.00 mm (-0, + 0.05mm tolerance) wide and 1 mm thick. If this plug gauge will not go through the venturi under any angle, the air intake is taken to be correct. If a different section for the venturi is used that fails this test, or a multiple air intake system is used, then the competitor shall bring templates, drawings, own tools or other means, together with an appropriate calculation of the total air intake area in order to allow the total air intake to be checked using a normal calliper or micrometer for control.

A.4.5. Noise Measurements

A calibrated sound level meter according to IEC61672 – 1:2002 Class 1 with a wind screen. The "A" frequency weighting to be used in all cases.

A.4.6 Race Equipment

- 1 starting flag.
- 1 stopwatch for the Starter.
- 1 minute clock clearly visible for pilots and callers and preferably also for the timekeepers for indication of the 1 minute engine start period.(recommended)
- Flags or some other means of identifying the individual prior to the race at the starting position and at the timekeepers' and pylon judges' positions.
- A system to provide the competitors with information of the number of laps flown and which can be easily identified by the teams and the spectators.(recommended).
- 3 sets of pylon cut indicators, clearly visible for competitors and Starter, preferably also for time keepers, pylon and side line judges.

A.4.7 Time keeping and judging

- 3 stopwatches + 2 reserve registering at least 1/100 sec.
- 3 manually operated lap counters + 2 reserve
- score sheets
- The complete time keeping, lap counting and judging equipment may be replaced by a computer based electronic system with multiple displays as have been used in the 2003 (Melnik, Czech republic) and 2005 (Tours, France) for great benefit of the competitors and the public.
-

A.4.8 Secretariat

The Secretariat should be housed in a building or caravan, but preferably <u>not</u> in a tent.

- Computer with scoring program and printing equipment or electronic calculators.
- Spare stopwatches.
- Scoreboard with felt pens or ~~an~~ other means of displaying ~~of~~ the competition results to the competitors and the public.
- Valid Sporting Code actualised version.
- Rules displayed, FAI language (English).
- Rules displayed, national language.

ANNEX 5

DRAW OF RACES

The main principles of the draw are specified in ABR Section, B.10.4.

The draw has to take into account that a pilot or caller may act as a caller in more than one race team.
It is convenient if a computer program is used to make the random draw, taking into account, in this order:

- The frequency distance of 20 kHz.
- That one person may act in two race teams. In case this can not be avoided in a specific heat , a pilot will be allowed to use a different caller for that heat but only if that caller has been registered as part of that team before the competition began.
- That a heat should comprise different nationalities in one heat (unless impossible).
- The maximum of difference in the composition of the heats. This means that a competitor will have the technically maximum number of other pilots he flies with in the competition. The NMPRA matrix computer-aided system to make race draws provides such a draw.
- That a single or two-up heat gives a certain advantage to a competitor, therefore single or two-up heats should be kept to a minimum and “equally” distributed amongst the competitors. The system of draw shall have sufficient flexibility to “fill up” races with reflights, so that a minimum number of single or two-up races will need be flown.
- That the draw shall be made in such a way that if the number of competitors is not a multiplier of 3, the last race will have one or two open places in which reflights can be used as a fill in as long as frequencies allow this. If the last race is a single race and there are no reflights to fill up, then the last two races shall be flown as two-up races.
- slow changes in the heat number a competitor flies in to give him a reasonable time between heats to be flown.

The complete draw (except modifications due to reflights) shall be done before the competition starts (ABR Section B.10.4). If the Contest Director has reasons to make substantial changes in the draw, this shall be reported in a team managers’ meeting.

ANNEX 6

PRACTICE

In accordance with ABR Section, B.7.4, a practice day prior to the competition must be scheduled. During any practice, no more than four aircraft and eight or sometimes nine people (pilots, callers plus, sometimes, the practice safety official) may be on the race course for safety reasons. Two aircraft may be in the air at any given time.
It is strongly recommended, that unofficial practice sessions are supervised by a safety official. This official may apply a system for assigning practice flights to assure a fair distribution of the available practice time to all pilots present. He can do this by using a list where the pilot can add his name. Only after the pilot has returned from his practice flight may he add his name again at the end of the list.
The safety official will ensure that not more, but preferably not less, than 4 pilots and 4 callers go on the race course at the same time to speed up the rate of practice flying. He shall permit only two aircraft to be in the air at the same time.
See also Annex 7.

ANNEX 7

GUIDELINES FOR ORGANISERS

Where this guide refers to the FAI Sporting Code Section 4 or Section ABR, the relevant paragraph is quoted in brackets.

A.7.1 OBJECTIVE

This document is intended to specify guidelines for the organisation of F3D international contests, for the benefit of both the organisers and the competitors. It is emphasised that these are recommendations and they do not have the same status as the binding regulations in the FAI Sporting Codes with special reference to ABR Section, B.7 & B.10.

However, since this guide will be widely distributed and should be regarded as the standard for F3D international competitions, organisers should avoid confusion by announcing in advance any changes from this guide such as may be necessary to suit local circumstances.
This guide is primarily applicable to World and Continental Championships, but parts of it may be used for open international competitions.

A.7.2 SITE

For race course lay-out see 5.2.7.2; for site lay-out see Annex 1

Other aspects affecting the suitability of a site include (not in order of priority):

a) the ease of access for competitors arriving by road or by public transport and via international ports and airports;
b) the availability of adequate official accommodation for all competitors, team managers, officials, and at least some supporters and helpers;
c) the time taken to travel between this official accommodation and the flying site (desirably this should be less than 30 minutes);
d) the availability of local hotels and camp sites for additional supporters;
e) the possibility of parking vehicles on the field;
f) local practice facilities if the field is unavailable prior to the start of official practice.
g) the organiser must survey the site of any competition event scheduled to be held in order to determine possible cases of radio interference that would affect any competitors. Any such possibilities must be reported as early as practicable to CIAM and the National Airsport Controls (NACs). Frequency bands or specific frequencies which have been shown to be reasonably free from interference at the site of the competition need also be reported.

When proposing a site in a Championships bid to CIAM, the National Airsport Control must give a detailed description of all the aspects discussed above.

It should be arranged for a CIAM representative from another country to visit the flying site and facilities (preferably at the same time of year as a Championships). This official may be a member of the CIAM Bureau, the Chairman or a member F3D Subcommittee, a CIAM Delegate, or a member of the FAI Jury at a recent F3D Championship. In the case of CIAM Delegates or CIAM Bureau members, the chosen representative should have recent F3D knowledge. The CIAM representative should discuss the site with internationally known and respected modellers who fly the F3D class and may have regularly used the proposed site.

The accommodation facilities must be described and the entry fee stated, split into an obligatory part and a part for food and accommodation (ABR Section, B.6.2). These fees should be justified to CIAM by including an estimated income and expenditure budget for the Championship ABR Section, Annex A1).

CIAM should be given a detailed summary of weather conditions at the time and place of the proposed event, compiled by the official meteorological organisation of the country and covering such aspects as the distribution of wind speed and direction throughout the day, range of temperatures, sunshine and rainfall. Note that the decision on the location of a Championship is normally decided two years in advance of the event (ABR Section, B.5.2).

Well in advance of the event, but not before agreement at the CIAM Bureau meeting in the November/December prior to the championship, information should be sent to National Airsport Controls with a copy to the FAI office and members of the FAI Jury. The information should include

a description of the site and any special features. Maps should be given showing the location of the flying field, the accommodation and arrival registration point relative to roads and local towns and also a detailed map of the flying field with its entrances and any restricted access areas.

A.7.3 FUEL (ABR Section, Annex B.3 & Volume F3D, 5.2.6).
The organisers shall provide the FAI standard fuel for use in competitions, and additionally, for cost, up to 20 litres of fuel per competitor for practice flying The practice fuel must be requested in advance by the competitor (at the time of entry and by the appropriate form provided by the organiser with the entry form) and must be available to competitors several days before the official day of arrival. This information is to be communicated to the competitors.

Fuel supplied by the organisers shall be mixed from top quality material. Methanol shall be at least commercial grade without additives. The castor oil shall be at least equivalent in quality to Castrol M.

A.7.4 PRACTICE (ABR Section B.7.4, Annex B.3 and Volume F3D Annex 6)
The fact that some teams prefer to arrive several days in advance for practice flying should be taken into account. It is highly recommended that the competition site or any suitable area in the neighbourhood is open for flying.
During the contest it should be possible to perform practice flights on the competition site contest area or on another suitable place close to it. Whenever the site is not used for the competition rounds, the competition site should be open for test flights under the supervision of a safety official according to the practice guidelines in Annex 6.

A.7.5 TIMETABLE
The time of year for the contest should be chosen so that the flying conditions, temperature and weather may be expected to be agreeable for the majority of competitors.
It is highly desirable that two unofficial practice days in addition to the official practice day is provided before the competition begins.

A suggested schedule for World and Continental Championships is as follows:

- Before the official day of registration, 1 – 3 days of unofficial practice, controlled by an official to ensure safe flying and fair use of the race course (Volume F3D Annexes 1 & 6). This practice should be used to train the pylon judges, the side line judges (to attain consensus over criteria for judgement dangerous or erratic flying, and the time keepers. These days should also be used to bring the flying site into full operation, which may cause the unofficial practice to be interrupted.
- The first official day of a championships is for arrival and registration of the teams by the team managers. On this day unofficial practice may be continued. The location of the registration office should signposted and be indicated on a map included in one of the bulletins. At registration the team manager should be given all relevant information for his team members, such as competitors numbers, ID cards, meal tickets, banquet tickets, accommodation details maps, schedules including the team slots for official practice, lists of participants and souvenir bags.
- One day of official practice and model processing. During the official practice it is recommended that the full race organisation, including all officials, all racing and timing equipment is present and in use. The Starter and safety officer will be in charge of the safety of the official practice session. The official practice schedule showing the team slots will facilitate the smooth running of the official practice.
- 3 days of competition, with 3 – 6 rounds per day, with the closing ceremony and banquet on the last day.
- The number of rounds for a World or European Championship shall be not less than 12 and not more than 15. For international competitions the number of rounds shall be not less than 6. The number of rounds shall be announced by the organiser at the team managers' meeting before the start of the competition. If weather conditions or other reasons require a reduction in the number of rounds per day, then an extra day of competition may be added or a team manager meeting will be held to agree the reduced number of rounds. Such a decision has to be taken as

early as possible, but with a minimum of five more rounds still to be flown after the decision, since a late decision may have effects on the fairness of the competition.

- The published timetable should include the expected start & finish times of the rounds. As well as the schedule for flying, the timetable should also include the time and place of:
    a) the meeting of the organisers with the team managers after arrival.
    b) the opening ceremony, at a time not infringing upon model checking or practice periods
    c) the awards presentation ceremony for the award of FAI medals, trophies and diplomas to the winners.

Copies of the timetable should be distributed at least 2 months in advance to National Airsport Controls, with points of detail supplied in hand-outs to all participants upon arrival at the event.

A.7.6 TEAM MANAGERS MEETINGS

Usually on the evening of the official registration there will be a meeting of the team managers with the organiser, the FAI jury and the judges with the following (minimum) agenda:

1. Welcome of teams by the Contest Director
2. Introduction of FAI jury, Starter, judges and other officials.
3. Urgent problems involving lodgings, transport or feeding of competitors
4. Draw for the flying order.
5. Local rules.
6. Comments from FAI Jury on any new rules or flight procedures they feel should be emphasised.
7. Comments from other judges or jury members about interpretation of rules or general competition procedure
8. Time table
9. Questions from team managers.

At the request of the FAI jury, the organiser or at least three team managers, team managers additional meetings may be held in the evening before each competition day.

A.7.7 INTERPRETERS

Interpreters must be available at all stages of World and Continental Championships to allow communication between the main officials, team managers and the FAI Jury. An essential minimum is to ensure that these three categories of peoples are able to communicate via English and the other official language specified for the Championships. The smooth running of the event is aided by also supplying interpreters for teams who are unable to converse in any of the official languages.

A.7.8 CEREMONIES

It is desirable to keep all ceremonies short and readily understood in all languages.

<u>Opening Ceremony</u>

The key elements of an opening ceremony are the introduction of the teams and welcoming remarks by the organisers and the president of the FAI Jury. Depending on the number of teams it may not be desirable to play the anthem of each country. If requested, the team managers should have brought recordings of their national anthem. For any country that does not bring an anthem, it is recommended that the FAI anthem be played in their case.

At the beginning of the opening ceremony, as soon as the teams are in their places, the FAI anthem is played and the FAI flag raised. At the end of the ceremony, the President of the FAI Jury will declare the Championship open, and the national anthem of the organising country is played.

<u>Award Ceremony</u>

The award ceremony, described in ABR Section, Volume B.14.4, should be separate from any closing banquet, so that it may be attended by all participants independent of whether they buy tickets for the meal.
The key preparation for the prize giving is to have all the trophies, medals and diploma awards available for presentation, with the diplomas completed with the winners' names.
There should be a rostrum or other central area or stage for presentations to the individual and team winners which allows suitable views for photographers.

Closing Ceremony

The award ceremony will be followed by a closing ceremony to include closing remarks by the organisers and the president of the FAI Jury.
At the end of this ceremony, the FAI anthem may be played, and the FAI flag presented, as a symbol, to the team manager or representative of the next organising country.

Closing Banquet

In planning any closing banquet it should be remembered that the main enjoyment of participants is meeting one another and talking together. To assist in this, it is ***not*** desirable to provide major special performers or speeches or loud music for the dinner.

A.7.9 PROCEDURES FOR MODEL CHECKING

Model processing must be carried out according to ABR section, Volume B.15.

There are three phases to processing:

first phase - before the competition begins;

second phase – random checks during the competition ;

third phase - after the provisional results.

First phase processing:

Checks for:

- Specification certificate
- Wing, tail & surface areas
- Wing root thickness
- Wingspan
- Fuselage height, width & cross-section
- Cowling
- Spinner nose radius
- Weight of model (dry)
- fail-safe
- Fuel shut-off
- Helmet
- Venturi
- Exhaust system
- Swept volume of engine
- Mark the engines
- Mark the exhaust
- Check the Olympic identification mark
- Check the FAI sticker
- Check the model identification code

Confirmation of the FAI sticker check should be shown by marking across the edge of the sticker and the model with an indelible special symbol or stamp of the organisation. If a stamp is used it is essential that it is with a permanent ink which does not wipe off under the effect of rain, model fuel or lubricants.

The identifying letters or number (unique code) on the models of each competitor should be identified in each race and recorded with the race times for that competitor.

All engines and silencers which might be used during the contest must be marked with an easily visible identification mark. Motors which have been checked and recorded in this way may not be exchanged with other competitors. (B.15.11)

During the competition additional motors and silencers, not being processed by other competitors for the same competition, may be processed for use in the competition.

To facilitate the smooth running of the first phase processing a schedule should be established with equal slots available for each race team.

If a competitor wishes to register a further model under rule ABR Section, B.15.12, then he must present to the organiser the corresponding certificate for the new model. The time and place for any additional model checking that a competitor may request should be clearly communicated via the team managers.

2) The second phase: random checking of models during the competition.

The models to be checked should be chosen at random and it should be done in a manner so as not to inconvenience or hinder competitors. Models should be impounded immediately after a flight and should be checked as soon as possible thereafter. The results of these checks should be recorded. Advance notice of the check should not be given.

Note that these checks are in addition to the model identification checks which the technical official makes before each flight.

3) The third & final phase - after the provisional results

For the check of the characteristics of all the models used by the competitors placing first, second and third (ABR Volume, B.15.14), it is prudent to impound at least the fourth place model as well, for processing in the case of any disqualification in the first three. It may be that the rechecking can be carried out at the flying site if good facilities are available there for accurate measurements; alternatively, the models should be impounded at the flying site and taken to an alternative site for processing. In this case the pilot may accompany his model.

Motor(s) total swept volume.
To determine motor(s) total swept volume the stroke and bore of the motor(s) must be measured accurately with precision engineering tools in accordance with A.4.4 Engine Measuring.

The swept volume is found by multiplying the swept piston area by the stroke. The calculations to determine the swept volume must use the full accuracy of the measured dimensions. If more than one motor is used, the measured total swept volume will be calculated by addition of the measured swept volume of all motors at full accuracy.
Then the calculated swept volume shall be truncated to two decimal places. This means that the figures in third and later decimal places are deleted and the result is compared to the maximum of 6.6 cc.
The following examples are given to clarify the procedure:

Calculated volume	6.596	6.604	6.608	6.612
Truncated volume	6.59	6.60	6.60	6.61
Within specification?	yes	yes	yes	no

Exhaust systems

The procedure for checking and approving of exhaust systems is given in Volume F3D Annex 2**.**