ANNEX 5X

CLASS F3T – RC SEMI-SCALE PYLON RACING WITH CONTROLLED TECHNOLOGY AEROPLANES

5.X ***Intention:*** *This class is defined for semi scale pylon racing at a controlled level of technology in aircraft aerodynamic design, aircraft construction, propeller and power plant, with maximum safety.*

Rules strategy*: The technical rules have the intention that speeds will not increase substantially over the years in order to maintain safety and controllability of model pylon racing aircraft. This is achieved by a limitation to approved models of a semi scale type, approved and unmodified engines plus exhaust systems and approved , propeller dimensions and materials.*

The class is controlled by a special CIAM F3T Approvals Committee (F3T ApsCom) with a minimum of 5 experts from different countries, nominated by their NACs, which will advise on:

- *Approval of F3T models*
- *Approval of F3T engines*
- *Approval of F3T propellers*

The names of the members of the F3T ApsCom will be published on the F3 Pylon Racing page of the CIAM web site.

The F3T ApsCom works under the responsibility of the CIAM F3 Pylon Racing Subcommittee.

Approved models, engines and propellers will be published on the F3 Pylon Racing page of the CIAM web site.

The F3T rules and Annexes are similar to the F3D rules and Annexes (FAI Sporting Code section 4 – Aeromodelling Volume F3 Radio Controlled Pylon Racing) except for the technical specification of the models

5.X.1 Definition of Radio Control Pylon Racing Aeroplanes

See 5.2.1

5.X.2 Technical Specifications of Pylon Racing Aeroplanes

See 5.2.2

The model aircraft must be a recognisable replica of a full-scale, human-carrying, propeller-driven aircraft, that either raced in, or was built for, close course or cross country racing or a speed record attempt. Delta or flying wing type aircraft are not permitted

Only models that have been approved by the F3T ApsCom are permitted.

For details of the approval procedure and criteria see Annex 5.X.A1.

5.X.3 Weight

Weight, less fuel but including all equipment necessary for flight, shall be at least 1800 g and not more than 2200 g. If ballast is used it must be permanently and safely affixed.

5.X.4 Fuselage

5.X.4.1 Depth and width

The fuselage depth shall be a minimum of 127.0 mm at its deepest point; except model aircraft from full-scale prototypes with belly-mounted radiators shall have a fuselage depth of at least 152.4 mm. Depth includes the radiator or belly scoop (if any) and the windshield canopy, pilot's head, or headrest, but does not include tail surfaces, dorsal or sub fins, tail skids, or non-scale protuberances.

The fuselage shall have a minimum width of 76.2 mm, the measurement to be that of the fuselage body and to exclude any fins, fillets, attachments or spacers. Width and depth points do not need to coincide.

5.X.4.2 Cross-sectional shape and features:

At some point the fuselage will have a minimum cross sectional area of 80.7 cm² excluding fillets and cheek cowls and competitors shall provide templates to prove this. Fillets are not considered part of the fuselage or lifting surfaces.

(a) Profile representations of any significant feature of the full-scale prototype are prohibited. Cross-sectional contours at the height and width measurements and at stations determining the likeness to the full-scale prototype shall maintain the integrity of the contours in the full-scale prototype. The only exception permitted shall be in the engine compartment for maintenance purposes.

(b) Cockpit, cheek cowls, canopy, and belly scoop, if any, shall have at least a 15.9 mm radius at their widest point so that a 31.7 mm diameter ball (pilot head in the cockpit) would fit inside, tangent to the outer surface. A cockpit, cowl, canopy, or scoop with an oval or rectangular cross-section and corners of less than 15.9 mm radius satisfies this requirement if the hypothetical 31 diameter ball would be fully enclosed. The cockpit need not be transparent and a dummy pilot's head need not be fitted.

(c) The front end of the fuselage shall be configured so that the engine head and cylinder protrude outside of the fuselage shape on all sides beyond 49.3 mm above the centerline of the crankshaft of the engine, measured perpendicular to the plane of the engine mount flanges. The exhaust system is to be fully exposed to air for its entire length. However, the fuselage may incorporate a shallow channel, dimple or trough to provide clearance for the muffler. In addition, the access hole for the engine crankcase and mounting lugs may be covered with a piece of fiberglass, Mylar, or other stiff material that restores the original contours of the fuselage in that area, as long as it adheres to the engine exposure requirement above.

5.X.5 Lifting Surfaces

5.X.5.1. Area of wing

The total projected area of the wing surface shall be a minimum of 25.8 dm².

5.X.5.2 Wing Span

The maximum wing span shall be 1422.4 mm.

5.X.5.3 Wing Thickness

The wing thickness at 75 mm from the wing centre shall be at least 22.2 mm. The thickness shall progress uniformly in a straight line or convex taper from root to tip; except that, if the full-scale prototype has a different progression, the progression on the model must be similar. The wing taper, in addition to other distinctive design features, is subject to the design approval requirements.

5.X.6 Engine

The engine must be of the single cylinder reciprocating piston type, with a maximum total swept volume of 6.60 cm^3. Propellers must rotate at the speed of the crankshaft. The engine shall have only one front air intake and one side exhaust.

Only engines approved by the F3T ApsCom are allowed. See annex 5.X.A1 for engine approval procedures and criteria.

Engine air intake shall be circular with a maximum diameter of 9 mm.

No modifications to the following parts of the engine are allowed other than as specified in 5.X.A1.3.

- crankshaft
- crankcase;
- cylinder,
- piston, conrod, piston pin
- cylinder head,
- technology of the bearings. (Only standard size, single row, full steel ball bearings allowed for the crankshaft and only plain bearings allowed in the con rod).
- crankcase back plate.

It is not allowed to have a system on board of the aircraft to supply power to the glow-plug of the engine. All electrical connections to the engine's glow plug from a power supply must be removed prior to takeoff.

5.X.7 Exhaust system:

(a) General description: The engine shall be equipped with an expansion chamber muffler, zero-boost muffler, or tuned muffler as provided by the manufacturer for the engine being used, and having a single exhaust outlet with a maximum outlet area of 40.2 square millimetres (equivalent to the area of a round hole measuring 7.15 mm diameter).

(b) Inner configuration or tuned mufflers: A tuned muffler used in this event shall have only one internal part, a straight tube or extractor of the type commonly known as a "mini-pipe". The mini-pipe shall have a constant, circular cross section and constant inside and outside diameter, with the following exception: the sidewall of the tube may be thickened not to exceed 2 mm wall thickness, within 12.7 mm of the front end of the mini-pipe where it attaches to the header.

(c) Outside dimensions: The distance from the centre of the piston to the centreline of the muffler shall not exceed 70 mm. The overall length of the muffler shall not exceed 185 mm, measured from the front of the header to the back of the exhaust outlet. The outside diameter shall not

exceed 45 mm and both the inside and outside diameter of the outside shell of the muffler shall remain constant for at least 75 mm.

(d) Modifications: No modifications to the muffler, as provided by the manufacturer, are permitted except that the muffler may be tapped for a pressure fitting to supply pressure to the fuel system.

5.X.8 Fuel pressure

If the tank is pressurised, only pressure from the exhaust system is permitted.

5.X.9 Propellers and spinners

5.X.9.1 Propellers must be two-bladed with fixed blades. The blades must be of equal length, area, and shape.

Composite resin continuous fibre construction propellers and metal propellers are not allowed.

Material:

Either wood or a chopped carbon fibre filled injection-moulded compound.

The material of injection moulded propellers needs approval of the F3T ApsCom,

Wood propellers may be modified from a commercial product or may be home made. A wood propeller shall be made from a single piece of wood and may be finished with a clear coating for the purposes of waterproofing or balancing only.

Dimensions:

Wooden propellers: no limits.

Injection moulded propellers: only commercially available stock carbon filled injection moulded propellers are permitted.

The propeller shall have a minimum diameter of 7.4” (188 mm).

Only propellers approved by the F3T ApsCom may be used. A propeller once approved shall be eligible for competition so long as it remains commercially available.

When the production of an approved propeller type is terminated, this will be marked on the web site by adding the date of production termination. Such propeller type can be used for two more years after this date.

Only propellers that carry the manufacturer’s type and dimension are permitted. The recommended rpm limit for this type as given by the manufacturer must not be exceeded during flights.

See annex 5.X.A1 for propeller approval procedures and criteria.

Note: The approval of a propeller refers only to the manufacturer and type. Under no circumstances can the F3T ApsCom be held responsible for the safety of an individual propeller.

In all cases, it is the competitor’s responsibility to ensure that any propeller he uses is safe.

Damaged propellers must not be used.

Changes to the propeller blades are not permitted, except for:

a. One blade may be sanded on the top (front) side only for balancing.
b. One side of the hub may be sanded for balancing.
c. The shaft hole may be enlarged, but only as much as necessary to fit the engine crankshaft. The enlarged hole shall be concentric with the original hole.
d. Edges and tips may be sanded, but only as much as necessary to remove sharp moulding flash.

5.X.9.2 A rounded nose spinner of at least 25 mm diameter, with a nose radius of not less than 5 mm (ABR B.19.4) must be fitted. The spinner shall be made of metal only.

5.X.10 Landing gear.

a) Location and size: the landing gear shall be fixed and shall resemble that of the full-scale prototype aircraft as to location on the airframe and the number of wheels used. At least two (2) of the wheels shall have a diameter of at least 2¼ inches.

b) Streamlining: wheel spats, or strut fairings are not required and are permitted only if they were used on the full-scale prototype.

Only non retractable landing gears are permitted.

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 is acceptable.

5.X.11 Shut-off
See 5.2.9

5.X.12 Fuel

The fuel composition (or commercially available type of the fuel) shall be announced in the invitation of the competition and will be supplied and dispensed by the organiser.

The fuel will consist of :

methanol

a minimum of 18% and a maximum of 23% oil

a maximum of 15% nitro methane

All percentages by volume.

Oil may be:

castor oil

synthetic oil*

a mix of castor oil and a synthetic oil*

**Note: Synthetic oils must have a sufficient high temperature resistance and have to be of a type with a flash point >200 degrees C and a flame point >270 Degrees C.*

Reference products: Ucon MA 731, Aerosynth 3, Klotz types 100, 104 (R50), 200.

Adding 3-5% of Castor oil is recommended for maintaining lubrication at very high temperatures (during lean runs) and also to make it possible to "read" the setting of the engine from the colour of the glow plug after a run.

5.X.13 Technical checks and safety requirements
See 5.2.11

5.X.14 Competitors
See 5.2.12

5.X.15 Helmets
See 5.2.13

5.X.16 Transmitter and frequency check
See 5.2.14

5.X.17 Race Course, Distance and Number of Rounds
See 5.2.16

5.X.18 Race from Start to Finish

Standard scoring system: See 5.2.17.

Alternative scoring system: See 5.2.17 except for the following variations:

b) Draw for Races and Heat Matrix

Note: The following instructions assume that three-plane heats will be flown. Two- or four-plane heats may be a better choice in some situations. In any case, the number of columns in each round of the matrix must always equal the number of aircraft per heat.

i) For 3 plane heats divide the entries into 3 equal columns as shown in the sample matrix. For two-plane heats, divide into 2 columns and for four-plane heats, divide into four columns.

If the entry numbers are not equally divisible then simply skip that number.

ii) Pilot numbers should be assigned; an example is given in the sample matrix.

iii) Use the matrix schedule to set up the heats for each round. All pilots must be given an equal number of opportunities to race.

iv) It is highly recommended, if not essential, for a smooth running of the competition that pilots who are callers for each other always appear in the same column. Groups of pilots/callers should be limited to three or fewer, in order to make an efficient draw possible.

v) In case not all competitors use 2.4 GHz radio systems:
For FM/AM radio systems each transmitting frequency appears in only one column. When

making the draw, there must be appropriate FM/AM radio frequency separation. (20 kHz, see A.5T.3)

vi) If re-matrixing has to be done, then it must only be done at the completion of a round. A pilots' meeting must be held first to obtain the pilots' informed consent to the decision. If consent is not given, then re-matrixing must not take place.

Note: Sometimes, attrition or other factors may result in a number of "bye" or solo heats. In such a case the CD may be tempted to re-matrix the remaining entries. Remember that consistency is part of the task of racing, and depriving a contestant of an easy win when competitors are not prepared to come to the starting line alters the task.

vii) Example of race matrix for 26 competitors:

All pilots get a race number (1 - 26); 9 heats per round.

The second row shifts one position upwards for each subsequent round, the third row shifts two positions, the fourth row (if applicable) shifts 3 places.

The aim of the system is that no pilot meets any other pilot more than once.

Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8
1, 10, 19	1, 11, 21	1, 12, 23	1, 13, 25	1, 14, -	1, 15, 20	1, 16, 22	1, 17, 24
2, 11, 20	2, 12, 22	2, 13, 24	2, 14, 26	2, 15, 19	2, 16, 21	2, 17, 23	2, 18, 25
3, 12, 21	3, 13, 23	3, 14, 25	3, 15, -	3, 16, 20	3, 17, 22	3, 18, 24	3, 10, 26
4, 13, 22	4, 14, 24	4, 15, 26	4, 16, 19	4, 17, 21	4, 18, 23	4, 10, 25	4, 11, -
5, 14, 23	5, 15, 25	5, 16, -	5, 17, 20	5, 18, 22	5, 10, 24	5, 11, 26	5, 12, 19
6, 15, 24	6, 16, 26	6, 17, 19	6, 18 21	6, 10, 23	6, 11, 25	6, 12, -	6, 13, 20
7, 16, 25	7, 17, -	7, 18, 20	7, 10, 22	7, 11, 24	7, 12, 26	7, 13, 19	7, 14, 21
8, 17, 26	8, 18, 19	8, 10, 21	8, 11, 23	8, 12, 25	8, 13, -	8, 14, 20	8, 15, 22
9, 18, -	9, 10, 20	9, 11, 22	9, 12, 24	9, 13, 26	8, 14, 19	9, 15, 21	9, 16, 23

h) All take-offs will be "Rise Off Ground". Model aircraft shall be released from the starting line on the starting signal (flag drop or light signal) at one-second intervals.

Lanes 1 and 3 start at the same time followed by lane 2.

In the case of 4-plane heats, lanes 1 and 3 start at the same time, followed by lanes 2 and 4 which also start at the same time.

In odd rounds, lanes 1 and 3 start first and in even rounds, lane(s) 2 (and 4) start first.

No mechanical device may be used to assist the aircraft to take-off, but hand pushing is permitted.

5.X.19 Timekeeping and Judging

See 5.2.18

5.X.20 Infringements and Penalties

See 5.2.19

5.X.21 Scoring and Classification

Standard scoring system : see 5.2.20.

Alternative scoring system : see 5.2.20 a), b) and c) except for the following additions:

i) Points per heat. After each heat, points shall be awarded based on the order of finish. In the case where a pilot has one infringement (5.2.19) recorded, he will fly one lap extra (11 laps) to finish.

ii) If the matrix is set up for three-plane heats, the winner receives three (3) points, second place two (2) points, and last place one (1) point.

iii) If the matrix is set up for four-plane heats, the result is four (4) points for first place, three (3) points for second place, two (2) points for third place, and one (1) point for last place.

iv) If the matrix is set up for two-plane heats, the winner receives two (2) points and the loser receives one (1) point.

v) Zero points are awarded for a no-start (DNS), failure to complete the heat (DNF), two or more infringements (ref 5.2.19), or disqualification.

vi) The final classification is on number of points after the conclusion of all heats,

vii) Ties shall be broken by a fly-off race. If time or another reason does not permit fly-off races, the best single race time shall be considered in determining final placing.

Note: 5.2.20.2 does not apply to F3T.

Annexes

The following F3D annexes also apply to F3T:

ANNEX 5Q - GUIDELINES FOR AIRFIELD LAY-OUT,

ANNEX 5R - GUIDELINES FOR DUTIES OF PERSONNEL

ANNEX 5S - GUIDELINES FOR TECHNICAL EQUIPMENT

ANNEX 5T - GUIDELINES FOR DRAW OF RACES

ANNEX 5U - GUIDELINES FOR PRACTICE FLYING

ANNEX 5V - GUIDELINES FOR ORGANISERS

Note: Within the annexes, references to World and Continental Championships do not apply to F3T.

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ANNEX 5.X.A1

APPROVAL PROCEDURES AND GUIDELINES FOR F3T MODEL AIRCRAFT, ENGINES AND PROPELLERS

5.X.A1.1 F3T Approvals Committee Procedures

The F3T Approvals Committee shall be appointed by the Chairman of the CIAM F3 Pylon Racing Subcommittee after consultation with the members of the CIAM Pylon Racing Subcommittee. The names of the members of the F3T ApsCom will be published at the F3 Pylon Racing page of the CIAM web site.

The task of the F3T ApsCom is to approve models, engines and propellers for F3T Pylon Racing. It is also responsible for the publication of data on the F3 Pylon Racing page of the CIAM web site.

The procedure for approval is as follows:

a) All technical documentation of a model, engine or propeller must be sent to the chairman of the F3T ApsCom at the address published on the F3 Pylon Racing page of the CIAM web site. In the case of engine and propeller, a sample must be sent together with this documentation.

b) The Chairman of the F3T ApsCom will judge whether the information given by the manufacturer is sufficient and shall, within a period 30 days, inform him if any additional information is necessary.

c) After receipt of all information, the Chairman of the F3T ApsCom shall distribute all relevant technical information to all the F3T ApsCom members.

d) The F3T ApsCom will, within a period of 60 days after receipt of the complete documentation, make a decision for approval or not, as the case may be. This decision will be made by simple majority. In the case of a tie, the F3T ApsCom Chairman will have a casting vote.

e) All approved models, engines and propellers will be published on the F3 Pylon Racing page of the CIAM web site.

f) Only approved models, engines and propellers may be used in competition.

5.X.A1.2 Approval of Models:

All designs, past and future inclusive, shall be submitted, with three (3) accurate views or photographs of the model aircraft and the full-scale prototype aircraft and photographs of the parts, or a finished model aircraft, to verify that the model satisfactorily reflects the supplied drawings.

In the case of unusual or little known designs, the designer must produce documentation to confirm that such a design did exist. A model shall be approved if it meets all the dimensional requirements of these rules and, in addition, does not vary significantly from the approved three views or photographs of the prototype.

Models will be approved with a two-step process:

a) The first step will be to review drawings of the model aircraft and to decide whether the drawn model design can be accepted as a recognisable replica of the full size aircraft.

b) The second step of the approval process, will be to review photographs of the parts or a finished model may be supplied for the F3T ApsCom to verify that the model aircraft satisfactorily reflects the previously approved drawings.

Dimensions which are not easily inspected at a contest event will be verified to meet the requirements of the rules. These dimensions are the cross section area and the wing area if a complex outline shape is used eg an elliptical plan form, etc.

The judgement of whether a model aircraft can be recognised as a replica of the full scale aircraft upon which it is based is in the similarity of the below listed features when the model aircraft is compared to the full scale aircraft. By “similar” it is meant that if the full scale aircraft has a convex curve on a particular feature, the model aircraft should not be flat or concave. The model aircraft and documentation of the full scale aircraft should be able to be compared side by side and for the model aircraft to be recognised as a replica of the full scale aircraft.

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Wing:

Plan form outline shape is similar to full scale.

Leading edge and trailing edge taper (sweep) angle.

Tip leading edge and trailing edge corner radii.

Tip Angle.

Landing Gear:

Mounts to airframe are in similar locations to those on the full scale aircraft (ie mounts to wing or mounts to fuselage, etc.).

Horizontal or Vertical-Stabiliser:

Plan form outline shape is similar to full scale.

Leading edge and trailing edge taper (sweep) angle.

Tip leading edge and trailing edge corner radii.

Tip Angle.

Vertical Stabiliser:

Outline shape is similar to full scale.

Leading edge and trailing edge taper (sweep) angle.

Tip leading edge and trailing edge corner radii.

Tip Angle.

Horizontal or Vertical -Stabiliser Position:

Fore - aft position is relative to the vertical stabiliser.

Side View

Overall outline of fuselage.

Wing and stabiliser location is relative to the thrust line.

Cockpit area shape and position.

Fuselage top view, nose area:

Forward fuselage plan view form should replicate the shape of the full scale aircraft for a recognisable distance.

Prior approval:

See the F3 Pylon Racing page of the CIAM website.

5.X.A1.3 Approval of Engines

The F3T ApsCom will approve engines according to the criteria listed below.

All future engines must be approved by the F3T ApsCom and a sample of each approved engine and replacement part (or combination thereof) will be retained by the F3T ApsCom Chairman for reference.

One of the fundamental principles of F3T racing is that the engines that are used do not differ significantly in performance and technology that significantly increases the price of engines (reference year 2013) is not permitted.

Note: For more information see the F3 Pylon Racing page of the CIAM website.

Design features

Engines for F3T can only be approved if they show the following design features:

a) Single cylinder reciprocating piston type, with a maximum total swept volume of 6.60 cm^3. (Rule 5.X.6)
b) Propeller must rotate at the speed of the crankshaft.(5.X.6)
c) Only one front air intake and one side exhaust.(5.X.6)
d) A removable cylinder sleeve. The outside diameter of the cylinder sleeve shall be less than 26 mm over more than 0.875 of its length.
e) Crankshaft passage diameter not more than 12.7 mm.
f) Standard size, full steel, single row ball bearings for the shaft.
g) Plain bearings for the con rod.
h) Materials to be used: only steel alloys, aluminium alloys, copper, brass and plastic. No Beryllium content over 5% allowed in any of the alloys.
i) Only the following surface coatings are allowed:

j) Chrome or nickel coating types on the cylinder sleeve.
k) Anodising of aluminium parts.

An engine manufacturer is only permitted one approved engine in any 36 month period.

Incremental upgrades during this approved period are permitted but restricted to a maximum of two items from the list below and must be made at the beginning of any 12 month phase of the approved 36 month period.

Incremental upgrades must be approved by the F3T ApsCom.

Upgrade parts

a) Crankshaft
b) Crankcase
c) Cylinder
d) Piston and connecting rod
e) Cylinder head
f) Bearings
g) Crankcase back plate

It is necessary that new engines and replacement parts are commercially available.

For approval to be granted, engines must be produced in quantities of at least 25 complete engines within the first year of production. Approval shall be withheld or withdrawn if this production quantity cannot be substantiated to the F3T ApsCom.

If an approved engine is not replaced after the 36 month period, then the 12 month incremental upgrade period may continue. The manufacturer may submit an engine for approval at any time after the 36 month period expires and if approval is granted then the 36 month period starts again for the new engine.

All previously approved engine combinations remain eligible, unless prohibited by a subsequent rule change.

In exceptional circumstances such as matters relating to safety, additional upgrades maybe submitted to the F3T ApsCom for approval at any time.

Prior approval:

See the F3 Pylon Racing page of the CIAM website.

5.X.A1.4 Approval of propellers.

Only propellers of the carbon filled injection moulded type shall be approved.

The propeller manufacturer must certify that the propeller is fit for purpose.

The safe working rpm must be at least 30,000 and declared as such by the manufacturer.

Approval is considered temporary and continued approval is dependant on the manufacturer informing the F3T ApsCom if propeller material or dimensional specifications change that will cause potential changes in performance. The F3T ApsCom is then required to determine if the propeller still conforms to the rules. If it does then it will inform the manufacturer of the continued approval. The F3T ApsCom shall have 60 days to make this determination and notification.

The F3T ApsCom shall require 3 sample propellers from the manufacturer for testing under flying conditions.

The type and dimensions must be indicated on the propeller by the manufacturer.

Note: The approval of a propeller refers only to manufacturer and type.

The F3T ApsCom or CIAM shall not accept any responsibility or liability related to the safety of an individual propeller. The competitor is in all cases responsible that a propeller can be used safely. The use of propellers with even small damage may be of high risk.

Prior approval:

APC propellers with part numbers in the family LP07xxxC, where "x" signifies the three numbers indicating diameter and pitch, are already approved.

Guideline for Manufacturers

Moulding materials shall have physical properties (including tensile strength and other industry standard properties) equivalent to or exceeding that of Ticona Celstran PA6-CF35-15 for temperatures ranging from 0 to 60 degrees Celsius.

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