ANNEX 5 Y
CLASS F3T – SEMI SCALE PYLON RACING MODELS OF LIMITED TECHNOLOGY

5.W ***Intention:*** *This class is defined for semi scale pylon racing at a limited 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.*

A special CIAM-F3X committee with a minimum of 5 experts from different countries, nominated by their NAC's controls the class by advising on:

- *Approval of F3X models*
- *Approval of F3X engines*
- *Approval of F3X propellers*

The names of the members of the F3X committee are published on the CIAM web site.

The F3X committee works under the responsibility of the CIAM RC Pylon Racing Subcommittee

Approved models, engines and propellers are published on the CIAM web site.

The F3X rules and Annexes are similar to the F3D rules and Annexes (FAI Sporting Code section 4 – Aeromodelling Volume F3D Radio Controlled Pylon Racing) except for the technical specification of the models

5.W.1 Definition of Radio Control Pylon Racing Model Aircraft:
See 5.2.1

5.W.2 Technical Specifications of Pylon Racing Model Aircraft
See 5.2.2
The model aircraft must be of conventional design with forward wing and an aft empennage and shall be a recognizable 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. No delta or flying wing type aircraft are permitted
Only models that have been approved by the F3X committee will be allowed.
For details of the approval procedure and criteria see Annex 5.W.A1

5.W.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.W.4 Fuselage

5.W.4.1. Depth and width
Fuselage depth will be Minimum 127.0 mm at its deepest point; except that 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 of the fuselage body and to exclude any fins, fillets, attachments or spacers. Width and depth points need not to coïncide .

5.W.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 on all sides at least 19.0 mm, not including the glow plug and the exhaust system is fully exposed for its entire length. However, the fuselage may incorporate a shallow channel, dimple or trough to provide clearance for the exhaust system. 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.

5.W.5 Lifting Surfaces

5.W.5.1. Area of wing

Total projected area of the wing surface shall be a minimum of 25.8 dm^2.

5.W.5.2 Wing Span

The maximum wing span shall be 1422.4 mm.

5.W.5.3 Wing Thickness

Wing thickness at 75 mm from the wing centre shall be at least 22.2 mm. 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 may be similar. The wing taper, in addition to other distinctive design features, is subject to the design approval requirements.

5.W.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 F3X committee are allowed. See annex 5.W.A1 for engine approval procedures and criteria.

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

In case fuel without nitro content is supplied by the organizer (see 5.W.12) , the diameter of the air intake shall have a maximum diameter of 12 mm.

No modifications to the following parts of the engine are allowed:

- crankcase,
- crankcase back plate.
- cylinder,
- cylinder head,
- piston, conrod, piston pin
- crankshaft
- 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).

5.W.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.W.8 Fuel pressure

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

5.W.9 Propellers and spinners

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5.W.9.1 Propellers shall be fixed, with two (2) fixed-pitch blades 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 fiber filled injection-molded compound. The material of Injection moulded propellers needs approval of the F3X committee,
Wood propellers may be modified from a commercial product or can be home made . A wood propeller shall be made from a single piece of wood and may be finished with a clear coating for purposes of waterproofing or balancing only.

Dimensions:

Wooden propellers: No limits

Injection Molded propellers.
Only stock propellers which are approved by the F3X committee and which commercially available shall be used.
A propeller once approved shall be eligible for competition so long as it remains commercially available.
The propeller shall have a minimum diameter of 7.4" (188 mm).
Only approved propellers can be used. See annex 5.W.A1 for propeller approval procedures and criteria.

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.W.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.W.10 Landing gear.

1) 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 2-1/4 inches.
2) Streamlining: Wheel pants, 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.W.11 Shut-off

See 5.2.9

5.W.12 Fuel .

The fuel will consist of 60 - 80% methanol, a minimum of 18% oil, (wherein a minimum of 3% is castor oil) and will contain not more than 15 percent nitromethane. All percentages by volume. 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 organizer.
In case an organizer supplies fuel without nitromethane, see 5.W.6 for air intake diameter.

5.W.13 Technical checks and safety requirements

See 5.2.11

5.W.14 Competitors
See 5.2.12

5.W.15 Helmets
See 5.2.13

5.W.16 Transmitter and frequency check
See 5.2.14

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

5.W.18 Race from Start to Finish
See 5.2.17

5.W.19 Timekeeping and Judging
See 5.2.18

5.W.20 Infringements and Penalties
See 5.2.19

5.W.21 Scoring and Classification
See 5.2.20

Note: 5.2.20.2 does not apply to F3X.

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.

Annex 5.W.A1

F3X committee. Procedures and criteria

1. Approval of Models:

All designs, past and future inclusive, shall not be entered in competition until three (3) accurate views or photos of the model and the full-scale prototype aircraft have been submitted to the F3X committee and approved by simple majority of the committee. Such approval shall be published on the CIAM web site. In the case of unusual or little known designs, the designer shall produce documentation to clarify that such a design did exist. A model shall be considered eligible for competition if it meets all dimensional requirements of these rules and, in addition, does not vary significantly from the approved three-views or photos of the same design.

Models will be approved with a two step process. The first step will be to review drawings of the model and whether the drawn model design is acceptably recognizable as a replica of the full size aircraft. For the second step of the approval process, photos of the parts or a finished model will be supplied for the committee to verify that the model acceptably reflects the previously approved drawings. Dimensions which are not readily inspectable at a contest event will be verified to meet requirements of the rules. Those dimensions are the cross section area and the wing area if a complex outline shape is used similar to an elliptical planform, etc.

The judgement of whether a model acceptably is a recognizable replica of the full scale aircraft it is modeling is decided by comparing features of the model to the full scale as listed below to be similar. By “similar” it is meant, if the full scale aircraft has a convex curve on a particular feature, the model should not be flat or concave. The model and documentation of the full scale aircraft should be able to be compared side by side for and be able to recognize that the model is a replica of the full scale.

Wing:
Planform 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 in similar location to where the full scale landing gear does. (i.e. mounts to wing or mounts to fuselage, etc.)

Horizontal or V-Stabilizer:
Planform 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 Stabilizer:
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 V-Stabilizer Position:
Fore-Aft position relative to vertical stab.

Side View
Overall outline of fuselage.
Wing and stab location relative to 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 recognizable distance.

A model will be approved by simple majority in the F3X committee.
Prior approval: All approved airframes from the AMA 422 listing as of the end of 2012 will be eligible. Approved models will be published on the CIAM web site.

2. Approval of Engines

The F3X committee will approve engines according to the following criteria.
All future engines are to be approved by the F3X committee, a sample of each approved engine and (combination of) replacement parts will be retained by the F3X committee chairman for reference.

Design features
One of the background principles of F3X racing is that engines are used that do not differ significantly in performance and that no technology will be used that increases the price of engines above the currently (2012) accepted level.

Engines for F3X can only be approved if they show the following design features:

- a removable cylinder sleeve.
- use of standard size, full steel, single row ball bearings for the shaft.
- plain bearings for the con rod.
- Materials to be used: only steel alloys, aluminium alloys, copper, brass and plastic. No Beryllium content over 5% allowed in any of the alloys.
- No other surface coatings allowed than chrome or nickel types on the cylinder sleeve, and anodising of aluminium parts.
- Crankshaft passage diameter not more than 12.7 mm

All engines and replacement parts must be commercially available.
Once approved an engine manufacturer will not be allowed another approved engine until a 36 month period has elapsed. Incremental upgrades will be allowed during this period but will be limited to 2 of the items listed below at the start of each 12 month period of the 36 month approval, incremental upgrades will be approved by the F3X committee.
All engines must be produced in quantities of at least 25 complete engines within the first year of production, approval will be withdrawn if this production quantity cannot be substantiated to the F3X committee.
If an approved engine is not replaced after the 36 month period then the 12 month incremental upgrade period continues, but then the manufacturer can submit an engine for approval at any time after the 36 month period expires and if approved the 36 month period starts again for the new engine.
All previously approved engine combinations remain eligible, unless outlawed by a subsequent rule change.
In exceptional circumstances such as matters relating to safety then additional upgrades maybe submitted to the F3X committee for approval within any 12 month period.

Upgrade parts
Crankshaft
Crankcase
Cylinder
Piston and connecting rod
Cylinder head
Bearings
Crankcase backplate

An engine will be approved by simple majority in the F3X committee.
Prior approval:. The approved AMA 422 engines as of the end of 2012 are eligible.
Approved engines will be published on the CIAM web site.

3. <u>Approval of propellers.</u>

Only propellers of the injection molded type can be approved made of material and physical properties equivalent or exceeding that of Ticona Celstran PA6-CF35-15. These material properties, which shall include tensile strength and other industry standard properties, must be equivalent to the above product for temperatures ranging from 30 to 150 degrees Fahrenheit. Substitutions of polymers that fall outside these specifications are not allowed.

Approval is considered temporary and continued approval requires the manufacturer, to inform the F3X committee when propeller material or dimensional specifications change, causing potential changes in performance. The F3X committee is then required to determine if propeller still conforms to the rules, and informs the manufacturer of continued approval. The F3X committee shall have 60 days to make his determination.

The type and dimensions must be indicated on the propeller by the manufacturer. The recommended rpm limit as given by the manufacturer must be 30.000 rpm or higher.

Before approval propellers from potential manufacturers need to be proven to be appropriately safe through a thorough testing period.

Prior approval:. APC propellers with part numbers in the family LP07XXXC, where "X" signifies the three numbers indicating diameter and pitch, are approved.
Approved propellers will be published on the CIAM web site.

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