CIAMFlyer
Introduction to the Model Aircraft World
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The Many Aspects of FAI RC Aerobatics

Aerobatics with radio-controlled model aircraft is challenging in more ways than one

For one, it requires extensive technical skills and great care when installing the radio control and mechanical transmission to the aircraft's control surfaces. Installation of the highly optimised propulsion units – whether combustion engines or electric motors – requires extensive experience and technical understanding. The second major challenge is flying itself: aerobatics is an extremely demanding sport requiring high levels of concentration!

The different aerobatics classes

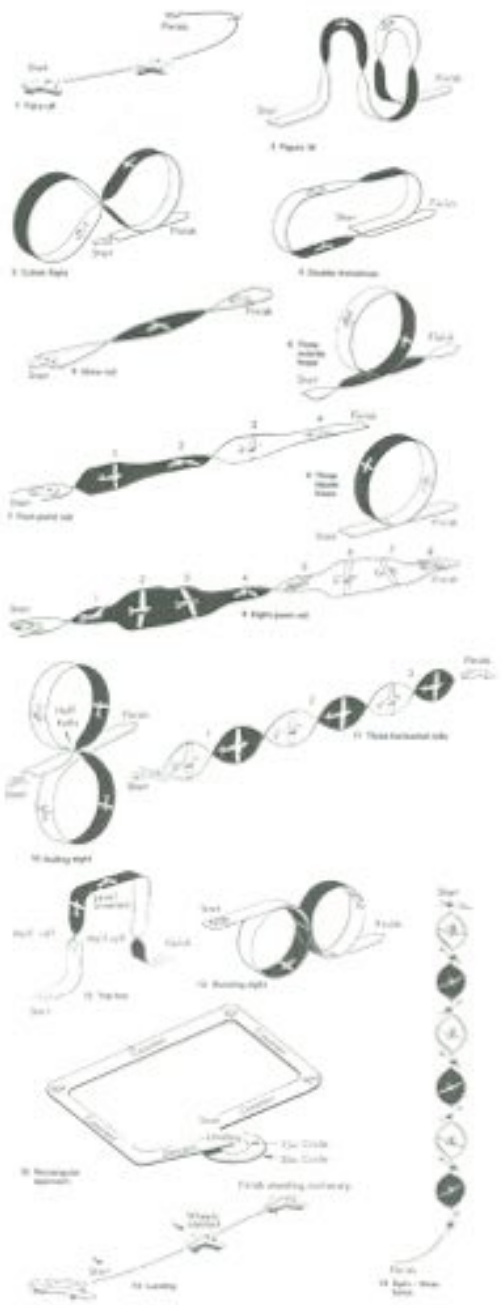
Frequently, the category "F3A" is taken to include all RC motorised aerobatics. However, this is no longer the case. F3A is the oldest and probably best-known aerobatics class, with World Championships being held since 1960, but more categories have since been introduced. It is important to differentiate between the various sets of FAI Aerobatics rules as, while they have much in common, they are nevertheless very different.

F3A – RC Aerobatic Aircraft, the traditional class

Of course, F3A is the oldest and probably best-known RC aerobatics class. The first FAI World Championships were held back in 1960 in Dübendorf, Switzerland and were a sensation at the time. From 1963, this only event with RC models was held every two years. By the way – neither in Switzerland nor within the FAI was this class ever known as RC1. The 31st F3A Championships will be held this summer in Italy with over 100 competitors expected.

Requirements
Aeronautical requirements are very tough. Suitable spaces for regular training have to be available. Models are generally purchased fully assembled or semi-assembled. Installation of propulsion and control components requires a lot of experience. With a bit of luck, novices may be able to acquire second-hand models

Model specifications
Maximum wingspan: 2 m
Maximum fuselage length: 2 m
Maximum weight inclusive battery for electric powered model airplanes. Without fuel (combustion engine): 5 kg.



Flying schedule of the late seventies

Flying schedule
Preliminary schedule P
Final schedule F (at WC/EC semi-finals and finals)
2 different unknown schedules (finals at WC/EC)
Advanced schedule A (simplified schedule for national competitions)
Schedules change every two years
Execution time: 8 min
The schedules are executed inside a "window" defined using angles.

F3M – Large Aerobatic Aircraft

F3M – Large Aerobatic Aircraft
One of the newer RC aerobatics classes.
No championship status from 2020.

Model specifications
Scale model of a man-carrying aerobatic aeroplane
Minimum wingspan: 2.1 m
Minimum wingspan biplanes: 1.8 m
Maximum take-off weight: 25 kg

Flying schedules
Known schedule
2 different unknown schedules
Execution time is not specified but the sequence of manoeuvres must commence within one minute of take-off. The aeroplane must be landed within two minutes after the sequence is completed.
Freestyle programme (4 min)
Execution time: As for the known and unknown schedules, the sequence should have a duration of 4 minutes.
Models are flown on an x-axis = main axis (parallel to the safety and jury line) and a y-axis (centre line).

Start preparation of a F3A model aircraft

Note: The American aerobatics scene for large models IMAC has developed largely independently of the FAI class F3M and has successfully escaped the bounds of F3A, especially with regard to airspace, 3D manoeuvres and presentation. These new approaches are now being adopted in part by the FAI. It should be noted that IMAC is being met with increasing interest in Europe.

Requirements

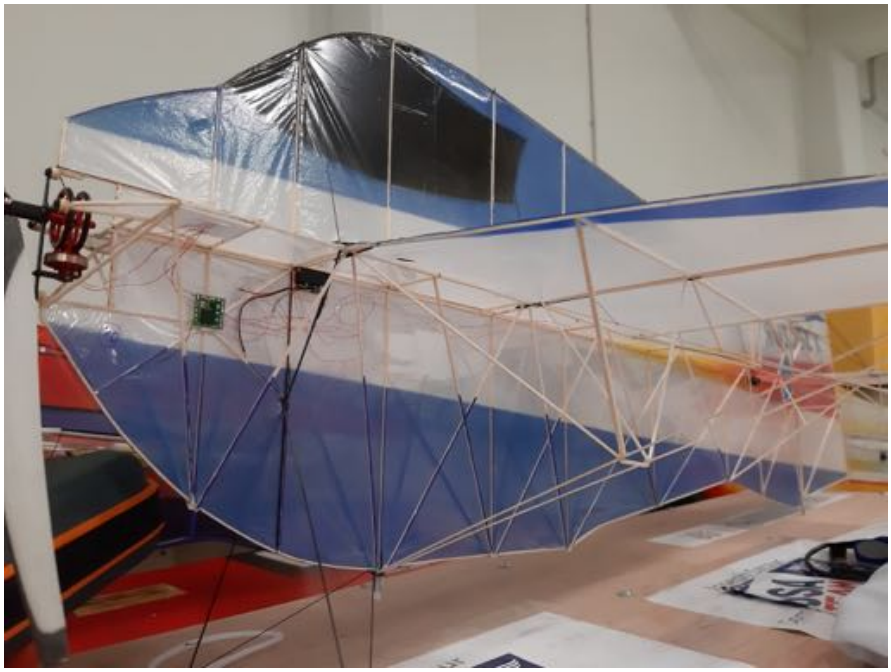
Aerobatics with large models requires exceptional technical and aeronautical skill. To keep weight low, most models are built from wood and foil. Commercially available, beautiful machines made from GFRP/CFRP are generally somewhat heavier which can be compensated for with the propulsion units. Depending on model size – generally 2.5 to 3 m – structural properties and generated forces are of vital importance as loads during manoeuvres are very high. Most models are equipped with combustion engines that deliver plenty of power but also produce more of noise, which creates certain requirements for training grounds. Fortunately, modern engine technology, silencers and suspension systems have provided astonishing improvements. As everywhere, the crucial parameters are speed and propeller diameter which also applies to large electric motors. Speeds of around 5000 rpm have proven to be ideal. The issue of transport has to be addressed from the onset.

Also F3M model aircraft may need to be lightweight

F3P - Indoor Aerobatic Aircraft

This is the youngest FAI Aerobatics WC class. This year already saw the 4th WC in Heraklion, Greece. There have been huge developments in the past 10 years, not only regarding the models, whose weight has shrunk to about a third or even less, but also regarding flying itself. Some models weigh less than 60 grams! Many competing pilots build their own amazing models – an achievement requiring exceptional skill.

F3P Indoor Aerobatic Aircraft



Model specifications
Maximum wingspan: 1.5 m
Maximum fuselage length: 1.5 m
Maximum weight incl. battery: 300 g

Flying schedules
Preliminary flight schedule F3P-AP
Final schedule F3P-AF
Execution time: 5 minutes
Schedule F3P-AA: simplified schedule for national competitions

Requirements
Due to the small airspace and short distances to the pilot and jury, the precision of manoeuvres can be assessed almost down to a centimetre. This calls for the highest flying skills. Ready access to suitable indoor spaces for regular training is an absolute necessity. In addition, and this is the case for all aerobatics classes, it is almost impossible for other models to share the airspace during training flights.

Completely constructed of wood

F3P-AFM – Freestyle Aerobatics to Music

Until recently, this class was a complement to the WC programme. This year, it is included in the World Championships competitions for the first time.

Model specifications
As F3P

Requirements
If you think that some random flying and playing a bit of music is all it takes for these competitions, you are very much mistaken. Apart from the highest flying skills, a sense of harmony and rhythm are called for. Manoeuvres are not prescribed but have to be flown accurately and the music has to match the manoeuvre – gentle manoeuvres, for example, do not go with hard rock. In short: freestyle is not least down to individual character.

F3S – Aerobatic Jet Modell Aircraft

F3S – Aerobatic Jet Model Aircraft
From the beginning of the gas turbine age, aerobatics with jet models has been particularly spectacular and very attractive to spectators. So far, there are no FAI World Championships in this class but these are replaced, to an extent, by the Jet World Masters. However, the provisional F3S rules allow international and national championships although, sadly, they are hardly ever used. This could partly be due to the large airspace required for turbine models.

Model specifications
Propulsion: turbine or electric ducted fan.
Maximum wingspan 3500 mm
Maximum length 3500 mm
Maximum take-off weight: 25 kg
Battery voltage for electric motors, no load: 72 Volt

Flying schedules
F3S Basic
F3S Preliminary
F3S Final
F3S Freestyle criteria similar to F3P AFM

Last but not least, the Juniors

With the advanced schedule, F3A provides a somewhat simplified programme for national competitions but this is still far too difficult for any novice. Most countries therefore have their own, highly simplified schedules for juniors which need to be promoted urgently. Without this, it becomes virtually impossible for any young person to get started with aerobatics. There is a widely held view that success in aerobatics competitions can only be achieved with the most expensive high-tech models but I strongly disagree with this. In RC aerobatics, as elsewhere, it may well be best to keep things simple.

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Editor Emil Giezendanner

Thanks a lot to our photo-graphers

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