



# F4J 'SCALE JET' Class

# 2006

**F4J Rules**  
Including  
*Judges*  
*Guidelines*

## Introduction

The changes from the previous edition are all in blue colour

## Rulebook

Base Document for F4J competition

## **Judges Guidelines (JG)**

*The separate document 'Judges Guidelines' has been deleted and incorporated in this document*

## Attachment no. 1

Diagrams & full details of all manoeuvres

## Board member Clarifications 25.11.06

1.0.1 (f)

2.0.5 (a)

4.0.2 (a)

4.0.4 (a)

5.0.4 note 1

5.0.5 (c)

5.0.6 Group 2 manoeuvre (14)

5.0.6 Group 5 manoeuvre (35)

5.0.9 (a)

## **CONTEST CLASSES**

### **1.0.1 Individual and Open Classes.**

From the beginning of 2000 there will be two official F4J contest classes, as follows:

- (a) Individual Scale, for pilots who build & fly their own model and comply with rule 2.0.2.
- (b) Open Scale, for pilots alone - or a team of 2 (pilot and builder), where the pilot does not have to be the constructor of all, or any part, of the model and has not complied with Rule 2.0.2.
- (c) (d) (Rules deleted)
- (e) The same scoring system will apply to Open scale entries as to Individual competitors. Apart from rule 1.0.1, the Open event will be held to the same rules and flown at the same time as the Individual contest.

(f) Any Pilots may participate only in one class

### **1.0.2 Number of Competitors.**

In a Jet World Masters, or European Masters, each country is permitted a maximum of 6 entries in the competition. There will be complete freedom of choice for each country in respect of the distribution of the number of entries between the two classes, i.e. a country may enter six Individual and no Open classes through to no Individual and six Open or any combination falling between these two extremes.

### **1.0.3 Nationality of Competitors.**

- (a) All competitors (including members of an Open entry) must be from the country/nation they are representing, and passports or other ID may be required as proof of this by the Contest Director, or the IJMC. If persons wish to compete for national teams other than the country of their citizenship then the following rules (b) to (e) will apply:
- (b) They must apply in writing to the IJMC Council for permission.
- (c) They must have resided for two years in the country in whose team they wish to compete and must provide the IJMC with documentary proof of the period of residence.
- (d) They must obtain the agreement of the team organisers to their membership of that country's team.
- (e) On returning to their country of citizenship an individual will immediately qualify for consideration for membership of that country's team, without the need for a period of residency. The IJMC has to be informed in writing of such changes in circumstances.

- (f) National teams will in future be recognised by exactly the same criteria as that used by the International Olympic Committee.  
However, "grandfather rights" will be allowed by the IJMC to recognise national teams that would not be accepted by the IOC but who have competed in the past in IJMC competitions. For example, the IJMC will continue to recognise separate teams from England, Scotland and Northern Ireland. **"Grandfather rights" will be retained forever.**
- (g) The IJMC will only recognise the National flags and insignia that are recognised by the IOC and those flags of national teams exercising "grandfather rights".

## **GENERAL REGULATIONS**

### **2.0.1 Definition of 'Jet' models eligible for F4J contests.**

- (a) The competitor's model shall be a replica (copy) of a heavier-than-air, fixed-wing, man-carrying aircraft that was built and flew successfully, and was powered only by 'jet' propulsion. (This includes full-size ducted-fans)
- (b) Competitors' models shall be powered solely by ducted-fan and/or gas-turbine engine(s). All other forms of propulsion are forbidden.

### **2.0.2 Builder of Model rule**

#### **(a) Competitor's Declaration**

The competitor in the "Individual" Class must have constructed, finished and detailed the model, and a signed declaration will be required by the organisers to this effect, prior to the commencement of the contest.

Competitors in the "Individual" Class will be required to declare all commercial items or finished assemblies that are incorporated in their model. Such commercial items could include, but not be limited to: moulded surface components, scale undercarriage assemblies, retracting undercarriage mechanisms, wheel braking systems, engine ducting, etc.

Competitors will not be required to declare radio control equipment, engines and fuel systems.

These declarations will be published at the place of the contest, before the start of the contest. (There will be no additional bonus for scratch-built or own-design models.)

#### **(b) Competitors' Assessment of Compliance with the Builder of the Model Rule**

All competitors will be required to complete a form on which they can anonymously address their belief that the entrants in "Individual" Class have or have not complied with the Builder of the Model Rule and that lists of declared commercial items are complete.

The forms will be uniquely numbered but the individual identity of the competitors completing the forms will not be known.

The forms will be submitted to the Contest Director by the end of the second day of the competition.

#### **(c) Examination of Cases of Doubt in respect of the Builder of the Model Rule**

An examining board of six IJMC members will investigate a maximum of six competitors who have attracted the most doubt in respect of compliance with the Builder of the Model Rule. The examining board will comprise a representative from each nation that has an entrant under investigation. If there are less than six competitors under investigation the examining board numbers will be made up to six by IJMC members elected by the competitors.

#### **(d) Disqualification of Competitors**

If the examining board finds that there is reasonable doubt that any competitor is not complying with the Builder of the Model Rule then the competitor will be disqualified. The examining board's decision will be final and not subject to the established protest procedure.

### **JG**

*Competitors in the "Individual" Class will be required to declare all commercial items or finished assemblies that are incorporated in their model. Such commercial items could include, but not be limited to: moulded surface components, scale undercarriage assemblies, retracting undercarriage mechanisms, wheel braking*

*systems, engine ducting, etc. Competitors will not be required to declare radio control equipment, engines and fuel systems.*

### 2.0.3 General Characteristics.

Max. weight of model at take-off (Excluding fuel)	20 kg.
Wing-loading	no restrictions
Max. surface area	no restrictions
Motive power	no restrictions

The weighing will be in a controlled environment to avoid effects of wind.

Note: The IJMC will keep and maintain accurate a 5 kg calibration weight for use throughout the competition so that scales can always be checked and scale calibration certificates will not be required.

### 2.0.4 Competition Programme.

The competition shall be divided into two scoring parts: Static judging & Flying judging. The final score shall be the total points awarded in all parts, calculated as per section 6. The ratios of maximum points possible shall be made up as follows:

Static points: 50%                      Flying points: 50%

### 2.0.5 Judges.

- a) A minimum of seven judges to be used. These judges [must be prepared](#) to be used as flying as well as static judges.  
Static judging to be done during the official practice session.  
Static judges to be divided into two groups consisting of three judges each and the seventh judge to be used to check documentation. [See also rule 4.0.4\(a\)](#)  
The one set of judges to judge outlines of models only and the second set to judge remaining aspects.  
~~All static judging to be completed before official flying starts.~~
- (b) (Rule deleted)
- (c) As soon as practical after each contest flight, the points awarded will be made available to the competitors for inspection, allowing sufficient time for them to adjust their manoeuvre schedules for the next contest flight if they should wish to do so.
- (d) Competitors are not permitted to discuss their scores with judges during the contest (except to accept guidance on the rectification of faults), except as provided in "Protests".
- (e) During static ('fidelity to scale and craftsmanship') judging, any prior or special knowledge of the prototype possessed by a judge shall be discounted, and the model shall be assessed solely on the documentation submitted by the competitor.
- (f) During static judging the judges are to totally disregard all internal parts of the ductwork and propulsion system that are contained within the model.
- (g) The 'Flying' and 'Static' judges may not harmonise the scores awarded to competitors.

### 2.0.6 Coefficients.

Where a coefficient (K) is stated, the points awarded shall be multiplied by the coefficient to give the total scores for that section. Fractions, in tenths of a point, may

be used in determining static points, but flying points (reference to noise points deleted) shall only be judged to the nearest  $\frac{1}{2}$  point.

### 2.0.7 Remarks.

- (a) All models shall become airborne in the manner of their prototype, except as in (b).
- (b) Models of seaplanes are permitted to use wheels or wheeled dollies for take-off, in the absence of suitable water surface conditions. Deviation from scale, through inclusion of permanently attached wheels, skids or similar non-prototype devices in the model structures shall, in this case, not be taken into consideration in scoring of 'fidelity to scale' points.
- (c) No parts of a model may be exchanged, removed, added or repositioned between flying and static judging, except for fuel, receiver antennas, and forward-facing pitot tubes or other devices that the flying judges or Contest Director consider could be dangerous in the event of an accident. Bombs, drop tanks, missiles, other ordnance, external parts etc., that are presented attached to the aircraft during static judging must remain on the model for the take-off of every contest flight.
- (d) Parts of the propulsion system, or airframe, that are damaged during the contest may be repaired or replaced with similar parts, and this may result in the model being weighed again, to ensure that it still complies with rule 2.0.3. The competitor must advise the CD, before any further contest flights are made, if any parts of the model are replaced, repaired or exchanged during the contest, which may increase the total weight of the model, or affect other regulations.
- (e) Reciprocating engines, where used, must be effectively muffled. The muffling system should be engineered within the confines of the outline of the model. External mufflers or engines, or parts thereof, will result in down marking in the static judging section, unless these are scale representations of those on the full-size prototype. The Contest Director retains the right to prohibit excessively noisy models from taking part in the contest.
- (f) No explosive devices may be dropped or activated, and rockets, or any other explosive devices may not be jettisoned during flight, or taxiing manoeuvres.
- (g) **Parts loss during flight.**  
If any part unintentionally separates from (comes off) the aircraft during flight (that was attached to the aircraft at the start of the contest flight), then the scoring stops and the competitor must land immediately. The points awarded from previously completed manoeuvres will still be awarded. If a part separates from the aircraft during one of the 8 mandatory and optional scoring manoeuvres, then no points will be awarded for this manoeuvre. However, 'Realism in Flight' points will still be awarded, in proportion to the amount of the flight completed.

### 2.0.8 Number of Models.

Each competitor, (reference to Team to be deleted), may enter the contest with one model only.

### 2.0.9 Number of Helpers.

Each competitor (pilot) is permitted a maximum of two helpers/assistants during the flying part of the contest, both in the 'Starting Area', and in front of the 'Safety/No-Score' line. However the CD may, at his discretion, allow additional helpers/assistants, particularly in the case of multi-engine or gas-turbine powered models, for safety reasons. No helper/assistant may touch the transmitter after the competitor has announced take-off. The official timekeeper is responsible for ensuring

that helpers do not touch the transmitter during flight. If this occurs the whole flight is scored zero.

#### **2.0.10 Radio Equipment.**

There shall be no limitations on the radio or mechanical equipment used by the competitor (e.g. Gyros are permitted). All R/C equipment must comply with statutory regulations of the country that the event is being held in, and transmit on an approved frequency for that country.

#### **2.0.11 Safety for WM contests.**

- (a) All R/C transmitters expected to be used during the contest must be checked by the organisers, prior to the contest, to ensure that they are transmitting on the stated frequency, and placed in a secure compound under constant observation and security by the organisers, or their officials. During the contest an official steward must be in control of the transmitter compound and will issue the transmitter to the competitor only when his name is called for him to stand by to make his flight. As soon as the flight/attempt has ended, the competitor's transmitter must be returned to the transmitter compound immediately. Radios cannot be used during static judging. Even not with DSC Cable.
- (b) Any unauthorised transmission during the contest will result in automatic disqualification of the offender from the contest, and render him liable to further penalties.
- (c) During the whole time of the official flight the pilot, with his transmitter, must stay on the ground within the area reserved for this purpose. The competitor will be notified if the model is flying outside the permitted area.

#### **2.0.12 Starting order.**

- (a) The starting order of the competitors will be established by the organiser before the contest. However, the flying will be opened (if they are taking part in the competition) by the Previous Individual Jet World Master flying first, followed by the Previous Open Class World Master. The rest of the starting order will be as established by the organiser. The static judging and first round of contest flying will take place in ascending numerical order (1, 2, 3...etc.). The organiser has the right, following approval by the IJMC Board, to determine the starting order to ensure the safe and efficient running of the competition
- (b) Deleted
- (c) **Order of Flying**  
The flying order of the second round will be the same as that of the first round. The final round will be flown according to points achieved in the pilot's best scoring round, the lowest scoring model flying first and the leading model last.

#### **2.0.13 Protests.**

- (a) Only Competitors, or Team Leaders, may submit a protest.
- (b) All protests must be made in writing, and handed to the Contest Director with a protest fee, which shall be the same amount as the competitor's entry fee. This protest fee shall be held by the IJMC Chairman (or other Council member) during the term of the protest.
- (c) As soon as possible after receiving a protest the CD will organise and appoint an 'Arbitration Tribunal', which will consist of 3 persons:
  - A representative of the event organiser/host association,



- A member of the IJMC Council (or an IJMC representative selected by the IJMC Council if all the Council members have an 'interest' in the protest result).
  - A representative of the competitors, who will be elected by a vote of all pilots at the Briefing before the contest begins.
- (d) The CD shall ensure that the Tribunal reaches a decision within 12 hours of any protest being made, and before any final results are released, or prize giving commences.
- (e) No other person(s) shall be present at the arbitration discussions, excepting for the protester, the competitor being protested against, and any language translators required.
- (f) The Tribunal will first hear from the Protester, and afterwards may request a response from the Competitor being protested against, if necessary.
- (g) If the arbitration panel upholds the protest (in favour of the protester) then the protest fee will be returned to the protester in full. If the arbitration panel does not find in favour of the protester, then the protest fee will be retained by the IJMC.
- (h) The Arbitration Tribunal's decision is final, and cannot be appealed against.
- (i) No protests may be submitted later than 3 hours after the last competitor's official flight.
- (j) In the event of any disputes or protests regarding translations of these rules into other languages, the 'English' version shall be the definitive version.

#### **2.0.14 Weather Conditions**

In the case of bad weather conditions (e.g.: rain, snow, strong winds or wind direction changes, etc.) during the flying part of a Jet WM., or European Masters, a meeting will be held which will be attended by each nation's Team Leaders and the Contest Director. A vote will be taken by all of the Team Leaders on whether flying should continue, and the decision will be carried by the majority vote. If voting is equal, then the Contest Director has the casting (deciding) vote.

All Team Leaders, and the Contest Director, have the right to activate (call) this meeting to discuss weather conditions.

The Contest Director also has the right to award any competitor a 're-flight', if weather conditions should become dramatically worse, or change, during a contest flight. (see 5.0.1(b))

## **NOISE ASSESSMENT**

**Rules 3.0.1, 3.0.2 & 3.0.3 have been entirely deleted.**

## **STATIC JUDGING**

### **4.0.1 Proof of Scale.**

- (a) Proof of scale is the responsibility of the competitor.
- (b) Name of entry - the exact name and type designation of the subject aircraft shall be indicated on the entry form, and in 'proof of scale' documentation.
- (c) The scale to which the model is built is optional, but must be stated in the documentation.
- (e) All models may be required to be weighed immediately after their official flight(s), to ensure that they comply with rule 2.0.3. Any fuel remaining in the aircraft may be removed before the aircraft is weighed.

### **4.0.2 Scale Documentation.**

Models will be placed in a "ready box", prior to formal Static Judging, for preliminary checks to be made. During formal Static Judging a Timekeeper will ensure compliance with Rule 4.0.3.

To be eligible for static points the following minimum documentation must be submitted to the judges by the competitor:

- (a) Three identical copies of an accurate published 3-view (minimum, **though all six views are recommended**) scale drawing of the full-size aeroplane having a minimum scale of 1/72, and a maximum scale of 1/24. Unpublished drawings by the competitor or other draughtsman are only acceptable if they are certified in writing as accurate in advance of the contest, by an authoritative source (such as the respective National Scale Committee or equivalent), the builder of the original aircraft, or other competent authority.
- (b) At least three differing photographs, or published printed reproductions, of the full-size aircraft, including at least one of the actual subject aircraft being modelled. At least one of these must show the prototype aircraft on the ground to allow the landing gear assembly to be judged.
- (c) For proof of colour, if one or more of the photographs in (b), of the actual subject modelled, is not in colour, then a published coloured drawing is acceptable, or a published printed description of the colour scheme (for example those from specialist scale model publications). Alternatively, authenticated written description and/or authenticated colour chips are acceptable.
- (d) Photographs must be considered to be more important than 3-views, and will take precedence over three-view drawings for verifying scale outlines.

### **JG**

*If the judges suspect that the information supplied in the presented documentation has been manipulated, the Contest Director should be informed immediately by the spokesman for the static judges. The Contest Director will then decide how to proceed.*

*If the competitor presents only partial Documentation, the static score points will be awarded in proportion to the documentation supplied. (IJMC philosophy)*

*If the competitor presents no Documentation at all, the static judging cannot be performed, and the static score will be zero.*

*If the competitor presents several different documents, that conflict with each other, the competitor must designate the documents that should be used for judging.*

#### 4.0.3 Static judging of 'Fidelity to Scale and Craftsmanship'.

4.0.3.1	Scale Accuracy - side views	K = 15
4.0.3.2	Scale Accuracy – front and rear view	K = 15
4.0.3.3	Scale Accuracy - top and bottom view	K = 15
4.0.3.4	Colour	K = 5
4.0.3.5	Markings Accuracy	K = 5
	Markings Complexity	K = 5
4.0.3.6	Surface Texture and Realism in general	K = 10
	Surface Complexity	K = 5
4.0.3.7	Craftsmanship in general	K = 10
	Complexity of structure	K = 5
4.0.3.8	Scale Detail Accuracy	K = 5
	Scale Detail Complexity	K = 5

Items 4.0.3.1 to 4.0.3.5 (inclusive) are to be judged first at a minimum distance of five metres from the nearest part of the model.

Items 4.0.3.6 to 4.0.3.8 (inclusive) are to be judged afterwards as close as the judges desire, including touching. The judges are not permitted to measure any part of the model. A maximum of 20 minutes is to be spent on the static judging of every model. The Judges may ask the competitors questions about the model and the full-size original.

The model should be placed on a turntable that is adjustable in height and there should be a matt white back-drop.

#### 4.0.4 Static points and Coefficient.

- (a) Each section in 4.0.3 shall be awarded points from 0 - 10 in 1/10<sup>th</sup> point increments by each judge and these points shall then be multiplied by the appropriate K factor (shown in 4.0.3). The scores of all three judges will be added together to give the total static points.

*The design of the score sheet shall ensure that, where two panels of 3 static judges are used [see rule 2.0.5(a)], judges from panel A and panel B are paired consistently throughout the process of static judging.*

- (b) The static points can only be used in the final classification of the contest after the model has commenced at least one official flight. (ie: after the model leaves the ground)
- (c) The maximum number of points possible, after applying the K factors, is 3000 points.

#### 4.0.5 Static Score.

The final static score is calculated by multiplying the total static points awarded by 50%. Therefore the maximum static score achievable is 1500.

## FLYING JUDGING

### 5.0.1 Official Flights.

- (a) Each competitor will be called to fly three rounds in the case of one flight line and four rounds in the case of two flight lines. Organisers will have the option of one or two flight-lines, with the choice of the two flight-line option being dependent on the availability of suitable runways (see e and f below). Each competitor must execute an official flight within the required time limit (see 5.0.2) on each occasion to be eligible for flight points for that flight. In the case of one flight line and three flying rounds, the best two flight scores will count towards the final classification, the lowest scoring flight being discarded. In the case of two flight lines and four flying rounds, the best three flight scores will count towards the final classification, the lowest scoring flight being discarded. If less than the total number of rounds - required for the number of flight lines - are flown, due to bad weather etc., no flight scores will be discarded, i.e. all flight scores will count towards the final classification. The organisers will endeavour to complete the required number of flying rounds.
- (b) If a competitor is unable to start or complete a flight and, in the opinion of the Contest Director, the cause is outside the competitors control (eg: act of God, bad weather or safety reasons) the C.D. may, at his discretion, allow the competitor a re-flight. The C.D. shall decide when the re-flight shall take place. If there is any doubt the competitor should be allowed a re-flight as soon as possible, then if the reason for the re-flight was subsequently considered not valid the protest procedure should be invoked. This will avoid delaying the closure of the competition to accommodate late re-flights. It will also ensure that re-flights are made in similar weather conditions to the original scheduled flight.
- (c) An official flight commences at the earliest of the following:
- (i) The competitor signals to the timekeeper that he is commencing to start his engine(s).
  - (ii) Two minutes after the competitor is instructed to start his flight by the Timekeeper. (See 5.0.2.(b))
- (d) In each flight, only one attempt is allowed for each manoeuvre after the start of the manoeuvre has been called.
- (f) [Rule deleted as it has been stated in (a) above.]
- (g) [Rule deleted as it has been stated in (a) above.]
- (h) Organisers must make the airfield available for local familiarisation flying for two days before the start of the competition.

### 5.0.2 Flying Time.

- (a) All competitors will be given at least 10 minutes warning before they are instructed to start their flight.
- (b) The competitor will then be instructed to start his flight.
- (c) Timing of the flight will start when the official flight commences (see 5.0.1 (c)).
- (d) Competitors with single-engine models will be allowed 10 minutes to complete the flight, an additional minute will be allowed for each extra engine in the case of multi-engine models.

(e) No points will be awarded for any manoeuvre that is not completed at the end of the time allowed. 'Realism in Flight' points will be awarded, in proportion to the amount of the flight completed.

(f) Flight time for non-aerobatics aircraft should be increased by 3 minutes.

### 5.0.3 Starting Time.

(a) If the model is not airborne within 6 minutes (plus one additional minute for each extra engine) after the official flight and timing commence, the flight will end and no points will be awarded for the flight.

(b) If the engine(s) stops before the model is airborne, the engine(s) may be restarted. If this happens during the take-off roll, the score will be in proportion of the amount of the manoeuvre completed before the engine stopped. The subsequent take-off after restart will not be scored again.

### 5.0.4 Flight Schedule.

Each contest flight will consist of 3 mandatory manoeuvres and 5 optional manoeuvres, and will also be awarded points for 'Realism in Flight'.

Take-off	K = 10
Straight flight	K = 5
Option 1	K = 10
Option 2	K = 10
Option 3	K = 10
Option 4	K = 10
Option 5	K = 10
Circuit, approach and landing	K = 15
Realism in flight	K = 20

~~Note 1: The five options may include only one 'Technical' option, which must be chosen from those listed in 5.0.6. This note 1 is now obsolete, 5.0.6.1 having been deleted.~~

**NEW** Note 1: The 5 optional manoeuvres shall be chosen, one from each of the groups defined in 5.0.6. They may be flown in any order but that order must be defined in advance of the flight.

Note 2: Taxiing is not considered to be a manoeuvre.

**NB: SEE ATTACHEMENT NO. 1 TO THE RULEBOOK FOR DIAGRAMS & FULL DETAILS OF ALL MANOEUVRES**

### 5.0.5 Mandatory manoeuvres.

(a) **Take-off** - The model shall take-off from the ground and climb away on a constant heading and climb angle for minimum 5 seconds. During this time the landing gear sequence has to be initiated.

#### JG

#### Errors:

- *Model is touched after calling "now" (zero marks)*
- *Model veers off runway direction on take-off*
- *Take-off distance is not in keeping with the prototype*

- *Speed unrealistic or acceleration too rapid*
- *Lift-off not smooth*
- *Climb rate incorrect (too steep or too shallow)*
- *Nose attitude during climb not in keeping with the prototype*
- *Flaps not used if applicable*
- *Landing gear sequence not initiated if applicable*
- *Climb-out track not the same as for take-off run*
- *Climb out too short*

- (b) **Straight flight** - The model shall make a low fly-by parallel and close to the runway for a duration of 5 - 10 seconds, at a height of between 3 - 10 metres.

### **JG**

#### **Errors:**

- *Track not straight*
- *Height not constant*
- *Manoeuvre not centred on judges position*
- *Track not parallel with judges line*
- *Manoeuvre too short in time*
- *Model's flight not smooth and steady*
- *Manoeuvre too far away, too close, too low or too high*

- (c) **Circuit, Approach and Landing** - The model shall commence upwind and execute a circuit and landing approach in the manner of the prototype, and land on the runway in front of the judges. When the model has come to a stop, the manoeuvre is complete. Subsequent taxi back will be considered under 'realism in flight' (see also 5.0.7. (a)) and taxiing time will not be included in the total flight time. Retractable undercarriage (where fitted) is to be extended during the downwind leg of the circuit, and flaps, spoilers, speed brakes etc., are to be extended as per the full-size prototype.

### **JG**

#### **Errors:**

- *Manoeuvre does not commence parallel to the runway (on the upwind leg)*
- *Circuit is not centred on the judges line*
- *Downwind track not parallel to runway axis*
- *Landing gear not extended on downwind leg*
- *Altitude changed before appropriate descent point*
- *Descent not smooth and continuous*
- *Model does not adopt a landing attitude appropriate to subject type*
- *Model does not come to a gradual and smooth stop after landing*
- *Model touches wing tip on the ground during landing*
- *One gear leg collapses after touch down = 20% penalty (same if one gear not extended during approach)*
- *Two or all gear legs collapse after touch down = 50% penalty (same if two or all gear legs not extended during approach)*
- *Landing run not straight*

*Note: All landings ending with the model on its back will be regarded as a crash landing and scored zero.*

## 5.0.6 Optional Manoeuvres.

### (5.0.6.1) Rule Deleted. No Special Options allowed

(5.0.6.2) Taxiing manoeuvres will not be regarded as an option, but will be considered in the 'Overall Flight Realism' section.

(5.0.6.3) Non-aerobatic type aircraft are not permitted to carry out the aerobatic options listed below. Aerobatic type aircraft are not permitted to carry out the non-aerobatic type manoeuvres listed below.

(5.0.6.4) Each manoeuvre may only be nominated once for each contest flight.

The grouping of manoeuvres will be re-assessed at every IJMC plenary meeting and will be decided at least 12 months before a Jet World Masters competition. Manoeuvres need not be flown in Group-number order.

## Group 1

- (01) Touch and Go** - The model shall commence upwind and execute a circuit and landing approach in the manner of the prototype, and land on the runway in front of the judges. The model then accelerates and, after a short distance, takes off again, followed by a climb on a constant heading and climb angle of approx. 5 seconds, during which time the landing gear is retracted. Retractable undercarriage (where fitted) is to be extended during the downwind leg of the circuit, and flaps, spoilers, speed brakes etc., are to be extended as per the full-size prototype. (all types)

### **JG**

#### **Errors:**

- *Manoeuvre does not commence parallel to the runway axis (on the upwind leg)*
- *Circuit is not centred on the judges line*
- *Downwind track not parallel to runway axis*
- *Landing gear not extended on downwind leg*
- *Altitude changed before appropriate descent point*
- *Descent not smooth and continuous*
- *Speed too high during descent*
- *Model does not adopt landing attitude appropriate to the prototype*
- *Model veers off runway direction on ground roll*
- *Ground roll too short / too rapid acceleration*
- *Lift-off not smooth*
- *Nose attitude during climb not in keeping with the prototype*
- *Flaps not used if applicable*
- *Landing gear not retracted if applicable*
- *Climb-out track not the same as for take-off run*
- *Climb out too short*

- (02) 4-Point Roll** - The model approaches in straight and level flight, parallel to the runway, and rolls at a constant rate through four complete quarter rotations, hesitating at each of three equally spaced intervals, and resumes straight and level flight on the same heading and altitude. This manoeuvre should be performed horizontally. (aerobatic option)

### **JG**

#### **Errors:**

- *Rate of roll not constant*
- *Style of roll not typical of the prototype*

- *Roll not centred on judges position*
- *Entry and exit at different heights or speeds*
- *Entry, and exit tracks and line of roll not parallel with judges line*
- *Model does not resume straight and level flight on same track as entry*
- *Style of roll not nominated*
- *Each quarter roll deviates from 90°*
- *Intervals between each part of roll different*
- *Manoeuvre too far away, too close, too high or too low*

**(03) Cuban Eight** - The model approaches parallel to the runway. After passing the judges' centreline, the model pulls up into approximately 5/8 of an inside loop and continues heading downward at 45°, inverted. The model performs a half roll at the intersection (on the judges' centreline), followed by another approximately 3/4 inside loop to 45° inverted. The model then executes a half-roll to normal flight on the judges' centreline, and then recovers to straight and level flight on the same track, heading and altitude as the start. (aerobatic option)

### JG

#### Errors:

- *Manoeuvre not performed in a constant vertical plane that is parallel with the judges line*
- *Loops are not in keeping with the prototype*
- *Loops are not the same size*
- *Half rolls are not centred on judges position*
- *45° descent path not achieved*
- *Model does not exit manoeuvre at same height as entry*
- *Model does not resume straight and level flight on same track as entry*
- *Inappropriate use of throttle*
- *Size and speed of loops not in manner of prototype*
- *Manoeuvre too far away, too close, too high or too low*

**(04) Slow Roll** - The model approaches in straight and level flight, parallel to the runway, and rolls slowly at a constant rate through one complete roll and resumes straight and level flight on the same heading and altitude, taking 3 - 5 seconds to execute the slow roll. This manoeuvre should be performed horizontally. (aerobatic option)

### JG

#### Errors:

- *Rate of roll not constant*
- *Style of roll not typical of the prototype*
- *Roll not centred on judges position*
- *Entry and exit at different heights or speeds*
- *Entry, and exit tracks and line of roll not parallel with judges line*
- *Model does not resume straight and level flight on same track and heading as entry*
- *Style of roll not nominated*
- *Roll rate too fast*
- *Manoeuvre too far away, too close, too high or too low*

**(05) Horizontal Figure of Eight** - The model approaches in straight and level flight, then makes a one-quarter circle turn in a direction away from the judges, followed by a 360° circle turn in the opposite direction. This is followed by a three-quarter circle turn in the same direction as the first turn, completing a figure-of-eight, parallel to the runway centreline and at a constant altitude. The manoeuvre ends on the same



altitude and heading as the start, and should be centred on the judges' centreline.  
(non-aerobatic option)

### JG

#### Errors:

- *Entry into first circle not at right angles to original flight path*
- *Circles are of unequal size*
- *Circles misshapen*
- *Constant height not maintained*
- *Intersection not centred on judges position*
- *Entry and exit path not parallel with judges line*
- *Overall size of manoeuvre not realistic for prototype*
- *Model flight path not smooth and steady*
- *Manoeuvre too far away, too close, too high or too low*

- (06) Combination Immelman/Reversal** - This manoeuvre is a combination of an Immelman and a split-S. The model approaches in straight and level flight, and approximately 75 metres after it has passed the judges centreline it pulls up into a half inside loop, and then immediately executes a half roll to normal attitude. After straight and level flight of approx.150 metres, the model performs a half roll to inverted, and then a half inside loop downwards to recover into level flight on the same heading and altitude as the start. (aerobatic option)

### JG

#### Errors:

- *Track of the half loop not in a vertical plane*
- *Half loop is not accurately semicircular*
- *Rolls start too early or too late*
- *Excessive height loss in the rolls*
- *The size of both half loops not equal*
- *Track veers during the rolls*
- *Model does not resume straight and level flight on the same track as the entry*
- *Manoeuvre not flown parallel with judges line*
- *Size of manoeuvre and speed not in manner of the prototype*
- *Manoeuvre too far away, too close, too high or too low*

- (07) Immelman - Variable Wing Geometry** - The model commences the manoeuvre parallel to the runway with wings swept back and performs a half inside loop upwards, starting at the judges centreline. During the half loop the wings are to be swept forward. On completion of the half loop the aircraft then executes a half roll at the top to resume normal level flight, on a reciprocal track to that at the start. (Aerobatic option)

#### Errors:

- *Half loop is not semi-circular*
- *Plane of the half loop not vertical or on line*
- *Half loop not centred on judges position*
- *Half loop is not in keeping with the prototype*
- *Inappropriate use of throttle*
- *Model inverted for too long or too short a time*
- *Roll starts too early or too late*
- *Excessive height loss in the roll*
- *Track veers during the roll*
- *Model does not resume straight and level flight on the opposite track to entry*
- *Manoeuvre not flown parallel with judges line*

- *Size and speed of manoeuvre not in the manner of the prototype*
- *Manoeuvre too far away, too close, too high or too low*

**(08) Horizontal Derry Eight** - The model approaches in straight and level flight, then makes a one-quarter circle turn in a direction away from the judges. Toward the end of this quarter circle turn the model rolls in the direction of the turn to be inverted at the end of the turn. The model continues to roll to enter a 360° circle turn in the opposite direction. The model will stop rolling when upright and banked in the direction of the turn. Toward the end of this 360° circle turn the model rolls in the direction of the turn to be inverted at the end of the turn. The model continues to roll to enter a three-quarter circle turn in the same direction as the first turn. The model will stop rolling when upright and banked in the direction of the final turn, completing a figure-of-eight, parallel to the runway centreline and at a constant altitude. The manoeuvre ends on the same altitude and heading as the start, and should be centred on the judges' centreline. (Aerobatic option)

**JG**

**Errors:**

- *Entry into first circle not at right angles to original flight path*
- *Circles are of unequal size*
- *Circles misshapen*
- *Constant height not maintained*
- *Intersection not centred on judges position*
- *Model not inverted when passing through the intersection*
- *Entry and exit path not parallel with judges line*
- *Overall size of manoeuvre not realistic for prototype*
- *Model flight path not smooth and steady*
- *Manoeuvre too far away, too close, too high or too low*

## Group 2

**(09) Chandelle** - From straight and level flight the model passes the judges' centreline, and performs a 180° turn in a direction away from the judges. During the first 90° of the turn the model simultaneously climbs and rolls into the turn. During the second 90° of the turn the model will continue climbing (gradually lowering the nose) and rolling away from the turn. At the end of the manoeuvre the model attains Standard Attitude. (non-aerobatic option)

**JG**

**Errors:**

- *Approach and departure not parallel to runway heading.*
- *Approach and departure not horizontal.*
- *Climb rate not constant*
- *Turn rate not constant*
- *Turn not 180°*
- *Manoeuvre too far away or too close*

**(10) Positive 'G' Roll** - This is a special form of the normal roll. The model approaches in level flight and parallel to the runway, and performs a 360 degree roll away from the judges while simultaneously pitching up, describing a gentle helical flight-path, and resumes level flight, again parallel to the runway but further away than on the entry track. (aerobatic option)

**JG**

**Errors:**

- *Rate of roll not constant*

- *Rate of pitch not constant*
- *Style of roll not typical of the prototype*
- *Roll not centred on judges position*
- *Entry and exit at different heights or speeds*
- *Entry and exit tracks not parallel to each other*
- *Model does not resume the same attitude as entry*
- *Style of roll not nominated*
- *Manoeuvre too far away, too close, too high or too low*

**(11) Half Cuban Eight -**

The model approaches parallel to the runway, straight and level and pulls up into a circular inside loop until 45° nose down. The 45° inverted flight is held until a half roll is performed in front of the judges; straight and level recovery is to be at the same height as original entry.

(aerobatic option)

**JG**

**Errors:**

- *Manoeuvre not performed in a vertical plane that is parallel with the judges line*
- *Loop is not circular*
- *Half roll is not centred on judges position*
- *45° descent path not achieved*
- *Model does not exit manoeuvre at same height as entry*
- *Inappropriate use of throttle*
- *Size and speed of manoeuvre not in the manner of the prototype*
- *Manoeuvre too far away, too close, too high or too low*

- (12) Knife-Edge Flight -** The model approaches in straight and level flight at a minimum height of 15 metres, parallel to the runway, then rolls through 90° to show the top of the model towards the judges. The model continues in this attitude, straight and level, for 5 - 8 seconds, and then executes another 90° roll (in the opposite direction) to recover into level flight on the same heading and altitude as the start. The distance between the first 1/4 roll and the judges' centreline, and the second 1/4 roll and the judges' centrelines, should be equal. (aerobatic option)

**JG**

**Errors:**

- *1/4 rolls not performed on the same track as knife-edge flight*
- *Model does not fly a straight course*
- *Model gains or loses height*
- *Model does not remain showing the top of model for the prescribed duration*
- *Manoeuvre not centred on judges position*
- *Manoeuvre not flown parallel with judges line*
- *Manoeuvre too far away, too close, too high or too low*

- (13) Cobra Roll -** The model starts in straight and level flight, pulls up into a 45° climb and executes a half roll to inverted. It then completes a 1/4 inside loop into a 45° dive, executes a half roll to normal attitude, and recovers to level flight at the same altitude and heading as the start. (Reference to a specific altitude has been deleted) The highest point of the 1/4 inside loop should be on the judges' centreline. (aerobatic option)

**JG**

**Errors:**

- *Manoeuvre not performed in a vertical plane that is parallel with the judges line*

- *Quarter loop is not centred on judges position*
- *45° climb and descent paths not achieved*
- *Half rolls not centred in climb and descent part of figure*
- *Model does not exit manoeuvre at same height as entry*
- *Inappropriate use of throttle*
- *Manoeuvre too far away, too close, too high or too low*

**(14) ~~Half Reverse Cuban Eight~~** – The model approaches parallel to the runway, straight and level and pulls up into a circular inside loop until 45° nose down. The 45° inverted flight is held while a half roll is performed in front of the judges; straight and level recovery is to be at the same height as original entry.  
(aerobatic option)

**Half Reverse Cuban Eight** - The model approaches parallel to the runway, straight and level and pulls to a 45° upline., performs a half roll in front of the judges then pulls through 5/8's of an outside loop to resume straight and level flight at the entry height on a reciprocal track.  
(aerobatic option)

*JG*

*Errors:*

- *Manoeuvre not performed in a vertical plane that is parallel with the judges line*
- *Loop is not circular*
- *Half roll is not centred on judges position*
- *45° ~~descent~~ ascent path not achieved*
- *Model does not exit manoeuvre at same height as entry*
- *Inappropriate use of throttle*
- *Size and speed of manoeuvre not in the manner of the prototype*
- *Manoeuvre too far away, too close, too high or too low*

**(15) 360° Wing-extending Turn** - The model approaches in straight and level flight with wings swept back, and enters a 360° circle, commencing by turning away from the judges on the centreline. The model adopts a rate of bank appropriate to the wing configuration and a constant altitude. While executing the 360° circle the wings are extended and the model decelerates to recover to straight and level flight on the same heading and altitude as the start. The rate of turn should be in keeping with the prototype, and is intended to demonstrate the transition from high-speed swept-wing configuration to the low-speed un-swept configuration. (All types)

*JG*

*Errors:*

- *Circle not centred on judges position*
- *Constant height not maintained*
- *Entry and exit path not parallel with judges line*
- *Overall size of manoeuvre not realistic for prototype*
- *Manoeuvre too far away, too close, too high or too low*

**(16) Two Axial Horizontal Rolls, one in each direction** - From straight flight the model rolls at a constant rate through one complete rotation, immediately followed by a roll at the same constant rate but in the opposite direction, then resumes straight and level flight on the same heading. The model should approach in straight flight, parallel to the runway.  
(Aerobatic option)

*JG*

*Errors:*

- *Rate of rolls not constant*
- *Style of rolls not typical of the prototype*
- *Rolls not centred on judges position*
- *Entry and exit at different heights or speeds*
- *Entry and exit tracks and line of rolls not parallel with judges line*
- *Model does not resume straight and level flight on same track as entry*
- *Rolls not horizontal*
- *Manoeuvre too far away, too close, too high or too low*

- (17)** **360 degree descending circle** - Commencing from straight and level flight, the model aircraft performs a gentle 360° descending circle, in a direction away from the judges, at a constant low throttle setting. The manoeuvre terminates at a maximum height of 5 metres, resuming straight and level flight on the same path. (all types)

*JG*

*Errors:*

1. *Rate of descent not constant.*
2. *Descent too steep.*
3. *Throttle setting not constant or low enough.*
4. *Circle misshapen.*
5. *No significant loss of height.*
6. *Model aircraft does not descend to 6 metres or below.*
7. *Circle not centred on judges' position.*
8. *Entry and exit paths not parallel with the judges' line.*
9. *Start and finish not called in straight and level flight.*
10. *Too far away, too close.*

- (18)** **Procedure Derry turn** – The model approaches in straight and level flight, then makes a one-quarter circle turn in a direction away from the judges. Toward the end of this quarter circle turn the model rolls in the direction of the turn, to be inverted at the end of the turn. The model continues to roll to enter a 270° circle turn in the opposite direction. The model will stop rolling when upright and banked in the direction of the turn. The manoeuvre ends on the same altitude and on a reciprocal heading to the start. The transition from the one-quarter circle turn to the 270° turn should be centred on the judges' centreline. (Aerobatic option)

*JG*

*Errors:*

- *Entry into the 270° turn not at right angles to original flight path*
- *270° turn not at a constant radius*
- *Constant height not maintained*
- *Transition not centred on judges position*
- *Entry and exit path not parallel with judges line*
- *Overall size of manoeuvre not realistic for prototype*
- *Model flight path not smooth and steady*
- *Manoeuvre too far away, too close, too high or too low*

### **Group 3**

- (19)** **Extend and retract landing gear** - The model approaches parallel to the runway, from downwind, at reduced speed in straight and level flight at an altitude of approx. 10 - 15 metres and the landing gear is lowered in front of the judges. The model then turns away from the judges and completes a circuit at constant height, retracting the landing gear when again over the runway in front of the judges. The model climbs

away with increased power on a constant track and climb angle for approximately 5 seconds, parallel to the runway centreline. (all types)

### JG

**Errors:** *Model speed too high for landing gear/flap/spoiler lowering*

- *Gear/ flaps/spoilers not extended or retracted in full view of the judges*
- *Speed and sequence of extension and retraction not realistic*
- *Model unstable when gear/flaps lowered or spoilers extended*
- *Change in attitude with gear/flaps lowered or spoilers extended not in keeping with the prototype*
- *Misshapen circuit or height not constant*
- *Circuit not centred on judges position*
- *Entry and exit paths not parallel with judges line*
- *Entry and exit tracks not the same*
- *Manoeuvre lacks scale realism (e.g. climb-out)*
- *Manoeuvre too far away or too close*

- (20) **Extend and retract flaps** (or airbrakes, spoilers, etc.) - The model approaches parallel to the centreline of the runway, from downwind, at reduced speed in straight and level flight at an altitude of approx. 10 - 15 metres and extends the flaps/spoilers in front of the judges. The model then turns away from the judges and completes a circuit at constant height, retracting the flaps/spoilers when again over the runway in front of the judges. The model climbs away with increased power on a constant track and climb angle for approx. 5 seconds, parallel to the runway centreline. (all types)

### JG

**Errors:** *Model speed too high for landing gear/flap/spoiler lowering*

- *Gear/ flaps/spoilers not extended or retracted in full view of the judges*
- *Speed and sequence of extension and retraction not realistic*
- *Model unstable when gear/flaps lowered or spoilers extended*
- *Change in attitude with gear/flaps lowered or spoilers extended not in keeping with the prototype*
- *Misshapen circuit or height not constant*
- *Circuit not centred on judges position*
- *Entry and exit paths not parallel with judges line*
- *Entry and exit tracks not the same*
- *Manoeuvre lacks scale realism (e.g. climb-out)*
- *Manoeuvre too far away or too close*

- (21) **Overshoot** - The model shall commence upwind and execute a circuit and landing approach in the manner of the prototype, descending smoothly at reduced power and speed and, in front of the judges at a height of approx. 3 metres, aborts the landing and applies full power. The model climbs on a constant track, heading and climb angle for approx. 5 seconds, during which time the landing gear is retracted. Retractable undercarriage (where fitted) is to be extended during the downwind leg of the circuit, and flaps, spoilers, speed brakes etc., are to be extended as per the full-size prototype. (all types)

### JG

**Errors:**

- *Manoeuvre does not commence parallel to the runway (on the upwind leg)*
- *Circuit is not centred on the judges line*
- *Downwind track not parallel to runway axis*
- *Landing gear not extended on downwind leg*
- *Altitude changed before appropriate descent point*

- *Descent not smooth and continuous*
- *Speed too high during descent*
- *Model does not adopt landing attitude appropriate to the prototype*
- *Abort of landing more than 3m above ground*
- *Climb rate incorrect (too steep or too shallow)*
- *Nose attitude during climb not in keeping with the prototype*
- *Flaps not used if applicable*
- *Landing gear not retracted if applicable*
- *Climb-out track not the same as for take-off run*
- *Climb out too short*

**(22) Slow Flight** - The model approaches straight and level, parallel and close to the runway at a height of 10 - 15 metres, with landing gear (and flaps, spoilers, etc., if fitted) already extended. The model will fly at just above landing speed, and continues for a minimum duration of 10 seconds, centred on the judges' centreline. (all types)

### JG

#### Errors:

- *Landing Gear or flaps not extended*
- *Model does not fly a straight course*
- *Model gains or loses height*
- *Model track not parallel to the runway centreline*
- *Manoeuvre not centred on judges position*
- *Manoeuvre not flown parallel with judges line*
- *Manoeuvre too short in time*
- *Model's flight not smooth and steady*
- *Manoeuvre too far away, too close, too high or too low*

**(23) Slow Flight (clean)** - The model approaches straight and level, parallel and close to the runway at a height of 10 - 15 metres in clean configuration, landing gear up and no flaps or speedbrakes deployed. The model will fly at just above stall speed, and continue for a minimum duration of 10 seconds, centred on the judges' centreline. (all types)

### JG

#### Errors:

- *Landing Gear or flaps extended*
- *Model does not fly a straight course*
- *Model gains or loses height*
- *Model track not parallel to the runway centreline*
- *Manoeuvre not centred on judges position*
- *Manoeuvre not flown parallel with judges line*
- *Manoeuvre too short in time*
- *Model's flight not smooth and steady*
- *Manoeuvre too far away, too close, too high or too low*

## Group 4

**(24) Immelman turn** - The model commences the manoeuvre parallel to the runway and performs a half inside loop upwards, starting at the judges centreline, and then executes a half roll at the top to resume normal level flight, on a reciprocal track to that at the start. (aerobatic option)

**JG****Errors:**

- *Plane of the half loop not vertical or on line*
- *Half loop not centred on judges position*
- *Half loop is not in keeping with the prototype*
- *Inappropriate use of throttle*
- *Model inverted for too long or too short a time*
- *Roll starts too early or too late*
- *Excessive height loss in the roll*
- *Track veers during the roll*
- *Model does not resume straight and level flight on the opposite track to entry*
- *Manoeuvre not flown parallel with judges line*
- *Size and speed of manoeuvre not in the manner of the prototype*
- *Manoeuvre too far away, too close, too high or too low*

- (25) One Inside Loop** - From straight and level flight, parallel to the runway, the model executes a 360° circle in a vertical plane, and resumes level flight at the same altitude, and on the same track and heading as it started. (aerobatic option)

**JG****Errors:**

- *Plane of loop not vertical*
- *Loop not in keeping with the prototype*
- *Inappropriate use of throttle*
- *Size and speed of manoeuvre not in the manner of the prototype*
- *Manoeuvre not centred on the judges position*
- *Model does not resume straight and level flight on the same track and height as entry*
- *Manoeuvre not flown parallel with the judges line*
- *Manoeuvre too far away, too close, too high or too low*

- (26) Flight in Triangular Circuit** – The model approaches in straight and level flight, parallel to the runway and, approximately 100 metres after passing the judges centreline, turns through 120° (away from the judges). It then flies straight and level for approximately 200 metres, turns 120° in the same direction as before, then continues straight and level for a further 200 metres approximately. It then makes another 120° turn in the same direction as before, and flies straight and level (parallel to the runway), completing an equilateral triangle, recovering with the model at the same altitude and heading as entry. (non-aerobatic option).

**JG****Errors:**

- *Model changes height*
- *Rate of turn at corners not constant*
- *Angular differences between the 3 corners*
- *Sides of triangle are not straight*
- *Sides of triangle are not equal in length*
- *Sides of triangle are too short*
- *Correction for drift not properly made*
- *Triangle not centred on judges position*
- *Manoeuvre too far away, too close, too high or too low*

- (27) Inverted Flight** - The model approaches in straight and level flight parallel to the runway and rolls at a constant rate through a half rotation and resumes straight and



level inverted flight at the same heading for 5 - 8 seconds. (Reference to altitude has been deleted) At the centreline the model should be in inverted flight. Then the model rolls at a constant rate through another half rotation and recovers on the same altitude and heading as the start. (Reference to direction of recovery roll has been deleted). (aerobatic option)

**JG****Errors:**

- *Half rolls not performed on the same track as inverted flight*
- *Model does not fly a straight course*
- *Model gains or loses height*
- *Model does not remain inverted for the prescribed duration*
- *Manoeuvre not centred on judges position*
- *Manoeuvre not flown parallel with judges line*
- *Manoeuvre too far away, too close, too high or too low*

- (28) Normal (Vertical) Roll** - From straight flight the model performs a 90° nose up to vertical, rolls at a constant rate through one complete rotation, and continues vertical flight and recovers with +ve G pull to level flight inverted then a half-roll to upright attitude. The vertical part of the manoeuvre should be on the judges centreline (Aerobatic option)

**JG**

- *Rate of roll not constant*
- *Style of roll not typical of the prototype*
- *Vertical Roll not centred on judges position*
- *Vertical Roll more or less than 360°*
- *Roll not vertical*
- *Manoeuvre too far away, too close, too high or too low*

- (29) Two consecutive axial horizontal rolls in the same direction** - From straight flight the model rolls at a constant rate through two complete rotations, and resumes straight and level flight on the same heading. The model should approach in straight flight, parallel to the runway. (Aerobatic option)

**JG****Errors:**

- *Rate of roll not constant*
- *Style of roll not typical of the prototype*
- *Rolls not centred on judges position*
- *Entry and exit at different heights or speeds*
- *Entry and exit tracks and line of rolls not parallel with judges line*
- *Model does not resume straight and level flight on same track as entry*
- *Rolls not horizontal*
- *Manoeuvre too far away, too close, too high or too low*

- (30) Procedure Turn** The model approaches parallel to the runway in straight and level flight, then makes a one-quarter circle turn in a direction away from the judges, followed by a 270° turn in the opposite direction. The manoeuvre ends on the same altitude and on a reciprocal heading to the start. The transition from the one-quarter circle turn to the 270° turn should be centred on the judges' centreline. (non-aerobatic option)

**JG****Errors:**

- *Entry into the 270° turn not at right angles to original flight path*

- *270° turn not at a constant radius*
- *Constant height not maintained*
- *Transition not centred on judges position*
- *Entry and exit path not parallel with judges line*
- *Overall size of manoeuvre not realistic for prototype*
- *Model flight path not smooth and steady*
- *Manoeuvre too far away, too close, too high or too low*

**(31) Inverted Normal axial horizontal Roll** - From straight inverted flight the model rolls at a constant rate through one complete rotation, and resumes inverted straight and level flight on the same heading. The model should approach in straight inverted flight, parallel to the runway. (aerobatic option)

*JG*

*Errors:*

- *Rate of roll not constant*
- *Style not typical of the prototype*
- *Roll not centred on judges position*
- *Entry and exit at different heights or speeds*
- *Entry and exit tracks and line of roll not parallel with judges line*
- *Model does not resume straight and level flight on same track as entry*
- *Roll not horizontal*
- *Manoeuvre too far away, too close, too high or too low*

**(32) Victory Roll** (third exit option) - The model commences parallel to the runway, in level flight, and before reaching the judges' centreline it climbs at approx. 45° for 2 - 3 seconds, followed by a complete roll on the judges centreline. After another 2 - 3 seconds the model makes a half roll to inverted, pulls to resume level flight followed by a half roll to the same track and heading as entry. (Aerobatic option)

*JG*

*Errors:*

- *Manoeuvre not performed in a constant vertical plane that is parallel with the judges line (except for the optional departure)*
- *Climb angle not constant*
- *Roll rate is too high*
- *45° climb path not achieved*
- *Model rolls by more or less than 360°*
- *Roll is not centred on judges position*
- *Manoeuvre too far away, too close, too high or too low*

## **Group 5**

**(33) Split S (Reversal)** - The model commences the manoeuvre parallel to the runway, performs a half roll to arrive in the inverted position at the judges' centreline, and then a half inside loop downwards, and resumes normal level flight on a reciprocal track to that at the start. (aerobatic option)

*JG*

*Errors:*

- *Roll starts too early or too late*
- *Track veers during half roll*
- *Excessive height loss in the roll*

- *Model inverted for too long or too short a time*
- *Inappropriate use of throttle*
- *Plane of the half loop not vertical or on line*
- *Half loop not centred on judges position*
- *Half loop is not in keeping with the prototype*
- *Model does not resume straight and level flight on the opposite track to entry*
- *Manoeuvre not flown parallel with judges line*
- *Size of manoeuvre and speed not in manner of the prototype*
- *Manoeuvre too far away, too close, too high or too low*

- (34) Victory Roll with level flight at the end** - The model commences parallel to the runway, in level flight, and before reaching the judges' centreline it climbs at approx. 45° for 2 - 3 seconds, followed by a complete roll on the judges centreline. After another 2 - 3 seconds the model resumes level flight on the same track and heading as entry.. (aerobatic option)

### JG

#### Errors:

- *Manoeuvre not performed in a constant vertical plane that is parallel with the judges*
- *Climb angle not constant*
- *Roll rate is too high*
- *45° climb path not achieved*
- *Model rolls by more or less than 360°*
- *Roll is not centred on judges position*
- *Manoeuvre too far away, too close, too high or too low*

- (35) Victory Roll** - The model commences parallel to the runway, in level flight, and before reaching the judges' centreline it climbs at approx. 45° for 2 - 3 seconds, followed by a complete roll on the judges centreline. After another 2 - 3 seconds the model resumes level flight with a turn of 90° at the end of the manoeuvre. (Aerobatic option)

### JG

#### Errors:

- *Manoeuvre not performed in a constant vertical plane that is parallel with the judges line (except for the optional departure)*
- *Climb angle not constant*
- *Roll rate is too high*
- *45° climb path not achieved*
- *Model rolls by more or less than 360°*
- *Roll is not centred on judges position*
- *Manoeuvre too far away, too close, too high or too low*

- (36) Normal horizontal Roll** - From straight flight the model rolls at a constant rate through one complete rotation, and resumes straight and level flight on the same heading. The model should approach in straight flight, parallel to the runway. (aerobatic option)

### JG

#### Errors:

- *Rate of roll not constant*
- *Style of roll not typical of the prototype*
- *Roll not centred on judges position*
- *Entry and exit at different heights or speeds*

- *Entry and exit tracks and line of roll not parallel with judges line*
- *Model does not resume straight and level flight on same track as entry*
- *Roll not horizontal*
- *Style of roll (horizontal) not nominated*
- *Manoeuvre too far away, too close, too high or too low*

**(37) Flight in Rectangular Circuit** - The model approaches in straight and level flight to a point approximately 150 metres past the judges centreline, turns 90° away from the judges, flies straight and level for approximately 150 metres, then turns 90° in the same direction as before. It then flies straight and level for approximately 300 metres, turns 90° in the same direction as before, then flies straight and level for approximately 150 metres. It makes a final 90° turn in the same direction as before, and completes the manoeuvre by resuming straight and level flight on the same heading and at the same altitude as entry. Opposite sides of the rectangle should be of equal length. (non-aerobatic option).

**Errors:**

- *Model changes height*
- *Rate of turn at corners not constant*
- *Angular differences between 4 corners*
- *Sides of rectangular circuit are not straight*
- *Opposite sides of rectangular circuit are not equal in length.*
- *Sides of rectangular circuit are too short*
- *Correction for drift not properly made*
- *Rectangular circuit not centred on judges position*
- *Manoeuvre too far away, too close, too high or too low*

**(38) 360° Horizontal Circle** - The model approaches in straight and level flight, and executes a 360° circle, commencing by turning away from the judges on the centreline. The model adopts a constant rate of bank (approx. 60°) and a constant altitude, recovering to straight and level flight on the same heading and altitude as the start. The rate of turn should be in keeping with the prototype, and is intended to demonstrate a high rate-of-turn. (all types)

**JG**

**Errors:**

- *Circle not centred on judges position*
- *Speed not constant or too low*
- *Constant height not maintained*
- *Entry and exit path not parallel with judges line*
- *Overall size of manoeuvre not realistic for prototype*
- *Bank angle changes during circle*
- *Manoeuvre too far away, too close, too high or too low*

**(39) Dropping of bombs, fuel tanks or other stores** - The model approaches the judges' centreline in level flight at reduced speed. The bombs or tanks are to be dropped on the centreline between the far side of the runway, and the centre mark. After release the model should accelerate noticeably.

Alternatively - bombs or fuel tanks may be dropped during a parabolic approach, with reduced power, parallel to the runway centreline. Afterwards the jet model climbs parabolically, with increased power. In both cases the bombs or fuel tanks should touch down near the centreline. (technical option)

**JG**

**Errors:**

- *Stores do not detach and fall in a realistic manner*
- *Drop is not in front of judges*
- *Overall dropping manoeuvre not presented in a realistic way*
- *Manoeuvre too far away, too close, too high or too low*

(p) Special Option – Rule deleted

### 5.0.7 Realism in flight. (Overall impression).

- (a) The judges will award points for overall realism, flight speed, smoothness and accuracy throughout the whole flight, including the taxi back after landing. They will also take into consideration such things as use of the permitted air space and the extent to which the flight style of the model is in keeping with that of the prototype aircraft. The judges will also take into consideration the realism of the reversing and turning manoeuvres between 'scoring' manoeuvres.
- (b) Competitors may release external stores, etc., between scoring manoeuvres (for instance releasing drop tanks before 'air combat manoeuvring' or aerobatics), even if not nominated as a technical option, and the judges will take this into consideration when awarding the 'Realism in Flight' points. However the competitor must inform the judges, before the flight commences, that external stores will be released, otherwise rule 2.0.7 (g) will be applied.

## JG

### **Taxiing Realism**

*Here taxiing away from the landing full stop (as in rulebook 5.0.5 b) is judged for realism only (not the course followed). Taxi speed should be in keeping with the full-size prototype, also the use of wheel brakes, use of the throttle, retracting flaps/spoilers/air brakes (if fitted) after landing etc.*

### **Flight Realism**

*The following aspects of the contest flight are marked here: the jet model's speed, the height and the overall smoothness of the flight. The realism of the turning/reversing manoeuvres (between scoring manoeuvres) is also taken into account here.*

#### *a) Speed*

*A factor to be judged subjectively is the jet model's speed. The speed must be true to scale, which means that horizontal manoeuvres are not normally flown at full throttle and that there is a noticeable difference in engine performance between horizontal manoeuvres and vertical manoeuvres. Vertical manoeuvres that are descending should be performed at reduced throttle.*

#### *b) Position of manoeuvres*

*This means that the manoeuvres should be flown symmetrically about the centreline.*

### 5.0.8 Position of Manoeuvres.

The manoeuvres must be performed in a position, and at a height, which will allow them to be seen clearly by the judges. At no time must any manoeuvre cause the Judges to elevate their line-of-sight above 60 degrees to the horizontal, this part of the flight will not be judged. If, at any time during a flight, the complete model passes behind the imaginary Safety/No-Score line then a zero mark will be awarded for that manoeuvre. If this occurs on one, or more, occasions during a flight the judges or the Contest Director may request that the pilot lands immediately, and the rest of the flight will be scored zero.

### 5.0.9 Flight points and Coefficients.

- (a) Each mandatory and optional manoeuvre will be awarded points from 0 - 10 in 1/2 point increments by each of the judges during every official flight. The points awarded

for each manoeuvre shall then be multiplied by the appropriate K- factor (as in 5.0.4). In the case of 5 flying judges, then the lowest and highest points awarded for each manoeuvre shall be discarded.

- (b) In the case of one flight line and three flying rounds, the best two flight scores will count towards the final classification, the lowest scoring flight being discarded. In the case of two flight lines and four flying rounds, the best three flight scores will count towards the final classification, the lowest scoring flight being discarded. In the event that less than the total number of rounds (required for the number of flight lines) are flown, due to bad weather etc., all flight scores will count towards the final classification. (see also 5.0.1.(a)).
- (c) The maximum possible flying points per flight round, after applying the K factors is 3000 points. The total flight points shall be the average of the points awarded by the judges in 5.0.4 for the highest scoring flights (see also (b) above). Averaging is done as follows: in the case of the two best flights out of three rounds the two best flight scores are added and divided by two and in the case of three out of four rounds the three best flight scores are added and divided by three.

#### 5.0.10 Flight Score.

The final flight score is calculated by multiplying the total averaged flight points awarded by 50%. Therefore the maximum flying score achievable is 1500.

## FINAL SCORING AND CLASSIFICATION

### 6.0.1 Final Placing

Final scores, classification and places for Individual and Open scale shall be determined as follows:

- (a) Add together the static points scored in section 4 (x 50%) and the flying points scored in section 5 (x 50%).

**The total maximum score achievable is 3000.**

Static score:	3000 max. x 50%	=	1500 max.
Flying score: 3 Rounds	$\frac{3000 \text{ max.} + 3000 \text{ max.}}{2} \times 50\%$	=	1500 max. (see also 5.0.9)
Flying score: 4 Rounds	$\frac{3000 \text{ max.} + 3000 \text{ max.} + 3000 \text{ max.}}{3} \times 50\%$	=	1500 max. (see also 5.0.9)
<b>Maximum points available (Static 1500 + Flying 1500)</b>		=	<b>3000 total</b> (see also 5.0.9)

(Reference to noise assessment has been deleted)

### 6.0.2 Nations Trophy

In all Jet WM contests there will be a 'Nations Trophy'. This is awarded to the nation/country that has the biggest number of points achieved by adding together the 3 total scores from the 3 highest scoring competitors from each country. (Reference to Team Scale score has been deleted)

## **Judges Guidelines (JG)**

### **7.0.1 Purpose**

*These guidelines act as a supplement to the “F4J Jet Class – F4J rules”, and are to be read in conjunction with them. They explain to the judges, competitors and organisers how the scoring should be carried out. However, in all disputes or protests the English version of the “F4J Jet Class – F4J rules”, will be regarded as the definitive rulebook.*

### **7.0.2 Judges**

*These guidelines standardise the criteria for judges scoring. They are instructions for the judges on how to judge during the presentation of the jet model in both flight and static, and how to allocate the points. The judges are only allowed to use this document in conjunction with the F4J rules. One of the judges must be appointed as the ‘Chief Judge’ before the contest commences.*

### **7.0.3 Competitors**

*These guidelines are also provided to explain to the competitors the best way to present the model in the contest. Competitors are not permitted to discuss scores awarded with judges during the contest, except as provided in "2.0.13 Protests". However, after scores have been awarded, the Competitors may ask about their faults and accept guidance from the judges on the correction of these.*

### **7.0.4 Scoring**

*The judges may not confer to harmonise the scores awarded to competitors. All mandatory and optional manoeuvres, as well as ‘realism in flight’, are to be judged independently by each judge. The judges may not allow any bias in their scoring due to competitor's lobby, model type, appearance, design, or engine (gas-turbine, ducted fan or electric ducted-fan).*

### **7.0.5 Flying manoeuvres**

*All flying manoeuvres must be judged while having in mind the performance of the full size prototype. The aim of the scale flight schedule is to recreate the flight characteristics and realism of the full size aircraft. Judges must therefore not confuse this scale competition with an aerobatics competition. This means that the requirements of “realism” and being “in keeping with the prototype” have to prevail in judging manoeuvres.*

## **DEFINITIONS**

### **7.1.1 Approach**

*The ‘approach’ describes the position and attitude of the jet model entering a manoeuvre.*

### **7.1.2 Departure**

*The ‘departure’ describes the position and attitude of the jet model leaving a manoeuvre.*

### **7.1.3 Standard Attitude**

*The ‘standard attitude’ means that the model is flying in a horizontal position in the longitudinal and lateral axes.*

#### **7.1.4 Horizontal**

All manoeuvres should be oriented to a horizontal line, even if the runway or surrounding terrain is not horizontal. Exceptions to this are explained in the manoeuvre descriptions.

#### **7.1.5 Parallel to Runway-Centreline**

In many of the following manoeuvre descriptions the term 'parallel to the runway centreline' is used. This means that the aircraft should be travelling parallel to an imaginary line running down the centre of the Contest Runway.

#### **7.1.6 Centre Line**

In many of the following drawings and descriptions the term 'centre line' is used. The organisers should have marked this with a high, brightly coloured, post or flag, about 150 metres directly in front of the flight judges centreline.

## **FLIGHT JUDGING**

### **7.2.1 General**

- a) *The Flight Judges will be seated alongside the landing area in a line parallel to the runway. This axis will be referred as the "judges line"*
- b) *The direction of the wind should have no consequence on the judgement of the manoeuvres, unless stated in the manoeuvre details. The competitor may decide if he wants to fly the manoeuvres either downwind or upwind, so there will be no judging for the wind direction. If there is a cross-wind causing persons to be endangered by a competitors model, or the Safety Line (established by the Contest Director) is crossed under any circumstances, the scoring stops and the pilot has to be immediately instructed to land the model.  
If there are bad weather conditions, the Team Leaders and the Contest Director will hold a meeting to decide whether to continue the contest. (See 2.0.14)*
- c) *If one judge does not see a manoeuvre, his score will be replaced by the arithmetical average of the other judge's scores. The judges will not confer and the average score will be calculated by the organiser from the judges' individual scores.*
- d) *The organiser should arrange some demonstration flights, performed by pilots & models that are not entered in the contest, to allow the judges to practice before the contest starts. The manoeuvres shown by the demonstration pilots should be from those included in the F4J competition rules. If no demonstration flights are possible, the judges are allowed to discuss the general standards of the first 3 - 5 contest flights, but the judges' scoring of these must be independent of each other.*
- e) *Each manoeuvre will be awarded points between 0 and 10, using increments of half a point. The Judges are required to utilise the full scoring range as below:  
0 points = figure not flown, not possible to identify figure.  
5 points = average figure.  
10 points = perfect figure and presentation.*

### **7.2.2 Manoeuvres**

- a) *Generally, all scoring manoeuvres are to be placed equally about the judges centreline, unless described differently in the manoeuvre details*



- b) *The height and positioning of individual manoeuvres should be proportional to that expected in a full size display typical of each prototype. Unless specified otherwise, manoeuvres that are carried out in an horizontal plane should commence on a flight path that is between 45° to 60° elevation to the judges. Judges should down-mark manoeuvres as too high, too low, too far away, or too close if they consider the positioning to be so.*
- c) *Turning or reversing manoeuvres are the parts of the contest flight between each of the scoring manoeuvres, as stated on the score sheet. Turning/reversing manoeuvres like Split S, Immelmann Turn or Reversal are not scored but can be taken into account in the 'Realism of Flight' section. Attention is to be paid to smooth flying movements and realism. The competitor is free to fly any type of turning/reversing manoeuvre.*
- d) *The 'Start' and 'Finish' of all scoring manoeuvres must be announced by the competitor, or his assistant. This announcement must be audible to the judges. Other words for "Start" like "Now" and "Beginning" can be used as long as they cannot create confusion. Likewise, other words for "Finish" like "Complete" and "End" can be used.*
- e) *If the competitor's assistant touches the transmitter at any time after the take-off has been announced by the competitor, then scoring stops with the last completed manoeuvre before the offence and the remainder of the flight is scored zero. 'Realism in Flight' points will be awarded, in proportion to the amount of the flight completed.*
- f) *After the start of a manoeuvre is announced, the competitor may only make one attempt at the manoeuvre. If the first attempt is not successful, the score for this manoeuvre will be zero. Any further attempt will not be judged.*
- g) *The order in which the optional manoeuvres are flown must be marked on the score sheet prior to the flight, and any manoeuvre flown out of order will be marked zero.*
- h) *If the flight is stopped before all the manoeuvres on the score sheet are completed, then only the manoeuvres completed will be judged. 'Realism in Flight' points will be awarded in proportion to the amount of the flight completed. The competitor will be informed as to which manoeuvres were scored.*
- i) *If, at any time during a flight, the model passes behind the imaginary Safety/No-Score line then a zero mark will be awarded for that manoeuvre. If this occurs on more than one occasion during the same flight, the Flight Line Director, the Judges or the Contest Director may request that the model is landed as soon as is safely possible, and the rest of the flight will be scored zero. 'Realism in Flight' points will be awarded in proportion to the amount of the flight completed.*
- j) *If hazardous manoeuvres endanger safety, the Flight Line Director, the Judges or the Contest Director may request that the model is landed as soon as is safely possible, and the rest of the flight will be scored zero. 'Realism in Flight' points will be awarded in proportion to the amount of the flight completed.*

### **7.2.3 Parts loss during flight.**

*If any part (that was attached to the aircraft at the start of the contest flight) unintentionally separates from the aircraft during flight, then the scoring stops and the competitor will be requested to land the model as soon as is safely possible. The points awarded from previously completed manoeuvres will still be awarded. If a part separates from the aircraft during one of the 8 mandatory and optional scoring manoeuvres, then no points will be awarded for this manoeuvre. However, 'Realism in*

*Flight' points will still be awarded, in proportion to the amount of the flight completed.  
(See 2.0.7(g))*

**7.2.4 Flying as Static Condition**

*The model has to be flown in the same condition as it was presented for static judging, excepting for changes permitted as in rules 2.0.7(c) and (d), and 5.0.7(b).*