IJMC Scale Jet Classes

2010

Rulebook and Judges Guidelines

Revision incorporating changes approved at the 2010 and 2011 AGM

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Note1: Within this document reference to the male gender implies both male and female
Note2: This rulebook can also be used for Jet European Masters or Jet Continental Masters if the need arises

CONTEST CLASSES

1.0.1 Weight classes

As from 2008, two official IJMC Scale Jet Contest Classes have been established, determined by weight limit only:

(a) **13.5 kg Class:** for jet models with a max dry weight of 13.5 kg

(b) **20.0 kg Class:** for jet models with a max dry weight of 20.0 kg

(c) An identical scoring system will be used for both weight classes and the competition will be held with the two classes intertwined.

(d) No contestant is allowed to enter a jet model in more than one class and the chosen class must be stated on the Contestant's Declaration Sheet before the official start of the competition. No change of class is allowed once the competition has started.

(e) An additional award, the Team Trophy, will be given to the highest scoring entry in either weight class which comprises a team of 2 (pilot and constructor) where the pilot is not the constructor of the model. The constructor must be present at the event as a helper and both team members must be of the same nationality as defined by rule 1.0.3. Both team members must sign the Contestant Declaration Sheet (see rule 6.0.1 (d)). Note that an entry for the Team Trophy is never eligible for the designer bonus (see rule 6.0.4).

1.0.2 Number of contestants

In a Jet World Masters, each country is permitted a maximum of six 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 weight classes, i.e. a country may enter six 13.5 kg class contestants and no 20.0 kg class contestants through to no 13.5 kg class contestants and six 20.0 kg class contestants or any combination falling between these two extremes.

1.0.3 Nationality of contestants

(a) All contestants 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. People wishing 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 their National Team 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) In future, National Teams will be recognised by exactly the same criteria as those used by the International Olympic Committee (IOC). 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 IJMC Scale Jet Competitions.

(a) The contestant's model shall be a replica of a heavier-than-air, fixed-wing, man-carrying aircraft that was built and flown successfully, and was powered only by 'jet' propulsion. This includes full-size ducted-fans.

(b) The contestant’s model shall be powered solely by ducted-fan (regardless if internal combustion or electric) and/or gas-turbine engine(s). All other forms of propulsion are forbidden.

2.0.2 Builder of Model rule

As of 2008, the Builder of the Model rule is no longer applicable. This means that the contestant does NOT have to be the builder of the model. However, an incentive to build his own model is given in the form of bonus points, see rule 6.0.4.

2.0.3 Airworthiness

The contestant is responsible for the airworthiness of the jet model he enters. He will state on the Contestant’s Declaration Sheet that he has personally test flown his jet model successfully and safely before the start of the competition.

2.0.4 General Characteristics

Except for the max dry weight restriction, all characteristics apply to both weight classes.

Maximum weight of the model (excluding fuel):

13.5 kg Class:	13.5 kg
20.0 kg Class:	20.0 kg
Wing loading:	no restrictions
Max. surface area:	no restrictions
Motive power:	no restrictions in power

The weighing of the models will be done in a controlled environment to avoid any effects of wind. Every model must be weighed after the first flight in the exact configuration as at Round 1 take off. De-fuelling is allowed but no batteries (including batteries for motive power) or any other part of the model may be removed between the flight and the weighing of the model. All this must happen under supervision of the Organisers. If a model does not meet the weight criteria for the class entered, the flight will score zero. The Organisers are encouraged to pursue weight checks after further flights on any model close to the limit.

Note 1: The IJMC will keep and maintain an accurate 5 kg calibration weight for use throughout the competition so that scales can always be checked and scale calibration certificates will not be required. The scales used in the competition should be calibrated at the

13.5 kg and 20.0 kg limit and made available to the contestants at least one day before the start of the competition.

Note 2: The upper limits must comply with legal limits required by the country hosting the event.

2.0.5 Competition Programme

The Competition Programme is divided into two equal scoring parts, the Static Judging and the Flying Judging. Additionally, a system of bonus points is added as an incentive to diversification, originality and creativity. The final score shall be the total points awarded in the two scoring parts and the bonus points, calculated per section 7. The maximum points attainable is made up as follows:

Static points: 1500 max
Flying points: 1500 max
Bonus system points: 150 max

2.0.6 Judges

(a) A minimum of eleven (11) judges is required to run the competition: 2 sets of 3 Judges for the Static part and 1 set of 5 Judges for the Flying part. Flying should start no sooner than 2 hours after Static has commenced. Each model must have been Static judged before flying.

Judges are selected by the IJMC Board for approval at the IJMC Annual General Meeting (AGM) from the list of current IJMC recognised judges who will have successfully attended an IJMC Judging Seminar, subject to the following constitutional criteria:

The IJMC holds a list of recognised judges. Every country has the right to propose one judge and one reserve. To be admitted to the Jet World Masters, judges must be approved at the IJMC AGM.

The five top scoring countries from the previous Jet World Masters competition have the fundamental right to nominate one judge from their country. In addition the organising country also has the right to nominate one judge and one reserve judge.

(b) Each contestant is allowed 1 hour to prepare his model for flight after the end of his Static judging.

(c) As soon as practical after each contest flight, the points awarded will be made available to the contestants 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) Contestants are not permitted to discuss scores awarded with judges during the contest, except as provided in section 2.0.14 (Protests). However, after scores have been awarded, the Contestants may ask about their faults and accept guidance from the judges on the correction of these.

(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 contestant.

(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) Only the ‘Static’ judges are allowed to confer and to harmonise the scores awarded to the contestants. The ‘Flying’ judges however may not harmonise the scores, as the high and low scores are removed for each manoeuvre.

(h) One of the judges must be appointed 'Chief Judge' before the start of the competition.

2.0.7 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 shall only be judged to the nearest half point.

2.0.8 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 Static and Flying 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. For the avoidance of doubt, the Organisers shall arrange for the models to be photographed as presented during Static judging.

(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 the weight criteria. The contestant 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, in particular that concerning airworthiness (2.0.3).

(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 with reciprocating engines 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 contestant must land immediately. The points awarded for the manoeuvres that were completed before the part loss will stand. If a part separates from the aircraft during one of the three mandatory and five optional scoring manoeuvres, then no points will be awarded for this manoeuvre. However, 'Overall Realism' points will still be awarded, in proportion to the amount of the flight completed. Any intentional drop of stores (tanks, bombs or other external stores) must be called to the attention of the judges prior to the drop.

2.0.9 Number of Models

No contestant is allowed to enter more than one jet model, the class of which must be nominated on the Contestant's Declaration Sheet before the official start of the competition. No change of class is allowed once the competition has started.

2.0.10 Number of helpers

Each contestant 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 contestant 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.

2.0.11 Radio Equipment

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. Rate gyros are allowed for improved scale realism, however any mechanical or electrical automatic pilot devices, which allow pre-programmed manoeuvres, flight patterns or flight schedules, are strictly prohibited.

2.0.12 Safety for Jet World Masters 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 contestant only when his name is called for him to stand by to make his flight. As soon as the flight/attempt has ended, the contestant's transmitter must be returned to the transmitter compound immediately. The use of Transmitters, with or without DSC cables, is banned during static judging.

(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 designated for this purpose. The contestant will be notified if the model is flying outside the permitted area.

2.0.13 Starting order

(a) Before the start of the competition, the organiser and the IJMC Board, will conduct a draw to determine the flying order, by country, in which the first flying round will be flown (each contestant from each country in turn). The team managers from each country will be free to decide the order in which their individual pilots will fly. The flying order, thus established, will determine the order in which the competitors will be static judged. No changes to the flying order will be accepted once the competition has commenced, except by approval of the organisers and the IJMC Board, to ensure the safe and efficient running of the competition.

(b) The order of the second flying round will be the same as that of the first flying round. The final round however will be flown in ascending order with regard to the preliminary classification following the two first flying rounds, including the static and the bonus points (three rounds in the case of two flight lines where a rotation between rounds will ensure that all competitors will be judged twice on each line, subject to adjustments as required to avoid frequency clashes). This allows the tension to build up towards the end of the competition and offers similar weather conditions to the top contestants.

2.0.14 Protests

(a) Only Contestants 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 contestant's entry fee. The IJMC Chairman (or other IJMC Board member) shall hold this protest fee for the duration 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 Board (or an IJMC representative selected by the IJMC Board if all the attending IJMC Board members could have an 'interest' in the protest result)
- A representative of the contestants, who will be elected by a vote of all pilots at the Briefing at the start of the competition except in a case where the elected representative is involved in the protest in which case the CD will appoint a Special Contestant Representative

(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, except for the protester, the contestant 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 Contestant 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 retained by the IJMC.

(h) The Arbitration Tribunal's decision is final, and cannot be appealed against.

(i) Protests must be submitted within 3 hours following the last contestant'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.

2.0.15 Weather Conditions

In case of bad weather conditions (e.g.: rain, snow, strong winds or wind direction changes, etc.) during the flying part of a Jet World Masters competition, a meeting will be held which will be attended by each nation's Team Leader 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. Any Team Leader, and the Contest Director, has the right to activate (call) this meeting to discuss weather conditions. The Contest Director also has the right to award any contestant 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 and 3.0.3 regarding noise have been entirely deleted except as provided for under Rule 2.0.8 (e)

STATIC JUDGING

4.0.1 Proof of Scale

(a) Proof of scale is the responsibility of the contestant.

(b) Name of entry - the exact name and type designation of the subject aircraft shall be indicated on the entry form, on the 'proof of scale' documentation and on the Contestant's Declaration Sheet.

(c) The scale to which the model is built is optional, but must be stated on the entry form, on the 'proof of scale' documentation and on the Contestant's Declaration Sheet.

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 contestant must submit the following minimum documentation to the judges:

(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 contestant 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.

(e) 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.

(f) If the contestant presents only partial Documentation, the static score points will be awarded in proportion to the documentation supplied.

(g) If the contestant presents no documentation at all, the static judging cannot be performed, and the static score will be zero.

(h) In the event that there is conflicting evidence in the documentation presented, it is the responsibility of the contestant, before judging commences, to indicate to the static judges which documents they are to ignore.

4.0.3 Static judging of 'Fidelity to Scale and Craftsmanship'

(a)	Scale Accuracy - side views	K = 15
(b)	Scale Accuracy – front and rear view	K = 15
(c)	Scale Accuracy - top and bottom view	K = 15
(d)	Colour	K = 5
(e)	Markings Accuracy	K = 5
(f)	Markings Complexity	K = 5
(g)	Surface Texture and Realism in general	K = 10
(h)	Surface Complexity	K = 5
(i)	Craftsmanship in general	K = 10
(j)	Complexity of structure	K = 5
(k)	Scale Detail Accuracy	K = 5
(l)	Scale Detail Complexity	K = 5

Items (a) to (f) (inclusive) are to be judged first at a minimum distance of five metres from the nearest part of the model. Items (g) to (l) (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 Organisers are responsible to monitor this time limit. The watch should be stopped when the model is repositioned. The Judges may ask the contestants 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 backdrop.

4.0.4 Static points and Coefficient

(a) Each section in 4.0.3 shall be awarded points from 0-10 in 1/10 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 judges will be added together to give the total static points. The design of the score sheet shall ensure that the two panels of 3 static judges 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 (i.e. after the model has left 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 0.5. Therefore the maximum static score achievable is 1500.

Further information on the static part of the competition can be found under section 9: judges guidelines to static judging.

FLYING JUDGING

5.0.1 Official Flights

(a) Each contestant 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 two flight lines option being dependent on the availability of suitable runways and a total of 16 judges to ensure the requirements of Rule 2.0.6 (a) are met. Each contestant 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 adverse 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 contestant is unable to start or complete a flight and, in the opinion of the Contest Director, the cause is outside the contestant's control (e.g. sudden adverse weather or safety reasons) the C.D. may, at his discretion, allow the contestant a re-flight. The C.D. shall decide when the re-flight shall take place. If there is any doubt, the contestant 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 allow re-flights to be made in similar weather conditions to the original scheduled flight.

(c) An official flight commences at the earliest of the following:

- The contestant signals to the timekeeper that he is commencing to start his engine(s).
- Two minutes after the contestant is instructed to start his flight by the Timekeeper.

(d) An official flight is scored and will count towards the final classification as from the moment the model has left the ground.

(e) In each flying round, only one attempt at an official flight is allowed (i.e., as soon as the model has left the ground, the flight counts for that round).

(f) In each flight, only one attempt is allowed for each manoeuvre after the start of the manoeuvre has been called.

(g) The 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 contestants will be given at least 10 (ten) minutes warning before they are instructed to start their flight.

(b) The contestant 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) Contestants with single-engine models will be allowed 12 (twelve) minutes to complete the flight, while 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. 'Overall Realism' points will be awarded, in proportion to the amount of the flight completed.

(f) An additional 3 (three) minutes of flight time is allowed for non-aerobatics aircraft.

(g) The flying judging and flying time stops at completion of manoeuvre (c): Circuit, Approach and Landing.

5.0.3 Starting Time

(a) If the model is not airborne within 6 (six) 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) stop(s) before the model is airborne, the engine(s) may be restarted but the timing continues. Should this happen 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 'Overall Realism'.

Take-off (mandatory)	K = 10
Straight flight (mandatory)	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 (mandatory)	K = 15
Overall Realism	K = 20

Note 1: The five optional manoeuvres shall be chosen, one from each of the groups defined in 5.0.6 and entered on the scoring sheet by the contestant in the order in which he chooses to fly them.

Note 2: Taxiing is not considered to be a manoeuvre but is included in the judgement of Overall Realism.

Note 3: The 'Flying' judges may not harmonise the scores, as the high and low scores for each manoeuvre are not counted. All mandatory and optional manoeuvres, as well as 'Overall Realism', are to be judged independently by each judge. The judges may not allow any bias in their scoring due to contestant's lobby, model type, appearance, design, or engine (gas-turbine, ducted fan or electric ducted-fan).

Note 4: 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 all judging manoeuvres.

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

5.0.5 Mandatory manoeuvres (all types)

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

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 the track of the 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.

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 (and flying time stops). Subsequent taxi back will be considered under 'Overall Realism' (see also 5.0.7. (a)) and taxiing time will not be included in the total flight time. Retractable landing gear (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.

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 bounces on touch down*
- *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

(a) Only the optional manoeuvres, which are described below in this rulebook, are allowed.

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

(c) Non-aerobatic type aircraft are not permitted to choose the dedicated aerobatic options listed below. Aerobatic type aircraft are not permitted to choose the dedicated non-aerobatic type manoeuvres listed below.

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

(e) The five optional manoeuvres shall be chosen one from each of the groups defined below. They may be flown in any order but that order must be defined in advance of the flight and flown in the same order as filled in on the scoring sheet.

(f) Dropping of stores (tanks, bombs or any other external stores) cannot be chosen as an optional manoeuvre. However, it is allowed **if called** (for example to clean up the airframe after straight flight and before starting any of the aerobatic optional manoeuvres). It will be considered in the 'Overall Realism' section (see 5.0.7 (b)). The contestant must inform the judges of any intentional external stores drop; otherwise rule 2.0.8 (g) will apply.

(g) 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.

Group 1 ----------

(11) Touch and Go (all types) - 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 sequence is initiated. Retractable landing gear (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.

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 bounces on touch down*
- *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 sequence not initiated if applicable*
- *Climb-out track not the same as for take-off run*
- *Climb out too short*

(12) Horizontal Figure of Eight (non aerobatic only) - 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 degree 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.

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*

(13) **Cuban Eight (aerobatic only) -** The model approaches parallel to the runway. After passing the judges' centreline, the model pulls up into approximately 5/8th's of an inside loop and continues heading downward at 45 degrees, inverted. The model performs a half roll on the 45-degree downline on the judges' centreline, followed by another approximately 3/4 inside loop to 45 degrees 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.

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 degree 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*

(14) **Combination Immelman/Split-S (aerobatic only) -** 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 downward to recover into level flight on the same heading and altitude as the start.

Errors:

- *Track of the half loops not in a vertical plane*
- *Half loops are not accurately semicircular*
- *First roll starts too late, second roll starts too early*
- *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*
- *Manoeuvre not centred on judges position*

(15) **Horizontal Derry Eight (aerobatic only) -** 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-degree 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-degree 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.

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*
- *Inappropriate roll rates*

(16) **Immelman – Variable Geometry wing (aerobatic only) -** 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. **Note: this option is only available for aerobatic models equipped with Variable Geometry wings.**

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*

Group 2 ----------

(21) **Slow roll (aerobatic only) -** 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 between 3 and 5 seconds to execute the slow roll. This manoeuvre should be performed horizontally. Contestant to nominate combat or airshow style.

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*

(22) **4-Point Roll (aerobatic only) -** 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.

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*
- *One or more of the quarter rolls deviate from 90 degrees*
- *Intervals between each part of roll different*
- *Manoeuvre too far away, too close, too high or too low*

(23) **Positive 'G' Roll (aerobatic only) -** This is a special form of 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.

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*
- *Attitude at entry is not the same as attitude at exit*
- *Manoeuvre too far away, too close, too high or too low*

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

Errors:
- *Manoeuvre not performed in a vertical plane that is parallel with the judges line*
- *Quarter loop is not centred on judges position*
- *45 degree 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*

(25) **Two Axial Horizontal Rolls, one in each direction (aerobatic only) -** 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.

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*

(26) **360 degree Wing-extending Turn – Variable Geometry wing (aerobatic only) -** The model approaches in straight and level flight with wings swept back, and enters a 360 degree circle, commencing by turning away from the judges on the centreline. The model adopts a rate of bank appropriate to the wing configuration and at a constant altitude. While executing the 360-degree 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 a lower speed unswept configuration. **Note: this option is only available for aerobatic models equipped with Variable Geometry wings.**

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*

(27) **Chandelle (non aerobatic option only) -** From straight and level flight the model passes the judges' centreline, and performs a 180 degree turn in a direction away from the judges. During the first 90 degrees of the turn the model simultaneously climbs and rolls into the turn. During the second 90 degrees 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.

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 degrees*
- *Manoeuvre too far away or too close*
- *Manoeuvre does not start and finish on the judges centreline*

(28) **360 degree descending circle (all types) -** Commencing from straight and level flight, the model performs a gentle 360 degree 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.

Errors:

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

Group 3 ----------

(31) **Extend and Retract Landing Gear (all types) -** The model approaches parallel to the runway, from downwind, at reduced speed in straight and level flight at an altitude between 10 and 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.

Errors:

- *Model speed too high for landing gear extension*
- *Landing gear not extended or retracted in full view of the judges*
- *Speed and sequence of extension and retraction not realistic*
- *Model unstable when landing gear is extended*
- *Change in attitude with landing gear 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*

(32) **Overshoot (all types) -** 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 sequence has to be initiated. Retractable landing gear (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.

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 then 3m above ground*
- *Climb rate incorrect (too steep or to 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*
- *Model does not complete a circuit before executing the overshoot*

(33) **Slow Flight in "dirty" configuration (all types) -** The model approaches straight and level parallel and close to the runway at a height of between 10 and 15 metres in a "dirty" configuration, i.e. with the landing gear already extended. Also flaps, airbrake(s) and/or spoiler(s) must be extended (if applicable). The model will fly at just above landing speed, and continues for a minimum duration of 10 seconds, centred on the judges' centreline.

Errors:

- *Landing gear not extended*
- *Flaps, airbrake(s) and/or spoiler(s) not extended if applicable*

- *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*

(34) **Positive 'G' Roll with landing gear extended (aerobatic only) -** This is essentially identical to the Positive 'G' roll (manoeuvre 23), only it is executed at **a moderate speed with the landing gear extended.** 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.

Errors:
- *Landing gear not extended prior to start of manoeuvre*
- *Rate of roll not constant*
- *Rate of pitch not constant*
- *Style of roll not typical of the prototype*
- *Speed with landing gear extended too high or not typical of prototype*
- *Roll not centred on judges position*
- *Entry and exit at different heights or speeds*
- *Entry and exit tracks not parallel to each other*
- *Attitude at entry is not the same as attitude at exit*
- *Manoeuvre too far away, too close, too high or too low*

Group 4 ----------

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

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*
- *Roll out not immediate on completion of half loop*
- *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*

(42) **Half Cuban Eight (aerobatic only) -** The model approaches parallel to the runway, straight and level, and after passing the judges' centreline, the model pulls up into approximately 5/8th's of an inside loop and continues heading downward at 45 degrees, inverted. The 45 degree inverted flight is held until a half roll is performed in front of the judges, followed by a pull out into straight and level flight, which is to be at the same height as original entry.

Errors:
- *Manoeuvre not performed in a vertical plane that is parallel with the judges line*
- *Loop portion of the manoeuvre is not circular*
- *Half roll is not centred on judges position*

- *45 degree 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*

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

Errors:

- *Manoeuvre not performed in a vertical plane that is parallel with the judges line*
- *Loop portion of the manoeuvre is not circular*
- *Half roll is not centred on judges position*
- *45 degree 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*

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

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*

(45) **Split "S" (aerobatic only) -** 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 immediately a half inside loop downwards, and resumes normal level flight on a reciprocal track to that at the start.

Errors:

- *Roll starts too early or too late*
- *Track veers during half roll*
- *Excessive height loss in the roll*
- *Model inverted for too long before commencing half loop*
- *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*

(46) **Flight in Triangular Circuit (non aerobatic option only) -** The model approaches in straight and level flight, parallel to the runway and approximately 100 metres after passing the judges centreline, turns through 120 degrees (away from the judges). It then flies straight and level for approximately 200 metres, turns 120 degrees in the same direction as before, then continues

straight and level for a further 200 metres approximately. It then makes another 120 degree 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.

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*

(47) **Procedure Turn (non aerobatic option only) -** 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 degree 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-degree turn should be centred on the judges' centreline.

Errors:
- *Entry into the 270 degree turn not at right angles to original flight path*
- *270 degree 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 5 ----------

(51) **Victory Roll (with rolling exit) (aerobatic only) -** The model commences parallel to the runway, in level flight, and before reaching the judges' centreline it pulls up to a climbing flight path of approx. 45 degrees for 2-3 seconds, followed by a complete 360 degrees 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 upright attitude and the same track and heading as entry.

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

(52) **Inverted Normal Axial Horizontal Roll (aerobatic only) -** From inverted straight and level flight parallel to the runway, the model rolls at a constant rate through one complete rotation, and resumes inverted straight and level flight on the same heading.

Errors:
- *Model not inverted at start of manoeuvre*
- *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 inverted straight and level flight on same track as entry*
- *Roll not horizontal*
- *Manoeuvre too far away, too close, too high or too low*

(53) **Normal Vertical Roll (aerobatic only) -** From straight and level flight the model performs a 90 degree pull up to vertical, rolls at a constant rate through one complete 360 degree rotation, and recovers with positive 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.

Errors:
- *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 degrees*
- *Roll not vertical*
- *Manoeuvre too far away, too close, too high or too low*

(54) **Two (consecutive) Axial Horizontal Rolls in the same direction (aerobatic only) -** From straight and level flight, parallel to the runway, the model rolls at a constant rate through two complete consecutive rotations, and resumes straight and level flight on the same heading.

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*
- *Hesitation between first and second roll*

(55) **Derry Procedure Turn (aerobatic only) -** 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-degree 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-degree turn should be centred on the judges' centreline.

Errors:
- *Entry into the 270 degree turn not at right angles to original flight path*
- *270 degree 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*

(56) **Flight in Rectangular Circuit (non aerobatic option only) -** The model approaches in straight and level flight to a point approximately 150 metres past the judges centreline, turns 90 degrees away from the judges, flies straight and level for approximately 150 metres, then turns 90 degrees in the same direction as before. It then flies straight and level for

approximately 300 metres, turns 90 degrees in the same direction as before, then flies straight and level for approximately 150 metres. It makes a final 90-degree 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.

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*

(57) **360 degree Horizontal Circle (non aerobatic option only) -** The model approaches in straight and level flight, and executes a 360 degree circle, commencing by turning away from the judges on the centreline. The model adopts a constant rate of bank (between 40 and 50 degrees) 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 of non-aerobatic models.

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*

The following are the manoeuvres, which have been deleted from the catalogue in 2008 due to too easy, or due to too difficult to judge or due to safety:

- External stores drop (still allowed when called to clean up airframe but not as an option)
- Victory rolls (with simple exit options)
- Normal Horizontal Roll
- Slow Flight Clean
- 360° Horizontal Circle for aerobatic types (also deleted for safety reasons)
- Inverted flight
- Knife edge flight
- Extend and Retract Flaps/Spoilers etc. (all types)

5.0.7 Overall Realism

(a) The judges will award points for overall realism, flight speed, smoothness and accuracy throughout the whole flight, including the taxi back (see notes) 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.

Note 1: in certain conditions, a pre flight taxi can be preferred. This would be agreed upon at the Team Leaders' briefing and the timing would stop for the duration of the taxi.

Note 2: no taxi would be required from seaplanes landing on its keel or skids, in which case an average of the other realism points would be granted instead.

(b) Dropping of stores (tanks, bombs or any other external stores) is allowed **if called** (for example to clean up the airframe after straight flight and before starting any of the aerobatic optional manoeuvres). The judges will consider it when awarding points for Overall Realism. The contestant must inform the judges of any intentional external stores drop before their flight commences; otherwise rule 2.0.8 (g) will apply.

Taxiing Realism: *here taxiing away from the landing full stop (as in rulebook 5.0.5 (c)), 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) where appropriate.*

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 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.

5.0.8 Positioning 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. Any manoeuvre causing the judges to elevate their line-of-sight above 60 degrees to the horizontal is to be avoided as this may result in this part of the flight not being 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 and a warning would be issued. If this occurs on a second occasion during the same flight, the judges or the Contest Director will instruct the pilot to land immediately, the rest of the flight scoring zero. 'Overall Realism' points will be awarded in proportion to the amount of the flight completed.

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 scoring zero. 'Overall Realism' points will be awarded in proportion to the amount of the flight completed.

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 five flying judges, then the lowest and highest scores awarded for each manoeuvre shall not be counted.

(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) is flown, due to adverse weather etc., all flight scores will count towards the final classification.

(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 for the highest scoring flights (see (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 0.5. Therefore the maximum flying score achievable is 1500.

Further information on the flying part of the competition can be found under section 10: judges guidelines to flying judging.

BONUS POINTS SYSTEM

6.0.1 Introduction of Bonus Point System

(a) The Bonus Points System is introduced in 2008 to give reward incentives to contestants who enter an older prototype subject, to contestants who enter an original prototype subject and to contestants who design and/or build their own model.

(b) The Bonus Points System is divided in three sections: a **Vintage Bonus** with a maximum of 50 points, an **Originality Bonus** with a maximum of 50 points and a **Designer Bonus** with a maximum of 50 points, making a total of 150 points attainable. This maximum of 150 points is to be added to the final attainable total score of 3000 points (but only if an official flight is scored).

(c) The Bonus Point System is fully objective and allows every contestant to calculate the available bonus for the subject he chooses.

(d) The chief static judge (or documentation judge) is responsible for verifying the number of bonus points, which will be filled in the appropriate cases on the Contestant's Declaration Sheet.

(e) If you have any doubts to the number of bonus points applicable to your subject, please contact the IJMC Board well in time with your personal assessment (if necessary, giving reasons) for confirmation or a ruling (e-mail addresses available on http://www.ijmc.net). This avoids discussions during the competition.

6.0.2 Vintage bonus (50 points max)

The vintage bonus allows contestants to choose older prototype subjects without being at a disadvantage. The date of the first flight as published on http://en.wikipedia.org determines the vintage. The most points are awarded to a pre 1940 model (50 points) and for every year the date of first flight is later, 2 points less is awarded, so we end up at 2 points for a 1964 first flight and zero points for any year thereafter.

Pre 1940	**50 points**
1940	**50 points**
1941	**48 points**
1942	**46 points**
.	**.**
.	**.**
1962	**6 points**
1963	**4 points**
1964	**2 points**
As from 1965	**0 points**

6.0.3 Originality bonus (50 points max)

(a) The originality bonus encourages contestants to break the trend of similar models. The most points are given to the model that appears for the first time. The more a subject has been classified in the last two editions of the Jet World Masters (two classes together), the less bonus points it will get. A subject presented for the first time will receive a 50 point's bonus and this will be reduced by 4 points for each appearance. Official designations will be used to establish whether a subject is similar or not. Variants are considered similar. Again, the designations on http://en.wikipedia.org will be determining. Example 1: an L-39 is similar to any other L-39 variant but is different from an L-159. Example 2: an F-16 is similar to any F-16 variant but is different from the F-16XL. In case of discussion, the chief static judge will decide. Note that two seater versions of a single seater and vice versa are considered similar.

(b) A list of classified models in the two last Jet World Masters will be published on http://www.ijmc.net so each contestant will be able to calculate this bonus for his chosen subject even before going to the next JWM.

13 models and more	**0 points**
12 models	**2 points**
11 models	**6 points**
10 models	**10 points**
.	**.**
.	**.**
3 models	**38 points**
2 models	**42 points**
1 model	**46 points**
0 models	**50 points**

6.0.4 Designer bonus (50 points max)

(a) The designer bonus encourages contestants to build their own designs. The contestant must declare (in the Contestant's Declaration Sheet) from which kit the model was built, if it is a full composite or a traditional kit, if it's an own design kit prototype or if it's a one off own design.

(b) This is how the bonus points are awarded:

Full composite kit	**0 points**
Traditional kit (with foam or built-up wings)	**10 points**
Own design kit prototype	**30 points**
One off own design model	**50 points**

(c) A full composite kit means the fuselage and flying surfaces are prefabricated from composite materials. It is of no importance whether the kit is prepainted or not. It is of no importance whether the kit is mass-produced or in limited series only. It is of no importance if the contestant modified the kit or not.

(d) A traditional kit needs to have at least the wings in a traditional veneered foam or wooden built-up construction. This can also be a completely rebuilt wooden wing on a full composite kit. It is of no importance whether the kit is mass-produced or in limited series only. It is of no importance if the contestant modified the kit or not.

(e) An own design kit prototype is a prototype of a kit, which is already commercially available (e.g. F-15C by Philip Avonds, Hawk by Stephan Völker etc.). This kit prototype must be designed by the contestant himself. An own design kit prototype can be claimed by one contestant only. However, in case of a joint design by two contestants claiming the same own design kit prototype, the bonus can be shared (each 15 points). A kit is considered commercially available if it has been advertised as available through any of the possible channels or if there are more than two entries with a model from the same basic moulds.

(f) A one off own design model must be designed by the pilot himself (e.g. Saab J35 Draken by Manfred Eberhard, Mirage III CZ by Frank Stein etc.). A one off own design model can be claimed by one pilot only. However, in case of a joint design by two pilots claiming the same one off own design model, the bonus can be shared (each 25 points), so there can never be more than two entries with the same one off design. A one off own design can subsequently evolve in a kit prototype (e.g. Hunter by Reto Senn which may be commercialised by let's say 2011 JWM, at which point it is no longer eligible for the one off own design bonus but still for the kit prototype bonus if the model is flown by Reto himself).

(g) Of course, some evidence will be required to prove own designs. This can be in the form of photographs, magazine articles etc. to be added to the Contestant's Declaration Sheet. In case of discussion, the chief static judge will decide. **Own design claims, which prove to be false, will be sanctioned with a disqualification from the competition.**

FINAL SCORING AND CLASSIFICATION

7.0.1 Final placing

Final scores, classification and places for the 13.5 kg class and for the 20.0 kg class shall be determined as follows:

Addition of the Static points scored in section 4 (x 0.5 = max 1500 points), the Flying points scored in section 5 (x 0.5 = max 1500 points) and the Bonus System Points in section 6 (max 150 points).

Static score: **max 3000 x 0.5** **=** **max 1500**

Flying score: **(3 rounds)** $\frac{\text{max 3000 + max 3000}}{2}$ **x 0.5** **=** **max 1500**

Flying score: **(4 rounds)** $\frac{\text{max 3000 + max 3000 + max 3000}}{3}$ **x 0.5** **=** **max 1500**

Vintage Bonus: **=** **max 50**
Originality Bonus: **=** **max 50**
Designer Bonus: **=** **max 50**

Maximum total points achievable (Static 1500 + Flying 1500 + Bonus 150) = max 3150

Note: the Static points and the Bonus points are only awarded to contestants having performed at least one official flight (i.e. the model must have left the ground).

7.0.2 Nations Trophy

The Nations Trophy classification is determined as follows: from each Nation/Country, the final total points of the three highest-ranking contestants (regardless of weight class) are added up. It is not necessary to have three contestants; a Nation/Country is classified as soon as one of its contestants obtains a final score.

DEFINITIONS

8.0.1 Approach

The 'approach' describes the position and attitude of the jet model entering a manoeuvre.

8.0.2 Departure

The 'departure' describes the position and attitude of the jet model leaving a manoeuvre.

8.0.3 Standard Attitude

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

8.0.4 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.

8.0.5 Parallel to Runway-Centreline

In many of the 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.

8.0.6 Centre Line

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

JUDGES GUIDELINES TO STATIC JUDGING

9.0.1 Judges

(a) The judges should have the chance to make a short visual inspection of all, or the majority, of the contest models before static judging starts, to allow them to assess the average quality of the models. This will help the judges to achieve the correct balance between the points awarded to the best and worst models. Also jet models that are not in the contest can be used for judging practice.

(b) The 'Static' judges are allowed to confer and to harmonise the scores awarded to the contestants.

(c) One of the judges must be appointed 'Chief Judge' or judges' spokesman before the start of the competition.

(d) After the static judging of each model is completed, the judges' spokesman is to keep the score sheets, until they are passed to the organisers for final classification of the competitors. If the judges' spokesman finds very large differences between the scores given to the same competitor, he may discuss this with the other static judges.

(e) If the static judges identify any defects in any contest model that might endanger flight safety, the Contest Director is to be informed before that model makes any flight.

9.0.2 Scoring

(a) Each section to be judged will be awarded marks between 0 and 10, using increments of a tenth a mark. The Judges should utilise the full scoring range. Generally, each error should be counted, and the score should be reduced by at least 1/10 point for each mistake.

(b) The static judges must decide if the errors are big or small. Big errors cause larger deductions. Each judge scores individually, but the judges have to use the same standard for each jet model.

(c) If a score is missing in the score sheet, all score sheets concerning this model must be returned to the static judges. If the score cannot be determined, it must be replaced by the average of the scores given by the other 2 judges.

9.0.3 Auxiliary materials

The judges are not allowed to use any auxiliary devices for scoring. Measuring any parts of the jet model is not allowed.

9.0.4 Judging time

(a) The static judges have a maximum of 20 minutes to judge each model and, generally, the full time period should be used to judge each model. The time of total 20 Min is divided in 2 x 10 Min. for each set of 3 Judges. The Organisers are responsible to monitor this time limit. The watch should be stopped when the model is repositioned. The Judges may ask the contestants questions about the model and the full-size original.

(b) However, in the event of a low standard model or inadequate documentation, the judges can shorten the judging of Scale Accuracy time. This time should be used to judge the different following sections of the 'fidelity to scale' as described in the IJMC Jet Class rules 4.0.3. The Contest Director is not allowed to shorten, or lengthen the judging time.

(c) A large clock is to be visible to the judges and competitor at each static judging location, to show the time taken for the judging of each model.

9.0.5 Competitors

(a) Before static judging of each model commences, the competitor may have a short time to explain his documentation to the judges. During the time when the model is being judged, the competitor is not allowed to talk to the judges, unless the judges ask questions. In this case the competitor must answer these questions immediately.

(b) The competitor has to follow the judges' requests, such as repositioning the model on the judging table, or adjusting gear door or flap positions etc. as long as this is feasible without making use of the radio.

(c) After static judging of all the models is completed, the competitor is allowed to ask the judges for errors that were found, but the competitor is not allowed to ask about points awarded.

9.0.6 Distance

The static judging has to be carried out at the distances set out in the current IJMC Jet Class rules section 4.0.3.

9.0.7 Proof of Scale

Judging should be performed in the following order: first the jet models side view, then the front/end views and, finally, the top/bottom view should be compared with the documentation.

9.0.8 Side views

The outline and shape will be compared, especially the outline, shape and size of the fuselage, the cockpit canopy, the air intakes, the vertical stabiliser, and the engine intake/exhaust outlet. The correct position and size of the wing, the stabiliser assembly, including the fin/rudder size. Position and angle of the landing gear, the landing gear doors and the size of wheels and rims, the cockpit canopy, and the shape, size and position of bombs, external fuel tanks or other external stores are to be examined. The angles between different parts are to be checked. The angle of incidence of the wing and the elevator unit are to be examined also any possible washout of the wing. If any control surfaces, or openings, are only painted on the model, points are to be subtracted in proportion to the loss of realism.

9.0.9 Front and rear view

Here the outline and shape, including all details, will be compared, especially the outline, shape and size of the fuselage, the cockpit canopy, the air intakes, the horizontal and vertical stabilisers, and the engine intake/exhaust outlet. The wing's thickness and taper, the stabiliser's thickness and taper, position and angle of the landing gear, the thickness of the wheels and the track are to be examined. Attention is to be paid to speed brakes, etc. The dihedral of the wings and the horizontal stabiliser unit are to be checked. If any control surfaces, or openings, are only painted on the model, points are to be subtracted in proportion to the loss of realism.

9.0.10 Top and bottom views

Here the outline and shape, including all details, will be compared, especially the outline, geometry, shape and size of the fuselage, the wings and control surfaces, the stabiliser unit and control surfaces, the cockpit canopy, the air intakes and the engine nozzle/exhaust outlet. The size and angle of the wing and the elevator unit are to be checked. Attention must be paid to 'sawtooths' or notches on the wings and stabilisers. If any control surfaces, or openings, are only painted on the model, points are to be subtracted in proportion to the loss of realism. Close-up photographs taken from low viewpoints to show underside detail such as the location of undercarriage doors, hatches, under-wing stores etc., should be provided to assist with the verification of underside detail.

9.0.11 Colour

Colour accuracy will be compared with the documentation provided. The level of difficulty of the making of the lacquer/paint is not important for the judging. Only the similarity of the jet model to the documentation is important.

The colour of the markings, numbers, letters, National insignia, all external surfaces of the airframe, and any camouflage colour or paint scheme colour is to be judged.

The overall surface and individual areas of the model, compared to the full-size prototype, must be checked in respect of a matt, semi-gloss or glossy finish.

9.0.12 Markings

Aircraft markings and lettering will be compared with the documentation provided. The similarity of the jet model to the documentation is to be scored under "Markings Accuracy".

The complexity and the level of difficulty of the making of the aircraft markings and lettering are to be scored under "Markings Complexity".

To be checked are the position and the size of all the aircraft markings and lettering. The style and shape of the markings is to be especially checked. The camouflage pattern or the paint scheme layout is to be checked.

9.0.13 Surface Texture and Realism

Here the surface texture, panel lines, maintenance hatches, openings etc., and the overall appearance of the jet model, will be compared to the documentation supplied. If rivets and sheet metal panels are only simulated (painted or marked on the model), the points awarded will be reduced in proportion to the loss of realism. Authentic weathering must be as shown in the documentation. The similarity of the jet model to the documentation is to be scored under "Surface Texture and Realism in general".

The complexity and the level of difficulty of creating the aircraft's surface texture are to be scored under "Surface Complexity".

9.0.14 Craftsmanship

Here the overall quality of the craftsmanship and construction of the model are judged. Worthy of special notice are joints/gaps between wing and fuselage, gaps at control surface hinges, etc., which should be in keeping with the prototype. The edges of the fuselage, wings, elevator unit, rudders including hinges and cockpit canopy are to be judged. Straightness and thickness of trailing edges on flying surfaces are to be checked. All the above is to be scored under "Craftsmanship in general"

For visible opening or fixing devices (hatch catches) for the cockpit canopy, engine and R/C access panels etc., and removable wing fixings, etc., points are to be subtracted in proportion to the loss of realism.

"Complexity of Structure" is an assessment of the judges as to how complex the overall model is from a builder's point of view. If the model is judged to be a highly challenging building effort, the model should be awarded a high "Complexity of Structure" score.

9.0.15 Scale Detail

The accuracy of landing lights and navigation lights, hatches, handles, maintenance panels, air & exhaust vents, radiator grilles, pitot tubes, instrument panels, cockpit and interior details, weathering effects and so on is to be checked and scored under "Scale Detail Accuracy".

"Scale Detail Complexity" is an assessment of the judges as to how complex the details on the model are, again from a builder's point of view. Indications of complexity include (but are not limited to) opening canopies, sequencing gear doors, complex control surfaces, extendable tailhooks, complex cockpit interiors, complex lighting systems etc.

A very complex detailed model should be awarded high "Scale Details Complexity" score.

JUDGES GUIDELINES TO FLYING JUDGING

10.0.1 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.

(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 judge calibration 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 IJMC Jet Class 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 remain 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, presentation and positioning*

In the event of any judge awarding a zero score for any manoeuvre the chief judge must be advised and should carry out a check for unanimity with the other judges.

10.0.2 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 a horizontal plane should commence on a flight path that is between 45 to 60 degrees 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 or reversing manoeuvres like Split S, Immelman Turn or Reversal are not scored but can be taken into account in the 'Overall Realism' section. Attention is to be paid to smooth flying movements and realism. Also the positioning of these reversing and turning manoeuvres and the symmetry about the centreline may be taken into consideration. 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 contestant, or his helper. 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 helper 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. 'Overall Realism' 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. 'Overall Realism' 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) The manoeuvres must be performed in a position, and at a height, which will allow them to be seen clearly by the judges. Any manoeuvre causing the judges to elevate their line-of-sight above 60 degrees to the horizontal is to be avoided as this may result in this part of the flight not being 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 and a warning would be issued. If this occurs on a second occasion during the same flight, the judges or the Contest Director will instruct the pilot to land immediately, the rest of the flight scoring zero. 'Overall Realism' 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 scoring zero. 'Overall Realism' points will be awarded in proportion to the amount of the flight completed.

(k) Flight speed: this is a factor to be judged subjectively. The speed must be realistic, 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 are normally performed at a reduced throttle setting.

(l) Taxi realism: the taxi back after the landing full stop 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, extinguishing landing lights, retracting flaps/spoilers/air brakes where appropriate etc.

(m) 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 contestant 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 three mandatory and five optional scoring manoeuvres, then no points will be awarded for this manoeuvre. However, 'Overall Realism' points will still be awarded, in proportion to the amount of the flight completed. Any intentional drop of stores (tanks, bombs or other external stores) must be called to the judges prior to the drop.

(n) The model has to be flown in the same condition as it was presented for static judging, except for changes permitted as in rules 2.0.8(c) and (d), and 5.0.7(b).

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