FÉDÉRATION AÉRONAUTIQUE INTERNATIONALE

SPORTING CODE
SECTION IV

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VOLUME F2 – CONTROL LINE

F2A-SPEED MODEL AIRCRAFT
F2B-AEROBATIC MODEL AIRCRAFT
F2C-TEAM RACING MODEL AIRCRAFT
F2D-COMBAT MODEL AIRCRAFT

ANNEX 4A- CLASS F2A - JUDGES' GUIDE
ANNEX 4B- CLASS F2B - JUDGES' GUIDE
ANNEX 4C- CLASS F2C - TEAM RACE JURY GUIDE
ANNEX 4D- CONTROL LINE WORLD CUP RULES
ANNEX 4E- CONTROL LINE ORGANISERS' GUIDE
ANNEX 4F- CLASS F2E (PROVISIONAL CLASS) - COMBAT MODEL AIRCRAFT WITH COMPRESSION IGNITION ENGINES

VOLUME F2

SECTION 4C – MODEL AIRCRAFT – F2 (CONTROL LINE)

PART FOUR – TECHNICAL REGULATIONS FOR CONTROL LINE CONTESTS

FEDERATION AERONAUTIQUE INTERNATIONALE

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All international sporting events organised wholly or partly under the rules of the Fédération Aéronautique Internationale (FAI) Sporting Code[1] are termed *FAI International Sporting Events*[2]. Under the FAI Statutes[3], FAI owns and controls all rights relating to FAI International Sporting Events. FAI Members[4] shall, within their national territories[5], enforce FAI ownership of FAI International Sporting Events and require them to be registered in the FAI Sporting Calendar[6].

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[1] FAI Statutes, Chapter 1, para. 1.6

[2] FAI Sporting Code, General Section, Chapter 3, para 3.1.3.

[3] FAI Statutes, Chapter 1, para 1.8.1

[4] FAI Statutes, Chapter 5, para 5.1.1.2; 5.5; 5.6 and 5.6.1.6

[5] FAI Bylaws, Chapter 1, para 1.2.1

[6] FAI Statutes, Chapter 2, para 2.3.2.2.5,

[7] FAI Bylaws, Chapter 1, para 1.2.3

[8] FAI Statutes, Chapter 5, para 5.1.1.2; 5.5; 5.6, 5.6.1.6

[9] FAI Sporting Code, General Section, Chapter 3, para 3.1.7

[10] FAI Sporting Code, General Section, Chapter 1, paras 1.2. and 1.4

[11] FAI Statutes, Chapter 5, para 5.6.3

[12] FAI Bylaws, Chapter 1, para 1.2.2

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RULE FREEZE FOR THIS VOLUME

With reference to paragraph A.12 of Volume ABR :

In all classes, the four year rule for no changes to model aircraft / space model specifications, manoeuvre schedules and competition rules will be strictly enforced, but in step with the World Championship cycle of each category.

This means that in Volume F2 for category F2, changes can next be adapted at the plenary meeting of 2004 for application January 1, 2005

The only exceptions allowed to the four year rule freeze are genuine and urgent safety matters, indispensable rule clarifications and noise rulings.

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VOLUME F2

SECTION FOUR - TECHNICAL REGULATIONS FOR CONTROL LINE CONTESTS

4.1. CLASS F2A - SPEED MODEL AIRCRAFT

Note*:* The F2A Judges' Guide is at Annex 4A.

4.1.1. Definition of a Speed Model Aircraft

Model aircraft in which the power is provided by a piston motor and in which lift is obtained by aerodynamic forces acting on the supporting surfaces, which remain fixed in flight except for control surfaces.

4.1.2 Characteristics of a Speed Model Aircraft

Maximum swept volume of motor or motors ..... 2,5 cm^3

Minimum total area (St) ..... 2 dm^2/cm^3 swept volume of the motor(s)

Maximum loading ..... 100 g/dm^2

Maximum wingspan ..... 100 cm

To determine the wingspan of asymmetric model aircraft the thrustline of the model aircraft is used. Refer Sporting Code Volume ABR Section 4C paragraph 1.4.5.

The model aircraft must take off from the ground.

A silencer is compulsory. Minimum internal volume 50 cm^3. Maximum tailpipe internal diameter 6 mm.

An effective shutoff is compulsory so that the duration of high level noise can be limited to 20-30 seconds per flight.

Rule B.3.1. of Section 4B does not apply to class F2A.

4.1.3. Fuel

Fuel to a standard formula for glow plug and spark ignition motors will be supplied by the organisers. Its composition shall be 80% methanol, 20% castor oil.

Note: Fuel for compression ignition motors is not restricted.

Before each attempt for an official flight the fuel tank must be rinsed (washed out) with standard formula fuel.

4.1.4. Diameter of Control Lines

Only two line control is allowed, minimum control line diameter is 0,40 mm with a tolerance of minus 0,011 mm.

4.1.5. Length of Course

The measured distance covered by the model aircraft must be at least one kilometre. The radius of the flight circle must be 17,69 m. (9 laps = 1 km).

4.1.6. Line Tests (to be made before each attempt for an official flight)

The radius is measured from the axis of the pivot on the pylon, to the axis of the propeller. Where two propellers are employed, the axis of symmetry is taken as the reference for measurement.

A load test shall be applied to the assembled control handle, lines and model aircraft equal to 50 times the weight of the model aircraft and this test shall be applied separately to the safety strap when attached to the competitor's wrist.

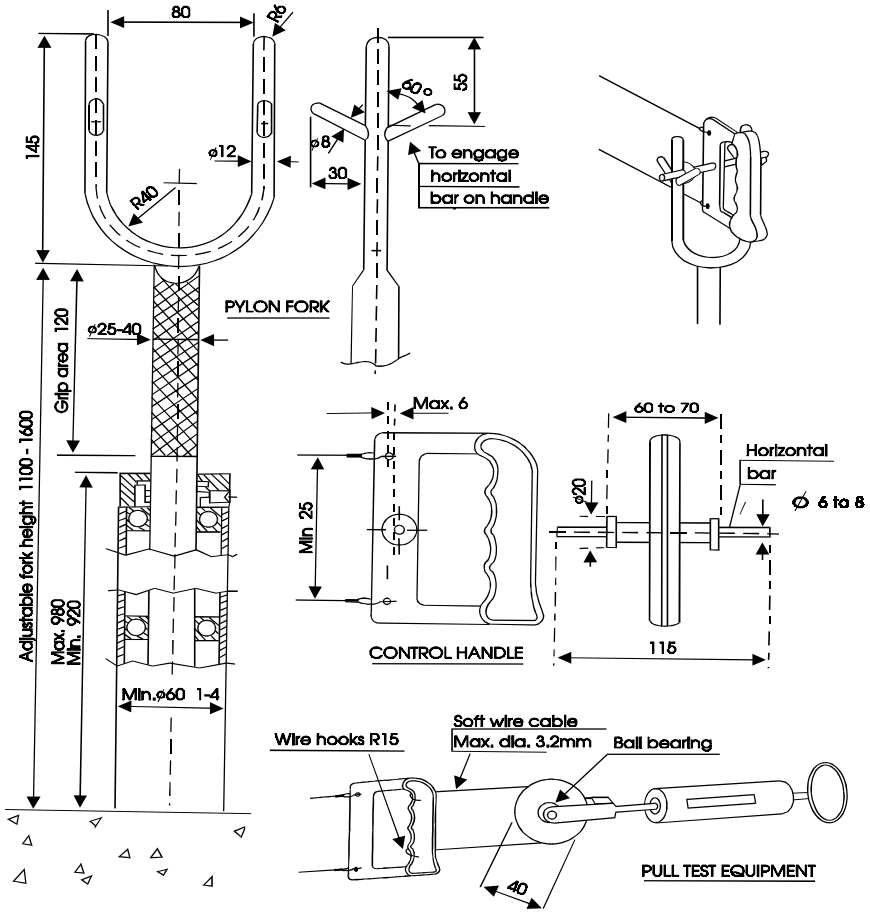
In each case the pull shall be applied three (3) times, slowly increasing to maximum load and releasing rapidly. The pull test should be made on the handle grip, not near the point of attachment of the lines (see sketch).

The diameter of the lines shall be checked at random distances on at least three points along the length of each line.

4.1.7. **Control Handle and Pylon Fork**

A pylon with supports as shown in the sketch, will be placed at the disposal of the competitors by the organisers. It is compulsory that a pylon fork and control handle of standard dimensions as specified, be employed. The distance between the flexible point of attachment on the control handle and the point of contact of the horizontal bar on the fork shall be a maximum of 6 mm. The horizontal bar (handle pivot) must be in continuous contact with the pylon fork during the official flights.

The pylon fork shall be infinitely adjustable between 1100 mm and 1600 mm from the ground and be steadily fixed to the ground surface. Mandatory dimensions are shown in the sketch. The pylon fork in its highest position may not deflect more than 20 mm when it is subjected to a horizontal pull test of 250 N.



No intentional twisting and/or linking of the two lines together shall be permitted from the point of exit of the model aircraft to the control handle. The lines shall be separated by at least 5 mm at the point of exit from the model aircraft and at least 25 mm at the handle.

The lines must be round in cross-section and may not have any liquid or coating material applied.

A safety strap connecting the competitor's wrist to the control handle must be provided by the competitor and used during all flights.

4.1.8. **Definition of an Attempt**

It is considered an attempt when the pilot does not engage the control handle in the pylon fork within 3 minutes after the starting signal.

4.1.9. **Number of Attempts**

In the case of an unsuccessful first attempt for an official flight, the competitor is entitled to a second attempt.

4.1.10 **Definition of an Official Flight**

The flight is official when the timekeepers start the watches.

4.1.11. **Number of Flights**

Each competitor is entitled to three official flights.

4.1.12. **Number of Helpers**

Two helpers and the team manager are admitted to the contest area. A pilot may start and adjust his own motor and at most one other motor as a helper. Only team members (including the Team Manager) are allowed to start and adjust the motor(s).

In case of an incomplete national speed team supporter(s) may act as helper(s) provided that he (they) is (are) registered as such for no more than one national team from the beginning of the contest through its close, and provided that the team member(s) plus helper(s) do not exceed three persons.

4.1.13. **Starting of Timing**

The timing commences officially when the competitor has placed his handle in the pylon fork and the model aircraft having made 2 complete circuits again passes the height marker on the edge of the circuit directly opposite the timekeepers.

4.1.14. **Height of Flight**

During the timing of an official flight, the flying height must not be less than one metre and not more than 3 metres.

4.1.15. **Cancellation of the Flight**

A flight is cancelled when:

a) any physical effort for the purpose of increasing the speed of the model aircraft during an official flight is applied by the pilot.

b) if at any time during the speed course the model aircraft exceeds a height of 6 metres or sustains a height in excess of 3 metres or less than one metre for more than one lap.

c) continuous contact is not maintained with the pylon fork during the official flight.

d) jettisoning occurs during the official flight.

4.1.16 **Number of Timekeepers and Judges**

a) The time shall be taken by three timing officials equipped with 1/100-second resolution digital stopwatches. In addition, an optical electronic system with equal or better resolution and accuracy may be used.

b) Speed judges, at least two in number, shall be responsible for observing the conduct of the pilot and the altitude of the flight.

c) For World and Continental Championships, a senior judge will be appointed to supervise the conduct of the timekeepers and judges.

The senior judge will be selected from a list of persons who are nominated by NACs for their proficiency and experience and approved by the CIAM.

4.1.17. **Classification**

a) The individual times recorded by each timing official shall be recorded in writing and retained by the senior judge or other official.

b) The mean time of the three stopwatches shall be taken to calculate the result, unless:

i. One of the stopwatch times differs from the closer of the other two by more than 12/100 seconds, or the official reports that he made a mistake. In this case the mean time shall be calculated from the other two stopwatch times.

ii. Two stopwatch times differ by more than 12/100 seconds from the middle one, or two officials report a mistake. In this case this fact should immediately be reported to the competitor or his team manager. The competitor then has the choice of using only the remaining stopwatch time to calculate his result, or to be allowed an attempt. His decision must be given to the F2A Circle Marshall without delay, and is irrevocable.

iii. There is an optical electronic system that has recorded a time within 12/100 seconds from the time taken from the stopwatches according to the above. In this case, the optical system takes precedence of the stopwatch times and is used to calculate the result.

No rounding off of decimals should be made when calculating the mean time.

The time thus obtained for calculating the speed should be recorded and retained.

c) The result of the speed in km/h shall be calculated by dividing 3600 by the time according to b), and then taken to the nearest lower 1/10 km/h.

d) The best speed attained during the three flights is used for classification. In case of a tie, to separate the fliers, the second best speed, and if still a tie, the third best speed is used.

e) The three first positions are subject to rechecking of the declared model aircraft characteristics.

4.1.18. **International team classification**

To establish the national team scores for the team classification, add together the best speed attained by each individual member of the team.

4.2. CLASS F2B - AEROBATIC MODEL AIRCRAFT

4.2.1. **Definition of an Aerobatic Model Aircraft**

Model aircraft in which the propulsion energy is provided by a piston motor(s) and in which lift is obtained by aerodynamic forces acting on the supporting surfaces which must remain fixed in flight except for control surfaces.

4.2.2. **Characteristics of an Aerobatic Model Aircraft**

Maximum flying weight ..... 5 kg

Maximum surface area (St) ..... 150 dm^2

Maximum loading ..... 100 g/dm^2

Maximum swept volume of the motor(s)

a) two stroke motor(s) ..... 10 cm^3

b) four stroke motor(s) ..... 15 cm^3

A silencer must be used except on 4-stroke engines. The model aircraft must take off from the ground. The noise level must not exceed 96 dB(A) for both types of motors. The noise level will be checked according to the procedure outlined in paragraph 5.1.2.

Rule B.3.1. of Section 4B does not apply to class F2B.

4.2.3. **Line Length**

Line length shall be not less than 15 meters or more than 21,5 meters.

4.2.4. **Line Tests to be made before each attempt for an official flight**

Line length is measured from the axis of the grip of the control handle to the axis of the propeller. Where two propellers are employed their axis of symmetry is taken as the reference for measurement.

A load test shall be applied to the assembled control handle, lines and model aircraft equal to 15 times the gravity force acting on the model aircraft up to a maximum pull of 200 N where the model aircraft weight is less than 2 kg and the engine is equal to or less than 10 cc swept volume. The load test shall be up to a maximum of 300 N where the model aircraft weighs 2 kg or more or the engine is more than 10 cm^3 swept volume.

4.2.5. **Definition of an Attempt**

There is an attempt when the model aircraft does not become airborne within three minutes of the starting signal, or the competitor does not enter the circle within two minutes from being called to fly.

4.2.6. **Number of Attempts**

Each competitor is entitled to two attempts for each official flight. After the first attempt the competitor is entitled to make his second attempt immediately but if he leaves the circle he shall be called to make his second attempt after 30 minutes have elapsed or if at the end of a round, after a maximum of 30 minutes have elapsed.

4.2.7. **Definition of an Official Flight**

A flight is official when the model aircraft becomes airborne.

4.2.8. **Number of Flights**

At World and Continental Championships and other limited international contests, each competitor is entitled to two qualifying flights during the first contest days (2, 3, ...) depending on the number of entries. A maximum of 45 to 50 flights per day is recommended. The 15 highest scoring individuals, on the basis of their highest single score in the qualifying flights, for both the senior and junior competitors, are entitled to three final flights.

For Open International contests, each competitor is entitled to three flights. Under exceptional circumstances, the FAI Jury may reduce the number of flights.

4.2.9. **Cancellation of a Flight**

A flight is cancelled when jettisoning of permanent model aircraft parts occurs at any time from the release of the model aircraft, to when the model aircraft stops forward motion on landing. In the case of a crash, or a flip over, a belly or upside down landing, the flight is not cancelled.

4.2.10. **Number of Helpers**

Each competitor is entitled to two helpers.

4.2.11. **Execution of Manoeuvres**

The manoeuvres must be executed in the order listed. Between the end of one manoeuvre and the start of the next the competitor must fly a minimum of 1½ laps. The competitor may attempt a manoeuvre only once in any one flight. The competitor must complete the flight programme within 7 minutes including the take off and landing. This 7 minutes time limit commences when the participant gives a hand signal prior to starting his motor, but not later than 3 minutes from the moment he has entered the circle. The motor must be started by hand. Timing ceases when the model aircraft stops forward motion on landing. No system or device may be used to stop or control the engine run.

4.2.12. **Scoring**

During the flight, each complete manoeuvre may be awarded marks between 0 and 10 points in increments of 0.5 point by each of the judges. These marks are multiplied by a coefficient which varies with the difficulty of the manoeuvre (see 4.2.15).

A manoeuvre flown out of sequence will not be scored. Omitted manoeuvres are not scored, but succeeding manoeuvres are considered to be in sequence if flown in the proper order relative to the remainder of the flight pattern.

Non-scoring manœuvres are permitted after the completion of the cloverleaf and before the commencement of the landing approach for the sole purpose of stopping the engine or unwinding the lines

4.2.13. **Judges and Timekeepers**

The organisers must appoint a panel of at least three judges who shall be selected a list of persons proposed by the National Airsports Controls for their proficiency and experience and approved by the CIAM. In the case of World and Continental Championships the panel of judges must be increased to five. At World and Continental Championships and other limited international competitions, the judges must be of different nationalities. In open international competitions the judges must be of at least two nationalities, and if the panel is composed of five judges (recommended) only three of them be approved by CIAM. The judges must be the same for all competitors in any particular series of flights. In this case of five judges, the highest and lowest scores for each flight will be discarded and only the three middle scores shall be counted. Aerobatic judges will be responsible for observing each attempt at an official flight and to record their awarded score for each manoeuvre as it is executed. Each judge will be provided with a secretary. There shall be training flights for judges, with a briefing before and debriefing after, to be held immediately before every World Championships and Continental Championships in this class. A master timekeeper shall give visual indication of elapsed time from the moment the competitor gives a hand signal prior to starting his motor, at one minute, three minutes and seven minutes stages.

4.2.14. **Classification**

a) The judges' marks multiplied by their appropriate coefficient are added for classification of the competitors. At World, Continental and other limited international contests, the classification of the 15 finalists will be done according to the sum of the two best final flights. The classification of non-finalists will be done according to their best single flight score in the two qualifying flights.

In the case of a two way tie for 15th place both competitors are classified as number 15 and the following competitor is number 17 ; in the case of a three way tie for 15th place all three will be classified as number 15 and the following competitor is number 18 ; etc.

At open international contests the classification will be done according to:

the sum of the best two flights in case of three flights;

the best single flight score in case of two or one flight(s).

b) To establish the national scores for team classification add the numerical placing of the three team members of each nation. Teams are ranked according to the lowest numerical score to highest, with complete three competitors teams ahead of two competitors teams which in turn are ranked ahead one competitor teams.

c) When the number of participating junior competitors is sufficient to give a title of Junior World or Continental Champion, the three best placing juniors, according to their results in qualifying flights, are entitled to fly three final flights. If any junior is in the overall top 15 and already flying in the finals, his/her open and junior final flights will be the same. The results of these junior final flights will serve to rank the top three juniors but will not affect the general results.

d) Facsimile copies of the original judges' score sheets from each official flight shall be given to each Competitor/Team Manager for World and Continental Championships before the next competitor's flight in the contest, or at the latest at the end of each round of the contest.

4.2.15. **List of Aerobatics Manoeuvres and their coefficients**

1. Starting ..... k = 1
2. Take-off ..... k = 2
3. Reverse wing-over ..... k = 8
4. Three inside loops ..... k = 6
5. Inverted laps (2 laps) ..... k = 2
6. Three outside loops ..... k = 6
7. Two inside square loops ..... k = 12
8. Two outside square loops ..... k = 12
9. Two inside triangular loops ..... k = 14
10. Two horizontal eights ..... k = 7
11. Two square horizontal eights ..... k = 18
12. Two vertical eights ..... k = 10
13 Hourglass ..... k = 10
14. Two overhead figure eights ..... k = 10
15. Four-leaf clover ..... k = 8
16. Landing ..... k = 5

4.2.16. **Description of Aerobatic Manoeuvres**

Note*:* The F2B Judges' Guide is at Annex 4B .

4.2.16.1. **Starting**

The competitor gives a hand signal prior to starting his motor. The motor must be started by flicking by hand. Release of the model aircraft within one minute receives full points; release of model aircraft after one minute receives no points.

4.2.16.2. **Take-off**

A correct take-off consists of the model aircraft rolling smoothly along the ground for distance of not less than 4,5 metres, but not greater than one quarter of a lap. The model aircraft then rises smoothly into the air with a gradual climb and a smooth level-off to normal flight level over the point at which the model aircraft commenced its ground roll. Model aircraft continues on for two smooth laps of normal level flight to point of original level-off.

Errors:

Model aircraft bounces or becomes airborne too soon, or too late. Take-off climb or level-off are not gradual and smooth. Level-off occurs too soon, or too late. Level-off and normal flight level are not within a height of 1,20 m - 1,80 m.

4.2.16.3. **Reverse Wing Overs** (one required)

Correct reverse wing overs are judged when model aircraft starts from normal flight level, makes a vertical climb and dive, passing directly over the flyer's head, cutting the ground circle in half, and recovers in an inverted position at normal flight level. The model aircraft continues for half a lap inverted, to the starting point, then makes a vertical climb and dive over the centre of the circle from inverted flight, recovers at normal flight level. All turns to and from level flight should be approximately 1,5 m radius, not exceeding 2,1 m.

Errors:

First Half: model aircraft starts at other than normal level flight, wobbles when going into climb. Model aircraft does not cross directly over flyer's head. Model aircraft does not cross circle in a straight line. Model aircraft wobbles or recovers at other than normal flight in an inverted position. Model aircraft does not cut circle in same position and direction in second part of manoeuvre.

Second Half: Scores same as first half, reversing the entry and recovery positions.

4.2.16.4. **Consecutive Inside Loops** (three required)

Correct loops are judged when the model aircraft starts from normal flight level and makes a series of three smooth round loops, all in the same place with the bottoms of the loops at normal flight level and the tops of the loops with the line(s) at 45 degrees elevation. The model aircraft then continues for another half loop, recovering inverted and descending to normal flight level, flying two laps before being judged for inverted flight.

Errors:

Loops are rough and irregular (i.e. egg-shaped, hexagonal, etc.). Bottoms of loops are not at 1,20 - 1,.80 m height. Tops of loops vary more than 0,60 m, plus or minus, of the 45 degrees elevation point. Second and third loops vary more than 0,60 m from the path of the first loop.

4.2.16.5. **Inverted Flight** (two laps)

Correct inverted flight is judged when the model aircraft makes two smooth, stable laps at normal flight level.

Errors: Height is not 1,20 m - 1,80 m. Height varies more than 0,60 m.

4.2.16.6. **Consecutive Outside Loops** (three required)

Correct loops are judged when model aircraft starts from inverted position at normal flight level and makes a series of three smooth, round loops, all in the same place, with the bottoms of the loops at normal flight level and the tops of the loops with the line(s) at 45 degrees elevation. The model aircraft then continues for another half loop, recovering at normal flight level.

Errors:

Loops are rough and irregular (i.e. egg-shaped, hexagonal, etc.). Bottoms are not at 1,20 m - 1,80 m height. Tops of loops vary more than 0,60 m, plus or minus, of the 45 degree elevation point. Second and third loops vary more than 0,60 m from the path of the first loop.

4.2.16.7. **Consecutive Inside Square Loops (two required)**

Consecutive inside square loops are judged correct when the model aircraft starts from normal flight level and flies a square course consisting of two loops, each with four inside turns of approximately 1,5 metres radius and straight segments, with bottom segments at normal flight level and top segments as inverted flight at 45 degrees elevation. The two bottom corners are equal and so are the two top corners. Manoeuvre begins and ends with the model aircraft in level flight at the point of start of the first turn.

Errors:

Model aircraft wobbles on turns. Lower height is not between 1,20 m - 1,8 m. Upper height is not within 0,60 m of the 45 degree elevation point. Turns are not precise and exceed 2,10 m radius. Second loop is not in the same flight path as the first loop.

4.2.16.8. **Consecutive Outside Square Loops** (two required)

Consecutive outside square loops are judged correct when the model aircraft starts from level flight at 45 degrees elevation and flies a square course (starting with a vertical dive) consisting of two loops, each with four outside turns of approximately 1,5 metres radius and straight segments with bottom segments at normal flight level and top segments as level flight at 45 degrees elevation. The two bottom corners are equal and so are the two top corners. Manoeuvre begins and ends with the model aircraft in level flight at the point of start of the first turn.

Errors:

Model aircraft wobbles on turns. Lower height is not within 1,20 m - 1,80 m. Upper height is not within 0,60 m of the 45 degree elevation point. Turns are not within 0,60 m of the 45 degrees elevation point. Turns are not precise and exceed 2,10 m radius. Second loop is not in the same flight path as the first loop.

4.2.16.9. **Consecutive Inside Triangular Loops** (two required)

Correct triangular loops are judged when the model aircraft starts from normal level flight and flies a triangular course, starting and ending with the base. The three sides of equal length and the three corner angles of equal size. The top corner must be placed at 45 degrees elevation. The second triangular loop must be flown in the same flight path as the first one. All corners must be smooth, precise and of approximately 1,5 metre radius.

Errors:

Model aircraft starts at a height other than between 1,20 m - 1,80 m. Turns are rough and wobbly or exceed 2,10 m radius. Peak of second turns is not within 0,60 m of the 45 degrees elevation point. Sides are wobbly and not equal in length. Second loop is not in the same flight path of the first loop.

4.2.16.10 **Horizontal Eights** (two required)

Horizontal eights are to be entered and completed at the intersection point of the circles and exit at the same point. The inside loop must be flown first. Correct eights are judged when the model aircraft makes two eights, each consisting of two round circles or loops of the same size, tangent to each other, and in a horizontal line. The model aircraft must enter the eight from normal flight level and be vertical at the intersection point of tangency of the circles. The eights must be symmetrical. At the top of each circle the model aircraft must be at the 45 degrees elevation point; the bottoms of circles must be at normal flight level.

Errors:

Model aircraft is not vertical at entry. Model aircraft at top of circles is not within 0,60 m of 45 degrees elevation point. Bottom of circles not within 1,20 m - 1,80 m height. Loops are not round and equal in size. Point of intersection varies. Second eight is not in the same position as the first.

4.2.16.11 **Square Horizontal Eights** (two required)

The eight is to be entered in the direction of the climbing sides of the loops, and after completion of two eights exit is made in the same direction. The inside loop must be flown first. Correct eights are judged when the model aircraft starts a vertical climb and makes a modified inside square loop followed by a modified outside square loop ending with a vertical climb at the same point. The loops are modified so their climbing sides are vertical, and the loops are tangent to each other along these sides, and the turns starting and ending the climbs are 90 degrees.

The top sides are slightly shorter than the remaining sides which are of equal length. The manoeuvre is repeated to form two eights. Tops of loops must be at 45 degrees elevation, bottom of loops must be at normal flight level, and all turns must be smooth, precise and of approximately 1,5 metres radius.

Errors:

Corners exceed 2,10 metres radius. Sides are not straight. Vertical sides and bottom sides are not equal in length. Loops are not equal in size. Top and bottom sides are not horizontal. Turns starting and ending the climbs are not 90 degrees. Tops of loops are not within 0,60 metres from 45 degrees elevation. Bottom of loops are not within 1,20 m - 1,80 m in height. The position of the climbing sides varies. Second eight is not in the same position as the first one.

4.2.16.12 **Vertical Eights** (two required)

Vertical eights are to be started at the point of 45 degrees elevation and finished at the same point in inverted flight. The inside loop must be flown first. Correct eights are judged when the model aircraft makes two eights, each consisting of two round circles or loops of the same size, tangent to each other, and in a vertical line. The model aircraft must be horizontal at the intersection point of tangency of the two circles. The eights must be symmetrical, the top of the heights at a point 90 degrees over flyer's head, and the bottom of the heights at normal flight level.

Errors:

Model aircraft is not horizontal at entry. Entry is not within 0,60 m of the 45 degrees elevation point. Tops of eights are not within 1,20 m from the 90 degrees point. Bottoms of eights are not at a height between 1,20 m - 1,80 m. Loops are not round and equal in size. Point of intersection varies. Second eight is not in the same position as the first.

4.2.16.13 **Hourglass Figure** (one required)

Correct hourglass figure is judged when the model aircraft starts from normal flight level and flies an hourglass course starting with an abrupt turn followed by an inverted climb, turns into a wingover path across the circle centre for a distance equal to half the total climb, turns into an inverted dive, and recovers at normal flight level. The flight paths of the climb and the dive cross at 45 degrees elevation. The four rounded corners of the figure shall have a radius of approximately 1,50 metres and the flight path forms two equilateral triangles of equal size, turned peak to peak and one in vertical line above the other.

Errors:

Manoeuvre starts at other than the normal flight level of 1,20 m - 1,80 m. Turns are rough and wobbly or exceed 2,10 m radius. Top of figure is not within 0,60 m from the 90 degrees position over the pilot's head. Triangle segments are not of equal length. The manoeuvre is not symmetrical around the vertical line through the crossing point at 45 degrees elevation. Recovery is not at normal flight level of 1,20 m - 1,80 m.

4.2.16.14 **Overhead Figure Eights** (two required)

Overhead eights are to be entered and completed at the intersection point of the circles, directly over the flyer's head, and exit from the same point. The inside loop must be flown first. Correct overhead eights are judged when the model aircraft makes two eights, each consisting of two round circles of the same size, with the intersection or point of tangency directly over the flyer's head. The model aircraft must enter the eights with a vertical climb through the centre of the circle, and must always point in this direction at the centre of the eights. The eights must be symmetrical and the model aircraft at the lowest point of each circle must be at a point of 45 degrees elevation.

Errors:

Model aircraft is not vertically overhead at entry. Low point of circles is not within 0,60 m of the 45 degrees elevation point. Loops are not round and equal in size. Point of intersection varies. Second eight is not in the same position as the first.

4.2.16.15 **Four-leaf Clover** (one required)

The manoeuvre is entered from level flight at approximately 38 degrees elevation and consists of one full inside loop, level flight, three-fourths of an outside loop, vertical climb, three fourths of an outside loop, level inverted flight, three-fourths of an inside loop, and a vertical climb. The right loops are tangent to the left loops along a vertical plane of symmetry through the centre of the clover leaf, and the bottom loops are tangent at the top loops. The loops are of equal size and they are connected by horizontal and vertical flight paths. The bottom points of the manoeuvre shall be at 1,50 metres height, and the top shall be tangent to the vertical plane through the circle centre.

When the last loop is performed, the manoeuvre is made complete by a vertical climb through the centre of the four-leaf clover and a recovery into normal flight level.

Errors:

Entry is not within 0,60 m of 38 degrees elevation point. Loops are rough or not of equal size. Parts connecting loops are not properly horizontal or vertical according to the manoeuvre sketch. Bottoms of lower loops are not at a height between 1,20 m - 1,80 m. Tops of upper loops are not within 1,20 m from the vertical plane through the circle centre. Loops are not properly tangential to form a square pattern. Model aircraft recovers before it has flown vertically through the clover pattern.

4.2.16.16 **Landing**

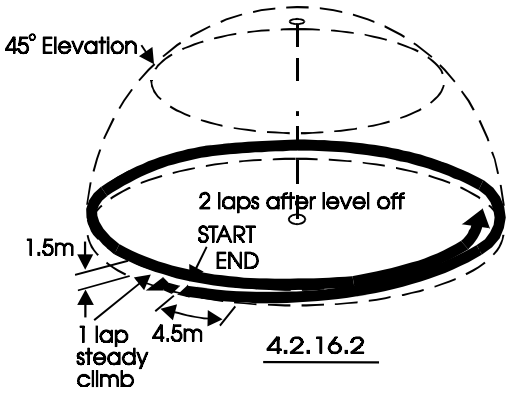
A correct landing is judged when the model aircraft descends smoothly from normal flight level to land with no bounce or unusual roughness, and without any part of the model aircraft other than the landing gear having touched the ground. The model aircraft comes to a stop within one lap from point of touch-down. The point of touch-down is one lap after the point at which the model aircraft begins its descent from level flight. Main wheel(s) or three point landings are permissible.

Errors:

An error is committed whenever the model aircraft bounces or when any part of the model aircraft other than the landing gear touches the ground. A crash, or a flip over, a belly or upside down landing receives no marks. Descent from level flight is not smooth, or is shorter or longer than one lap. Model aircraft does not come to a stop within one lap.

Any unusual circumstances, outside the pilot's control, which may have caused one of the above mentioned errors will be taken into consideration by the judges.

Note: illustrations are for anti-clockwise flight and are reversed for clockwise flying.



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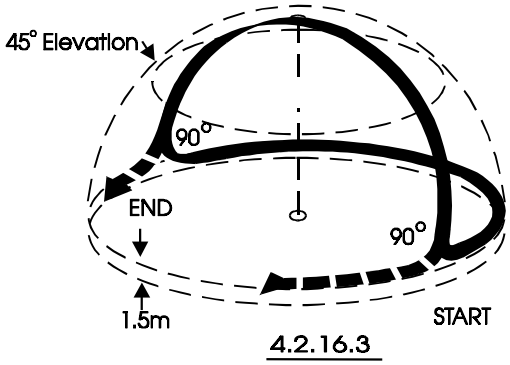

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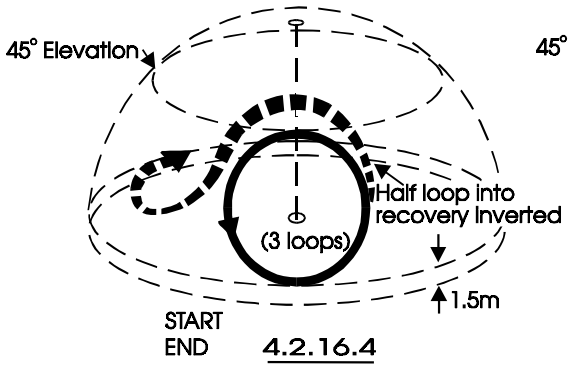

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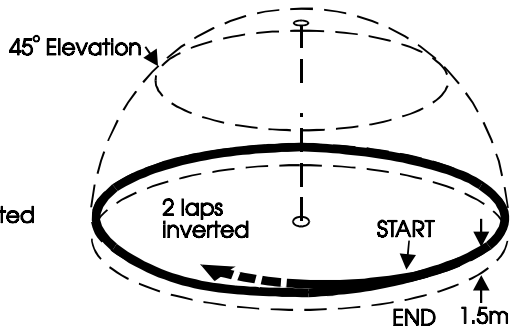

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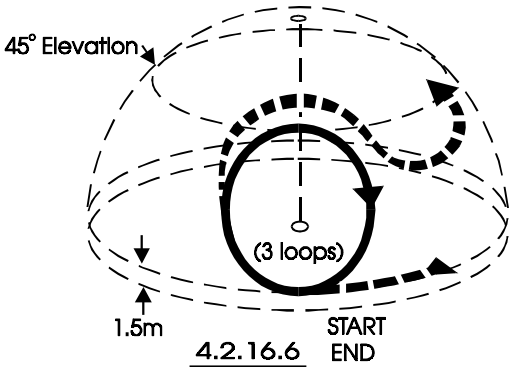

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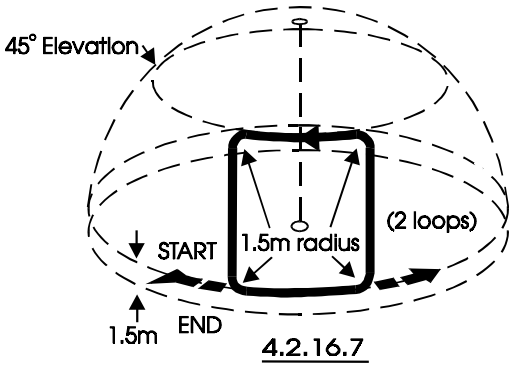

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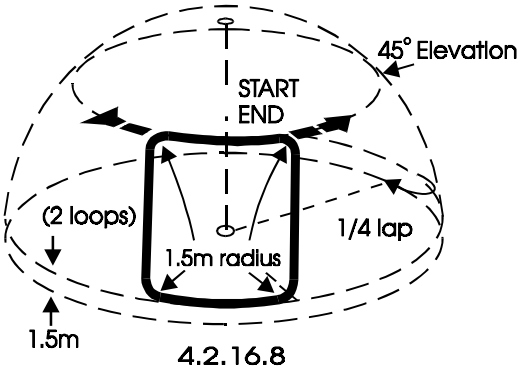

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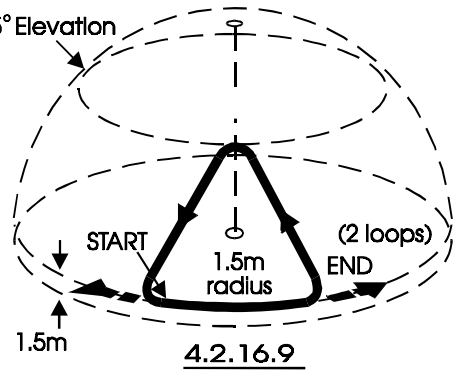

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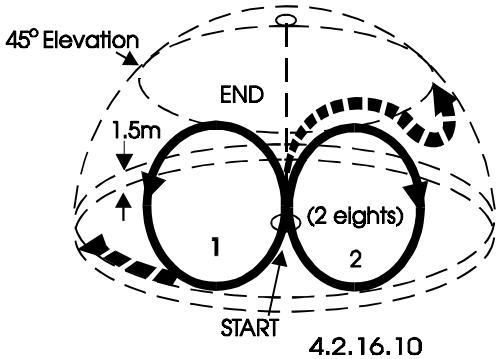

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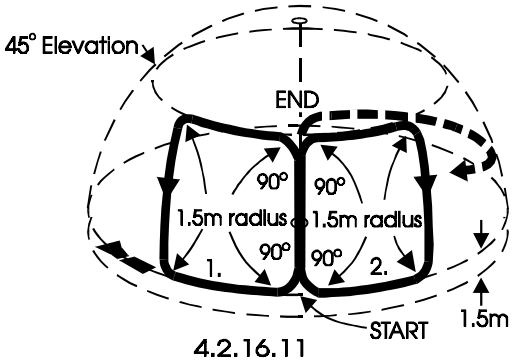

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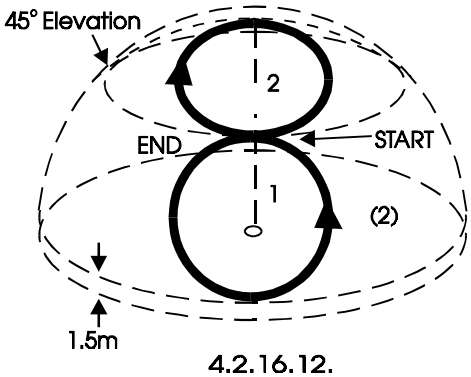

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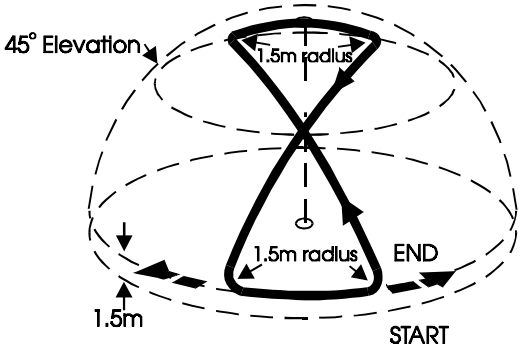

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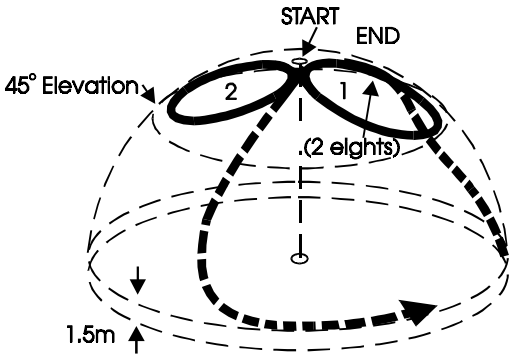

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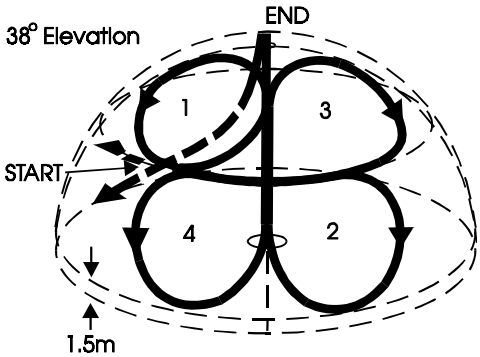


4.2.16.15

4.3. CLASS F2C - TEAM RACING MODEL AIRCRAFT

4.3.1. Definition of a Team Racing Event

a) A team racing event is a contest during which eliminating races are followed by semi-finals races and a final race, in which three model aircraft participate simultaneously in each race, flying around the same circuit, each of them being entered by one team consisting of one pilot and one mechanic. In exceptional cases, a race may be run with only two teams.

b) No member of a team may be a member of another team.

c) A race is run over a set number of laps corresponding to the distance to be covered with at least one landing for refuelling. The time taken by each model aircraft to cover that distance after the starting signal is registered. Team classification will follow the process indicated in 4.3.10.

d) The eliminating races and the semi-finals races are run over 100 laps, corresponding to 10 kilometres. The final race is run over 200 laps, corresponding to 20 km.

e) During the race the pilots remain in the centre of the circuit. Their only function is to control the model aircraft. The mechanics are placed outside the flight circle, as defined in paragraph 4.3.2. Their function is to start and adjust the motor and to refuel when the model aircraft is on the ground, and generally, to deal with the different operations that enable the model aircraft to race. The motor must be started by flicking the propeller by hand.

f) During a race, the mechanics must wear a safety helmet, with a chinstrap, strong enough to withstand the impact of a flying team racing model aircraft.

4.3.2. Team Racing Site

A team racing site must consist of two concentric circles which shall be marked on the ground:

a) Circle to be used by the mechanics: 19,6 m radius. This is called the flight circle, and is divided into six equal 60 degree sectors. At each sector a starting and refuelling area, one meter in length, shall be marked on the outside of the flight circle and be known as the "pitting area".

b) Circle to be used by the pilots: radius 3 metres. This is called the centre circle. The centre of this circle shall be marked with a white spot of 0,3 m diameter.

4.3.3. Definition of a Team Racing Model Aircraft

Model aircraft in which the propulsion energy is provided by a piston motor(s) and in which lift is obtained by aerodynamic forces acting on the supporting surfaces which must remain fixed in flight except for control surfaces. The model aircraft must be of a semi-scale type and its general lines must be similar to those of a full-size aircraft.

4.3.4. Characteristics of a Team Racing Model Aircraft

a) Maximum swept volume of motor(s) : 2,5 cm^3

The maximum exhaust outlet area is 60 mm^2 at the cylinder liner projected exhaust outlet or crankcase exhaust outlet. If a silencer is used the measurement is taken at the exhaust outlet of the silencer. The piston face at the exhaust outlet shall not be visible from the exterior of the model aircraft when side or front exhaust engines are used.

b) Minimum total projected surface area (St) : 12 dm^2

c) Total maximum weight : 700 g

d) Minimum dimensions of the fuselage at the pilot's location: height: 100 mm; width: 50 mm; cross-sectional area: 39 cm^2 - (wing fillets shall not be included in the fuselage cross-sectional area).

e) The model aircraft must carry a scale pilot head with minimum dimensions: height: 20 mm; length: 14 mm; width: 14 mm.

f) Minimum diameter of the wheel(s): 25 mm. The use of metal wheels is forbidden.

g) Maximum fuel permitted: 7 cm^3. Only one tank is allowed, to contain fuel and oil for lubrication.

h) The model aircraft must fly in the anti-clockwise direction.

i) The motor(s) must be entirely enclosed including the cylinder head and the body of the carburettor (except the opening of the induction throat). The fairing or additional extensions to the motor shall be permitted to be exposed as long as they conform with the natural shape of the fuselage and do not mar the semiscale appearance of the model aircraft. The only parts permitted to protrude from the fuselage are those to be manipulated during the operations of starting the motor, regulating the mixture, plugs, advance control, compression control, needle valves, tank fillers, etc. If a silencer is used, it may be fixed outside the fuselage.

j) Openings for the entry and exit of air, exhaust, etc. may be provided for proper functioning of the motor(s).

k) A cockpit or cabin with transparent windshield giving direct visibility forward must be provided to house the scale model aircraft pilot head which shall be clearly and fully visible.

l) The landing gear must be arranged to permit normal take-of and landing. It may be retractable during flight but must return to its extended position before landing.

m) The model aircraft must remain in a correct state according to 4.3.4 (a) - (n) throughout the full race, otherwise it will be disqualified.

n) Fuel tank, tubing and any associated filling valves or shut-off units must be accessible and capable of being measured accurately in order to check the total capacity as a unit. If the organisers do not consider the system to be accessible or accurately measurable, then the team will be disqualified.

o) The model aircraft must be equipped with an effective engine-stopping device for enabling the pilot to terminate the engine run before the fuel tank is completely empty.

p) Rule B.3.1. of Section 4B does not apply to class F2C.

4.3.5. **Controls - Technical Verification**

a) Line Length: The radius of the flight circle is 15,92 m. It is measured from the axis of the control handle to the axis of the propeller for a single motor model aircraft and to the axis of symmetry for a multimotor model aircraft.

b) Control System: Two control lines must be used. If constructed of single steel wire each, these must be of 0,30 mm minimum diameter with a minus tolerance of 0,011 mm allowed. If stranded line construction is used, these shall have a minimum of three strands and all strands shall be of equal diameter and the stranded combination shall have a minimum width of 0,34 mm with no minus tolerance allowed. In all cases the lines shall be measured using a suitable instrument with measuring surface diameters of 5 mm minimum and 8 mm maximum. Before every race a load test shall be applied to the assembled control lines and the model aircraft in flying order equal to 30 times the gravity force, to a maximum of pull 140 N. The control handle must be built so that the distance between the axis of the handle and the points of flexibility of the two cables does not exceed 40 mm.

   No intentional twisting and/or linking of the two lines together shall be permitted between the point of exit of the model aircraft and a point 300 mm from the handle. The use of flexible grouper(s) attached to the wing tip and extending a maximum of 2 cm is permitted.

c) Fuel Tanks: The fuel tank capacity is checked through the use of an accurate system by visual examination of the volume of the fuel put into the tank and pipes. Control is to be made before the contest and may be made after each race in addition to a verification after the final race.

4.3.6. **Organisation of Races**

a) Three competing teams (in exceptions only two) will fly simultaneously in each race after having been drawn for order. Qualifying races with less than 3 teams will be put at the end of the draw, in order to allow a three-team races with teams which have been granted an attempt.

b) The draw is organised in such a way that, when possible, only one team of any nation may participate in an eliminating race or semi-final race.

c) When it is not possible to organise a reflight for a team which has been granted an attempt, the F2C panel of judges will ask for volunteers (from different countries in the case of World Championships and Continental Championships) to fill the qualifying race. The F2C panel of judges will organise an appropriate draw for the race among the volunteers and the team with the attempt. If there are no volunteers, the team will be allowed to fly alone to complete their qualifying reflight during the same round.

d) The teams may be allowed to run their motors just before entering the circle under the organiser's supervision so the running does not interfere with the starting procedure of a race. Mechanics are not allowed to walk with a running engine.

e) A pitting area (4.3.2.(a)) is occupied by each of the model aircraft which are to participate in a race. The model aircraft of the team designated first during the draw occupies the place chosen by that team. The other teams choose one of the remaining free pitting areas in order of the draw. The chosen pitting areas are considered occupied until the race is finished.

   For the final race, the choice of the pitting areas shall be according to the results in the semi-finals. The team with the fastest time chooses first, the team with the second fastest time chooses next, etc. In case of a tie the teams' second fastest times in the semi-finals will decide the order of choice.

f) After entry to the circuit, it is forbidden to start a motor before the first signal has been given by the Circle Marshal, unless allowed by the Circle-Marshal.

4.3.7. **Race from Start to Finish**

a) Three timekeepers are assigned to each team. They stand outside the flight circle, near the pitting area of the model aircraft that they control. They are in charge of the timekeeping and lap counting for their particular team.

b) A first signal given by the Circle Marshal authorises the mechanics to proceed with the warming up to the motor(s), during 90 seconds. A second signal (visual and acoustic) announces the end of the warming up period and orders the mechanics to stop motors.

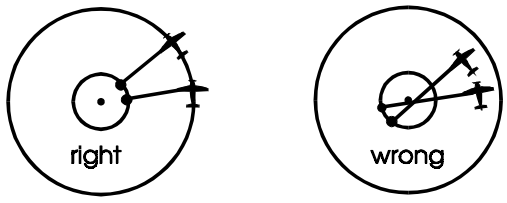
c) A period of 30 seconds is allowed for final preparations (filling up the tanks) and the Circle Marshal announces the last five seconds by reverse counting.

d) The starting signal is given by the Circle Marshal through a visual signal (flag) and a sound signal. For the last 3 seconds of the countdown and at the starting signal the mechanics must be standing erect close to their model aircraft and the pilots must be crouching on the border of the centre circle, with their control handles as close to the ground as defined by the F2C panel of judges. The starting signal must be "sharp" to enable accurate timing.

e) Model aircraft must fly at a normal height of between two and three metres, except for overtaking, taking off or landing.

f) Pilots must keep their controlling hand and the model aircraft on a plane perpendicular to a line joining their shoulders and passing through the centre line of their body, pilots must also keep their controlling hand on the vertical line between the middle of the chest and the top of the forehead, except when overtaking, taking off and landing when an exception of three laps is allowed.

g) Overtaking must be done by overflying. The model aircraft is not in any case allowed to fly over six metres height when overtaking. The pilot being overtaken must on no account carry out any manoeuvre to impede the overtaking competitor and must leave space for the overtaking pilot when the overtaking is finished.



POSITION OF PILOT

h) The model aircraft is allowed to fly a maximum of two laps without the motor running.

i) Landings take place inside the flight circle.

j) The model aircraft must touch the ground with its motor stopped before the mechanic is allowed to catch it.

k) After the mechanic has caught the model aircraft, he must go to the nearest free pitting area from the point at which the model aircraft was stopped. A pitting area is occupied if a mechanic is standing at such an area, even if his team's model aircraft is still in the air.

l) After the mechanic has caught the model aircraft, but only then, the pilot is allowed to put one foot outside the centre circle.

m) During the refuelling and the restart of the motor, and until the time when he releases the model aircraft, the mechanic must keep the model aircraft in contact with the ground by at least one point and with the centre line outside the flight circle. During that time the pilot must be crouching or sitting inside the centre circle. He keeps his handle and his lines as close to the ground as defined by the F2C panel of judges until the model aircraft starts again.

n) The race ends when the number of laps completing the required distance has been covered by all the competing model aircraft or, when the official time limit has been reached, which is fixed at 10 minutes for an eliminating race or a semi-final race and at 15 minutes for the final race.

o) When the model aircraft has finished the race or when it cannot continue after a stop, its pilot must sit down or crouch outside the centre circle as long as the other competitors are still engaged in the race, unless the Circle Marshal allows him to leave the circle earlier.

4.3.8. **Definition of an Official Flight**

An official flight is recorded for every participant in any race not granted an attempt.

Attempts are granted as follows:

a) Any team in an eliminating race or a semi-final race which has been interrupted through an obstruction or collision for which it was not responsible shall be granted an attempt.

b) In a final race which has been interrupted through an obstruction or collision before any of the participants has completed 100 laps the final shall be stopped and all competitors, except any who have at the point of stoppage of the race been disqualified, shall be granted an attempt.

c) If, before 50 laps of an eliminating race or a semi-final race have been completed by any of the teams who started the race, only one team remains in the running and flying alone, the race will be declared void and considered an attempt for the remaining team. A team which has been granted an attempt is allowed to participate in another race.

4.3.9. **Warnings - Eliminations**

At each warning the chief judge shall notify the team manager concerned so that, in turn, he may convey the reason of the warning to the mechanic. In the event of any serious breach of the rules, the F2C panel of judges may eliminate the team from the race.

A TEAM SHALL BE WARNED:

a) If a pilot interferes with or obstructs another pilot either by his conduct in the circle (for example by raising the handle above his head during take-off), or by a manoeuvre of his model aircraft preventing another model aircraft from flying or landing normally.

b) If a pilot, instead of walking around the centre, stands in the same place or walks backwards or continuously keeps the centre spot of the circle between him and the model aircraft.

c) If the pilot's flying style does not conform to 4.3.7.f).

d) If a pilot applies physical effort to increase the speed of his model aircraft during the official flight.

e) If the height level of the flight prescribed by the rules is exceeded.

f) If, during the start of the race or during the pit stops, the control handle, the lines and the model aircraft are not as
close to the ground as defined by the F2C panel of judges and/or the centre line of the model aircraft is inside the flight circle.

g) If a mechanic services the model aircraft outside the designated pitting area.

h) If the pilot does not leave space for an overtaking pilot when the overtaking is finished.

i) For any other flagrant breach of the rules.

A TEAM SHALL BE ELIMINATED FROM A RACE

j) If the pilot steps outside the centre circle before the mechanic has taken hold of the landing model aircraft, and/or the pilot does not act in accordance with rule 4.3.7.i) and m).

k) If the mechanic steps into the flight circle (with either foot), or reaches further than 0.5 m into the flight circle..

l) If the mechanic retrieves his model aircraft by any device.

m) If overtaking is done by passing under the slower model aircraft.

n) If the pilot whose model aircraft is to be overtaken carries out any manoeuvres to impede the overtaking competitor.

o) If a member of the team or the model aircraft causes a collision.

p) If jettisoning occurs or if the model aircraft is not in the condition as stated in 4.3.4.a). to l).

q) If the model aircraft flies more than two laps with the motor stopped.

r) If the model aircraft is recovered with the motor running or prior to touch down with the motor stopped.

s) If, after its model aircraft have been processed, the competing team has used parts or elements not checked during
the control; if the team has modified its model aircraft(s) by changing the characteristics or specifications imposed by the rules this may lead to the application of penalties as stated in the General Section of the Sporting Code.

t) If the mechanic does not act according to 4.3.7.k) and l).

u) If the team has accumulated three warnable offences during the race.

4.3.10. **Team Qualification and Classification**

a) Each competing team must take part in at least one eliminating race to qualify for the semi-finals. For World and Continental Championships the elimination races will be three. The other contests will be organised on two eliminating races and when it is decided by the organiser of the contest, on three.

b) The number of teams qualifying for the semi-finals will depend upon the total number of teams entered in the competition. Each qualifying team may take part in two semi-final races.

Number of teams	Number of semifinalists
2 up to and including 9	0
10 up to and including 16	6
17 up to and including 39	9
40 or greater	12

The 6, 9 or 12 teams which register the 6, 9 or 12 best times respectively during the eliminating races qualify for the semi-finals. If there are no semifinalists then all teams are allowed three eliminating races.

c) There is a tie between some teams when their best times in any single eliminating race are equal and also between their second best (and so forth in case of three flights). If there still exists a tie between some teams, new eliminating race(s) will be organised between these teams until an adequate number of teams is qualified. In that case, departure will be made by an individual draw.

d) This system for the elimination of ties will only be enforced if more the number of semifinalists (6, 9 or 12, depending on the total number of teams entered in the competition) qualify for the semi-finals.

e) The three teams having registered the three best times during the semi-finals qualify for the final race.

All semi-final races will take place between three teams. Where this cannot be achieved either by withdrawal or in re-flights, then the number will be made up by bringing forward the tenth placed team (seventh or thirteenth in case of 6 or 12 semifinalists) and so on as necessary. Those teams will not be granted an attempt but any recorded flight(s) shall be eligible to qualify for the final race.

f) In case of a tie amongst the semifinalists during the semi-finals, the regulations (b), (c) and (d) will be applied, based on the semi-final results, the number 6, 9 or 12 being reduced to three.

The competing teams which have participated in the final race will be placed at the head of the classification, only taking into account the times of flights during the final race, after checking tank capacity and the general characteristics of the model aircraft.

The teams which have participated in the semi-finals will be placed next in order of classification, only taking into account the times during the semi-finals. All teams not participating in the semi-finals will be classified according to their best time in any single eliminating race. Classification of any team that retired from any race, or exceeded the official time limit for any race but was not disqualified, shall be ranked according to the number of laps completed.

If more than one team is disqualified in the final race, they are placed in the order of the number of laps completed. A disqualified team is always placed after any team that has retired without a disqualification.

Note : The F2C panel of judges decision must be communicated to the lap counters to ascertain the number of "legal" laps.

h) A specific junior final will be flown if, at least, three junior teams have recorded a time after the eliminating races.

The result of this junior final will be taken into account only for the specific junior classification, and will not change the general placing.

4.3.11. **International Team Classification**

International team classification is established by adding the numerical position achieved by each individual team. The lowest team is ranked first, etc. with complete three-team teams ahead of two-team teams which in turn are ranked ahead of single team entries. In case of a team tie, the best individual placing decides.

4.3.12. **Judges and Timekeepers**

a) The organisers must appoint a panel of at least three judges, who shall be selected from a list of persons proposed by the National Airsports Controls for their proficiency and experience and approved by the CIAM.

The judges must have at least one language in common. At World and Continental Championships and other limited entry international competitions, the judges must be of different nationalities. In open international competitions, the judges must be at least two nationalities and two of them must be approved by CIAM.

b) Three timekeepers, equipped with electronic stopwatches registering at least 1/100th second, with a timing limit of minimum of 15 minutes will be allotted to each team.

c) The time retained is the average of the registered time, made up to the next upper 1/10th second. A maximum tolerance of 0,5 seconds is allowed between watches. Any single watch exceeding this tolerance shall not be counted in the average.

4.3.13. **Duties of the F2C panel of judges**

a) The F2C panel of judges is responsible for observing the conduct of each team during the race. Teams will be informed of any offence by visual indicators. After a maximum of three offences a team will be eliminated from a race.

b) Warning and cancellation are notified to each team by means of three coloured lights: .....
Green light - First warning (first offence).....
Amber light - Second warning (renewal of the first offence or a new one) .....
Red light - Elimination (renewal of previous offences or a new one)

c) A time penalty of 5 seconds shall be given to a team starting the engine(s) during the countdown before the starting signal.

Note: The Team Race Jury Guide is at Annex 4C.

4.4. CLASS F2D - COMBAT MODEL AIRCRAFT

4.4.1. **Definition of a Combat Event**

A combat event is a contest during which eliminating heats are followed by a final in which two competitors with their model aircraft fly in the same circle at the same moment for a predetermined time, the object being to cut a streamer attached on the longitudinal centre line of the opponent's model aircraft, points being awarded for each cut taken.

4.4.2. **Definition of a Combat Model Aircraft**

a) Model aircraft in which the propulsion energy is provided by a piston motor(s) and in which lift is obtained by aerodynamic forces acting on surfaces which remain fixed in flight, except for control surfaces.

b) The longitudinal centre line shall be defined as the axis of the propeller in case of a single engined model aircraft and the axis of symmetry in the case of multi-engine model aircraft.

4.4.3. **Combat Site**

A combat site must consist of two concentric circles which shall be marked on the ground.

a) The flight circle: radius 20 metres

b) The centre (piloting) circle: radius 2 metres.

The flight circle must be laid out on grass. The centre piloting circle may be laid out on grass or any other material having a maximum radius of 4 metres.

4.4.4. **Competitor**

The pilot, who shall be the entrant and known as the competitor, may employ a maximum of two mechanics in any one heat. (In exceptional circumstances of wet or extremely windy weather, an additional helper may be used as a streamer holder and must perform no other function for the duration of that combat period).

For World and Continental Championships, the helpers, a maximum of six other than team members or the team manager (or assistant team manager), must be registered for no more than one national team, from the beginning of the competition throughout to the end. During active combat periods, the pilot and his mechanic(s) must wear protective headgear fitted with an effective retaining strap.

4.4.5. **Characteristics of a Combat Model Aircraft**

Maximum surface area: ..... 150 dm^2

Maximum weight: ..... 5 kg

Maximum loading: ..... 100 g/dm^2

Maximum swept volume of motor(s): ..... 2,5 cm^3

Engines with glow plug ignition shall have their exhaust port(s) connected to silencer(s) (one or two), consisting of a simple chamber with one circular cross-section outlet aperture of 8mm (1) or 5,65 mm (2) diameter(s) opposing the exhaust port connection. The minimum total volume of the exhaust system shall be 12,5 cm^3. In the case of two exhausts, each silencer shall have a minimum volume of 6,0 cm^3. The maximum total length of the exhaust system from exhaust port(s) of the cylinder to and including outlet(s) is 15 cm.

The motor shall have a maximum effective venturi diameter of 4,00 mm (see 4.4.6.d for field verification). A safety wire with a minimum diameter of 0,5 mm must be attached between the bellcrank bolt (axle) and the engine(s) so as to withstand a minimum pull load of 100 N.

The model aircraft shall not carry any artificial aid intended to assist the cutting of the streamers. The model aircraft shall be equipped with a device specially designed to retain the streamer which shall be fitted on the longitudinal centre line and sufficiently strong so that the streamer shall not become detached under normal flying conditions.

Standard fuel shall be supplied by the organisers to be used for practice (minimum 0,5 ltr.) and competition (sufficient to complete rounds) to the following formula: 10% nitromethane 20% castor oil lubricant (first pressing) 70% methanol. A reasonable charge may be made for the fuel.

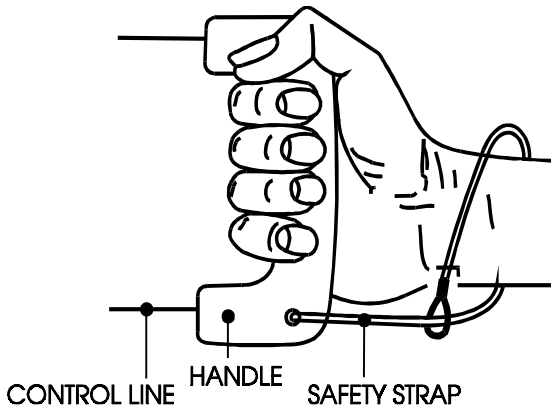
Note: Fuel for compression ignition engines is not restricted.

Rule B.3.1. Section 4B does not apply to class F2D.

4.4.6. **Controls - Technical Verification**

a) Line length: The length of the control lines must be 15,92 +/- 0,04 m. It is measured from the inboard face of the grip of control handle to the longitudinal centre line of the model aircraft.

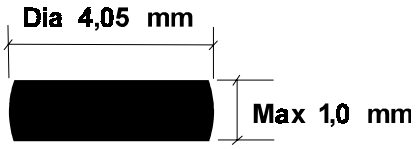
b) Control System: two multi-strand control lines of a minimum diameter of 0,385 mm (no minus tolerance) must be used. No free ends capable of entangling an opponent's lines, and no line splices, are permitted. A safety strap connecting the competitor's wrist to the control handle must be provided by the competitor and worn at all times while his model aircraft is flying.



HAND AND SAFETY STRAP FIGURE

c) Line Tests: Before each heat any sets of lines which may be used must be checked for length and diameter. A pull test shall be applied to the assembled handle(s), control lines and model aircraft for all equipment to be used in that heat. The pull test shall be equal to 150 N.

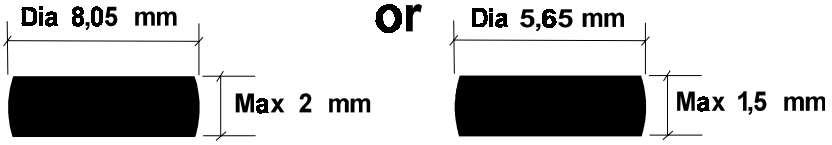
d) The motor shall be naturally aspirated via a single round intake. For field verification before a flight this intake opening shall be checked with a simple plug gauge per the following sketch:



Any interconnecting chamber between the air intake and the induction port of the motor shall have a maximum volume of 1,75 cm^3. This clearly prohibits sub-piston induction for supplementary air intake.

Any venturi insert designed to accomplish this must be positively retained so that it may not accidentally become dislodged during the heat.

e) The silencer(s) on the glow engines shall have a round exhaust the rearmost end of which will not admit a 8,05 mm (one silencer) or 5,65 mm (two silencers) diameter plug gauge(s).



Silencer measurements will also measure :

1) the volume of the silencer by filling with an appropriate liquid (oil or other);
2) inspecting the silencer's internal compartment to determine if it is truly "simple", i.e. it is an empty container with no internal components, a single exhaust opening and one allowable pressure tap directly connected to the fuel tank, of maximum diameter 2 mm. No other openings or vents are allowed.

4.4.7. **Number of Model Aircraft**

a) A competitor may have processed a maximum number of model aircraft equal to twice the number of heats a competitor may have to fly (excluding reflights). Only one model aircraft specification certificate is required for each design of model aircraft presented by each competitor.

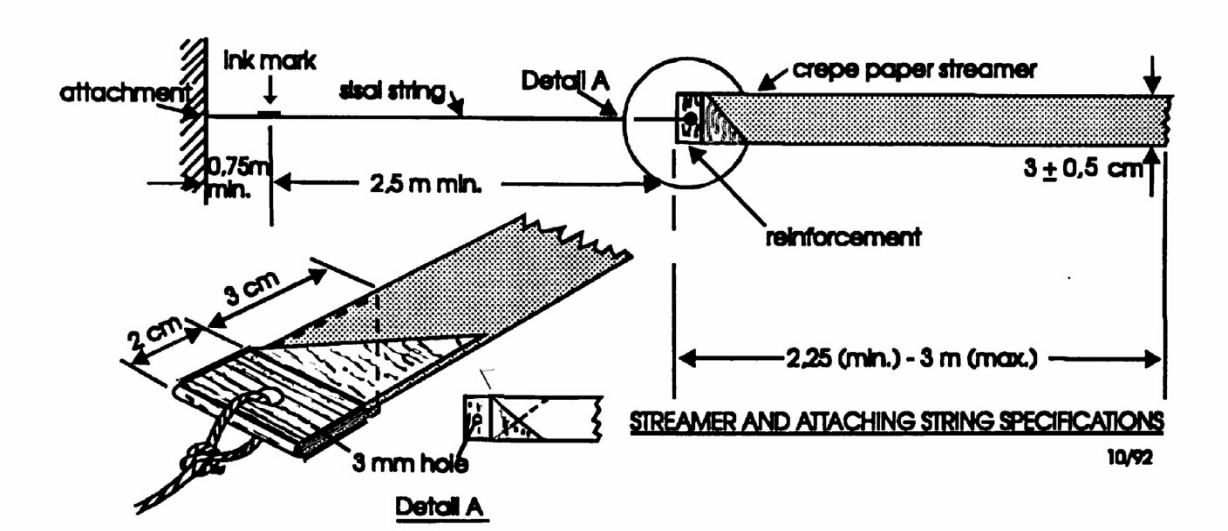
b) Each competitor shall be permitted a maximum of two model aircraft, two handles, two pairs of lines and two engines in each combat heat. If the reserve model aircraft is used, the streamer or its remaining parts must be transferred to the reserve model aircraft. Handle plus lines for the reserve model aircraft must be placed just outside the centre circle.

c) Engines, control lines and handles may not be replaced or interchanged during the combat period.

4.4.8 **Streamer**

The streamer shall consist of double weight crepe paper (80 g/m^2) or any replacement of equivalent strength, not less than 2,25 m or more than 3 m long and 3 +/ 0,5 cm wide, fixed to a sisal string of 2,5 m minimum length. All streamers must be of the same length. There shall be a clearly visible ink mark 2,5 m from the junction of the string and streamer. The streamer shall be attached to the model aircraft in such a way that the ink mark is level with, or behind, the rearmost portion of the model aircraft (see sketch). The attachment part of the string shall have a minimum length of 0,75 metre.

The attachment end of the streamer shall be reinforced on either side by tape approximately 2 cm wide affixed diagonally to the length of the streamer with one at right angles to the other and extending for a maximum of 5 cm. An additional fiber/fabric reinforced tape 2 cm wide is affixed across the streamer (see detail below).



STREAMER AND ATTACHING STRING SPECIFICATIONS

The colour of the streamer must be different for the two competitors in the heat. Each pilot/pit crew shall be issued with a streamer at the start of the heat by the judge assigned to that competitor. A second streamer will be available from this judge when needed.

4.4.9. **Method of Starting**

a) All signals shall be both acoustic and visual.

b) During the starting period the launching positions must be separated by at least a quarter of a lap. The first named competitor in the draw shall have the choice of streamer colour and the other the choice of starting position

c) The motor(s) must be started by flicking the propeller by hand.

d) A first signal, given by the Circle Marshal, shall signify the beginning of the 60 seconds period when the mechanic(s) or the pilot have the opportunity to start, run and adjust their motors.

e) A second signal, given by the Official Timer, shall signify the beginning of the combat period on or after which the model aircraft may be launched.

f) From the moment the Official Timer has given the signal to launch the combat heat lasts for four minutes.

g) When the Circle Marshal is satisfied that each model aircraft has completed two level laps, anti-clockwise, separated by approximately half a lap, he will give a signal that combat may commence.

h) Combat may begin after a restart signal from the Circle Marshal following an interruption when one or both model aircraft have been grounded. This signal shall be given as soon as the Circle Marshal is satisfied that there is approximately half a lap separation between the two model aircraft.

4.4.10. **Termination of the Contest**

a) The Circle Marshal shall give an acoustic signal to terminate the combat heat four minutes after the signal to launch, i.e. five minutes after the first signal to run and adjust motors.

b) The same acoustic signal shall be given if the heat has to be terminated due to disqualification of one or both competitors or for any other reason.

c) The Circle Marshal shall signal both pilots to fly level and anti-clockwise and to cease combat when both streamer strings have been cut. If one pilot has only the string remaining he may request the circle marshal instruct both pilots to fly level and anti-clockwise and to cease combat. This decision may not be reversed, once made.

4.4.11. **Method of Scoring**

a) Scoring shall commence from the signal to launch and continue for the four minute period.

b) 100 points shall be awarded for each distinct cut off the opponent's crepe paper streamer. There is a cut each time the model aircraft, propeller or lines fly through the opponent's streamer resulting in paper particle(s) becoming detached from the streamer.

c) A cut must contain at least one part of the paper streamer. A cut that contains string alone will not count.

d) Should the string become detached from the model aircraft while airborne the competitor shall be penalised by 100 points and must immediately on a signal from the Circle Marshal land and replace the streamer. Ground time will be counted from the moment of such a signal being given.

If after a midair collision no streamer can be found and the streamer retaining device is missing or bent, then, with the permission of the judges, it is acceptable to continue the heat without replacing the streamer.

e) One point shall be awarded for each whole second that a model aircraft is airborne during the four minute period.

f) Each whole second of stay on the ground of the model aircraft shall be penalised by 1 point. In the case of a model aircraft fly-away, with or without lines, this ground time shall commence from the moment of such fly-away (see 4.4.12.b)).

g) Each warnable offence (see 4.4.14.) shall be penalised by the deduction of 40 points from the competitor's score.

h) Should the mechanic(s) damage the streamer, or the model aircraft cut its own streamer, whilst the model aircraft is on the ground the mechanic(s) must replace it with a new streamer. If they launch the model aircraft without so replacing it, the competitor shall be penalised by 100 points. Ground time will be counted while the model aircraft is airborne with the damaged streamer.

4.4.12. **Attempts**

Only one attempt will normally be allowed to complete a combat heat except for when:

a) A streamer breaks or fails to unfurl from the rolled state.

b) In the event of a model aircraft fly-away, as a result of the lines having been severed by his opponent's model aircraft, lines or engine, in which the model aircraft and streamer may not be retrievable due to the distance flown, the circle marshal asks the affected pilot whether he wants a new attempt or not. The affected pilot must respond immediately, without consulting others about the status of the heat. If the pilot wants to continue the flight he must use a new full-length streamer.

The pilots should be informed before the beginning of the competition where the fly-away area is defined. This area should be clearly defined by the organisers.

c) In the event of a line tangle resulting in the control line(s) breaking and only one model aircraft being grounded, making it impossible to clear the line tangle.

d) If, as a result of a line tangle, an opponent’s model aircraft cuts its own streamer in flight or the streamer, unless only string remains, becomes wrapped around the model aircraft and/or the lines, the heat shall be reflown.

4.4.13. **Conduct**

a) A pilot must remain inside the centre circle while his model aircraft is flying except at the moment of release of his model aircraft by the pitman.

b) During the combat period each competitor (and his pit crew) shall be watched by at least one member of the F2D panel of judges specifically assigned to him, in addition to the Circle Marshal, to ensure that they behave in a fair manner according to the rules.

c) After a midair collision the heat shall continue as if both model aircraft had landed, subject to articles 4.4.15.c), e), k), l), and m).

4.4.14. **Offences**

The following are warnable offences and shall attract the appropriate penalties (4.4.11.g):

a) if a pilot unintentionally leaves the centre circle while his model aircraft is airborne;

b) if the mechanics enter the flying circle at an oblique angle or cut across the flying circle to reach a downed model aircraft. One penalty only will be incurred for each offence even if more than one mechanic is involved;

c) if the mechanic(s)/pilot do not immediately, or after a line disentanglement, withdraw a grounded model aircraft to outside the 20 metre circle prior to servicing it;

d) if the model aircraft is launched prior to the starting signal;

e) if the mechanic(s)/pilot allows both engines to be running at the same time during the 4 minute flight period; brief bursts, not longer than 10 seconds to warm the engine with a prime or to clear a flood is permitted. Running the engine from the tank is not permitted.

f) 1) If the silencer falls off during the flight or ceases to operate, the pilot must land immediately and replace the silencer, 100 points penalty.

2) If, as a result of a mid-air collision, the silencer is detached and the model aircraft remains airborne, the heat may continue but the silencer must be replaced on landing before the model aircraft can be used again.

4.4.15. **Cancellation of the Flight**

An entrant will be eliminated from the heat and his opponent declared the winner, subject to 4.4.12.c), if:

a) he deliberately attacks the streamer of his opponent's model aircraft prior to the Circle Marshal's signal to commence;

b) his model aircraft fails to become airborne within two minutes of the signal to launch;

c) he attempts to fly a model aircraft which at the time of launch does not have a strong effective control mechanism, or does not have a secure engine attachment or does not have a running engine;

d) he interferes with his opponent, or forces his opponent to leave the centre circle;

e) he leaves the lines or any of his model aircraft, which at that moment are not airborne, in the centre circle;

f) he attacks his opponents streamer without his own, or the remaining parts, attached to his model aircraft;

g) he is not present at his allotted flight time, unless he has the express permission of the Circle Marshal;

h) he leaves the centre circle, intentionally while his model aircraft is flying, or without informing his opponent of his intention to do so when his model aircraft is grounded for a purpose other than to pick up the lines of the reserve model aircraft or to allow his model aircraft to be serviced;

i) he or any of his mechanics does not wear a protective helmet;

j) he flies in such a manner as to inhibit his opponent, or his opponent's pit crew, from clearing any line entanglement;

k) he flies other than level in an anticlockwise direction when only his model aircraft is airborne and there is no line entanglement;

l) he fails to clear any line tangle prior to launching his reserve model aircraft unless both he and his opponent have informed the Circle Marshal that they have agreed to continue the heat without clearing the line tangle. In this event the Circle Marshal must agree to the continuation, only doing so when he is satisfied that it is safe to continue;

m) for any other flagrant breach of the rules;

n) he releases the handle, or removes the safety strap, for any reason, while the model aircraft is flying;

o) his model aircraft(s) do(es) not conform to para. 4.4.5.;

p) he interferes to cause a ground hit of, or collides with his opponent's model aircraft that clearly has no streamer left and flies level in anticlockwise direction without any manoeuvres to chase and attack;

q) if the streamer becomes detached from the streamer retaining device during combat, but not as a result of the mid air collision;

r) if the model aircraft lands with no streamer string and the streamer retaining device is missing or bent, but not as a result of a midair collision;

s) if the mechanics jump over the opponent's model aircraft(s) and lines kept within the pitting area;

t) if the pilot fails to land (subject to 4.4.14f);

u) the pilot's aircraft takes off without a complete and operating silencer;

v) if a mechanic carries a model aircraft and lines over an opponent’s pit crew he will be disqualified;

w) if one or both opponents are guilty of either

a) causing line tangles; or

b) a “sawing” action on the line(s)

he or they may be disqualified at the discretion of the Circle Marshal.

4.4.16 **Classification**

a) The contest shall be run as a knockout tournament.

b) The competitor who obtains the highest score in points shall be the winner of each heat.

c) A competitor shall be eliminated from the competition when he has lost two heats.

d) Each round shall be randomly drawn (subject to 4.4.16.j)) from the competitors remaining in the competition.

e) In the event of an unmatched competitor remaining in any round, that competitor shall be matched with the first competitor drawn (subject to 4.4.16.j)) in the next round and if he is not first eliminated in each successive

round, unless such time as there is again an unmatched competitor remaining in a round. At that time these two competitors shall be matched (subject to 4.4.16.j)) to complete that round.

f) Individual and team standings will be based on the number of heats won. Losses will not be subtracted.

g) In the event of a tie for second or third place (both cannot happen) fly them off using the above procedures except allowing only one loss during the fly-off.

h) In the event of a two way tie for third remaining after a fly-off for second, match them with the winner to take third.

i) In the event of a tie score in any heat, that heat shall be reflown. A heat is considered a tie if the score difference is 5 points or less.

j) Previous opponents and competitors of the same nationality shall be drawn apart if possible with competitors of the same nationality to fly against each other only if there are no remaining opponents

Defending champions, not members of their national team, are considered as individuals not possessing any specific nationality.

k) A specific junior final tournament will be organised if juniors are at the same placing (tie) in the general tournament, in order to define who is first, second and third for the specific individual placing and will have no influence on the general individual placing (no change in the team classification).

4.4.17. **International Team Classification**

a) Each competitor shall be ranked according to his number of wins, not counting fly-off heats, with the fly-off heats being used to establish second and third place as necessary.

b) The competitors "win" scores, not counting flyoffs, shall be added for the participants of each nation.

c) Nations shall be classified with the highest scores obtained in 4.4.17.b) above considered highest in position. Complete three-competitor teams are ranked ahead of two-competitor teams which, in turn, are ranked ahead of single entries.

4.4.18. **Judges and Timekeepers**

The organisers shall appoint a panel of three judges who shall be selected from a list of persons proposed by National Airsport Controls for their proficiency and experience and approved by the CIAM. The judges must have at least one language in common. At World and Continental Championships and other limited entry international competitions the judges must be of different nationalities. In open international competitions the judges must be of at least two nationalities and only two of them must be approved by CIAM. Three timekeepers/scorers, efficiently briefed about their task and trained on the field during the practice flights, shall be allotted to each competitor for World and Continental Championships, two for open internationals. They are only responsible for the competitor's score. If required, they can ask the advice of the judge/circle marshal.

- ANNEX 4A -

CLASS F2A - JUDGES' GUIDE

F2A is, essentially, a simple class to administer with very few rules. However, it is important that there is continuity of interpretation from one Championship to another and it is for this reason that this Judges' Guide has been written.

Rule 4.1.1. Definition of Speed Model Aircraft

Requires no clarification.

Rule 4.1.2. Characteristics of Speed Model Aircraft

- When measuring the surface area, allowance should be made for the geometrically projected shape where the wing and tail join the fuselage.
- Model aircraft must be checked for the fitment of a shutoff.
- The shutoff must be checked for mechanical function in the line check prior to each attempt.
- To check shutoff function:

1. Using a squash bottle, fuel must be shown to flow from the fuel tank to the engine.
2. The shutoff must then be activated and resistance to fuel flow from the fuel tank to the engine using a squash bottle must be felt.

- The fuel bottle should be of approximately 100 cc capacity and must be fitted with a fuel filter.

Rule 4.1.3. Fuel

- It should be noted that the lubricant specified is castor oil only.
- No additives are allowed so only first pressing castor oil may be used.
- Proprietary brands such as Castrol M™ which may contain additives may not be used.
- This is essential to maintain standardisation of fuel supply throughout the world.
- The fuel mix ratio should be measured by volume and mixed thoroughly.
- The fuel mix should be tested for methanol/oil ratio by testing its specific gravity using a standard calibrated float.
- The fuel mix must be verified by the FAI Jury.

Rule 4.1.4. Diameter of Control Lines

- This rule should cause no problem but plated wire is <u>not</u> permitted under rule 4.1.7. which states that "No coating material may be applied to the lines".
- A micrometer capable of measuring to one micron must be supplied and used by the contest organisers to measure the control line wires.

Rule 4.1.5. Length of Course

- The measured distance covered by the model aircraft must be at least one kilometre.
- The radius of the flight circle must be 17.69 m (9 laps = 1 km).

Rule 4.1.6. Line Test

- The pull test must be applied to the handle grip NOT the horizontal cross bar.
- The pull test on the wrist strap is to test the strength of the strap and its attachment to the handle. It is not to test the strength of the control system.

Rule 4.1.7 Control Handle and Pylon Fork

This rule states that "the horizontal cross bar must be in continuous contact with the pylon fork during the official flight".

- This statement does not mean that the cross bar must be behind the fork and above the "V" piece as illustrated in the sketch.
- The important factor is that the cross bar stays in contact with the fork throughout the flight.
- The cross bar may be above or below the "V" or one end of the cross bar may be in front of the fork.
- Any position other than that illustrated in the sketch makes it more difficult for the pilot and he will therefore always strive to achieve that position.
- The "V" is there only to assist the pilot achieve the preferred position. There is no speed advantage to be obtained from any other position. The pilot cannot see the pylon and it could be disastrous for him to look to check the position.
- The drawing accompanying this rule shows the dimension between the cross bar bobbins to be a minimum of 60 mm.
- The maximum is 79 mm because it must be possible to fit the cross bar between the forks of the pylon.

Rule 4.1.8. Definition of an Attempt

- The competitor has 3 (three) minutes from the starting signal to take off and place his handle in the pylon.
- The timing sequence will then take place. Thus the timing of the official flight may start and finish more than the 3 (three) minutes after the time of the starting signal.

Rule 4.1.9. Number of Attempts

Competitors may not take their second attempt without first returning to the line check area in order to comply with rules 4.1.3. and 4.1.6.

Draw for Flying Order

- It is recommended that the draw should be arranged so that competitors fly at five minute intervals.
- The draw should be arranged so that competitors from one nation are not required to fly within fifteen minutes of each other.
- After the draw has taken place, it should be split into three equal groups, A, B and C.
- For round one, group A flies first, followed by group B and then group C.
- For round two, group B flies first, followed by group C and then group A.
- For round three, group C flies first, followed by group A and then group B.
- There should be a ten minute break at the end of each hour of flying.
- Re-flights should take place at the end of each round.

Rule 4.1.10. Definition of an Official Flight

An audible signal should be made to the pilot at the end of the timed flight by one of the timekeepers.

Rule 4.1.11. Number of Flights

Requires no clarification.

Rule 4.1.12. Number of Helpers

- Care must be taken to ensure that this rule is complied with.
- Only team members and team managers are permitted to start and adjust motors.
- In the case of a complete team, the two helpers will be the other team members.
- In the case of an incomplete team, only supporters or competitors from other control line disciplines may be registered to act as helpers but they must not start or adjust motors.
- They can help only one team.
- Competitors may not act as helpers for competitors from other nations

- It is almost impossible to enforce the second sentence of this rule which states that " a pilot may adjust his own motor and at most one other as a helper".

Rule 4.1.13. Start of Timing

- The chief timekeeper should determine when the pilot has placed his handle in the pylon - NOT the judge who is observing the conduct of the pilot.
- The chief timekeeper must call when the pilot has placed his handle in the pylon.
- He will call "two" when, after the pilot has placed his handle in the pylon, the model aircraft first passes the height marker. He will then call "one" as the model aircraft again passes the height marker.
- The timekeepers start timing the next time the model aircraft passes the height marker.
- The timekeepers should preferably be positioned one behind the other, not side by side.
- The judge who is observing the pilot must call if the pilot removes the handle from the pylon.
- The timekeepers and circle judges must use the official practice session to train in their individual and collective duties.

Rule 4.1.14 Height of Flight

- Two judges must be used for this task; one for each of the height markers.
- They must be positioned at eye level to the respective height marks.
- The height restriction applies only during the timed run.

Rule 4.1.15 Cancellation of Flight

Requires no clarification.

Rule 4.1.16. Number of Timekeepers and Judges

Requires no clarification.

Rule 4.1.17. Classification

Requires no clarification.

Training/Practice

- The official training/practice session should continue on the draw basis as currently used where each competitor is allocated a ten minute slot.
- The circle should not be available for practice during the round (allowing practice at, say, lunchtime can give unfair advantage to competitors drawn to fly after lunch).
- Practice on free days and after the rounds should not be on a draw basis.
- Speed competitors have learned to self regulate circle use by each taking one flight in rotation. This system allows many more practice flights per hour than any draw based practice session. All competitors then have a chance to make a test flight, go away and make adjustments, think about what is required and return for another test.

-ANNEX 4B -

CLASS F2B - JUDGES' GUIDE

4B.1 Purpose

This Judges Instructions document is an aid to judging and marking FAI Class F2B Aerobatics competitions. It should be used both for the training of potential judges, and for maintaining the proficiency of judges who are already practising. This document forms part of Section 4 of the FAI Sporting Code applicable to Class F2B Aerobatics.

4B.2 Judges' qualifications and the selection of Judges' Panels for international competitions

The National Aero Club/Airsports Council (NAC) of each country having F2B judges who join (or who wish to join) Judges' Panels at international F2B competitions should ensure that a defined standard of judging proficiency is reached and maintained by each of the judges for which it has responsibility. Each such NAC should therefore:

4B.2.1 provide translations into their own language of both the current FAI F2B Sporting Code and of this complete Judging Instructions document;

4B.2.2 arrange suitable means and procedures to guarantee that each judge is fully trained, and that such standard is maintained. This should include arranging regular and repeated group training in both theoretical (classroom) and practical (flight) venues where every aspect of both the current Sporting Code and of this document may be examined and practised in detail;

4B.2.3 provide suitable means for officially recording each such training session attended by every judge within its national responsibility. Such official record should include dates, duration, and number of flights observed at such training sessions, and should also separately list details of all the international F2B competitions at which each judge has been a member of the Judges Panel;

4B.2.4 establish selection criteria which clearly defines the minimum periods of undergoing such training, and of actually judging high quality F2B flights at national level, before judges are eligible to be nominated or invited to join Judges' Panels at international F2B competitions.

Provision of all the above will ensure that the judging of all international F2B contests is carried out to the same basic standard, and will also enable the organisers of international competitions to ascertain that all judges invited or nominated to a Judges Panel do indeed meet the required standards of qualifications and experience. The organisers of all World and Continental Championships should therefore submit a list of proposed judges' names, together with their NAC qualification details (4B.2.3), to their own NAC and to the Control Line Subcommittee of the FAI not later than the month of January in the year that the competition will be held.

To ensure a continuous pool of suitably qualified international F2B judges, it is recommended that, with suitable modifications, each NAC apply the criteria and procedures at 4B.2.1 through 4B.2.4 above to the selection and training of F2B judges for competitions at national level.

4B.3 Sporting Code and Manoeuvre Rules Knowledge

The primary requirements for fair, accurate, and consistent judging are:

4B.3.1 a clear understanding of all of the applicable regulations and definitions within the complete FAI Sporting Code;

4B.3.2 an in-depth and fully detailed knowledge of all of the current F2B manoeuvre Rules;

4B.3.3 a fully detailed knowledge of this complete Judging Instructions document.

Self-study of all of the above points is a must, as is regular detailed group training at both classroom and flight venues in the practical application of all of the above points to the judging of high quality F2B competition flights.

It is stressed that individual "interpretation" of the intent and/or meaning of the FAI Sporting Code is strongly discouraged – the purpose of these Judging Instructions is to eliminate any need for such "interpretation" by individuals.

4B.4 Terminology

4B.4.1 In all of the following manoeuvre marking instructions, the descriptions have been written from the viewing point of the pilot and **not** of the judges; and all the following descriptions use "two dimensional" terms on the basis that whilst it is known that model aircraft actually fly hemispherical arcs, the real judging task is to mark manoeuvres such as Square Loops (for example) on the basis of what can be most easily and clearly described in writing as "straight line" flight paths. Rather than using terms which are geometrically accurate but which may create confusion, all the manoeuvre descriptions in this document therefore use terms which express the meaning of the Sporting Code and explain the judges' marking tasks as clearly and as simply as possible.

4B.4.2 The following "everyday English" terms appear but are used throughout this document in a specific way:

Term:	Definition:
- manoeuvre -	- means the full total of figures and segments necessary to complete the marked "flying exercise" listed in the Sporting Code under a single Rule number - examples: the Take-off *(Rule 4.2.16. 2)*; the Three Consecutive Inside Loops *(Rule 4.2.16.4);* and the One Four Leaf Clover *(Rule 4.2.16.15).* These are **all** referred to in this document as a single manoeuvre. Note that each manoeuvre listed in the Sporting Code has a Rule number. In this document the relevant Rule number is shown in italic (cursive) script in the heading at the start of each of the manoeuvre description paragraphs.
- figure -	- means a shape which makes up a separate, recognisable whole portion of a complete manoeuvre. For example, the first loop of the Three Consecutive Inside Loops *(Rule 4.2.16.4)* **is** referred to as a figure in this document; but the first loop which makes the first half of the first complete figure eight in the Two Overhead Figure Eights *(Rule 4.2.16.14)* **is not** referred to as a figure in this document.
- segment -	- means a specifically defined part of a figure (or a manoeuvre) during which the judge is required to observe certain particular detail points. For example, the Two Consecutive Inside Square Loops manoeuvre *(Rule 4.2.16.7.)* This document has divided that manoeuvre into two separate figures (the first and second loops), and the first loop has also been sub-divided into four separate segments for judges to observe specific detail points.
- upright -	- means that the model aircraft is flying in its "normal" attitude (that is: with it's main landing gear wheels nearest to the ground);
- inverted -	- means that the model aircraft is in an attitude reversed from upright flight (colloquially: the model aircraft is "flying on it's back", or is "flying upside-down");
- "vertical" -	- means at right angles (perpendicular) to the ground over which the flying takes place. This word is marked with inverted commas (quotation marks) throughout this document as a constant reminder to judges that the requirement of the Sporting Code is for model aircraft to fly at right angles to the ground, even if that ground is not level and/or has a perceptible slope.
- "horizontal" -	- means parallel to the ground over which the flying takes place. This word is marked with inverted commas throughout this document as a constant reminder to judges that the requirement of the Sporting Code is for model aircraft to fly parallel to the ground, even if that ground is not level and/or has a perceptible slope.
- "straight line" -	- means the closest distance between two points when shown in two dimensions. These words are marked with inverted commas throughout this document as a constant reminder to judges that the judging requirement in all the Square and Triangular manoeuvres (for example) is to observe a number of turns ("corners") which should be joined by flight paths which appear to be straight lines when the judges are positioned correctly and when the competitor positions the model aircraft as required in the relevant manoeuvre Rules.

- momentarily } - or momentary } -	- used throughout this document in their original dictionary definition sense - that is: something which lasts only for a very brief period of time. So (for example) the very short period during which the model aircraft is required to be in a vertically-banked "knife-edge" attitude above the competitor's head during the Two Overhead Figure Eights manoeuvre *(Rule 4.2.16.4)* is described in this text as “momentarily”.
- lateral reference -	- means an imaginary line drawn upwards from the ground at right angles. The judges should use this as the reference point when observing the size, positioning, symmetry, and superimposing of figures and manoeuvres being judged. As required by individual manoeuvre Rules, the text may refer to a lateral reference, to a lateral reference line, or to a lateral reference point. In this last case the text will also define the specific point (height) on the imaginary line at which the lateral reference point is to be located.
- wingover path -	- means the vertically-banked ("knife edge") flight path segment defined as part of the One Reverse Wingover manoeuvre (*Rule 4.2.16.3,* see 4B.25.4).

When words appears in inverted commas with italics (cursive) script in the following text, this means that they have been taken directly from the relevant manoeuvre Rule.

4B.5 Judging focus

In order to get a complete picture of each manoeuvre, judges should focus their attention on four major aspects:

4B.5.1 Shape: - This is the form or outline of the entire manoeuvre, but shape also relates to the position of each of the figures making up a complete manoeuvre. In manoeuvres consisting of repeated multiple figures (for example: the Four-leaf Clover), an important criteria is that the shape of each individual figure is consistently the same for each repetition. All manoeuvres should be of the shape defined in the various manoeuvre Rules - that is: round loops should be round with no flat spots; square manoeuvres should have clearly defined corners connected by “straight line” flight paths; consecutive manoeuvres should be performed with the second and subsequent manoeuvres all positioned in exactly the same place as the first (superimposed).

4B.5.2 Size: - Manoeuvre sizes are defined in the Rules by specifying line elevation angle (specified in degrees of arc above the normal 1.5 metres upright level flight height). Judges should watch for manoeuvres being flown with their tops above or below the specified 45 degrees, 38 degrees, and 90 degrees line elevation angles - and as a result of such errors, judges should therefore also watch for complete figures which are either larger or smaller than the line elevation angle specified in the relevant Rule. All such errors should be downgraded in the marks awarded by judges. The use of visible fixed terrain reference points at each site to help judges ”fix into memory” both the 1.5 metres normal upright and inverted level flight height, and 45 degrees lateral angle ($^{1}/_{8}^{th}$ lap) is recommended. Contest organisers are also encouraged to erect suitable markers at contest sites to assist judges, particularly at sites where suitable natural fixed features are limited. Judges should practice using the available terrain features, plus any erected markers, at each competition site during the calibration flight sessions held before the start of each particular competition (see also 4B.16).

4B.5.3 Intersections: - The judging (and therefore the marking) of the intersections between the various elements of complex manoeuvres is also made easier if judges use fixed terrain reference marks to "fix into memory" the visual position of the model aircraft when it passes an intersection point for the first time in a manoeuvre, and then compare that “locked-in” point with the position of the model aircraft when it comes to the same intersection point at later stages of the same manoeuvre. As in 4B.5.2 above, the erection of suitable markers is encouraged to assist this practice, particularly at sites which lack suitable fixed terrain reference points (see also 4B.16).

4B.5.4 Bottoms: - Normal upright level flight and inverted level flight is specified in the manoeuvre Rules as being required to be flown at a height 1.5 metres, often with an allowed tolerance of plus/minus 30 cm. These occasions are all clearly described in the following descriptions and judges should mark accordingly, as per 4B.7, 4B.10.2, and 4B.10.3.

4B.6 General comments regarding the marking of manoeuvres

Although model aircraft fly on the surface of a hemisphere, from the pilot's perspective all manoeuvres are flown in plane geometry – because all points on the surface of a hemisphere are at an equal distance from the pilot, the pilot sees all manoeuvres as if they were drawn on a flat sheet of paper. But from their position outside the circle, judges are, firstly, not in the ideal position to view manoeuvres, and secondly, they also usually view manoeuvres from a point which is not directly opposite the centre line axis of each manoeuvre. Therefore the judges' marking tasks include a large element of personal analysis and situational awareness that should take their own (less than ideal) viewing position into consideration when awarding marks. There are however a number of precise definitions within the manoeuvre Rules which judges must assess accurately if they are to award fair and consistent marks. These are:

4B.6.1 Recognition of level flight altitude of 1.5 metres, plus/minus 30 cm.

4B.6.2 Recognition of 45 degrees line elevation height, plus/minus 30 cm.

4B.6.3 Recognition of 38 degrees line elevation height, plus/minus 30 cm.

4B.6.4 Recognition of a position directly overhead the centre of the flight circle, plus/minus 60 cm.

4B.6.5 Recognition of "vertical" climbing and diving flight paths.

4B.6.6 Recognition of a "horizontal" flight path.

4B.6.7 Recognition of *"maximum 2.1 metres radius"* as an abrupt change of direction with the resulting requirement for the model aircraft to fly a very tight corner (see also 4B.8).

4B.6.8 Recognition of the correct "Start" and "Stop" points specified in the Rule for each manoeuvre (as highlighted within the description of each manoeuvre in this document by means of "Start judging at ..... "; and "Stop judging at ..... " sections).

4B.6.9 Recognition of the fact that all the above "dimensions" are specified as measured from the pilot's viewing point, with due allowance to be made by judges for model aircraft flown on different line lengths and for the difference between the pilot's position and the judges' actual viewing position/s.

4B.7 Judging objective errors.

Provided that throughout all the judged laps the model aircraft remains inside the tolerance defined in the Rules and provided that it tracks smoothly without any visible height changes (that is, no "hunting") throughout, no downgraded mark should be awarded. A flight track which slightly exceeds the stated tolerance (such as flying 40 cm off the flight track where plus/minus 30 cm is required) should be considered as a "minor" error which would cause the judge to award a mark downgraded by 0.5 points. Flying off the defined flight track by as much as twice the defined tolerance should be considered as a "medium" error, resulting in the award of a mark downgraded by 1 point. Errors of three times the defined tolerance from the defined flight track should be considered as "major", resulting in the award of marks downgraded by 1.5 points. In order to use this method successfully, judges must be trained to recognise flight path deviations of 30 cm and 60 cm at a viewing distance of approximately 45 metres, and this will require relevant and repeated demonstrations to train judges to be able to readily gauge such measurements. Such training is highly recommended for all judges, and such training should also emphasise the varying tolerances defined in the Rule for each manoeuvre and for each segment of each figure of each manoeuvre. See also 4B.10.2 and 4B.10.3.

4B.8 Judging subjective errors.

4B.8.1 "wobbles" etc: - A phrase such as "*the model aircraft wobbles during a turn"* is subjective, and the degree to which the model aircraft wobbles cannot be measured. Similarly, Rules statements such as *" ... the model aircraft makes two smooth, stable laps ..."*, are difficult to apply when faced with the task of translating a certain lack of smoothness into an actual mark to be awarded to a competitor. As a basic guide, judges should consider terms such as stability and smoothness to be conditions defined by the absence of "wobbles", "jerks", and/or "hunting". Therefore "wobbles", "jerks", and/or "hunting" are errors, and each judge should decide on the extent of each such error seen and should award a downgraded mark according to the severity of each of these errors that he/she has observed. See also 4B.10.2 and 4B.10.3.

4B.8.2 Turn radii: - Similarly, judges should recognise that the intent of the Sporting Code regarding corner radii in manoeuvres such as Square Loops, Square Eights, Triangles, etc, is that model aircraft should turn as sharply (tightly) as possible. Therefore, although it is not possible for judges to accurately measure whether or not a model aircraft has or has not made a turn of between 1.5 and 2.1 metres radius, the intent of the Sporting Code is clearly

that model aircraft should turn as tightly as possible when making such turns. Therefore judges should award the highest marks to model aircraft turning the tightest (sharpest) corners (provided that the required line elevation angles and/or the model aircraft's pitch angles have also been achieved), and they should award the lowest marks to model aircraft making the largest (softest) such turns

4B.9 Error interpretation

Each manoeuvre Rule states which errors shall be considered as errors but nothing is written about the relative importance of those errors. The judges' task is therefore twofold in this respect - first, he/she has to count the total number of errors committed – second, he/she must **also** decide on the extent to which each of those errors has deviated from the standard specified in each manoeuvre Rule. As a general principle it therefore follows that a manoeuvre which is flown with a large number of major errors should result in judges awarding a lower mark than for a manoeuvre which is flown with just a few, only minor errors. However, judges should also note that if a manoeuvre is flown with a very large number of errors, although each of those errors may be individually judged as being only a minor deviation from the manoeuvre Rule, it could be quite correct to award a lower score for that manoeuvre than for another manoeuvre which is flown with only a few errors, but where each of those errors is individually judged as being a major deviation from the manoeuvre Rule. This is precisely one of the skills that judges are expected to develop and apply! See also 4B.10 2 and 4B.10.3.

4B.10 Awarding marks

4B.10.1 Segmented and multiple manoeuvres: - Many manoeuvres have been described in this document as consisting of several figures, and in many of those manoeuvres those figures have in turn been broken down into separate segments for judging purposes. But all these segments and figures should be combined to result in the award of only a single mark for the complete manoeuvre. In addition, many manoeuvres detailed in the manoeuvre Rules consist of multiple (repeated) figures. Once again judges should award only a single mark for each such manoeuvre (for example: the Three Consecutive Inside Loops; the Two Horizontal Square Eights; etc).

4B.10.2 Principles of marking: - Judges should **only** score (mark) manoeuvres between the points " Start judging at: .... " and " Stop judging at: .... ", as set out in each of the manoeuvre descriptions in this document. When the model aircraft reaches the "Start judging at …. " point for each manoeuvre, each judge should assume that the manoeuvre will be flown within all the "dimensions" and other requirements defined in the relevant manoeuvre Rule. (This would of course mean that the judge should award the full maximum available 10 points if he/she has seen no errors by the time the manoeuvre is completed). But as the model aircraft proceeds through the manoeuvre, each judge will (usually) observe some deviations from the manoeuvre Rule requirements, so he/she should then mentally deduct point/s (or half point/s) from the potential maximum of 10 points whenever a deviation is seen. The number of points or half points to be deducted for each error by each judge will of course depend on his/her judgement as to whether each of those deviations is a "minor" error, a "medium" error, or a "major" error, as described in 4B.7 above. So after the model aircraft has reached the "Stop judging at … " point for each manoeuvre, the judges' task is then to total all the points and half points which have been mentally deducted during the manoeuvre, and the final mark to be entered into the score sheet is simply the maximum available 10 points, minus the total of all the points mentally deducted by the judge while the manoeuvre was being flown. This deduction method, while not easy to learn, and while requiring a considerable amount of instruction and practice, does offer the advantage of coming very close to producing repeatable results when using a consistent marking bandwidth for weighting each error seen.

4B.10.3 Marking bandwidth: - The following scale of Marks is listed to provide judges with a practical tool applicable to the principles in 4B.10.2 above:

Judges' Observations:	Mark awarded:
- Nil deviations from Sporting Code "dimensions" and requirements seen:	= Mark 10 points
- Very few minor errors seen:	= Marks range 9.5 to 8 points (Note [1])
- Few and/or minor errors seen:	= Marks range 8 to 5.5 points (Note: [2])
- More and/or medium errors seen:	= Marks range 5.5 to 3 points (Note: [2])
- Many and/or major errors seen:	= Marks range 3 to 0.5 points (Note:[3])

Notes for Marking bandwidth table:

Note [1].- The number of points actually awarded for each manoeuvre will be dependant upon the total number of errors seen by each judge, and whether or not each judge decides that these are all minor errors only.

Note [2] – The number of points actually awarded for each manoeuvre will be dependant upon the total number of errors seen by each judge, and the extent to which each judge decides that each error is either a minor, a medium, or a major deviation from the manoeuvre Rule.

Note [3] – As per Note [2] above, but the mark 0 (zero) points should be reserved for manoeuvres which are not attempted at all; for manoeuvres which are incomplete; and for manoeuvres where the incorrect number of repeat figures are flown.

Judges should use the entire Marks bandwidth available as above. This means awarding a Mark of 10 points to any manoeuvre where the judge does not observe any of the errors listed in the manoeuvre Rules and/or in this Judging Instructions document - such as an Inverted Flight manoeuvre where the model aircraft remains truly stable and without "hunting" inside the allowed height tolerance of plus/minus 30 cm throughout all judged laps. But as an example of the opposite extreme, a Square Eights manoeuvre which is flown with line elevation angles of over 60 degrees, with "soft" corners, with angled sides, with slanted tops, with pullouts which are both too high and too low, and with intersections which are missed by several metres (in other words, a manoeuvre which is barely recognisable), should be awarded a Mark of perhaps 1 or 0.5 points. **Note once more the comments in paragraph 4B.9.**

It should also be noted that since nothing written anywhere in the Sporting Code defines terms such as general impression and flying style, accurate and repeatable marking really depends "only" (!) upon each judge deciding on the total number of errors committed and the degree to which each error has deviated from the flight track defined in each manoeuvre Rule. This **includes** subjective elements, where (apart from stability, which can be marked as discussed in 4B.8), the reality is that each competitor's score should depend "simply" (!) and solely upon the total number of all the errors observed by each judge, coupled with each judges decision as to the degree of severity of each of those errors.

4B.11 Consideration of external factors

With the exceptions mentioned in Landing *(Rule 4.2.16.16)*, "normal" external factors should not in any way affect the marks awarded by judges. So it is **not** permitted for judges' marks to allow for the effects of gusty winds in marking any phase of any of manoeuvre, **except** during the ground rollout phase of the Landing manoeuvre – for example, if a sudden fierce gust of wind coming from behind the model aircraft causes it to flip over or tip onto its nose during the last part of the ground rollout.

This therefore means that factors such as wind, turbulence, gusts, and any other factors outside the competitor's control should not normally influence the marks awarded by the judges. However, some individual exceptions to this general observation may occur occasionally – for example, a safety-related exception should be imminent danger of electrocution by thunderstorm. Exceptions should also be made where a completely "accidental" incident prevents the proper execution of a manoeuvre, or forces a competitor to abandon a manoeuvre or a flight altogether (for example, an animal wandering into the flight circle). In cases where the head judge feels that such external factors have influenced the result of a competition flight, he should use his discretion and authority to recommend that the Contest Director grants a reflight. See also 4B.20 and 4B.38.

4B.12 Judging a manoeuvre missed by a judge

If a judge misses the observation of a manoeuvre for any reason, he or she should not mark an estimated "typical" mark for the missed manoeuvre. Instead the judge who missed the manoeuvre should clearly write an "X" symbol on his/her score sheet in the space for the mark for the manoeuvre which has been missed. This symbol should then alert the scores tabulating team to use a procedure which calculates the average of the marks for that manoeuvre as awarded by all the other judges. This calculated average mark should then be entered into the missing mark ("X") area by the scores tabulating team before they proceed with further processing of all the remaining marks from that flight.

4B.13 Results awareness

In order to prevent influence of any kind, no judge should look at tabulated results scores and/or at competitors' placings until after the completion of a competition. Neither should judges discuss individual official flights, the execution of manoeuvres, and/or the marks awarded (and/or the tabulated results and scores), with anyone at all

during the whole competition, including other judges, competitors, or team managers. The head judge should ensure that all members of the Judges Panel observe these requirements throughout the competition.

4B.14 Judges' preparations to be made at Competition Sites

Well before the start of official competition flights, the head judge should meet the competition organiser and F2B Contest Director to define and/or verify:

4B.14.1 Head judge in charge.

4B.14.2 Classification procedures.

4B.14.3 Score calculation procedures.

4B.14.4 Competitors' flying order.

4B.14.5 Competitor call up procedure.

4B.14.6 Nominated official time keeper; how times will be communicated to Judges Panel.

4B.14.7 Duration of rounds.

4B.14.8 Meal & break times; seating arrangements; sun shades; umbrellas; etc.

4B.14.9 Availability of score recorders.

4B.14.10 Score sheet transportation.

4B.14.11 Competitors' pull-test procedure.

4B.14.12 The availability of fixed terrain reference points, and/or erected markers (refer 4B.5.2 and 4B.5.3).

4B.15 Judges' calibration ("warm-up") flights

A minimum of two warm-up flights, to be flown immediately prior to the beginning of official competition flights, should be flown per each round (or per each day) of the contest by volunteer pilots selected by random draw from amongst all registered competitors. Alternatively, one such calibration flight may be flown by the reserve member from the team of the country which is running the competition.

After each warm-up flight the judges should **not** discuss the individual scores they have awarded to each flight. Instead they should go through a manoeuvre-by-manoeuvre discussion, comparing and discussing their individual assessments of each error (including the severity of those errors) that they have seen during every segment of every figure and every manoeuvre flown. In order to avoid the definitely undesirable "levelling" of marks awarded by each judge, the actual marks (scores) awarded by each judge should not be discussed – rather, the discussions should focus upon the number, extent, and degree of severity of each error seen. The content of all such judges' warm-up flight discussions should not be made public.

4B.16 Sighting devices and terrain reference points

Hand-held sighting devices should not be used. Whenever possible, fixed terrain reference points should be used to define intersections, "verticals", line elevation angles, and $^{1}/_{8}{}^{th}$ lap (45 degrees laterally) bottom manoeuvre lengths and/or lap segments. As per 4B.5.2 and 4B.5.3, contest organisers are also encouraged to erect suitable markers (for example, for the 45 degrees lateral dimension specified in the relevant manoeuvre Rules), especially when a particular contest site lacks natural fixed reference points. It is recommended that such reference points and/or markers be recalibrated for each individual competition site on the occasion of each competition held at that site, and that these should be discussed privately between the judges prior to the start of warm-up flights. Final agreement on useable natural reference points and/or erected markers should be reached between all members of the Judges Panel before the start of official competition flights.

4B.17 Time-keeping

It is common practice to assign official time-keeping duties to the F2B Circle Marshall. Before starting official competition flights judges should confirm that this is indeed the case. Judges should also define the method/s by which the results of this timekeeping will be signalled to the Judges Panel. The times recorded by the defined official timekeeper are binding, but as a cross reference it is recommended that the head judge runs his own stopwatch in parallel to the official timekeeper (see also 4B.38.10).

4B.18 Judges' position

The panel of judges should be placed in a position defined by each competitor prior to starting his/her official flight. If no change to the judges' position for the previous official flight is requested by the pilot of the next official flight, then the position of the panel of judges at the time of starting the next official flight is assumed to be correct. Judges may however, at their own discretion, move from the positions originally taken at the start of an official flight by up to plus/minus $^{1}/_{8}{}^{th}$ of a lap during an official flight.

4B.19 Contest supervision

Judges should closely observe the running of the contest in general, and the proceedings on the F2B flight circle in particular. Where not defined by the organiser, the panel of judges shall name a head judge as their speaker for addressing the Contest Director. The head judge shall intervene in the running of the contest if the goal of fairness appears to be in danger, and the head judge may at all times take safety-related decisions and order suitable remedial action.

4B.20 Consistency

Judges should use a consistent scale of awarding marks throughout all the rounds of a competition. This scale should be a personal instrument based upon the number of errors seen, plus the severity of each error. This personal scale should have been arrived at by careful study of the current Sporting Code, study of this Judging Instructions document, and as a result of practical judging experience. Once the official flights of a competition have started, each judge's personal scale should remain firm and fixed and should **not** (for example) become influenced by factors such as discussions with others (including other judges), by the weather, by model aircraft speed, by model aircraft type or engine sound, or by an awareness of the reputation or results previously achieved by any particular pilot being judged. In this respect it should be noted that in the following manoeuvre descriptions the words model aircraft and competitor (and **not** pilot) have been used!

4B.21 Definition of an Attempt *(Rule 4.2.5)*

4B.21.1 *" ... called to fly":* - Means that an official calls the competitor to enter the circle. The competitor must enter the circle within two minutes of being called. This leads to a Critical point: - Judges are advised to watch for the competitor (or for an official) calling for an attempt if the competitor does not enter the circle within the two minutes time limit.

4B.21.2 *" ... within three minutes of the starting signal":* - Means that the model aircraft does not become airborne within three minutes of giving the starting signal. This again leads to a Critical point: - Judges are advised to watch for the competitor (or an official) calling for an attempt if the model aircraft does not become airborne within three minutes from the starting signal.

4B.22 Execution of Manoeuvres *(Sporting Code 4.2.11 & 4.2.12)*

4B.22.1 Judging *" ... a minimum of 1 1/2 laps.":* - Competitors may choose to fly more than, but may not fly less than, $1^{1}/_{2}$ intervening laps between each manoeuvre. If a manoeuvre is performed after less than $1^{1}/_{2}$ intervening laps have been flown, then that manoeuvre should be awarded a mark of 0 (zero) points, and 0 (zero) points should also be awarded to every other manoeuvre where less than 1 ½ laps are flown between manoeuvres.

4B.22.2. Judging the height of intervening laps: - The height of the laps flown between manoeuvres is not specified in the Sporting Code and should therefore not be judged or marked.

4B.22.3 Judging the sequence of manoeuvres: - Every manoeuvre flown out of the sequence specified in the Sporting Code *(Rule 4.2.15)* should be awarded a mark of 0 (zero) points.

4B.22.4 Judging incomplete manoeuvres: - Every manoeuvre which is not completed by the competitor should be awarded 0 (zero) points.

4B.22.5 Judging omitted manoeuvres: - Every manoeuvre omitted from the List of Aerobatics Manoeuvres *(Rule 4.2.15.)* should be awarded a mark of 0 (zero) points.

4B.22.6 Judging manoeuvres flown after a manoeuvre has been omitted: - After an omitted manoeuvre, all succeeding manoeuvres should be judged and awarded points as usual, provided that the succeeding manoeuvres are all flown in the sequence listed (*Rule 4.2.15*).

4B.22.7 Judging manoeuvres flown with an incorrect number of multiple figures (for example: the Three Consecutive Inside

Loops manoeuvre required *(Rule 4.2.16.6)*; but the manoeuvre is actually flown with 2 or 4 loops): - All manoeuvres flown in such ways are incorrect and should be awarded a mark of 0 (zero) points.

4B.22.8 Attempted manoeuvre/s: – If a competitor makes more than one attempt at any one manoeuvre during one official flight the judges should mark the first attempt in accordance with the instructions listed in this paragraph and the relevant following manoeuvre description paragraph. Any further attempt/s at the same manoeuvre during the same official flight should not be marked at all.

4B.23 Starting *(Rule 4.2.16.1)*

4B.23.1 Start of timing: - The timekeeper and/or judge/s should start timing when the competitor gives a hand signal indicating that he/she is ready to start the motor/s. Award 10 points if the beginning of the Take-off ground roll takes place within one minute from the start of timing; award 0 (zero) points if the beginning of the Take-off ground roll is after one minute from the start of timing.

4B.23.2 Critical point: - Judges should maintain their full attention on the model aircraft during the whole Take-off ground roll (4B.23.1) and the three laps following lift of, not taking their eyes off the model aircraft to verify the total time taken for starting the motor and beginning the Take-off ground roll until **after** the third lap of the whole take-off manoeuvre has been completed (4B.24.5).

4B.24 Take-off *(Rule 4.2.16.2)*

4B.24.1 Start judging at: - The beginning of the Take-off ground roll.

4B.24.2 Judging the ground roll and lift-off segment: - From the beginning of the Take-off ground roll to the point of lift-off. Lift-off should not occur before 4.5 metres from start of ground roll, nor later than $^1/_4$ of a lap. *"Smooth"* means without a "sudden jump" into the air.

4B.24.3 Judging the climb out and levelling-off segment: - From lift-off, up to and including levelling-off. Levelling-off should occur at a height of 1.5 metres, plus/minus 30 cm, and should occur exactly overhead the point of the beginning of the take-off ground roll. *"Gradual"* means that the rate of climb should be constant throughout the climb from lift-off until levelling-off into normal upright level flight. *"Smooth"* means a "jerk free" transition from climbing flight to level flight.

4B.24.4 Judging the level flight segment: - Two laps, from the end of levelling-off to the end of lap three. *"Smooth laps of normal level flight"* means that the model aircraft does not deviate from a height of 1.5 metres plus/minus 30 cm.

4B.24.5 Stop judging at: - The end of lap three, exactly overhead the point of the beginning of the Take-off ground roll.

4B.24.6 Critical points are: - Take-off ground roll shorter than 4.5 metres or longer than $^1/_4$ lap. Model aircraft “jumping” into the air. Reaching level flight altitude too quickly. Climb rate not gradual (for example: too shallow at first and then too steep later). Levelling-off before or after passing exactly overhead the point of the beginning of the Take-off ground roll. Not maintaining a level flight height of 1.5 metres, plus/minus 30 cm throughout upright level flight, lap numbers two and three.

4B.25 One Reverse Wing Over *(Rule 4.2.16.3)*

4B.25.1 Entry: - From normal upright level flight at a height of 1.5 metres, plus/minus 30 cm.

4B.25.2 Start judging at: - The beginning of the first turn into a “vertical” climb.

4B.25.3 Judging turn radii: - All turns should be of 1.5 metres radius, maximum 2.1 metres radius.

4B.25.4 Judging the first "vertical" climb and dive segment: - From the beginning of the first turn into a “vertical” climb, over the competitor’s head, into a “vertical” dive, until the end of the second turn (recovering from the “vertical” dive into inverted level flight). *"Passing directly over the flyer's head"* means that the model aircraft should pass through an imaginary line projected at right angles upwards from the centre of the ground circle. *"Cutting the ground circle in half"* means that the judges should “mentally project” the start and finish points of the complete line of “vertical” flight downwards onto the ground, with the result that these two points are exactly opposite each other on the ground circle if the first “vertical” climb and “vertical” dive segment has been correctly flown.

4B.25.5 Judging the inverted “horizontal” level flight segment: - After recovery from the first “vertical” dive, until the start of the second turn into the second “vertical” climb. The inverted level flight segment should be flown at a height of 1.5 metres, plus/minus 30 cm. The length of the inverted flight segment, including turns, should be exactly ½ a lap.

4B.25.6 Judging the second “vertical” climb and dive segment: - The point at which the model aircraft first reaches a

"vertical" attitude in this second "vertical" climb should be exactly the same as the point at which the model aircraft first reached a "vertical" attitude at the start of the first "vertical" climb. *"Over the centre of the circle"* means that the model aircraft should pass through an imaginary line projected upwards at right angles from the centre of the ground circle. The point where the model aircraft starts its recovery to normal upright level flight at the end of the whole manoeuvre should be exactly opposite the point where the model aircraft first reached "vertical" flight attitude at the start of the whole manoeuvre. Recovery should bring the model aircraft to normal upright level flight at a height of 1.5 metres plus/minus 30 cm.

4B.25.7 Stop judging at: - The end of the fourth turn (recovery to normal upright level flight).

4B.25.8 Critical points are: - First climb not "vertical". Model aircraft not passing through the right angled line projected upwards from the centre of the flight circle. "Vertical" climb and/or dive segments being curved (meaning not "straight line") flight path/s. Recovery/ies to inverted level flight and/or to normal upright level flight not at a height of 1.5 metres, plus/minus 30 cm. Not maintaining a height of 1.5 metres, plus/minus 30 cm during inverted level flight. The "turning points" defined above not being exactly opposite each other. Turn radii not equal in all four turns and/or exceed 2.1 metres.

4B.26 Three Consecutive Inside Loops *(Rule 4.2.16.4)*

4B.26.1 Entry: - From normal upright level flight at a height of 1.5 metres, plus/minus 30 cm.

4B.26.2 Start judging at: - The start of the first loop (as the model aircraft departs its normal upright level flight path).

4B.26.3 Judging the first loop: - From normal upright level flight the model aircraft should fly upwards along a circular flight path to a height specified in the Sporting Code as a line elevation angle of 45 degrees, at which point it should be inverted. The model aircraft should continue, without interruption, its circular flight path downwards until reaching its first normal upright level flight height, at which point it should be upright. *"Round"* means no visible deviations from a circular flight path. *"Smooth"* means without flat spots or "jerks". When the model aircraft reaches a "vertical" attitude for the first time this has defined the lateral reference for the whole manoeuvre.

4B.26.4 Judging the second and third loops: - The model aircraft should follow a flight path exactly as described above. The second and third loops should be flown in exactly the same position (meaning that the second loop should be superimposed exactly on top of the first loop, and the third exactly on top of the second), and all three should be of exactly the same size.

4B.26.5 Stop judging at: - The end of the third loop as the model aircraft completes recovery into normal upright level flight.

4B.26.6 Exit procedure: - Should be flown as recommended by this rule but should not be judged or marked.

4B.26.7 Critical points are: - Line elevation angle/s above 45 degrees (loop/s too big). Line elevation angle/s less than 45 degrees (loop/s too small). Bottom/s of loops not all at a height of 1.5 metres, plus/minus 30 cm. Tops and/or bottoms of loops are not all at the same heights. Shapes are not truly circular. Flight path is not steady (examples: uneven rate of turn; "wobbling" flight). Flat spots on any of the loops. Second and third loops are not exactly the same size as the first. Second and third loops are not in exactly the same position (not superimposed upon) the first loop.

4B.27 Two Laps Inverted Flight *(Rule 4.2.16.5)*

4B.27.1 Entry: - From inverted level flight at a height of 1.5 metres.

4B.27.2 Start judging at: - The beginning of lap three (as counted from the exit point of the Three Consecutive Inside Loops manoeuvre – *Rule 4.2.16.4*).

4B.27.3 Judging inverted flight height: - Should be at 1.5 metres. *"Stable"* means that the model aircraft does not deviate by more than plus/minus 30 cm from 1.5 metres. *"Smooth"* means the absence of visible height deviations.

4B.27.4 Stop judging at: The end of lap four (as counted from the exit point of the Consecutive Inside Loops manoeuvre – 4.2.16.4).

4B.27.5 Critical points are: The first inverted flight height at the beginning of lap three is not 1.5 metres, plus/minus 30 cm. Model aircraft deviates more than plus/minus 30 cm from a height of 1.5 metres during the two judged laps. The model aircraft shows visible height corrections.

4B.28 Three Consecutive Outside Loops *(Rule 4.2.16.6)*

4B.28.1 Entry: From level inverted flight at a height of 1.5 metres, plus/minus 30 cm.

4B.28.2 Start judging at: The beginning of the first loop (as the model aircraft departs its level inverted flight path).

4B.28.3 Judging the first loop: From level inverted flight the model aircraft should fly upwards along a circular flight path to a height specified in the Sporting Code as a line elevation angle of 45 degrees, at which point it should be upright. The model aircraft should continue, without interruption, its circular flight path downwards until reaching its first inverted flight height, at which point it should be inverted. *"Round"* means no visible deviations from a circular flight path. *"Smooth"* means without flat spots or "jerks". When the model aircraft reaches a "vertical" attitude for the first time this has defined the lateral reference for the whole manoeuvre.

4B.28.4 Judging the second and third loops: The model aircraft should fly a flight path exactly as set out in the individual segments above. The second and third loops should be flown in exactly the same position (meaning that the second loop should be superimposed exactly on top of the first loop and the third loop onto the second) and all three should be of exactly the same size.

4B.28.5 Stop judging at: The end of the third loop, when the model aircraft passes the 1.5 metres normal flight level in inverted flight.

4B.28.6 Exit procedure: Should be flown as recommended by this rule but should not be judged or marked.

4B.28.7 Critical points are: Line elevation angle/s above 45 degrees (loop/s too big). Line elevation angle/s less than 45 degrees (loop/s too small). Bottom of loop/s not at a height of 1.5 metres, plus/minus 30 cm. Tops and/or bottoms of loop/s are not all at the same heights. Shapes are not circular. Flight path is not steady (example: "wobbling" or "jerky" flight). Flat spots on any of the loops. Second and third loops are not exactly the same size as the first. Second and third loops are not in exactly the same position (not superimposed upon) the first loop.

4B.29 Two Consecutive Inside Square Loops *(Rule 4.2.16.7)*

4B.29.1 Entry: From normal upright level flight at a height of 1.5 metres plus/minus 30 cm.

4B.29.2 Start judging: From the point in normal upright level flight where the model aircraft begins its first turn into a "vertical" climb.

4B.29.3 Judging turn radii: All turns should be of 1.5 metres radius, maximum 2.1 metres radius.

4B.29.4 Judging the first turn plus "vertical" climbing segment: The model aircraft should reach and maintain a flight path which is at right angles to the ground.

4B.29.5 Judging the second turn plus top "horizontal" segment: The model aircraft should turn into inverted level flight to reach a height of 45 degrees line angle elevation as it becomes inverted. The top segment should be flown in inverted level flight with the flight path parallel to the ground.

4B.29.6 Judging the third turn plus "vertical" diving segment: The model aircraft should reach and maintain a flight path which is at right angles to the ground.

4B.29.7 Judging the fourth turn plus bottom "horizontal" segment:. The model aircraft should recover to normal upright level flight at a height of 1.5 metres plus/minus 30 cm. The length of the bottom segment, including both turns, should be exactly $^{1}/_{8}^{th}$ of a lap.

4B.29.8 Judging the complete second loop: The model aircraft should fly a flight path exactly as set out in the individual segments above. The second loop should be flown in exactly the same position (meaning that the second loop should be superimposed exactly onto the first loop) and should be of exactly the same size as the first loop.

4B.29.9 Stop judging: In normal upright level flight, at exactly the point where the model aircraft started its first turn into a "vertical" climb at the beginning of the complete manoeuvre.

4B.29.10 Critical points are: Line elevation angle/s above 45 degrees (loop/s too big; top segment/s flown too high). Line elevation angle/s less than 45 degrees (loop/s too small; top segment/s flown too low). Turn radii are not equal, and/or exceed 2.1 metres radius. Climb and/or dive segments not "vertical". Top segment/s not level (not parallel to the ground and/or not "straight line" flight throughout). Bottom segment/s not at a height of 1.5 metres, plus/minus 30 cm. Length of bottom segment/s greater than/less than $^{1}/_{8}^{th}$ of a lap. Loop/s are either wider than their height/s and/or higher than their width/s. Sides are not "straight line" flight. Flight path is not steady (example: "wobbling" flight). Second loop is not exactly the same size as the first. Second loop is not in exactly the same position (meaning not superimposed exactly upon) the first loop.

4B.30 Two Consecutive Outside Square Loops *(Rule 4.2.16.8)*

4B.30.1 Entry: From upright level flight at a height of 45 degrees line angle elevation.

4B.30.2 Start judging: From the point in normal upright level flight where the model aircraft starts its first turn downwards into a "vertical" dive.

4B.30.3 Judging turn radii: All turns should be of 1.5 metres radius, maximum 2.1 metres radius.

4B.30.4 Judging the first turn plus "vertical" dive segment: The model aircraft should reach and maintain a flight path which is at right angles to the ground.

4B.30.5 Judging the second turn plus bottom "horizontal" segment: The model aircraft should recover from diving flight to inverted level flight at a height of 1.5 metres plus/minus 30 cm. The bottom segment should be flown with the flight path parallel to the ground. The length of the bottom segment, including both turns, should be $^{1}/_{8}{}^{th}$ of a lap.

4B.30.6 Judging the third turn and "vertical" climbing segment: The should model aircraft reach and maintain a flight path which is at right angles to the ground.

4B.30.7 Judging the fourth turn and top "horizontal" segment: The model aircraft should recover into upright level flight at a height of 45 degrees line angle elevation. The top segment should be flown in level upright flight with the flight path parallel to the ground.

4B.30.8 Judging the complete second loop: The model aircraft should fly exactly as set out in the individual segments above. The second loop should be flown in exactly the same position (meaning that the second loop should be superimposed exactly on top of the first loop) and should be of exactly the same size as the first loop.

4B.30.9 Stop judging: In level flight, at exactly the point where the model aircraft started its first turn into a "vertical" dive at the beginning of the complete manoeuvre.

4B.30.10 Exit procedure: Should be flown as recommended by this rule but should not be judged or marked.

4B.30.11 Critical points are: Manoeuvre entry height not within the plus/minus 30 cm tolerance. Model aircraft not in level flight when starting first turn. Line elevation angle/s above 45 degrees (loop/s too big; top segment/s flown too high). Line elevation angle/s less than 45 degrees (loop/s too small; top segment/s flown too low). Turn radii are not equal, and/or exceed 2.1 metres radius. Climb and/or dive segments not "vertical. Top segment/s too high and/or too low (not at 45 degrees line angle elevation). Top segment/s not level (parallel to the ground; not "straight line" flight throughout). Bottom segment/s not at a height of 1.5 metres plus/minus 30 cm. Length of bottom segment/s greater than/less than $^{1}/_{8}{}^{th}$ of a lap. Loop/s are either wider than their height/s and/or higher than their width/s. Sides are not "straight line" flight. Flight path is not steady (example: "wobbling" flight). Second loop is not exactly the same size as the first. Second loop is not in exactly the same position (not superimposed exactly upon) the first loop.

4B.31 Two Consecutive Inside Triangular Loops *(Rule 4.2.16.9)*

4B.31.1 Entry: From normal upright level flight at a height of 1.5 metres plus/minus 30 cm.

4B.31.2 Start judging: From a point approximately $^{1}/_{8}{}^{th}$ lap of a lap of level upright flight before the model aircraft starts its first turn into an inverted climb.

4B.31.3 Judging turn radii: All turns should be of 1.5 metres radius, maximum 2.1 metres radius.

4B.31.4 Judging the first (climbing) turn plus inverted climb segment: The model aircraft should reach and maintain a "straight line" inverted climb flight path at approximately 30 degrees past right angles to the ground.

4B.31.5 Judging the second (diving) turn segment: The model aircraft should turn through approximately 60 degrees, reaching and maintaining a "straight line" inverted dive flight path at approximately 30 degrees less than right angles to the ground. The maximum height reached during this turn should not exceed a line elevation angle of 45 degrees.

4B.31.6 Judging the third turn plus bottom "horizontal" segment: The model aircraft should recover to normal upright level flight at a height of 1.5 metres plus/minus 30 cm. The length of the bottom segment, including both turns, should be equal to the length of both the climbing and the diving flight segments including their respective turns.

4B.31.7 Judging the complete second loop: The model aircraft should fly exactly as set out in the individual segments above. The second loop should be flown in exactly the same position (meaning that the second loop should be superimposed on top of the first loop) and should be of exactly the same size as the first loop.

4B.31.8 Stop judging: With the model aircraft in normal level upright flight, at exactly the same point as the model aircraft started its first turn at the start of the complete manoeuvre.

4B.31.9 Critical points are: Line elevation angle/s above 45 degrees (loop/s too big). Line elevation angle/s less than 45 degrees (loop/s too small). Turn radii are not equal, and/or exceed 2.1 metres. Climbing and or diving flight segment/s not “straight line” flight path/s and/or flight path/s not at approximately 60 degrees to the ground. Bottom segment/s not “straight line” flight, and/or not parallel to the ground, and/or not at a height of 1.5 metres plus/minus 30 cm. Length of individual segments (meaning sides of triangles) not equal. Tops and/or bottoms of loops are not all at the same heights. Second loop is not exactly the same size as the first. Second loop is not in exactly the same position (not superimposed exactly upon) the first loop.

4B.32 Two Horizontal Eights *(Rule 4.2.16.10)*

4B.32.1 Entry: From normal upright level flight at a height of 1.5 metres plus/minus 30 cm.

4B.32.2 Start judging: When the model aircraft passes the intersection point for the first time.

4B.32.3 Locating the intersection: When the model aircraft reaches a “vertical” climbing attitude for the first time this has defined the intersection point for the whole manoeuvre (i.e. after 1/4 of a full loop has been flown).

4B.32 4 Judging the first inside loop: From normal upright level flight the model aircraft should fly upwards along a circular flight path to a height specified in the Sporting Code as a line elevation angle of 45 degrees, at which point it should be inverted. The model aircraft should continue, without interruption, its circular flight path downwards until reaching its first normal upright level flight height, at which point it should be upright. The model aircraft should then, without interruption, continue its circular flight path for a further $^1/_4$ of a loop until reaching the intersection point, at which point it should be momentarily "vertical“. This is exactly the same as described for the Inside Loops manoeuvre (Rule 4.2.16.4), and *“Round”* means no visible deviations from a circular flight path. *“Smooth”* means without flat spots or “jerks”. The height of the bottom of the first inside loop should be 1.5 metres plus/minus 30 cm.

4B.32. 5 Judging passage through the intersection point and transition into the first outside loop: The intersection point first defined by the model aircraft at the beginning of the manoeuvre (4B.32.3 above) should be maintained throughout the complete manoeuvre. At the time of passing through the intersection point and transitioning to the first outside loop the model aircraft should be momentarily in a "vertical" nose up attitude but should not visibly travel in a "straight line" and/or along a "vertical" climbing flight path.

4B.32.6 Judging the first outside loop (actually 1 complete loop from the intersection point): After passing through the intersection point the model aircraft should continue, without interruption, to fly a complete outside loop as defined for the Outside Loops manoeuvre *(Rule 4.2.16.6).* This means that the model aircraft should fly upwards along a circular flight path to a height specified in the Sporting Code as a line elevation angle of 45 degrees, at which point it should be upright. The model aircraft should continue its circular flight path downwards until reaching the inverted flight height of 1.5 metres plus/minus 30 cm, at which point it should be inverted. *“Round”* means no visible deviations from circular. *“Smooth”* means without flat spots or “jerks”. The model aircraft should then, without interruption, continue its circular flight path for a further $^1/_4$ of a loop until reaching the intersection point, at which point it should be momentarily "vertical“.

4B.32.7 Judging the second complete figure eight: The model aircraft should follow a flight path exactly as set out in the individual segments above. The second figure eight should be flown in exactly the same position (meaning that the second eight should be superimposed exactly on top of the first eight) and should be of exactly the same size as the first eight.

4B.32.8 Stop judging: As the model aircraft completes the second figure eight, when passing the intersection point in a "vertical" climb for the fifth and last time.

4B.32.9 Exit procedure: Should be flown as recommended by this rule but should not be judged or marked.

4B.32.10 Critical points are: Line elevation angle/s above 45 degrees (eight/s too big). Line elevation angle/s less than 45 degrees (eight/s too small). Bottom/s of eight/s not at a height of 1.5 metres, plus/minus 30 cm. Top/s and/or bottom/s of eight/s are not all at the same height. Shapes are not circular. Model aircraft not "vertical" when passing through the intersection point. Flat spot/s on any of the eight/s. Model aircraft flies a "straight line" segment when passing through the intersection point. The intersection varies from the point first defined by the model aircraft. Inside and outside loop/s are too far apart (resulting in an "X"-shaped flight path at the intersection point). The second eight is not exactly the same size as the first. The second eight is not in exactly the same position (not superimposed upon) the first eight.

4B.33 Two Square Horizontal Eights *(Rule 4.2.16.11)*

4B.33.1 Entry: From normal upright level flight at a height of 1.5 metres plus/minus 30 cm.

4B.33.2 Start judging: With the model aircraft in upright level flight, from the point flight where the model aircraft starts its first turn upwards into a "vertical" climb for the first time.

4B.33.3 Judging turn radii: All turns should be of 1.5 metres radius, maximum 2.1 metres radius.

4B.33.4 Locating the intersection line: When the model aircraft reaches a "vertical" attitude for the first time this has defined the intersection line for the whole manoeuvre.

4B.33.5 Judging the first climbing turn and "vertical" climbing segment of the first (inside) square loop of the first figure eight: The model aircraft should turn into a "vertical" climb, reaching and maintaining a flight path which is at right angles to the ground.

4B.33.6 Judging the second turn and top "horizontal" segment of the first (inside) square loop of the first figure eight: The model aircraft should turn into inverted level flight to reach a height of 45 degrees line angle elevation as it becomes inverted. The top segment should be flown with the flight path parallel to the ground.

4B.33.7 Judging the third turn and "vertical" dive segment of the first (inside) square loop of the first figure eight: The model aircraft should turn into a "vertical" dive, reaching and maintaining a flight path which is at right angles to the ground.

4B.33.8 Judging the fourth turn and bottom "horizontal" segment of the first (inside) square loop of the first figure eight : The model aircraft should recover to normal upright level flight at a height of 1.5 metres plus/minus 30 cm. The length of the bottom segment, including both turns, should be exactly $^{1}/_{8}{}^{th}$ of a lap.

4B.33.9 Judging the first climbing turn and "vertical" climb segment of the second (outside) square loop of the first figure eight: At the end of the previous segment (4B.33.8), the model aircraft should turn into a "vertical" climb, reaching and maintaining a flight path which is at right angles to the ground. This flight path should be in exactly the same position as defined by the model aircraft at the beginning of the manoeuvre (4B.33.4).

4B.33.10 Judging the second turn and top "horizontal" segment of the second (outside) square loop of the first figure eight: The model aircraft should turn into upright level flight to reach a height of 45 degrees line angle elevation as it becomes level. The top segment should be flown with the flight path parallel to the ground.

4B.33.11 Judging the third turn "vertical" dive segment of the second (outside) square loop of the first figure eight: The model aircraft should turn into a "vertical" dive, reaching and maintaining a flight path which is at right angles to the ground.

4B.33. 12 Judging the fourth turn and bottom "horizontal" segment of the second (outside) square loop of the first figure eight:. The model aircraft should recover to inverted level flight at a height of 1.5 metres plus/minus 30 cm. The length of the bottom segment, including both turns, should be exactly $^{1}/_{8}{}^{th}$ of a lap.

4B.33.13 Judging the complete second figure eight: The model aircraft should follow a flight path exactly as set out in the individual segments above. The second figure eight should be flown in exactly the same position (meaning that the second eight should be superimposed exactly on top of the first eight) and should be of exactly the same size as the first eight.

4B.33. 14.Judging the last turn and "vertical" climb exit from the manoeuvre: At the end of the second bottom "horizontal" segment of the fourth loop the model aircraft should turn into a "vertical" climb, reaching and maintaining a flight path which is at right angles to the ground. This flight path should be in exactly the same position as defined by the model aircraft at the beginning of the manoeuvre (4B.33.4).

4B.33.15 Stop judging: As the model aircraft completes the second figure eight, when passing a height of 45 degrees line elevation in a "vertical" climb for the last time.

4B.33.16 Exit procedure: Should be flown as recommended by this rule but should not be judged or marked.

4B.33.17 Critical points are:

Line elevation angle/s above 45 degrees (eight/s too big). Line elevation angle/s less than 45 degrees (eight/s too small). Bottom of eight/s not at a height of 1.5 metres plus/minus 30 cm. Tops of eight/s are not all at the same heights. Turn radii are not equal, and/or exceed 2.1 metres radius. Bottom segment/s are not equal, and/or are longer or shorter than $^{1}/_{8}{}^{th}$ lap. Bottom segment/s are not flown parallel to the ground, and/or are not flown at a height of 1.5 metres plus/minus 30 cm. "Vertical" climb and/or dive segment/s are not flown at right angles to the ground.

Figure/s are wider than their height/s. Figure/s are higher than their width/s. Side/s of figures are not “straight line” flight path/s, and/or the model aircraft “wobbles”. The intersection line first defined by the model aircraft varies in subsequent segments of the manoeuvre. The second eight is not exactly the same size as the first. The second eight is not in exactly the same position (not superimposed upon) the first eight.

4B.34 Two Vertical Eights *(Rule 4.2.16.12)*

4B.34.1 Entry: From normal upright level flight the model aircraft should fly upwards along a circular flight path to a height specified in the Sporting Code as a line elevation angle of 45 degrees, at which point it should be inverted.

4B.34.2 Start judging at: After the model aircraft has flown the first half of an inside loop, as it passes through the intersection point for the first time.

4B.34.3 Locating the intersection: The intersection of the whole manoeuvre is defined when the model aircraft passes through inverted level flight at a height of 45 degrees line elevation angle for the first time.

4B.34.4 Judging the first segment (inside loop): As the model aircraft passes through the intersection point for the first time it should continue to fly a complete round inside loop. The bottom of this loop should be at a height 1.5 metres plus/minus 30 cm. The loop should be completed by the model aircraft returning to the inverted position at a height of 45 degrees line elevation angle. *“Round”* means no visible deviations from a circular flight path.

4B.34.5 Judging the model aircraft’s passage through the intersection point and transition to the second (outside) loop: The flight path should touch the intersection point and this point should be maintained throughout the entire manoeuvre. At the time of passing through the intersection point and transitioning into the second (outside) loop the model aircraft should momentarily be in a level inverted flight attitude but should not visibly follow a “straight line” flight path. Also, the model aircraft should neither climb nor dive during this momentary period of inverted flight.

4B.34.6 Judging the second segment (outside loop): As it passes through the intersection point the model aircraft should continue on without interruption, flying a complete outside round loop. The bottom of this second loop should be at a height of 45 degrees line elevation angle and the top should be at 90 degree line elevation. *“Round”* means no visible deviations from a circular flight path.

4B.34.7 Locating the “vertical” axis: The centres of both loops should be positioned on an imaginary line drawn upwards from the ground at right angles.

4B.34.8 Judging the complete second figure eight: The model aircraft should follow a flight path exactly as set out in the individual segments above. The second figure eight should be flown in exactly the same position (meaning that the second eight should be superimposed exactly on top of the first eight) and should be of exactly the same size as the first eight.

4B.34.9 Stop judging: As the model aircraft completes the second figure eight, at the moment when it reaches inverted level flight at a height of 45 degrees line elevation angle.

4B.34.10 Exit procedure: Should be flown as recommended by this rule but should not be judged or marked.

4B.34.11 Critical points are: The lower (inside) loop/s are too big with line elevation angle/s exceeding 45 degrees. The upper (outside) loop/s are too big/too small with line elevation angle/s not reaching or exceeding 1.2 metres from 90 degrees line elevation. Bottom/s of lower loop/s not at a height of 1.5 metres plus/minus 30 cm. The intersection point is not at a height of 45 degrees line elevation angle, plus/minus 30 cm. All loops are not of the same size. The loops are not round. The loops show flat spots. The model aircraft is not momentarily parallel to the ground when passing through the intersection point. The model aircraft follows a climbing and/or diving flight path when passing through the intersection point. Loops overlap. The intersection flight path is "S"-shaped. The loops are too far apart. The intersection point flight path is "X"-shaped. The intersection point varies from the position first defined by the model aircraft during the first inside loop. Loops are not all positioned on the “vertical” axis (4B.34.3). The second eight is not exactly the same size as the first. The second eight is not in exactly the same position (not superimposed upon) the first eight.

4B.35 One Hourglass Figure *(Rule 4.2.16.13)*

4B.35.1 Entry: From normal upright level flight at a height of 1.5 metres plus/minus 30 cm.

4B.35.2 Start judging: With the model aircraft in upright level flight, from the point where the model aircraft starts its first turn into a climb for the first time.

4B.35.3 Judging turn radii: All turns should be of 1.5 metres radius, maximum 2.1 metres radius.

4B.35.4 Judging the first turn and inverted climb segment: The model aircraft should reach and maintain an inverted climb with a "straight line" flight path angled at approximately 30 degrees past right angles to the ground. That climb should be continued until terminated with an outside turn which should result in the model aircraft following a wingover path. That wingover path should be located at 90 degrees to the centre line axis of the whole manoeuvre.

4B.35.5 Judging the "overhead" segment and third turn: This segment should be flown in "straight line" flight and the length of this segment, including its two turns, should be slightly more than $^{1}/_{8}^{th}$ of a lap. This segment should be finished by an outside turn through approximately 60 degrees into an inverted dive.

4B.35.6 Judging the inverted dive segment: The model aircraft should reach and maintain an inverted dive with a "straight line" flight path angled at approximately 60 degrees to the ground.

4B.35.7 Judging the intersection: The intersection of the two climbing/diving segments should be at a height of 45 degrees line elevation angle.

4B.35.8 Judging the manoeuvre's symmetry: The figure should be flown symmetrically in relation to its "vertical" centre axis.

4B.35. 9 Judging the fourth turn and bottom level flight segment: The model aircraft should recover to normal upright level flight at a height of 1.5 metres plus/minus 30 cm. The length of this segment should be slightly more than $1/8^{th}$ of a lap.

4B.35.10 Stop judging: With the model aircraft in normal level upright flight, at exactly the same point as the model aircraft started its first turn at the start of the complete manoeuvre.

4B.35.11 Critical points are: Corner angles are significantly different from 60 degrees. Turn radii are not equal and/or exceed 2.1 metres. Climb and/or dive segments are not "straight line" flight path/s. When passing the overhead point, the line elevation angle does not reach (or it exceeds) 90 degrees within 60 cm. The top and bottom segments are twisted in relation to each other. The height of the bottom segment is not at 1.5 metres plus/minus 30 cm. The bottom segment is not flown parallel to the ground throughout. The intersection point is not at a height of 45 degrees line elevation angle. Climbing and/or diving segment flight path angles are not the same and/or produce an asymmetric manoeuvre.

4B.36 Two Overhead Figure Eights *(Rule 4.2.16.14)*

4B.36.1 Entry: From normal upright level flight the model aircraft should climb to the overhead point.

4B.36.2 Start judging: As the model aircraft passes through the overhead point for the first time.

4B.36.3 Locating the overhead/intersection point: The overhead point and the intersection point should be in exactly the same position. - that is: at the point where the top of the flying hemisphere meets an imaginary line projected upwards at right angles from the centre of the ground circle.

4B.36.4 Judging the first segment (complete inside loop): From the overhead position the model aircraft should fly a complete round inside loop, returning to the overhead/intersection point. The bottom of this loop should be at a height of 45 degrees line elevation angle plus/minus 30 cm. *"Round"* means with no visible deviation from a circular flight path. This loop should be flown symmetrically to an imaginary line on the face of the flying hemisphere drawn upwards at 90 degrees to the axis of the model aircraft's climb to the intersection point.

4B.36.5 Judging passage through the intersection point and transition into the second (outside) loop segment: The intersection point should be maintained throughout the entire figure eight. At the time of passing through the intersection/overhead point the model aircraft should smoothly transition into the second (outside) loop without visibly following either a "straight line" and/or a curved flight path. As it flies overhead the centre of the ground circle the model aircraft should be momentarily in a "knife edge" position with a line elevation angle of 90 degrees.

4B.36.6 Judging the second segment (complete outside loop): From the overhead position the model aircraft should transition smoothly into the second round (outside) loop, returning to the overhead/intersection point. The bottom of this loop should be at a height of 45 degrees line elevation angle plus/minus 30 cm. *"Round"* means no visible deviation from a circular flight path. This loop should also be flown symmetrically to an imaginary line on the face of the flying hemisphere drawn upwards at 90 degrees to the axis of the model aircraft's climb to the intersection point (4B.21.4).

4B.36.7 Judging the second figure eight: The model aircraft should fly exactly as set out in the individual segments above. The second eight should be flown in exactly the same position (meaning that the second eight should be superimposed on top of the first eight) and should be of exactly the same size as the first eight.

4B.36.8 Stop judging at: The end of the second (outside) loop as the model aircraft passes through the intersection point.

4B.36.9 Exit procedure: Should be flown as recommended by this rule but should not be judged or marked.

4B.36.10 Critical points are: Model aircraft is not vertically overhead (90 degrees line angle) at the time of entry into the manoeuvre. Loops are too big with bottoms reaching down below 45 degrees line elevation angle. Manoeuvre shows left/right 45 degrees line elevation angle asymmetry. Manoeuvre shows front/rear asymmetry. Manoeuvre orientation is "twisted" in relation the "vertical" entry centre line axis. Loop/s are not same size. Loops are not round. Model aircraft is not 90 degrees overhead when passing through the intersection point. Model aircraft curves left/right when passing through the intersection point. The intersection point varies from its initial position as defined by the entry point. The second eight is not superimposed exactly on top of the first.

4B.37 One Four-leaf Clover *(Rule 4.12.16.15)*

4B.37.1 Entry: *"... level flight at approximately 38 degrees elevation ..."* means that the model aircraft should be in upright level flight at a height of 38 degrees line elevation height before starting the first (inside) loop.

4B.37.2 Start judging: With the model aircraft in upright level flight at a height of 38 degrees line elevation angle, just before the point of entry into the first (inside) loop.

4B.37.3 Judging the complete first (inside) full loop figure: *"Full inside loop"* means a full 360 degrees circle which is positioned tangentially to an imaginary "vertical" line drawn upwards at right angles from the ground. The lateral position of this line is determined when the model aircraft reaches a "vertical" attitude for the first time and this imaginary line then becomes the lateral reference for the whole manoeuvre. The top of the first loop should be tangential to the wingover path located at 90 degrees to the centre line axis of the whole manoeuvre. The model aircraft should recover into upright level flight at a height of 38 degrees line elevation angle plus/minus 30 cm. *"Round"* means with no visible deviations from a circular flight path.

4B.37.4 Judging upright level flight at 38 degrees line elevation angle: At 38 degrees line elevation angle the model aircraft should follow a "straight line" flight path parallel to the ground in upright level flight. The length of this segment should be equal to the diameter of the first (inside) loop.

4B.37.5 Judging the second (outside) ¾ loop segment: *"..., three fourths of an outside loop"* means an arc measuring 270 degrees. The 270 degrees of this loop should be flown as a true circular arc without visible deviations from a circular flight path. The bottom of this loop should be at a height of 1.5 metres plus/minus 30 cm and this loop should end with the model aircraft entering "vertical" climb whose flight path is the same as the great circle line resulting from flying the first loop.

4B.37.6 Judging the first "vertical" climb segment: The model aircraft should climb vertically (at right angles to ground) and the length of this segment should be equal to the diameter of the first inside loop.

4B.37.7 Judging the third (outside) ¾ loop segment: *" ..., three fourths of an outside loop"* means an arc measuring 270 degrees. The 270 degrees of this loop should be flown as a true circular arc without visible deviations from a circular flight path. The bottom of this loop should be at a height of 38 degrees line elevation. The loop should end with the model aircraft recovering to inverted level flight at a height of 38 degrees line elevation angle plus/minus 30 cm.

4B.37.8 Judging inverted level flight at 38 degrees line elevation angle: At 38 degrees line elevation angle the model aircraft should follow a "straight line" flight path parallel to the ground in inverted level flight. The length of this segment should be equal to the diameter of the first (inside) loop.

4B.37.9 Judging the fourth (inside) ¾ loop segment: *" ..., three fourths of an inside loop"* means an arc measuring 270 degrees. The 270 degrees of this loop should be flown as a true circular arc without visible deviations from a circular flight path. The bottom of this loop should be at a height of 1.5 metres plus/minus 30 cm and this loop should end with the model aircraft entering "vertical" climb whose flight path is the same as the great circle line resulting from flying the first loop.

4B.37.10 Judging the second "vertical" climb segment:. The model aircraft should climb vertically (at right angles to ground) and the length of this segment should be such that the model aircraft flies through the complete clover leaf figure.

4B.37.11 Stop judging at:. The end of the last "vertical" climb as the model aircraft passes through a point exactly at right angles to the centre of the ground circle.

4B.37.12 Exit procedure: Should be flown as recommended by this rule but should not be judged or marked.

4B.37.13 Critical points are: Model aircraft is not flying level at a height of 38 degrees line elevation angle plus/minus 30 cm at the time of entering the figure. The top of the first inside loop does not meet tangentially, or overshoots the wingover path. The model aircraft recovers at a height other than 38 degrees of line angle elevation. The model aircraft climbs or descends during any level flight segments. The 38 degrees angle of line elevation level flight segments are too short or too long. The bottom of the second (outside) loop is not at a height of 1.5 metres plus/minus 30 cm. The first "vertical" climb is not at right angles to the ground. The first "vertical" climb is not tangential to the imaginary "vertical" line defined by the first loop. The top of the third (outside) loop does not meet tangentially, or overshoots the wingover path. The model aircraft recovers into inverted level flight at height other than 38 degrees of line angle elevation. The bottom of the fourth (inside) loop is not at a the same height as the bottom of the second (outside) loop. The "horizontal" and "vertical" flight segments are not superimposed one on top of the other. Loops are not of the same size. Loops are not round. The figure is not symmetrical in both axes. The final "vertical" climb is not at right angles to the ground.

4B.38 Landing *(Rule 4.2.16.16)*

4B.38.1 Entry: From normal level flight at any height between 1.2 metres and 1.8 metres.

4B.38.2 Start judging when: The model aircraft leaves the descent entry height at the beginning of its engine-out landing approach (glide).

4B.38.3 Judging the descent segment: The model aircraft should travel for one full gliding (engine out) lap, measured from the start of the descent until the point of touchdown. *" ... descends smoothly"* means that during the whole of this one gliding lap the rate of descent should remain constant.

4B.38.4 Judging the touchdown segment: *" ... with no bounce or unusual roughness"* means that the model aircraft gently touches down once only and then remains with all its main wheel/s in contact with the ground throughout the entire ground rollout.

4B.38.5 Judging the ground rollout segment: The model aircraft should come to a stop within one lap of the touchdown point.

4B.386 Additional factors for judges consideration: *"Unusual circumstances outside the pilot's control*" are either ground surface conditions or obstacles which suddenly appear to be apparently in the approach and landing path. The appearance of such obstacles could lead to the competitor making sudden, unplanned, and/or unspecified manoeuvres for safety reasons and should therefore not be penalised by the judges. Similarly, a rough ground surface could cause a model aircraft to bounce on landing without the competitor being able to control the bounce so again rough ground at a contest site should not be penalised by the judges. But with the exception of safety hazards such as an impending thunderstorm, weather conditions generally, and wind conditions especially, should **not** to be considered as *"unusual circumstances outside the pilot's control"*. Wind and weather should not therefore be considered by judges when awarding marks for the Landing, **except** during the last phase when, as stated at 4B.11 as an example, a sudden gust of wind coming from behind the model aircraft could cause it to flip over or tip onto its nose during the ground rollout, but with the competitor powerless to prevent the resulting "crash landing".

4B.38.7 Stop judging when: The model aircraft ceases the ground roll which is clearly in a forwards direction and in line with its normal flight path.

4B.38.8 Stop timing when: The model aircraft has come to a complete stop at the end of its ground rollout.

4B.38.9 Awarding marks for "irregular" landings: The Mark 0 (zero) points should be awarded for the complete landing manoeuvre if the model aircraft crashes; if it lands on its belly; or if it lands upside-down. The 0 (zero) points Mark should also be awarded if the model aircraft flips over, but this example is subject to the notes at 4B.38.5 above. The Mark 0 (zero) should also be awarded for the complete Landing manoeuvre if the official timekeeper confirms that the model aircraft has come to a stop after the total time allowed has elapsed *(Rule 4.2.11)*.

4B.38.10 Critical points are: The model aircraft does not fly level at the beginning of the final descent. The gliding (engine out) descent to touchdown is longer or shorter than one lap. The rate of descent in the gliding approach is not steady. The model aircraft touches down on its tail or nose wheel/s before the mainwheel/s touch. The touchdown is not gentle, and/or there are multiple mainwheel touchdowns. The ground rollout is longer than one lap.

4B.38.11 Additional remark: It is recommended that one member of the Judges' Panel makes a note of the total elapsed time on the score sheet of each competitor.

- ANNEX 4C -

CLASS F2C - TEAM RACE JURY GUIDE

It is the intent of this jury guide to aid both the F2C panel of judges and the competitors in realising a fair and enjoyable competition. The guide is an indication of the current consensus of the F2C rules as written in the Sporting Code. Problems with the rules or the guide, together with suggestions for improvement, are welcomed by the Control Line Subcommittee and will be considered at its annual meeting.

4C.1. F2C Panel of judges

4C.1.1. The F2C panel of judges is composed of three members, each of whom should have had recent experience in international competition or judging at that standard. Members of the F2C panel of judges should be of different nationalities for World and Continental Championships. Only one member need be of foreign nationality for Open International events, in an effort to reduce expenses for the host. All three members of the F2C panel of judges must have a good understanding of a common language.

4C.1.2. It is the duty of the F2C panel of judges to assure a fair competition between the teams and their model aircraft, and to disallow unfair actions which would result in placing one team at an advantage or another team at a disadvantage.

4C.1.3. The F2C panel of judges' responsibilities regarding issue of warnings, eliminations, reflights, only start with the GO signal; however, to help in the smooth running of the contest, they should assist the Circle Marshal by checking all other aspects of the contest are in accordance with the rule book. Examples of this are:

a) pilots and pitmen wearing helmets;

b) the correct 90 second warm-up and 30 second countdown are allowed;

competitors using the circle for unauthorised practice;

compliance with the model aircraft specification, for example, rules 4.3.4.e) (scale pilot head) and 4.3.4k) (transparent winsshield giving direct forward vivibility).

Transgressions should be brought to the attention of the Circle Marshal for him to rectify.

4C.1.4. Members of the F2C panel of judges should allocate the specific tasks of warnings operation, microphone use, note taking, prior to the commencement of the contest. They should also practice working together either by observing the official practice flights or, preferably, by viewing videos from recent previous championships. It is recommended that a video is situated in the jury tower. This should not be used by the F2C panel of judges before decisions are made nor will it be made available to teams before the end of the round but it will be useful for:

- later discussions between the members of the F2C panel of judges to aid better coordination;
- viewing by the FAI Jury in the event of a protest;
- viewing by teams and members of the F2C panel of judges for a better all-round understanding; and
- to be available for judges to train on prior to the next championships.

Video recording of a race may be accepted by the F2C panel of judges at its discretion to resolve protests related to flight incidents requiring a decision of reflight or disqualification.

4C.1.5 F2C panel of judges is recommended to adopt the following procedure during races:

a) before the start, each judge selects one team that he will watch at pitstops (preferably from a different nationality to the judge). His specific responsibilities are to check for:

- starting before GO,
- landing model aircraft outside circle,
- pilot foot out,
- handle off ground, etc.

His decision on violations must be accepted by the other judges without discussion and the appropriate penalties given.

b) For the remainder of the race, all members of the F2C panel of judges should observe all three competitors. It is recommended that the members of the F2C panel of judges adopt a running commentary of the race as this will allow them to centre in on any infringements quickly.

c) Warnings/eliminations should be given when verbal agreement of two members of the F2C panel of judges is obtained and no verbal disagreement is heard from the third member.

d) The panel of judges should give clear decisions immediately regarding teams that have been obstructed. It should not put the responsibility for fair play on the FAI Jury who probably will not have observed the incident.

e) It is a central part of the rules that protests can be made by teams who feel that they have not received a fair result. Juries should encourage teams to use this facility.

4C.1.6. It is equally important for members of the F2Cpanel of judges to observe model aircraft positions in flight in case collisions occur.

4C.1.7. Warnings should be communicated to the teams quickly, however, all warnings are effective at the lap or race time when the infringement occurs, not when verbally communicated to the team. Three warnings within a 100 lap race (or 200 lap final race) constitutes an elimination.

4C.1.8. Warnings should be given using short standard phrases whenever possible, the more common ones are shown below thus "....." under section 2. Verbal communication from the F2C panel of judges should be kept to a minimum to prevent pilot distraction. Teams should be called by their flying colour and not by name.

4C.2. Most Common Warnable Offences

4C.2.1. "WHIPPING" is the application of physical force to increase the speed of the model aircraft. This occurs when the model aircraft is behind the line perpendicular to the pilot's body (4.3.7.f). See also figures 1 and 2 at the end of this guide. This is a function of the position of the pilot's handle (H) relative to the centre of the circle (or centre of rotation CR) and the model aircraft M. The CR can be determined as illustrated in figure 2 by observing the rotation of the pilot's handle and taking the midpoint of the maximum left and right movement of the handle.

4C.2.2. "BLOCKING" is defined as obstructing another pilot either by body position or arm position, preventing the other pilot taking his correct piloting location and thus slowing down his model aircraft. See figures 1d and figure 4. Blocking is caused by the position and attitude of the blocking pilot. With the body between lines 3 and 4 blocking can be caused, rotation of the shoulders can cause more (a) or less (c) blocking action. Warnings should be given as soon as the overtaking pilot is impeded, delays can lead to more serious and potentially dangerous situations occurring. Pilots being blocked by a slower opponent will frequently attempt to clear the situation by crossing lines. Where the blocking pilot has received a warning for this but remains in the same position, then the overtaking pilot should not be penalised for line crossing for a short duration whilst he clears the obstruction. Excessive blocking to directly prevent being overtaken is an elimination offence (4.3.9.m)).

4C.2.3. "PIVOTTING" is defined as keeping the handle in the centre of the circle with the pilot's body behind the centre.

4C.2.4 "TAKING CENTRE" is defined as the pilot physically keeping his body in the centre and forcing the other pilots to walk around him. This can also occur when a pilot does not return to walking forward after completion of his overtaking manoeuvre.

4C.2.5 " LINE SHORTENING" occurs when either:

a) the centre of rotation is in front of the pilot's handle, or

b) the handle is pulled back from its correct position in front of the body.

4C.2.6. "ILLEGAL HANDLE POSITION" occurs when the pilot does not fly in accordance with rule 4.3.7.1. this is frequently the precursor to a blocking situation.

4C.2.7. "PILOT INTERFERENCE" is defined as holding or pulling another pilot such that his normal activities may be impeded. Warnings should not be given when a pilot touches another pilot only to help his orientation.

4C.3. Competitors Activities During the Race.

4C.3.1. Proper pilot activity is to attempt to walk a circle at the centre of the 3 m centre circle so as to keep the control handle moving forward, in the same direction as the model aircraft and that circle should be as small as practicable.

4C.3.2. The pilot keeps his controlling hand on the centre-line of his body, with his hand in close proximity to his chest (approximately 10 cm). The handle position is restricted to any place between the middle of his chest and the top of the forehead (rule 4.3.7.f). He is allowed to move his handle away from the body (forward) but still on the centreline in order to better control the model aircraft during overtaking for a maximum of three laps. During overtaking, the pilot's head may be removed from the centreline for better vision of his model aircraft. During takeoff and landing rule 4.3.7.f. does not apply (up to 2 laps).

4C.3.3. Rule 4.3.9.h. states that teams shall be warned for any flagrant breach of the rules. Actions by either team member leading to a dangerous situation during a race shall be considered a flagrant breach. The following specific examples are given:

a) Pilot flies too high immediately after takeoff.

b) Pilot stands erect or raises hand above head immediately after takeoff and before fully joining other pilots in the centre.

c) Pilot does not immediately join other pilots in the centre.

d) Pilot does not lower his head and bend down during landing approach.

e) Pilot does not promptly bring his model aircraft below 2 m after the engine has cut.

f) Pilot, when running the model aircraft on ground for more than one segment during landing, does not attempt to avoid (hop over) the lines of other model aircraft that are refuelling and restarting.

g) Pilot flies the model aircraft at an effectively dangerous radius when passing over another mechanic, i.e. his handle should remain inside the 3 m circle until the last segment.

h) Mechanic releases his model aircraft with physical effort (see take-off at 1.4.12).

i) Mechanic has the model aircraft or its lines significantly off the ground during repair, adjustment, change of segment, catch, refuelling or restarting.

j) Mechanic releases model aircraft without properly checking that no other model aircraft is overflying his pit position (especially landing) causing it to bypass its mechanic in order to avoid a collision. . reflight for the other team. Note if a collision occurs, the team releasing its model aircraft is eliminated.

It is important to remember warnings are given in these situations when the action(s) actually causes danger to other competitors or their model aircraft. Generally, this means that when a competitor is flying solo and behaves as described above, he will not be warned. Danger to other competitors can only occur when they are racing. A F2C panel of judges cannot, however, wait until an incident/collision occurs before giving warnings. This would be patently unfair to competitors who have had their flight obstructed and possibly model aircraft damaged. The responsibility of the F2C panel of judges to give warnings in these situations must be viewed as a controlling mechanism to maintain a satisfactory standard so that a dangerous situation does not arise.

Rule 4.3.9. states " In the event of any serious breach of the rules, the F2C panel of judges may eliminate the team from the race". This should be restricted to unsafe and/or unsporting actions, in addition to those specifically listed under items i) to t).

When a competitor has been eliminated. he should land his model aircraft immediately (within 10 laps). If he does not attempt to land, and continues to prevent the other competitors continuing without interference, the F2C panel of judges will inform the FAI Jury with a view to his disqualification from the whole contest. Teams that are eliminated in a race have the right of protest to the FAI Jury. If the protest is upheld, they will be granted a reflight. Their original race time will not be counted, therefore, there is no advantage to be gained by flying on after elimination.

A contest consists of three distinct sections: eliminating races, semi-finals, final. Each section poses its own unique problems for the F2C panel of judges and the competitors. The first couple of races will have a significant effect upon the standard of the rest of the contest. It is important that both the competitors and the F2C panel of judges are aware of this. The F2C panel of judges has to maintain an even standard throughout the two (or three) rounds of eliminating races. It will be aided in this if the competitors in the early races recognise this fact. Juries' decisions are made in response to actions taking place in the flying circle. It is very important that members of the F2C panel of judges have got a unified understanding between themselves before the first race.

Semi finals are between the top placed competitors, with very little difference in speed and ability between them. The F2C panel of judges should aim to keep a similar standard to the races, however, this may not always be possible (nor is it essential) as the emphasis is likely to be different with teams having less speed differential, overtaking is more difficult, tension is higher, blocking situations are more frequent. Again, the prime responsibility of the F2C panel of judges is to maintain an even standard across all semis.

The final is a unique race between the three best teams. It is double the distance, but teams are still allowed two warnings before elimination! It cannot be juried in exactly the same manner as the races, the F2C panel of judges must issue warnings where safety is at risk, teams are gaining an unfair advantage or are obstructing other teams, but should be more lenient on purely technical infringements that will have no direct effect on the result of the final. Where teams have already received two warnings, and are equally guilty of a third warnable offence, juries are recommended to allow the race to continue and be decided by stopwatch. It is preferable that the results are determined by the competitors and not by a dictatorial F2C panel of judges.

All competitors should recognise that variations on warnings given will occur during the course of the contest, and that the F2C panel of judges will miss/not observe some incidents. The F2C panel of judges operates from a fixed location and must take this into account. It should not give warnings for technical infringements where by virtue of position it cannot treat all teams equally, except when there is a significant safety risk or gross misconduct.

The rules state that the model aircraft cannot fly for more than two laps without the engine running. When this occurs close to the end of the race, it is important that the F2C panel of judges is given a clear signal from the timekeepers at the 98 lap stage.

The draws for flying order should be made by the F2C event director in the presence of the F2C panel of judges as early as possible so that competitors are given the maximum time to prepare. The second (third) round of eliminating races should be drawn immediately after completion of the first (second) round. For semi-finals both rounds are drawn at the same time using the following matrix. If three competitors of one nation have qualified they are placed diagonally across the matrix (A); other multiple nations are placed in the matrix randomly across the X axis (B).

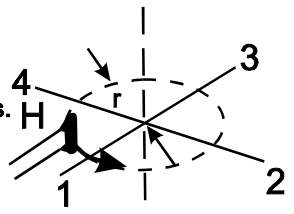
A B..... F The first round is selected horizontally

B A..... D The second round is selected vertically

C E..... A In each case a random draw is made to determine segment choice.

FIGURE 1

Figure 1a
Normal Handle position. Pilot slightly holding back his own handle, but not lobcking his opponents. Radius r must be as small as possible



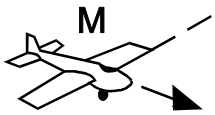
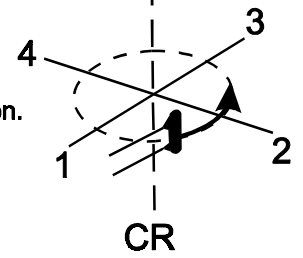


Figure 1b
Classical whipping position. If pilot walks forward, no blocking occurs.



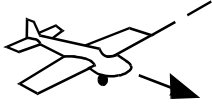
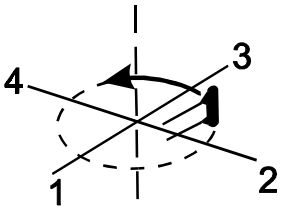


Figure 1c
Whipping and shortening of flying radius. Severe blocking of opponents may occur. This position is very often combined with walking backwards. (e.g. walking backwards after overtaking)



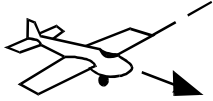
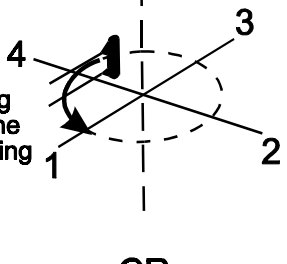


Figure 1d
Walking forward but in the wrong segment results in blocking of the opponents as well as in shortening of the flying radius



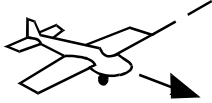


FIGURE 2

With a little practice the CR is very easy to find in this way, and if one can, one can understand a lot more about what happens during a race.

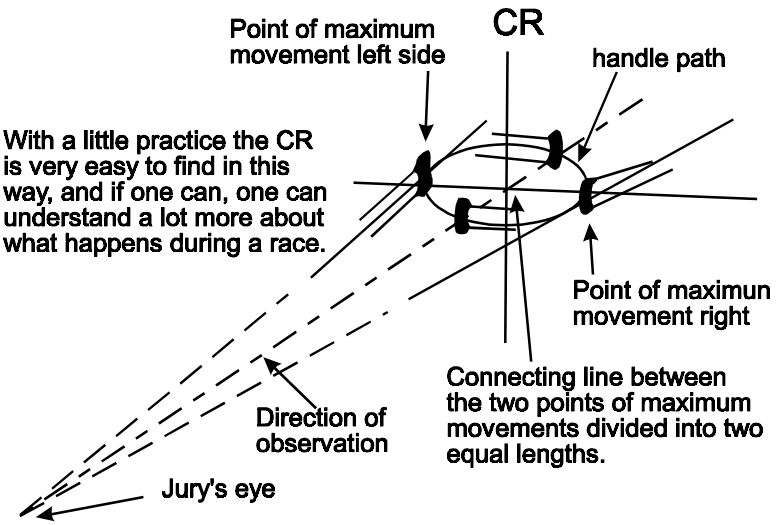


FIGURE 3

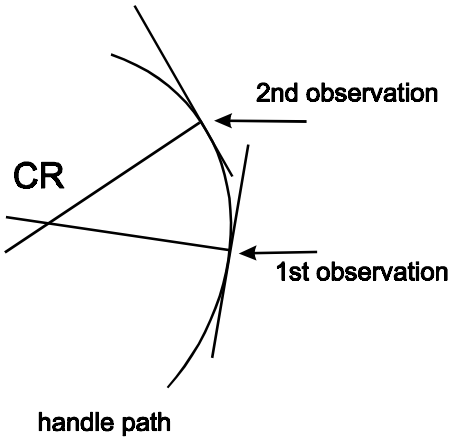
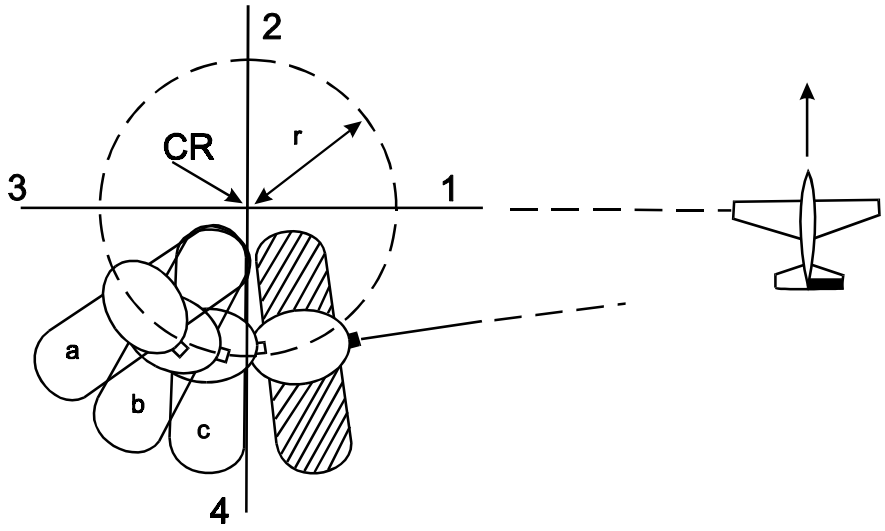


FIGURE 4



- ANNEX 4D -

CONTROL LINE WORLD CUP RULES

4D.1. Classes

The following separate classes are recognised for World Cup competition in Control Line: F2A (speed), F2B (aerobatics), F2C (team racing) and F2D (combat).

4D.2. Competitors

All competitors in the specified open international contests are eligible for the World Cup.

4D.3. Contests

Contests included in the World Cup must appear on the FAI Contest Calendar and be run according to the FAI Sporting Code. The contests to be counted for a World Cup in a particular year are to be nominated at the CIAM Bureau Meeting at the end of the preceding year and are to be indicated on the FAI Contest Calendar. The selection of the contests for each class should be according to the following guidelines:

a) a maximum of two contests in each class may be selected for any one country.

b) each competitor (team in F2C) may count only one competition from each country in Europe (taking the better score for any European country in which he has scored in two competitions).

4D.4. Points Allocation

The points to be allocated to competitors (teams in F2C) will depend in each class on the number (N) of competitors (teams in F2C) who will have completed at least one flight in the event. A competitor (team in -F2C) has completed a flight if in:

- F2A he registers a speed not equal to zero (0);
- F2B he registers a score not equal to zero (0):
- F2C he registers a time not equal to zero (0);
- F2D he flies in a heat

Points are allocated to competitors (teams in F2C) who will have completed at least one flight according to their placing in the results given in the following tables:

a) N > 20

Placing	1	2	3	4	5	6	.....	20	21 and after
Points	20	19	18	17	16	15	.....	1	0

A bonus of 8 points is given to the first, 5 points to the second and 3 points to the third.

b) N < 20 or N = 20

Placing	1	2	3	4	5	6	.....	N-1	N
Points	N	N-1	N-2	N-3	N-4	N-5	.....	2	1

The bonus is defined as follows:

- for first: N/3 rounded up to the nearest whole number of points with a maximum of 7 points;
- for second: N/5 rounded up to the nearest whole number of points with a maximum of 4 points;
- for third: N/7 rounded up to the nearest whole number of points with a maximum of 3 points

In the event of a tie for any placings, the competitors (teams in F2C) with that placing will share the points which would have been awarded to the places covered had the tie been resolved (round up the score to the nearest whole number of points).

4D.5. Classification

The World Cup results are determined by considering the total of points obtained by each competitor (team in F2C) in the World Cup events. Up to three events may be counted, selecting each competitor's (team's in F2C) best scores during the year. The winner of the World Cup is the competitor (team in F2C) with the greatest total.

In the event of a tie for first, second and third place, the place will be determined according to the following scheme. The number of events counted is increased from three, one at a time, until the place is obtained. If this does not separate the tied competitors then the winner will be determined by considering in the best three events:

- in F2B and F2D the points obtained in each event multiplied by the number of competitors who will have completed at least one flight in the event; the winner is the one with the greatest total thus calculated.
- in F2A the best speed and in F2C the best time.

4D.6. Awards

The winner is awarded the title of the winner of the World Cup. Further medals, trophies or certificates may be awarded by the CIAM Control Line Subcommittee as available.

4D.7. Organisation

The Control Line Subcommittee shall be responsible for organising the World Cup and may nominate a responsible person or special subcommittee to collect the results.

4D.8. Communication

The Control Line Subcommittee should receive the results from each contest in the World Cup and then calculate and publish the Current World Cup positions. These should be distributed to the news agencies and should also be available, by payment of a subscription, to any interested bodies or individuals. Final results of the World Cup are to be sent also to the FAI, National Airsports Controls and Model Aircraft press.

4D.9. Responsibilities of Competition Organisers

Competition organisers must propose their event for inclusion in the World Cup when nominating events for the FAI International Sporting Calendar. The final selection of events from these proposals is made by the CIAM Bureau as defined in paragraph 3.Immediately after the event, the competition organiser must send the results to the World Cup organiser, at least within one month as required in the Sporting Code B.6.5.. Any failure to return results promptly will be reviewed by the CIAM Bureau when considering the competition calendar for the following year.

4D.10. Board of Judges

A Board of Judges of three responsible people shall be nominated by the CIAM Control Line Subcommittee to rule on any protest concerning the World Cup during the year. Any protest must be submitted in writing to the Control Line Subcommittee Chairman and must be accompanied by a fee of CHF 80. In the event of the Board of Judges upholding the protest, the fee will be returned.

In a World cup competition, any infringement of the Sporting Code rules concerning composition of a panel of judges will lead to the cancellation of the results of the competition for the class which is concerned. The only exception to be considered is the case of an obvious withdrawal of a judge at the last moment. A FAI Jury member involved in a Panel of judges has to be replaced for that class (as FAI Jury member) by another eligible person

- ANNEX 4E -

CONTROL LINE ORGANISERS' GUIDE

Foreword: This guide is intended to give some helpful advice to organisers of international contests. The guide should be looked upon as a set of recommendations concerning contest organising, and the statements are in no way to be regarded as definite rules except in those cases when they quote the Sporting Code. The guide is written for world championships, but can be used for any international competition. If so, compare with the Sporting Code for aberrations.

FIRST PART: PRE-CONTEST ARRANGEMENTS

Contents:

Time schedule for organising the world championships and information to the CIAM Bureau: See General Organisation of a World Championship.

Appendix I: .....Site Layout - Scale 1: 1000

Appendix II: .....Team-racing circle dimensions.

1. Information

1.1. The offer to organise will be given not later than at the CIAM Plenary meeting the year previous to the W/Ch.

1.2. First information can be given at the next Plenary meeting.

1.3. First information to intended judges and jury members should preferably be distributed not later than January 1 the year of the W/Ch. This information must stress that the appointment is subject to the approval of the CIAM Bureau meeting the following spring.

The jury members must be chosen according to Sporting Code ABR Section 4B para. B.4.

The Judges must be chosen from the approved FAI list of judges and according to Sporting Code Volume ABR Section 4B para. B.4.5. - B.4.6. and Volume F2 Section 4C para. 4.2.13. - 4.3.12. and 4.4.18.

1.4. Information to National Airsports Controls and entry forms must be dispatched at least three months before the contest (Sporting Code Volume ABR Section 4B para. B.6.1.). This information must contain date, place, time schedule and name and address of contact person. It is possible to ask for a preliminary number of entrants at an early stage and have this figure completed with names at a later date but not later than one month before the competition.

1.5. Information to the CIAM Bureau shall be given by a delegate from the organising nation at the Bureau meeting prior to the competition.

This information shall include jury and judges according to Sporting Code Volume ABR Section 4B para. B.4. and Volume F2 Section 4C para. 4.2.13., 4.3.12. and 4.4.18. for approval.

An example of this information is given in General Organisation of World Championships.

1.6. The organiser must acknowledge receipt of the entry form and the entry fees (Sporting Code Volume ABR Section 4B para B.6.6.). This should be done in due time before the contest.

2. Publicity

2.1. A first set of information to national press, radio and TV can be dispatched about half a year before the contest. It should contain common information about model flying and some basic information about the international contest which is to be run.

2.2. Simultaneously a set of information should be sent to the international model flying press.

2.3. About two months before the contest an information meeting should be arranged with invited guests from the main national newspapers and radio and TV.

At this stage it should be possible to release detailed information about the contest, such as number of entrants, etc.

2.4. A second set of information should be distributed as 2.1. and it should contain mainly the same information as given under 2.3. It should also be sent to the international model flying press.

2.5. Press conferences should be prepared to be held during the contest.

2.6. Posters about the contest should be distributed at least in the city where the contest area is located about one month prior to the contest.

3. Time Schedule

3.1. A common time schedule for control line W/Ch is as follows:

1st day: .....Arrival

2nd day: .....Processing, Test flying

3rd day:.....Inauguration, 1st round speed, aerobatics, team racing

4th day: .....2nd round speed, aerobatics, team racing

5th day: .....3rd round speed, 3rd and 4th rounds aerobatics, semifinals and final team racing, prize giving banquet

6th day: .....Departure

4. Practice flights

4.1. The fact that some teams prefer to arrive several days in advance for practice flying should be considered. Accommodations should be arranged or at least advised prior to the contest, and the tracks or any suitable area in the neighbourhood must be open for flying.

4.2. During the contest it should be possible to perform practice flights within the contest area or in another suitable place close to it. The tracks should be open for test flights whenever they are not used for contest rounds.

4.3. If space permits an extra circle for test flying is recommended within the contest site.

4.4. If test flying only can be arranged far away from the contest site a transportation system of suitable frequency (e.g. mini-buses) must be in use.

5. Awards (Sporting Code Volume ABR Section 4B para. B.12)

5.1. The organiser should get in contact with FAI and the CIAM Secretary to assure that perpetual trophies, diplomas and medals are delivered to the contest in due time.

5.2. If there is any intention to offer a new perpetual trophy, it should be approved by the CIAM Plenary Meeting the year before the contest.

6. Contest grounds

6.1. General. The place should be chosen in such a way that the following are considered:

6.1.1. Distance between accommodations - feeding place - contest ground should be kept to a minimum.

6.1.2. Easy transports for entrants and spectators. Bus tours should be organised.

6.1.3. Parking areas for entrants and spectators.

6.1.4. Noise problems (if any).

6.1.5. Windy places should be avoided, if possible.

6.1.6. Turbulence caused by trees or houses surrounding the circle (especially for aerobatics) should be avoided.

6.1.7. Site and surroundings must not be dusty (dust clouds in the contest area might well break the engines). Grass is to be preferred in between the circles.

6.1.8. If possible: areas for test flying close to the contest area (test flights might interfere with the contest).

6.1.9. Public conveniences must be available at the contest area.

6.2. Layout

6.2.1. The area should preferably contain three hard circles and, if combat is included: one grass circle. The circles shall be horizontal. The distances between the circles must permit safe passing while the models are flying.

See the lay-out sketch in Appendix 1.

The circles should not be too widely spread as this will cause communication problems for the teams and the officials.

6.3. Depots

6.3.1. Sufficient area for depots must be provided. The depots should be placed within the contest area and they can be of open air, tent or indoor type. They should preferably be equipped with a sun - or rain - shed.

6.3.2. Avoid putting the depots so close to the tracks that motor testing interferes with the starting procedures.

6.3.3. The depots should be organised in such a way that spectators cannot obtain access to them. They should be easily entered by the competitors.

6.3.4. The depots should preferably be equipped with an area (4 m x 24 m per nation) where models with lines and handles assembled can be put. This area can be marked by cloth bands on short poles.

6.3.5. Tables and chairs in each depot are always appreciated.

6.4. Site

6.4.1. The contest site should be fenced off so spectators can be outside it. Places for spectators should thus be placed outside the limits of the area although as close to it as possible.

6.4.2. The different hard circles should be made of tarmac, asphalt or similar material. The surface shall be smooth without rough joints and free from grit and dust. It is recommended to have the tracks leaning slightly outwards so water is not collected on them.

6.4.3. The best track is the one where the complete circle area is made of the same material. If there is grass or gravel between the centre circle and starting and landing circles there is a risk that lines are caught thus causing accidents.

6.4.4. If the flying surface is shaped like a ring, then enough space must be left both inside and outside the 15,92 m circle to permit normal foot work to the pilot for safe take-off and landing without the model falling outside the smooth area.

6.4.5. The central part of the flying circle must be smooth, but not slippery, especially in case of rainy weather (rough tarmac, rough concrete or coating with special anti-slip paints is recommended). Its radius must be sufficient during take-offs and landings.

6.5. Tracks

6.5.1. Speed

6.5.1.1. In case of a permanent installation, checks s The speed circle must be surrounded by a fence 2,5 m high according to Sporting Code Volume ABR Section 4C para. 2.2.2.b). It should be placed as close to the track as possible, but the radius must not be shorter than 22 m. There should also be a place for timekeepers, officials and their equipment.

6.5.1.2. In case of a permanent installation, checks must be made for any rust or corrosion (especially near the sea) reducing its strength.

6.5.1.3. On the fence, diametrically opposite to the timekeepers place, there should be a mark on the fence, preferably a white board, 20 cm wide and at least 2 m high. It should be placed at the normal flight level at 1 - 3 m height.

6.5.1.4. At three evenly spread places there shall be T-marks showing the flight heights of 1 m, 3 m and 6 m.

6.5.1.5. The fence shall have one entrance and one exit opposite to each other.

6.5.1.6. Just outside the entrance there shall be a line control square, fenced off with a low fence or a rope. In this square the line length 15,92 m will be marked by marks firmly fixed to the ground. The marks should preferably be of the edge type, and the edges not wider than 2 mm.

6.5.1.7. In the centre of the circle there shall be a speed pylon according to Sporting Code Volume F2 Section 4C para. 4.1.7. The pylon must be firmly fixed to the ground.

6.5.1.8. Any protruding part which may engage the pilot's clothes must be avoided on the lower (non-rotating) parts of the pylon.

6.5.1.9. The pylon must be checked for sufficient stiffness in the fully extended position. The pylon must reach a sufficient height to permit flying with the handle at shoulder level.

6.5.1.10. The device which holds the upper (rotating) part of the pylon at the height chosen by the pilot, must be built in such a way that it assures a positive positioning avoiding any displacement during the official flight. Checks are recommended in this respect, in case of an old pylon, after prolonged use and wear.

6.5.1.11. The swivel must be free from any appreciable friction or stiffness.

6.5.1.12. Any eventual bolts for fixing the pylon to its base or the ground must be under ground level or conveniently covered flush to the ground, so the pilot is allowed to run around the pylon with his feet close to it without hindrance. If the pylon has a flange for fixing it to the ground, the same aspects should be regarded.

6.5.1.13. The judges and the timekeepers should be placed in a special area with a safety fence between themselves and the flying models. The area must be chosen so the officials have the sun behind their backs, and so it does not interfere with the timekeeping.

6.5.2. Aerobatics

6.5.2.1. A large circle is needed. It should permit fliers to use 21,5 m lines considering that they tend to walk around in the centre, sometimes with their flying arm straight towards the model.

6.5.2.2. The centre point should be marked on the ground, preferably together with a small centre circle of approximately 1 m radius, just to help the pilot to know where the centre is.

6.5.2.3. A mark for the maximum line length of 21,5 m should be painted on the ground and the distance could be measured to the centre circle.

6.5.2.4. The judges shall have an area all along the outside of the track so they can place themselves in the best position according to changes in the wind direction.

6.5.2.5. Around the circle there should be marked a "danger area" preferably by a low fence, a rope etc. to prevent people from walking too close to the flying models. This fence shall have a radius not shorter than 25 m.

6.5.3. Team Racing

6.5.3.1.1. The centre circle and the flight circles shall be marked (painted) on the ground in a colour having a high contrast on the ground,according to Sporting Code Volume F2 para. 4.3.2. The circle lines shall be 10 cm wide. The radii are:

Centre circle , 3,0 - 3,1 m
Flight circle, 19,5 - 19,6 m

The centre of the centre circle shall be marked with a spot of 0,3 m diameter in the same colour as the circles. See Appendix II.

6.5.3.2. The team race circle must be surrounded by a fence 2,5 m high according to Sporting Code Volume ABR Section 4C para 2.2.2.b. It should be placed as close to the track as possible but the radius to the circle centre shall not be shorter than 22 m.

6.5.3.3. In case of a permanent installation, checks must be made for any rust or corrosion (especially near the sea) reducing its strength.

6.5.3.4. At three evenly spread places there shall be T-marks showing the flight heights of 2 m, 3 m and 6 m.

6.5.3.5. The fence shall have one entrance and one exit preferably diametrically opposite to each other to allow a smooth flow of entrants at the end and beginning of each race.

6.5.3.6. Just outside the entrance there shall be a line control square at least 4 m x 18 m, fenced off with a low fence or rope. In this square, the line length 15,92 m shall be marked by two marks firmly fixed to the ground. The marks should preferably be of the edge type, and the edges not wider than 2 mm.

6.5.3.7. In the square there should be signs showing where to keep the handles and where to keep the models. As motor running is allowed in the square while a race is running, the models should be kept away from the jury's place.

6.5.3.8. The jury is preferably placed on a raised floor about 2 m above the ground just outside the safety fence. There shall be a 6 m high tower for one official checking high flying models. The jury members must be placed close together having the sun behind their backs.

6.5.3.9. At the track there shall also be three lap-counting displays, a big enough to be seen (clearly) from the track, and three sets of warning indicators.

6.5.4. Combat

6.5.4.1. The combat track should consist of short cut grass.

6.5.4.2.1. The centre (piloting) circle (radius 2 m) and the flight circle (radius 20 m) must be clearly marked on the ground.

6.5.4.3. The track should be fenced off with at least a low fence or a rope surrounding the track as close as possible, but with a radius to the circle centre not shorter than 22 m.

6.5.4.4. A square for line tests shall be arranged just outside the circle. It should contain two line length marks 15,92 m apart.

6.5.4.5. The judges should be placed so they have the sun behind themselves, and so it does not affect their ability to observe the flying models.

7. PA Systems

7.1. One system addressing the spectators.

7.2. One system addressing the entrants, calling them for flights, etc.

7.3. One system to be used by the team race jury addressing teams during their races.

7.4. Hand-held devices are needed in combat and are very useful in speed and aerobatics.

Remarks: 7.1. and 7.2. can be combined. 7.3. cannot be combined with any other use.

8. Equipment

8.1. Speed

3 stopwatches showing at least 1/100 sec. for clocking the speeds.

1 stopwatch for clocking the attempt times

1 pair of field glasses, on a pivot, used to check the position of the handle in the pylon fork.

1 pylon (Sporting Code Volume F2 Section 4C para 4.1.7.)

1 handle (Sporting Code Volume F2 Section 4C para. 4.1.7.)

1 table and a sufficient number of chairs for the officials.

Sun- or rainsheds for the officials

1 micrometer 1/100 mm resolution

1 depth micrometer 1/100 mm resolution

1 internal diameter micrometer with its calibrating tool (0-15 mm)

1 metal graduated rule 1 m long - 1 mm resolution

1 metal graduated rule 300 mm long - 1 mm resolution

1 balance 1 kg capacity ± 5 g accuracy

1 spring balance for pull tests 0 - 50 kgf.

1 measuring tape 20 m

Fuel to both the standard formulas (Sporting Code Volume F2 Section 4C para. 4.1.3.)

A number of plastic bottles about 200 cm^3 capacity for filling of tanks.

1 - 3 squeeze bottles or injection-syringes for rinsing the tanks.

8.2. Aerobatics

1 stopwatch for clocking starting time

1 stopwatch for clocking flight time

1 spring balance for pull tests 0-50 kgf.

1 micrometer 1/100 mm resolution

1 depth micrometer 1/100 mm resolution

1 metal graduated rule 1 m long - 1 mm resolution

1 metal graduated rule 300 mm long - 1 mm resolution

1 balance 1 kg capacity ± 5 g accuracy

1 balance 5 kg capacity 25 g accuracy

1 measuring tape 30 m

1 flag for visual indication at time stages (Sporting Code Volume F2 Section 4C para 4.2.13.)

10 chairs and 10 rain- or sunsheds for the jury and the secretaries.

5 blotting pads for the secretaries.

8.3. Team Racing

6 stopwatches registering at least 1/100 sec.

6 manually operated lap counters

1 spring balance for at least 15 kgf pull

1 micrometer 1/100 mm resolution

1 depth micrometer 1/100 mm resolution

1 internal diameter micrometer with its calibrating tool (0-15 mm)

Graduated glass burette, capacity 10 cm^3, accuracy 1/20 cm^3

1 metal graduated rule 1 m long - 1 mm resolution

1 metal graduated rule 300 mm long - 1 mm resolution

1 balance 1 kg capacity ± 5 g accuracy

1 measuring tape 20 m

Jigs for checking fuselage dimensions, 100 mm and 50 mm

25 mm jig for wheel dimension

1 starting pistol, whistle, etc.

1 flag

3 remote lap indicators, showing each lap from 0 to 100. They should be painted in different colours so they can easily be identified by the teams and the spectators.

3 sets of warning indicators showing green, amber and red light. They should be controlled by the jury and it must be possible to light the different indicators independently of the others (Sporting Code Volume F2 Section 4C para. 4.3.13.b.)

2 sets of coloured pieces of cloth for each teams. There should be two pieces for each team, and they should be of different colour for the three teams participating in a heat. The pieces of cloth should be equipped with bands so they easily could be fastened on the entrants.

17 chairs for the timekeepers, lap counters and jury members.

Sun- or rainsheds if needed

1 table for the jury

Cleaning equipment so the oil and fuel could quickly be removed from the starting positions.

8.4. Combat

1 stopwatch to clock the heat time.
2 stopwatches (accumulating) to clock the flight times
1 micrometer 1/100 mm resolution
1 depth micrometer 1/100mm resolution
1 internal diameter micrometer with its calibrating tool (0-15 mm)
1 metal graduated rule 1 m long - 1 mm resolution
1 metal graduated rule 300 mm long - 1 mm resolution
1 balance 1 kg capacity ± 5 g accuracy
1 spring balance for pull tests 0 - 50 kgf.
1 measuring tape 20 m
1 flag
1 starting pistol, whistle, etc.
Streamers
5 chairs for the jury and the timekeepers
1 table for the jury
5 blotting pads for the jury and the timekeepers
Aspirin for the jury

8.5 Secretariat: Should be kept in a house or a caravan, preferably not in a tent.

Typewriter
Desk calculators
Spare stopwatches
Combat streamers
Scoreboard
Felt pens
Printing equipment
For processing:
Slide rules
Contest numbers
Contest portfolios
Stamps
Table of nationality markings
Sporting Code
Rules displayed, national language
Rules displayed, FAI language.

9. Officials and Judges:

The number of officials needed varies between the different classes. The number given are those officials needed for each separately, and the fact that officials sometimes can have doubled duties is not considered.

9.1. Contest management:

1 Contest manager
1 Treasurer
1 Quartermaster
1 Secretary

1 PR officer

1 Official in charge of each class

1 Official in charge of transports

1 Official in charge of PA systems

9.2. FAI Jury: 3 jury members (Sporting Code Volume ABR Section 4C para. 2.4.1.)

9.3. Speed:

3 timekeepers (Sporting Code Volume F2 Section 4C para. 4.1.16.a)

2 judges (Sporting Code Volume F2 Section 4C para. 4.1.16.b)

2 officials for line tests

1 circle marshal, could be main timekeeper or one of the judges

9.4. Aerobatics

5 judges (Sporting Code Volume F2 Section 4C para. 4.2.13.)

5 secretaries (Sporting Code Volume F2 Section 4C para. 4.2.13)

1 master timekeeper (Sporting Code Volume F2 Section 4C para. 4.2.13.)

2 officials for line and pull tests

Calculating personnel in the secretariat

9.5. Team Racing

3 Judges (Sporting Code Volume F2 Section 4C para. 4.3.12.a)

6 timekeepers (Sporting Code Volume F2 Section 4C para. 4.3.12.b)

6 lap counters (Sporting Code Volume F2 Section 4C para. 4.3.12.c)

1 circle marshal (Sporting Code Volume F2 Section 4C para. 4.3.7.b)

2 officials for line tests

1 official in charge of line control square, and motor running prior to heats

1 official looking for high flying models

9.6. Combat:

3 judges

4 timekeepers/score counters

2 officials in charge of pull tests

In the secretariat there should be a sufficient number of officials to serve the different classes such as: calculating personnel, messenger persons, recording personnel etc.

Aerobatic results should be checked twice, by two different officials, before they are released.

Timekeepers and other officials must have sufficient experience.

Special education and training courses for officials must be arranged if there is any lack of experience from international contests.

10. **Emergency - First Aid**: At least one medical attendant should always be available on the site when flying is permitted. One ambulance, on request.

11. **Insurance**: The organiser must take measures so every entrant is insured against public liability during the contest and during the organised practice flights.

12. **Accommodation**: Accommodation should be of a satisfactory standard. Special attention must be paid to the hygienic problem. Showers should be available. There must be a sufficient number of toilets for all the entrants.

If possible there should be family accommodations as well as separate lodgings for men and women.

Camping facilities are always asked for.

13. **Food**: The menu should not be too locally composed, but should rather be of an international kind.

The fact that some entrants' religions could limit the choice of food must be considered.

14. **Fuel - World Championships**: The organisers shall provide, for cost, up to 20 litres of fuel per competitor for practice flying and, when a FAI standard fuel is not specified, for use in competitions. The fuel must be requested in advance (at the time of entry). Unless a standard fuel is specified for use in an event, the competitor shall specify the constituents to be purchased on his behalf. Fuel supplied by the organisers shall be mixed from top quality material. Methanol shall be at least commercial grade without additives. Castor oil, when used, shall be at least equivalent in quality to Castrol M.

15. **F2C -** The team manager may never become physically involved during the race.

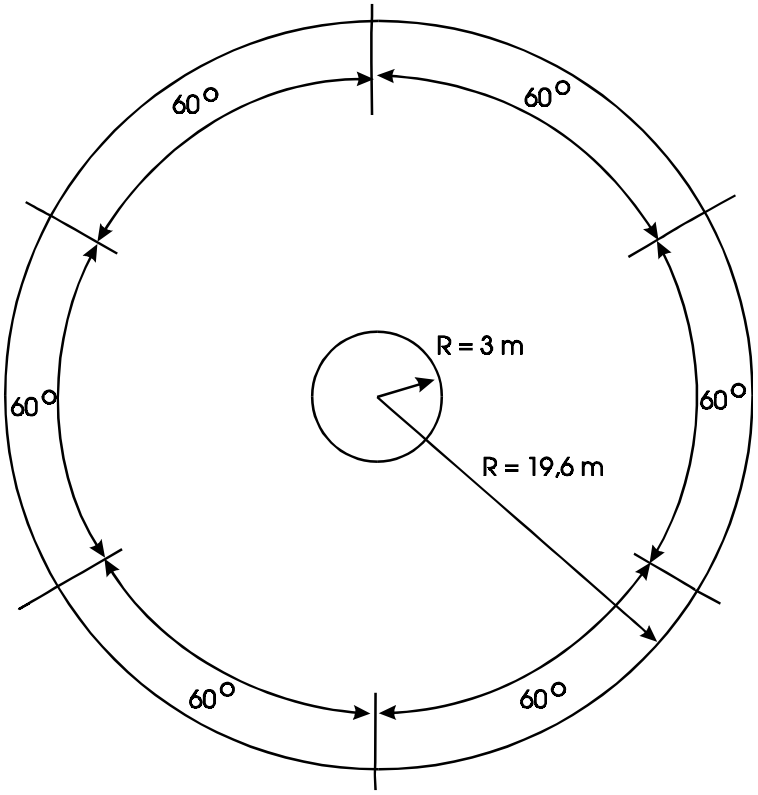
16. **F2C -** During the landing process, the landing model has the priority.

Note: For time schedule, see General Organisation of a World Championship.

APPENDIX I

Site Layout
Scale 1:1000

APPENDIX II
Team-racing circle dimensions



The centre circle and the flight circles shall be marked (painted) on the ground in a colour having a high contrast on the ground. The circle lines shall be 10 cm wide.

The radii are:

3,0 - 3,1 m for centre circle

19,5 - 19,6 m for flight circle

The centre of the centre circle shall be marked with a spot of 0,3 m diameter in the same colour as the circles.

SECOND PART: CONTEST ARRANGEMENTS

Contents:

1. **Reception**: Reception should be laid out in such a manner so as to allow the quick handling of arriving teams (or part teams). The name of the team manager should be known in advance so that he may be given details of team managers' meetings , processing times, practice times, need to inspect teams' sporting licences, etc.

As soon as the participants or supporters arrive, they should be given their food vouchers (if applicable) and the place and details (map if necessary) of their sleeping and lodging arrangements. It is of course advisable to have several persons working in parallel to deal with the inevitable sudden influx of competitors.

In addition to the personnel dealing with the above, two other officials should be available at the reception area. One to deal with financial arrangements - late entry fees, etc. and one prepared to answer any questions of a general nature about the competition timetable, transport, practice times and places, etc.

Some competitors at this time are understandably tense and nervous and are likely to have problems with language and general procedure in a foreign country. Every effort should be made to assist them to join smoothly into a previously prepared scheme.

Verification of sporting licences can often cause a bottle-neck at reception. A possible alternative is to insist that the team managers bring their teams' sporting licences to the team managers' meeting for inspection.

Where transport is available, reception should enquire if arrivals need transportation and make a note of those teams that will require daily transport throughout the contest.

2. **Transport**: If the placement of the participants' lodgings are further than a reasonable walking distance to the competition site, the organisers should be in a position to offer transport (to and from the site) to those teams requiring it.

3. **Team Managers Meeting**: It is important to hold the first of these meetings as soon as conveniently possible after the arrival of all teams. This information could well be published in the pre-contest material together with a time and place (if known in advance).

A suggested agenda for the TMs meeting is as follows:

1. Welcome of teams by contest director
2. Urgent problems involving lodgings, transport or feeding of competitors
3. Introduction of members of juries, judges, etc.

4. Draw for any necessary flying order
5. Comments from FAI Jury on any new rules or flight procedures they feel should be emphasised
6. Comments from other judges or jury members about interpretation of rules or general competition procedure
7. Questions from T/Ms.

Team managers meetings may be held at other times during the contest if the organisers or judges/juries feel that they are necessary.

4. **Opening Ceremony**: Where a formal opening ceremony is envisaged, it is suggested that an explanation and a clear order of march and/or standing position of the teams, be given to each team manager at their arrival at reception. Many opening ceremonies have suffered through foreign teams not fully understanding what was expected of them.

5. **Spectators**: Understandably at world championships and other major international events, large groups of spectators can be expected. This is often of financial benefit to the organising airsport control and indirectly to the competitor (lower entry fees, etc.). Two points must however be considered.

a) In the interest of attracting the spectators to run on other days of the contest, some form of commentary or easily seen, up to the minute, results should be available, in addition to reasonable viewing areas at all circles.
b) The layout of the circles and spectators' enclosures *must* allow for *spectator-free* access to all circles for the competitors and officials.

If spectators are required for financial reasons, then pre-contest publicity must of course be aimed at attracting "the man in the street" in addition to interested aeromodellers.

6. **Secretariat**: During the contest the secretariat should have sufficient personnel to cope with:

1) General queries from competitors and officials
2) Collation and recording of all results
3) Immediate presentation of all results on clearly visible scoreboards adjacent to the secretariat. On a day-to-day basis, the organiser must provide the team managers with copies of the results of each round for each class.

7. **Scoreboards**: Scoreboards should be of a type whereby the name, country and placing of each competitor is clearly visible. They should be continuously staffed so as to publish the results as soon as possible after they have been verified and recorded by the secretariat.

8. **Prizegiving**: The possibilty of "on the field" recognition of the winners should be considered from the point of view of spectator appeal. The Olympic system of three different height platforms has proved popular. (For team events, two-person platforms might be required).

The official prizegiving usually takes place after all the competitors have finished and before, at or after an official prizegiving banquet. The actual process of prizegiving is up to the host airsports control ingenuity, but it is felt that this should not be too prolonged a procedure, bearing in mind that relaxation in tension and naturally festive inclination amongst the competitors.

9. **Processing**: The times for processing all nations' teams should be given to team managers (and all team members, if possible) on arrival at reception. Attention of organisers is drawn to Sporting Code Section 4b, para. B.7.2. and B.7.3.. The organisers must provide themselves with the necessary measuring apparatus, adequate to check the characteristics of the model aeroplane in question, and give the competitors opportunity to determine the characteristics of their models on the official measuring equipment before the contest.

Processing may take place during the practice day providing the published times for practice and processing allow no possibility for overlap.

The processing team must be familiar with the equipment they are using and should have a reasonable understanding of the models they are processing.

For F2C, if after two attempts to measure the fuel system, it still cannot be done accurately, the competitor must return at the end of processing for another attempt. The team must provide an adapter for filling their fuel system that shall have a 3 mm diameter nipple to attach to the organiser's measuring equipment.

The processing area should be restricted to processing officials, jury members, judges, and the team and team manager whose models are undergoing processing.

10. **Practice**: In the interest of giving the competitor the opportunity of performing at his best, provision of practice circles is required (Sporting Code Volume ABR Section 4C, para. 2.2.2.b). One day prior to the start of the contest is usually set aside for practice (Sporting Code Volume ABR Section 4B, para. B.7.4.). National teams are allowed on all circles for a limited time in strict rotation.

If a practice circle or circles are not available at the site of the contest, every effort should be made to allow competitors the use of existing circles outside the times when they are required for competition flights.

11. **Pull Tests**: Pull tests on C.L. models' lines should be carried out as recommended by the Sporting Code or the Safety Rules promulgated by the FAI Technical Sub-Committee.

The personnel conducting these tests must be experienced in the use of the equipment recommended and fully understand the safety hazard of an incorrectly performed pull test.

12. **Timekeepers**: The organising airsport control is responsible for supplying the appropriate number of timekeepers for each event as stated in the Sporting Code Volume F2 Section 4C para. 4.1.16, para. 4.2.13 b and c. (F2B), para. 4.3.12.b and d. (F2C), para. 4.4.18 (F2D).

The organisers must ensure that the timekeepers are familiar with the class of model to be timed and if any doubt exists, practice sessions before the contest should be arranged. It is particularly important that the timers for class F2A - Speed, should have previous experience in timing these models.

13. **Field Processing**: To forestall any infringement of the rules, the organisers should have the facilities and personnel for running spot checks on models throughout the contest.

A random selection of 20% must be processed during the contests (Sporting Code Volume ABR Sect. 4B para. B.13.4.) in addition to any models suspected of having characteristics different from those recorded when processed prior to the start of the contest.

14. **Processing of Winners**: Sporting Code Volume ABR Section 4B para. B.13.5. states that all results are subject to the rechecking of the declared characteristics of the first, second and third place models. The organisers must be prepared to impound and process T/R models immediately after the finals.

15. **Ranking - International Team Classification**: Complete three competitor teams are ranked ahead of two competitor teams, which are in turn ranked ahead of single competitor teams.

F2D - Individual and team standings will be based solely on the number of matches won. Losses will not be subtracted. Complete 3 competitor teams are ranked ahead of 2 competitor teams, which are in turn ranked ahead of single competitor teams.

THIRD PART: POST - CONTEST ARRANGEMENTS

Contents:

1. Results

a) The official results should be released and given to all entrants and the team managers not later than at the banquet the last day of the event.

b) Result information should be given to radio/TV and press agencies continuously during the competition, but also the official results must be given to them as soon as possible when the contest is finished.

c) The official results must be sent to the FAI not later than one month after the termination of the contest.

2. Reports

a) The international modelling press in some cases have their own reporters present at the competition, at least if it a W/Ch contest. In these cases where the contest is not so well covered by the press the organiser is advised to send reports to those magazines which are not represented at the contest. These reports should also contain a complete list of the official results for all the entrants and, if possible, some snapshots from the competition.

b) Reports must usually be given to the local newspapers together with the results, unless they have had their own journalists covering the event. It is important that these reports are well prepared in advance so that they can be released as soon as possible after the flights.

3. Correspondence

a) The organiser is advised to thank the local authoritioes which have contributed to the arrangements, by official letters.

b) In some cases the organisers feel that a letter to the National Airsports Control or government authorities of a special team can help the sport in that particular country. In other cases it might be necessary to write a letter of complaint about the behaviour of a special team. The decision to send these kind of letters is, however, entirely up to the judgement of the organiser.

4. Equipment

Equipment: Any equipment, flags, etc. which have been borrowed from the FAI should be returned as soon as possible after the contest, and not later than one month after the termination of the competition unless anything else is agreed upon by the FAI Secretariat.

FOURTH PART: SAFETY RULES FOR CONTROL LINE

1. The following safety rules can be enforced by :

- the FAI Jury
- the judges
- the contest director
- the circle marshal
- the processing officials
- pull test officials

The highest authority regarding safety questions is the FAI jury.

2. **Model Aircraft -** At the processing and at the pull test, it should be checked that the model aircraft is not equipped with any of the following details:

- metal bladed propellers
- metal wheels
- any loose parts which can be jettisoned during flight or in any other way cause accidents

Safety Precautions - Immediately before each attempt to an official flight the model aircraft, the lines and the control handle shall be pull-tested with a load equal to :

- 50 times the weight of the model aircraft for F2A ;
- 15 times the weight of the model aircraft up to a maximum pull of 200 N where the model aircraft weight is less than 2 kg and the engine is equal to or less than 10 cc swept volume for F2B. The load test shall be up to a maximum of 300 N where the model aircraft weighs 2 kg or more or the engine is more than 10 cm^3 swept volume ;
- 30 times the weight of the model aircraft with a maximum of 140 N for F2C ;
- 150 N for F2D.

Crash-proof safety helmets with a chin strap should be worn by mechanics in F2C and by mechanics and pilots in F2D.

4. **Conduct -** During flights, the following is forbidden:

- to deliberately release the control handle while the model aircraft is moving (penalty: disqualification from the contest). It is allowed to hand over the handle to another pilot, or to change hands, in case of emergency ;
- jettisoning.

In F2C, it is forbidden by safety reasons:

- for the pilot to step outside the 3 m circle before the mechanic has taken hold of the landing model aircraft ;
- for the mechanis to step into the flight circle (with either foot), or reaches further than 0.5 m into the flight circle ;
- for the mechanic to retrieve the model aircraft by any device ;
- to overtake a slower model aircraft by passing under it ;
- for the pilot whose model aircraft is to be overtaken to carry out any manoeuvre to impede the overtaking competitor ;
- to cause a collision.

In F2D, it is forbidden by safety reasons:

- to deliberately attack the opponent’s model aircraft as distinct from the streamer ;
- to make any attempt to fly a model aircraft which cannot remain airborne under its own power or under the full control of the pilot ;
- to interfere with the opponent or force him to leave the centre circle ;
- to fly deliberately in a dangerous manner ;
- to cause a collision ;
- to attack the opponent’s model aircraft when it is not airborne, inside the flying circle ;

- for the mechanics to enter the flying circle at an oblique angle or cut across the flying circle to reach a downed model aircraft ;
- for the mechanic(s)/pilot, immediately, or after a line disentanglement, not to withdraw a grounded model aircraft to outside the 20 metre circle prior to servicing it ;
- to launch a model aircraft prior to the starting signal ;
- for the pilot to leave the lines or any of his model aircraft, which at that moment are not airborne, in the centre circle ;
- for the pilot to leave the centre circle while his model aircraft is flying, or without informing his opponent of his intention to do so when his model aircraft is grounded for a purpose other than to pick up the lines of the reserve model aircraft or to allow his model aircraft to be serviced ;
- for the pilot or any of his mechanics not to wear a protective helmet ;
- for the pilot to fly in such a manner as to inhibit his opponent, or his opponent's pit crew, from clearing any line entanglement ;
- for the pilot to fly other than level in an anticlockwise direction when only his model aircraft is airborne and there is no line entanglement ;
- for the pilot to fail to clear any line tangle prior to launching his reserve model aircraft unless both he and his opponent have informed the Circle Marshal that they have agreed to continue the heat without clearing the line tangle. In this event the Circle Marshal must agree to the continuation, only doing so when he is satisfied that it is safe to continue ;
- for the pilot to release the handle, or remove the safety strap, for any reason, while the model aircraft is flying ;
- for the pilot to interfere to cause a ground hit of, or to collides with his opponent's model aircraft that clearly has no streamer left and flies level in anticlockwise direction without any manoeuvres to chase and attack ;
- for the mechanics to jump over the opponent's model aircraft(s) and lines kept within the pitting area ;
- for a mechanic to carry a model aircraft and lines over an opponent’s pit crew ;
- to cause line tangles or to do a “sawing” action on the line(s).

5. Flying Sites

Avoid power cables.

Avoid flying too close to inhabited area (noise reasons)

Avoid flying too close to public roads (traffic reasons)

The tracks for F2A and F2C should be equipped with a 2,5 m high fence according to Sporting Code Volume ABR Section 4C para. 2.2.2.b.

This fence should be placed as close to the track as possible but the radius to the track centre should not be less than 22 m. The fence should be strong enough to stop a flying model aircraft.

The F2B and F2D tracks should be equipped with a safety circle which is the limit of the dangerous area. The safety circle should have a radius not shorter than 25 m in F2B and 22 m in F2D. The safety circle can preferably be marked with a rope fence.

The F2B track should also have its centre well marked on the ground.

Only the competitor and his helpers, and the officials concerned are allowed to stay inside the fences or safety circles.

Personnel who have fulfilled their mission must immediately leave the dangerous area.

6. Insurance - The organiser is responsible that all competitors are insured against public liability.

- ANNEX 4F -

CLASS F2E - COMBAT MODELS WITH COMPRESSION IGNITION ENGINES

4F.1. Definition of a Combat Event:

A combat event is a contest during which eliminating heats are followed by a final in which two models are flown at the same time in the same circle for a pre-determined time, the object being to cut a streamer attached on the longitudinal centre line of the opponent's model, points being awarded for each cut taken.

4F.2. Definitions

a) A combat model is a model aeroplane in which the propulsion energy is provided by a piston motor and in which lift is generated by aerodynamic forces acting on supporting surfaces which must remain fixed (except for control surfaces) during flight.

b) The longitudinal centre line shall be defined as the axis of the propeller.

4F.3. Combat Site:

A combat site must consist of two concentric circles which shall be marked on the ground.

a) The flight circle: radius 20 m.

b) The centre piloting circle: radius 2 m.

The flight circle must be laid out on grass, the centre piloting circle may be laid out on grass or on any other material having a maximum radius of 4 m.

4F.4. Competitor:

The pilot, who shall be the entrant and known as the competitor, may employ a maximum of two mechanics in any one heat. (In exceptional circumstances of wet or extremely windy weather, an additional helper may be used as a streamer holder and must perform no other function for the duration of that combat period). The helpers (a maximum of six) other than team members or the team manager, must be registered for no more than one national team, from the beginning of the competition through to the close. During active combat periods the mechanics must wear protective head-gear fitted with an effective retaining strap and must also wear an effective form of ear protection.

4F.5. Characteristics of Combat Model

Maximum surface area:..... 150 dm^2

Maximum weight: ..... 5 kg

Maximum loading: .....100 g/dm^2

Motor: .....Compression ignition

Maximum swept volume of motor:..... 2,5 cm^2

The motor shall have a maximum venturi diameter of 3,5 mm. (see 4.E.6.d. for technical verification). A safety wire with a minimum diameter of 0,5 mm must be attached between the bellcrank bolt (axle) and the engine so as to withstand a pull load of 105 ± 5 Newtons.

The motor must run on a suction fuel feed only, with the fuel tank mounted such that the entire fuel tank is outboard of the longitudinal centre line.

The propeller must be of 190 mm minimum diameter and 150 mm minimum pitch from a blade radius of 40 mm to the tip and constructed from a thermoplastic material (glass filling is permissible).

The model shall not carry any artificial aid intended to assist the cutting of the streamers. The model shall be equipped with a device specially designed to retain the streamer which shall be fitted on the longitudinal centre line and sufficiently strong so that the streamer shall not become detached under normal flying conditions.

Fuel is not restricted.

4F.6. Controls - Technical Verification

a) Line Length: The length of the control lines must be 15,92 +/- 0,04 metres measured from the inboard face of the grip of the control handle to the longitudinal centre line of the model.

b) Control System: Two multi-strand control lines of a minimum diameter of 0,385 mm (no minus tolerance) must be used. No free ends capable of entangling the opponent's line and no line splices, shall be permitted. A safety strap connecting the competitor's wrist to the control handle must be provided by the competitor.

c) Line Tests: Before each heat any sets of lines which may be used must be checked for length and diameter. A pull test shall be applied to the assembled handle, control lines and model. The pull test shall be equal to 150 Newtons.

d) The motor shall be naturally aspirated via a single round intake bore which will not admit a 3,55 mm diameter plug gauge.
Any interconnecting chamber between the air intake and the induction port of the motor shall have a maximum volume of 1,75 cm^3. This clearly prohibits sub-piston induction.
Any venturi insert designed to accomplish this must be positively retained so that it may not become accidentally dislodged during the heat.

4F.7. Number of Models

a) A competitor may have processed a maximum number of models equal to the number of heats a competitor may have to fly (excluding reflights).
Only one processing certificate is required for each Design of model presented by each competitor.

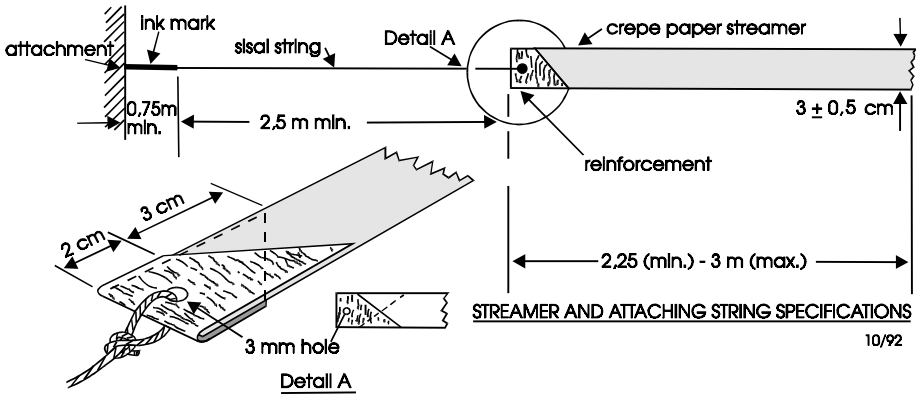
b) The motor, control lines nor handle shall be replaced during the combat period. One model per match shall be allowed.

4F.8. Streamer

The streamer shall consist of double weight crepe paper (80 g/m^2) or any replacement of equivalent strength, not less than 2,25 m or more than 3,00 m long and 3,.00 ± 0,5 cm wide, fixed to a sisal string of 3,00 m minimum length. All streamers must be of the same length.

There shall be a clearly visible ink mark 2,5 m from the junction of the string and the streamer.

The streamer shall be attached to the model in such a way that the ink mark is level with, or behind, the rearmost portion of the model (see sketch). The colour of the streamer must be different for each model in the heat. Each pilot/pit crew shall be issued with a second streamer at the start of the heat, to be used if required. This streamer shall be returned to the organiser if it remains unused.



STREAMER AND ATTACHING STRING SPECIFICATIONS

4F.9. Method of Starting

a) All signals shall be both visual and acoustic.

b) During the starting period the launching positions must be separated by at least a quarter of a lap. The first named competitor in the draw shall have the choice of starting positions.

c) The motor must be started by flicking the propeller by hand.

d) A first signal, given by the Circle Marshal, shall signify the beginning of the 60 seconds period when the mechanic(s) or the pilot have the opportunity to start, run and adjust their motor.

e) A second signal, given by the Official Timer, shall signify the beginning of the combat period on or after which models may be launched.

f) From the moment the signal to launch has been given the contest lasts for four minutes.

g) When the Circle Marshal is satisfied that each model has completed two level laps, anticlockwise, separated by approximately half a lap, he will give a signal that the combat may commence.

h) Combat may begin again after a restart signal from the Circle Marshal following an interruption when one or both models have been grounded. This signal shall be given as soon as the Circle Marshal is satisfied that there is approximately half a lap separation between the two models.

4F.10. Termination of Contest

a) The Official Timer shall give an acoustic signal to terminate the contest four minutes after the signal to launch, i.e. five minutes after the first signal to run and adjust the motor.

b) The same acoustic signal shall be given if the contest has to be terminated due to disqualification of one or both contestants or for any other reason.

c) The Circle Marshal shall signal both pilots to fly level and anti-clockwise and to cease combat when both streamer strings have been cut.

4F.11. Method of Scoring:

a) Scoring shall commence from the signal to launch and continue for the four minute period.

b) 100 points shall be awarded for each distinct cut from the opponent's streamer. There is a cut each time the model, propeller or lines, fly through the opponent's streamer resulting in paper particle(s) becoming detached from the streamer.

c) A cut must contain at least one part of the paper streamer. A cut that contains string alone will not count.

d) Should the string become detached from the model whilst airborne the competitor shall be penalised by 100 points and must immediately on a signal from the Circle Marshal land and replace the streamer. Ground time will be counted from the moment of such a signal being given. If, after a mid-air collision, no streamer string can be found and the streamer retaining device is missing or bent, then it is permissible to continue the heat without replacing the streamer, with the permission of the judges.

e) One point shall be awarded for each whole second that the model is airborne during the four minute period.

f) Each whole second of stay on the ground of the model shall be penalised by one point.

g) Each warnable offence (see 4.E.14.) shall be penalised by the deduction of 40 points from the competitor's score.

h) Should the mechanic(s) damage the streamer, or the model cut its own streamer, whilst the model is on the ground the mechanic(s) must replace it with a new streamer. If they launch the model without so replacing it, the competitor shall be penalised by 100 points. Ground time will be counted whilst the model is airborne with the damaged streamer.

4F.12. Attempts:

Only one attempt will normally be allowed to complete a combat heat except for when:

a) A streamer breaks or fails to unfurl from the rolled state.

b) In the event of a model fly-away, as a result of the lines being severed by his opponent's model.

c) In the event of a line tangle resulting in the control line(s) breaking.

For these exceptions the jury will grant a further attempt to complete the heat.

4F.13. Conduct

a) A pilot must remain inside the centre circle while his model is airborne except at the moment of release of his model by the pit crew.

b) During the combat period each competitor (and his pit crew) shall be watched by at least one member of the jury specifically assigned to him, in addition to the Circle Marshal, to ensure that they behave in a fair manner according to the rules.

c) After a mid-air collision the heat shall continue as if both models had landed, subject to articles 4.E.15.c), l) and m).

4F.14. Offences: The following are warnable offences and shall attract the appropriate penalties (4.E.11.g):

a) If a pilot unintentionally leaves the centre circle whilst his model is airborne.

b) If the mechanic(s) enter the flight circle at an oblique angle or cut across the flight circle to reach a grounded model during the combat period.
One penalty only will be incurred for each offence even if more than one mechanic is involved.

c) If the mechanic(s)/pilot do not immediately or after a line disentanglement, withdraw a grounded model to outside the 20 metre circle prior to servicing it.

d) If the model is launched prior to the signal signifying the beginning of the combat period.

4F.15. Cancellation of the Flight:

An entrant will be eliminated from the heat and his opponent declared the winner if:

a) He deliberately attacks the streamer of his opponent's model prior to the Circle Marshal's signal that combat may commence.

b) His model fails to become airborne within two minutes of the signal to launch.

c) He attempts to fly a model which at the time of launch does not have a strong workable control mechanism, or does not have a secure engine attachment, or does not have a running engine.

d) He interferes with his opponent, or forces his opponent to leave the centre circle.

e) He deliberately flies in a dangerous manner.

f) He leaves the lines in the centre circle when his model is grounded.

g) He attacks his opponent's streamer without his own, or the remaining parts, attached to his model.

h) He is not present at his allotted flight time, unless he has the express permission of the Circle Marshal.

i) He leaves the centre circle intentionally whilst his model is flying or without informing his opponent of his intention to do so when his model is grounded.

j) He deliberately leaves the centre circle, for a purpose other than to allow his model to be serviced, without wearing protective head gear.

k) He flies in such a manner as to inhibit his opponent, or his opponent's pit crew, from clearing any line entanglement.

l) He flies other than level in an anti-clockwise direction when only his model is airborne and there is no line entanglement.

m) For any other flagrant breach of the rules.

n) He releases the handle, or removes the safety strap, for any reason while the model is airborne.

o) His model does not conform to para 4.E.5.

p) He deliberately attacks or interferes with his opponents continuously level flying model, which clearly has no paper streamer left.

q) If the streamer string becomes detached from the streamer retaining device during combat, but not as a result of a mid-air collision.

r) If the model lands with no streamer string and the streamer retaining device is missing or bent, but not as a result of a mid-air collision.

s) If the mechanics jump over the opponent's equipment.

4F.16. Classification

a) The contest shall be run as a knock-out tournament.

b) The contestant who obtains the highest score in points shall be the winner of each heat.

c) A competitor shall be eliminated from the competition when he has lost two heats.

d) Each round shall be randomly drawn (subject to 4.E.16.j) from the competitors remaining in the competition.

e) In the event of an unmatched competitor remaining in any round, that competitor shall be matched with the first competitor drawn (subject to 4.E.16.j) in the next round and, (if he is not first eliminated) in each successive round, unless such time as there is again an unmatched competitor remaining in a round. At that time, these two competitors shall be matched (subject to 4.E.16.j) to complete that round.

f) The number of wins minus the number of losses, "wins-losses", shall be used to determine placings with the highest score placing highest.

g) In the event of a tie for second or third place (both cannot happen) fly them off using the above procedures except allowing only one loss during the fly-off.

h) In the event of a two way tie for third remaining after a fly-off for second, match them with the winner to take third.

i) In the event of a tie score in any heat, that heat shall be re-flown. A heat is considered a tie if the score difference is five points or less.

j) Previous opponents and competitors of the same nationality shall be drawn apart if possible, with competitors of the same nationality to fly against each other only if there are no remaining opponents.

4F.17. International Team Classification:

a) Each competitor shall be ranked according to his wins minus number of losses, not counting flyoff heats, with the fly-off heats being used to establish second and third place as necessary.

b) The competitors “wins - losses” scores, not counting fly-offs, shall be added for the participants of each nation.

c) Nations shall be classified with the highest scores obtained in 4.E.17.b), considered highest in position.

4F.18. Judges and Timekeepers:

The organiser shall appoint a panel of three CIAM approved judges (for open internationals needs only one to be CIAM approved) and who shall be of at least two different nationalities. The judges must have at least one language in common.

Two timekeepers/scorers shall be allotted to each competitor.