



**BRITISH MODEL FLYING ASSOCIATION**

# **SCALE JUDGES GUIDES**

**STATIC AND FLIGHT JUDGING FOR ALL BMFA SCALE  
CLASSES**

**ISSUE 5**

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# SCALE JUDGES GUIDES

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\* Includes Helicopters

## **INTRODUCTION**

These Judges Guides are managed solely by the BMFA Scale Technical Committee (STC) and are revised and re-issued as considered necessary. They can be downloaded from the scale website at <http://www.scalebmfa.co.uk>

It is hoped that these guides will be enhanced with input from active judges and competitors so that they reflect the knowledge and experience that exists within the scale fraternity. This will offer the greatest benefit to the less experienced and at the same time improve judging standards.

Judges, prospective judges and competitors are invited to forward any suggestions and proposals for improvement of these guides, preferably by e-mail to [c.allen134@btinternet.com](mailto:c.allen134@btinternet.com) or to any member of the Scale Technical Committee.

## **GENDER**

Words of masculine gender should be taken as including the feminine gender unless the context indicates otherwise.

## **WORD DEFINITIONS**

The use of “shall”, “must”, “is” and “are to” indicates that the aspect concerned is mandatory.

The use of “should” implies a non-mandatory recommendation.

The use of “may” implies what is permitted or what might happen and is non-mandatory.

The use of “will” indicates a future happening which may not be mandatory.

## **FORMS AND DOWNLOADS**

The Scale Rule Book, Competitors Declaration forms, and score sheets can be downloaded from the Scale Website - [www.scalebmfa.co.uk](http://www.scalebmfa.co.uk) or are available in hard copy on request from the Scale Tech Committee Secretary or the relevant Contest Director.

**Scale competitions cannot be organised and run in the absence of Judges and if the Scale Technical Committee is to continue to manage a Scale Competition programme it is essential that there are sufficient numbers of volunteers prepared to offer their services as Judges. Anyone who thinks they have the necessary experience and is willing to offer their services as a Scale Judge is invited to contact the Scale Technical Committee.**

## **STATIC JUDGES**

With the exception of the assessment of craftsmanship, static judging of scale models is based upon the documentation submitted by the competitor and judges must disregard any prior or special knowledge they may have of the full size subject aircraft. Static Judges must also refer to the Competitors Declaration which, depending on the class rules, provides the judge with essential information on the design origin of the model and any components which are not manufactured by the competitor.

Static Judges must have good analytical skill, an 'eye' for detail and be familiar with the complications which can arise when making comparisons between three dimensional objects and two dimensional drawings and photographs. They must also have a good understanding of photographic distortion and perspective.

In order to make an accurate assessment of the craftsmanship involved, Static Judges also need to have a good understanding and preferably practical experience of the skills, materials and processes involved in the construction and finishing of flying scale model aircraft.

## **FLIGHT JUDGES**

In total contrast to Static Judges, Scale Flight Judges must possess a good depth and breadth of understanding of the different categories of full size aircraft, how they fly and their performance limitations. Flight judges must also understand how the performance of a full size aircraft is dependent on its design requirements and also how the evolution of aircraft and aircraft engine technology has influenced aircraft performance.

Flight Judges will inevitably be asked to judge a scale model of an aeroplane that they may have never even heard of and consequently will have no knowledge of its capabilities or limitations. Being advised of the maximum speed and/or the cruising speed from the score sheet is of limited help and further assumptions regarding performance will be necessary in order to be able to make a fair comparison between the full size and the model. To minimise this risk, Flight Judges are encouraged to expand their knowledge not only by their choice of reading and studying historic film but also by attending full size airshows. It is important therefore for judges to do their 'homework' so to speak, in the event that they are asked to judge a new model of a less familiar aeroplane.

# 1. STATIC JUDGES GUIDE

Applicable to the following classes:

**SCALE R/C (F4C) and partial relevance to STAND-OFF SCALE (F4H)**

**SCALE R/C HELICOPTERS and partial relevance to STAND-OFF SCALE HELICOPTERS.**

**SCALE INDOOR R/C**

**SCALE CONTROL LINE**

**SCALE FREE FLIGHT CLASSES and partial relevance to PEANUT, PISTACHIO & KIT SCALE**

**Relevant Rules - BMFA Rule Book - Section 6.1.2**

## 1.1 General

Before any static judging commences, the judges should make a general survey of as many as possible of the models entered in the competition in order to establish a standard for the complexity aspects. This need not be a formal process and does not require all the models to be 'lined up' and presented to the judges, because all that is necessary is to make a superficial examination of the models in relation to each other. These observations can usually be achieved by simply walking around the 'pit area' or the place provided for competitors to assemble and prepare their models.

The static evaluation is broken down in accordance with section 6.1.2.5 of the Scale Rule Book and each item is marked out of 10 in increments of 0.1 of a mark. Judges must work as a team and attempt to reach agreement on the marks to be awarded for each item. Although each judge retains the right to differ, any degree of difference should be minimal.

Regardless of the actual marks awarded, it is imperative that an accurate and fair comparison is attained across the whole range of models entered. The relative mark of one model compared to another is the most important standard to be achieved. It is important that the judges retain all the score sheets until all the models have been judged in case any corrections or adjustment of complexity marks are necessary. Judges are also encouraged to make use of a simple analysis sheet to assist in making the necessary comparison.

If the model aircraft has completed a scoring flight before being static judged in the same competition, any damage sustained during that flight shall be ignored by the static judges provided it is practical to do so and the model is intact.

Static Judging should ideally be carried out under cover or indoors, however if this is not possible or practical, it is important to ensure that the quality of lighting is consistent.

With the possible exception of the Stand-Off Classes, where models can if necessary be judged when they are on the ground, the contest organisers should provide suitable tables which allow the model to be viewed with the wing or wings at the judges eye level and large enough to allow the model to be rotated in the horizontal plane.

The model must be presented for static judging supported only by its undercarriage or normal aids to take-off and landing. If applicable, folding wings may then be unfolded and locked for flight in the manner of the full size aircraft.

With the exception of undercarriage retraction, a demonstration of functional detail of any part of the model is permitted during static judging providing such functionality is normally only operable by the pilot or aircrew of the full size aircraft from their crew position. (N.B this paragraph has now been included in the BMFA Scale Rules and the FAI/F4C rules.) The Contest Director or Organiser must allow the Competitor to use his transmitter if required to demonstrate these features. (This will be subject to Tx control measures for any competitor using 35mhz equipment.)

The competitor must be available throughout the static judging process in case the judges need to question the competitor on any aspect of the model or the documentation. Depending upon the size of the model, additional handlers should also be available to position the model as directed by the judges. With the exception of Peanut and Pistachio classes, direct measurement of the model is not permitted and other than the indoor classes, models should not be handled by the judges.

*Note. The above paragraph specifies what the competitor must do and will therefore be transferred to the Rule Book at the next update (2019)*

Judging distances (from the centre of the model) are as prescribed in the following table, which is copied from rule 6.1.2.6.

SCALE CLASS	ITEM 1 (a), (b) & (c)	ITEMS 2 to 6 inc	REMARKS
Control Line	3 metres	No Restriction	
R/C (F4C modified)	5 metres	No Restriction	
R/C Stand-Off (F4H modified)	n/a	n/a	All at 5 metres
R/C Indoor	n/a	n/a	*
R/C Helicopter	5 Metres	No Restriction	
R/C Stand-Off Helicopter	n/a	n/a	All at 5 metres
Outdoor FF (I/C power)	2 metres	No Restriction	
Outdoor FF (Rubber)	2 metres	No Restriction	
Outdoor FF (CO <sub>2</sub> or Electric )	2 metres	No Restriction	
Indoor FF (Rubber)	n/a	n/a	*
Indoor FF (CO <sub>2</sub> or Electric)	n/a	n/a	*
Peanut	n/a	n/a	*
Pistachio	n/a	n/a	*
Indoor Kit Scale	n/a	n/a	*

\*It will be necessary for judges to handle the model during static judging

## 1.2 Competitors' Declaration and the Builder of the Model rule

Judges must carefully examine the Competitors Declaration to ensure that it has been correctly completed and that there are no conflicting statements.

The purpose of the declaration questionnaire is to assist the static judges to determine the method of construction and the extent to which any components not manufactured by the competitor have contributed towards the scale accuracy.

The Builder of the Model rule effectively means that if the competitor did not make it, then he gets no marks for it. This is particularly important when the overall outline is dependent upon the use of moulded major airframe components. The onus of proof of the manufacture of such components lies with the competitor and if judges have any reason to believe that undeclared commercial components have been used they should question the competitor. Where commercially available parts have been used in the construction of the model, the "Scale Accuracy" marks, "Craftsmanship" marks and possibly the "Scale Detail" marks must be reduced accordingly.

If the construction of the model is based on commercially available mouldings and the competitor claims that he has modified these components to improve the scale accuracy, then unless these modifications are comprehensively documented, the marks awarded must reflect the origin of the mouldings.

### **1.3 Proof of Scale Documentation**

The model can only be judged by comparing it with the proof of scale documentation presented by the competitor. Judges can only award marks based on the information available from this documentation.

The minimum documentation requirements are stated in paragraph 6.1.2.2 of the rules and the penalties for not providing this minimum are specified in paragraph 6.1.2.3. Advice to competitors on how the documentation should be presented is also given in paragraph 6.1.2.4 of the rules.

The minimum standard of documentation is unlikely to provide all the evidence necessary for the judges to award high marks. Also there is more to 'quality of documentation' than how it is presented and good presentation is no guarantee that it is fully comprehensive and relevant. Judges must ensure that a competitor does not benefit by default when the documentation is incomplete or of poor quality. It follows therefore that if the documentation is missing, insufficient or poorly presented then this must be reflected in the marks which can be awarded.

Judges are advised to first check that the documentation meets the minimum requirement and take note of any discrepancies.

#### **1.3.1 Photographs.**

Photographs submitted as evidence of outline accuracy should ideally show the complete aircraft. Photographs should show good definition, with a good depth of focus and ideally free from distortion.

Unless the competitor has taken his own photographs and provides the details in his documentation, it is unlikely that judges will be made aware of the camera format and the focal length of the lens used to produce the photographs, or how close the photographer was to the subject. Static Judges must therefore have a good understanding of camera lens distortion and perspective distortion and how these factors can influence the photographic image of the subject aircraft.

Note: Detailed explanations of camera lens distortion and perspective distortion is available on the internet and there are numerous books on the subject.

With the ready availability of computerised photo editing software (e.g. Photoshop), Judges should be on their guard in order to spot photographs of the full size aircraft which may have

been edited in order to hide errors on the model. Similarly judges must also be on the lookout for photographs of the model which have been edited to make the model appear to be the full size aircraft.

Photographs showing the complete aircraft should also be of a reasonable size and the image size should not be less than 15cm wide. Photographs which provide evidence of scale details may be smaller but the location of the detail on the aircraft must be clearly indicated.

### **1.3.2 Scale Drawings.**

The specification for drawings is defined in rule 6.1.2.2(a)(ii), but this only defines minimum dimensions. Line thickness is also important and drawings which show thick outlines are often an indication that the drawing has been enlarged from a small image and will be of dubious accuracy. The line thickness of a drawing should ideally be no greater than 0.5mm.

Judges should also be aware that a drawing labelled by an Aircraft Manufacturer as a General arrangement (GA) drawing is no guarantee of accuracy.

Judges must seek to verify the origin of drawings and where they have been published. If the drawing does not display the originator/publisher it must be certified by the appropriate National Aerospace Council (NAC), which in the UK is the Scale Technical Committee.

If a 3-view drawing has been divided in order to show each view of the model with the associated photographs on the same card, judges must ensure that unless each view has been certified the original three-view should also be available as proof of certification/publication.

Drawings which do not display proof of origin or have not been endorsed by the competitors NAC should be disregarded and the appropriate penalty applied.

### **1.3.3 Proof of Markings**

The markings on an aeroplane identify that particular aeroplane from another of the same type (unless of course only one was built).

Comprehensive evidence showing all the markings on both sides of the subject as well as the upper and lower surfaces of the wings, can be difficult to obtain and whilst excellent photographs are often provided for the same aeroplane type it is not uncommon to be presented with only one photograph as evidence of markings.

Judges must not make assumptions that the markings are the same on each side of the aeroplane and shall only award high marks for aircraft markings if the documentation provides evidence of all the markings.

Military aircraft are a possible exception, because markings are generally applied to an official specification and if comprehensive photographic proof of markings is not available for a particular military aeroplane, published details of the markings specification, supported by photographs of a similar aircraft from the same squadron or unit may be acceptable.

Military aircraft are also invariably covered with a plethora of stencilled servicing instructions and component identity marks which require detailed photographic evidence.

### **1.3.4 Proof of Colour.**

Correct colour may be established from colour photographs; from published descriptions if accompanied by colour chips certified by competent authority; from samples of original paint; or from published colour drawings or artwork, e.g. Profile Publications.

Published colour chips and charts are acceptable when identified in a published written description, but judges should be suspicious when colour patches painted by the competitor are accompanied by a letter stating authenticity, unless the patches themselves are identified and authorised by a competent authority.

When the model is painted with the same paint used for the subject aircraft, the proof including batch details must be accompanied by certification from the owner of the full size aircraft. This in itself is no guarantee of colour accuracy even when the paint is from the same batch as used on the full size, because the finished colour is often influenced by what it is applied to, i.e. the surface material, its preparation and any undercoat.

Colour photographs can be unreliable as proof of colour since they can be reproduced in virtually any shade. Furthermore the ambient light conditions (colour temperature and polarization) prevailing when the photographs were taken may not be the same as when the model is judged. E.g. photographs taken of the full size aircraft illuminated with artificial light are not reliable proof of colour when the model is judged outdoors.

The optimum photographic proof of colour has to be a good quality photograph of the model and the subject aircraft posed together preferably taken outdoors or illuminated with the same balanced lighting. This ensures that any errors introduced by the photo reproduction process will be the same for the model and the full size aircraft.

Proof of colour must also indicate whether the finish is matt or gloss, or somewhere between.

### **1.3.5 Proof of Surface Texture and Realism.**

Surface Texture and Realism are often confused or seen as the same thing and frequently the competitors documentation evidence to support these aspects is the same as used for scale accuracy.

Surface texture is by definition; “the manner of arrangement of particles in a substance” or more simply the ‘feel’ of a surface. The problem is judges must not touch ! Proof of texture therefore requires evidence in the form of detailed close-up photographs which show all the different surface materials used on the full size aircraft.

Realism is by definition; “representing things as they really are” and can be as detailed as you wish, however in this context it is best to consider the whole model and make the comparison with the full size subject aircraft, in which case the proof required must be a good quality photograph of the whole subject a/c which can be one of the photographs provided as proof of scale accuracy and/or colour/markings.

The judge must take care to avoid using his own knowledge, or make assumptions based on the subject aircraft type and the construction techniques used when it was built.

## **1.4 Assessment of the Model**

Having first carefully examined the Competitor’s Declaration and his Documentation, the judges can now commence assessment of the model and get some marks on the score sheet.

There are no rules governing the order in which the various aspects are marked but it is suggested that they are marked in the order they appear on the score sheet. In practice

there is considerable overlap of these aspects, e.g. errors in outline are often revealed by the colour scheme and the markings or the positioning or omission of details.

#### **1.4.1 Assessing Outline Accuracy**

It is suggested that the model should first be positioned in a pose similar to that in the best photograph and checked for any obvious discrepancies. Because of the possibility that the photographs may suffer from some form of distortion (see 1.3.1 above), Static Judges must cross check between photographs and the drawings. Photographs that are taken at an oblique angle can often give a false impression of dihedral and rigging angles and the drawings may provide a more accurate reference.

Judges should be aware of perspective when judging the model and if a model is assessed from a relatively close position, as is often the case in indoor scale, the relative angles of various components may become distorted. This is particularly so when assessing dihedral on swept wings. If in doubt, perspective effects can be reduced by holding a straight edge in front of the model at a point along the plane or centreline of the component to be judged, so that an accurate assessment of relative angles can be obtained.

Particular attention must be paid to models whose overall outline is dependent upon the use of moulded major airframe components. Unless it is obvious, or stated in the documentation, judges should question the competitor to determine precisely who is responsible for the accuracy of the moulding. Marks can only be awarded for accuracy of outline when the judge is satisfied that the competitor did the work necessary to achieve it. If the judge has any reason to doubt the competitors' declaration statement, he may request proof of the competitors involvement in the manufacture of the plug and/or the mould.

**(a) Side view.** Examine carefully the fuselage outline, cabin or canopy shape (including significant internal structure where visible), cockpit aperture shape, engine cowling, propeller and spinner shape or rotor blade section and static droop (where applicable), outline of fin and rudder, wing and tailplane sections. Also the shape, angle and position of landing gear legs and nose/tail wheel or skid and the size of wheels and tyres. If applicable a check should be made of wing stagger, wing gap and the shape and arrangement of struts and rigging wires. Particular attention should be given to the aerofoil section and any changes of section along the wing. It will be necessary to examine both sides of the model because there are few aeroplanes where the port side is identical to the starboard side.

**(b) Front-end view.** Check the wing/s dihedral, wing thickness and taper, washout, wing struts, bracing and gap on multi-wing aircraft. Also check the thickness of fin, rudder and tailplane, cross-sections of fuselage and engine cowling, cowling shape and cut-outs, propeller size and blade shape or rotor blade section and static droop (where applicable), shape of cockpit canopy or windshields; size, shape, position and angle of landing gear, wheel track, tyre thickness.

**(c) Plan view.** Check the wing outline and fairings, aileron size, flaps, slats, tailplane size and outline; elevator size, shape and cut outs, trim tabs, fuselage shape and taper, cockpit or canopy shape, engine cowling shape. It is usually necessary to also examine the underside of the model if there are features of the outline which are not clearly visible in any other view. The plan view assessment also provides the opportunity to check the accuracy and the position of the wing markings.

#### **1.4.2 Assessing Markings Accuracy**

Check that the position and size of all markings are correct; that the style and thickness of all national markings, unit/serial/detail alpha-numeric characters, badges and logos are correct.

Particular emphasis should be made to the relative positioning between markings and key features on the airframe as these often highlight errors in outline accuracy.

It cannot be assumed that the markings are the same on each side of the aeroplane and judges should only award high marks if the documentation provides evidence of all the markings. As a guide, if only one side elevation of the subject a/c is submitted as evidence of markings and there is no indicative evidence to support the remainder of the markings, irrespective of how complex they are, no more than 2.5 marks should be awarded.

### **1.4.3 Assessing Markings Complexity**

Prior to commencing judging, the judges should agree the principle for awarding complexity points in relation to markings. A high mark for markings complexity is not solely dependent upon the number of markings, but also the difficulty in achieving the required effect. Complex lettering, particularly when spread over a large area or relating to key positions on the airframe, should attract a higher complexity mark than sparsely positioned markings of more simple design. Curved lines are usually more complex than straight lines as are markings applied to curved surfaces rather than flat surfaces. For high marks to be given in this section it is also important that comprehensive evidence is provided for all the markings.

### **1.4.4 Assessing Colour Accuracy**

It is essential that if high marks are to be awarded, a comprehensive standard of colour documentation must be presented.

The assessment must be made by comparing the evidence of colour with the colour of the model and this includes the accuracy of all the colours used for markings, lettering and insignia. It may be necessary to place the proof of colour evidence against the model and step back to make an accurate assessment.

Judges should ensure that when judging colour accuracy, the documentation must be examined under the same ambient light conditions (colour temperature and polarization), as the model; i.e. avoid placing the judges chairs in the shade or close to anything where reflected light may not be the same as the light on the model.

Judges should also avoid wearing tinted or polarizing glasses

### **1.4.5 Assessing Colour Complexity**

The system for awarding colour complexity points should be agreed before starting judging and consideration should be given to the greater effort involved in reproducing multi-coloured finishes compared to models which feature only one or two basic colours.

It is suggested that up to two complexity points may be given for each main colour that covers a significant part of the airframe. A maximum of a single point may be given for each minor colour, such as those for the insignia, struts, guns, bombs etc. and basic colours of black and white should attract a fraction of a complexity point.

The marks awarded should not be confined simply to the number of colours used, but also how the colours are distributed on the model and whether the colour boundaries are on a flat or curved surface/structure. Check that any pin striping is of the correct dimensions and is correctly positioned.

Camouflage colour schemes are difficult to assess because the specifications for many camouflage schemes are only indicative and even within the same squadron or unit there will

be variations of the same scheme. Many schemes are applied freehand, with complex patterns involving indistinct edges and graduated merging of shades.

Assumptions must not be made and again it is essential that if high marks are to be awarded, a comprehensive standard of colour documentation must be presented.

#### **1.4.6 Assessing Surface Texture**

The texture and appearance of the surface of the model should be a good scale reproduction of the surface detail of the subject aircraft.

Fabric covered surfaces should be covered in material which shows the coarseness of the weave to the correct scale. The edge treatment of the fabric including rib tapes must be as documented, i.e. frayed, pinked or straight. Rib stitching should show the correct or simulated knots and inspection panels should show the correct lacing. The underlying structure, stringers and wing ribs should also show the correct degree of prominence.

Ply covered or wooden structures should be correctly simulated and any sag between the ribs and formers should be apparent if this is present on the subject aircraft. There should be no evidence of wood grain on external surfaces. Many aircraft which had plywood skinning were also covered with fabric and this should be correctly reproduced.

Metal stressed skin structures should show simulation of the correct type of riveting or fixing and whether joints between metal sheeting are plain lapped or joggled if such detail is visible on the full size a/c. Removable or hinged panels should show simulation of the correct type of fastening.

In all instances the appropriate surface roughness and gloss or matt finish should be correctly reproduced.

#### **1.4.7 Assessing Scale Realism**

To assess realism, the judge must determine how well the model captures the character of the subject aircraft. The judges should ask themselves if they are looking at the subject aircraft in miniature, or just a model aeroplane?

If the subject aircraft is an unblemished museum example then the model should be in similar pristine condition. If the subject aircraft is an operational aircraft then a degree of weathering and signs of regular use should be evident.

The quality of the documentation is of vital importance when assessing realism, and if the documentation does not contain a good quality picture or a photograph that 'captures' the character of the subject full size aircraft in its 'grime or its glory', then this omission must be reflected in the marks awarded. The judge must be careful to avoid making assumptions based on the type of aeroplane.

#### **1.4.8 Assessing Craftsmanship Quality**

This is an assessment of the skill, ingenuity, workmanship, artistry and general finesse involved in the construction of the model including the application of the colour scheme and the markings. High marks for scale accuracy are generally a reflection of good craftsmanship.

The principle to adopt here is that if it can be seen and is adequately documented then it can be assessed. Based on this principle, the competitor must be given the opportunity to show any features of the model which may not be immediately obvious. Access to features such

as scale interior or scale structure if not visible in open cockpits must be by means of opening cockpit canopies, scale doors, hatches or wing folds etc.

Judges must consult the competitor's declaration to check for any components that are visible but have not been made by the competitor. Any such items must be excluded from this assessment and the points awarded reduced proportionately. If the structural integrity of the model is dependent upon the visible use of commercially available prefabricated or engineered components, or major parts of the structure are commercially available mouldings, albeit masked by an excellent painted finish, the marks for craftsmanship must be significantly reduced.

Judges should also recognise that where the competitor has produced components or moulds/plugs for components using traditional methods, a greater level of craftsmanship is required than when using CNC technology or 3D printing.

The model should be checked for the quality of workmanship, with particular reference to clean, sharp edges, especially trailing edges of wings and tail surfaces; the absence of warps in the structure; non-scale ripples in flat surfaces and inadequately filled wood grain.

Models 'age' and a model which has survived many years of competing, will inevitably acquire a few scars which if left uncorrected will result in a loss of craftsmanship points.

Any visible non-scale items such as switches, needle valves, silencers, exhaust pipes, fuel hose, control horns, etc. with the exception of "take-off aids" (Rule 6.1.1.19 refers), must result in a loss of marks. Non-scale joints or fixings necessary for dismantling the model and non-scale hatches or access panels used for model operation should be unobtrusive.

#### **1.4.9 Assessing Craftsmanship Complexity**

Judges must consult the competitor's declaration and check for any components that have not been made by the competitor. Any such items must not be included in this assessment.

Judges should consider the overall complexity of the aircraft design awarding higher marks for more intricate shapes and structures and the difficulty of reproduction. Judges should also consider the variety of construction techniques and processes used in the design of the subject aircraft and whether or not these have been accurately replicated or simulated

It is important to separate complexity from repetition and to recognize that compound curves are more difficult to reproduce than straight line or flat structures. E.g. a multi-bay biplane with straight identical wing panels may appear to be highly complex, but a monoplane having semi-elliptical wings of varying chord and thickness will be more difficult to construct.

Demonstrations of scale functionality other than normal control function; e.g. sliding canopies, folding wings, etc. may also be rewarded under this section, subject to the constraints imposed by rule 6.1.2.7.

#### **1.4.10 Assessing Scale Detail Accuracy**

The documentation presented should clearly show the details that are being assessed. The marks awarded should reflect both the accuracy and the quantity of scale detail present. Judges must carefully examine the photographs of the full size aircraft to determine whether the competitor has omitted any details which are clearly visible in the documentation.

Particular attention should be paid to dummy engines and those parts of engines visible inside air intakes, air vents and around exhaust pipes and jet nozzles.

The following list shows the sort of detailed items which may or may not be present on the full size aircraft and should be reproduced on the model. They must be well documented, accurately reproduced and correctly positioned.

Hatches	Brake pipes
Handles	Landing gear springing
Footsteps	Tyre treads
Doors	Wing slots
Armament	Navigation and landing lights
Bomb racks	Pitot heads and static tubes and vents
Control cables	Walkways
Control horns	Tanks
Fairings	Radiators and coolers
Structural Bracing	Filler caps
Turnbuckles	Louvres
Struts	Cooling gills
Lacing or stitching	Mass balances
Aerials	Instrument panels
Venturies	Cockpit or cabin interior detail
External sensors	Access panels
Trim tabs	Drain holes
Screws, nuts and bolts and fixings	Helicopter transmission components
Rotor blades	Rotor heads/hubs
Swashplates and control linkages	External winches
Hinges	External instruments
Flying/landing wires	Static dischargers
Javelins	Wing fences
Stall warning devices	Tie-down rings

Judges must consult the competitor's declaration and check for any components that have not been made by the competitor and adjust the marks awarded accordingly.

#### **1.4.11 Assessing Scale Detail Complexity**

Again Judges must consult the competitor's declaration to check for any components that have not been made by the competitor and any such items must be excluded from this assessment and the marks reduced proportionately.

Judges should ensure when marking this aspect that they are relating to the complexity of detail actually on the model and not awarding marks for the complexity of the subject aircraft.

A well-documented highly detailed model should score proportionately more than a model with little detail, even if the subject aircraft is itself sparsely detailed.

## **1.5 Final Assessment Review**

When all the models have been individually judged the spread of marking for all the models should be reviewed, particularly the complexity marks awarded. This is to ensure that these marks accurately reflect the spread of complexity across all the models entered. The relative mark of one model compared with the others is important and to ensure this is achieved, the marks can be altered retrospectively. The use of a summary sheet for this review is recommended.

## **2 R/C STAND-OFF SCALE (F4H)- STATIC JUDGES GUIDE**

**Applicable to:**

**R/C STAND-OFF SCALE (F4H)**

**R/C STAND-OFF SCALE HELICOPTER**

**Relevant Rules - BMFA Rule Book - Section 6.3.2**

### **2.1 General**

Stand-Off Scale static judging is all carried out at 5 metres and the Static Judges must take particular care that they are not seen to be closely examining any model that they are or will be judging.

As with other scale classes, before individual judging commences all the models entered should be reviewed in order to superficially grade the Colour and Markings Complexity aspects of the models in relation to each other. It is appreciated that not all the models entered may be presented or visible to the judges at the same time, therefore Judges are encouraged to make use of a simple analysis sheet.

The major difference when judging stand-off scale as compared with the premier classes is that the Scale Accuracy is assessed without concern as to who built the model.

When the Scale Accuracy has been marked, the Declaration questionnaire is then used to provide the information on which to make the assessment of 'Originality of Model Design and Construction, (see para. 2.3 below).

The requirement for documentation in the Stand-Off Scale Rules specifies the minimum evidence considered to be necessary to make a fair assessment of the model when viewed from 5 metres. Drawings and a maximum of 5 different photographs or printed illustrations are permitted. Drawings must conform to the same requirements as F4C and if more than 5 different photographs are presented, the judge must direct the competitor to remove or cover up the excess.

It is important that judges do not waste time seeking to assess any aspect which is not adequately supported by the documentation and provision is made on the score sheet for this to be recorded.

As a rough guide approximately 15 to 20 minutes is considered sufficient time to assess each model.

### **2.2 Scale Accuracy (Outline Accuracy)**

As with all static judging it is often necessary to cross refer the photographic evidence with the drawings. Further advice on photographs and drawings is given in paragraphs 1.3.1 and 1.3.2 respectively, and advice on assessing outline accuracy is provided in paragraph 1.4.1 (a), (b) and (c)

### **2.3 Originality of Model Design & Construction**

Following the assessment of Scale Accuracy(Outline Accuracy), the judges must determine the extent to which the Scale Accuracy is due to the efforts of the competitor. To make this assessment the judges must establish the 'Originality of Model Design & Construction by examining the Competitors Declaration including any supporting evidence presented by the competitor and if necessary question the competitor.

A maximum of 10 points should only be awarded to a model which is entirely 'scratch built' and declared as such by the competitor. The score must be reduced if the Scale Accuracy is achieved by someone other than the competitor, or by the use of commercially available machined, moulded or pre-cut parts. However an allowance should be made if the competitor is able to provide evidence that he has incorporated modifications which have improved the Scale Accuracy. A model which has been assembled 'straight out of the box' or built entirely by someone other than the competitor should score a zero.

The following should be used as a guide:

Scratch built models entirely designed and built by the competitor .....	10 points
Models built from a kit or a published plan based on a built-up structure and which may include pre-cut parts and some proprietary items. ....	5-9 points
Models built from a kit based on a moulded/grp fuselage and veneered foam or grp flying surfaces. ....	2-4 points
Typical ARTF or a model built by someone else .....	0-2 points

## **2.4 Colour and Markings Accuracy**

Judges must not forget that in Stand-Off Scale the competitor is responsible for applying the surface finish i.e. colour and markings and the certification of this work must be signed on the Competitors Declaration. Judges must determine that even if the model is an ARTF kit or the model was purchased in a fully completed and finished condition, it has been refinished by the competitor and it may be necessary to question the competitor to establish how the colour and markings were applied. If the base colour of a model is derived from the covering material, unless the competitor has re-covered the model then the judge must award zero marks for colour accuracy and may have to decide if a false declaration has been made.

Further advice on Proof of Colour and Markings is provided in paragraphs 1.3.3. and 1.3.4.

Further Advice on Assessing Colour and Markings is provided in paragraphs 1.4.2 and 1.4.4

Up to 5 points should be awarded for colour accuracy and up to 5 points for markings accuracy.

Comprehensive documentation with good colour references and evidence of all the markings will be necessary to achieve high marks. As a guide, if the documentation only illustrates one side of the subject aircraft and there is no indicative evidence to support the remainder of the colour and markings, irrespective of how complex they are, no more than 2.5 marks should be awarded for colour and markings accuracy.

## **2.5 Colour and Markings Complexity**

Consideration should be given to the effort involved in reproducing the colour and markings of the full size subject a/c. This should not be confined to the number of colours and the extent of the markings, but also how they are distributed on the model. i.e. the complexity of the boundary between colours and whether applied to a flat or curved surface, on fabric or solid surfaces etc.

It is important to ensure that the marks awarded are a fair comparison with the spread of marks awarded across the range of models entered.

Paragraphs 1.4.3. & 1.4.5. provide further advice on assessing colour and markings complexity.

## **2.6 Realism**

The quality of the documentation is of vital importance when assessing realism, and if the documentation does not contain a good quality picture or a photograph that portrays the subject full size aircraft then this omission must be reflected in the marks awarded. The judges must be careful to avoid making assumptions based on the type of aeroplane.

Judges should consider how well the model captures the character of the full size aircraft as portrayed in the documentation. If the subject aircraft is 'factory fresh' or an unblemished museum example, then the model should be in a similar pristine condition. Alternatively if the photograph of the subject aircraft shows worn or stained surfaces and weathered paintwork, then this should be reflected in the model. Judges should be careful to avoid penalising the omission of details which are not clearly visible at 5 metres.

## **2.7 Final Assessment**

When all the models have been individually judged the spread of marking for all the models should be reviewed, particularly the complexity marks awarded. This is to ensure that these marks accurately reflect the spread of complexity across all the models entered. The relative mark of one model compared with the others is important and to ensure this is achieved, the marks can be altered retrospectively. The use of a summary sheet to aid this review is recommended.

## **3 FLIGHT JUDGES GUIDE FOR C/L SCALE**

### **Relevant Rules - BMFA Rule Book - Section 6.2.1 and 6.2.2**

#### **3.1 General**

The aim of the scale flight schedule is to recreate the flight characteristics of the full-size aircraft in a realistic manner within the limits and constraints of the control-lines. The flight must be judged bearing in mind the performance of the full size subject aircraft; judges must therefore not confuse Scale C/L contests with Stunt F2B-contests.

Judges must use their own experience to assess the following aspects:

- a) The shape, size and technical requirements of the intended manoeuvre.
- b) The positioning of the manoeuvre relative to the judges position or other datum.
- c) How well the pilot is able to achieve an element of scale realism in his flight, despite the limiting factor of the control-lines.

#### **3.2 Realism of Flight**

All judges should discuss this after completion of the flight and they should attempt to arrive at an agreed score for each item. Realism of Flight covers the entire flight performance including the way the model flies between the manoeuvres. always keeping in mind the likely characteristics of the subject aircraft.

If the model lands (or crashes) before the flight schedule is complete, all the realism marks should be reduced from what would have been awarded if the schedule had been completed. The amount of reduction should be in proportion to the percentage of the schedule not flown.

Judges will award points for Realism within the following aspects,

##### **3.2.1 Model sound**

This is an assessment of how accurately the model replicates the characteristic sound of the subject aircraft. Judges cannot be expected to have retained an exact impression of the sound produced by all aeroplanes likely to be modelled, however apart from the obvious differences between piston powered, propeller-turbine powered and jet turbine powered aeroplanes, judges should be familiar with typical sounds produced by different categories of aeroplane and different engine design.

Judges should also be aware of the variations in sound produced at varying throttle settings and/or propeller speeds. Judges should therefore consider how closely the sound produced by the model demonstrates what would be the typical sound produced by a full size aircraft in the same category and powered by a similar design of engine to that which the model is attempting to replicate.

There should also be some variation in the sound produced depending on throttle settings and whilst it is difficult for example, to make a single cylinder 2-stroke sound like a RR Merlin at full throttle there may be times during the flight, particularly when the throttle is closed when the sound is more realistic.

If a competitor chooses to substitute electric power in his model when the full size uses some form of internal combustion power, there is invariably a penalty to pay in the marks which can be awarded for model sound. The use of electronic engine sound reproduction systems which often produce very accurate and impressive engine sound when the model is on the ground, is no guarantee that the sound reproduction in flight is realistic.

Special consideration should be given where the model demonstrates any particular characteristic sounds of the full size aeroplane. Competitors are encouraged to advise judges if such characteristic sounds can be reproduced and where they will occur in the flight. E.g. Excessive propeller noise at high power setting or noise produced by the airframe during high 'g' manoeuvres.

### **3.2.2 Speed of the model**

This should be an assessment of the scale speed of the model. A rough guide can be, calculated from the speed of the full size aircraft (as indicated on the score sheet and documentation) divided by the scale of the model. A model that appears to be flying at twice scale speed should only be awarded half marks, a model flying at three times scale speed, or faster, should be marked zero.

Depending on the model there should be some variation in speed throughout the flight programme and between the manoeuvres. This will be a minimum for early types and touring aeroplanes, whereas military aeroplanes from the 'thirties' onwards should demonstrate the greatest variations between cruise and maximum speeds.

### **3.2.3 Smoothness of flight**

The model should be well trimmed and show no signs of instability. Judges should assess the smoothness of control taking into account the prevailing weather conditions. They should also judge the attitude of the model in flight, i.e. any nose-up or nose-down tendency.

It should be noted that many models are flown faster than is realistic in order to make the flight smoother and because the k-factors for speed and smoothness are the same, many competitors use excess speed to disguise instability. Judges should be careful not to inflate the marks for smoothness which is only being achieved because the model is flown too fast.

## **4 FLIGHT JUDGES GUIDE FOR R/C SCALE**

**Applicable to the following classes:**

**Scale R/C (based on FAI Class F4C) including Helicopters**

**Stand-Off R/C Scale including Helicopters**

**Scale R/C Flying Only including helicopters**

**Scale R/C Indoor**

**Relevant Rules - BMFA Rule Book - Sections 6.3.**

### **SPECIAL NOTE**

For many years in both BMFA and FAI Scale Rules, “Realism in Flight” has been marked on the basis of sound, speed and smoothness. A few years ago there was additionally an attempt to include “choice of manoeuvres” in the ‘end of flight assessment’, but this concept was subsequently abandoned because of poor guidance and inconsistent judging standards. There remains however widely held views that there are elements of overall flight realism which are missing from the current philosophy of judging scale models in flight; i.e. the appropriateness of the manoeuvres, the sequence of the manoeuvres and the overall flight presentation. The integration of Scale Helicopter rules into the BMFA Scale Rule Book has provided an opportunity to revise the ‘end of flight assessment’ to include those realism aspects which have previously been missing. This is addressed in Para. 4.8 below and is also under consideration as a future change for fixed wing models.

### **4.1 General**

Flight judging should be a pleasurable experience, but it can sometimes be frenzied and sometimes tedious. When judging a jet model whose pilot is in a hurry, there is barely time to enter the marks on the score-sheet, before the next manoeuvre is called. Contrast this with the slow flying biplane fighting a strong headwind to get back to the judges after being blown downwind. Judges must take care to avoid being over critical of slower models, because slow flying models are ‘in the judges eye’ for much longer than a fast flying model.

The flight must be closely observed from the start of the take-off to the completion of the landing, so it is also important to be comfortable and to avoid being distracted.

### **4.2 Flying Site and Judges Line**

Unless the judge is familiar with the flying site, it is recommended that before flying commences, the take-off and landing area is examined and any hazards are noted. This is particularly important, in view of the penalties for a bad landing and the vulnerability of some models that have poor crosswind tolerance.

When the “judges’ line” and the judges seating position and additionally for a helicopter competition, the position of the helipad has been verified by the Contest Director, the judges must pick out a prominent object or landscape feature on or near the horizon and perpendicular to the judges line which is necessary to identify the centre line for manoeuvres. Alternatively a clearly visible marker post or flag could be placed on the far side

of the take-off and landing area far enough away as to not present a hazard. If there is no obvious marker, judges should be prepared if asked by the competitor, to point out the centreline.

The Contest/Flight Line Director is responsible for monitoring the wind direction and if in his opinion the wind direction continually deviates more than 30° from the judges' line, subject to any constraints of the flying site, the judges line, the judges chairs and the centreline marker should be changed. Flight Judges should of course not hesitate to point out to a less than diligent CD if the wind direction has changed, that the judges line should also be changed.

At indoor events it is normally sufficient to identify the judges line and the centreline with suitable markers or lines on the floor and/or the walls.

### **4.3 Flight Schedule/Score Sheet**

The competitor is responsible for ensuring that he has compiled his flight schedule by clearly identifying the manoeuvres he has planned and the order they are to be flown in. He must do this using the current issue of the Flight Score Sheet and he must prepare sufficient copies for each Flight Judge.

From 2017 because of the change of rules regarding the use of automatic flight stabilisation devices (gyros) the Competitor must also sign a declaration on the Flight Score Sheet to identify whether such devices are fitted to the model and whether they are to be used during the flight.

For his first flight in a competition the competitor must ensure that the flight score sheet is presented to the judges, before he commences to start his engine or move his model to the take off area. This will give the judge time to check that the flight schedule has been correctly identified and the Gyro Declaration has been signed. However in practice, this procedure is not always followed; the score sheet only being made available when prompted by the judge before take-off is called. Under these circumstances the competitor bears the responsibility for any errors or omissions on the sheet and loses flight time in the event that the judges require clarification of the schedule, before the aircraft is permitted to take-off.

For the second and any subsequent flights, the Flight Judges will already be in possession of the score sheets. Should a competitor wish to change any of the manoeuvres flown, or the order in which they are to be flown after the first flight, it is his responsibility to amend or re-issue the score sheets before he commences to start his engine or move his model to the take off area.

If a competitor has decided to include a non-listed manoeuvre or flight function in his schedule he must provide full details of any such manoeuvre or flight function, preferably with a diagram, to the Flight judges. The rules state that this should be done before flying commences in order to avoid discussion at the flightline and delay to the flying program.

Whilst most 'seasoned competitors' know and understand the rules and procedures related to scale flying, it is inevitable the judges will be confronted with a 'first time competitor' who may not be totally familiar with the rules. In this event judges must be prepared to make concessions to the competitor whose nervousness may impede his judgement.

### **4.4 Flight Safety**

Flight Judges must be aware that they are exposed to some considerable risk in the event that a model is being flown badly or is out of control. They need to have a strong sense of self survival and should be prepared to abandon their chair and move quickly if the need arises. Judges should not hesitate to warn competitors if they feel the model is repeatedly flown too close to the judges and should instruct the competitor to land if they feel safety will be compromised if the flight is allowed to continue.

One of the greatest risks to flight judges is an uncontrolled swing by a fixed wing model on take-off and competitors should be advised to reposition their take-off starting point if it seems likely that a swing will result in the model colliding with the judges.

The penalties for competitors who fly over a designated no-go area or an area laid out for the protection of spectators, officials and other competitors, are clearly stated in para. 6.3.1.11 of the rules. However in practice overflying no-go areas can be as difficult for the judge to determine as it would be for the competitor and it may be necessary for the Flightline Director or the event CD to advise the flight judges that an infringement has occurred.

At the UK Nationals, the airspace for R/C scale flying is restricted and control is exercised by the use of flags. A stationary flag will be used to advise the competitor that the model is at or near the airspace boundary and no penalties will be incurred regardless of the number of times the flag is shown. A waved flag is an indication to the judges that the competitor has encroached into another discipline's adjacent airspace, in which case the competitor will be warned. In the event of a second infringement during the same flight, the judges will stop marking and the competitor will be requested to land.

NOTE - The use of flags for airspace control is currently under review and may be replaced during the current flying season

#### **4.5 Flight Timing**

At least one of the Flight Judges should carry a stopwatch or other means of timing the flight. In practice this means starting 'the clock' as soon as the competitor signals he is ready to start or in the case of an I/C powered model when the starting process is commenced.

#### **4.6 Judging Manoeuvres**

Section 6.3.4 of the rules provides descriptions of most of the better known flight manoeuvres for R/C Scale models and also lists many errors that are likely during those manoeuvres, however these lists of errors are not exhaustive and mostly serve to enhance the manoeuvre description.

The start and finish of all manoeuvres must be 'called' by the competitor, (rule 6.3.1.7) but sometimes these calls are inaudible or the timing of the call is not as specified in the description of the manoeuvre. Judges must make up their own minds as to how they penalise 'bad' calling; the important thing is to be consistent.

Some manoeuvres are designated as 'into wind' and there should be no confusion as to precisely what this means from the judges' perspective. Competitors can choose the heading and track for these manoeuvres and are permitted to cross the judges' line without penalty. However this is not an open licence to perform these manoeuvres anywhere and judges should only award high marks for these manoeuvres when the competitor makes the best use of the available space.

The flight judge must examine each manoeuvre from these three aspects:

- The positioning and height of the manoeuvre
- The shape, size and technical requirements of the manoeuvre.
- The realism achieved.

All of these aspects which are discussed in more detail below, have an impact on each other and depending upon the model these aspects can also be affected by the prevailing atmospheric conditions.

There is no prescribed weighting for awarding marks to each of these aspects, so judges must decide upon the importance of any errors, whilst taking into account the performance of the full size aircraft. It is also important that judges are consistent in this regard throughout the competition.

#### **4.6.1 Positioning of Manoeuvres**

With the exception of those manoeuvres designated as “into wind”, all other manoeuvres must be started and finished on a heading which is parallel to the judges line and if the model crosses the judges line during a manoeuvre it must be marked ZERO

The majority of manoeuvres commence with the model in straight and level flight and the flight path should be between 30° and 60° elevation with respect to the judges (indoor scale may be lower depending upon venue limitations). Manoeuvres such as the Spin and Split-S should start at a higher elevation whilst the Descending Circle should start at a point directly above the landing area which could be at an elevation of up to 85°.

Smaller scale and slower flying models should commence and finish most manoeuvres on a track which passes over the landing and take-off area in front of the judges. Larger and faster models need to be further away, particularly when flying manoeuvres with a vertical element. Judges must deduct points for manoeuvres which are considered to be too high, too low or too far away. Judges must also deduct points when manoeuvres are flown closer than the centre of the landing and take-off area or closer than 10 metres (3 metres for indoor scale).

A typical ¼ scale model of a single engined aeroplane would be expected to fly most manoeuvres and most of the turn-rounds or positioning within 60° azimuth either side of the judges centreline. The only exceptions to this would be the “into wind manoeuvres”.

#### **4.6.2 Shape and Size of Manoeuvres**

The extent to which the shape of a manoeuvre conforms to the theoretical ideal, as illustrated in the diagrams in section 6.3.6 of the rules, is largely determined by the skill of the pilot, but when manoeuvres have a vertical element, the power loading has an impact on what the pilot can achieve. Most R/C scale models have a proportionately higher power loading than the full size and are therefore able to achieve greater rates of climb than is realistically possible.

The size of an individual manoeuvres should be proportional to that expected in a display typical to the full size aircraft, and the vertical element of a manoeuvre should also be proportional to what the full size aircraft can achieve.

#### **4.6.3 Realism in Flight**

In order to make an informed assessment of how realistically a scale model is being flown, the judge must rely on his knowledge of the full size aircraft, how it flies and what its limitations are. This is not an unreasonable expectation for aircraft which are currently airworthy and can be seen flying, or in the case of historic aircraft which have been filmed or their flight characteristics have been well documented. However this may not be possible for models of some aeroplanes which no longer exist or are not airworthy and the best that can be expected is to make a comparison between the model and an aircraft with a similar performance when flying a similar manoeuvre.

Most R/C scale model aircraft have an excess of engine power and control power by comparison with the full size and are able to climb and roll at a rate which would be impossible for the full size. Harsh use of the controls including the throttle are the most common faults in scale flying and are usually the reason why a scale model does not appear realistic in the air.

#### **4.7 Marking Realism in Flight (Fixed Wing classes)**

Under the current rules for outdoor fixed wing classes, in addition to the realism aspects of each manoeuvre, the judges must assess the realism of the whole flight after the model has landed (rule 6.3.1.9 (11) (a), (b) and (c) refers). Judges are reminded therefore that what the model does between manoeuvres must be closely observed and critically assessed.

If the flight is terminated for whatever reason before the flight schedule has been completed, the marks for Realism in Flight must be reduced in proportion to the part of the schedule which has not been flown.

For indoor events after the model has landed, marks are awarded for “Flight Performance”, which covers all aspects of the flight other than the specific manoeuvres. This includes the overall flight impression and the flying between manoeuvres.

#### **4.8 Marking Flight Impression (Helicopter classes)**

At the end of the flight the judges must confer to decide the marks for Flight Impression. This breaks down into the following aspects which should be given equal weighting:

- (a) The realism of the flying between the scheduled manoeuvres – this is assessed in the same way as the realism of the manoeuvres (para 4.9 refers).
- (b) The sequence of the scheduled manoeuvres – judges must decide how well the scheduled manoeuvres fit together into a program which minimises unnecessary circuits, changes of altitude and turn-round manoeuvring.
- (c) The appropriateness of the manoeuvres to the subject helicopter – judges must decide if the manoeuvres are appropriate for the subject helicopter and typical of the manoeuvres which would be flown in an air display or an operational scenario.

If the flight is terminated for whatever reason before the flight program has been completed, the Flight Impression marks will be reduced in proportion to the part of the program not flown.

#### **4.9 Realism Aspects**

At present the rules for outdoor fixed wing classes require that the assessment of Realism in Flight is divided into three aspects which are marked separately. Judges must confer and should attempt to agree these separate marks for Model Sound, Speed of the model and Smoothness of flight, as detailed below.

##### **4.9.1 Model sound**

This is an assessment of how accurately the model replicates the characteristic sound of the subject aircraft. Judges cannot be expected to have retained an exact impression of the sound produced by all aeroplanes likely to be modelled, however apart from the obvious differences between piston powered, propeller-turbine powered and jet turbine powered aeroplanes, judges should be familiar with typical sounds produced by different categories of aeroplane and different engine design. Judges should also be aware of the variations in sound produced at varying throttle settings and/or propeller speeds. Judges should therefore

consider how closely the sound produced by the model demonstrates what would be the typical sound produced by a full size aircraft in the same category and powered by a similar design of engine to that which the model is attempting to replicate.

There should also be some variation in the sound produced depending on throttle settings and whilst it is difficult for example, to make a single cylinder 2-stroke sound like a RR Merlin at full throttle there may be times during the flight, particularly when the throttle is closed when the sound is more realistic.

If a competitor chooses to substitute electric power in his model when the full size uses some form of internal combustion power, there is invariably a penalty to pay in the marks which can be awarded for model sound. The use of electronic engine sound reproduction systems which often produce very accurate and impressive engine sound when the model is on the ground, is no guarantee that the sound reproduction in flight is realistic.

Special consideration should be given where the model demonstrates any particular characteristic sounds of the full size aeroplane. Competitors are encouraged to advise judges if such characteristic sounds can be reproduced and where they will occur in the flight. E.g. Excessive propeller noise at high power setting or noise produced by the airframe during high 'g' manoeuvres.

#### **4.9.2 Speed of the model**

This should be an assessment of the scale speed of the model. A rough guide can be, calculated from the speed of the full size aircraft (as indicated on the score sheet and documentation) divided by the scale of the model. A model that appears to be flying at twice scale speed should only be awarded half marks, a model flying at three times scale speed, or faster, should be marked zero.

Depending on the model there should be some variation in speed throughout the flight schedule and between the manoeuvres.

This variation will be a minimum for early types and touring aeroplanes, whereas military aeroplanes from the 'thirties' onwards should demonstrate the greatest variations between cruise and maximum speeds.

#### **4.9.3 Smoothness of flight**

Judges must examine and assess the smoothness of flight, which includes improper use of the rudder, uncoordinated turns, correcting adverse yaw, sideslipping and skidding. Judges must also be aware that because of the scale factor rapid increases of throttle setting will produce unrealistic acceleration of the model.

Taking into account the prevailing weather conditions and the characteristics of the subject aircraft, models of aeroplanes that have a low wing loading, will be affected by gusts, turbulence and crosswind to a greater extent than aeroplanes with a high wing loading.

The model should be well trimmed and show no signs of instability. The attitude of the model can be an indication of a C of G problem, but judges need to be aware that some full size aeroplanes actually fly with a nose down or nose up attitude.

It should be noted that many models are flown faster than is realistic in order to make the flight smoother and because the k-factors for speed and smoothness are the same, many competitors use excess speed to disguise instability. Judges should be careful not to inflate the marks for smoothness which is only being achieved because the model is flown too fast.

#### **4.9.4 Automatic Stabilisation Devices (Gyros)**

With effect from January 2017 the rules on the use of automatic stabilisation devices, commonly known as gyros, have been changed and such devices are now permitted albeit with a penalty in the form of a reduced K-factor for smoothness of flight.

These devices are only permitted in basic mode and Heading hold, Altitude Hold and Speed hold modes including devices which regulate gyro gain from a GPS signal are not permitted.

The Flight Score sheet has been revised to include a declaration on the use or otherwise of automatic stabilisation devices and the competitor must not be allowed to commence his flight unless this declaration has been signed.

A correctly adjusted automatic stabilisation system can undoubtedly help to overcome the effect of air turbulence and improve the smoothness of flight, particularly for smaller and lighter models. However it must not be forgotten that full size aeroplanes are affected by turbulence and as with excessive speed, Judges must be careful to avoid inflating the marks for a model which flies as though it is on rails when in the presence of turbulence.

#### **4.10 NOTES**

##### **4.10.1 Retractable undercarriage failure.**

Rule 6.3.1.7 states that any model which flies with wheels down whereas the full size aircraft actually featured retractable landing gear shall have the total flight score reduced by 10%. Flying with just the tail wheel down when the full size had a retractable tail wheel, will incur a 3% penalty.

Whilst it should not be difficult to determine whether or not the main wheels should or should not be retractable, this is not always the case for tail wheels. The use of retractable tail wheels on many aircraft, particularly WWII fighters was often dependent upon the aircraft mark number or production batch, the Spitfire being a good example of this. Unless the Judge has detailed knowledge of the full size aircraft he may need to ask the competitor, but in practice the question is only likely to arise in flying only competitions, where the absence of accurate scale detail is not so important.

If any part the undercarriage malfunctions or is only partially retracted, or partially extends during the flight, this should be noted on the score sheet with a recommendation as to the percentage penalty, i.e. between 1% and 10% depending upon the severity of the problem.

##### **4.10.2 Components or parts falling from the model**

If something falls from the model during the flight and there is no obvious impact on flight safety, then it is the competitors responsibility to decide if the performance of the model has been affected and whether or not to continue the flight. Judges will need to agree the extent to which realism has been affected and deduct marks accordingly.

##### **4.10.3 Use of Flaps; Lift enhancing devices and Air brakes.**

There is generally a very good reason why many full size aircraft are fitted with lift or drag enhancing devices. Scale models of these aircraft should also be fitted with these devices and they should function in a 'Scale like' manner, not only for reasons of scale accuracy, but because it is necessary to deploy these devices in flight to achieve flight realism.

There are of course many variations of these devices including: Plain flaps, Split flaps, Fowler flaps, Krueger flaps, coupled flaps and slats, slots, drooping ailerons, wing mounted spoilers and fuselage mounted air brakes etc.

These devices must be correctly deployed at the appropriate time during the flight or during a specific manoeuvre, i.e. take-off, landing, touch and go, slow flight etc.

The rules now require the competitor to demonstrate the range of movement of any lift enhancing devices before take-off.

If the judge is in any doubt about what devices should be fitted, he should discuss the question with the competitor preferably before flying commences.

#### **4.10.4 R/C Telemetry**

Recent years have shown an increase in the use of telemetry to provide the pilot with live data from the model. The Rules restrict the use of telemetry to propulsion and receiver system health monitoring only. Judges must be alert to the possibility that the pilot may benefit from telemetry which is prohibited.

## **5 FLIGHTJUDGES GUIDE FOR FREE FLIGHT SCALE**

### **Applicable to classes :**

Outdoor F/F (I/C Piston Engine Powered)

Outdoor F/F (Rubber Powered)

Outdoor F/F (CO2 or Electric Powered)

Outdoor F/F Open - Flying Only

Outdoor F/F Aeromodeller/Model Aircraft Designs – Flying only

Indoor F/F (Rubber Powered)

Indoor F/F CO2 or Electric Powered)

Indoor Kit Scale

**Relevant Rules - BMFA Rule Book - Section 6.4.1; 6.4.2; 6.4.3; 6.4.4; 6.4.5; 6.4.6; 6.4.7; 6.4.11 & 6.4.12**

### **5.1 Flight Phases**

The flight of a Scale Free Flight model has been broken down into several phases for judging purposes and the following descriptions apply to these phases. Not all these phases apply to all free flight classes and the individual class rules should be referred to as appropriate.

These descriptions are largely theoretical and indicate the typical performance of a Scale Free Flight model.

Models should at all times fly in the same manner as the subject full size a/c. The following notes describe an average aeroplane and judges should use their own personal judgement to decide on an appropriate flight style for the model submitted and mark the flight accordingly.

#### **5.1.1 Take-off**

The model should slowly accelerate from rest, leaving the ground after an appropriate ground run. The take-off run should be straight, and transition to flight should be smooth.

The takeoff should be penalised if: the ground run is too short, too long or assisted, the tail or nose wheel does not leave the ground before the main wheels, the wing drops or the run is curved. Note that a swing may occur as the tailwheel leaves the ground; this is normal and should not be penalised unless it is excessive.

#### **5.1.2 Initial Climb**

The model should smoothly rotate to a climbing attitude, and commence a gentle straight or curved climb. The climb should be smooth and appropriate to the subject a/c.

The climb should be penalised if: too steep, too shallow, too highly banked, wing drop or wing rock occurs or nose attitude is too high or too low. Note that a high bank steep spiral climb is normal for a Pitts but that a Bleriot should hardly leave ground effect.

### **5.1.3 Transition to Descent**

The model's flight path should smoothly change between cruise and descent. The change may be abrupt, after an engine failure, or prolonged as the power slowly reduces. The direction of flight may or may not change.

The transition should be penalised if: the model stalls as the engine fails, wing drop or wing rock occurs or an excessive pitch change is apparent.

### **5.1.4 Descent and Landing Approach**

The descent should be smooth, continuous and stable. It may be straight or curved. The angle of descent should be consistent with that of the subject full size either engine on or engine off. As the model nears the ground it should adopt a landing attitude consistent with that of the subject a/c. Allowance must be made for prevailing wind conditions.

The descent and landing approach should be penalised if: the model stalls, drops or rocks the wings, shows too steep a glide or does not change to a landing attitude. Note that the glide angle may change significantly with engine on or off.

### **5.1.5 Quality of Landing (Indoor Only)**

After adopting the landing attitude, the model should descend slowly to the floor, and touch down without bouncing. The ground run should be smooth and straight, with the model coming slowly to rest. Touchdown may be on main wheels only, or on tail down three points.

The landing should be penalised if: the model bounces, the ground run is curved, the model does not stop, it ground loops or touches down too hard. Landings in a nose down attitude, or on the nose wheel, should be penalised.

## **5.2 Realism in Flight**

The model should mirror the flight characteristics of the subject a/c in speed, flight attitude, stability and balance. The model may fly in a straight line or turn in either or both directions. Turns should display an appropriate amount of bank. The flight should be smooth and continuous, especially the transitions between takeoff, climb, cruise, descent and landing approach. Due allowance must be made for the prevailing wind conditions.

Realism in flight should be penalised if: the model flies too slowly or too fast, the nose attitude is too high or too low, the model stalls, or shows fugal flight path, has persistent wing drop or wing rock, flies an out of balance turn or pitches harshly on engine failure. A stall or wing drop may occur if the model hits turbulence or its own slipstream. If the recovery to stable flight is smooth, this should not be penalised. A grossly out of balance turn, left turn with right bank for instance, or a flat turn should be penalised.

The noise the model makes should also be considered when deciding on a mark. In some cases it may be worth considering what is inappropriate rather than what is appropriate, i.e. the slapping of a rubber motor on the fuselage side should be marked down, whereas a silent rubber motor should not. Similarly, the whine of an electric motor may be inappropriate for an IC powered prototype, whereas the noise may be realistic for a jet.

## **6 JUDGES GUIDE TO SCALE PEANUT AND PISTACHIO.**

### **Relevant Rules - BMFA Rule Book - Section 6.4.6; 6.4.7 & 6.4.9**

#### **6.1 General**

Prior to commencement, the judges should review as many as possible of the models entered in the competition in order to establish a standard for the Workmanship and Complexity of Colour and Markings scores. The entries should be studied in relation to each other from a superficial aspect only. This may be achieved by a casual walk around the flying area looking at as many models present as possible.

As an aid to ensuring that marks are awarded in proportion for all entries, as marking progresses a list should be compiled on a single sheet of paper of marks awarded to each model. Marks given are then easily compared. Judges should not be afraid to change marks awarded to an earlier entry if they feel that they have misjudged the initial standard.

Finally, before commencing judging, check the size of the model; you may need to eliminate a model early which will avoid wasting time.

#### **6.2 Peanut or Pistachio**

Pistachio models are, of necessity, a lot less complex than their brother, the Peanut. For example, no penalty should be given for single surface covering, even if this gives the impression of a thinner finish.

Take care also to note the number of total marks allocated under each heading, there exists quite large differences between the two classes.

#### **6.3 Documentation**

Models should be disqualified if less than the minimum documentation is submitted, or if the documentation does not fall within the requirements of the rules.

#### **6.4 Workmanship**

Complexity of the subject model must not be taken into account under this heading. Marks for complexity of subject are allocated under separate headings later.

Models should be checked for quality of workmanship and marked accordingly. In particular, the following should be assessed if appropriate: the filling of grain, the sharpness of line and edge (including that of the colour scheme), the fit of components and the general finesse of the model. The propeller should not be assessed.

#### **6.5 Complexity of Colour and Markings**

Full marks should be given to the most complex subject that has been accurately portrayed. Marks should be awarded to other models in proportion with the lowest mark being appropriate to the simplicity and standard of the poorest, simplest subject. In all cases, the authenticity of the markings should also be taken into account.

When assessing complexity, take account of the following: curved rather than straight lines, number of different colours and size and relative position of markings.

In particular, when assessing authenticity look at the relative size and position of the markings as well as the completeness. This would include such items as colour break lines in camouflage patterns.

## **6.6 Authentic Details**

Marks should be allocated according to the amount of authentic detail on the model. Complex subjects that show a lot, but not all, of the detail should be given a higher mark than a simple subject that has all the detail; present, providing that the detail on both models is accurate and authentic and that the more complex model has more detail on than the simple one.

## **6.7 Flying Surfaces**

The type of covering should not be taken into account. For example, a wing covered on both sides whether in balsa, tissue or foam is still double covered.

## **6.8 Surface Finish**

Consideration should be given to the weight and depth of colour on the model when deciding on the marks allocation under this heading. As a guide, the lighter covering material and thinner finish should be given less marks than the heavier covering material and/or heavy (solid) paint finish.

## **6.9 Complexity of Subject Marks**

Take care when making an assessment under each heading to ensure that marks are allocated according to the relative complexity of each subject when compared to the others in the submitted group of models. For example, if one particular model had a grossly complex fuselage cross-section then the dividing line between a 'square' and 'other than square' fuselage could be moved to give this particular model the correct relative mark. Thus, a 'square' fuselage with a curved turtle deck could be classed as 'square' in one group of models and 'other than square' in another.

Marks should not be given twice for any one feature. For example, if given the premium that applies to a floatplane, no marks should be awarded for the landing gear, unless separate landing gear exists besides the floats.

## **6.10 Negative Points for Deviation From Scale to Assist Flying Performance**

Any deviation from scale that has not already been penalised and would, in the judge's opinion, assist stability or help increase endurance should be penalised by deducting two marks from the static score.

Apart from the listed headings, judges should look for the following; grossly increased distance between propeller and nose block, widening of fuselage, clear or other trim tabs that are not authentic, gross washout on wings, gross deviations in wing section, etc..

## **7 JUDGES GUIDE TO SCALE INDOOR KIT SCALE**

### **Relevant Rules - BMFA Rule Book - Section 6.4.8 & 6.4.9**

#### **7.1 General**

Kit Scale is intended as a class both to encourage newcomers to participate in judged indoor flying and to allow experienced competitors to build and fly models of aircraft that may not be suitable for the 'open' classes due to lack of documentation or complexity. The philosophy is different from other scale classes in that models are judged against authenticity and accuracy to the kit plan rather than absolute accuracy to photographs and 3 view drawings.

#### **7.2 Flying Schedule**

Flying is to be judged in accordance with the guide for Free Flight, section 5 refers

#### **7.3 Static Judging**

Ideally all models entered in the competition should be assembled in the same area for judging to allow the judges to establish a standard for the Workmanship and Overall Character scores. The entries should be studied in relation to each other from a superficial aspect only. Alternatively, this may be achieved by a casual walk around the flying area looking at as many models present as possible. As an aid to ensuring that marks are awarded in proportion for all entries, as marking progresses a list should be compiled on a single sheet of paper of marks awarded to each model. Marks given are then easily compared. Judges should not be afraid to change marks awarded to an earlier entry if they feel that they have misjudged the initial standard. To ensure consistent marking and to speed up the process when faced with a large number of entries, judges may break down the allocation of marks for workmanship and authenticity into a number of specific criteria as suggested in 7.5 and 7.6 below. How this is done is not critical provided that it is applied consistently across all entries. The allocation of marks may be clarified in a future issue of the rules for this class.

You only need to check the size and weight of a model if you suspect that it may exceed the specified limits.

#### **7.4 Documentation**

Documentation requirements are minimal. The kit plan, or a photocopy, **MUST** be produced to confirm that the model is built from a kit and to authenticate its accuracy. It is only necessary to provide one photograph, drawing or painting to authenticate colour and markings. If none is provided, the model will not be disqualified but will score zero for that element of the marking.

#### **7.5 Workmanship**

Models should be judged for accuracy against the kit plan and the quality of workmanship and marked accordingly. In particular, the following should be assessed if appropriate: the filling of grain, the sharpness of line and edge (including that of the colour scheme), the fit of components, lack of warps and the general finesse of the model. The propeller should not be assessed. It is expected that sections such as trailing edges and wing tips shown unfinished on some, typically older, plans will be sanded to produce a more realistic appearance. Deviations are allowed to accommodate a different power source and to replace the original

propeller and wheels with more efficient variants. Credit may be given where this is particularly neatly done.

## **7.6 Authenticity of Colour Scheme & Accuracy of Markings**

This should be judged against the documentation provided. This need not necessarily represent a particular full size aircraft but must be appropriate for the era and type of aircraft modelled (eg WW1 military fighter, civilian tourer etc). Markings may be painted, cut from tissue, printed or applied as transfers. Any covering material is permissible and may be pre-coloured, printed or painted, but see para 7.8 below in respect of deductions. Some credit should be given for complexity of colour scheme and markings but this is not overriding: a well-rendered simple scheme should still attract high marks.

## **7.7 Overall Character**

This is the judges' opportunity to assess the 'appeal' of the model and how well it captures the spirit of the subject full size aeroplane.

## **7.8 Deductions**

This class is intended to enable relative beginners to be competitive against more experienced modellers. Kit-based models are often 'improved' by builders to make them more accurate or to gain complexity marks in the 'open' or Peanut classes. Such alterations are not prohibited in Kit Scale but will result in a reduction in marks in this class. Judges should use their discretion over the total deductions made, particularly as some manufacturers offer alternate options on the plan for such things as separate control surfaces. As a guide, the following should each attract a 5 mark deduction:

- (a) Fully painted surface finish (including light airbrushing).
- (b) Separate control surfaces where these are not shown on the plan. Note that 5 is the maximum deduction; a lower figure may be awarded for a single-surface infringement.
- (c) Significantly increased, or reduced, dihedral (unless already penalised under 'workmanship').
- (d) Addition of a significant amount of detail (other than a pilot, which is not penalised).
- (e) Installation of artificial aids to stability other than manually adjustable trim tabs.