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BRITISH MODEL FLYING ASSOCIATION

SCALE JUDGES GUIDES

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

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SCALE JUDGES GUIDES

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INTRODUCTION

These Judges Guides are managed solely by the BMFA Scale Technical Committee (STC) and are revised and re-issued following any significant rule changes or as required. They can be downloaded from the BMFA website at <http://scale.bmfa.org/judges-guide>

These guides are designed to reflect the knowledge and experience that exists within the scale fraternity. This will offer the greatest benefit to the less experienced and also help to improve judging standards.

Judges, prospective judges and competitors are invited to forward any suggestions and proposals for improvement of these guides, or refer any queries regarding these guides preferably by e-mail to c.allen134@btinternet.com or to any member of the BMFA 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 . Static 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. Static Judges must also have a good understanding of photographic distortion.

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 and their performance limitations. Flight judges must understand how the performance of a full size aircraft is dependent on its design requirements and how the evolution of aircraft and aircraft engine technology has influenced aircraft performance.

Flight Judges must be able to translate the speed and manoeuvring performance of the full size aircraft into the equivalent performance of the model at the relevant scale.

Flight Judges will inevitably be asked to judge the flight of a scale model of an aeroplane they will have little or no knowledge of. Therefore some assumptions regarding its performance will be necessary in order to be able to make a fair comparison between how

the full size aircraft flies and how the model should be expected to perform. 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 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.

APPEAL FOR JUDGES

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 or wishes to improve their scale building and flying and is willing to offer their services as a Scale Judge is invited to contact the Scale Technical Committee.

GENDER

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

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

1.1 STATIC JUDGING - General

The static judging requirements for all classes of Scale Model Aircraft is specified in the BMFA Scale Rule Book. Static Judges must work as a team and attempt to reach agreement on the marks to be awarded for each aspect or item. Although each judge retains the right to differ, any degree of difference should be minimal.

With the exception of some of the Free Flight classes, each aspect of the model is marked out of 10 in increments of 0.1 of a mark.

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.

Before any static judging commences, the judges should make a general comparison of the complexity aspects of as many as possible of the models entered in the competition and place them in an approximate order of merit.*

This need not be a formal process and does not require all the models to be 'lined up' and presented to the judges. 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.

**NOTE. At present the Static Judging process is confined to Complexity of Markings, Colour, Craftsmanship and Scale Detail. Complexity of Design is not considered.*

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.

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 should 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 providing such function 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.)* For the R/C classes, the Contest Director or Organiser must allow the Competitor to use his transmitter if required to demonstrate these features. This will be subject to any Tx control measures, particularly for any competitor using 35mhz equipment.

The competitor must be available throughout the static judging process in the event that 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.

Direct measurement of the model is not permitted and with the exception of free flight and the indoor classes, models should not be handled by the judges.

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 ₂ or Electric)	2 metres	No Restriction	
Indoor FF (Rubber)	n/a	n/a	*
Indoor FF (CO ₂ 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

It is important that the static judges retain all the static score sheets until all the models have been static judged in case any corrections or adjustment of complexity marks are necessary.

1.2 DOCUMENTATION REQUIRED

Currently and for the foreseeable future Flying Scale model competitions require various items of documentation:

Score sheets for both flying and static judging – These are downloadable from the BMFA Scale Website or available from the STC or Contest Directors. These documents are re-issued following any rule changes and Judges must ensure that they are presented with the correct sheets and that the details that they require have been provided by the competitor.

Competitor's Declaration - Downloadable from the BMFA Scale Website or available from the STC or Contest Directors.

Static 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 Declaration also provides the certification that the model conforms with the "Builder of the Model rule" (BMFA Scale Rules 6.1.1.3 refers), which 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 that moulded components have been manufactured by the competitor 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 "Scale Detail" marks must be reduced accordingly.

If the competitor claims that he has used commercially available components but has modified them to improve scale accuracy, he must provide evidence of the extent of such modifications. The extent of any re-working or re-finishing must be clearly documented otherwise the marks awarded must reflect the origin of the mouldings.

Proof of Scale Documentation - The model can only be judged by comparing it with the proof of scale documentation or scale evidence presented by the competitor. Judges can only award marks based on the information provided by the competitor.

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.

With the exception of Stand-Off Scale classes, the **minimum** proof of scale documentation requirements are stated in paragraph 6.1.2.2 of the BMFA rule book and paragraph 6.1.2.3 indicated the penalties for not providing this minimum standard.

The minimum standard of documentation is unlikely to provide all the evidence necessary for the judges to award high marks and good presentation is no guarantee that it is fully comprehensive.

Section 1.3 below provides guidance to Judges on what the optimum standard of proof of scale documentation should be and Judges must ensure that a competitor does not benefit by default when this documentation is incomplete or of poor quality.

For the Stand-Off scale Classes the proof of Scale Documentation requirements are stated in section 6.3.2.5 of the BMFA Scale Rules

Advice to competitors on how the documentation should be presented is given in paragraph 6.1.2.4 of the rules.

1.3 PROOF OF SCALE DOCUMENTATION

1.3.1 Photographs.

Photographs submitted as evidence of outline accuracy should ideally show the complete aircraft 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 marked.

The photographs provided should show good definition, with a good depth of focus and ideally be free from distortion. Static Judges must 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 be on the lookout for photographs of the model which have been edited to make the model appear to be the full size aircraft.

1.3.2 Scale Drawings.

The specification for drawings is defined in rule 6.1.2.2(a)(ii), which defines minimum dimensions. However 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 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 BMFA 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.

Judges should also be aware that a drawing labelled by an Aircraft Manufacturer as a General arrangement (GA) drawing is no guarantee of accuracy. Manufacturers GA drawings are often literally just that, i.e. they are produced to illustrate the overall shape of the aircraft in the simplest manner.

Drawings which do not display proof of origin or have not been endorsed by the competitor's NAC should be disregarded with the associated loss of marks.

1.3.3 Proof of Markings and the Colour scheme

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

Comprehensive evidence showing both sides of the subject as well as the upper and lower surfaces of the wings, can be difficult to obtain and whilst photographs of a similar aeroplane

may be available, judges should only award high marks for aircraft markings if the documentation provides evidence of all the markings and the total colour scheme.

All too often, whilst excellent photographs are provided for the aeroplane type, only one photograph or illustration shows the subject aeroplane and judges must not make assumptions that the markings are the same on each side of the aeroplane.

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, 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 for marks to be awarded..

1.3.4 Proof of Colour Accuracy.

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

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

Colour photographs can be unreliable 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.

Judges should be aware that B&W photographs can be hand or digitally coloured and for practical purposes accurate colour photographs were not available until the late 1930's. Until the mid 1940's black and white photographs were often based on orthochromatic film which, unlike panchromatic film reproduces red and yellow as a darker shade of grey than blue.

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.

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 authorising authenticity, unless the patches themselves are identified and authorised by a competent authority.

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

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

1.3.5 Proof of Surface Texture.

The correct surface texture of the model is as equally important as the shape (outline and detail) and the colour.

Surface texture is by definition; “the manner of arrangement of particles in a substance” or the degree of smoothness or the ‘feel’ of a surface. In the Outdoor classes Static judges are not permitted to touch the model but because allowance must also be made for the scale of the texture, the ‘feel’ of the surface is of less relevance than how it looks.

Surface Texture is also commonly the most poorly documented and it is not sufficient to be provided with evidence which proves how the full size is constructed and what the surface is; e.g. metal, composite, wood or fabric.

Static Judges cannot make assumptions on the texture of these surfaces based on what they are made of and the full size finish. They must therefore be provided with evidence of the texture of all the different surface materials used on the full size aircraft. . Clearly samples of the full size aircraft structure are not practical, therefore detailed close-up photographs must be provided.

1.3.6 Proof of Scale Realism.

Realism is by definition; “representing things as they really are” and in the context of scale model aeroplanes it is best to consider the whole model and make the comparison with the full size subject aircraft. The evidence must therefore be a good quality photograph or photographs.

These photographs can be the same as used for scale accuracy, but ideally the photographs should be presented separately.

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 laid out below which is also 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.

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 and marks can only be awarded for accuracy of outline when the judge is satisfied that the competitor did the work necessary to achieve it, e.g. when it can be proven that the competitor produced the plug and/or the mould.

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.

(a) Side view, for 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, for dihedral, wing thickness and taper, washout, wing struts, bracing and gap on multi-wing aircraft. Also 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, for wing outline and fairings, aileron size, flaps; 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 markings, particularly on the top and underside of the wings.

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. Check that any pin striping is of the correct dimensions and is correctly positioned.

Particular emphasis should be made to the relative positioning between markings and key features on the airframe as these often highlight errors in shape and outline and can be a good indication of scale accuracy.

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.

High marks should only be awarded for markings accuracy if the documentation provides evidence of all the markings, i.e. both sides and the top and bottom. It cannot be assumed that the markings are the same on each side of the aeroplane. As a guide, if the evidence

for markings shows only one side elevation of the subject and there is no indicative evidence to support the markings on the other surfaces, 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 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 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 colours on 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 when assessing colour.

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.

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 subject aircraft and the marks that are awarded must reflect the standard of documentation presented. The surface texture is one aspect that is often not clearly

documented; remember, the judge cannot use his own knowledge or make assumptions, based on the subject aircraft type and when it was built.

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. 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 removable 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

Realism is a question of 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 full size aeroplane, 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 finish and the application of markings.

The principle to adopt here is that if it can be seen and it 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.

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 wing joints or fixings necessary for dismantling the model and non-scale hatches or access panels used for model operation should be carefully disguised to avoid any loss of marks.

1.4.9 Assessing Craftsmanship - Complexity

Judges should consider the overall complexity of the aircraft construction 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.

Judges must consult the competitor's declaration and check for any components that have not been made by the competitor, including laser cut parts, CAD and cutter/plotter produced components. Any such items must not be included in this assessment.

Demonstrations of scale functions other than normal control function; e.g. sliding canopies, hinged doors, folding wings, etc. may also be rewarded under this section, providing such functionality is appropriate to the full size aircraft and normally operable by the pilot or aircrew of the full size aircraft.

1.4.10 Assessing Scale Detail Accuracy

The documentation presented should clearly show the details that are being assessed. The marks awarded should reflect the accuracy, the quantity and the completeness of scale detail present. This is of course easier said than done and Judges must carefully examine the photographs of the full size aircraft to verify that the competitor has not omitted 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 provides some examples of detailed items which may be present on the full size aircraft and should be reproduced on the model. They must be well documented, accurately reproduced and correctly positioned on the model.

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
Bracing wires	Filler caps
Turnbuckles	Louvres
Struts	Cooling gills
Lacing or stitching	Mass balances
Aerials	Instrument panel
Venturies	Cockpit or cabin interior detail
External sensors	Access panels
External gauges	Static wicks
Trim tabs	Drain holes
Screws, nuts and bolts and fixings	Helicopter transmission components
Rotor blades	Rotor heads/hubs
Swashplates and control linkages	External winches

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 the 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.

1.4.12 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 aspects 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. Templates for the summary sheets can be downloaded from the Scale Website

2 STATIC JUDGES GUIDE FOR R/C STAND-OFF SCALE

Applicable to the following classes:

R/C STAND-OFF SCALE

R/C STAND-OFF SCALE HELICOPTER

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 static judging stand-off scale as compared with the other classes is that the Scale Accuracy is assessed without concern as to who built the model.

Each aspect of the model is marked out of 10 in increments of 0.1 of a mark.

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 photographs with the drawings, however the documentation requirements for Stand-Off scale have been simplified and if high quality photographs are submitted and they are considered sufficient to fully assess the three views, the competitor should not be penalised for not providing drawings.

Paragraph 1.3.1 provides advice on using photographs and paragraph 1.4.1 provides advice on assessing outline accuracy.

2.3 Originality of Model Design & Construction

The judge must examine the Competitors Declaration including any supporting evidence presented by the competitor and if necessary question the competitor, in order to evaluate the extent to which the competitor has contributed to the Scale Accuracy (Outline Accuracy). 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 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

Colour and markings accuracy is determined by comparison with the documentation which is presented. The ambient light conditions (e.g. light and shade) prevailing during judging may not be the same as that which applies to the documentation and particular consideration should be given when this occurs.

Camouflage colour schemes should show the correct pattern and the correct degree of merging of the shades.

Check the position and size of markings, insignia, numbers and lettering.

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.

Paragraphs 1.4.2. & 1.4.4. provide further advice on assessing 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 prototype. 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 and a summary sheet can be downloaded from the BMFA Scale website.

3 FLIGHT JUDGES GUIDE FOR C/L SCALE

Applicable to the following classes:

Scale Control Line

Scale Control Line Flying Only

3.1 General

The aim of the C/L scale flight schedule is to enable the competitor to recreate and demonstrate the flight characteristics of the full-size aircraft to the judges 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 and judges must therefore not confuse Scale C/L contests with Stunt F2B-contests.

Section 6.2.3 of the rules provides descriptions of most of the better known flight manoeuvres for C/L 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 flight must be closely observed from the start of the take-off to the completion of the landing, so it is important to be comfortable and to avoid being distracted.

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.

All of these aspects of course, also have an impact on each other and depending on the model these aspects can also be affected by the prevailing atmospheric conditions. Judges must decide upon the importance of each error whilst taking into account the performance of the full size aircraft. There is no prescribed weighting for awarding marks to each of these aspects, therefore it is important that judges are consistent in this regard throughout the competition

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, noise produced by the airframe, including whistling over gun ports, vibration of rigging wires etc, or the use of a siren.

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. Models should also be downmarked if they fly too slowly.

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

4.1 Flight Judging - 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 may 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, it may be necessary to change the judges line, re-position the judges chairs and the centreline marker. 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 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 prepare sufficient copies for each Flight Judge.

The Competitor must enter the cruising or max speed of the full size aircraft and the scale to which the model is built on the score sheet.

The Competitor must also sign a declaration on the Flight Score Sheets to identify whether automatic flight stabilisation devices (gyros) are fitted to the model and whether they are to be used during the flight.

For the 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.

For the second and any subsequent flights, the Flight Judges will already be in possession of the score sheets. If a competitor wishes to change his flight schedule 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 proposed 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 take-off swing will result in the model hitting 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. 6.3.1.12 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 when necessary the competitor and the judges will be advised that the model is at or near the airspace boundary. If the competitor has encroached into another discipline's adjacent airspace, the competitor will be warned and in the event of a second infringement, flight scoring will stop and the competitor will be requested to land.

4.5 Flight Timing

At least one of the Flight Judges should carry a stopwatch or other means of timing the flight. The competitor has 17 minutes to complete his flight, plus an additional minute for each engine or motor greater than one.

In practice for an I/C powered model, timing commences as soon as the competitor signals he is ready to start his engine or engines. For electric powered models timing commences as soon as the propeller starts to turn.

4.6 Judging Manoeuvres

Section 6.3.6 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.

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 of course, also have an impact on each other and depending on the model these aspects can also be affected by the prevailing atmospheric conditions. Judges must decide upon the importance of each error whilst taking into account the performance of the full size aircraft. There is no prescribed weighting for awarding marks to each of these aspects, therefore it is 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). Manoeuvres such as the Spin and Split-S should start at a higher elevation whilst the Descending Circle should start at an elevation of up to 80° as seen from the judges position.

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 exception to this would be the landing approach.

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 dependant upon how realistically the model is flown and the skill of the pilot.

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

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. There are 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.

At the 2018 Plenary the CIAM agreed to replace the sound element of realism with “Flight Presentation”. After consideration of the CIAM change, the STC decided not to adopt this change for 2019.

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.

In order to make an informed assessment of how realistically a scale model is being flown, the flight 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.

Flight judges should be aware of the effect of adverse yaw and also be able to recognise when turns are uncoordinated.

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) 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 produced by the model 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, noise produced by the airframe, including whistling over gun ports, vibration of rigging wires etc, or the use of a siren.

4.9.2 Speed of the model

This is 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. Models should also be downmarked if they fly too slowly.

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

4.9.3 Smoothness of flight

The model should be well trimmed and show no signs of instability. Judges should assess the smoothness of flight taking into account the prevailing weather conditions and the characteristics of the prototype. 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 attitude of the model can also 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.

4.10 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.

Gyros are only permitted in basic mode. 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 improve the smoothness of flight particularly for smaller and lighter models and hence improve the realism for many models when flying in turbulent air. 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 in the presence of turbulence.

4.11 NOTES

4.11.1 Retractable undercarriage failure.

Rule 6.3.1.9 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 the undercarriage 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.

4.11.2 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.

4.11.3 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.

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.

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

If the flight judges knowledge of the design of the full size aircraft is such that there is doubt regarding which devices should be fitted to the model, then the subject must be discussed with the competitor preferably before flying commences.

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

4.11.4 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. E.G. height data, GPS data, etc.

5 FLIGHTJUDGES GUIDE FOR FREE FLIGHT SCALE

Applicable to the following 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

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 prototype.

When considering the marks to be awarded to each phase of flight, Judges should first consider how realistic the model performs in comparison with the full-size. As well as the general sit of the model, 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.

5.1.1 Take-off

The model should accelerate from rest at a rate and in a manner that reflects the performance of the subject aircraft, 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 full size aircraft.

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 Cruise

The cruise phase of a Free Flight Scale model is normally the longest part of the flight and it also has the highest K- factor.

The model may fly in a straight line, turn in either direction or fly an S shaped pattern. Altitude may vary but rate of climb or descent must not be excessive. Any change of direction or altitude should reflect the agility of the subject aircraft and turns should show an appropriate amount of bank.

The cruise should be penalised if the model shows any instability; if the speed of the model is inappropriate or if the model stalls or shows a fugoïdal flight path.

5.1.4 Transition to Descent

The model's flight path should smoothly change between cruise and descent. The change may be abrupt, after an engine stop, 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.

5.1.5 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 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 full size. 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.

5.1.6 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 prototype 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 a fugoidal flight path
- has persistent wing drop or wing rock
- pitches harshly when the engine stops
- flies an out of balance turn
- flies a flat turn

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.

6 JUDGES GUIDE FOR SCALE PEANUT AND PISTACHIO.

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 full size 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

Highest marks should be given to the model with the most complex markings that have been accurately portrayed. Marks should be awarded to other models in proportion with the lowest mark awarded to the model with the least complex colour scheme and the minimum of markings.

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 Bonus points for Complexity

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 judges 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 FOR INDOOR KIT SCALE

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 views.

NOTE : Judges only need to check the weight and wing loading of a model if it is suspected that the specified limits have been exceeded. (Rule 6.4.11.1 refers)

7.2 Flying Schedule

Flying is to be judged in accordance with the Flight Judges Guide for Free Flight, (section 5 refers), but note the minimum qualifying flight time of 10 seconds.

7.3 Static Judging

Ideally all models entered in the competition should be assembled in the same area 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.

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 and a simple scheme which is well-rendered should still score well.

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 full size aircraft as illustrated by the documentation supplied.

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 above that shown on the plan (other than a pilot, which is not penalised).
- e) Installation of artificial aids to stability other than manually adjustable trim tabs.
- f) The addition of gurney tabs that are not on the plan.
- g) the addition of clear tabs that are not on the plan.