BRITISH MODEL FLYING ASSOCIATION

SCALE TECHNICAL COMMITTEE

SCALE JUDGES HANDBOOK

INCLUDES STATIC AND FLIGHT JUDGING GUIDES FOR ALL BMFA SCALE CLASSES

ISSUE 1

Supersedes all issues of the BMFA Scale Judges guides

Effective March 2024

SCALE JUDGES HANDBOOK

INDEX

INTRODUCTION

This Judges Handbook issue 1 is a new document which represents a major revision of and supersedes all issues of the BMFA Scale Static and Flight Judges Guides.

This document is managed solely by the BMFA Scale Technical Committee (STC) and will be revised and re-issued as required or following any significant scale rule changes.

This document is designed to reflect the knowledge and experience that exists within the Flying Scale fraternity. It is essential reading for all BMFA Scale Judges and Competitors and will offer the greatest benefit to the less experienced and help to improve judging standards.

It is also considered to be essential reading for ASRC Examiners who will be asked to conduct a Scale C test..

Judges, prospective judges and competitors are invited to forward any suggestions and proposals for improvement of this document, or refer any queries or comments, preferably by e-mail to the editor c.allen134@btinternet.com or to any member of the BMFA Scale Technical Committee.

This document can be downloaded from the BMFA website at http://scale.bmfa.org and selecting Documents – Judges Handbook

Gender

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

Cross References to the Scale Rule Book.

Where a cross reference to the BMFA Scale Rule is made, the relevant paragraph number in the Rule Book will appear in **Bold Type.**

A Scale Class cross reference guide has been added for information on page 4

SCALE CLASSES - CROSS REFERENCE GUIDE		
Class Code	**Class Description**	**Rule Book Reference**
CL1	Scale Control Line (based on F4B)	6.2.1
CL2	Scale Control Line Flying Only	6.2.2
RC1	Scale Radio Control (based on F4C)	6.3.1
RC2	Scale Radio Control Stand-Off (based on F4H)	6.3.2
RC3/4	Scale Radio Control Flying Only & Light Scale	6.3.3
RCX1	Scale Radio Control Indoor Open	6.3.4
RCX2	Scale Radio Control Indoor Flying Only	6.3.5
RCX3	Scale Radio Control Indoor Kit Scale	6.3.6
FF1	Scale Free Flight Outdoor Open (I/C Piston Engine Powered)	6.4.2
FF2	Free Flight Outdoor Open (Rubber Powered)	6.4.3
FF3	Scale Free Flight Outdoor Open (CO2, Electric, Compressed Air or Reaction Motors)	6.4.4
FF4	Scale Free Flight Outdoor Intermediate	6.4.5
FF5	Scale Free Flight Outdoor Flying Only	6.4.6
FF6	Scale Free Flight Outdoor Precision (Rubber Powered	6.4.7
FF7	Scale Free Flight Outdoor Eddie Riding Trophy	6.4.8
FFX1	Scale Free Flight Indoor Open (Rubber Powered)	6.4.9
FFX2	Scale Free Flight Indoor Open (CO2 or Electric Powered)	6.4.10
FFX3	Scale Free Flight Indoor Intermediate	6.4.11
FFX4	Scale Free Flight Indoor Kit Scale	6.4.12
FFX5	Scale Free Flight Indoor Peanut	6.4.13
FFX6	Scale Free Flight Indoor Pistachio	6.4.14
FFX7	Scale Free Flight Indoor Starter No-Cal Profile	6.4.15

SCALE JUDGES – REQUIREMENTS AND ATTRIBUTES

Static Judges

Static Judges are tasked with assessing the scale accuracy of flying scale model aircraft and in some classes also assessing the competitor's skill and craftsmanship which has been used to build the model. Static Judges must also assess the complexity of certain aspects of all the models entered in the competition to ensure that the models are placed in the correct order of merit.

When assessing the scale accuracy of the model, the judge must only use the documented proof of scale evidence provided by the competitor and must disregard any prior or special knowledge he may have of the full-size subject aircraft. The Static Judge must also refer to the Competitor's Declaration which provides essential information on the model construction and should also provide details of any components which are manufactured by a third party.

Static Judges must have good analytical skill and 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 perspective and the various forms of photographic distortion.

Static Judges also need to have a good understanding and practical experience of the materials and techniques involved in the construction and finishing of flying scale model aircraft in order to make an accurate assessment of the skill and workmanship. They also need to have an awareness of the various engineering techniques and processes including computer driven processes which are increasingly being used in the construction of model aircraft components.

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.

The Competitor is required to provide details of the maximum and cruising speed of the full-size aircraft to the judges. However, knowing the speed of the full-size aircraft is not sufficient information to assess the flight of the model or make a fair comparison between how the full-size aircraft flies and how the model should be expected to perform.

The flight judge must therefore use his background knowledge of the performance and capability of full-size aircraft and if necessary, make some assumptions based on the performance of aircraft of a similar design.

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 that they have little knowledge of or may have never seen before. In this situation it is the judge who is being tested and therefore it is important for Flight Judges to constantly expand their knowledge of aircraft performance not only by their choice of reading and studying historic film, but also by studying the flight of full-size aircraft.

APPEAL FOR JUDGES

Flying 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.

Closely scrutinising other people's models and how they are flown is one of the best ways to improve your own skills, so if you think you have the necessary experience or wish to improve your scale building and flying and are willing to offer your services as a Scale Judge, you are invited to contact the Scale Technical Committee.

1. STATIC JUDGES GUIDE – FOR ALL CLASSES WHERE THE BUILDER OF THE MODEL RULE IS APPLICABLE

1.1 STATIC JUDGING - General

This Section is applicable to all the Scale Classes which are static judged and with the exception of Class RC2, all the classes to which the Builder of the Model rule is applicable. (see **6.1.1.3**) with the exception of classes FFX4, FFX5 and FFX6.

Static judging of flying scale models is based upon the assessment of several aspects of the model which vary depending on the Class Rules. These aspects which are specified in the BMFA Scale Rule Book fall into three categories which are:

1 The scale accuracy of the model:

2 The application of the skills and the craftsmanship required to build the model (except for Class RC2).

3 The Complexity of some aspects of the model.

> ***SPECIAL NOTE REGARDING COMPLEXITY OF THE MODEL***
>
> *For C/L and R/C scale classes where there is an equivalent FAI Championship class the BMFA Static Judging Rules closely follow the FAI Sporting Code which currently makes no allowance for the* ***design*** *complexity of the full-size subject aircraft. Consequently, the competitor who builds a model of a complex design rather than a simple design cannot be fully rewarded for his effort by receiving more marks from the judges. If, however, to replicate a more complex design the competitor uses a greater variety of construction methods and techniques, the judges can award higher marks for Craftsmanship Complexity and Detail Complexity. See paragraphs 1.4.9 to 1.4.11 below.*

The Static Judges must work together as a team and attempt to reach agreement on the marks to be awarded for each aspect. Although each judge retains the right to his own opinion, any difference between the marks awarded by different judges at the same competition should be minimal and not more than 2 marks.

Apart from some of the Free Flight classes, each aspect of static judging is marked by each judge out of 10 in increments of 0.1 of a mark. The marks awarded for each aspect of Scale Accuracy and Realism are subjective for the model. *However, the marks awarded for complexity aspects are relative to all the models entered in the competition and the marks awarded must reflect the order of merit for that aspect across all the models entered in the class.*

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.

If the model aircraft has completed a scoring flight before being static judged in the same competition, any superficial 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 or a platform which allows the model to be viewed with the wing or wings at the judge's 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 in the manner of the full-size aircraft.

Except for 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. For the R/C classes, the Contest Director or Organiser must allow the Competitor to use his transmitter if required to demonstrate these features.

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.

Direct measurement of the model is not permitted and Judging distances are as prescribed in the following table which is copied from rule **6.1.2.7**. Measurements are taken from the centreline of the model to the Judge's chair for the classes listed. For all other classes which have a static judging element it will be necessary for the Static Judges to handle the model.

SCALE CLASS	ASPECT ITEM 1	ASPECT ITEMS 2 to 6 Inc
CL1	3 metres	no restriction
RC1	5 metres	no restriction
RC2	----------All at 5 metres----------	
FF1	2 metres	no restriction
FF2	2 metres	no restriction
FF3	2 metres	no restriction
FF4	2 metres	no restriction
FF9	2 metres	no restriction

The static judges must retain all the static score sheets until all the models have been static judged and then carry out a final review of the marks awarded. This process is particularly important for the complexity marks to ensure they reflect the correct order of merit of all the models in the class.

1.2 EXAMINATION OF DOCUMENTATION

The documentation required consists of Score sheets, the Competitors' Declaration and the Proof of Scale documentation. These documents must be available when the model is presented for static judging and the Static Judges should carefully examine the documentation before assessing the model.

1.2.1 Static judging Score sheets

Blank forms are downloadable from the BMFA Scale Website or available from the STC and the Contest Director.

The scoresheets must be correctly filled in with the Competitors details and the details of the model.

1.2.2 Competitor's Declaration

A completed and signed Competitors Declaration form is an essential document and static judging cannot commence unless the completed Declaration has been presented to the Static Judges. (**see 6.1.1.7**)

Blank Declaration forms are downloadable from the BMFA Scale Website or available from the STC

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

The Declaration provides the certification that the model conforms with the "Builder of the Model rule" (**see 6.1.1.3**).

The Declaration also contains a Questionnaire, the purpose of which is to assist the Static Judges to determine the method of construction of the model and the extent to which any components not manufactured by the competitor have contributed towards the structure of the model and its scale accuracy. The competitor is responsible to identify any components that have been manufactured by a third party and this is particularly important when the overall outline of the model is dependent upon the use of moulded major airframe components.

There is an increasing use of computer software in the design (CAD) of model aircraft and the use of computer aided tools (CNC machinery and 3D printing) to produce model aircraft components. It is important that the extent to which the use of this technology and/or these devices, is identified and understood by the judges and also the extent to which the competitor is involved in these processes.

1.2.3 Proof of Scale Documentation

The scale accuracy of 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 for scale accuracy based on the information provided by the competitor. It follows therefore that if the documentation relating to any part of the model is missing, inadequate or poorly presented, then this must be reflected in the marks which can be awarded.

The minimum requirement for proof of scale documentation is specified in section **6.1.2.3** of the BMFA scale rules and the penalties for inadequate documentation are specified in section **6.1.2.4**. of the BMFA scale rules. It must be stressed that although the rules specify the minimum requirement for proof of scale documentation, in most cases this minimum standard of documentation will not provide sufficient

evidence for the judges to award maximum marks for scale accuracy. The quality of the documentation and the manner of presentation must also be taken into account.

Proof of Scale documentation should be presented in a format which can be quickly and easily understood. Advice to competitors on how the documentation should be presented is given in paragraph **6.1.2.5** of the BMFA Scale Rules. Good presentation, however, is no guarantee that it is fully comprehensive.

Judges must ensure that they only award maximum static marks if the combination of photographs and drawings provides 100% unambiguous coverage of the visible surfaces, colour, markings, texture and scale details of the model. In practice this means that unless there is comprehensive photographic coverage of the model the drawings must show 5 views i.e. both sides, top and bottom and a front view.

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

1.3.1 Photographs.

Photographs submitted as evidence of outline should ideally show the complete aircraft and the image size should not be less than 15cm wide. Photographs which provide evidence of scale details, components and surface texture may be smaller but must be clearly marked with the precise location of such detail on the aircraft.

The photographs provided should be of good quality, with good definition, a good depth of focus and ideally be free from distortion. Static Judges must have a good understanding of how the focal length of the camera lens can distort the image and how the distance between the camera and the subject can also introduce distortion of the photographic image. Detailed explanation 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 must be on the lookout for photographs of the full-size aircraft which may have been edited to enhance the accuracy of the model and also to spot photographs of the model which have been digitally enhanced to make them look like the full-size aircraft. It may be necessary to carry out detailed close-up examination of the photographs if it is suspected that they may have been digitally edited.

1.3.2 Scale Drawings.

Judges must seek to verify the origin of drawings, who drew them and where they have been published and this information must be shown on the drawing. Unattributed drawings downloaded from an unknown website are not acceptable and unpublished drawings or drawings produced by the competitor must be certified in advance of the competition, by an authoritative source such as the builder of the full-size aircraft or the competitor's National Aerospace Council (NAC), which in the UK is the BMFA Scale Technical Committee. Drawings which do not display proof of publication or have not been endorsed by the competitor's NAC should be disregarded and the penalties described under rule **6.1.2.4** applied.

If a complex multi-view drawing has been divided 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 drawing should also be available as proof of certification/publication.

Proof of publication is no guarantee of accuracy and the accuracy of a drawing can usually only be verified by comparison with the full-size aeroplane or undistorted photographs

The specification for drawings is stated in BMFA rule **6.1.2.3(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

It is common practice by some publishers to crop scale drawings to fit them on to one page of a book or one A4 sheet. This usually means that in a three-view drawing, one wing is cropped on the front view and on the plan view the fuselage is often divided down the centre line to show the top and bottom. Many early aeroplanes had identical but opposite port and starboard wings, but there are usually differences in detail, e.g., pitot heads, landing lights etc. Similarly, both sides of the fuselage are rarely identical and there are also differences in the colour scheme or markings.

Drawings should also ideally show the wing aerofoil section and if this is changed from root to tip. Many scale models particularly if built from a kit have a simplified aerofoil to ease construction or reduce drag, e.g. flat bottomed instead of under-cambered.

Judges must not make assumptions that both port and starboard wings and both sides of the fuselage are identical, and the documentation must clearly show the details of both wings and both sides of the fuselage. With the current exception of class RC2/F4H the drawing should show the top and bottom plan view of the entire aeroplane

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

The drawings should be applicable to the same Mk./variant or modification standard of the full-size subject aircraft that has been modelled. Drawings of a different variant of the same aircraft are acceptable providing the differences between variants are minimal, clearly identified and illustrated with supplementary sketches and/or cross referred to photographs.

1.3.3 Proof of Markings and the Colour Scheme

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

Proof of all markings and the complete colour scheme on both sides of the subject aircraft as well as the upper and lower surfaces of the wings, can be difficult to obtain and all too often, whilst excellent photographs are provided for the aeroplane type, only one photograph or illustration shows the subject aeroplane. One photograph can at best, only provide evidence of 50% of the markings and therefore in this case the maximum possible marks for colour and markings cannot be more than 50% of the available marks.

Judges must not make assumptions that the markings are the same on each side of the aeroplane or the same on both upper and lower surfaces of the wings.

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

Military aircraft from the 1930's onwards are also invariably covered with a plethora of stencilled servicing instructions and component identity marks which require detailed photographic evidence for high marks to be awarded.

The manner of application of markings is also important and judges must pay particular attention to how the markings are applied. Traditionally markings were always painted on, but many modern aircraft (post the 1980's) use markings which are pre-printed on vinyl or polyester film and then stuck on. Pre-printed markings produced by a third party should be declared on the Competitors Declaration and Judges may need to question the competitor on this matter.

1.3.4 Proof of Colour Accuracy.

The aspect of Colour accuracy is concerned solely with the tonal accuracy of the colours on the model by comparison with the evidence submitted and it is essential that if high marks are to be awarded, a comprehensive standard of colour evidence 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 lit by natural light outdoors, will not be a reliable proof of colour when the model is judged indoors illuminated with artificial light.

Judges should be aware that black & white photographs can be hand or digitally coloured and for practical purposes accurate colour photography was not available until the late 1930's. Judges also need to be aware that until the 1940's black and white photographs were often taken using orthochromatic film which is oversensitive to blue light which appears as a light grey and insensitive to red which appears as black. Panchromatic film which is more commonly used has a much wider spectrum and reproduces black and white tones closer to how they are perceived by the human eye.

The optimum photographic proof of colour must be a good quality photograph of both the model and the subject aircraft posed together and 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. Even then this 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 in-between.

1.3.5 Proof of Surface Texture.

The correct surface texture of all the different surfaces of the model is equally as important as the shape (outline and detail,) and the colour and markings of the model.

Surface texture is by definition; “the manner of arrangement of particles in a substance” or, put another way, the degree of smoothness or what it feels like. In practice, because judges are often not permitted to touch the model, judging texture is not a question of what it feels like, but what it looks like.

Good evidence of surface texture is difficult to obtain and this is one aspect of static judging that is often poorly documented. Although static judges cannot use any prior knowledge they may have of the subject aircraft, they can be expected to have general knowledge of the different visual aspects of materials used in the construction of aircraft.

The best evidence of texture is good quality photographs taken in controlled lighting, but if this is not available because the subject aircraft is no longer in existence, a detailed written description of the surface structure of the subject aircraft, e.g., metal skinned, composite, plywood or fabric, may provide useful information for the judges

Judges must take care not to confuse surface texture with “surface detail” but in practice this may depend upon the scale of the model. Even with good photographic evidence of texture, the assessment of texture becomes more difficult as the scale factor increases. I.e. Assessment of the fabric covering on a ¼ scale model is straightforward, whereas assessment of the fabric covering of a model built to 1/10th scale is all but impossible.

1.3.6 Proof of Scale Realism.

Realism is by definition; “representing things as they really are” and in practice the assessment of realism of a scale model aeroplanes, is a comparison between the whole model and photographs of the full-size subject aircraft.

The best evidence of realism is therefore a good quality photograph or photographs which show the whole of the full-size aircraft which has been modelled. Additional close-up photographs will be necessary to show details of any weathering or signs of use and/or damage or imperfections in the structure and the finishing.

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

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. 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 in which the aspects 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 Scale Accuracy

The principle to adopt is that if it can be seen and it is adequately documented and it conforms to the Builder of the Model rule, then it can be assessed and marked.

Based on this principle, the competitor must be given the opportunity to show any features of the model which may not be immediately obvious. This must not require any dismantling of the model and access to features such as scale interior or scale structure if not visible through fixed openings, e.g., open cockpits, must be by means of scale doors, hatches, or wing folds etc.

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.

At any time during the static assessment of the model, the Judges may question the competitor to resolve any queries they may have regarding the declaration or any third-party involvement in construction of the model. As a guide a model built using a commercially available moulded fuselage should not be awarded more than 50% of the available marks for Scale accuracy

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 for scale accuracy must be reduced to reflect the origin of the components.

It is suggested that the model should first be positioned in a pose like 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, 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 how 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.

Static Judges must avoid wasting time trying to determine the precise **cause** of an error, particularly an outline error, e.g., when there is disparity between the drawings and the photographs and the model does not conform with either, it is not the judge's

job to determine the reason for an error but simply to decide on the extent of the error and decide on how many marks to deduct.

1.4.1.1 Side View – Both Sides

Examine the fuselage outline, cabin or canopy shape (including significant internal structure where visible), cockpit aperture shape, engine cowling, propeller and spinner shape, 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 wing cross-section and any changes of section along the wing.

1.4.1.2 Front-end View

Examine the wing or wings dihedral, 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, shape of cockpit canopy or windshields; size, shape, position and geometry of landing gear, wheel track, tyre thickness.

1.4.1.3 Plan view – Upper and Lower Surfaces

Examine the wing or wings 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 important 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 and Colour Scheme Accuracy

Check that all the elements of the colour scheme and the position and size of all markings are correct; that the delineation of the colours is in the correct position and 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.

The method used to apply the markings must also be assessed and a close examination may be necessary. The use of pre-printed markings is usually indicated by a change in surface texture and unless supported by the documentation in the case of a model of a modern or restored aeroplane the marks awarded must be adjusted accordingly.

Particular attention 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.

Judges should only award high marks for aircraft markings and colour scheme accuracy if the documentation provides evidence of all the markings and the total colour scheme. i.e. on all surfaces. 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 clear evidence to support the markings on the other surfaces, irrespective of how complex they are, no more than 25% of the marks should be awarded.

1.4.3 Assessing Markings and Colour Scheme Complexity

Prior to commencing judging, the judges should agree the principle for awarding complexity points in relation to markings. A high mark for markings and colour scheme complexity is not solely dependent upon the number of different colours and markings, but the difficulty in achieving the required effect.

Curved lines are more complex than straight lines, as are markings applied to curved surfaces rather than flat surfaces. Camouflage schemes, particularly when the different colours are merged are often difficult to apply.

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.

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 all the different 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 marks 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 marks may be given for each main colour that covers a significant part of the airframe. A maximum of a single mark 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 mark.

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.

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, but the judge cannot use his own knowledge, and must also guard against making assumptions of the texture of the model based on the design of the full-size aircraft and when it was built.

The rules do not require the Competitor to include constructional details of the full-size aircraft in the documentation. Although a written description of the covering material, e.g., metal skinned, composite, plywood, or fabric, may provide useful information for the judges, but the judge must then decide on the effect of the scale factor on the appearance of these materials.

Doped or painted fabric covering invariably* shows the weave of the fabric and this should be reproduced to the correct scale. With a model built to a scale of 1:4 this is not difficult, but for models built to a scale of 1:10 the weave will be very difficult to reproduce.

*Oratex® heat shrink film which is not painted and does not have a woven structure has now been certified as a covering material for full-size aircraft and is now being used on some modern aircraft and some restored or replica light aircraft.

Wooden structures or Ply-wood skinning should be correctly simulated and if it is uncovered on the full size aircraft, the woodgrain may be visible, particularly on larger models

Many aircraft which have plywood skinning are also covered with fabric and this should be correctly reproduced.

Metal skinning both stressed and unstressed and the method of fixing must be correctly reproduced or simulated. Stressed metal skin is often flush riveted and sometimes spot welded and may show little or no indication of the fixing. Unstressed removable panels often have a rippled surface which should be documented and accurately reproduced. Some metal surfaces are polished to a high gloss or left in the natural metal state.

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

1.4.7 Assessing Scale 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 ‘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.

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.

Judges must take care to avoid using any knowledge they have of the full size aircraft and must not make assumptions based on the subject aircraft type, or the construction techniques in use at the time it was built, or the environment the aircraft was in when it was photographed.

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. If high marks are awarded for Scale Accuracy, Colour and Markings accuracy and Surface Texture, this is usually an indication of good craftsmanship.

The model should be checked for the quality of workmanship, with particular attention 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 when simulating metal surfaces.

Any visible non-scale Items such as switches, needle valves, silencers, exhaust pipes, fuel hose, control horns, etc. except for “take-off aids” (Rule **6.1.1.20** 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.

It is the skill of the competitor which is being assessed and not the skill of a third party. 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. The points awarded must reflect the competitor’s contribution to the finished model. If the structural integrity of the model is dependent upon the 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 be aware that the use of traditional methods i.e., handmade moulds/plugs to produce components requires a greater level of craftsmanship than when using CNC technology or 3D printing.

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 and the difficulty of replication. Higher marks should be awarded for more intricate shapes and structures. Judges should also consider the variety of the different construction techniques and processes used in the subject aircraft and whether these have been accurately replicated or simulated.

It is important to separate complexity from repetition e.g., a multi-bay triplane with straight identical wing panels will have an impressive number of struts and rigging wires, but they will all be of the same dimensions and be simple to reproduce. Contrast this with a monoplane having an elliptical wing of varying chord and cross-section containing flaps and retractable undercarriage mechanisms. Compound curves are more difficult to reproduce than straight line or flat structures and functional mechanical parts will require a greater number of different skills and construction techniques.

Demonstrations of scale functionality, e.g. scale control linkage,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 to be assessed, but the marks awarded for Detail Accuracy should not simply reflect the accuracy of the detail that is highlighted by the evidence presented, it must also reflect the completeness of scale detail that is present on the model.

This is of course easier said than done and to some extent is an eyesight test for the judges. Judges must carefully examine the photographs of the full-size aircraft to determine whether the competitor has omitted details which the documentation shows are clearly visible on the full-size aircraft. Marks must be deducted if the Judge finds details that appear in the documentation, but which are not present on the model and not covered by detail photographs or drawings/sketches.

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 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
Door Handles	Landing gear springing
Hinges	Hand holds
Footsteps	Tyre treads
Doors	Tyre valves
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
Venturis	Cockpit or cabin interior detail
External sensors	Access panels
External gauges	Static wicks
Trim tabs	Drain holes
Wing slots and slats	Tie-down shackles
Correct screw heads	Correctly locked nuts and bolts

Judges must consult the competitor's declaration and check that marks are not being awarded for scale detail items which have been manufactured by a third party.

1.4.11 Assessing Scale Detail Complexity

This aspect is easily misunderstood and Judges should ensure that the marks they award relate to the complexity of the detail that has been included on the model and that they are not awarding marks for the design 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.

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.

1.5 FINAL ASSESSMENT REVIEW

When all the models have been individually assessed the spread of marks awarded for all the models, particularly the complexity marks should be reviewed under the guidance of the Chief Static Judge. This is to ensure that the order of merit for all the competitors accurately reflects the spread of complexity aspects across all the models entered.

The relative marks of one model compared with the others is important and to ensure this is achieved, the static judges must be given time to complete this review and if necessary, make retrospective alterations to the marks previously awarded.

A judge's marks can only be changed by the same judge who made the original assessment and any alterations must be initialled by the same judge.

The use of a summary sheet for this review is recommended and the score sheets must only be released for final computation of the static scores when the review has been completed.

1.6 DEBRIEFING COMPETITORS

Static Judges are under no obligation to discuss the results of the static judging process with the Competitor. However, it is not unreasonable for a competitor to ask the static judges to advise the competitor regarding the errors found during the static assessment.

Any attempt by the competitor or the competitor's representative to request a re-appraisal or question the marks awarded by the judge must be seen as harassment and the competitor must be warned that he faces disqualification if he persists.

2 STATIC JUDGES GUIDE FOR CLASS RC2

NOTE – Class RC2 is closely aligned to the FAI class F4H and the F4H rules are currently under review. The specific aspects of the F4H rules which may change are the Declaration requirements and the Proof of Scale Documentation Requirements. There is currently an anomaly whereby the Scale Accuracy (outline) of the model is assessed without examining the underside of the model, but the rules require all the colour scheme and markings to be assessed, which of course requires the underside of the model to be examined.

2.1 STATIC JUDGING - GENERAL

The Static assessment of a model in class RC2 is based on the same principle as the other scale classes but with the exception that the Builder of the Model rule (**6.1.1.3**) is not applicable.

The Static Judging process is similar to other classes but all the assessment is carried out with the Static Judges positioned 5 metres away from the centreline of the model. Consequently, it becomes a much less intensive process because if any aspect or detail of the model cannot be clearly seen at 5 metres it is not include in the assessment.

Surface Texture, Scale Detail and Craftsmanship are not assessed because these aspects cannot be clearly seen at 5 metres. Static Judges must take particular care that they are not seen to be closely examining any model until after all the entries have been judged and the score sheets submitted.

As with other scale classes, before individual judging commences, all the models entered should be superficially reviewed in order to grade the Colour and Markings Complexity aspects of all 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.

There is also an additional aspect called ‘Originality of the Model (see para. 2.3.7 below). In practice there is little for the Static Judge to assess because the competitor is not required to provide details of any third-party involvement in the construction of the model.

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

2.2 Proof of Scale Documentation

The Rules for class RC2 specify the requirement for proof of scale documentation, **(see para 6.3.2.4).**

Photographs and printed reproductions must conform to the same requirements as the RC1 class **6.1.2.2 (a) (i)** but the overall limit of five photographs or illustrations must not be exceeded.

If more than 5 different photographs or printed illustrations are presented, the judges must direct the competitor to remove or cover up the excess before judging commences.

Drawings must conform to the same requirements as the RC1 class **6.1.2.2 (a) (ii)**

Paragraph 1.3.1 and 1.3.2 above provides further advice on using photographs and drawings.

Provision is made on the score sheet for the adequacy and quality of the documentation to be recorded

2.3 Assessment of the model

Having first carefully examined the Competitor's Declaration and his Documentation, the judges can now commence assessment of the model. The principle to adopt is that if it can be seen at 5 metres and it is adequately documented then it can be assessed.

Judges should be careful to avoid penalising the omission of documentation for details and texture which are not clearly visible at 5 metres.

There are no rules governing the order in which the various aspects are assessed 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 often some overlap of these aspects, e.g., errors in outline are often revealed by the colour scheme and the markings.

It is important that judges do not waste time seeking to assess any aspect which is not adequately supported by the documentation and the marks awarded must reflect this.

2.3.1 Assessing Scale 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 the real proportions of the aircraft particularly dihedral and/or rigging angles and the drawings may provide a more accurate reference.

(a) Side view - Examine the fuselage outline, cabin or canopy shape (including significant internal structure where visible), cockpit aperture shape, engine cowling, propeller and spinner shape, 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 wing thickness 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 – Examine the wing dihedral, thickness and wingtip taper, washout, prominence of ribs, 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, cross section of cockpit canopy or shape of windshields. Also examine the shape, position and angle of landing gear, wheel track, tyre thickness.

(c) Plan view (upper surfaces only) Examine the wing outline and fairings, aileron size, flaps (if visible), tailplane size and outline; elevator size, shape and cut outs, trim tabs, fuselage shape and taper, cockpit or canopy shape, engine cowling shape. The plan view assessment also provides the opportunity to check the accuracy and the position of the markings on the top of the wings.

2.3.2. Assessing Colour Accuracy

The assessment must be made by comparing the evidence of colour with all the different colours on the model and this includes the accuracy of all the colours used for markings, lettering and insignia.

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 avoid wearing polarizing or tinted glasses (unless a neutral grey tint) when assessing colour.

2.3.3. Assessing Colour Complexity

The system for awarding colour complexity marks 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 marks may be given for each main colour that covers a significant part of the airframe. A maximum of a single mark 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 mark.

2.3 4. Assessing Markings and Colour Scheme Accuracy

The documentation must provide evidence of all the markings and the entire colour scheme to achieve high marks. As a guide, if the documentation only illustrates one side of the subject aircraft and there is no evidence to support the remainder of the colour and markings, irrespective of how complex they are, no more than 3.5 marks should be awarded.

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

2.3.5. Assessing Markings and Colour Scheme Complexity

Consideration should be given to the effort involved in reproducing the colour and markings. 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.

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.

2.3.6. Assessing 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 '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.

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.

Judges must take care to avoid using any knowledge they have of the full size aircraft and must not make assumptions based on the subject aircraft type, or the construction techniques used when it was built, or the environment the aircraft was in when it was photographed.

2.3.7 Assessing Originality of the Model

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 marks should only be awarded to a model which is entirely built by the competitor. The marks awarded must be reduced if the Scale Accuracy is the result of work carried out by someone other than the competitor, or by using commercially available machined, moulded or pre-cut parts. 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: NB possible revision for UK rules

Competitor built (own construction from a plan or a traditional kit) ……..……10 marks

Pre-built airframe and wings, covered and painted by the competitor……..6 - 8 marks

Fully moulded composite model painted by the competitor……4 - 6 marks

ARTF model with markings modified by the competitor……..……..0 - 4 marks

'Out of the box' or purchased model with no added work ……0 marks

The judge has a little flexibility however, and an allowance should be made if the competitor is able to provide evidence that he has modified any third-party manufactured items to improve the scale accuracy.

2.4 Final Assessment

When all the models have been individually judged the spread of marking for all the models should be reviewed, particularly the marks awarded for complexity. 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 STATIC JUDGES GUIDE FOR FF CLASSES FFX5/6 (PEANUT AND PISTACHIO).

3.1 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.

3.2 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.

3.3 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.

3.4 Workmanship

Complexity of the subject full size must not be considered 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 if the model. The propeller should not be assessed.

3.5 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.

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.

3.6 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.

3.7 Flying Surfaces

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

3.8 Surface Finish

Consideration should be given to the weight and depth of colour on the model when assessing this aspect. 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.

3.9 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.

3.10 Penalties 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..

4 STATIC JUDGES GUIDE FOR KIT SCALE CLASSES RCX3 and FFX4

4.1 General

The Kit Scale classes are intended to encourage newcomers to participate in indoor scale competition flying.

4.2 The static judging philosophy is different from other scale classes in that models are judged for accuracy and fidelity to the kit plan rather than absolute scale accuracy to photographs and drawings of the full size aircraft.
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)

4.3 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.

4.4 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.

4.5 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 if 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.

4.6 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 (e.g. 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.

4.7 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.

4.8 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.

5 FLIGHT JUDGES GUIDE FOR CONTROL LINE CLASSES CL1 & CL2

5.1 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 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

5.2 Realism of Flight

All judges must confer to discuss this after completion of the flight and should attempt to arrive at an agreed score for each aspect. Realism of Flight covers the entire flight performance including the way the model flies between the manoeuvres always keeping in mind, the performance 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 the following aspects.

5.2.1 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 whist 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 produces 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.

5.2.2 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 down marked 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**.**

5.2.3 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 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.

6 FLIGHT JUDGES GUIDE FOR ALL R/C SCALE CLASSES

6.1 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 scoresheet 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.

Flight judges must attempt to observe the entire flight 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. In practice it will be necessary for judges to take their eyes off the model to record marks on the scoresheet, but Judges should minimise times spent 'eyes down' to effectively observe and assess what the model is doing between manoeuvres.

6.2 Flying Site and Judges Line

Although setting out the Flying Site and the Judges Line is covered by the Rules and is the responsibility of the Contest/Flight Line Director, further explanation is included here because the Flight Judges have a responsibility to ensure fairness and to recognise that any constraints imposed by the site and/or the weather conditions, do not give an unfair advantage to a particular model or type of model.

The Judges line should be as close as possible on the same heading as the wind direction and in practice this is usually done in consultation with the judges. When the "judges' line" and the judge's seating position 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 judge's line which will become 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 this centreline.

The wind direction must be constantly monitored during the competition by the CD/Flight line Director. If the wind direction continually deviates more than 30^{O} from the judges' line, unless there are good reasons not to do so and in consultation with the judges, the judge's line must be changed and the judge's chairs and the centreline marker re-positioned. It is essential that this process is adhered to in order to ensure fairness of the competition, because some models are vulnerable to gusty winds and /or have low tolerance of crosswinds,

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 noted. This is particularly important, in view of the penalties for a bad landing.

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.

6.3 Flight Schedule/Score Sheet

The competitor is responsible for ensuring that he has compiled his flight schedule by clearly identifying the manoeuvres he wishes to fly and the order they are to be flown in. He must then ensure that the flight schedule has been forwarded to the CD/Scorer and the Flight Judges.

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.

For indoor events, the Competitor must also identify whether automatic flight stabilisation devices (gyros) are fitted to the model and whether they are to be used during the flight.

The competitor must ensure that the flight judges have a copy of his flight schedule before he commences to start his engine or move his model to the take-off area.

If a competitor wishes to change his flight schedule after the first flight, it is his responsibility to ensure that the revised schedule has been passed to the judges 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. In practice this means that before flying commences the flight judge should be prepared to enter discussion with the competitor to ensure any non-listed manoeuvres are fully understood.

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.

6.4 Flight Safety

Flight Judges must be aware that they are exposed to some considerable risk if 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 being hit by a model following an uncontrolled swing during take-off. Judges should be prepared to advise competitors to reposition their take-off starting point to minimise this risk.

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. **6.3.1.14** 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 Power Nationals, the airspace for R/C scale flying may be 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, Judges must stop marking and advise the competitor who will then be requested to land the model.

6.5 Flight Timing

Other than at international competitions or the UK National Championships, 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 indicates he is ready to start his engine or engines. For electric powered models timing commences as soon as the propeller starts to turn.

6.6 Assessing and Marking the Scheduled Manoeuvres

Section **6.3.7** 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. These lists of errors are not exhaustive and mostly serve to enhance the manoeuvre description.

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

1. The shape, size, and technical requirements of the manoeuvre.
2. The positioning of the manoeuvre relative to the judges' position or other datum.
3. The scale realism achieved relative to the subject aircraft.

These aspects 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 aspect whilst considering how the model performs compared with the performance of the full-size aircraft. There is no prescribed weighting for awarding marks to each of these aspects but whatever strategy the judge decides to apply, it is important that judges are consistent in this regard throughout the competition.

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, providing they fly a 'safe' distance from the judges' position, (minimum 10 metres). This is not an open licence to perform these manoeuvres anywhere and the model should only cross the judges' line during the approach or exit of the manoeuvre. Judges should only award high marks for these manoeuvres when the competitor makes the best use of the available space.

Each manoeuvre must be clearly announced in advance and the start and finish of all manoeuvres must be 'called' by the competitor, (**rule 6.3.1.9**).

Calling the start and finish of a manoeuvre is part of the definition of the manoeuvre and the assessment of that manoeuvre starts and stops at these points in time. An early "start" call or a late "finish" call is not considered a major error providing the model is flying straight and level on the correct track and heading and at the correct altitude. However, a late "start" call or an early "finish" call, diminishes the manoeuvre and must be penalised, as must inaudible or missed calling. Judges must make up

their own minds as to how they penalise ‘bad’ calling; the important thing is to be consistent.

6.6.1 Shape, Size, and Technical Requirements of Manoeuvres

The shape and size of the manoeuvre is dependent upon the scale of the model and the capability of the full-size aircraft. The size should also be proportional to that expected in a display typical to the full-size aircraft, with the vertical element of the manoeuvre proportional to what the full-size aircraft can achieve.

The extent to which the technical requirements of the manoeuvre conforms to the theoretical ideal, as illustrated in the diagrams in section **6.3.7** of the rules, is dependent upon the capability of the full-size aircraft and to some extent by the skill of the pilot, i.e. does the model give the impression that the full size aircraft is being flown by a pilot of at least average ability?

It is not practical or indeed possible in this document to provide guidance on how a model of a particular aeroplane can be expected to fly a particular manoeuvre, therefore the judge must rely on his knowledge of the performance of the full - size aeroplane.

In practice, high marks should only be given for a manoeuvre if the speed of the model and the size that the manoeuvre is flown, allows the model to achieve the technical requirements of the manoeuvre smoothly and without exceeding the performance capabilities which would be proportional to that of the full-size aircraft.

6.6.2 Positioning and height 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 judge’s line and if the model crosses the judge’s line during the 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 30º and 60º 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.

Judges must deduct points for manoeuvres which are flown 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). 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.

A typical ¼ scale model of a single engine aeroplane would be expected to fly most manoeuvres and most of the turn-rounds or positioning between manoeuvres within 60° azimuth either side of the judges’ centreline. One exception to this would be the landing approach for a passenger carrying multi engine aircraft.

6.6.3 Realism of Manoeuvres

The assessment of each manoeuvre starts and stops with the pilots' call, see 6.6 above and assessing and marking this aspect should not be confused with assessing and marking Realism in Flight, which is done after the model has landed, see 6.7.1 below. However, the guidance given in section 6.7.1 is nevertheless equally valid for judging manoeuvres as for the rest of the flight.

Judges are reminded that what the model does between manoeuvres must also be closely observed and critically assessed, so judges must minimise time spent 'eyes down' on the scoresheet when marking the manoeuvres.

The realism of any manoeuvre is of course firstly dependant on whether or not the full-size aircraft was capable of flying that manoeuvre. If all the competitor's flight schedules are available for scrutiny by the judges before flying commences, the flight judges can examine this aspect and decide on the validity of the manoeuvres. If the competitor flies a manoeuvre which is ruled invalid, then it must be marked zero.

6.7 Assessing Realism in Flight

For many years in both the BMFA and the FAI Scale Rules, "Realism in Flight" has been judged by assessing three aspects, i.e. model sound, speed, and smoothness. However, there were widely held views that some elements of flight realism were missing from this rationale.

At the 2018 Plenary for the F4 R/C classes the CIAM agreed to replace the "model sound" aspect of realism with "Flight Presentation" which additionally embraces aspects such as "manoeuvre selection", "flight schedule presentation" and "power management" whilst retaining the aspects of Speed and Smoothness. The K-factor of 4 for model sound has currently been retained for these new additional aspects.

This change to FAI rules has now been adopted in principle by the STC but for UK competitions, the K-Factors for all the aspects of Realism in Flight have been re-balanced and are now divided into five aspects. Guidance for these 5 aspects is given below in sections 6.7.2 to 6.7.6.

6.7.1 Assessing Realism in Flight

The assessment of Realism in Flight is made after the model has landed and covers the entire flight including what the model does between manoeuvres. The Flight Judges are permitted to confer when assessing Realism in Flight and should attempt to reach agreement on the marks to be awarded.

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 either no longer exist, are not airworthy, or are not well known, in which case the Flight Judge must make a comparison between the model and an aircraft of similar type.

Most R/C scale model aircraft have an excess of engine power and control power by comparison with the full size and can be made to climb and roll at rates which would

be impossible for the full size. It is the failure to recognise these excesses, coupled with harsh use of the controls, including the throttle, which are usually the reason why a scale model does not appear to fly in a realistic manner.

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

Good Realism in Flight is a test of the level of knowledge and understanding the competitor has of the full-size aircraft he has modelled and also confirmation that the competitor has taken the trouble to understand the performance limitations of the full size aeroplane.

For the Indoor Scale R/C classes, Realism in Flight is assessed under one heading and one mark out of 10 is awarded for the entire flight other than the scheduled manoeuvres. Flight Judges should however take note of the guidance given below, which may help reduce the degree of subjectivity.

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.

6.7.2 Manoeuvre Selection

In practice this is one aspect of the flight which could be marked as soon as the flight schedule is known, even before the model has flown.

The manoeuvres selected by the competitor for his flight schedule must reflect the purpose for which the full size aircraft was designed. The manoeuvres selected must also be those which give a good demonstration of the performance of the full-size aircraft.

It is important that the Flight Judges confer and reach agreement on this aspect, particularly if the competitor selects a manoeuvre which the full size aircraft could not achieve; in which event zero marks should have been awarded for the actual manoeuvre.

6.7.3 Flight Schedule/Display presentation

Scale flying is not an aerobatic or a precision flying contest for scale models and the rationale to be used when assessing display presentation is quite simple; does the flight represent what would be a typical display of the full size aircraft at an airshow?

The successful display pilot keeps the aircraft in front of the spectators as much as possible. The selection of manoeuvres and the order they are placed in the flight schedule should be such as to achieve a continuous and flowing display. The turn-around manoeuvring should be such as to minimise the effort required to position the model at the correct altitude and track for the next manoeuvre in the schedule. Other than a low altitude fly-by with one wing down, often seen as a photo opportunity at an airshow, fly-bys and unnecessary circuits to get the model to the starting position of the next manoeuvre should be minimized.

6.7.4 Power Management/Sound

This aspect of realism is one of the most difficult for the judge to assess because I/C powered scale models are normally well silenced, some are electric powered and are

sometimes fitted with electronic sound systems. Harsh or inappropriate use of the throttle can be difficult to detect and the model must be watched carefully for inappropriate acceleration.

The rule states: “The sound of the model will be judged more as a generic sound relating to the type of power plant and aircraft, rather than whether it is an accurate representation of the sound of the full-size aircraft.”

Judges should therefore consider whether the sound produced by the model demonstrates what would be the typical sound produced by a full size aircraft in the same category and at the throttle setting which would be appropriate to the manoeuvre being flown.

Electronic engine sound reproduction systems often produce very accurate and impressive engine sound when the model is on the ground, but this is no guarantee that the sound reproduction in flight is realistic and synchronised to the throttle setting.

6.7.5 Speed of the Model aircraft

A rough guide for the scale speed of the model can be calculated from the speed of the full size aircraft (as indicated on the score sheet) 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 down marked if they fly too slowly.

Depending on the model there should be some variation in speed throughout the flight. Models of aeroplanes that are less agile should fly at an economical cruising speed, whereas models of military aeroplanes should exhibit a greater speed variation between cruising and combat throttle settings. Military aeroplanes, particularly fighters from the ‘thirties’ onwards should demonstrate the greatest variations between cruise and maximum speeds.

6.7.6 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 full size 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 ability of the model to recover after any upset caused by local conditions will give an indication of its stability.

Judges should also assess the control of the model. Jerky movements and/or over-controlling should be penalised appropriately unless such movement is part of an aerobatic schedule or a characteristic of the full-size.

It should be noted that many competitors fly their model faster than is realistic in order to make the flight appear to be smoother and some models are flown at an 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 at an excess speed.

6.8 Automatic Stabilisation Devices (Gyros)

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.

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.

6.9 Retractable undercarriage failure.

Rule **6.3.1.9** states that a model of an aeroplane which had retractable landing gear which flies with wheels down 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 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.

6.10 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 it is safe to continue the flight. Judges will need to agree the extent to which realism has been affected and deduct marks accordingly.

6.11. Use of Flaps; Lift enhancing devices and Air brakes.

There is a 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 judge’s 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 before flying commences. The competitor should be prepared to demonstrate the deployment and full range of movement of these devices before take-off if required by the judges.

6.12 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, CCTV etc.

7 FLIGHT JUDGES GUIDE FOR ALL FREE FLIGHT SCALE CLASSES – Except FF7, FFX5, 6 & 7

7.1 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.

When considering the marks to be awarded to each phase of flight, Judges should try to make a comparison between how the model performs and how the full-size aircraft can be visualized. As well as scale speed, attitude, smoothness and stability, 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.

7.1.1 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 take-off 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 slight swing may occur as the tailwheel leaves the ground; this is normal and should not be penalised unless it is excessive.

7.1.2 Initial Climb

The model should smoothly rotate to a climbing attitude and the climb may be straight or follow a gentle curve. The climb should be smooth and the climb rate and the rate of turn should be appropriate to the full-size aircraft.

The climb should be penalised if it is too steep, too shallow, too highly banked, or the nose attitude is too high or too low. Any wing drop or wing rock should be penalised.

Note that a high bank steep spiral climb is normal for a Pitts special but a Bleriot should have a low climb rate and only reach a low ceiling.

7.1.3 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 fugoidal flight path.

7.1.4 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.

7.1.5 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.

7.1.6 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.

7.2 Realism in Flight

The model should replicate the flight characteristics of the prototype in scale speed, flight attitude, stability and balance. Turns should display an appropriate amount of bank. The flight should be smooth and continuous, especially the transitions between take-off, 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.