British Model Flying Association

Member's Handbook
2017 Issue

Welcome to the 2017 issue of the BMFA Member's Handbook.

The BMFA is constantly reviewing it's advice to model flyers and it regularly advises the Civil Aviation Authority (CAA) on model flying matters. Extracts from the latest CAA issue of CAP 658 (2013) are incorporated into this book for your information.

As it is six years since the issue of the last handbook there are so many alterations and additions/deletions that side barring the changes has proved impossible. If you take the view that everything is new (not that it is!) at least you won't miss anything. Future issues will revert to highlighting by sidebars.

The Member's Handbook is an active document that is constantly kept under review and we are very happy to receive input from anyone concerned about model flying matters.

In fact, we know that many of you will recognise new sections or paragraphs or alterations to existing paragraphs that cover matters that you have brought to our attention over the past few years and we would encourage anyone with comments on the Handbook or with ideas for new or changed items to contact the Technical Secretary via the BMFA Leicester office. Thank you to those who have contributed to this issue – you know who you are!

Please note that the BMFA Website – www.bmfa.org is the major source of information for the BMFA. It is regularly referred to throughout this document as there are many specialist booklets now available for downloading (also available from the Leicester office).

Words of masculine gender should be taken to include the feminine gender unless the context indicates otherwise.

British Model Flying Association

(SMAE Ltd)

Chacksfield House, 31 St Andrews Road, Leicester, LE2 8RE

Telephone 0116 244 0028 Fax 0116 244 0645

e-mail admin@bmfa.org Website www.bmfa.org

CONTENTS

This page deliberately left blank.

1. INTRODUCTION

1.1 SMAE and the BMFA

Welcome to the British Model Flying Association (BMFA) which, as the Society of Model Aeronautical Engineers (SMAE), was established in 1922 as the national body for model flying.

It is a non-profit making association of model flying clubs and individuals who agree to join together and pool resources for the benefit of all. In its over ninety years of existence it has built up a fund of knowledge, experience and has accumulated benefits for its members which add up to an unbeatable membership package for you.

The SMAE's recognition by the Royal Aero Club dates from it origination, but its roots can be traced back to 1909, the year in which the Kite Flying Association was formed. Its name was changed to the Kite and Model Aircraft Association shortly thereafter and in 1921 it was replaced by the London Aeromodellers' Association which a year later became the Society of Model Aeronautical Engineers (SMAE). Many British aviation pioneers have been members, including Sir Frank Whittle, Sir Thomas Sopwith and Sir Alliot Verdon Roe founder of Avro.

Since 1948 the SMAE has been a Company Limited by Guarantee as are most of sport's governing bodies in the UK. In 1987 the Annual General Meeting of the SMAE voted to adopt a working title, the **British Model Flying Association (BMFA).** The SMAE still exists as the parent body and its title is still used on all legal documents and for many functions of the Society.

Although both titles may be used throughout this handbook where appropriate, member clubs and individuals should use the BMFA title. The colours of the SMAE are silver and blue and those of the BMFA are red, white and blue.

Much of the BMFA's time and resources are taken up in working with government bodies, local authorities and other organisations in order to safeguard your model flying interests. The BMFA also spends much time promoting and encouraging all facets of model flying.

Please read this booklet carefully and familiarise yourself with its contents as it will help you gain the maximum benefits from your membership of the Association.

1.2 Organisation

The BMFA is controlled by its Annual General Meeting and it is administered by a Council of Management elected form its members (details in Section 25 of this Handbook).

It also has a full time staff of the Chief Executive, Development Officer, Club Support Officer, and other support staff who all work from the permanent office in Leicester, to further the running of the Association. They are available to answer your queries or put you in touch directly with BMFA Officers if necessary

1.3 Objectives

The following are the main objectives of the BMFA and many of them stem from the original SMAE's 1948 Memorandum of Association and still apply today.

- The promotion, protection, organisation and encouragement of model aircraft building, flying and development in all its aspects in the United Kingdom, through the medium of clubs and individual members; assistance and guidance to model aircraft clubs or individuals; collaboration between members of the Society; and co-operation on behalf of members with the Civil Aviation Authority or other government departments and any other bodies and organisations in the United Kingdom and overseas.
- To produce collect and distribute information in connection with model aircraft or the model aircraft movement on such terms as the Council shall think fit.

- To encourage and support research in model aircraft design, theory and construction.
- To control and record model aircraft performance within the areas under the jurisdiction of the Royal Aero Club.
- To act as promoters of National and International model aircraft meetings, contests and exhibitions; as publishers, stationers and booksellers, general traders, dealers agents and manufacturers, both wholesale and retail, of any articles of any description which may assist the development of model aviation.
- To establish and support, financially or otherwise, or aid in the establishment and support of any educational scheme or establishment with benefit to the model aircraft movement.

Our motto is: "UNITED WE ACHIEVE"

1.4 BMFA Areas

The country is divided into thirteen geographic Areas plus the Royal Air Force Model Aircraft Association (RAFMAA) who also act as an area. Every club in an Area is automatically a member of their Area Committee and the officers of the Area Committee are elected from the club delegates who attend the Area meetings.

However, if you are not a club member you do not have representation at Area meetings. You are therefore advised to join a club.

At any Area meeting your representative can hear the viewpoint of the elected Area officers and the representatives of other clubs as well as expressing your own club's opinion.

The Area Committee can be a powerful influence for the benefit of model flying, both locally and nationally particularly as one member of each of the fourteen Area Committees has a seat on BMFA Council. These Delegates are the link between the Area and Council through which information can flow; yet another reason for your club to send a representative to attend Area meetings.

In addition, two delegates from each Area (usually the Area Chairman and the Council Delegate) attend the Areas Council, a sub-committee of the BMFA Council of Management. Area Council has direct responsibility for many vital aspects of BMFA operations including all the Achievement Schemes (see Section 22 of this Handbook)

If your club is not making its presence felt at Area level, why don't you consider becoming its representative? Details of Area Meetings can be obtained from the Association's Leicester Office.

1.5 Relations with the General Public.

It is important to remember that although our chosen sport is one of the larger of the minority sporting activities, we are still vulnerable to the negative aspects of public opinion.

The BMFA spends considerable time and effort creating the best possible public impression of model flying but all this work can easily be wasted if you fly in a thoughtless manner. Your enjoyment of model flying, now and in the future, depends on developing and displaying a highly conscious 'safety first' attitude towards your equipment and the flying site you use. The best publicity the sport can receive is through your actions and your responsible and safe attitude to flying at all times.

There is no place in model flying for those who do not consider other people's safety; nor is there a place for those who are inconsiderate about noise. One person's thoughtless actions can jeopardise the enjoyment and pleasure of those many others who adopt a responsible approach. Considerate and careful model flying must always be our aim.

Clubs and members enjoy the benefits of flying from many varied sites throughout the UK. Everyone should remember that it is a common courtesy to make sure that they have the landowner's permission before flying on any site.

Wherever and whatever you fly, BMFA expertise can help you liaise and negotiate with local councils, government agencies and other public and private landowners so that you can have the best and safest possible model flying facilities.

1.6 The Contest Scene.

The BMFA organises numerous contests at venues all over Britain, covering all the varied disciplines of the sport from indoor flying through thermal soaring to large radio controlled scale models. Details of forthcoming competitions and events are published on the BMFA's website, in its own publications and in the commercial model flying press.

Newcomers to contests are always welcome and should not be afraid to participate. There is no doubt that competition will improve your skills, and even the experts can be beaten. Taking part in competitive events can add a great deal of enjoyment to model flying and it will also give you the opportunity to see some of the country's best models and flyers in action.

Contest organisation is the responsibility of the Technical sub-committees of the BMFA and updated rules for the various classes are published annually. Please see the website (www.bmfa.org) for more details.

1.7 National and International Status

The BMFA is the body delegated by the Royal Aero Club to be responsible for all aspects of model flying in the UK.

Model flying is recognised by UK Sport as an official sport. Although not recorded as a separate entity in the UK Sport composite list of sports, model flying is one of the three categories of air sports encompassed under the single heading 'Flying'

It is also recognised as the sole representative organisation for the sport in the UK by the Federation Aeronautique Internationale (FAI), the world governing body for all forms of sporting aviation including model flying. The FAI has numerous international committees relating to its various disciplines and the Commission Internationale d'Aeromodelisme (CIAM) is the committee responsible for our sport of model flying. The BMFA is represented each year at the annual plenary meeting of CIAM by a small team of specialists who are delegated to speak for the UK.

The SMAE pioneered the present world programme of model flying and as a result is the holder of an Honorary Group Diploma of the FAI, an honour given to those who have contributed greatly to the progress of aviation.

The benefits of our FAI and Royal Aero Club memberships are two-way, since we can learn much from the way the problems of model flyers are tackled by other countries, as well as giving them the benefit of our own experience.

The BMFA is empowered by the FAI to issue international sporting licences to individuals and this document is essential for anyone competing abroad or in any FAI international event. They are available at reasonable cost on request from the BMFA office. An FAI Licence can also be of great help to anyone flying a model abroad as it is an internationally recognised document. It can also be of help when dealing with airlines over the carriage of models and radios and it could help if you seek to fly with a foreign club or have to deal with local authorities abroad over model flying matters. If you are planning on model flying abroad then, for the small cost involved, it would be well worth considering obtaining your own FAI licence

1.8 The Education Initiative

The BMFA is extremely concerned about the increasing lack of exposure of school children to model flying. Increasing competition from other activities and the lure of the computer game has led to a situation where very few children have had the opportunity to fly a model.

The long term future of model flying in the UK may well depend on positive action being taken to counter this trend. Therefore the BMFA has produced a package that has been designed to integrate into National Curriculum Craft, Design and Technology (CDT) courses and which enables any teacher or youth leader of nine to thirteen year olds to make use of a structured course as an introduction to aviation subjects. The practical side of this course uses the BMFA Dart and other easy-to-build model aircraft as demonstration tools.

The scheme is not aimed at recruiting junior members but rather to give children who may never have even held a model aircraft the thrill of that first successful flight that we all remember.

The BMFA Education Working Group co-ordinates the efforts of all who wish to be involved in this vital work. If you think you can help or you would like details of the package for your school, please contact the BMFA's Leicester office for details. For those schools with existing model aircraft clubs or those who are considering setting up such an activity, the BMFA Youth Group Scheme will be found to be invaluable; see the section on BMFA Membership for details.

1.9 Codes of Practice and Achievement Schemes

The BMFA, as the national body for model flying, gives the best advice it can to all model flyers and other interested parties, not only on specific flying matters but also other legal responsibilities that members might encounter. It has gathered a great deal of experience in such matters and this freely available to anyone whom requires it.

In some cases it has published Codes of Practice on specific subjects and details of these are included in this Handbook where appropriate and are available for download from the website at www.bmfa.org.

For instance, as a practical means of improving radio control model flying standards, achievement schemes for radio control power fixed wing, helicopter, silent flight thermal soaring, silent flight slope soaring and electric flight have been introduced and you will find further details in section 22, later in this handbook, and on the BMFA web site.

1.10 Contests and Records.

The BMFA provides and maintains Individual contest rules for all the model aircraft disciplines, including Indoor and Outdoor Free Flight, Control Line, R/C Power, Scale, Silent Flight, Electroflight and Rocketry. International Class rules (the 'F' classes) are not included as such although the national variations to these rules are included. Copies of these various sets of rules are available from the Leicester Office or as downloads from www.bmfa.org for the BMFA classes or www.fai.org for the international 'F' classes.

The BMFA is also responsible for documenting and overseeing all model flying records set in the UK, whether they are National or World Records. There are over 80 categories of FAI World Records plus many more categories of British National Records, both contest and non-contest.

Two booklets are available free of charge from the Leicester office or as downloads from www.bmfa.org. The first (No 2A) is the rule book and is required reading for anyone considering making a record attempt and the second (2B) is a full list of the current British records and record holders. A list of the current World records is also available.

If you are serious about wanting to set a record then a chat with the BMFA's Records Officer is essential.

2. TYPES AND CONDITIONS OF MEMBERSHIP

2.1 BMFA Membership

Membership is available to all applicants. Those over 18 years of age on the 1st January of the year of membership are Senior members, those younger than this are Juniors (but have full membership status).

Note: In exceptional circumstances, the BMFA Council reserves the right to refuse membership applications.

2.2 Country Members.

These are Individual members not belonging to a BMFA Affiliated club and are known as Country Members.

2.3 Family Membership

This is available to families living at the same address. To qualify for family membership, one senior member must register as 'Head of Family'; a spouse/partner and all children 18 years old or less on the 1st January of the year of membership can then register as family members at a reduced fee. Family membership is open to both club and country members. All family members have full membership status but only the 'Head of Family' receives a copy of BMFA News.

2.4 Fellowship and Honorary Membership

These are two different classes of membership which are awarded to a few people in cases of special merit. Fellowship is, in fact, the highest honour awarded by the Association and is awarded for meritorious work within the BMFA to a maximum of two people each year by the Annual General Meeting.

2.5 Membership Period.

The normal period of membership is from 1st January to 31st December in each year. Applications for membership part way through the year may be subject to a reduced membership fee as decided from time to time by BMFA Council. The membership fees are agreed each year at the Annual General Meeting of the Society.

2.6 Competition Entry.

Full members of the BMFA may enter the contests and events organised by BMFA on payment of the entry fee. Evidence of membership must be shown to an authorised BMFA official if requested.

2.7 Fees and Benefits.

The categories, term and benefits of membership are occasionally modified as the Association develops. When in doubt about the current fees or benefits, please contact the BMFA's Leicester office where the staff will be pleased to provide you with all the information you or your club require about joining the Association

3. BMFA AFFILIATED CLUBS

3.1 Affiliated Club Membership

Open to clubs and model flying groups consisting of not less than five persons. All current club members who fly and/or who are involved in any organising function within the club whatsoever must be registered with the BMFA as fully paid up individual members and at least one of them must be a senior member.

3.2 Schools and Youth Group Membership

Open to bona-fide school model flying clubs and clubs organised by recognised youth organisations such as the ATC, the Young Engineers or the Scouts etc. The minimum number of club members is one individual senior and four juniors. The juniors need not be named and their membership fee will be one third of the current junior fee, rounded to the nearest pound.

This gives the club full affiliated membership of the BMFA and at General meetings such clubs carry one vote for the senior member and one vote for every three reduced rate juniors, subject to a minimum of five votes.

Any reduced rate junior may become a full member of BMFA by paying the balance of the full junior membership fee. Any such full junior member is not disqualified from membership of his youth group.

4. GENERAL MEETINGS

4.1 General Meetings

These consist of the Annual General Meeting of the Society, normally held in November, plus any Extraordinary General Meetings which may be called from time to time to consider particular matters.

4.2 Voting rights at General Meetings.

Fellows of the SMAE and all clubs affiliated to the BMFA have the right to vote at general meetings of the SMAE. Each shall have one vote, the affiliated club's being cast by its duly authorised representative. If a poll vote is called, an affiliated club shall have one vote for each registered full member and a Fellow shall have five votes.

Council of Management meetings do not come into this category and have their own voting system (see the section 25 of this handbook).

4.3 Voting rights in Postal Ballots

These are decided by BMFA Council from time to time. Depending on circumstances, all BMFA members may be eligible to vote in the postal ballot and voting forms will be distributed as required.

5. MEMBERS INSURANCE

Please note that this is a summary of the covers provided only and does not reflect the full terms and conditions of this policy. Copies of this can be requested from Integro Insurance Brokers. See also the information on the BMFA Website.

5.1 Liability Insurance

The primary insurance cover provided by the BMFA for its members is Third Party Liability. This covers you, the flyer, against any liabilities you may incur during your model flying activities. Note that, as with any other third party insurance, this is NOT an automatic cover for the 'injured party'. The person insured is the flyer and the policy will indemnify the flyer against any claim if negligence is proven whilst flying.

Cover is also provided for personal accident insurance covering permanent disablement along with cover for clubs for loss or damage to club equipment only.

Title

It covers the BMFA, its employed, elected and co-opted officers, their committees and all registered clubs and individual members of the BMFA.

Activities

It covers the normal and lawful pursuits of the Association and its registered members.

Note: Any form of flying for trade or commercial enterprises, whether paid or unpaid, is not covered by the basic policy (See 'Exclusions' and the section on 'Model Traders Insurance').

5.2 Indemnity Limits for the Third Party Public and Products Liability

£25,000,000 for any one claim, (in the aggregate in respect of Products Liability).

Territorial Limits

The whole of the UK and elsewhere in the world in respect of the Association's officers and registered members temporarily abroad.

Note: Although the BMFA insurance cover is fully valid in the USA and Canada, you are required to inform the BMFA office if you intend to fly in those countries on your BMFA insurance.

Models Covered

(a) All classes of model aircraft of whatever size, weight or engine capacity (subject to compliance with CAA regulations) except as noted in 'Exclusions'.

(b) Model boats and cars.

(c) Models powered by legal rocket propulsion systems up to and including 'M' size motors.

(d) Steam powered models except when used for passenger carrying purposes for hire or reward.

(e) Kites (subject to compliance with CAA regulations).

(f) First Person View RC flying provided it is carried out in accordance with CAA/BMFA regulations and recommendations.

Exclusions

(a) Any form of commercial or trade activities (whether paid or unpaid) including professional, semi-professional or sponsored display teams.

(b) Pulse jet powered models except as specified in the BMFA General Rules, Section 1.2.3.1, Reaction Motors, parts (1) and (2) as noted later in this handbook.

(c) Deliberately staged mid-air collisions at airshows and public displays.

Notes:

(i) Money paid to clubs by organisers of fetes, shows, etc, where the club is giving a demonstration does not constitute 'professional use'.

(ii) The carrying of Company or Organisation names or logos on models does not constitute a 'form of commercial or trade activity'.

Extensions

(a) *Member-to-member* liability is covered including damage to property belonging to fellow members.

(b) Indemnity is automatically extended to any Principals (*Landowners, Schools, Local Authorities, Government Departments* etc.) whose land or premises is used by any BMFA affiliated club or registered member.

(c) The Indemnity is extended to the *Committee Members* of any affiliated club and all lawful club activities are also indemnified.

(d) The reduced rate insurance cover available to juniors under the '*Schools and Youth Groups'* membership scheme only applies when such juniors are flying under the supervision of their group leader(s). To obtain the full unlimited BMFA insurance cover, any such junior must become a full junior member of the BMFA.

(e) Indemnity is provided for paid flying instruction provided the conditions laid down by the Association are complied with (see '*Flying Training Cover'* section).

(f) In the '*Airside Cover'* special provision, indemnity is provided for members operating their private motor vehicle 'airside' on an airfield or aerodrome, in pursuit of any activity associated with model flying where the members own private motor vehicle policy makes a specific exclusion in this respect. A higher excess is applicable to any claim made under this special provision.

(g) Club indemnity is extended to cover first time visitors to a club who have no previous experience but are seeking to try out model flying prior to joining the BMFA and the Club. Indemnity under this '*First Time Inexperienced Flyer'* provision will only be in place when flights are being totally organised and supervised by a suitable club member approved by the Club Committee. The limit of this indemnity is 3 separate day visits for any single inexperienced flyer.

(h) Club indemnity is extended to enable clubs to welcome *model flyers from overseas countries* to fly at their club sites during short visits to the UK. In the interest of promoting good international relations the BMFA will absorb the cost of providing this indemnity for a period not exceeding 30 consecutive days for any one overseas visitor in any single membership year. Club Secretaries are required to notify the BMFA, in advance, if this provision is required.

(i) Employer's Liability Cover with a £10 million level of indemnity is provided to all affiliated clubs. This covers legal liabilities for damages and legal costs arising from death or injuries caused to employees in the course of their 'employment'

The definition of 'employee' in this context includes labour only sub-contractors and volunteers working within the club.

5.3 Conditions

(a) When dealing with the injured/third party **you must not, under any circumstances**, admit liability or make or agree any financial settlement with respect to any incident which might give rise to a claim under the policy.

However, when dealing with the BMFA and its insurer, you should provide a full and honest account of events, especially when filling in an incident report form.

(b) It is the duty of the insured to exercise reasonable care to see that their models are sound and in proper order and that all reasonable safeguards and precautions against accidents are provided and used.

5.4 Incident Reporting Procedure

(a) Prompt notification of all incidents / accidents that may result in a claim on the policy is essential. Initial telephone contact with the BMFA's Leicester Office should be within 24 hours of the incident. Reports out of office hours will be recorded on the office answerphone.

(b) The Leicester office will supply you with an incident report form which will become the basis of an initial report of an incident to the Insurer if required. The office staff will give you any specific advice you need to help you complete this form.

(c) Regardless of how serious an incident may be, the reporting procedure outlined above will nearly always be adequate.

(d) It is important advice that, in the event of any incident that may have insurance implications, you should never admit any liability to any third party involved in the incident.

However, when completing the incident report form supplied by the BMFA office, **it is essential** that you provide a truthful account of events leading to the incident. If you believe that you have any responsibility or liability for the incident then you should declare this on the reporting form. Any declaration you make on the BMFA incident report form will NOT result in you being penalised in any way.

(e) The CAA has set out procedures for reporting more serious incidents in CAP 658 and these are set out in Section 21, later in this handbook together with more advice from the BMFA on the subject.

5.5 Operative Dates

The liability cover is effective from the date of joining until the end of the current membership year being the 31st December. Note that 'date of joining' means, for members of affiliated clubs, the date that payment is made to the club's BMFA contact and, for all others, the date payment is received at the Leicester office.

5.6 Certificates

Individual insurance certificates will be provided to all registered members of the Association from the Leicester office with their membership card. To maintain continuous cover it is vital that your membership renewal each year is prompt. Any changes to the personal information detailed on your certificate should be notified to the BMFA.

5.7 Product Liability

In any incident it is quite possible for blame to be attributed to a component or equipment failure which could well not be the responsibility of the flyer. The supplier of the component or equipment, who could possibly be a fellow member, could be held ultimately responsible and that could be you. Hence, product liability insurance is essential and it is a key element of the BMFA insurance protection.

5.8 Ministry Of Defence Indemnity and Flying On MoD Property

An exclusive feature of the BMFA insurance is the vital Crown Indemnity cover given to clubs and members flying on land owned by the Ministry of Defence (e.g. RAF airfields).

In order to fly on Ministry of Defence property you will require three things:

1. Third party insurance, as provided by the BMFA for its members.

2. Crown indemnity insurance which is a special cover provided by the Association and which is invoked as in 3) below.

3. A licence issued by Defence Estates (DE) which must be submitted to the BMFA for countersignature to the effect that the applicant is a BMFA affiliated club or member, thus invoking the special BMFA Crown Indemnity insurance cover.

Only BMFA members will be permitted to fly on the site and, since random military security checks operate, model flyers using MoD land must carry their card identifying them as BMFA members.

The formal procedures for obtaining access to MoD lands are contained in Defence Council Instructions and will be referred to by the Commanding Officer or the Defence Estate office concerned.

The BMFA's Leicester office is very familiar with the procedure and will provide help and the necessary documents when needed. BMFA Area officials may also be able to help and advise you on this subject.

5.9 Data, Development and Demonstration Membership Extension

The BMFA is pleased to provide an extension to Membership which includes additional

insurance cover for BMFA Members in respect of activity falling outside of the standard Sport and Recreational policy cover.

The Membership Extension provides public liability cover up to £25,000,000 through Mitsui Sumitomo Insurance Group and QBE Insurance for activity falling within:

DATA, DEVELOPMENT AND DEMONSTRATION COVER: Flights undertaken where the primary purpose is other than Sporting and Recreational, but where the pilot does not directly benefit financially as defined in Aerial Work. This includes the capturing of data including images and film footage, flights carried out for the purpose of product development, training/testing (other than in respect of the BMFA achievement schemes and sport and recreation), education and commercial demonstration including trade display flights).

This Membership Extension replaces the BMFA Commercial Traders Membership and also provides cover for:

- Trade stands at Exhibitions, Model Shows or Displays
- Demonstration flights at Exhibitions, Model Shows or Displays
- The flight of model airships at Exhibitions/shows
- The flying element of commercial flight training schools

5.10 Personal Accident Insurance

(a) Members of the BMFA between the ages of 3 and 85 are covered by a standard personal accident policy whilst participating in Association activities which include the building and flying of model aircraft for sport and recreational purposes as well as travel to and from the flying site.

(b) Personal Accident Cover is extended to cover first time visitors to a club who have no previous experience but who are seeking to try out model flying prior to joining the club and BMFA. Indemnity under this '*First Time Inexperienced Flyer'* provision will only be in place when flights are being totally organised and supervised by a suitable club member approved by the Club Committee. The limit of this indemnity is 3 separate day visits for any single inexperienced flyer.

(c) Full details of this cover is available from the Leicester Office or direct from the BMFA's broker.

5.11 Travel Policy

BMFA members can take advantage of an enhanced travel policy for Worldwide travel whilst the primary aim of the travel is to fly model aircraft. For details of travel rates please see the BMFA website or contact Integro direct.

Members are able to buy cover themselves and it is set up as follows: -

- This would be non-advisory sale, although if required a member could telephone Integro for advice;
- Member to download form from website and send a cheque and form to Integro Insurance Brokers;
- 'Receipt' issued to confirm cover in place;
- Primary purpose of holiday has to be to fly, although family members can be included as well with costs shown as per person;
- Declaration will be kept by Integro and provided to BMFA as required;
- Any queries on members 'purpose of trip' to be referred to BMFA for consideration.

5.12 Club Equipment Insurance

The BMFA have arranged cover which protects individual clubs against loss or damage to club equipment at the club premises. The policy provides cover against loss or damage to club equipment such as club buildings and grass cutting equipment etc.

For details of current levels of indemnity and cover, please visit the website or contact the Office.

Please note that the cover provided by this policy excludes:-

- Individual club members' equipment;
- Storm damage to open sided building;
- Theft or damage caused by attempted theft from any open sided building.

Theft Restriction

The policy does not cover damage caused directly or indirectly by or consisting of theft or attempted theft unless:

Involving entry to or exit from a building by forcible and violent means;

or:

As a result of or in connection with actual or threatened assault or violence or use of force at the premises against the insured or any employee of the insured or any other person lawfully on the premises.

Reasonable precautions

As we do not request risk information on each location, clubs must ensure they take reasonable precautions to protect their own property.

Members Property Exclusion

The cover provided by the policy specifically excludes any property belonging to individual club members.

5.13 Supplementary Items

Additional Insurance schemes are available directly from the BMFA's Insurance Broker. These include:

(1) House and Contents insurance, which includes cover for model equipment whilst at home, in transit or whilst left unattended in a secured vehicle.

(2) Commercial Flyers Insurance which provides cover for aspects of commercial model flying such as aerial photography, survey work or flying training undertaken on a commercial basis.

6. ADVICE TO CLUBS

6.1 Flying Site Negotiations

The BMFA has, over many years, built up a unique depth of experience and expertise in negotiations with local government authorities and other landowners and this is available to any club needing such advice.

6.2 The BMFA Club Support Officer

The BMFA has the services of a full time advisor whose brief is to assist all BMFA affiliated clubs with site and planning problems.

Before your club enters into any form of dialogue with Local Authorities or anyone else on the subject of model flying it is essential, for your own benefit, that you discuss your problems or proposals with the BMFA Club Support Officer . There are also a number of booklets available from the Leicester Office and for download from the website (www.BMFA.org), including an example Club Constitution, Flying Site Guide, Dealing with L.A.s, Dealing with Farmers, etc. See comprehensive list on the website.

Very early involvement is crucial in any negotiations.

This will enable the BMFA to build an information file on your circumstances which will be invaluable if you run into problems. All information will, of course, be confidential.

Independent action by clubs has, at times, led to the complete withdrawal of flying facilities for everyone using a site so the facts are clear – to give your club the best chance of success you should use the experience and expertise available through the BMFA. It is only a telephone call away.

Help and advice from BMFA has been instrumental in obtaining and retaining the use of many flying fields so call the BMFA's Leicester office for details of how to contact the Club Support Officer.

6.3 Club Assets and Grant Applications

If you are making grant applications (for instance, to Local Authorities) you may find that the award will depend on your Club Constitution clearly stating what will happen to assets in the event of the club winding up.

The usual requirement is that your members may not benefit directly and your Constitution may need to state that the Club assets would be transferred to, for instance, a charity or possibly to the BMFA.

The BMFA operates a Trust scheme to help clubs in these circumstances. All assets are held in trust for a period of ten years and will be administered by a Board of Trustees. The money may be used to assist the re-forming of the Club or the formation of a new Club in the immediate area.

For more details, contact the BMFA Leicester office.

7. THE CARE AND PROTECTION OF CHILDREN AND VULNERABLE ADULTS

7.1 Legal Responsibilities

Model flying clubs and groups have legal responsibilities to consider the care and welfare of children and vulnerable adults. BMFA has sought the best advice possible for its clubs and members on this matter so that junior and vulnerable adult members can continue to take part in club activities.

The BMFA has produced a comprehensive document that is available to all clubs and which covers most circumstances that you will find at club level. However, it is important that any policy which you implement within your club is one that suits your particular needs and circumstances. There is no 'one size fits all' policy. Copies of the document are available free of charge from the BMFA Leicester office or as a download from the BMFA website at www.bmfa.org.

Implementing a policy within a model flying club is a relatively simple process, the main requirement being a large degree of common sense. At all times the objective is to do what is 'reasonable'.

For further advice on Child Protection or CRB matters, please contact the Development Officer or the Chief Executive at the BMFA Leicester office.

7.2 Disability Guidelines for Model Flying Clubs

The BMFA encourages and supports model aircraft flying and related modelling activities at all levels and within all social groups.

The Disability Discrimination Act (DDA) of 2005 extended previous 1995 legislation to make it illegal for private clubs with 25 or more members to discriminate against a member or potential member on the grounds of their disability.

This places a requirement on private clubs to consider reasonable measures to improve access to their facilities.

Knowledge of the disability legislation and how it affects clubs and individuals is important and we recommend that everyone involved in organised model flying should be aware of their legal obligations towards disabled members.

As such the BMFA has produced a comprehensive set of Guidelines for Model Flying Clubs, which are available free of charge on request or via the BMFA website at www.bmfa.org.

Meeting a disabled person's needs is largely a matter of common sense and clear communication at the outset can often prevent problems arising at a later date. For further advice, please contact the Chief Executive Officer or the Development Officer at the BMFA Leicester Headquarters.

8. LEGAL CONTROLS OVER MODEL FLYING

The sport of model flying is subject to various legal controls which should be carefully considered at all times. You are personally responsible for any flights you make and knowledge of your legal responsibilities is important.

8.1 The Air Navigation Order (ANO)

The ANO is the legal framework which covers all flying activity in the UK. It is administered by the Civil Aviation Authority (CAA) and has been ratified by Act of Parliament. This means that the ANO is part of the body of law of the UK and, if you break it, you are liable to criminal prosecution.

However, model flying has been exempted from most of the clauses of the ANO. The current ANO is CAP 393, 2016 No.765. The main clauses that still apply are 241, 240, 94 and 95. You will note that the clauses have been renumbered in this version. The old clause numbers are shown in parentheses below.

NOTE: Because the Isle of Man is a Crown Dependency and thus not part of the UK it is covered by its own ANO – 2015 No. 870. However this does say exactly the same things but under different clause numbers and these are given in italic below.

Article 241 (138) *IoM 74*;

> **"A person must not recklessly or negligently cause or permit an aircraft to endanger any person or property"**

Article 240 (137) *IoM 73*;

> **'A person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft'**

THESE APPLY TO ALL MODEL AIRCRAFT AT ALL TIMES, WHATEVER THEIR WEIGHT OR SIZE.

Article 94 (166) *IoM 97*, (Small Unmanned Aircraft)

(1) A person shall not cause or permit any article or animal (whether or not attached to a parachute) to be dropped from a small unmanned aircraft so as to endanger persons or property

(2) **The person in charge of a small unmanned aircraft may only fly the aircraft if reasonably satisfied that the flight can safely be made.**

(3) The person in charge of a small unmanned aircraft must maintain direct, unaided visual contact with the aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions.

(4) The person in charge of a small unmanned aircraft which has a mass of more than 7 kg excluding its fuel but including any articles or equipment installed or attached to the aircraft at the commencement of its flight, must not fly the aircraft:

(a) in Class A, C, D or E airspace unless the permission of the appropriate air traffic control unit has been obtained (effectively in any controlled airspace down to ground level – Ed); or

(b) within an aerodrome traffic zone during the notified hours of watch of the air traffic control unit (if any) at that aerodrome unless the permission of any such air traffic control unit has been obtained; or

(c) at a height of more than 400 ft above the surface unless it is flying in airspace described in sub-paras (a) or (b) and in accordance with the requirements for that airspace (i.e. in any uncontrolled airspace. A further point is that 'above the surface' means 'above the point of launch from the ground' and this has been clarified with the CAA on several occasions – Ed).

(5) The person in charge of a small unmanned aircraft must not fly the aircraft for the purposes of aerial work except in accordance with a permission granted by the CAA (This doesn't affect you unless you are flying your model commercially for 'valuable consideration' – Ed).

Article 95(167) *IoM 98*, (Small unmanned surveillance aircraft)

(1) The person in charge of a small unmanned surveillance aircraft must not fly the aircraft in any of the circumstances described in paragraph (2) below, except in accordance with a permission issued by the CAA.

(2) The circumstances referred to in paragraph (1) are :-

(a) over or within 150 metres of any congested area;

(b) over or within 150 metres of an organised open-air assembly of more than 1,000 persons;

(c) within 50 metres of any vessel, vehicle or structure which is not under the control of the person in charge of the aircraft; or

(d) subject to paragraphs (3) and (4), within 50 metres of any person.

(3) Subject to paragraph (4), during take-off or landing, a small unmanned surveillance aircraft must not be flown within 30 metres of any person.

(4) Paragraphs (2)(d) and (3) do not apply to the person in charge of the small unmanned surveillance aircraft or a person under the control of the person in charge of the aircraft.

(5) In this article 'a small unmanned surveillance aircraft' means a small unmanned aircraft which is equipped to undertake any form of surveillance (eg. video) or data acquisition.

BMFA Notes.

BMFA has had clarification from the CAA that 'surveillance or data acquisition' equipment does NOT include such items as dataloggers, variometers etc. that are clearly used to monitor the performance of the model carrying them. They are only concerned with models equipped with cameras, video equipment etc. that have the potential to be used for surveillance purposes, either visual or electronic.

It should also be noted that the above legislation (articles 94 and *95*) does NOT prohibit you from flying a camera or video equipped model for recreational purposes. The person in charge of the model must retain direct visual contact with the model (Article 94) and there are some restrictions as to where you can fly (Article 95). See also Section 19.22 First Person View.

Probably the most important of these restrictions are the limits of not flying within 50 metres of any person or 30 metres from any person during take off and landing and these are exactly the same as for any model over 7 kg. Most clubs cope with these restrictions quite easily.

8.2 Large Model Aircraft (Over 20 kg)

All large model aircraft having a mass of more than 20 kg (mass of model and equipment, but excluding fuel) require an exemption to fly.

A large model aircraft can only be operated under the terms of an Exemption issued by the CAA

Such models are subject to airframe and build inspection before an 'exemption to test' certificate can be issued by the CAA. This is valid for one year only and it allows the model to be flown in private by the named pilot to prove the airworthiness and safe operating criteria for the model.

If the model is satisfactory over a set number of logged flights, the issue of a full exemption certificate will be recommended to the CAA. If this is agreed, the model may then be flown in public.

Exemptions are valid for one year but may be re-issued by the CAA on application provided that no changes or significant repairs have been made to the model. If any changes or significant repairs have been made, the model must be re-examined and a fresh 'exemption to test' certificate applied for, with the model going through the full test schedule before the issue of a new full exemption certificate.

It is unlikely that an exemption will be issued without the condition that the model must be flown within the 'control' of a recognised model association and at a suitable site.

Note carefully that the only person legally allowed to fly the model is the person named on the exemption certificate. There are some exceptions to this rule but these have to be agreed directly with the CAA.

The maximum mass for a model aircraft to be treated under the guidelines of CAP 658 is 150 kg. Above this mass full airworthiness regulations may apply. Builders contemplating the construction of a model having a mass of more than 150 kg should contact the CAA prior to commencing construction.

BMFA Notes on Models Over 20 kg

These are considered by the CAA to be aircraft, not model aircraft and, as such, they are treated in a different manner to models under 20 kg.

The exemption certificate does exactly what it says, it exempts the model from most of the clauses of the ANO, but the model is then subject to whatever conditions the CAA might apply to the model and these are detailed on the certificate itself.

Most of the conditions are usually based on those for models between 7 and 20 kg, set out in Article 95 of the ANO above, but the CAA reserves the right to include other conditions if it thinks fit.

It should be noted that breaking any of the terms set out in the exemption certificate, for instance during a flight, will invalidate the certificate at that point in time and make the model and its pilot subject to the whole of the ANO. This could literally make that part of the flight illegal.

8.3 Gliders Between 20 kg and 80 kg

Pure gliders over 20 kg now need an Exemption from the CAA before they may be flown. Therefore, before a model glider between these masses is built the advice of either the Large Model Association (LMA) or the British Model Flying Association (BMFA) should be sought on construction, testing and operating techniques.

8.4 Upper Mass Limits

For powered models the upper mass limit is 150 kg and for gliders it is 80 kg. Beyond these masses you must contact the CAA for details of the regulations that must be followed and what permissions are needed.

8.5 Mandatory Model Flying Insurance

It is a legal requirement in the UK that all models over 20 kg maximum take off mass (MOTM) must carry at least £750,000 third party public liability insurance.

This obviously applies to all models over 20kg dry, which are covered by CAA exemption certificates. However, it also applies to those models under 20kg which do not need an exemption certificate but which are taken over 20kg when fuelled for flight.

8.6 Planning Permission Considerations

Use of a site for model flying may in some circumstances require specific planning permission. In granting a planning consent a local planning authority may impose conditions designed to reduce the risk of disturbance by noise and any such conditions should be observed at all times.

If your Local Authority requests that you obtain planning permission, it is essential and very much to your advantage to contact the BMFA Club Support Officer, via the BMFA office. The success rate for planning applications is good but there is no doubt that early contact with BMFA will help you avoid the errors that can severely damage your case.

8.7 Byelaws

Local authorities may make bylaws, subject to approval by the Secretary of State, prohibiting or restricting model flying on certain municipally owned land or on land subject to certain provisions of

the National Parks and Access to the Countryside Act, the Countryside Act, and the Countryside (Scotland) Act . Similar provisions apply in Northern Ireland.

8.8 Noise

Under the Environmental Protection Act (EPA) 1990, local authorities or individuals may apply to a Magistrate's court for a noise abatement notice which may restrict or prohibit model flying at a particular site if the noise caused by the activity is judged to amount to a statutory nuisance.

In Northern Ireland similar action may be taken by local authorities and magistrate's courts under articles 38 and 39 of the Pollution Control and Local Government (Northern Ireland) Order.

8.9 The Department of the Environment Noise Code

8.6, 8.7 and 8.8 above would normally entail the relevant authorities (Planning Authorities or Magistrates) consulting the Department of the Environment Code of Practice for the Restriction of Noise from Model Aircraft 1982.

The Code of Practice is not the law and, in fact, there are no direct legally enforceable noise level requirements for model aircraft.

What IS legally enforceable, however, is a Noise Nuisance Notice which could be issued by a Magistrate against model flyers whom they consider are creating a statutory nuisance and which would stop any flying on the site immediately and permanently.

When a Magistrate is deciding if model flyers are creating a statutory noise nuisance, the document most likely to be referred to is the DoE Code of Practice which can be downloaded from <https://www.gov.uk/government/government/publications/code-of-practice-on-noise-from-model-aircraft>

9. THE BMFA GUIDELINES AND SAFETY CODES FOR MODEL FLYING

9.1 CAP 658

During 1996 the Civil Aviation Authority (CAA) issued Civil Aviation Publication 658 (CAP 658), Small (Model) Aircraft: A Guide to Safe Flying.

This document gives advice for all model flyers, much of which is based on the existing BMFA Safety Codes. Extracts from the latest version of CAP 658 (June 2013) are included in this handbook where appropriate.

Whilst the recommendations in CAP 658 are not regarded as legal requirements, one of the reasons why it is issued by the CAA is to provide a guide to what would be considered 'reasonable practice' in the event of a model flyer being prosecuted by them under the Air Navigation Order.

This makes CAP 658 an important document for all model flyers and it can be downloaded from the BMFA web site or direct from:

<http://publicapps.caa.co.uk/CAP658>

BMFA NOTE: All model clubs of any type (R/C or FF) should obtain and read a copy for their own information and protection.

9.2 Introduction to the Safety Codes

Accident statistics and the low insurance rates that BMFA Member's enjoy show that model flying is not a dangerous sport but, as with other sporting activities, hazards can arise if common sense rules are not applied. It is important that we all follow safe model flying practice and the BMFA Safety Codes are designed to help everyone achieve this.

The BMFA Safety Codes presented here are available to all model flyers and show you ways to fly your models safely, based on over half a century of experience.

Sections are available covering all model flying activities, including displays and competitions and there are many additional booklets on specific subjects giving detailed information. These can all be downloaded from the BMFA web site or obtained directly from the Leicester Office..

At some flying sites, circumstances may dictate that additional safety measures beyond those indicated in this handbook might have to be taken. Examples could be limiting the number of spectators or the number of models being flown at any one time.

With the advent of small electric models that can be flown from small sites, such as football pitches, you may also have to think carefully about the size and type of aircraft that you can safely fly from such sites.

As the pilot it is ultimately your decision as to what and where you fly but the range of types and sizes of model currently and easily available to you means that you may have to give the subject of suiting your model to your flying site much more thought than it needed in the past.

The Association wishes to encourage any safety initiatives wherever they may be thought necessary by the users of any site and, indeed, any suggestions about the contents of the Safety Codes and the Handbook in general will be welcomed.

Finally – remember that your attitude to safety can affect the whole image of model flying.

Model flying must not only BE safe – it must be SEEN to be safe.

9.3 Respect the Environment

Much model flying takes place in countryside locations and many clubs and individuals fly in places of natural beauty or Sites of Special Scientific Interest (SSSI). Wherever you fly you should take steps to minimise the impact on your surroundings.

Our aim as model flyers should be to leave any flying site in the same condition that we found it. Clearly, leaving litter or damaging property are not acceptable.

Model flyers should be familiar with the basic provisions of the Countryside Code which is compiled by Natural England and applies to all of the countryside in England and Wales. Most of it is just good commonsense as it is designed to help us all to respect, protect and enjoy our countryside.

9.4 'Mixed' Sites

Model flying does (and can continue to) take place safely on sites where other airspace users are operating at the same time close by.

Because, in all such cases, the other users always involve 'people carrying' aviation e.g. gliding, hang-gliding, paragliding, parachuting, light aviation etc. **the model flyer must accept that his needs are going to be secondary to the safety of the other user**. Indeed, this point is specifically covered by the Air Navigation Order.

On any shared site, it is extremely important that the model flying group have a robust and reasonable set of rules that are agreed by all users of the site and are rigidly applied. Anything less than this could lead to compromised safety.

These rules should always include the provision to set up a permanent lookout whenever model flying is taking place, either by individuals or by everyone present. Any airfield may be used by aircraft in emergencies or as waypoints for overflights, even when it is officially inactive.

Remember also that on such a site, there will always be a person on the full size side who will be in ultimate charge of airfield safety. This may be Air Traffic Control, the Chief Flying Instructor or even a Senior Instructor. Their instructions must be followed at all times.

In the particular case of hang-gliding and paragliding on slope sites, shared airspace is sometimes involved and the Association has a separate Code, agreed jointly with the British Hang and Paragliding Association (BHPA), which covers such situations and which is available on request from the Leicester office or for download from the web site (BHPA-BMFA Code).

9.5 Military Low Flying

Military aircraft may conduct low flying exercises over much of the UK on any weekday and the sudden appearance of a low flying military aircraft is difficult to anticipate. However it is vital to be aware of the problem and to remember that one aircraft may be the first in a stream of three or four.

In areas known to be used for low flying a dedicated lookout is considered essential.

On **WEEKDAYS** only, on flying sites where low level flying by military aircraft is **KNOWN** to take place and where a club is planning to operate **FIVE or MORE** models at any one time, the CANP reporting procedures outlined in CAP 658 can be used. If possible call the day before the activity. A minimum of four hours notice is required to allow full circulation of the information.

Telephone Freephone on 0800 300120 or 01780 416001 or e-mail <swk-lfoflfbc@mod.uk> and give the following information;

Civil low flying – recreational activity
Model aircraft flying
Location (ordnance survey grid reference or position in relation to the nearest town).
Operating area (e.g. 500 metres radius).
Date and start/finish in local time.
Operating heights (lower and upper limits above ground level).
Number and type of models (e.g. 3 gliders and 3 aeroplanes)(sic).
Contact telephone number (ideally a mobile that will work on site.
Operator or club name and telephone number if different to above.

For more details of this service, clubs are advised to contact the BMFA's Leicester office.

9.6 Your Fitness to Fly

Many factors can affect your day-to-day ability not only to operate a model aircraft, but also to participate in other flying related activities such as the retrieving of free flight models or taking part as an organiser in competitions, club events or model displays and airshows.

Before operating a model aircraft of any type careful consideration should be given to ensure that you are not compromising your own safety and welfare or that of those around you. Be aware that you might occasionally be 'unfit to fly'.

When at the flying field take good care of yourself and make sure that you are equipped with any medication that you are taking. If you use an inhaler, make sure that you have a charged one with you at all times. In hot weather consider taking sun-block, a hat and fluids – the effects of de-hydration can be serious. In cold weather make sure that you are equipped with suitable clothing.

If you wear prescription glasses or contact lenses ensure that these are used along with appropriate eye protection for the prevailing conditions. Good quality sunglasses will help protect your eyes from harmful UV radiation at any time of the year.

Some medications may render you unfit to fly and the effects of alcohol should not be ignored. As a guide, if you are fit to drive a motor vehicle then you are probably fit to fly an R/C aircraft. If you are in any doubt then do not fly solo. As always, however, the responsibility for the final decision on whether to fly rests with you, the pilot.

9.7 The effects of alcohol

There is a mass of scientific evidence about the bad effects of alcohol in matters of judgement and on the type of motor skills we rely on when taking part in model flying.

Even small amounts can have serious effects on your performance, with the added problem that you are nearly always unaware of the situation.

Whether you are operating models on any type or are responsible for organising the flying of models (as a competition CD or flight line organiser at a club event for instance) the best advice is not to drink alcohol at all. If you must drink it should be in moderation, bearing in mind the levels of alcohol that are considered appropriate to operate a motor vehicle.

In particular, you should be very aware of the cumulative effects of alcohol and you should avoid drinking at regular intervals during the day, even if you limit yourself to small amounts. It takes longer than you might think for any alcohol intake to be neutralised by the body.

10.HAZARDOUS MATERIALS

We come into contact with hazardous materials every day but there are some that we use in and around our models that you should be particularly careful about.

10.1 Carbon (and sometimes boron) fibre

This is regularly used as strengthening and structural material in models. These fibres, when stressed or fractured give off clouds of ultrafine microscopic fibres which are immune to your lungs' natural cleansing mechanism. Long term exposure may have very serious consequences. 'Stressed or fractured' carbon fibre could be found when you are repairing a model but it is also found when cutting and sanding new material. Whenever working with such material, always wear an appropriate mask. Cut over clean white paper. When finished, fold the paper and dispose of carefully. Vacuum the work surface and your hands regularly. When finished, always wash your hands initially in COLD water.

10.2 Kevlar fibres

May also give long term problems so equal care should be taken if using this material. If any model aircraft is built or repaired using composite materials or parts then it is essential to be particularly diligent in picking up any debris after a crash or mid-air collision. Composite shards do not degrade quickly and can be a dangerous hazard in and on the ground for many years

10.3 Cyanoacrylate glues (superglues)

These are well known for causing severe allergic reactions in some people and such reactions can build up over time. Work in a well ventilated area, avoid breathing superglue fumes and, if necessary, wear a fume proof mask and eye protection. Superglue fumes may be absorbed through the tear ducts. Superglue 'kicker' is also known to cause adverse reactions on occasions so care should be taken when using that too.

10.4 Epoxy and polyester resins

These are also known to build up allergic reaction in some people over time. It is likely that the main culprit is the fumes given off by the products as they cure so it is important that you heed the advice to work in a well ventilated area.

10.5 Methanol

This is fairly safe to store in a cool place and out of sunlight. However, it is a poison and the ingestion of even small quantities can be dangerous. Don't let it stay on your skin if you spill any.

10.6 Petrol

An increasingly used fuel and the ease with which its vapour ignites make it one to be very careful with. A small spark can lead to a big explosion. Don't store it or try to transfer it between containers indoors. This is one where working outdoors is essential advice.

10.7 Smoke Systems.

Some of the oils used in model aircraft smoke systems are known to be carcinogenic when burnt and all of them are irritants to varying degrees, even the purer types. Smoke should only be used when the wind is blowing away or at least along the pits / flightline area and there is no possibility of the smoke cloud being blown over pilots or spectators.

11. THE BMFA GUIDES TO THE SAFE OPERATION OF MODEL AIRCRAFT

11.1 General Club Information

Clubs or groups of flyers should draw up carefully considered safety rules for specific sites. It is recommended that the Codes in this Handbook are used as a basis for these rules but additions to cover local circumstances should always be considered too. These 'flying field' rules, should cover the club or group's normal operating procedures and safety measures.

Clubs should take care to keep their flying field rules separate from their Club Constitution. This will enable them to regularly review their operating procedures to ensure that, if any additional safety measures are needed, they are recognised and implemented.

Where byelaws restrict model flying to specific areas and times, model flyers should encourage local authorities to erect notices indicating the restrictions. On private sites with public access, suitable notices warning of model flying should be erected if possible and where appropriate.

The signs should say **'Please Be Aware. Model Flying Takes Place Beyond This Point'.**

On public sites, or sites where casual visits by the public are likely, then temporary notices as in (d) above may be helpful when flying. Always try to use the same take-off areas. Other regular users will then expect to see model aircraft operating from a particular place.

11.2 The Safety Marshal

On all sites with public access, and especially on sites where model flying activity and the public interact regularly, it is strongly recommended that a SAFETY MARSHAL be appointed at any flying sessions. His duties should include warning both the public and flyers of flight patterns, take-off areas and safety procedures and advising spectators of the safest area from which to watch.

Note that the person appointed will usually be appointed on the day and it may not be the same person all day. Many clubs operate the system successfully by having a rota system so that no one individual is expected to do too much. It may even be that every member on the field is tasked with acting as a Safety Marshall as part of their flying field responsibilities. The most important point is that all flyers are aware that care must be taken and that steps have to be taken to ensure public safety.

11.3 The Club Safety Officer

If it is considered to be appropriate, a Club should appoint a competent CLUB SAFETY OFFICER whose duties would be to ensure that both the BMFA and the Club Safety Codes are followed.

However, a Safety Officer acting alone has an almost impossible task and some form of infrastructure should be set up within the club to help the designated officer.

The most successful way to do this is to make the task of Assistant Safety Officer part of the duties of every Committee member. These Assistants then report to the designated Safety Officer when required. This will keep the Safety Group to a manageable size but will ensure that there is a recognised safety presence at most flying sessions.

If it is felt that this might not be enough, you can appoint other responsible club members as assistants too. Examiners, Instructors or senior club members might all be candidates.

It is not recommended that you appoint 'all club members' as their own safety officers. Such an approach loses the focus of a smaller group and can become ineffective.

Clubs should educate and encourage their members, particularly new or junior members, to conform to Club safety requirements and should have no hesitation in disciplining persistent offenders.

11.4 Using Your Flying Site

(a) All flyers must ensure that the site they intend to use is entirely suitable for the type and size of model they wish to fly before attempting to use it. You are personally responsible for the flights you make and the consequences of flying at an inappropriate site could be serious.

(b) All flyers must ensure that the site is left free of any foreign objects or debris. This is particularly important where the use of active airfields is concerned or when livestock is likely to have access to the site at any time.

(c) **CAP 658 says:-** For any model aircraft flying, first choose an unobstructed site and at all times keep a safe distance from persons, vessels vehicles and structures.

(d) Then only fly in suitable weather, with regard for any other conditions such as local bylaws and with due consideration for other people and property. If light conditions or visibility are such that you might lose sight of your model then do not fly.

(e) Take great care if you fly near any overhead cables. Telephone wires are dangerous and electricity cables can and have killed. Even the low level electricity lines on wooden posts carry lethal voltages. **KEEP CLEAR**.

(f) Do not leave fuel, adhesives etc. where children or other spectators may get hold of them.

(g) Flying alone should be avoided if at all possible. There are many cases on record where model flyers have been injured or incapacitated on the flying field and have only been saved from permanent injury or worse by the prompt actions of fellow flyers. If you do fly alone, take a mobile 'phone with you. There are risks of interference with a mobile but the safety factor of being able to summon help if you are injured is more important.

(h) It is extremely unwise to let children wander on a flying site. If children are there make sure that they are under supervision and safe.

(i) Dogs and model aircraft do not mix. If you take your dog to the flying field it should be on a lead and restrained at all times.

12. R/C FLYING SITE LOCATION

12.1 Inter-club interference

(a) Inter club interference is possible when 35 MHz is in use as a model control frequency. However, if a club is set up to use 2.4 GHz equipment only then the following section is not relevant and lesser safety distances will apply. If your club is using 2.4 GHz only, the organisation must be very careful to police the rule rigorously and, in the case that there are nearby clubs, it would be good practice to inform them of the club's location and the fact that only 2.4 GHz will be used.

(b) As a general rule, when 35 MHz is in use as a club frequency in both clubs, they should not operate closer together than 2 miles unless an agreement has been negotiated between them giving an equitable and workable frequency sharing plan. The 'block' frequency sharing arrangement is the safest and most common method. The use of odds/evens split by power and glider clubs flying close together is another, lesser used example (see the section 'Frequency Allocation at Club Sites').

(c) Both parties are bound by the implications of radio transmission law and the Air Navigation Order to take action. Therefore, **please take note that negotiation in such circumstances (i.e. where interference is possible) is mandatory.**

(d) The use of the 35 MHz frequency bands and channels is legally granted to all of us but no one group or individual has the 'right' to reserve the use of any of the frequencies, no matter how long they have been using them on a particular site, and whoever turns on a transmitter first in any given situation is the legal user of that frequency until they turn the transmitter off.

(e) It is recommended that each negotiating club or group appoints a named person as a point of contact, possibly from its existing Committee members. Good communication is important in these circumstances to avoid misunderstandings occurring and rumour spreading and to make sure that your flying is as safe as possible.

(f) It must always be borne in mind that continuing to operate in these circumstances, (i.e. using 35 MHz as a model control frequency) without reaching a practical frequency sharing agreement may have serious legal consequences under the terms of the Air Navigation Order and may also have insurance implications for both the pilots and clubs concerned.

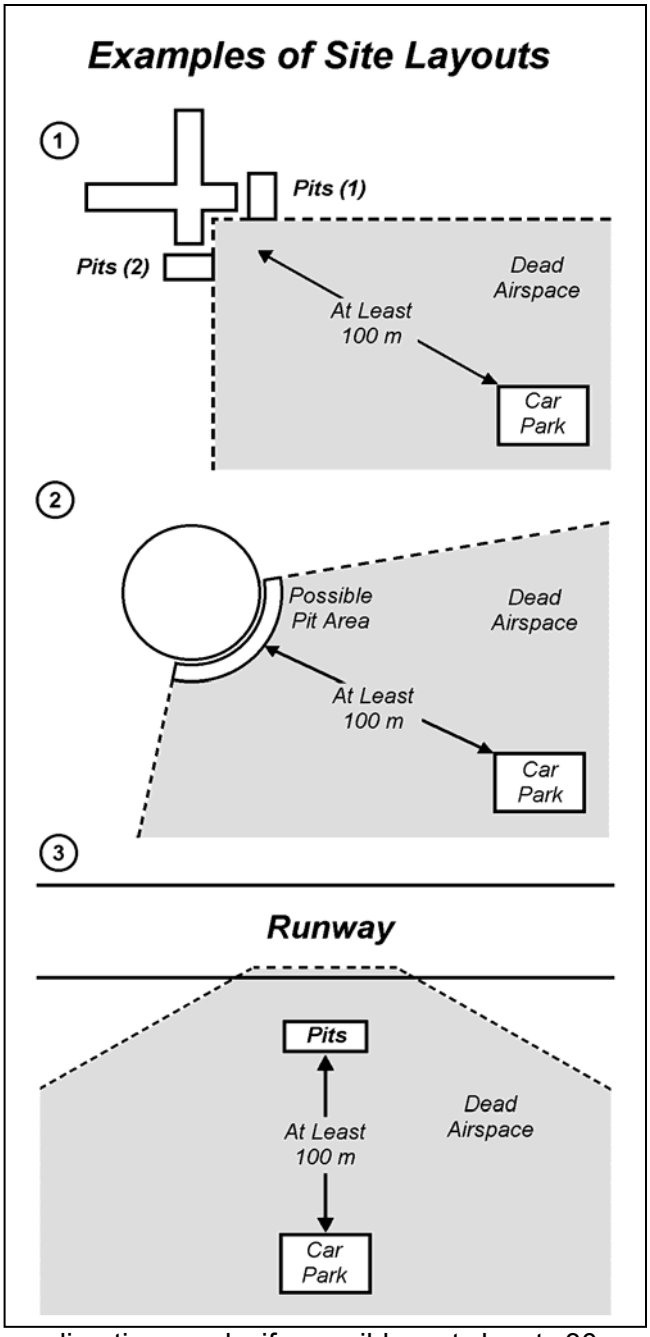
12.2 Model Flying Heights and Interaction with Full Size Aviation

(a) At flying sites very close to airports and aerodromes, liaison should be maintained with the airport authorities to agree any special precautions needed. For instance, in certain cases, safe model flying heights might need to be arranged.

(b) Models under 7 kg are not subject to any specific legal restrictions in this respect but you must always remember that Articles 240 and 241 of the Air Navigation Order (which cover endangering) apply at all times to all models and possible conflict with full size aircraft MUST be avoided.

(c) You do, however, have rights as model flyers and the operators of airports and aerodromes may not simply say that you cannot fly without giving very good reasons. In any situations where they will not listen to your case or where a reasonable compromise cannot be reached you should contact the BMFA office as soon as possible for assistance.

13. R/C POWER FLYING SITE LAYOUT AND FLIGHT PATTERNS



13.1 Introduction

A study of the incident reports received by the BMFA shows that many accidents are either caused or made worse by poor flying site layout, lack of thought about flight patterns or general lack of flying discipline.

The following section sets out the lessons learned in general terms and it gives a framework in which the general safety code can work to its best advantage. These guidelines are advisory as every flying site has its own particular circumstances.

It is strongly recommended, however, that all R/C power oriented clubs, both fixed wing and helicopter, study this section and see how their sites and practices compare with the guidelines, especially with respect to the provision of 'dead airspace'.

13.2 Layout

(a) Set up a car park separate from the pits area and, if possible, arrange for it to be at least 100 metres from the take-off/landing area, and behind the pits. Some sites do not allow the car park to be positioned this far away from the flying area but you should make an effort to position it as far away as practicable. If your site allows, you will find it useful to position your car park near some obstacle to flying such as trees or a high hedge.

(b) Enforce a strict ruling of no cars in the pits area. An exception could be made for any of your disabled members but only for loading and unloading.

(c) Have at least two recognised pits areas available so that the pits can be set up crosswind from the active runway whatever the wind direction and, if possible, at least 30 metres from the take-off/landing path. Under no circumstances allow models to take-off from or land over or towards the active pits area.

(d) Some field layouts may mean that your approach road cannot be included in the dead airspace you define. In these cases you must take extra care to have a laid-down method of driving on to the field and you should make sure that all your members are carefully briefed and aware of the safety situation

13.3 Flight Patterns

(a) Do not allow flying all around the field 'control line' fashion. Lay out an area of dead airspace that takes in the pits area, the car park, the approach to the field and any noise or safety sensitive areas which you need to avoid. The dead airspace area will usually be a segment of at least 90^{o} and could be up to 180^{o} i.e. all flying takes place one side of a line through the strip with the pits,

car park etc. on the other side. It is vital to set up this area of dead airspace, even if your field is totally unobstructed all around.

(b) Enforce a strict rule that NO-ONE flies in the 'dead airspace' at ANY height.

(c) Specify that any flying actually over the take-off/landing area must be into wind only (except in an emergency or when practising with no other models airborne). This avoids conflicting flight patterns over the active runway but does not prohibit other styles of flying away from it.

13.4 Notes

Section 13.3 above has certain implications, the main one being that the circuit flown at any time will depend on the wind direction. For instance, if the prevailing wind is westerly and this gives you a left hand circuit on your field, a change in the wind to easterly means that you must fly a right hand circuit.

Because of this your members will have to become proficient in both left and right hand circuits and will have to be able to land either from their left or their right. None of this should bother most reasonably competent club flyers or any newcomer trained to fly like that from the start but a few flyers, even some quite experienced ones, may need encouragement and help to break old habits and begin flying in a slightly more disciplined style.

Once settled into this more disciplined style, your members may find that it is easier to fly this way.

Please note that this section refers to club flying sites only. Model flying displays have their own site safety code recommendations in a separate document available from the Leicester Office.

14. LEARNING TO FLY RADIO CONTROL

14.1 CAP 658 says

If at all possible contact and join a local model flying club. There is no doubt that this is the best way to learn to fly. Details of your local clubs can be obtained from the BMFA or your local model shop.

Most of the many hundreds of model flying clubs in the UK offer training in R/C flying to beginners.

It is not impossible to learn to fly without being a member of a club but it can be very difficult. If you are not able to join a club then try to get help from an experienced model flyer who will be able to guide your first efforts.

Some organisations offer commercial model flying training. Details can usually be found in the model flying magazines.

14.2 Simulators and Simulator Leads

Flight simulators are becoming increasingly popular as a tool to help you learn to fly R/C models and there's no doubt that they also help develop and hone flying skills when you can't get out to fly.

Look out for depth perception problems when you move back to real models as there are differences.

Be aware that the frequent plugging and unplugging of simulator or training leads can lead to poor connections or damage to the host circuit board on some transmitters

15. RADIO CONTROL AND YOU

15.1 Introduction

This section gives advice and guidance on the operation of your radio equipment which may not be covered in the manufacturer's literature.

15.2 Aerials

(a) The aerial on your transmitter is an integral part of the set that is certified/tested by the manufacturer in order to qualify for the CE mark. If you are replacing a telescopic aerial on a 35 MHz set you should try to obtain the manufacturer's spare part. If you can't do this then the aerial you fit should be of the same specification (length, screw fixing etc) as the original.

If you wish to fit a base loaded or 'rubber duck' aerial, you should be aware that you may only use one of these aerials if the manufacturer has cleared your particular transmitter for such an aerial. If this is the case, then you should be able to buy the manufacturer's authorised spare.

If your particular 35 MHz transmitter is cleared to use such an aerial by the manufacturer but you can't get the original manufacturer's spare then any replacement aerial you buy must meet the same specification as the manufacturer's item. Note that, with this type of aerial, the specifications are more complex than simply matching the length.

You should be aware that fitting an aerial that does not meet the transmitter manufacturer's specifications will result in you being considered to have introduced into use a new variant of the transmitter which will not be covered by the manufacturer's testing/certification and CE mark.

If you wish to fit an aftermarket aerial you should first contact the manufacturer/importer of your transmitter for further information. You might also find information on the Ofcom website at www.ofcom.org.uk

(b) A dirty or oily telescopic transmitter aerial will degrade the range of your transmitter, sometimes quite severely, and may even affect the output frequency. Clean it every two or three months with methylated spirit or similar and never lubricate it.

(c) Take care to route your receiver aerial well away from any carbon fibre in your aircraft. Carbon fibre is electrically conductive and is a good aerial itself. Large quantities of it can blanket your receiver aerial completely and even a few strands used for strength can cause glitching in flight if they are close to the aerial and can affect the signal reaching it.

It has also been reported that some metallic covering films and certainly some metal clad airframes have also been seen to suffer from degraded range and glitching and the siting of receiver aerials in these types of model can be quite critical.

(d) A point that is often overlooked, even by experienced flyers, is that the placement of 2.4 GHz receiver aerials is much more critical than for 35 MHz equipment. You must read the manufacturer's installation instructions very carefully and take note of the information they give you. If you don't do this you may find yourself flying with equipment that is low on airborne range simply because the aerial configuration you have set up is inefficient.

If you do not have the original instructions, visit the manufacturer's website and download the information from there.

15.3 Batteries

(a) Dry cell batteries do have their uses in some transmitters but care should be taken to monitor pack voltage at all times.

(b) The use of dry cell batteries in airborne battery packs is strongly discouraged and they must never be used in the airborne pack if you have four or more servos operating.

(c) Subject to the advice given below, It is recommended that you only use rechargeable batteries in your radio control equipment. However, when fitting Nickel Cadmium (Ni-Cd) or Nickel Metal Hydride (Ni-Mh) rechargeable batteries to equipment designed and sold to take dry batteries, always ensure that the cells are soldered or welded into packs and that the packs are either hard wired or wired through a plug and socket into your transmitter and receiver systems. Do not rely on the spring type battery contacts in battery boxes.

(d) There are, however, exceptions to this advice. Some modern transmitters have very low current drain and are supplied as dry battery sets with battery boxes that are not removable. In these cases dry cells give an acceptably long operational life and may be used safely.

If you do use individual re-chargeable cells in these transmitters, make sure that the cells are removed at least monthly. While the cells are out of the transmitter, carefully clean the spring battery contacts and the ends of the cells before replacing them. You should also carry out this procedure if the transmitter has been standing idle for any length of time.

If you don't take these precautions, your transmitter might suffer from the same symptom as many TV remotes when they stop working until you have disturbed the batteries.

(e) Lithium Polymer batteries (Li-Po) are being used increasingly in radio control transmitters and many flyers are retro-fitting Li-Pos in place of Ni-Cd or Ni-Mh battery packs. If you are considering this, it is essential that you contact your Tx manufacturer / importer for information on whether this is allowable in your transmitter. This is because there are significant issues with voltage differences between the different types of battery pack and the ability of any specific transmitter to cope with them. It is safer to consider using Lithium-Fe cells as their voltage is lower than Li-Po cells and equate more closely to standard transmitter battery packs.

If you are not given clearance to make this change but you still go ahead then you will run the risk of damaging your Tx and, in addition, any warranty you have will be invalid, you may not be able to have the equipment serviced and the CE mark on the transmitter will also be invalid. The legal responsibility that you then take on yourself is considerable and must not be underrated.

(f) The regular use of a battery checker for receiver batteries is a good idea and there are many cheap reliable units available, either hand held or on-board. The peace of mind in knowing that the last flight of the day will not be the last flight of the model is well worth having. There is a selection of battery checkers available to cover most battery types so no matter what type of cells you are using you can buy a checker to suit.

(g) The Electroflight section later in this handbook. Gives more information on the use of batteries and associated equipment.

15.4 Nickel Cadmium (Ni-Cd) Batteries

(a) Ni-Cd cells will self discharge at a rate of around 20% of their capacity each month and if a stored pack discharges below approximately 1 volt per cell, there is a danger that one of the cells in the pack may be irreversibly damaged. The lower the voltage reached the more risk there is that this will happen. It is therefore recommended that all Ni-Cd packs be charged regularly, at least every few months, and that any pack not in regular use be initially stored fully charged.

(b) Ni-Cd cells are very resilient when trickle charged at around 1/10C (i.e. 50mA for a 500mA battery). Most chargers supplied with radio equipment are designed to work in this range and there is little risk involved if packs are inadvertently left on charge when using them. Even if you regularly fast charge your cells, it is good practice to trickle charge them occasionally.

(c) Overcharging Ni-Cds at high currents (fast charging) can ruin your cells and has been known to cause battery packs to explode violently. Most fast chargers have a 'delta peak' voltage controlled cut-off and are generally very reliable. If you don't have such a charger and wish to fast charge your cells then, as a minimum, you should use a charger with a timer or temperature controlled cut-off.

(d) If you have a charger capable of both discharging and charging your battery packs then you should fairly regularly cycle the packs as this will help to keep them in optimum condition.

However, it is also good practice to occasionally trickle charge any packs that are regularly fast charged whether they have been cycled or not. Just make sure that the pack has been well used or discharged before you start (no lower than 1 volt per cell though).

15.5 Nickel Metal Hydride (Ni-Mh) Batteries

(a) Ni-Mh cells can self discharge at a rate of up to 40% of their capacity each month and the danger of a stored pack discharging below 1 volt per cell and possibly causing irreversible cell damage is therefore considerably greater than with Ni-Cd cells simply because it will occur sooner. It is therefore recommended that all Ni-Mh packs be charged more regularly than Ni-Cds, at least every two or three months, and that any pack not in regular use be initially stored fully charged.

(b) Ni-Mh cells may be trickle charged at around 1/10C (i.e. 50mA for a 500mA battery) and most chargers supplied with radio equipment are designed to work in this range.

However, Ni-Mh cells are more fragile than Ni-Cds and are susceptible to damage by overcharging even at normal trickle charge rates and should never be left connected to the charger longer than is necessary. The 'safe' constant trickle charge rate is very much less that that provided by the standard type of charger supplied with most radio equipment so the possibility of overcharge damage when using these trickle chargers must always be borne in mind.

(c) Ni-Mh packs can be charged at high currents (fast charging) but overcharging can quickly ruin the cells. Most fast chargers have a 'delta peak' voltage controlled cut-off and are generally very reliable but you must ensure that the one you are using is specifically designed for Ni-Mh batteries.

(d) Ni-Mh packs may be cycled, as with Ni-Cds, and you should consider doing this fairly regularly. However, it is also good practice to occasionally trickle charge any packs that are regularly fast charged whether they have been cycled or nor. Just make sure that the pack has been well used or discharged before you start (no lower than 1 volt per cell though) and note the advice in (b) above.

(e) A noticeable feature of Ni-Mh technology has been the increasing capacity of the cells for any given cell size. For instance, the early AA pencells were rated at around 700 mAH but you now see capacities of around 2000 mAH for the same cell size.

The only way this extra capacity can be achieved is by increasing the surface area of the active components within the cell and, for a given size of casing, this can only be done by making these components thinner. The problems that this will give you are increased internal resistance (the cell won't give it's energy up as easily and may get hot) and increased fragility of the cell. Thinner materials can be damaged more easily, both electrically when charging or discharging and mechanically, for instance, due to overheating when soldering or being over-stressed in a crash.

These problems may not be apparent in your transmitter pack but you should think carefully about using very high capacity Ni-Mh cells in airborne packs where the demand on the batteries will fluctuate and can be much higher than in a transmitter. You can easily get into a situation where a high capacity pack is unable to supply the voltage required by some hard working servos simply because the internal resistance of the cells will not let the energy stored in them be released quickly enough.

15.6 Low Self Discharge (LSD) Ni-Mh Batteries

Originally developed by Sanyo under the trade name 'Eneloop'. This type of cell is now produced by several other manufacturers.

These cells have such a low self discharge rate that you can treat them very much as you would a Li-Po and charge them when you come in from flying rather than the day before you go out.

They are robust and can be charged with a standard Ni-Mh battery charger. They are a little more expensive than standard Ni-Mh cells but their very slightly higher operating voltage gives good energy storage levels and the claimed number of possible charge cycles is greater than the standard cells.

The technology is certainly worth considering as an alternative and very useable battery, especially in Transmitter applications or in airborne packs that cannot be readily removed from the airframe for charging..

15.7 Lithium-Polymer (Li-Po) Batteries

Li-Po batteries are now used by a very significant number of model flyers and they must be treated differently to the more conventional rechargeable batteries.

For full details on safety and use of Li-Po batteries please see the BMFA booklet – Battery Safety Booklet 2014 which is available from the Leicester office or for download from the BMFA website.

15.8 Battery Isolator Switches

One of the most dangerous points in the flight preparation of electric models is when the flight battery is plugged into the model. A freshly charged battery has a lot of power locked up in it and many models are very awkward when it comes to connecting the battery pack, especially as you usually need both hands to do the job.

Consequently, if the pilot fails to set the throttle to the correct setting or the onboard electronics in the ESC fail, it's very easy to have a propeller or rotor come to life when you least expect it to, with possible serious consequences.

Ideally, there should be an isolating switch between the battery connections and the ESC that would enable you to plug the flight battery in but still leave the model 'dead' until you were able to switch on the power with the model held safely.

We recommend that you seriously consider the fitting of an isolator switch to any model that uses powerful batteries. They should be considered to be an essential safety fitting for most electric models.

15.9 BECs / UBECs / Receiver Batteries

A large majority of Electronic Speed Controllers (ESC) have a built in battery eliminator circuit (BEC) and the use of the BEC to run the airborne radio package of electric models is very popular.

However, there are factors that you should bear in mind when using or considering the use of the BEC.

All BECs are limited in the amount of current they can supply. The cheaper BECs can usually supply current that is adequate for most sport models with three or four servos but if you are using more servos than this or are using digital, large or special servos, you should check the specifications of the BEC you are using to see if the current it can supply is adequate.

Remember that digital servos may require more current supply than you might expect and, no matter what type of servo you use, any binding or stalled servos or high aerodynamic loads will also pull significant current. Helicopters can be particularly demanding.

If you have any concerns, there are two ways to improve the situation and give your airborne system the ability to supply the current that the receiver and servos require.

(a) Fit a UBEC. This is a stand-alone BEC unit that is not reliant on the ESC circuitry. These units are usually quite cheap and you can check the current capabilities of the units before you buy.

(b) Fit a separate receiver battery of an appropriate capacity.

Both of these solutions are valid but you should think carefully about the model and flight requirements before making your choice.

For instance, if you have a model that requires nose weight, it would make sense to fit a separate receiver battery and use this as part of the weight required. An electric powered glider might also be a

good candidate for a separate battery as you may reach a situation where you have exhausted the propulsion battery but may still have significant flight time to come, especially if you are thermalling.

There is one other point that you must bear in mind and that is the ESC will have limits to the voltage (number of cells) and to the out-put current in amps. The BEC output will be specified in amps at the standard voltage (4.8 to 5.2 volts) but the BEC has to handle the total voltage of the supply pack (e.g. 12 volts for a 3S Li-Po). The higher this voltage the greater is the power dissipated in heat which might require a reduction in the output current demanded of the BEC to avoid overheating and possible damage and failure. It may be that, in these circumstances, the BEC will not be able to safely supply the current needed by the airborne RC pack. If this is the case then a separate receiver battery will be essential. The ESC manufacturer's documentation should indicate the BEC current limits at given main pack voltages.

15.10 Black Wire Corrosion

(a) Systems fitted with rechargeable batteries, particularly the older Ni-Cd batteries, can suffer from **black wire corrosion**. When this happens the surface of the copper strands in the core of the negative (black) wire in a circuit receive a coating of black material which works inwards until all of the copper in the wire has corroded. This corrosion has a high electrical resistance so as it gets deeper into the wire it lets less current through until eventually your radio stops working.

(b) The wires which are most affected by this corrosion are the negative wires from the battery to the switch in both transmitter and receiver wiring but in severe cases the corrosion can go much further than this and in extreme cases has even been seen in servo leads.

(c) The causes of the corrosion are very complex but it seems worse on batteries in storage, particularly in a damp atmosphere, or which have been allowed to go flat. Well used and maintained batteries certainly suffer much less but they are not immune to the problem.

(d) Unfortunately, there is only one practical way to find out if your wiring is suffering from black wire corrosion and that is a visual inspection of the core of the wire. If you are competent to do this, inspect the wire leading from the negative terminal of the battery. Stripping back a very short length of outer will show if you have the problem.

(e) There is no cure for black wire corrosion other than removing the affected wire and replacing it with new.

(f) If you are unsure of any of this advice, it will be well worth sending your rechargeable batteries and switch harness back with your radio equipment when you have it serviced with a specific request for black wire corrosion checking. Several companies specialise in supplying batteries and they might also be able to help. Another source of advice could be your local model shop but failing all this you should ask an experienced modeller for assistance.

15.11 Crystals

(a) It is essential that you use the correct specification crystals in any non-2.4 GHz transmitter or receiver you are using. Not all crystals are the same and you should **NEVER** use one manufacturer's crystal in another's Tx or Rx. The only exceptions are many of the aftermarket receivers and their manufacturers actually specify which crystals are compatible.

(b) When buying crystals, always take care to specify in which individual piece of equipment they are to be used. Original manufacturer's crystals are always the best choice.

(c) Receiver crystals are a fragile point in any airborne R/C system and they are susceptible to crash damage. If you have any concerns about your Rx crystal after an incident then you should replace it with a new one. This could be a very good investment if you consider the implications of crystal failing in the air a few flights later.

15.12 Failsafes

(a) CAP 658 says:

For All Model Aircraft

Any powered model aircraft fitted with a receiver capable of operating in failsafe mode (i.e. PCM receivers, Digital Signal Processing (DSP) receivers or 2.4 GHz equipment) must have the failsafe set, as a minimum, to reduce the engine(s) speed to idle on loss or corruption of signal.

This means that you will have to carefully consider what type of receiver you are using in ANY i/c or electric powered model, even the smallest.

For Models Weighing 7 to 20 kg

A serviceable 'fail-safe' mechanism should be incorporated to operate on loss of signal or detection of an interfering signal. For example on a power driven model this should operate, as a minimum, to reduce the engine(s) speed to idle.

For All Gas Turbines

All gas turbine models should be fitted with a failsafe. This must bring the engine to idle in the event of radio interference or failure. The fuel system must be capable of manual shut off via a fuel valve or fuel pump switch.

(b) All PCM sets, most DSP 35 MHz receivers and all 2.4 GHz equipment have settable failsafe modes and if you are using any one of these then you must take care to set the failsafe to at least engine idle.

For over 7 kg, you must ONLY use failsafe settable equipment and, again, set to engine idle as a minimum.

(c) As a reminder, nearly all PCM and DSP receivers and **all 2.4 GHz equipment defaults to 'hold last position' out of the box** so if you don't set the failsafe, then that's what it will do. This means that, for even the smallest model, interference or loss of signal will mean throttle and control lock-on and a potential flyaway or high throttle, high energy impact. If ever you re-bind a model please remember to recheck the failsafe as some sets may revert to default settings under these circustances.

(d) Users of any failsafe capable radio equipment (PCM, DSP or 2.4 GHz) should check fail-safe operation before each flying session. With the model restrained, switch off the transmitter and ensure that all relevant controls on the model move to their pre-set fail-safe positions. Switch the transmitter on again and make sure that normal control operation returns within a few seconds. If the fail-safe does not re-set quickly there may be a fault so **DO NOT FLY.** Also remember that if the failsafe is set to retract the undercarriage the model will need supporting off the ground.

To be safe, You must take the positive step of specifying what your failsafe should do instead of leaving it set at default. Read your radio manual carefully for details of settings.

If you don't initially understand the instructions for setting the failsafe on your equipment then you MUST take steps to find out how to do it. This is one thing you cannot ignore and ignorance of the procedure is not an excuse that can be accepted.

Note: If you have PPM equipment and don't have a DSP receiver but are using an add-on failsafe, it too should be set as a minimum to low throttle.

Glider Failsafes for Models Weighing 7 to 20 kg

The requirement in CAP 658 to use and set failsafes applies to these silent flight models too, although obviously the 'setting of throttle' does not apply. You should remember that the reason that the CAA requires failsafes is to prevent flyaways, not to deliberately crash the model, and you should set the controls of your model with this in mind. Application of spoilers, 'crow' brakes or even rudder and elevator to spin the model might be appropriate.

#

Electric Model Failsafes

The setting of the failsafe to, as a minimum, reduce the engine(s) speed to idle, obviously applies to all electric models too. However, given the ability to re-start the motor(s) at will, it makes sense to have the failsafe cut the motor(s) completely. This will give you the desired 'minimum power' situation and will avoid you having to decide on what idle speed you might need to set.

Multi-rotor Failsafes

The development of modern electronics means that it is now possible to fit model aircraft with what are known as 'Intelligent Failsafes'. These are particularly applicable to multi-rotor aircraft and full details are given in the Multi-rotor section of General Model Safety later in this Handbook.

15.13 Frequency Identification

Users of 2.4 GHz will not have or need any method of frequency identification but for users of 35 MHz there will be many occasions when others might need to quickly identify the frequency you are operating on and your transmitter should carry an easily visible channel identification pennant;

For 35 MHz, an orange flag with one inch black or white numerals should be used

15.14 Mix-and-Match Tx and Rx

Using different makes of transmitter and receiver is common practice when using 35 MHz equipment, especially with the large range of aftermarket receivers available. There is a point you must be aware of, however, concerning manufacturers guarantees. A matched Tx and Rx will be warranted by their manufacturer both as individual items and to work together as a pair. If you 'mix and match', the individual warranties still apply but you have no guarantee that the pair will work together. In this case you take upon yourself the legal responsibility of making sure that your equipment operates correctly.

15.15 Mobile Phones

Although mobile telephones operate on frequencies far removed from our model control frequency bands they are a major addition to the increasing background radio 'noise' that our equipment has to filter out. In addition, there is some evidence that there may sometimes be an interaction between mobile 'phones and microprocessor controlled transmitters.

Many mobile 'phones transmit powerful signals regularly even when on standby and BMFA recommends that they are not taken into the pits area and especially not on to the flying area. Many 'phones also emit a powerful signal pulse when switching off, which is also something you may have to consider. Your radio equipment has a hard job to do filtering out background RF radiation and you could make it much worse with your mobile 'phone.

15.16 Module Equipped Transmitters

Plug-in transmitter modules sometimes suffer from corrosion of the connecting pins, especially if the transmitter has been operated in a damp or humid atmosphere. Unplug it regularly and check for dirty connections. Carefully clean the pins with methylated spirit or similar (check that the solvent doesn't affect the plastic before you use it).

Broken fixing lugs on the plug-in module is another problem that may affect a module equipped transmitter. Never rely only on the connector pins to hold the module in. Modules in this state have been known to fall out of the transmitter without warning, sometimes with a model in flight.

15.17 Neckstraps

There have been several cases of transmitter neckstrap users accidentally knocking the throttle stick open when getting ready to fly. This can have very serious consequences so take great care with your pre-flight preparations if you use a neckstrap.

15.18 Pacemakers

The use of radio control equipment by heart pacemaker users has been investigated but no direct interaction problem has been identified. If you are a pacemaker user, however, and you require more information you are strongly recommended to speak to the Consultant who fitted your pacemaker. He should have all the technical specifications of the particular unit you use and should be able to identify any problems you may have.

It should be noted that modern pacemakers, fitted since around 2006, are very much more resistant to interference that the older models and should give very little cause for concern.

15.19 Servos

Do not use standard inexpensive servos in any situation where flight loads are likely to be very high, i.e. virtually any flight control on a large or fast model. Standard servos have many uses and are usually very reliable and good value but they simply do not have the torque, precision and power of a servo designed to cope with very high loads. There is an enormous range of servos available so think about what you expect of the servo and choose carefully. If your model is large or likely to be fast then don't automatically fit the cheapest you can get or those that simply come to hand in your workshop.

Many modern models feature long servo and battery leads and the trend towards separate aileron servos in each wing means that even quite small models might have extended servo leads fitted. If you are using 35 MHz equipment, these long leads can make excellent aerials, feeding signals back into the receiver and possibly causing interference. Any extended lead should be de-coupled either by a using a commercial opto-electronic de-coupler or by looping the lead several times through a small ferrite ring which may be obtained from your local model shop.

It should be noted that this should not be a problem with 2.4 GHz radios.

High power, high torque and digital servos may have a high power drain and you should carefully consider the capabilities of the batteries you use with them. Multiple battery systems may be required in some cases. This is especially so if you expect your servos to work hard in your model. The more work you expect them to do, the more current they will take to do it.

15.20 Switches and Wiring

The standard airborne wiring harness and switch sets supplied with most new radio equipment, and also many of those available as aftermarket spares, are usually rated at approximately 3 amps. You can recognise this quite easily as the three core flat cable and plugs used are similar or identical to normal servo connector leads.

When multiple, digital or high torque, servo installations are used, the 3 amp limit can very easily be exceeded, sometimes by a large margin. So if you are using a demanding servo setup (and, for instance, most 3D capable fixed wing and Heli models or larger or faster models will be) then you should think very carefully about using a higher rated switch and wiring harness.

15.21 Telemetry

Many modern radios have the ability to downlink telemetry data from your model to suitable ground receivers such as laptops, tablets or smart-phones as well as your transmitter. If you are using this facility it is essential that you have a helper to monitor the data and not to do it yourself unless it is auditory only. You are obliged by the ANO to remain in visual contact with your model at all times.

If you use a smart-phone as the receiver you should ensure that it is switched to 'flight mode' as this will enable you to take it on the flightline with no risk that it will operate as a mobile phone whilst you are flying.

15.22 Transmitter and Receiver Issues

With new or repaired radio control equipment, a ground range check is essential, preferably in a model and with the model's engine running if possible. Check the manufacturer's literature or website for guidance on your transmitter or, if this is not possible, look for a minimum range of between 30 and 50 metres with the transmitter aerial down and no servo jittering.

2.4 GHz equipment usually has a 'range check' button that enables a ground range check to be done, even though the aerial cannot be altered. It is recommended that you make use of this facility regularly so that you can monitor the performance of your radio.

It is good practice to carry out a routine range check on your equipment at regular intervals, at least every month or so, and a check is advisable if you have not flown for a few weeks. You should also be prepared to do a range check if you feel that you have a problem with your radio equipment or if you have removed and replaced crystals or a transmitter module.

If you use aftermarket 35 MHz receivers be aware that many are designed for indoor use, especially the very lightweight models. The range and ability to filter out interference of such receivers may not be suitable for outdoor use and you should take care that you are aware of the limitations of the equipment you are using.

When selecting which receiver to buy and use you should consider carefully where you will be flying and remember that to a great extent you get what you pay for. Single conversion receivers are usually the cheapest and work well in most circumstances but the more expensive high specification or dual conversion receivers are generally more capable, especially with outside interference rejection. Small 2.4 GHz receivers often have a limited range and this is stated in the documentation.

If you are operating in a busy radio environment (such as at a busy club site or on a site known to be subject to outside interference) then you should seriously consider only using higher specification or dual conversion receivers or moving to 2.4 GHz equipment.

The radio spectrum gets busier by the day and your transmitter signal has to be filtered out by your receiver from every other signal out there. This situation will only get worse and there are already some sites where only high specification, dual conversion or 2.4 GHz equipment is safe to use.

With certain types of transmitter, when setting up mixers and servo interconnections on a model it has been shown that, in some circumstances, the trim button will work in the opposite direction to that expected. Take a few seconds in the workshop to ensure that every control and trim works exactly as it should.

Problems have been reported with the binding of 2.4 transmitters and receivers when the Tx is surrounded by metal, such as in an open car boot or an open transmitter case. Make sure that the Tx is in 'clear air', close to and in line of sight to the Rx when binding. But note that some 2.4 systems require a minimum separation (usually a metre or so) for binding to properly take place.

16. RADIO CONTROL AND YOUR CLUB

16.1 Introduction

(a) Before starting to use a flying site every effort should be made to determine if there is any radio interference present on the bands it is intended to use. Particular attention should be paid to other major users of the radio spectrum in the area, such as other model clubs or hospitals, factories etc. (who might be using paging systems or other high power radio frequency transmissions).

(b) All radio control clubs (unless they are 2.4 GHz only) should have access to some means of frequency checking or monitoring. There are several 35 MHz monitors on the market which retail from around £50 to £400. These are all good value and offer a range of facilities ranging from a basic scanner up to a combined scanner/pegboard.

(c) BMFA has several frequency monitors which are available to clubs on loan. Contact the Leicester office for details. An alternative is a ham radio type scanning monitor which will cover all the bands we use. These are about £400 to buy new but a second-hand unit in good condition could be a good investment.

(d) Hand held **frequency checkers** are also available at reasonable cost and are a purchase that is highly recommended to any R/C club that has significant numbers of 35 MHz transmitters in use. They will enable a Club to keep a regular comparative check on its members' individual transmitters and are invaluable for spotting such things as faulty crystals, wrong frequency flags etc. One model even allows the checking of receiver crystals.

(e) If your club feels that some monitoring information on 2.4 GHz is required, please note that a USB dongle is now available that will allow a laptop to act as quite a reasonable spectrum analyser which gives good results on the 2.4 GHz band. Contact the BMFA Leicester office for details of the supplier.

16.2 Cellphone Masts and Microwaves

(a) It has been shown that Cellphone transmitter masts may cause short range interactions with the radio equipment we use. To be safe, do not allow models to fly within 100 metres of such masts. If there is a mast near your field, you should arrange your flying area so that the pilots have their backs to the mast and it is in ‘dead airspace’ if possible.

(b) The UK is crossed by many low level microwave communication beams and the number of these has increased dramatically since most cellphone masts have been converted from landline feeds to microwave interconnection.

If one crosses your field it may cause problems with interference and glitching, particularly with 35 MHz radios. If your club member’s suffer from such interference regularly (usually in the same place on the field) then it may be a microwave problem.

(c) You can guard against it completely by simply wrapping 35 MHz receivers in a layer of aluminium cooking foil, making sure to tightly crimp the foil for about 5cm out along both the receiver aerial and the bundle of servo leads. The interference affects the components of the receiver directly and doesn’t work through the aerial. Note that some receivers already have a conductive coating of carbon sprayed on the inside of their plastic case which has the same effect as the external foil wrap.

16.3 35 MHz Transmitter Interaction Problems

Any model using 35 MHz can suffer severe interference if it flies closer to an operating 35 MHz transmitter other than the one that is controlling it. To avoid the chance of this happening Clubs should:

(a) Ensure that all pilots stand reasonably close together when flying. The concept of a ‘pilot’s box’ is useful, even though it will not usually be marked out.

(b) Ensure that operating transmitters are not overflown. Care should be taken by the club to ensure that flying field procedures make this very clear.

(c) Take action to prevent operating transmitters being taken out on to an active flying area when, for example, models are being retrieved. Transmitters should be handed to a helper on the flightline and should remain switched on until the model has been retrieved and switched off.

(d) Ensure that all inactive transmitters in the pits area have their aerials retracted if possible. The extension of the aerial should be one of the last actions taken when moving out to the pilot's box to fly and retracting the aerial should be one of the first actions when moving back into the pits area with your model and transmitter switched off.

16.4 Frequency Control at Club Sites

(a) All clubs should operate some form of frequency control system on the flying site, such as a peg-board

(b) At larger flying sessions the use of a transmitter pound should be considered in addition to the frequency control system.

(c) All transmitters, except 2.4 GHz sets, should carry an easily visible channel identification pennant;

For 27 MHz, a correctly coloured ribbon and/or a white flag, approximately three inches by two inches with one inch minimum height black numerals.

For 35 MHz, an orange flag, approximately three inches by two inches with one inch minimum height black or white numerals.

For 2.4 GHz, there is no need for an identifier.

(d) All clubs operating a mix of 35 MHz and 2.4 GHz transmitters should institute very robust pre-flight checks, especially if individual members fly a mix of frequencies.

Several incidents have occurred where a flyer has not appreciated that the 35 MHz set they have in their hand is not the 2.4 GHz set they are used to using and have neglected to extend the aerial. Constant vigilance is required.

(e) If you are setting out a pegboard after a flying session starts, take care to identify all the models present and the frequencies they are using. Check thoroughly as a mistake can lead to a shoot down and don't assume that a model in the air is on 2.4 GHz

16.5 Pegboard Recommendations

For 35 MHz frequency control (and for 27 MHz where still used) there are three basic pegboard systems: Peg Off; Peg on; and the Double Peg. There is also the Individual marker system which is used by some clubs. Each of these systems is described below and it is essential you determine which system is used at your club before you ever switch on your transmitter.

It is highly recommended that all club pegboards are clearly marked with the GPS co-ordinates or map reference of the flying field. This will enable emergency services to find your location easily in the event of a serious incident, even in isolated areas.

(a) 2.4 GHz – 2.4 GHz radios do not need a pegboard system to be set up to control radio frequency safety. However, there is one circumstance where a 2.4 GHz pegboard might be extremely useful to a club and that is when there is a limit to the number of models allowed to be flown at any one time.

Many clubs in these circumstances use the number of pegs 'on the board' to help control the number of active models and the ability to monitor the number of 2.4 GHz sets actually in use at any one time could be important.

(b) The 35 MHz Peg-Off System – The pegboard displays all useable channel number/colours each with an appropriately numbered peg or marker clipped to it. To reserve a channel the flyer must take the correct peg off the board and, usually, clip it to his transmitter aerial.

Pegs must be returned to the board at the end of each flight or there can be confusion as to who has the right to fly. This system is useful for fixed base operations when the board and its pegs can be left on site without being subject to vandalism.

(c) The 35 MHz Peg-on or Reversed Peg System – The pegboard is marked out with the channel numbers/colours as before but with no pegs. Each flyer carries his own named peg and to reserve a channel the peg is clipped on to the board before a transmitter is switched on. It is essential that pegs are removed from the board when a flight is finished and pegs must always carry the pilot's name.

This system is useful for sites where vandalism might be a problem as the pegboards can be made small enough to carry easily and each member of a club can have his own, only one being used at any flying session of course.

(d) The 35 MHz Double Peg System – The pegboard used is exactly the same as for the peg-off system, complete with a full set of numbered pegs. The pilot, however, also has a named peg that he carries with him as in the peg-on system. In use, to reserve a frequency, the pilot takes the numbered peg off the pegboard and replaces it with his own named peg.

This system still has to be used carefully but it is recognised as probably the most reliable system as it avoids several of the potential problems with the two other peg systems.

(e) The Individual Marker System – A further popular system is where each club member has his own small individual frequency marker board with his name and channel number marked on it. These are stuck side by side in the ground by the flyers as they arrive on the site making, in effect, one large pegboard. Flyers on the same frequency place their markers one behind the other and use a peg or similar to reserve the channel between them.

This system has been known to be effective on beach and hill sites as the marker boards can carry 'permit to fly this year' details as well as name and frequency information. It may also have uses with 2.4 GHz equipment, not as a frequency control system but to enable the flyers to see who is actually on the field or slope and this may have significant safety implications if anyone is injured or taken ill.

(f) There are other variations and clubs should select the system which they feel is most appropriate to their flying field situation and, whichever system is chosen, should ensure that the operation of frequency control is well understood by all their members and visiting flyers.

(g) Pegboard Problems

(i) Switching on without 'getting the peg' is the cardinal sin and can have very serious consequences so Clubs should make very sure that their flyers do not slip into such bad habits. This is especially important as many flyers are now using both 35 MHz and 2.4 GHz sets and not using the 35 MHz pegboard because they have become used to using a 2.4 GHz set is becoming a common problem. It cannot be emphasised enough that all Clubs should insist on high standards of training in the use of their frequency control system. The move to the pegboard before even thinking about switching on a 35 MHz set should be second nature to all R/C flyers.

(ii) Changing 35 MHz crystals, either on the field or at home, can also have very serious consequences if the flyer forgets that he has done it. It is very easy to then take his 'usual' peg and reserve a completely different frequency to that which he is actually using. The dangers are obvious. If 35 MHz channels are changed, it is essential that channel flags are used and changed with the crystals. Pilots must discipline themselves to act correctly in these circumstances as it is very easy to make a mistake with the pegboard after a change has been made.

(iii) With the Peg Off system, flyers sometimes take the peg home with them and the 'missing peg' can lead to a new peg being made. The problems then occur when both pegs then turn up at the same time. Even worse is the situation where it is assumed that a missing peg has been taken off-site and a new temporary peg is made for the rest of the day. You can very easily have two people both thinking that they have use of a frequency

(iv) With the Peg On system, under no circumstances should anyone simply remove a peg that is reserving a frequency. If, however, you suspect that a peg has been left on the board in error (the flyer may have gone home) then you should check with senior flyers on the field and the peg may then only be removed after stringent checks that it is no longer in use. The name on the peg helps again here and is yet another reason to make sure that all pegs are named.

16.6 35 MHz Synthesised Frequency Transmitter Control

Synthesised frequency transmitters are legal to use in the UK, as long as they have been tested and carry the familiar CE mark.

Synthesised transmitters do not have a higher risk factor than crystal controlled sets but the possible problems that may arise are slightly different because of the ease with which channels may be changed.

To help control this situation, all UK available synthesised frequency sets either have a two stage switch-on sequence where the frequency to be transmitted is clearly shown on initial switch-on or a permanent display of the set frequency that is shown even when the transmitter is switched off.

This is virtually the same procedure that the user of a crystal controlled transmitter goes through and it gives the users of both type of set the opportunity to go to the frequency control system and reserve their frequency ('get the peg').

Whatever type of 35 MHz transmitter control is used, the biggest risk will always be the flyer who switches on without thinking and without 'getting the peg' and it makes no difference if their transmitter is a synthesised one or not.

16.7 35 MHz Frequency Allocations at Club Sites

The 35 MHz frequency band is by far the most used by club flyers but, because almost every club operates in unique circumstances, it is not possible to recommend a fixed band plan for the regulation of those frequencies on every site.

There are, however, several different types of frequency allocation already in operation at club level, as laid out below, and all clubs should consider very carefully which method of frequency allocation they should use.

(a) Use of all frequencies at 10 kHz spacing – This is the most used system and it is operated successfully by most clubs. Modern equipment gives very few problems at 10 kHz spacing, especially when common sense precautions against self generated radio interactions are taken. As one safeguard, it is important that flyers regularly operating together on adjacent channels should perform an adjacent channel check every two or three months. Use of all the frequencies at 10 kHz spacing, combined with the Club's general safety precautions and the Adjacent Channel Check is probably the safest way to operate. Modern equipment is quite capable of operating to this standard and when faults do develop (usually faulty crystals) they can usually be spotted before they cause any trouble.

(b) The 35 MHz Adjacent Channel Check – The check is quick and easy to do. Flyer A switches on transmitter (with aerial down), then switches on his receiver and stands about 4 metres from his model. Flyer B, on an adjacent channel, switches on transmitter (aerial up) and stands alongside flyer A. No interference should be noted on A's model and it should be under the full control of A's transmitter. The test is then repeated using B's model and with his transmitter aerial down and A's extended.

Note that 'interference' will range from 'glitching' with older sets to failsafe operation with DSP receivers or PCM sets. Any interference noted indicates possible tuning or crystal problems and must be investigated further. The test may save your model as it will give early warning of problems beginning in your radio equipment, usually well before they become bad enough to cause control problems in the air.

(c) Use of the Contest Band Plan / 20 kHz spacing – The original contest band plan, dating from the first allocation of 35 MHz frequencies, is as follows:

R/C power .....all odd frequencies
R/C silent flight all even frequencies

The original allocation of competition channels was the responsibility of the BMFA Technical Committees but it was also used by most clubs as their standard 35 MHz frequency band plan. It gives an automatic 20 kHz split between frequencies in use on a site and this was important in the early days of 35 MHz, when the equipment available was not as reliable as it is today.

However, increased demand for frequencies and better standards of radio equipment has led to this system becoming used much less, both at club level and in competitions. This system may still be useful for some 'silent flight' clubs and for some power clubs with sites near to known slope or thermal soaring sites. Its use has, however, been overtaken by frequency requirements and availability and the 'block frequency allocation' is now more appropriate in many cases.

(d) Use of Block Frequency Allocation – Where a club has a large site and is able to set up two or more flight lines, or where two clubs operate closely together then each is allocated an agreed block of frequencies. Each flightline then has its own pegboard, allowing only the agreed allocated frequencies to be used.

Many combinations can be worked out to suit individual needs and the increased number of channels made available in recent years has made this type of frequency sharing much easier. The ability to have targeted pegboards on each flightline or site is very important in avoiding frequency clashes.

16.8 Lone Flyers

Lone flyers, or people who fly in small groups of two or three, must take the greatest care that they are not operating in situations where they can cause interference to a local club or flying group. As a general rule, you should not fly within two miles of a recognised club flying site unless you have some arrangement with the club who fly there.

This is for the benefit of both parties as interference works both ways and could result in the loss of aircraft on either site.

Lone Flyers, in fact, are far safer when operating on 2.4 GHz as there are no interference implications and the radios can be used anywhere that the flyer wishes.

If you wish to fly alone and are still using 35 MHz radio but are not sure if there are clubs sites local to you, contact your local model shop or the BMFA's Leicester office for information. You will usually be able to get into contact with clubs quite easily through these sources and it is essential that you do so to ensure safe flying for all concerned. You should also consider the purchase of a hand held scanner, although remember that at ground level it might not pick up a signal that is apparent at your model's altitude.

17. INTERFERENCE

17.1 Individual Cases

It is a great temptation to claim interference whenever a model crashes but the plain fact is that outside radio interference is rare and causes very little trouble. If you have crashed a model and think you have been affected then run through this checklist first. These are the main causes of model crashes.

(a) Pilot error – this includes stall/spin incidents on final turns, tip stall incidents everywhere, not 'keeping up' with the model so that it doesn't seem to be doing what you tell it, disorientation, lack of awareness of where the model is in relation to ground features, flying over operating transmitters, the inappropriate use of low specification radio equipment and very many more.

(b) Airborne power failure – including receiver battery failure or lack of capacity, wiring, plug and switch failures, black wire corrosion etc.

(c) Airborne hardware failure – including individual servos and receivers, crystal failures, aerials breaking or being masked, linkage failures, airframe failures etc.

(d) Ground failures – transmitter battery failure or low capacity, transmitter crystal failure, module pins corroding, dirty, faulty or loose transmitter aerial, dirt and oil in transmitter electronics etc.

(e) 35 MHz Club interference – other members switching on without frequency clearance, other transmitters faulty, people wandering over the field with operating transmitters etc.

The list is by no means exhaustive and you can add to it if you give it some thought but these are the things that you should think about very carefully. If you can honestly say that you can eliminate all of these then you MAY have suffered from interference. If so, then you should report the matter to your club committee, setting down all the relevant facts, and your club will then be in a position to file a report with BMFA if necessary.

17.2 Club Cases

(a) If your members are reporting regular cases of what seems to be interference then it is almost certain to be on 35 MHz and your first step is to conduct what on-field investigations you can.

(b) Look very carefully at the individual incidents to see if you can eliminate any. Try to collate the incidents you have to see if there is any pattern. Use your club scanner to see if you can pick up any specific interference.

(c) Investigate the equipment used by anyone suspected of suffering from interference. It may be that your site requires the use of high specification receivers and you can spot this quite easily if those affected are all using single conversion but no high specification receivers are affected. Read the section 'Radio Control and You' for more information. A new club site rule may be all that is required to solve the problem.

(d) When you are reasonably sure that you are suffering from 35 MHz interference then contact BMFA Leicester office and ask for an interference reporting form. When you have completed and returned this form, it will be cross-referenced with the BMFA interference database and appropriate action will be taken, usually in conjunction with the UK Radio Control Council (UKRCC) of which BMFA is an active member.

(e) The action taken may range from setting up an independent on-field investigation with specialised tracking equipment to gain more information to directly reporting your problems to Ofcom for immediate action.

18. GENERAL MODEL SAFETY

18.1 General Safety

(a) Models should be built to a standard such that they will not fail under normal circumstances, giving particular attention to control surfaces and connections.

(b) They should be thoroughly checked prior to each flying session and after any hard landing.

(c) It is recommended that rounded spinners or safety propeller nuts of the domed type are fitted to internal combustion and electric powered models and that gliders and pusher powered aircraft noses should also be rounded (no needle noses)

(d) Care should be taken by the operator that propellers are of suitable size and construction for their engine or motor's operating speed. All propellers should be carefully balanced. Cheap and efficient propeller balancers are available from your local model shop.

(e) Do not use propellers on i/c engines that are designed for use on electric motors.

(f) On internal combustion engines and electric motors, damaged propellers must not be used. Inspect your propellers regularly and replace any that are not in good condition

(g) Metal propellers must not be used.

(h) The use of locking prop nuts is recommended, especially for 4-stroke engines. A backfire or 'kick' can loosen a prop nut and locking nuts will prevent the propeller flying off. The safety factor of locking prop nuts on four-stroke engines is more important than the recommendation to use 'domed' safety nuts so, if you have to choose, go for the locking nuts.

(i) Heavy ballast, or any other heavy part, subject to jettisoning in flight is prohibited. Jettisonable ballast must be of a safe nature e.g. water.

(j) All R/C models are subject to in-flight vibration, landing knocks, transport damage etc. Be sure that receivers and batteries are well protected, servos are fixed securely, control linkages (pushrods, snakes, closed loop etc.) are robust enough for their purpose, are properly supported where necessary and are as slop free as possible and that all control surface hinges and horns are fitted correctly. Pushrod clevises should fit control horns cleanly with no sideways strain and they should be fitted with a plastic or silicon tube 'keeper' as a secondary closure.

(k) When starting an engine make sure that the model is restrained and cannot move forward. Restraint is best done by either a helper or by some mechanical means.

(l) Never put yourself in a position where your face is in line with a turning propeller. A broken propeller will fly out and forward so make all engine adjustments from the rear if possible. A broken propeller will also be a danger to anyone standing nearby so take care that no-one is in line with it when starting your engine.

18.2 A Safer Flying Field and You

When you arrive at a flying field and before you start flying, we recommend that you take a few moments to consider the surroundings and the flights you will be making.

Think **S.W.E.E.T.S.**

S - Sun
W - Wind
E - Eventualities
E - Emergencies (Inc. Failsafes)
T - Transmitter Control
S - Site Rules

Sun – Where is the sun in relation to where you will be flying? Will it affect your flight patterns? What actions will you take if you accidentally fly 'through' the sun? Should you be wearing sunglasses? Remember that low sun in winter can be a particular problem.

Wind – Consider the wind strength and direction. How will this affect your flights? Will you have to modify your normal take-off and, especially, your landing patterns? From your local knowledge, will there be any turbulence with 'this' wind direction and strength? And how bad might it be?

Eventualities – What will you do if you hear or see a full size aircraft or helicopter flying at low level near the field? What if the landing area is suddenly obstructed when you are on finals to land? What will you do if a nearby footpath or bridle path suddenly has walkers or horses on it?

Emergencies – You may have an engine cut at any part of a flight so consider where your deadstick landings might be safely made and which ground areas you should definitely avoid. How will you warn other field users if you have an emergency? You may also have a complete loss of signal and therefore before every flight you should check that the failsafe is working how you expect it to.

Transmitter Control – Is the site pegboard in operation? If not, why not? Where has the pegboard been placed? Are you familiar with the system and understand how it works?

Site Rules – Are there any specific site rules you should be aware of? Most importantly, where are the no-fly zones or dead airspace areas on the site?

The answers to most of these questions are contained within these Safety Codes and your local Club rules but you will be making the final decisions as to whether flights can be made safely. If conditions are poor or a site is unsuitable remember that a decision not to fly can be both valid and sensible. We would also recommend that you review the sections on the sun and wind throughout the day as they obviously change over time and this may affect some of the decisions you will be making.

18.3 Radio Control Flying Safety

(a) Before you do anything else, make sure that you understand and are complying with the field frequency control system. NEVER switch on until you are sure it is safe. ALWAYS check the pegboard – on EVERY flight.

(b) Before every flight, check that transmitter trims, rate switches etc. are in their correct positions and that each control surface on the model moves freely and in the correct sense.

(c) Immediately before take-off, flight controls must be checked for full, free and correct movement under full power if applicable. If there are any doubts as to their operation, **DO NOT FLY**.

(d) Flyers using adjacent frequency channels should first perform an interaction check. If they regularly operate together they should perform the check every two or three months. See the previous section on Radio Control and Your Club for details of the simple check you should perform**.**

(e) Inexperienced R/C flyers should never fly without an experienced helper.

(f) Unless positive controls are in force, all flyers should use the same take-off area at any particular flying session.

(g) Do not taxi in or out of the pits area. Wheel or carry your model well clear of the pits before commencing taxying and stop the model well clear when taxying back after landing. Do not put other flyers at risk.

(h) Before take-off, check that both ground and sky are clear and never take off or land towards other pilots, spectators or the pits area.

(i) Always make the initial turn after take-off away from spectators and parking areas. Diving manoeuvres should always be pointed away from spectators, parking areas and other people.

(j) Always maintain a clear view of the model and allow plenty of room between the flight path and spectators, other flyers or model pit areas.

(k) **DO NOT OVERFLY** houses, domestic gardens, car parks, traffic, railways, organised games or spectators. You may not be able to control people walking by at a reasonable distance from the take off/landing area but you should take care not to overfly them at low level.

(l) At any sign of malfunction or jettisoning of model parts, land as soon as it is safe to do so.

(m) Do not distract pilots, particularly when they are controlling models taking off or landing.

(n) Clubs should exercise strict control over the take-off/landing area used. Pilots about to take off should inform people already flying. Pilots landing should have priority but must call out their intentions 'loud and clear' and must **NEVER** assume that they have been heard. A pilot going out to take off may not hear a call over the noise of his model's engine.

(o) **NEVER** assume that the landing area is clear even if you have called landing. In emergency situations call for help from your fellow flyers and always be prepared to land in a safe place off the landing area if necessary. In **ALL** cases, the safety of people is paramount.

(p) Care must be taken at all times to avoid overflying operating transmitters. Pilots should stand together and should not be allowed to wander over the flying area when operating transmitters. Clubs should take action to prevent operating transmitters being taken out on to an active flying area when, for example, models are being retrieved (see the section on 'Radio Control at your Club'). There are exceptions to this particularly in some silent flight operations, and extreme care should be taken not to overfly transmitters in these cases.

(q) Under no circumstances whatsoever should you move to the far side of the flying area so that you can land your model between yourself and the pits area.

(c) Under no circumstances whatsoever should you fly between yourself and the pits area.

(s) Take extra care when flying in adverse weather conditions. It is easy to lose sight of your model in fog or low cloud. Strong winds and turbulence can be a stimulating challenge but can catch out the unwary. Flying in rain can give serious radio problems if water gets inside your transmitter.

(t) The staging of deliberate mid-air collisions at airshows and public displays is banned and they are not covered by the Association's insurance.

18.4 Pre Flying Session Model Checks

On arrival at the flying site:

(a) Check airframe for any transit damage.

(b) Check that servos and linkages are secure.

(c) Check undercarriage for secure fixing and correct alignment.

(d) Check propeller for damage and secure fixing.

(e) Check receiver aerial for damage and, with 2.4 GHz equipment, that the orientation is correct.

(f) Carry out a range check.

(g) Carry out a failsafe check and make sure that it does what you expect.

(h) Check that the receiver and transmitter batteries have sufficient capacity for the intended use.

18.5 Checks Before Each Flight

(a) Obtain frequency clearance. Exactly what you do will depend on the rules of the site but be sure you understand exactly what you are doing and do not forget this step.

(b) Pay particular attention to using the correct sequence appropriate to your model. For 35 MHz this is usually 'get the peg, Tx on, Rx on'. For 2.4 GHz, you should be aware of any local transmitter usage limitations and if a flight peg is required, it must be obtained before the usual Tx on, Rx on sequence. Note that some radio equipment and occasionally a specific model set up, require that the Rx be switched on first. If this is so take extra care.

(c) Check that all controls operate freely and do not bind or stick at any point in their movement.

(d) Check that all controls move in the correct sense. For conventional models, stand behind the model and look for;

Elevator stick back – Elevator comes up.
Aileron stick right – Right hand aileron comes up.
Rudder stick right – Rudder moves to the right.

(e) Check that all control surfaces are in their correct positions with the transmitter trims at neutral.

(f) Look for any minor radio malfunctions such as slow or 'jittery' servos, glitches etc. If in doubt, **DO NOT FLY**.

(g) Check Rx and Tx battery capacity is sufficient for the intended flight with an added safety factor.

(h) **With i/c models**

(i) After starting the engine and allowing it to warm up, check that the pick-up from idle to full power is satisfactory. Hold the model with its nose pointing upwards at a steep climbing angle for ten or fifteen seconds and check engine operation at full power. If the engine falters or cuts it is usually set too lean and must be re-tuned. Repeat the test until the engine runs correctly in the nose-up attitude.

(k) **With electric models**

(i) The first and most important principle of electric flight ground safety is to understand that the instant you start to plug in the flight battery, the model you are holding may transform itself from a dead airframe into one with its motor running at full revs and all controls moving. No matter how good your other safety checks, you must be prepared for this to happen every single time you start to connect the flight battery. If a separate Rx battery is fitted then you have the opportunity to check the operation of the radio equipment before the flight battery is plugged in.

(ii) Since plugging in the flight battery is nearly always a two-handed job you must give serious thought to how your model will be restrained BEFORE it does something you don't expect. When plugging in, positive restraint, either by a helper holding the model or by some other method, and staying completely clear of the propeller must always be part of your regular routine.

(iii) Electric motors have very different power and torque characteristics to normal IC model engines. You must take very great care when setting up their control systems and handling them as an accident, such as the propeller hitting your hand, which would stall a glow engine, might just make an electric motor turn even harder.

(iv) Just before you go out to fly, **DOUBLE CHECK** that all transmitter trims, rate switches, mixers etc. are in their correct positions and that the transmitter meter is 'in the green' or that you have the correct model selected and that your aerial is extended.

(v) Finally, with the aircraft held securely (usually on the ground for i/c models but not if the failsafe is set to retract the undercarriage), open up to full power and re-check all flying controls again for full and free movement, also noting any glitches, hesitations or odd vibrations. <u>At this point also switch off the transmitter and make sure that the failsafe works properly and how you expect it to</u>. If **ANYTHING** seems odd, **DO NOT FLY**

(l) **Be S.M.A.R.T**. with your transmitter.

S ....Switch on
M....Model selected is correct / **Meter** in the Green
A ....Aerial secure / extended
R ....Rate switches all in correct positions
T.....Transmitter voltage good and **Trims** all in correct positions. Failsafe working.

18.6 Checks After Each Flight

(a) Receiver OFF then transmitter OFF (Unless your equipment manufacturer specifies otherwise).

(b) Clear the frequency control system.

(c) Clean the aircraft down

(d) Check propeller, airframe, undercarriage, wing fixing etc. for security of fastening and for possible flight or landing damage.

(e) **REMEMBER** – Never fly with a damaged aircraft or propeller, or with any possible radio problem.

19.SAFETY ADVICE FOR SPECIFIC MODEL TYPES

19.1 Almost Ready to Fly Models

(a) ARTFs are very popular and usually offer very good value for money but you should be aware that some airframes you may buy could have manufacturing or design defects. Close scrutiny of even a pre-covered airframe may pay big dividends if you can prevent a future failure.

(b) All visible glue joints within the fuselage should be checked, especially the engine bulkhead, fuselage bulkheads, wing mounting plates or wing dowels, undercarriage mountings and servo mountings. If you have any concerns then the reinforcement of many of these joints using scrap balsa stripwood will significantly increase the strength and durability of the airframe for very little weight increase.

(c) Take particular care when gluing wing panels together. Follow the manufacturers instructions and when adding such things as dihedral braces make sure that the whole joint is wetted out by the glue.

(d) Check pre-fitted pushrods, snakes and clevises for suitability. Most will be fine but some have been seen that were inadequate for the job expected of them, either being to thin or too weak. The rule of thumb should be 'if I was fitting this, would I fit this'.

(e) Always check flying surfaces for warps – don't assume that a wing will be straight because it was built for you. Minor warps can sometimes be removed by gently heating the covering, twisting the surface in opposition to the warp and holding until cool. Major warps are a reason for returning to where you bought the model.

(f) The ONLY acceptable (and beneficial) warp on an R/C model is matched wash-out. That is, looking from the rear the trailing edge at each wingtip is twisted upwards a little compared to the root of the wing. If this is present then it MUST be even on both wings or it's just another warp.

(g) On i/c powered models, have a good look at the fuel proofing around the engine and fuel tank bay. If you are looking towards something more than a throw away airframe then an extra coat of fuel proofer in and around the nose will certainly be worth while.

(h) Extra care should be taken with second hand airframes as you will usually have no idea of their history. Close scrutiny of the whole airframe and any necessary repairs and strengthening are essential before you fly the model.

19.2 Ultralight R/C Models

(a) There are numerous electric powered 'Slow Fly' or 'Park Fly' models on the market that may be classed as 'Ultralight' and this is encouraging the flying of R/C models in places that have never seen model flying or which have been out of bounds to flying for many years.

(b) Although virtually all of these models are lightly loaded, great care must be taken when flying them as you can be led into situations that you would not face on a club field.

(c) Read the Safety Codes contained in this handbook carefully as virtually all of them still apply to this type of flying, especially those concerned directly with radio control.

(d) Be very careful to avoid flying near to existing model flying sites if you are using 35 MHz equipment. Find out where models are being flow in you area and check on a local map that your chosen flying area is far enough away to be safe.

(e) Take special care to avoid putting members of the public at risk. Your activities, with quiet slow models will almost certainly draw the attention of passers by - they could appear from anywhere.

(f) Park flyers have the possibility of introducing model flying to great numbers of the general public who may never have seen our sport close up before. Your behaviour and safety awareness could result in there being many new model flyers in the future.

(g) Be aware that some Local Authorities have by-laws banning the flying of powered models from their open spaces. Check carefully to avoid trouble.

(h) You may, however, find yourself in a situation where you are flying sensibly, safely and not causing a nuisance and are approached by someone who says he represents the Local Authority or some other official body and who tells you that you are not allowed to fly. You are within your legal rights to ask to see a copy of the by-law that bans flying on the area you are using.

If you still have trouble and you consider that your rights as an individual and a model flyer are being overridden, you should contact the BMFA office for help and advice as soon as possible.

19.3 Helicopters

(a) It cannot be stressed enough that a model helicopter must have a higher degree of safety built into it than perhaps any other flying model. Because the BMFA feels so strongly about this the following comprehensive guide is set out below. This is in addition to the regular R/C safety code.

It is VITAL that you never fly or run up your helicopter in or near the pits area or near spectators.

Rotor blades must always be carefully balanced and you should always remember that vibration in helicopters can be very destructive.

(b) **Electric Model Setup**

An electric model can start up with full power and torque immediately. Therefore when setting up an electric model it is imperative that the electric motor is disengaged from the transmission. This can be done by disconnecting the motor, disconnecting the pinion or disengaging the gears. This procedure should also be followed when any changes are made to the ESC.

(c) **For I/C Powered Helicopters**

When starting the model in the pits, hold the rotor head firmly. When the engine is running carry the model a sensible distance from other people before running up or flying. Do not release the rotor of the model until you are sure that it is safe to do so and NEVER FORGET the amount of energy there is in a spinning rotor.

Never hold the model overhead to run up the engine or run the engine with no rotor blades fitted.

(d) **For Electric Powered Helicopters**

Electric helicopters should be carried out from the pits area with the flight battery disconnected and it should only be connected in a safe area. The model MUST be considered to be live as soon as this is done and great care is needed during this procedure.

(e) **A MODEL HELICOPTER MUST NEVER, UNDER ANY CIRCUMSTANCES, BE FLOWN OR RUN UP:**

(i) **IN OR NEAR** the pits area or close to any spectators.

(ii) Directly towards the pits area or any spectators.

(iii) With knife sharp leading edges on main or tail rotors.

(iv) With damaged or out of balance rotor blades. Note that blades, especially wooden ones, should be reinforced at the root with hardwood, glass-fibre or some other suitable material.

(vi) With radio equipment unproofed against shock and vibration.

(vi) In the presence of spectators or at a competition or fly-in until properly tested and proved airworthy.

(vii) Until thorough maintenance checks are carried out as set out in (A) and (B) below.

(viii) Note that all helicopters weighing more than 7 kg without fuel are subject to the ANO regulations concerning models over this weight and must comply with those conditions when flown. In particular, you must have permission to fly from the appropriate Air Traffic Control

Unit if you are flying in controlled airspace. If you don't have such permission, your flight is illegal.

(f) **Checks Before Daily Flying Session**

(i) Check all ball links for slop and change as necessary.

(ii) Check that all rotor blades have no damage apart, perhaps from minor tip damage.

(iii) Check for loose or missing nuts and bolts.

(iv) Check that there is no backlash in the drive system apart from gear backlash which should not be excessive.

(v) Check that servos are secure and free from oil.

(vi) Check that the fuel tank and all piping is secure.

(vii) Check that the receiver aerial is secure and in good condition with no chafing or damage.

(viii) A range check involving a 360 degree rotation of the model to check for any receiver aerial shielding. This is especially important on 2.4Ghz systems where the aerials are easily shielded by carbon and metal

(g) **Checks Before Each Flight**

(i) If a helicopter suffers damage or a heavy landing, recheck all of (A) above.

(ii) Check all controls before starting especially for binding links or slowing of servos.

(iii) Re-check controls at high rotor rpm just before lift-off.

(iv) Check for vibration and eliminate before flight.

(v) Check main rotor blades for true tracking in hovering flight.

(vi) Check that the receiver aerial cannot become entangled with any moving or rotating part.

(vii) Double check that all switches are in their correct positions before **EVERY** flight.

(viii) Check that the gyro systems are responding in the correct direction (tail rotor and swashplate for flybarless models).

For more information on the Association of Helicopter Aerosports, contact the BMFA's Leicester office.

(h) **Helicopter Rotor Blade Safety**

Rotor blade failures have five basic causes:

(i) Most design and manufacturing faults seen are centred around the rotor fixing hole. Typical faults are the hole being drilled on the junction between two wood laminations and incorrect wood selection leading to the hole being drilled in a soft lamination.

Blades with this type of fault should not be used. Even root reinforcement may not stop a failure.

(ii) Incorrect user assembly is commonly found in root reinforcements and in blades which have to have tip weight of some description added. In all cases you should take the greatest care that any components added are fitted correctly and with suitable adhesive. Incorrect glue joints and badly applied reinforcing components are probably the biggest single cause of blade failure so it is very important that you take the greatest care with any assembly work you have to carry out.

(iii) Do not be tempted to undertake any repairs to damaged rotor blades.

(iv) Any ground strike or boom strike will almost certainly cause damage to rotor blades and in many cases this may go unnoticed under the blade covering. If in doubt, have no hesitation in stripping off the covering for inspection. Re-covering and re-balancing the blades is a small price to pay for peace of mind.

(v) Ageing of glue joints in wooden structures is common and the high stresses inherent in rotor blade operation mean that you should keep a close eye open for delamination in wooden blades. A problem sometimes seen in composite blades is heat damage. Blades left in a car on a hot day can suffer from softening of the resin and this, combined with an expansion of the foam filler, can make the blades unsafe. To summarise, keep a close eye on your rotor blades and do not hesitate to discard them if you are at all concerned over their condition.

(i) **Metal Rotor Blades**

CAP 658 does not currently allow the general use of metal rotor blades.

19.4 Multi-Rotors

Advances in modern electronics has lead to the development of a wide variety of multi-rotor aircraft of various shapes and sizes, with varying levels of autonomous abilities. However, it must be stressed that a pilot should not simply rely entirely on electronic autonomy alone for flight. If using autonomous modes, the pilot MUST be able to take back manual control of the aircraft at any time. It is VITAL that the pilot of any multi-rotor is aware of the abilities of their aircraft and knows what flight functions are available, how they affect the aircraft and how to operate them. The pilot MUST also be able to identify what mode the aircraft is in at any given time. This may be done by a visual indicator on the aircraft such as a beacon LED or via the transmitter switch positions or screen.

(a) Electric multirotors should be carried out from the pits area with the flight battery disconnected and it should only be connected in a safe area. The model MUST be considered to be live as soon as the battery is connected. As the position of multiple propellers is generally facing straight up at the pilot during arming, great care is needed during this procedure. It is worth remembering that electric models have the potential to go to full power the moment they are armed.

(b) Propeller orientation and motor direction is VITAL for multirotors and special care should be taken to ensure that everything is correct prior to attempting any flight. While adjusting the settings on a multirotor or during programming, propellers MUST be removed to prevent any accidental losses of control.

(c) Unlike fixed wing aircraft or helicopters that can glide or auto rotate after a power failure, a multi-rotor that loses a propeller, or suffers motor or esc failure in flight can become dramatically unstable with a total loss of control. Aircraft with six or more propellers may have an increased level of redundancy against total loss failures.

(d) Compared to most other model aircraft, where the electronics are enclosed within an airframe, multi-rotors tend to have exposed components. Therefore care should be taken to ensure they are kept free of debris and that all wiring is securely routed and not in a position to be damaged by or entangled with any moving parts.

(e) Multi-rotors require 3-axis gyros for stabilisation to enable flight and these are sensitive to vibration, so care should be taken to ensure all propellers are balanced and that correct anti-vibration materials are used where necessary.

(f) If you are intending to use your multi-rotor for FPV flying, then the relevant section of this guidebook MUST also be given careful review. Importantly, attention should be paid to the frequency that the pilot intends to use for their FPV equipment. The pilot must comply with any local video frequency control system, where applicable. In addition they should understand that switching their FPV equipment on while other pilots are flying FPV could result in a pilot losing video signal, so they should check that the frequency/channel they intend to use is clear before switching on.

(g) If you are intending to use your multi-rotor to carry a camera, then it is VITAL to understand the additional CAA regulations from article 95 (formerly article 167) of the Air Navigation Order.

(h) Many modern cameras have wireless connection options such as WIFI or Bluetooth, this may need to be switched off to avoid potential interference with the radio control signal.

(i) If using GPS on a multi-rotor it is VITAL that the system be given time to accurately locate the aircraft's position before attempting to fly, taking off before a full GPS lock is achieved may result

in an uncontrolled fly away. Where appropriate, a pilot MUST also understand when and how to calibrate the aircraft's compass in line with the manufacturer's guidelines in order to ensure accurate control of the aircraft is maintained.

(j) Intelligent Failsafes – In order to use intelligent fail safe modes, the aircraft will need, as a minimum, to be fitted with a control board capable of self levelling, with the more advanced options also requiring GPS to be fitted. If the aircraft is not capable of intelligent fail-safe, then the fail-safe mode should be set to reduce throttle idle/off as a minimum.

(i) Loiter – In this mode the aircraft will attempt to stay in a fixed position and maintain altitude upon loss of radio signal. It is intended that the pilot will then have the chance to get closer to the aircraft to in order to regain control. It is not advisable to use this mode without GPS, as the aircraft can drift away with the wind.

(ii) Controlled descent – Aircraft that can self-level may have the option to set the throttle to a soft point, such as to induce a smooth controlled descent on loss of signal.

(iii) Return to home – Aircraft capable of storing a take off point while using GPS may be set to return to their take off point and land autonomously upon loss of signal. It is important to note that in this mode the aircraft will typically fly a straight line from its current location to the take off point, so careful consideration should be given when flying near obstacles such as trees or buildings, which potentially may obstruct the return path. It is often possible to set the aircraft to climb to a 'safe' height, before returning. If 'return to home' is to be used, careful consideration should also be given to the location for the take off point, as the GPS modules may only be as accurate as 5 -10m from the original take off point.

(k) Checks before daily flying session:

(i) Check the propellers for damage and correct orientation, as well as ensuring that they are securely fixed to the motors or blade grips. This check should also include a careful examination of the propeller for any signs of stress, which is typically indicated by a 'whitening' of the plastic. This often occurs close to the hub and propellers showing any such damage should be discarded.

(ii) Check for loose or missing nuts and bolts

(iii) Check the motors for any signs of damage or debris

(iv) Check the airframe for any damage and ensure all components are secure.

(v) Check that the rotor arms are secure, especially in the case of collapsible/folding airframes.

(vi) Check all wiring is secure and routed safely to avoid snagging on any moving components.

(vii) Check that any gyro or flight controller and is secure and that all aerials (including GPS) are secure and orientated correctly.

(viii) Check that the battery is secure and capable of supplying enough power for the duration of any autonomous flight stages planned.

(ix) Check that all aerials are securely attached, free from any damage or chafing and are orientated correctly.

(x) Ensure all transmitter switches are in the correct position for flight prior to initial arming.

(xi) Confirm the integrity/reliability of any FPV link, if appropriate.

(xii) Check that servos are secure and check any ball links for slop and change as necessary,.

(xiii) If appropriate, check there is no backlash in the drive system apart from gear backlash, which should not be excessive.

(l) Checks before and after each flight.

(i) If the multi-rotor suffers damage or a heavy landing, recheck all of (A) above.

(ii) Check all controls before starting especially for binding links or slowing servos.

(iii) Check for vibration and eliminate before flight.

(iv) Check that all wiring is secure and cannot become entangled with any moving or rotating part, especially the receiver aerial.

(v) Before starting insure all switches are in the correct position for takeoff and the correct flight mode selected before EVERY flight.

(vi) If planning to use GPS at any point during the flight, confirm that you have a suitable lock before taking off. (Method for this will vary from unit to unit, but is typically by way of a flashing indication LED)

(m) Flight Modes

(i) Manual – The simplest of modes, the aircraft is still stabilised by the gyros, but only to enable flight. The aircraft will not self-level or fly autonomously in any way and can be rolled inverted.

(ii) Self levelling – More a feature than a full mode and can be used in conjunction with manual mode. The aircraft may still be manually inverted by rolling for example, however releasing the sticks will result in the aircraft automatically returning to an upright level position.

(iii) Atti – Sometimes referred to as 'stabilised'. In this mode the aircraft cannot be rolled inverted, instead a full push and hold of the aileron or elevator stick will only result in the craft tilting to a set angle of approximately 30 degrees. Releasing the sticks to centre will see the aircraft self level to horizontal, however it will drift with the wind. This is often mistaken for manual mode, which it is not.

(iv) GPS – Sometimes called 'position hold'. In this mode a GPS module is connected to the main controller and allows for additional autonomous aircraft control functions, such as 'way point programming' or 'return to home'. Typically an aircraft flying in GPS mode will behave the same as one in 'Atti mode', however when the sticks are released the aircraft will no longer drift with the wind, but attempt to stay in one location.

(v) Geo-Fencing – Appearing in more and more controllers, geo-fencing is designed to prevent an aircraft flying in restricted areas, such as near a major airport. Pilots may find their aircraft either won't take off at all, or will stop in the air as if it has reached an invisible wall.

(vi) IOC – 'Intelligent orientation control' (IOC) has a few different modes, such as 'point of interest' or 'compass heading'. In these modes the basic controls of the aircraft can be changed at the flick of a switch to accomplish specific tasks, such as flying a perfect circle around a fixed point. A pilot should fully understand the different modes available via their chosen control board, how each mode will effect the controls of their craft and how to deactivate them quickly in case of an emergency. On some aircraft these modes cannot be used if the aircraft is within a set distance of the take off location.

(vii) Hazard avoidance – Some aircraft are now being fitted with sensors to prevent the aircraft flying in to obstacles, however these must never be relied upon in place of the pilot's judgement.

19.5 Silent Flight – General

R/C silent flight models generally operate with low wing loading and low drag. Consequently, landing approaches may cover a lot of ground at low level. Check your landing approach path before you launch. Check again before you enter the landing circuit. Remember that people will not hear your model coming so take no chances.

When strong thermal or slope lift is encountered, beware of flying too high. At altitude, lift is often very strong and turbulent. Models fitted with spoilers or 'crow' brakes should have little trouble leaving such lift but do not try to dive out of strong lift if these are not fitted. Fly away from the lift and try to find sinking air. In an emergency, full up elevator and full rudder may give the safest descent.

Design considerations mean that many silent flight models are built light. Be sure that the design, construction and materials are adequate for the job.

Silent flight models are often flown at considerable distances from their pilots and a high visibility colour scheme can be a great safety factor. Be extra careful when flying at distance and/or height and beware of flying across the sun.

19.6 Thermal Soaring

(a) When using a towline, bungee or power winch, locate yourself and your equipment well away from car parking areas and ensure that there is no possibility of launching lines falling on buildings, persons, roads or where they might distress wild, domestic or farm animals.

(b) Launch stresses can be severe. Be sure that wing joiners/attachments are strong enough to cope with the high loads imposed. The use of a 'weak link' of known breaking strain in launch lines is a measure that may safeguard model wing structures and should be considered.

(c) Bungee (Hi-Start) anchorages must be very secure. Use a screw-in type of fixing and do NOT peg the end down with devices such as old screwdrivers. Consider using guy lines on the stake for extra security and always do so if the stake is in soft earth.

(d) Electric winches should have an obvious, clearly marked master on/off switch accessible to anyone in an emergency. Shrouded plugs and sockets should always be used and the motor switching should be indirect, i.e. by relay.

(e) Turn-round pulleys must be very securely staked and braced with guy lines. Remember that the load at the pulley is double that on the line and pulley carrier geometry may produce even more load at the stakes.

(f) Whether you use winch, bungee or hand tow, make sure that spectators cannot be endangered if the model veers to one side on launch.

(g) Soaring pilots may tend not to stand together when flying. If this happens on your site then avoid overflying other transmitters at any distance from your own. It is your model that will suffer from interference and it could easily be damaged.

(h) **Aerotowing** requires careful handling of both the tug and the glider. Remember that to fly any model over 7 kg above 400 feet requires a permission. Your local club may already have such a permission as they may have taken advantage of the CAA scheme which allows site permission to be granted, but check before you fly. In controlled airspace contact the appropriate Air Traffic Control Organisation. Never tow to any height without making sure that you are legal.

19.7 Slope Soaring

(a) Slope sites are often used by many people other than model flyers. Always ensure that flying is permitted on your selected site. Note that an increasing number of slope sites are being used on an exclusive basis by clubs who may be paying considerable fees for the privilege. Keep away from paths used by ramblers and climbers and make sure that you do not frighten or disturb any animals.

(b) If the site is regularly used or overflown by full size gliders or hang gliders, then you should attempt to contact them and arrange shared use of airspace and land. We all have airsports participation in common and discussion is better than confrontation. Advice is available from the Association's Leicester office along with details of an agreed code of practice for shared sites.

(c) If a frequency control system is operating on the site, you MUST use it. If no control is operating you must not switch on your radio until you have checked that it is safe to do so.

(d) To avoid possible interference, pilots should attempt to keep reasonably close together. If this is not possible (i.e. if a pilot does a cross-country flight) then everyone on the slope should be made aware of the fact.

(e) Be aware of the turbulence immediately behind the apex of the slope. With high wind conditions and/or steep slopes this can be severe. If necessary, land either slightly down-slope or well back in the lee of the hill.

(f) Specific guidelines for the flying of slope combat, covering models, flying sites and legal requirements, are available from the BMFA Leicester office. These contain important advice and information for the slope combat flyer and should be considered essential reading if you fly this type of model. Be aware, though, that this is a legal activity if carried out on suitable sites and with care taken to avoid the endangering of other people on the slope.

19.8 Electroflight

(a) The first and most important principle of electric flight ground safety is to understand that the instant you start to plug in the flight battery, the model you are holding may transform itself from a dead airframe into one with its motor running at full revs and all controls moving. No matter how good your other safety checks, you must be prepared for this to happen every single time you start to connect the flight battery.

(b) Since plugging the flight battery in is nearly always a two handed job you must give serious thought to how your model will be restrained BEFORE it does something you don't expect. When plugging in the flight battery, positive restraint, either by a helper holding the model or by some other method, and staying completely clear of the propeller must always be part of your regular routine.

(c) Electric motors have very different power and torque characteristics to normal i/c model engines. You must take very great care when setting up their control systems and handling them as an accident, such as the propeller hitting your hand, which would stall a glow engine might just make an electric motor turn harder.

(d) Developing technology has made it much more acceptable to use battery eliminator systems (BECs) to save the weight of a receiver battery, especially in lightweight installations using two or three small servos. You should not use BEC in an installation where servo battery drain may be high or prolonged, for instance with four or more servos or with standard servos in a thermalling electric glider. Also, many older BEC systems are not as reliable as the modern equipment and in all these cases the use of a separate battery is still considered to be the safer choice. The decision is yours but if you have any doubts then you should use a separate battery. It should be noted that the use of BECs will not invalidate your insurance.

(e) Always check that motor operation does not interfere with the R/C equipment in the model. Range checks with the motor off and with it on will highlight any problems. Suppression of a brushed motor is a simple task and you should seek the advice of an experienced flyer on the subject.

(f) All connectors and cables should be robust enough to carry safely the current for the motor/s used. Wiring used for small motors will reduce the power of larger motors and may run dangerously hot. If you change a motor, check that the wiring is adequate for the new one.

(g) **Batteries**:- Ni-Cd or Ni-Mh fast charge cells and larger Li-Po packs can be discharged at very high currents (up to 100 amps and more). Short circuits, faulty wire insulation or loose contacts can result in very considerable heat generation and may cause fires.

(h) The standard two pin polarised connectors supplied with many 'buggy' type battery packs are only suitable for small to medium current draw as they can offer significant resistance at times and have been known to overheat badly. There are other specialist connectors, especially the readily available gold plated 'bullet' connectors (available in various sizes from 2mm upwards), which are much better as they offer very low resistance and are designed to carry high currents.

(i) Always ensure that flight batteries are securely fixed and that they cannot move in flight.

(j) Many speed controllers have a specific 'arming' sequence, which is a pre-programmed sequence of actions that have to be followed before the motor will respond to throttle stick movements. For instance, after switching on the transmitter and receiver and then plugging in the main flight battery, one type of controller requires that you move the throttle stick from low to full throttle and then back to low before the motor is 'armed' and ready for flight. You must be fully familiar with the system fitted to your model.

(k) You must pay particular attention to the 'throttle to low – transmitter on – receiver on' sequence and be aware that the model you are holding will be 'live' as soon as you start to plug in the flight battery, no matter what controller arming sequence you may then have to go through.

(l) The setting of the failsafe to, as a minimum, reduce the engine(s) speed to idle, obviously applies to all electric models too. However, given the ability to re-start the motor(s) at will, it makes sense

to have the failsafe cut the motor(s) completely. This will give you the desired 'minimum power' situation and will avoid you having to decide on what idle speed you might need to set.

19.9 Control Line

(a) Always use steel lines of sufficient strength for the type of model you are flying. Where possible, stranded lines should be used when flying over grass or when the model is going to be manoeuvred.

(b) If swivels are used between the control handle and the lines they must be of substantial construction. Do not use the thin bent wire type.

(c) Before each flying session and after any heavy landing, the model should be subjected to a pull test of at least 10 times the model's weight.

(d) Before every flight check the lines and linkages thoroughly. If any damage is found, **DO NOT FLY** until it has been rectified and re-tested to your satisfaction.

(e) Ensure that there are no spectators near to the circle before you release the model.

(f) Do not fly near **ANY** overhead cables. Even the low level distribution cables on wooden posts carry lethal voltages which can 'jump' many metres to your control lines. **KEEP WELL AWAY**.

(g) Control lines make good lightning conductors. Do not fly in thundery weather.

(h) Whenever high pulls are expected, use a safety strap connecting the handle to your wrist.

(i) Never release the control handle when the model is flying.

(j) Encourage spectators to stand upwind of the circle.

(k) Always mark a centre spot for your circle, ensuring that adjacent circles are not too close to each other.

(l) Always stay on the centre spot when flying.

(m) If someone strays into the circle whilst you are flying, fly high to avoid them and stay high until the circle has been cleared.

(n) Always 'ditch' your model rather than hitting someone.

19.10 Free Flight

(a) A model should not normally be launched from an area such that it would overfly houses, major roads, railways or similar hazards in its expected flight pattern.

(b) Always launch models, particularly powered ones, well away from and downwind of any spectators or vehicles.

(c) When a fuse type dethermaliser is used, always use a snuffer tube.

(d) Check flying surface alignment and, if your model employs them, the dethermaliser and any automatic systems fitted thoroughly before launching.

(e) All glider launches should be undertaken with the towline detached from the hand winch.

(f) The use of radio dethermalisers i(RDT) in free flight models is positively encouraged. Having control of when the model is DT'd provides the benefits of bringing the model down away from trees, buildings and other hazards. It also helps to keep the model within the confines of the flying site.

19.11 Indoor Free flight

(a) Take care when launching that no one is standing in the flight path of the model.

(b) If your model hangs up at height, take great care when retrieving. If you have to climb to get the model, use ladders and get someone to hold them steady. Do not over-reach, take foolish risks or take on tasks that are beyond your ability.

If you are flying in the larger sites such as the Cardington airship sheds, professional help is usually available and should be used.

19.12 Indoor Radio Control

(a) Most of the precautions for outdoor R/C club flying will apply to indoor events.

(b) It is not advisable, except under exceptional circumstances, to have free flight and radio control flying at the same time.

(c) Active transmitter control should be in operation throughout the meeting and at larger events a transmitter pound should be used.

(d) You should take note that some indoor specification receivers may not have the performance of standard receivers and should be prepared to limit the available frequencies to 20 kHz spacing for some sets.

(e) The pits area should usually be situated along the shorter wall next to the door and you should, if possible, use netting to isolate the pits area from the flying. Pilots should stand together in front of the nets.

(f) A 'duty pilot' should always be on duty to act a flight marshal. This may not be the same person for the whole event but, whoever it is, they must have the authority to ground any persistently unsafe pilots.

(g) The duty pilot should decide on the number of aircraft to have safely in the air and which direction the circuit to be flown should be.

(h) A written event briefing sheet should be given to all pilots if staggered arrivals make a pilots briefing impractical.

(i) The size of the venue will limit the size of model allowed to fly but as a general rule for a larger hall you might consider a maximum weight of 200 grams and a maximum wing loading of 15 grams per square decimetre (just over 7 ounces and 4.5 ounces per square foot).

19.13 Models Between 7 kg and 20 kg – General (Large Models)

(a) Any model aircraft **(that is, either power fixed-wing, glider or helicopter)** weighing between 7 kg and 20 kg without fuel is subject to regulation by the Air Navigation Order, over and above Articles 240 and 241. Full details are included in the section 'Legal Controls over Model Flying.

Pilots of models between 7 and 20 kg should take great care to comply with these regulations as their wilful or negligent breaking could result in their flights being illegal under the terms of the ANO and they may be liable to criminal prosecution.

The address of the CAA is listed at the back of this handbook and you can contact them or download a copy of CAP 658 from the BMFA web site. In addition, BMFA will supply news of all the latest CAA conditions on request. Contact the Leicester office for more details.

One of the most important clauses in the ANO regulations for these larger models is Article 94 (2) which says 'The person in charge of a small unmanned aircraft may only fly the aircraft if reasonably satisfied that the flight can safely be made.'

This puts a legal requirement on the pilot to consider all aspects of safety before a flight is made. Pilots should take great care not to underestimate the importance of this clause.

(b) Large models may not be flown in any full-size air traffic control zone or special rules zone without the specific permission of the appropriate ATC authority. For information on such zones, contact your nearest airfield or airport air traffic control. They will be able to give you the permission you

require if your flying site falls within such an area. If you have any problems with this process you should contact the Leicester office for advice.

(c) Pilots of large radio control models should be aware that such models may have different operating characteristics to smaller models, several of which may not be initially apparent.

The greater mass and inertia of the large model, its generally more robust (less compliant) structure and the differences in aerodynamic efficiency of larger flight surfaces can mean handling characteristics nearer to full size aircraft than to models. You may be caught out if you are not aware of this.

You may also have visual perception problems caused by the size of the model. This usually takes the form of the aircraft being much further away than you think and can cause positioning problems in flight and danger on landing due to the large ‘swept' area on the approach. Be aware of this problem, especially when flying at low level.

(d) When constructing the model ensure that all parts have adequate strength for the task they perform. Pay special attention to the way in which wing load stresses are transferred between the wing structure and the fuselage. Tailplane members, if detachable, should have a positive lock to their mounting so that they cannot be shed in flight.

(e) Never use long unsupported control rods to the control surfaces or plastic clevis connectors as control forces will be high. Wherever possible each aileron should have its own servo and the elevator should preferably have two independent servos with either (a) mechanical interconnection so that either can drive the control surface (with reduced movement) should the other fail or (b) each servo should drive one half of the elevator through separate pushrods.

(f) Pay particular attention to the state of the battery and the switch harness. Ensure that the batteries in both the model and the transmitter have adequate capacity for the flight to be undertaken and are fully charged for each flying session. Don’t expect a standard receiver battery pack to cope with the demands of high power servos and large control forces. Loss of battery power is the most frequent cause of system failure. There are commercial battery back-up systems available and circuits have been published for similar systems. These should be seriously considered if overall servo current drain is likely to be very high.

(g) As required by the CAA, a radio fail-safe device must be fitted and operational to all models over 7 kg. Remember that the purpose of the device is not to land the model but to prevent it from flying away in the event of radio failure. You should test it regularly as part of your pre-flight checks.

(h) It is recommended that all ‘large model' pilots should hold the BMFA ‘B' certificate or a similar qualification (e.g. SAA Silver Wings, LMA Certificate of Competence), and should ensure that both adequate third party insurance is operational and that all flights made comply with CAA regulations.

(i) Do not operate large models at a site which allows public access to the take-off or landing area unless that access can be marshalled during the duration of the flight. Although you may be aware of the potential dangers, the general public, especially children, will not know these of hazards.

(j) Above all always fly sensibly and safely.

19.14 Large Power Fixed Wing

(a) The fail-safe device fitted must, as a minimum, bring the engine to idle speed.

(b) Pay particular attention to vibration proofing the airframe. Larger engines may produce high amplitude low frequency vibration unlike that normally associated with model aircraft engines. Ground test the airframe under full power until you are satisfied that nothing will loosen in flight.

(c) Take No Chances With a Running Engine. The greatest care should be taken when running the engine of a large model. Full-size aviation standards of safety and awareness must be exercised whenever you start, run and adjust the settings of the engine.

19.15 Large Helicopters

(a) The fail-safe device fitted must, as a minimum, bring the engine to idle speed.

(b) The greatest attention must be paid to the effects of vibration on the airframe and radio installation. Linkages must be regularly checked and any that are suspect must be renewed.

(c) Because of the high airframe density and lifting power of modern helicopters, it is very easy to be operating a model weighing over 7 kg without being aware of the fact. Pilots are recommended to weigh all helicopters powered by '40' sized engines and above and to make certain that you are complying with any current CAA regulations if necessary.

19.16 Large Gliders – Slope and Thermal

(a) Considering that the purpose of the fail-safe device fitted is to avoid a flyaway, it is recommended that it should be set with that in mind. Activation of spoilers, crow brakes or even the elevator to full up and the rudder to full left (or right) would be appropriate.

(b) Many large gliders have scale 'bolt on' wing fixings. Pay strict attention to how the wing load stresses are passed from the wing skins and spars through any such fixings to the fuselage.

(c) When flying from the slope be sure that you give audible warning to spectators, assistants and other pilots when about to launch or land. Agree a flight pattern to be used along the slope with other pilots or follow local rules. Always turn away from the hill at the end of each pass.

(d) Do not operate large gliders in the same airspace as other users, e.g. full-size gliders, aircraft, hang gliders etc. (see the earlier section on 'mixed sites').

(e) Always perform aerobatics well away (not less than 50 metres) from people or property and never, under any circumstances, overhead.

19.17 Flying Sites For Models Between 7 Kg And 20 Kg

Models between 7 kg and 20 kg are directly regulated by the Air Navigation Order and two of the main legal requirements are that they are not flown in controlled airspace or in aerodrome traffic zones (ATZ) without Air Traffic Control (ATC) permission and that they are not flown at more than 400 ft agl without the permission of the relevant authority. Within controlled airspace this is the appropriate ATC unit and outside controlled airspace it is the CAA itself.

CAP 658 says;

Models between 7 and 20 kg must not be flown above 400 ft agl unless with ATC permission, and should be flown well clear of any congested area of city, town or settlement; 150 metres is suggested. (note that the CAA definition of 'congested area' includes playing fields that are actually in use, i.e. if a football match is in progress – Ed). Arranging to fly on a site already cleared for model flying could save you some problems.

Long term permission can be arranged for sites within controlled airspace and ATZs and you should liaise with your local ATC to arrange this. Such permission should be in writing and will probably be for one year. This type of long term permission is endorsed by the CAA and BMFA and if your local ATC is not willing to give it in what you consider to be reasonable circumstances then you should contact the BMFA Leicester office. An arbitration procedure has been agreed with the CAA and the matter will be taken further on your behalf by the BMFA.

19.18 Models Over 20 Kg

Models over 20 kg are subject to the issue of a CAA 'Permission to Test' exemption certificate before they may be flown. This certificate lasts for twelve months.

The CAA will not issue such a certificate unless the construction of the model has been monitored and 'signed off'. A UK wide building inspection system which is available to all who need it has been set up and details can be obtained from the BMFA office.

A full exemption certificate will then only be issued by the CAA on the completion of a witnessed test flight schedule. Only pilots named on the exemption certificate may fly the aircraft in public and each named pilot is required to complete the flight test schedule on the aircraft separately.

It is extremely important that anyone building or thinking of building a model that may exceed 20 kg should use the inspection service and test flight monitoring service. If you don't then an exemption certificate will not be issued by the CAA. Flying the model will then be illegal (in the strict definition of the word) and you will be liable to prosecution if you do fly it.

19.19 Flying Sites For Models Over 20 Kg.

Such models are subject to the issue of a CAA exemption certificate before they may be flown. The certificate will set out any conditions required but you can certainly expect any restrictions to be at least based on those noted above for models between 7 and 20 kg and it is extremely unlikely that they will be less strict.

19.20 Space Models – CAP 658 Says

NOTE: Article 240 of the ANO 2016 (Endangering Safety of an Aircraft) applies to all rockets: the operator of a model rocket must ensure that it does not endanger a real aircraft.

(a) **General –** Only fly on sites that are clear and open with adequate open space downwind of the launch point and in good visibility. No person shall launch a rocket unless he has reasonably satisfied himself that:

(i) the flight can be safely made; and

(ii) the airspace within which the flight will take place is, and will throughout the flight remain, clear of any obstructions including any aircraft in flight. Models should be constructed of lightweight materials capable of meeting the minimal structural loads expected during flight. The use of metal components should be limited to the absolute minimum necessary to ensure the integrity of the rocket during flight and recovery.

(iii) Models should, for the most part, use commercially available factory-produced motors, otherwise non-commercial motors must follow the United Kingdom Rocket Association (UKRA) approved safety code. Only motors that are compliant with all relevant UK legal requirements shall be used. For further information contact either the BMFA or the UKRA.

(iv) Models should be equipped with a suitable recovery system to ensure a safely retarded descent.

(v) Motors should be ignited electrically in such a way that the operator is at least five metres from the launch point.

(b) **Rockets between 160 Newton-seconds ('G' Rating) and 10,240 Newton-seconds ('M' Rating).**

In addition to the above, article 96 of the ANO 2016 (Rockets) applies to all rockets with motive power exceeding 160 Newton-seconds ('G' Rating) and the requirements of the article are summarised below.

No person shall launch a rocket with a motive power that exceeds 160 Newton- seconds ('G' rating) unless he has reasonably satisfied himself that:

(i) the flight can be safely made; and

(ii) the airspace within which the flight will take place is, and will throughout the flight remain, clear of any obstructions including any aircraft in flight;

And unless:

(iii) for a flight within controlled airspace, he has obtained the permission of the appropriate air traffic control unit for aircraft flying in that airspace;

(iv) for a flight within an aerodrome traffic zone he has obtained the permission of the air traffic

control unit, the aerodrome flight information service unit at the aerodrome or the air/ground communications service unit as appropriate; and

(v) for a flight for aerial work purposes the flight is carried out under and in accordance with a permission granted by the CAA.

(c) **Rockets over 10,240 Newton seconds ('M' Rating)**

Large rockets exceeding 10,240 Newton-seconds must not be launched unless in accordance with a permission granted by the CAA. Further details can be obtained from the Airspace Utilisation Section of the CAA (Contact the BMFA for contact details).

BMFA Notes In addition:

(i) Models must be launched from a stable platform equipped as a minimum with a launch rod for initial guidance and must not be launched at an angle of more than 30º from the vertical.

(ii) A clearly audible countdown of at least 5 seconds must be given by the launch supervisor. In the event of a misfire, do not approach the model until it is certain that ignition will not occur.

(iii) Where spectators are present, a Range Safety Officer should be appointed to take responsibility for all flying activity.

(d) **Large Scale Rockets, 'H' to 'M' Motors.**

Details of the operating and safety procedures for large scale high powered rockets are naturally more extensive and involved than for the lower powered ones.

A comprehensive safety code has been written by UKRA to cover such operations and is published by the BMFA. It is required reading if you are interested in large scale rocketry.

(e) **Space Modelling Specialist Bodies**

The BMFA Specialist Bodies covering space models are Federation Aeronautique Internationale Rocketry (FAIR) and the United Kingdom Rocketry Association (UKRA). These bodies can be contacted via the BMFA's Leicester office.

19.21 Gas Turbines

A 'Code of Practise for the Operation of Gas Turbines' has been prepared by the Gas Turbine Builders' Association and the Jet Modellers' Association. Anyone intending to build and fly a gas turbine model should obtain and read this document before proceeding, as it covers all the essential safety procedures and additional legal liabilities concerned with this type of model. It is available for download from the BMFA web site (www.bmfa.org) or directly from the Leicester Office.

(a) **General**

(i) The operation of gas turbines requires special care and the manufacturer's operating instructions must be understood and closely followed. All pilots and helpers must be fully briefed on the operation of the engine before any starts are attempted.

(ii) Never run an engine in excess of the manufacturer's recommended power rating. Always follow the manufacturer's recommendations on pipework and fittings, especially with regard to periodic renewal.

(iii) Take extra care during the engine's initial operating period. Until the unit is proven, do not operate it near people.

(iv) Pressurised gas fuels, such as Propane, require care in handling; spill dispersal rates can be slow and the gas can 'pool' in hollows or in void areas in fuselages. The liquid can also cause frostbite, if allowed to come into contact with skin.

(v) Ensure that all fuel is stored in labelled containers fit for the purpose. These containers should be no larger than necessary.

(vi) Model jet turbine installations may produce significant amounts of RF interference. In particular, fuel pumps, if they use brushed motors, and the turbines themselves, which have

been known to produce significant static interference, especially if ceramic bearings have been incorporated. Make sure that you do not install receivers or servos or run aerials near to the engine installation.

(vii) All gas turbine models are required by the CAA to be fitted with a failsafe. This must, as a minimum, bring the engine to idle in the event of radio interference or failure. The fuel system must be capable of manual shut off via a fuel valve or fuel pump switch.

(b) **Before Starting**

(i) Smoking or naked flames must not be allowed near the engine and the fuelling area.

(ii) A suitable fire extinguisher (CO2 or dry powder but not water) should always be present at Start Up and for any period during which the engine is running.

(iii) The Start Up area should be kept clean and free from any loose items that may get sucked into the fan or turbine.

(iv) Ideally, the Start Up area should be on a paved surface, but if this is not possible the grass should be short and clear of all loose material.

(v) Check the integrity of any compressed air hoses, clips etc, prior to turning on the air. Manufacturer's instructions should always be followed, particularly those relating to safety.

(vi) Gas fuelled models must never be left in the pits area fuelled up. Once fuelled up they should be moved directly to the designated start-up area.

(c) **Starting**

(i) The engine should normally be started facing into wind but make sure that it is not pointed at people or the pits area. The effect of the jet blast must always be kept to the absolute minimum.

(ii) Beware of 'wet' starts with liquid fuels.

(iii) After starting the engine always check the oil flow to the bearings. It is also advisable to check the exhaust gas temperature each day and you should keep a constant watch for any new noises or vibration. Any deviation from normal could indicate trouble. Do not run the engine if you are not sure.

(iv) Whenever possible a reliable helper should assist with the start. The helper should be close by and fully briefed on the operation of the engine. The helper should ensure that you are not distracted during the start sequence.

(v) Models must be physically restrained during start up. The use of wheel brakes alone is not sufficient.

(d) **Shutdown**

After every flight ensure that the engine is fully shut down, the fuel shut-off has been operated and that any hatches are opened to assist engine cooling.

(e) **Turbine Model Flight Safety Information:**

(i) Adverse runway conditions can have an adverse effect on the aircraft's performance on take-off. E.g. wet or long grass will significantly increase take-off distance.

(ii) The rate of climb at take-off weight may be significantly less than that of a propeller driven model aircraft. Care must be exercised to ensure safe clearance of any obstacles immediately after take-off.

(iii) The lack of "prop wash" over the control surfaces of a jet propelled model aircraft will result in less control surface effect particularly at low speed.

19.22 First Person View R/C

FPV R/C is a legitimate activity but there are limitations that you must observe to be both legal and insured.

CAP 658 Says

(a) **What is First Person R/C**? – Also known as First Person View, is a system whereby a radio control model aircraft is piloted, not through direct line of sight, but by using a live video downlink from an on-board camera allowing the pilot to experience a 'cockpit view' and to control the aircraft from the visual perspective of that camera. The live video is normally displayed to the pilot through 'video goggles' worn on the pilot's head or through a stand-alone monitor.

(b) **Legal Position** – The law requires that the person in charge of a model aircraft must maintain direct unaided visual contact with the aircraft sufficient to monitor its flight path so that collisions may be avoided. This is obviously not possible if the person in charge is wearing goggles. Therefore there needs to be a way to facilitate this and to address other safety concerns.

(c) **Safety Concerns** – Images captured by a camera and displayed on a flat screen afford the pilot little by way of depth perception and no peripheral vision. This can make it difficult for the pilot to accurately judge speed and distance and to maintain sufficient awareness of the area surrounding the aircraft to effectively 'see and avoid' obstacles and other aircraft. The ability to control the aircraft and avoid collisions is also greatly affected by the quality of the video being displayed. Furthermore, in the event of a loss of the video data stream, which can easily occur if the aircraft is flown beyond the range of the transmitter, the pilot is likely to experience difficulty in locating the aircraft relative to his own position and visually acquiring it before loss of control occurs.

(d) **Control Measures** – The mechanism to address the safety concerns and to overcome the visual contact problem is already in place within radio control flying. This is the Buddy Box system which is regularly employed to train ab-initio pilots. In a FPV R/C scenario it enables the person in charge of the model to hold the master transmitter and maintain direct unaided visual contact with the model whilst another person flies the model by reference to the live video from the on-board camera. In the event of an emergency or problem the person in charge with the master transmitter must take control of the aircraft and take whatever action necessary to maintain safety.

(e) In addition to the guidance already given in paragraph (1) above, consideration should also be given to the following:

  (i) **Pre-flight Checks –** Ensure that the additional transmitters (data/video) are switched on whilst conducting the range check.

  (ii) **Battery Charge Status –** FPV can involve several more batteries than normal R/C flight. All batteries should be checked for full charge before each flight.

  (iii) **Training –** FPV flying means that the pilot controls the aircraft by reference to the horizon – just as with full size aviation. Before attempting a first flight it is a good idea for a novice FPV pilot to wear the goggles and view the video feed as a 'passenger' whilst another pilot flies the aircraft.

  (iv) **Positional Awareness –** FPV flying differs from line-of-fight flying in that the pilot sees a completely different perspective and, during his first flights, it is easy to lose track of where the aircraft is relative to the flying field – especially when directly above it.

(f) **Only Fly If:**

  (i) two pilots take part;

  (ii) a Buddy Box system is employed;

  (iii) the person in charge operates the master transmitter;

  (iv) the person in charge does not wear the headset or view the screen;

(v) the aircraft remains within the natural unaided visual range of the person in charge;

(vi) reliable operation of the Buddy Box is established;

(vii) a clear handover protocol is established; and

(viii) the person in chatge is solely responsible for the safety of the flight.

These operating conditions very clearly place the legal responsibility for the safety of the flight on the person in charge who must maintain direct unaided visual contact with the model at all times.

19.23 FPV Pilot Exemption for Lightweight Models

The CAA have issued an exemption (Official Record Series 4 No 1226 – General Exemption E4457) which allows the solo flying of lightweight FPV models, subject to the following conditions:

(a) The Civil Aviation Authority, in exercise of its powers under article 266 of the Air Navigation Order 2016 ('the Order'), exempts any person in charge of a Small Unmanned Aircraft (SUA) from the requirement at article 94(3) of the Order to ensure that direct unaided visual contact is maintained with the aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles and structures for the purposes of avoiding collisions.

(b) This exemption only applies if the conditions at paras. (c) to (g) below are met.

(c) (i) The person in charge is the person piloting the SUA.

Note: The person in charge remains responsible for the safety of the operation and may only fly the SUA if reasonably satisfied that the flight can safely be made.

(ii) The person in charge is accompanied by a competent observer who maintains direct unaided visual contact with the SUA sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions and advises the person in charge accordingly.

(iii) The maximum take-off mass of the SUA does not exceed 3.5 kg, including any batteries or fuel.

(d) The person in charge must not fly the SUA:

(i) In class A,C,D or E airspace unless permission of the appropriate air traffic control unit has been obtained;

(ii) within an aerodrome traffic zone during the notified hours of watch of the air traffic control unit (if any) at that aerodrome unless permission of any such air traffic control unit has been obtained;

(iii) at a height of more than 1000 feet above the surface (provided the competent observer can maintain visual contact with the SUA throughout the flight);

(iv) over or within 150 metres of any congested area;

(v) over or within 150 metres of an organised open-air assembly of more than 1000 persons;

(vi) within 50 metres of any vessel, vehicle or structure which is not under the control of the person in charge of the SUA;

(vii) within 50 metres of any other person, apart from the competent observer, except when taking off or landing in accordance with para. (viii);

(viii) within 30 metres of any other person, apart from the competent observer, other adjacent model operators, or any model flying club members, during take-off or landing

(e) For the purposes of this exemption, a 'competent observer' means someone whom the person in charge has designated as the competent observer.

(f) Before designating someone as the competent observer, the person in charge of the SUA must be satisfied that he or she:

(i) has been briefed in accordance with paragraph. (g);

(ii) is competent to perform the tasks which he or she may be called upon to perform in accordance with paragraph (g); and

(iii) is competent by direct unaided visual observation of the SUA, to assist and advise the person in charge with the safe conduct of the flight.

(g) The person in charge must ensure that;

(i) the competent observer is fully briefed on the planned flight and what is expected of him/her taking into account the prevailing conditions;

(ii) the competent observer understands that he/she must stay directly adjacent to the person in charge and maintain direct unaided visual contact with the SUA at all times, to visually and aurally monitor the airspace for other aircraft and the take-off and landing area for any persons;

(iii) the competent observer has been instructed on the actions to take in the event of another aircraft being spotted and a risk of collision is assessed; and

(iv) the competent observer understands that he/she must advise if the SUA is proceeding beyond the point at which he/she is able to monitor its flight path sufficiently to identify a risk of collision.

(h) This exemption supersedes Official Record Series 4 No. 1168, which is revoked.

(i) This exemption has effect from the date it is signed until varied, suspended or revoked.

BMFA NOTE – The conditions that you must comply with to use this exemption are almost identical to those applied to models over 7 kg. In particular, you MUST take note of the requirement not to fly in any controlled airspace without the permission of the relevant Air Traffic Control Authority. Considering that controlled airspace down to ground is applied to many urban and semi-urban areas, you should check very carefully to avoid flying illegally and negating the exemption.

20. MODEL FLYING DISPLAYS

If you or your club intend to hold a model flying display it is essential that you obtain both the Display Organiser's Handbook 2016 and the Public Display Form 2016. This latter form is so that your insurance can be upgraded to allow for a Public Display. Both these documents can be obtained from the Leicester Office or downloaded from the BMFA web site.

The Handbook has been prepared to give guidance to organisers of, and participants in, public displays which include model flying as part of a demonstration or entertainment. It contains a wealth of information that will assist the organisers in meeting their direct responsibility for the safety of spectators and nearby persons and property.

It does not apply to

(a) competitive model flying events where spectators attend in the knowledge that model aircraft will be taking part in contest flying; for these events specific safety rules are included in the appropriate competition rules; or

(b) general model flying, the safety requirements for which are covered in the BMFA Safety Code for General Flying.

21. MANDATORY OCCURRENCE REPORTING

21.1 Definitions

An **ACCIDENT** is where a person suffers a fatal or serious injury as a result of contact with any part of any model including parts that have become detached from the model.

A **SERIOUS INCIDENT** means an incident involving circumstances indicating that an accident nearly occurred.

An **INCIDENT** is an occurrence that has the potential for an accident or serious incident to occur.

21.2 General

First of all, you should bear in mind that any reportable incident might well trigger a CAA inquiry, run by the Air Accident Investigation Board (AAIB).

The possibility of a future inquiry will usually depend on the severity or potential severity of the incident and your actions regarding collection of evidence, etc. should be with this in mind.

A fatal accident is certain to result in such an inquiry.

Almost all these inquiries are conducted for the AAIB by the BMFA so there is an assurance that an experienced modeller will be involved and not someone who is unfamiliar with model operations.

21.3 General Flying

In the event of an accident involving a model aircraft which causes injury to a third party, the pilot must inform their own National Association as soon as is reasonably practicable.

Whilst not being required to report accidents (defined as involving fatal or serious injury) directly to the CAA, any serious incident may well trigger an AAIB inquiry.

With this in mind, those present on the flying field will have to decide very quickly on their course of action.

In the case of a fatal incident there is no doubt that the first course of action will be to alert the emergency services, e.g. ambulance and police.

The model, radio equipment and any other items involved should not be moved or even touched, if that is possible. If any transmitters operating during the incident are switched off later this should be noted.

All other transmitters, the pegboard and the pits area should be left untouched until full details have been recorded.

Photographs of the area will be extremely useful and, if a camera is not available, mobile phone pictures will do; as many as possible.

Names and addresses should be taken of all those present and no one should be allowed to leave the field until a police presence has been established.

If there are no Committee members on the field then, at some point, Committee officers must be contacted. This should obviously be done as soon as possible but Club members on the field should not wait for a Committee presence to take care of the steps outlined above, many of which need to be done quickly.

For any incident that has not resulted in a fatality but is still serious, a police presence will probably not be required and the level of evidence collection may be reduced but you should always remember that an inquiry might be held into the incident.

Plenty of photographs of the scene, possibly impounding the model and radio equipment, names and addresses of witnesses and notes taken at the time will all be extremely helpful if you consider that you may be involved in an inquiry. It will also help in any insurance related queries that might arise.

21.4 Contact Details

The respective Associations are to maintain a list of contacts who are authorised to act on behalf of their Association on notification of an accident or serious incident occurring.

Accident reporting to the CAA (Out of Office Hours) is on 07808 900329

21.5 Public Events (Displays or Competitions)

These events have more stringent requirements details of which are in the Display Organisers Handbook downloadable from the BMFA web site or direct from the Leicester Office.

Do not be complacent about this matter. Any incident, serious or potentially serious, that occurs in front of the public will almost certainly be reported to the press, probably before the dust has settled, and the press will almost certainly contact either the CAA or the BMFA for comment.

Consider the consequences of a telephone call from the press to the CAA on a Monday morning asking for details of the ‘model aeroplane crash’ that turns out to be a serious one and neither the CAA nor the BMFA has any knowledge of it!

22. THE RADIO CONTROL ACHIEVEMENT SCHEMES

22.1 Introduction

The RC Achievement Scheme is run by the BMFA as a National Scheme and it is open to all RC model flyers, including non-members. The scheme encompasses power and silent flight disciplines.

The aim of the Scheme is to encourage RC model flyers to improve their standard of flying and safety, and to prove that standard to an Examiner.

It is important to appreciate that the scheme is not about permitting or licensing. Fundamentally, the scheme is all about personal goals and challenges. It is intended to provide every RC flyer with something to aspire to and aim for, should they so wish. The scheme is not compulsory!

21.2 Scheme Control

The scheme is administered nationally by the Scheme Controller. The Achievement Scheme Review Committee (ASRC) has ownership of all Achievement Scheme materials, which are reviewed on an annual basis.

BMFA Areas control and co-ordinate the activities of all Area Chief Examiners and Instructors, within their Area. Individual clubs administer their Club Examiners and Instructors.

21.3 Qualifications

The scheme provides proficiency certification and achievement awards at ‘A’ (basic) and ‘B’ (advanced) levels for a wide variety of disciplines. Specialist ‘C’ certificate endorsements are also available to ‘B’ certificate holders.

Full details of the scheme and the wide variety of achievements available are detailed in the dedicated Achievement Scheme Handbook, along with information on the various Instructor and Examiner ratings.

This Handbook is available from the Leicester Office or for download from the BMFA web site.

23. AN INTRODUCTION TO THE DEPARTMENT OF THE ENVIRONMENT NOISE CODE

23.1 Introduction

In addition to the occasional scrutiny of model flying by Magistrates referred to in the section 'Legal Controls over Model Flying', Planning Authorities are constantly making decisions on whether to allow change of use for model flying sites or whether to issue clubs with a licence to fly on Local Authority land.

When they are taking these decisions they have a statutory duty to ensure that the activities on the site are not a potential nuisance to the surrounding area. When considering possible noise nuisance, the document to which they will most likely refer is the DoE Code of Practice.

If a noise complaint is made against your flying site, the Local Authority will probably send an Environmental Health Officer (EHO) to investigate. He will arrive armed with his noise meter and a copy of the DoE Code of Practice.

If the noise your models make is going to be judged by anyone, then the Code of Practice is most likely to be the standard that it will be judged against. For this reason alone, you should take careful note of the conditions laid out in this document; you never know when it may be applied to you.

Finally, the model flying knowledge of the EHO who may turn up will vary from nil to extremely good and, strange as this may seem, the same may apply to his knowledge of the Noise Code. Read and absorb the Code and it's likely that you will know as much (or more) about it as he does, which would certainly be to your advantage.

The Code can be downloaded from:

<www.gov.uk/government/publications/code-of-practice-on-noise-from-model-aircraft>

23.2 BMFA Advice on the Noise Test

The noise testing procedure noted in the DoE noise code above should be followed carefully but to get the best results it is strongly recommended that you should take special note of the following.

Make sure that no noise reflecting surfaces are near the test site. This means not just buildings but cars, concrete, models, model boxes and even hard packed earth. Do the test over grass.

Do not take measurements when there is any appreciable background noise. Traffic on a nearby road, other models flying or being readied for flight and even people talking near the meter can affect the readings.

Wind blowing across the microphone has a big effect on readings. Do not test on breezy days and when you do test, use a microphone wind shield.

Make sure that the actual microphone is over the end of the seven metre tape, not your hand or the centre of the meter.

Think carefully about the four test positions of the model at the other end of the tape. As a suggestion, for the sideways-on readings put the fuselage on the seven metre mark, for the nose-on reading put the propeller over the mark and for the tail-on reading line the trailing edge of the wing up with it.

Please remember that large engines at full power can be very dangerous and before conducting any noise tests you are strongly advised to contact the Club Support Officer ant BMFA Head Office for recommended procedures.

23.3 Helicopter Noise Testing

Because of the specific problems associated with performing noise tests on helicopters, it is recommended that a revised procedure be adopted.

Three markers should be laid out in a line on the flying area, one central, one seven metres to one side (crosswind) and one seven metres to the other side (crosswind). The helicopter which is being checked is held in a steady hover above the centre marker with the pilot standing downwind of it, as normal.

Noise readings are then taken with the meter positioned over each of the end markers in turn. For safety, when the meter is being carried from one end marker to the other, the checker must walk around behind the pilot flying the model.

The two readings obtained take the place of the four obtained in the fixed wing test and all other criteria are as noted in that test procedure.

Note – This method of testing is offered by the BMFA as a safe way of obtaining meaningful figures for helicopter noise levels on club sites by club flyers. It is not officially part of the DoE Noise Code.

23.4 Gas Turbines and Electric Models

The advent of model gas turbines and some higher powered electric models has presented an interesting problem in terms of noise levels and how they fit into the DoE Noise Code.

Although the gas turbine is, in scientific terms, an internal combustion engine, it is the BMFA's contention that the DoE Noise Code should not apply to it. The reason for this is that the noise code was written to cover the types of model i/c engines that were known at the time, i.e. piston engines, and the concept of model gas turbines was not even considered.

The fact is that model gas turbines are very quiet indeed in the air when heard from any reasonable distance, far quieter than most piston engines, and on that evidence you would expect them to be able to pass 82 (d)BA at 7 metres.

However, most of the noise they emit is very high frequency and the higher the frequency of any noise, the better it dissipates with distance. Consequently the problem is that a very quiet gas turbine in the air will not pass the DoE i/c engine noise code on the ground because the test is done at 7 metres and the high frequency noise it emits has not yet had a chance to dissipate.

The Noise Code clearly does not apply to electric models as it specifically for i/c powered models. Again most electric models are very quiet in the air and will cause no complaint

However there are certain turbine powered models and types of electric model that can sound very loud when in close proximity. EDF models and high speed pusher electrics can produce noise levels that can seem very loud at close quarters.

Although there is no meaningful test that can be applied directly to such models, a subjective assessment can be made with a little common sense.

Given that the high frequency noise produced by such models does dissipate quickly with distance, the question has to be whether a model will cause a noise complaint and you cannot judge this from the flying field close to the flight path of the model. The only way to check is to go to a reasonable distance from the flying field and listen to model as a possible complainant would.

If a model is still considered to be too noisy for the field then it would not be unreasonable to ask the pilot to either modify the flight pattern or not to fly that particular model.

It should be noted that the BMFA have no record of any electric models causing direct noise complaints on flying fields, in clear contrast to i/c models ahich have to be built and operated with care to avoid such complaints

24. RADIO CONTROL TECHNICAL INFORMATION

The BMFA is an active member of the UK Radio Control Council (UKRCC). This is the body recognised by the Government Agency Ofcom as representing all modelling use of radio frequencies in the UK.

For more information check out the UKRCC website at www.ukrcc.org

24.1 Official Frequency Allocations

The specific frequency bands available for the use of radio controlled models are shown below, with the maximum effective radiated power output of the transmitter measured in milliwatts

Frequency (MHz)	Bandwidth (kHz)	e.r.p. (mW)	Use
26.96 to 27.28	10 or 20	100	General model control
34.945 to35.305	10	100	Air model control
40.66 to 41.00	10	100	Surface model control
49.82 to 49.98		10	General model control (SRD)
433.05 to 434.79	25	1	Data telemetry (SRD)
434.04 to 434.79	25	10	Data telemetry (SRD)
458.50 to 459.50	25	100	General model control
2.4 GHz	Wideband	100/10*	General model control
5.8 GHz	Wideband	25	Airborne video

* NOTE: 100mW e.i.r.p and 100mw/100kHz e.i.r.p. density when frequency hopping modulation is used. 10mW/MHz e.i.r.p. density when other types of modulation are used.

This and other information concerning modelling use of radio frequencies can be found in the Ofcom document OfW 311. You can view the latest copy on www.ofcom.org.uk (use the search box).

24.2 The 27 MHz Band

(a) Identification is by coloured ribbon attached to transmitter aerial in the colours as listed when using 20 kHz spacing and a white flag with channel number in black when using 10k Hz spacing..

(b) The channel spacing on this band is 10 kHz and all modern sets, with the CE mark, should meet this specification. However, many older specification sets are still in use and these have a minimum channel spacing of 20 kHz. This situation will remain for a number of years so if you are operating narrow band 27 MHz then be aware of the danger.

© You must not use an old 20 kHz split crystal in a new set. Even if you wish to transmit on the same frequency, a new narrow band crystal will be required in a narrow band set.

(d) The **27 MHz** band is legally shared by other users, in particular, model cars, model boats, citizens band operators and an increasing number of radio controlled toys. It therefore cannot be recommended for use by airborne models. In fact many clubs have already found it necessary to ban it completely.

(e) If you really must use it take great care particularly near urban areas and remember when you fly a model aircraft you are personally responsible for the safety of the flight. So think very carefully before proceeding because of the many sources of potential interference..

Chan.	Frequency.	Old Colour	Chan.	Frequency.	Old Colour
1	26.965		17	27.125	Orange-Yellow
2	26.975	Black	18	27.135	
3	26.985		19	27.145	Yellow
4	26.995	Brown	20	27.155	
5	27.005		21	27.165	
6	27.015		22	27.175	Yellow-Green
7	27.025	Brown-Red	23	27.185	
8	27.035		24	27.195	Green
9	27.045	Red	25	27.205	
10	27.055		26	27.215	
11	27.065		27	27.225	Green-Blue
12	27.075	Red-Orange	28	27.235	
13	27.085		29	27.245	Blue
14	27.095	Orange	30	27.255	Blue
15	27.105		31	27.265	
16	27.115		32	27.275	White or Purple

24.3 The 35 MHz Band

(a) The **35 MHz** band is SOLELY for model aircraft and under no circumstances must it be used for any other purpose, such as the control of surface vehicles. Transmitters must not be airborne.

(b) Identification is by orange flag with black or white channel numerals.

34.950	channel 55	35.070	channel 67	35.190	channel 79
34.960	channel 56	35.080	channel 68	35.200	channel 80
34.970	channel 57	35.090	channel 69	35.210	channel 81
34.980	channel 58	35.100	channel 70	35.220	channel 82
34.990	channel 59	35.110	channel 71	35.230	channel 83
35.000	channel 60	35.120	channel 72	35.240	channel 84
35.010	channel 61	35.130	channel 73	35.250	channel 85
35.020	channel 62	35.140	channel 74	35.260	channel 86
35.030	channel 63	35.150	channel 75	35.270	channel 87
35.040	channel 64	35.160	channel 76	35.280	channel 88
35.050	channel 65	35.170	channel 77	35.290	channel 89
35.060	channel 66	35.180	channel 78	35.300	channel 90

(c) To Identify the Channel Number of an Untagged Crystal,

(1) If the crystal is marked 34.xxx you subtract 40 from the first two numbers after the decimal point of the frequency marking, (i.e. 34.960, subtract 40 from 96 giving channel 56)

(2) If the crystal is marked 35.xxx you add 60 to the first two numbers after the decimal point of the frequency marking, (i.e. 35.260, add 60 to 26 giving channel 86).

24.4 The 40 MHz Band.

(a) This is for surface vehicles only and band identification is usually by green flag with white channel numeral. The band will use the last three numerals of the actual transmitted frequency as the channel identification, for instance,

40.665 MHz will be channel 665
40.825 MHz will be channel 825

(b) This band is SOLELY for surface vehicle use and under no circumstances must it be used for the control of model aircraft

24.5 The 49 MHz Band

The very low radiated power of this band would limit it to indoor use only. As far as is known no commercial equipment for model use is available, although it is widely used by the toy industry, including for indoor model aircraft. Transmitters may not be airborne.

24.6 The 433 MHz and 434 MHz UHF Bands

These are data telemetry bands for short range devices (SRD) and may be used to transmit data back to the transmitter. However they are not exclusive to model controllers and are shared with other users who are permitted to radiate relatively higher powers, so you must take care when selecting a channel for use in a particular locality. All equipment used must be type approved (ETSI 300 200-1) and therefore show the CE mark.

24.7 The 459 MHz UHF Band

Identification will be by channel numeral.

458.525	channel 1	458.850	channel 14	459.175	channel 27
458.550	channel 2	458.875	channel 15	459.200	channel 28
458.575	channel 3	458.900	channel 16	459.225	channel 29
458.600	channel 4	458.925	channel 17	459.250	channel 30
458.625	channel 5	458.950	channel 18	459.275	channel 31
458.650	channel 6	458.975	channel 19	459.300	channel 32
458.675	channel 7	459.000	channel 20	459.325	channel 33
458.700	channel 8	459.025	channel 21	459.350	channel 34
458.725	channel 9	459.050	channel 22	459.375	channel 35
458.750	channel 10	459.075	channel 23	459.400	channel 36
458.775	channel 11	459.100	channel 24	459.425	channel 37
458.800	channel 12	459.125	channel 25	459.450	channel 38
458.825	channel 13	459.150	channel 26	459.475	channel 39

The **459 MHz** is shared with various industrial telemetry and telecommand devices between 458.5 and 458.95 and to specialised telemetry beween 458.95 and 459.1, so users of these channels should be aware of the possibility of interference being present. The use of frequencies above 459.100 MHz (channel 24) is recommended. Transmitters may not be airborne.

24.8 The 2.4 GHz Band.

This is a worldwide Industrial/Scientific/Medical (ISM) band, similar in scope to the 27 MHz band.

There are two currently available types of equipment. One uses spread spectrum technology and does not operate on a fixed frequency. There are 80 channels available and each set uses two channels during operation. They automatically set themselves to a pair of unused frequencies when switched on. Operation is constantly self monitored and the set will move to an unused frequency if any interference is detected.

The other technology in use is frequency hopping which operates in a similar manner to mobile 'phones.

All should be self regulating when it comes to selecting frequencies to use and the two different operating systems can co-exist with each other. Consequently, no direct frequency control is required for the band.

.This band is useable for most regular R/C applications. It is also used by many computer applications such as wireless networking and Bluetooth devices but the method of operation of the equipment in this band means that the possibility of interference from such devices is extremely low.

The band may also be used by video equipment but only at a maximum radiated power of 10 mW.

24.9 The 5.8 GHz Band

The band covers 5.725 GHz to 5.875 GHz.

This band is used by most FPV video equipment. It has been divided into four bands A, B, E, and F, each band having 8 channels as the table below.

	1	2	3	4	5	6	7	8
A	5865	5845	5825	5805	5785	5765	5745	5725
B	5733	5752	5771	5790	5809	5828	5847	5866
E	5705	5685	5665	5645	55885	5905	5925	5945
F	5740	5760	5780	5800	5820	5840	5860	5880

As you can see the grey channels are illegal for use in the UK. Some commercial manufacturers may use a different range of channels some of which may also be illegal. Check very carefully the frequencies used by any video equipment you intend to purchase.

24.10 72 MHz Equipment

Contrary to some people's belief, **72 MHz IS NOT A LEGAL FREQUENCY FOR MODEL CONTROL IN THE UK.** A manufacturer's development license is available (under very strict conditions) to bona-fide designers/manufacturers from the DTI. Anyone using 72 MHz without such a current special licence is operating illegally and may face a fine and confiscation of the equipment. This licence is for genuine development work only and does NOT give the operator the right to use the frequency for normal R/C flying.

72 MHz is very widely used in the UK for communications purposes.

24.11 R/C Equipment Type Approval

In October 1998, harmonised standards for low power radio control equipment were introduced into European Union Countries. From that date all new equipment either manufactured or imported into the UK has to comply with the requirements for the issue of a CE marking

The European standards which apply to all newly introduced R/C equipment are ETSI 300 – 220 For Equipment pre 2.4 GHz and ETSI 300 440 covering Wideband (2.4 and 5.8 GHz) equipment. For full details see ofw 311 and IR 2030 available at www.ofcom.org.uk These also reference the above ETSIs.

It is therefore essential that any radio control equipment you buy and use carries an official CE marking.The CE marking is your only assurance that the equipment you own, or are intending to purchase, complies with the standards laid down by the Government. When purchasing your next R/C equipment, make a special point of looking for the CE marking; this is the only way you can be sure the equipment you are using is legal.

Notes:

(a) From October 1998 all newly introduced 27 MHz equipment must also carry a CE marking and be capable of operating at 10 kHz spacing. 27 MHz equipment manufactured before that date is exempt from this legislation.

(b) The 1998 legislation noted above was not retrospective so all 35 MHz equipment which was previously tested against the old SAME/MHTF Type Approval standards remains legal to use.

(b) Current legislation allows the CE mark to appear on the equipment itself, the instruction leaflet or on the box.

24.12 Synthesised Frequency Equipment

(a) 35 MHz synthesised frequency transmitting equipment is legal in the UK as long as it has been tested and carries the CE mark. There is, however, a limitation to its use in the UK that has been agreed with Ofcom and also at international level by the FAI.

(b) This is that any synthesised transmitter must have a two stage switch-on process. The first switch-on stage must NOT transmit but must give a clear indication of the frequency that will eventually be transmitted. This is to enable you to select frequencies safely and, more importantly, to obtain clearance from the site frequency control system.

(c) Only after you have done this should you activate the second switch-on stage which enables transmission.

(d) Synthesised frequency equipment will give you much greater flexibility in your frequency selection but it also has many pitfalls and you should take great care if you use such equipment. Remember that most people you are flying with will not have the same facilities and your operations must fit in with what is accepted as normal operating procedures.

(e) For instance, you should be showing a frequency flag and be prepared to change it if you change frequencies. You must take extra care when using the frequency control system as your opportunities to reserve the wrong frequency will be much greater. You may find that the ability of your transmitter to select any frequency will be viewed with suspicion by some and, in the event of interference being suspected, you could find that you are the first person checked. The only way to avoid problems is to be scrupulously careful in your operations.

(f) Finally, although synthesised sets have the potential to be more reliable and cheaper to produce than plug-in crystal sets, remember that they still use a fixed crystal in the transmitter module and the receiver and that any crystal can drift over time. You will still need to have your radio equipment checked occasionally as a master crystal drifting will affect all the other frequencies synthesised from it. Curing the problem will be a job for the importer/manufacturer and will not be as simple as just plugging in a new crystal.

24.13 Grey Imports

There is a small but increasing trend, driven in many cases by the ease of internet shopping, for flyers to directly import equipment from sources outside the EU for their own use. All frequency bands are affected by this and sets on both 35 MHz and 2.4 GHz are especially involved.

Now most of us are not familiar with EU and UK law on this subject but you should consider the following very carefully.

It is a fact that the onus for making sure that the equipment meets EU standards rests not on the manufacturer but on the original importer into the EU. This applies whether the equipment carries a real or bogus CE mark or no CE mark at all.

This means, of course, that equipment bought through the normal model shop chain is warranted to be legal by the major importers who do the original importing into the EU. However, if you have imported equipment directly from outside the EU for your own use then you are personally responsible for it's legal operation within the UK.

This is extremely important to you as a user because you may inadvertently find yourself in serious trouble if you are involved in an incident.

Just to take two instances;

(1) The application of bogus CE marks to equipment manufactured and supplied from certain parts of the far east is not unknown. If you have one of these sets you have no idea whether it is legal to operate or not.

(2) The USA and Canada have higher power limits for 2.4 GHz equipment than we do and it is known that most Spectrum sets sold there have been built to take advantage of these higher powers. If you have personally imported a set from the USA then it will almost certainly be illegal to operate in the UK unless it has been re-calibrated by the official importers.

24.14 Radio Control Licence

From 1.8.1981, model control equipment is **exempt** from the requirement of a Licence under Section 1 (1) of the Wireless Telegraphy Act 1949 subject to the terms, provisions and limitations set out in parts 1 and 2 respectively of the Statutory Instrument 1980 No. 1848.

25. THE BMFA COUNCIL OF MANAGEMENT

Otherwise known as FULL COUNCIL

25.1 Members of Council

The Council comprises the following members:

(a) **Elected Officers:**

Chairman Vice-Chairman
Honorary Secretary Honorary Treasurer
Technical Secretary Public Relations Officer
Records Officer FAI Delegate
Competition Secretary

These posts are for two years and are directly elected by postal ballot just before the AGM each year. To retain continuity, roughly half of the Elected Officers retire each year but may re-stand if they wish.

(b) **Area Delegates**

One accredited representative from each of the thirteen BMFA geographic Areas plus the RAFMAA, which operates as an Area. Each of these posts is elected by their individual Areas, usually at the Area AGM.

(c) **Co-opted Members**

Up to 9 co-opted additional members as determined by Council. The Council usually co-opts a representative from each of the Technical Committees to fill 6 of the co-options available.

(d) A delegate nominated by the Royal Navy Model Aircraft Association.

(e) A delegate nominated by Council to represent BMFA at the Royal Aero Club.

Additionally, the Royal Aero Club is itself entitled to nominate a delegate to sit on Council. Normally, this post is filled by the same person that is sent as the BMFA delegate to them (see (e) above).

(f) **Visitors**

Any BMFA affiliated club may apply to send an observer to any Council meeting. Application must be made in advance to the Chief Executive who will select two from those applying.

In addition, the Chairman of a meeting may invite whoever he wishes to attend. Standing invitations to Full Council exist for the Hon. Solicitor, the BMFA Newsletter Editor and up to two club representatives

25.2 Dates of Council Meetings

Council usually meets three times per year. Dates of the meetings along with agendas and reports of the previous meeting are carried in the Club Bulletin or they may be obtained from the Leicester office on request.

25.3 Council Sub-Committees

Some of the responsibilities of BMFA Council have been delegated to several Sub-Committees of Council, each of which has its own terms of reference.

The procedures for having items discussed by these Sub-Committees is exactly the same as for the full BMFA Council meetings and, unless the matter is urgent, proposals are allocated to the next most appropriate meeting. Voting rights at these meetings are given to those specified in the terms of reference of the meeting as laid down in the Council Handbook. The Sub-Committees are:

(a) **Areas Council**

Meetings take place three times per year and are attended by all Area Delegates and Area Chairmen, plus representatives of RNMAA. The meeting is Chaired by the Honorary Secretary with the PRO as Vice-Chairman.

Its main responsibilities are all Club and Area related business and the Achievement Schemes.

The Achievement Scheme Review Committee is a sub-committee of Areas Council and it advises the Council on all matters concerned with the operation and regulation of the Achievement Schemes.

(b) **Technical Council**

Meetings take place two or three times per year and are attended by delegates from all the Technical Committees. The meeting is Chaired by the Technical Secretary with the Competition Secretary as Vice-Chairman.

Its main responsibilities are all competition and safety matters.

(c) **Executive Committee**

Meetings take place as necessary but at least three times per year. They are attended by the Association's Elected Officers and the Chief Executive and are Chaired by the Association's Chairman.

It's main responsibility is the running of the Association's business affairs.

25.4 Proposals to Council

A great many of the ideas discussed by Council are generated by you, the members and clubs of BMFA, and any member can affect the Association's policies.

This section sets out how you go about having your ideas put forward as proposals or discussion items to a BMFA Council. It is not a difficult process and anyone can have their say on how model flying is run in the UK.

Constitutionally, only Council Members, Area Committees or Technical Committees may place proposals before Council but there are several ways that you as a BMFA member or club can have your point of view put forward.

You can attend your local Area meeting and discuss your ideas there. If you make a good enough case the Area will make the proposal for you and it will be presented to Council by the Area Delegate. On important matters you might be invited to attend the Council meeting but in any case you can apply to be an observer at the meeting through normal channels. Dates and contacts for your Area are available from the Leicester office.

If your ideas are more in line with the work of a Technical Committee, you can approach it directly and ask it to act for you. If the Technical Committee agrees then it will put the proposal forward to Council. Technical Committee contacts are available from the office.

If these two approaches fail, and you are still convinced that your point is valid, you can approach ANY Council member for help. They each have the power as individuals to put proposals forward to Council and will do so if your ideas have merit. Again, contact addresses are available from the office.

Finally, if all else fails, a letter to the Chairman of the Association will sometimes work.

You should be aware, though, that having what you think is a good idea might not be enough to have the idea placed before Council and agreed.

If you read this section carefully you will see that there is a natural filtering process in the system and you will have to convince a number of other people of the worth of your idea before it can progress.

26. THE COMPETITION RULE BOOKS

26.1 BMFA Rule Books

All the following rule books are available as free-of-charge downloads on the BMFA website or they may be obtained pre-printed from the BMFA Leicester office at a cost of £3.00 per book (books 3 to 7), plus an A5 SAE.

FAI Class rules are now excluded from these rule books, but they do include variations to the FAI rules where implemented in the UK. See below for full FAI rules.

Section 1 & 2 General Regulations and Rules
This section is issued free with sections 3 to 8.

Section 2a Records Rules
This section contains detailed regulations concerning record attempts and t is available free on request.

Section 2b UK Records List
This section contains details of all ratified UK records including the current records and holders and it is available free on request.

Section 3 Free Flight
All Outdoor and Indoor classes.

Section 4 Control Line
Speed and Aerobatics', Team Racing, Combat and Carrier classes

Section 5 Radio Control Power
Aerobatics (GBRCAA and IMAC), Helicopters, Pylon, Waterplanes, Sam 35 Vintage, Fun-Fly and FPV.

Section 6 Scale
Free Flight, Control Line, Radio Control, Indoor and Helicopters

Section 7 Radio Control Silent Flight Book 1
Glider and Electroflight classes

Section 8 Space Models
All Classes

26.2 FAI Sporting Code

Each section contains all the FAI rules for the discipline, including FAI Provisional rules.

CIAM General Rules	£4	Volume F3 Pylon	£5
Records	£4	Volume F3 R/C Soaring	£5
EDIC – Electronic Devices in Competition	£4	Volume F3 FPV Racing Model Aircraft V2	£5
Volume F1 Free Flight	£5	Volume F4 Scale	£5
Volume F2 Control Line V2 plus Annex 4J	£5	Volume F5 R/C Electric Powered Models	£5
Volume F3 R/C Aerobatics	£5	Volume F7 Aerostats	£5
Volume F3 FPV Racing	£5	Volume S Space	£5
Volume F3 R/C Helicopters	£5	Buy one discipline and each additional discipline is	£3

27. BMFA NEWS and WEBSITE

27.1 BMFA News

The BMFA News is published six times a year and is delivered direct to every full member's door. It has the highest circulation of any UK model flying publication and carries articles and photos of general interest plus news of BMFA activities.

It is also used to inform you of changes to the Achievement Schemes and many other areas of interest in addition to the official announcements that it contains. It will be to your advantage to read each issue carefully.

27.2 BMFA Website

The BMFA website at www.bmfa.org. is now the major source disseminator of information for the BMFA

The site is updated on a regular basis and carries an ever expanding list of the latest versions of many BMFA publications including advice on most aspects of model flying, all the booklets and leaflets mentioned in this Handbook, clublists, contacts, links to clubs, other modelling organisations, commercial sites, one of the busiest 'small ads' sections on the web and the most comprehensive contest and events calendar and results lists in the UK.

New features are constantly being added to the website so check it regularly.

28 TAILPIECE

If you have any comments or suggestions for the updates or the next revision, please contact the Technical Secretary via the Leicester Office.

David Varallo
BMFA Technical Secretary
May 2017