



Edited by

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**March 2007
Issue 1**

Introduction

This booklet is intended as guidance to beginners on the types of models that can be built and flown in the different classes and ways in which the beginner can progress to competing with world class model aircraft, all whilst having FUN.

There are hundreds of different types of models that you can build and classes of events in which you can participate.

This booklet is not intended to be a complete guide to all aspects of this sport but just a means of signposting the way. For specific rules on particular classes that you are interested in, contact the BMFA Office to obtain the relevant rulebook.

The editor has asked each of the BMFA Technical committees to write a short piece on their particular discipline.

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BMFA Technical Committees

There are six Technical Committees who control the model classes in the UK. They are as follows:-

FREE FLIGHT – Look after all free flight models that fly outdoors with the exception of Scale. They also look after Magnetically Steered models.

CONTROL LINE – Look after all classes of models flown on the end of a set of control wires, with the exception of Scale.

RADIO CONTROLLED POWER - Look after all classes of models controlled by radio and powered by an internal combustion engine or engines. It covers both conventional aircraft and helicopters, with the exception of Scale.

RADIO CONTROLLED SILENT FLIGHT- Look after all classes of models controlled by radio that are either gliders or powered by electric motors.

SCALE - Look after all classes of scale models.

INDOOR - Look after all classes of free flight models flown indoors, with the exception of Scale.

Additionally **MODEL ROCKETRY** is controlled by the Competition Secretary and covers all the Space model classes.

All the above classes have various competitions and flying events run both locally and nationally, with most types having classes that have European and World Championships run under the auspices of the Federation Aeronautic International (FAI).

FAI Class code explained

The FAI Classification code covers all forms of air sports both model and full size and covers every thing from hot air balloons through to space flight. Each Classification Code is made up of 3 digits made up of alpha, numeric, alpha.

For the general classification of 'flying models' 'F' has been given as the first alpha. However, 'Space Models' have a separate classification of 'S'.

For flying models 'F'

The second digit designates the general category of model as follows:-

- F1 – Free Flight
- F2 – Control Line Circular Flight
- F3 – Radio Controlled Flight
- F4 – Scale Models
- F5 – Radio Controlled Electric Powered Flight

The last digit is for the actual class of model as follows:-

Free Flight Duration

- | | |
|---|------------------------------------|
| F1A - Towline glider (A2 class) | Senior & Junior Championship Class |
| F1B - Rubber powered models (Wakefield) | Senior & Junior Championship Class |
| F1C - Internal combustion engine powered models | Senior Championship Class |
| F1D - Indoor rubber powered models. | Senior & Junior Championship Class |
| F1E - Magnetic steering gliders. | Senior & Junior Championship Class |
| F1F - Helicopter models | |
| F1G - Rubber powered models (Coup D'hiver) | |
| F1H - Towline glider (A1 class) | |
| F1J - Internal combustion engine powered models (1/2A class) | |
| F1K - CO ² gas motor powered models | |
| F1L - Indoor rubber powered models (EZB class) | |
| F1M - Indoor rubber powered models (Beginner class) | |
| F1N - Indoor hand launch glider | |
| F1P - Internal combustion engine powered models. | Junior Championship Class. |

Control Line

- | | |
|----------------------------------|------------------------------------|
| F2A – Speed models. | Senior & Junior Championship Class |
| F2B – Aerobatic models. | Senior & Junior Championship Class |
| F2C – Team racing models. | Senior & Junior Championship Class |
| F2D – Combat Models. | Senior & Junior Championship Class |

Radio Controlled

- | | |
|---|------------------------------------|
| F3A – Aerobatic powered models. | Championship Class |
| F3B – Thermal soaring gliders. | Championship Class |
| F3C – Helicopter. | Championship Class |
| F3D – Pylon racer models. | Championship Class |
| F3F – Slope soaring gliders | |
| F3G – Powered gliders | |
| F3H – Soaring gliders cross country racing | |
| F3I – Aero tow soaring models | |
| F3J – Thermal duration gliders. | Senior & Junior Championship Class |

Scale Models

- F4A** - Free flight flying scale models
- F4B** - Control line flying scale models. Championship Class
- F4C** - Radio controlled flying scale models. Championship Class
- F4D** - Rubber powered free flight indoor flying scale models
- F4E** - CO² gas motor powered or electric motor free flight flying scale models
- F4F** - Rubber powered free flight indoor flying scale models (Peanut formula)

Radio Controlled Electric Powered Flight

- F5A** - Aerobatic models.
- F5B** - Motor gliders. Championship Class
- F5C** - Helicopter.
- F5D** - Pylon racer models. Championship Class
- F5E** - Solar powered model aircraft
- F5F** - Ten cell motor gliders
- F5G** - Big electric powered motor gliders

Note —

There are also the following categories that are at present not covered by a Technical committee or rules in the UK.

- F6** - Airsports Promotion Classes
- F7** - Lighter than Air Classes

For space models 'S'

The second digit designates the actual class of model follows:-

Space Models

- S1** - Altitude models.
- S2** - Payload models.
- S3** - Parachute Duration models.
- S4** - Boost-glide duration models. Senior & Junior Championship Class
- S5** - Scale - altitude models.
- S6** - Streamer duration models. Senior & Junior Championship Class
- S7** - Scale models. Senior & Junior Championship Class
- S8** - Rocket glider duration models. Senior & Junior Championship Class
- S9** - Gyrocopter duration models. Senior & Junior Championship Class
- S10** - Flex-wing duration models.

Note each space model class, except class S7 has been subdivided related to engine size. They range from 'A' at 0 to 2.5 Newton seconds thrust through to 'F' at 40.01 to 80.00 Newton seconds thrust.

Outdoor Free Flight.

What are free flight models?

If you have already built a **BMFA Dart** then you have a 'free flight' model, albeit one most suited for indoor use, or outdoors on a very calm, dry day. Free flight models are those which need no outside control to fly safely after release. This is in contrast to radio controlled or control line models, which must be directly controlled throughout their flight. The free flight model is usually adjusted by its operator in order to fly in circles and to return to the ground after a pre-defined time. The model will be carried in the direction of the wind for a distance governed by length of time in the air and wind speed.

Free flight is the oldest form of model flying and has been a popular activity, both in construction and flying, since the start of the last century. Many of the pioneers of full size aviation such as A.V. Roe, Frederick Handley Page and Geoffrey De Havilland started their aviation careers with free flight models.

Most free flight models are powered by rubber motors, small electric or I/C engines, or are gliders launched with a towline or thrown by hand. Most are still built of balsa wood and tissue paper and weigh under 500 gm. Free flight continues today as both low key flying for fun, and serious competition.

The satisfaction for the non-competitive flyer comes from building and then flying a machine which is all your own work. Your building and operating skill allows you to enjoy the beauty of flight without intervention from the ground.

The challenge and the aim of free flight competition is pure and simple. Duration is the name of the game. Designing, adjusting and flying the aircraft to stay airborne for a few seconds longer is fascinating and the stopwatch is the unbiased judge.

Performance is limited by rules constraining total weight, wing area, towline length or power source. On a dead calm day with no air movement, the contest will be decided purely on model performance but these conditions are rare and thermal currents of rising air will usually play a major role in the flying. Spotting this 'good air' in which to launch is a large part of free-flight. Each contest is a series of flights (usually 3 or 5), with a maximum possible score for each one. If at the end of the contest there is a 'tie', a deciding 'fly-off' is held with no maximum time.

How to start?

Because of the diversity of types of free flight models, some simple, some complex, there have to be different approaches for the different ages of would-be fliers.

For the youngest flyers.

Children from 4 to 6 are best introduced to flying with small catapult gliders supervised by parents or teachers. These gliders should be up to 30 cm wingspan and made from balsa or foam. There are many ready-made models of this type available from model shops and some toyshops. Always read the instructions before attempting to fly. Choose an open area and for first flights always pick a calm day. If flights of 20 seconds are achieved the model and the model flier has done well.

For the next age group.

Children from 6 to 10 can still enjoy the models described above but there are many types of other ready-made models now available. Some are rubber powered, some are electric powered and some are powered by compressed air. Rubber can be a bit fiddly, compressed air can be fun but perhaps the most reliable form of power is electric. Foam models with a wingspan up to 50 cm can give flights of over 1 minute. More space will be needed and the flyer must remember to always fly from the upwind end of the flying field. Remember that the Wright brothers best flight on their first successful day was 59 seconds so anything over 1 minute is good.

From 6 and over

It may be a good time to increase the pleasure of free flight by building the model yourself. It is worth remembering however that there is more to building a model aircraft than the complete novice may expect and help from an experienced modeller will make all the difference. The rubber powered **BMFA Dart** can be flown outdoors on very calm days but it is a delicate model. There are other kits available and for newcomers of all ages, it is advisable to select simple models. Avoid at first very small models and 'scale' models that are replicas of full size aircraft. Tow-line gliders need only a tow line to get them in the air whereas rubber powered models need a winder, spare motors and rubber lubricant. Go for a glider of at least 90 cm span. Again more space is needed. It is a good idea to use a stopwatch to regularly time flights. In this way any adjustments that are made to the balance point and the flying surfaces can be assessed and used to learn the rudiments of the science of flight. **Always put your name and address on the model.** At this stage 2 minutes is a good time.

After these steps

For children who have progressed through the above steps and adults who want to start, if you have not already joined a club now is the time to do so or, at least, find someone else who flies free flight.

Where to fly?

Free flight fliers are not that easy to find! They tend to fly in remote places often early in the day or in the evening when it is nice and calm. Most of their models are quiet and do not attract immediate notice. Join the **BMFA**, seek out other fliers in your area, look in model flying magazines or the **BMFA News** for information about where free flight takes place. Arrange to attend a meeting and have a look, don't be frightened to ask questions. Decide which type of model appeals. Ask which is the best model to start with. Build the model accurately and trim it to fly smoothly. Seek more advice and, when it looks good, enter a club competition. This is the best way to learn. Gradually the full range of free flight models and competitions will become apparent.

Even if you cannot find a free flight club locally go along to one of the bigger competitions advertised in the model press, **BMFA News** or **Free Flight News**. Also make a date to attend the Free Flight National Championships (the Nats.) held on the end of May Bank Holiday each year, usually at RAF Barkston Heath near Grantham. There you will see all types of free flight, sports flying and competition, and come away inspired and informed.

What is the cost?

Most free flight models are cheap to build and operate and provide an ideal entry point to model flying. A simple glider or rubber powered model built from a kit or one of the many plans available can be built for under £30 and many of the materials purchased will be in quantities that will leave spare for subsequent models. You can then start enjoying free flight.

If you choose a P30 class rubber model, a hand launched glider or a simple towline glider, then very little additional equipment will be needed for that first club competition. Once the free flight bug really bites then things can get more costly. However engines suitable for sport flying only need cost around £40 and a fully competitive rubber or glider competition model can be built for well under £70.

The basic equipment required is a stopwatch and binoculars plus essential items to operate your particular model, like towlines, rubber motor winders and fuel for engines powered models. Later on additional equipment can be radio beacons and receivers, GPS, and perhaps a bicycle to help with retrieving.

To build or not to build?

We have so far described a route into free flight from the starting point of a simple **BMFA Dart** which assumes that the model flyer will also wish to be a model builder. Many of today's lifelong enthusiasts for aeromodelling and many of our most experienced and successful contest fliers build their own models from basic materials and by doing so obtain maximum satisfaction and world class results.

However, it is no longer necessary for the beginner to build his own models or even for the International contest flyer to do so. Just as in other branches of model flying, the ready built, ready to fly model is available in free flight. At the junior end flying toys are plentiful. At the top end, International class competition models are available ready to fly in Glider, Power and Rubber types. You need never even fasten two components together but can still make the UK free flight team and compete in World or European championships.

All it takes is money and hard earned flying skills. An International class model will cost between £600 and £1,500 depending on the chosen class and degree of sophistication. To compete internationally you will need at least three of them. So with the necessary support equipment you can be fully set up for perhaps £6,000. Cheap compared with many sports.

However, in the UK all the domestic free flight classes, with the exception of the major International competition classes (F1A, F1B and F1C) require that you build your own model. So both alternatives are available. Make your selection to suit your tastes (and pocket). If your ambitions are to go on to International competition then bear in mind that getting the best performance out of a purchased model requires skills that are best learned in the building and operation of your own creations. Ultimately the flier of purchased models may well wish to make some modifications to incorporate his own ideas and then those early learned skills will be vital.

Magnetically Steered models.

International competition class F1E is flown from a slope whereas most other free flight classes are flown on large flat areas, outdoors.

By contrast, F1E models fly into the wind and therefore remain in sight for much longer—in fact the ideal flight is one that lands after dethermalizing, at the point of launch!

The model is basically a glider, and the average size is about 2 metre (6 feet) span. It has a bar magnet which is pivoted to allow it to swing in a North-South direction, very much in the same way that a compass-needle seeks North. The magnet is attached to a rudder, which makes the model fly into the wind.

Components for the steering units are available by mail order, and cost around £35. This outlay

is a once-for-all cost, as no fuel, rubber, gas or electricity is required

Contests are flown in rounds, each of which has a declared maximum (target) time of between 2 and 5 minutes. Slopes are often shared with radio controlled slope soaring gliders under a mutual arrangement.

Further reading.

Magazines to read are Radio Control Model Flyer (in spite of the title it contains a lot of free flight information) and Aviation Modeller International (AMI).

Books to read are 'Building and flying rubber Powered Airoplanes' and 'Flying models' (both by Don Ross) and 'The Book that Flies' by Bob Bass and Martin Dilly (out of print but try your library or the internet)

Contacts and materials.

If your interest is in free flight competition then subscribe to **Free Flight News**.

If sports and fun flying is your interest then join SAM 35. This society specialises in vintage models but is a good source of designs and information for both sport and low key competition flying.

Beginners models can be obtained from Flying Toys Ltd and many model shops.

Most model shops have some kits and materials for free flight but this tends to be limited by their focus on radio control. The best sources of free flight materials are the specialist mail order suppliers such as Flitehook, Free Flight Supplies and Sams Models.

Addresses:

Flitehook, 42 Player's Crescent, Totton, Southampton, Hants. SO40 9AZ.
Phone-023 80861541

Free Flight Supplies, 12 Marston Lane, Eaton, Norwich, Norfolk, NR4 6LZ, UK
Phone - 01603 457754 www.freeflightsupplies.co.uk

Sams Models, The Chapel, Sandon, Buntingford, Herts. SG9 OQJ
Phone - 01763 287606 www.samsmodels.demon.co.uk

SAM 35.

Society of Antique Modellers, Secretary and Membership
Alan Chatfield, 27 Causeway Terrace, Watchet, Somerset, TA23 0HP
Phone – 01984 634631 email alan.val.chatfield1@sagainternet.co.uk

Free Flight News
7 Ashley Road, Farnborough, Hants, GU14 7EZ
email ffn@btinternet.com

Radio Control Model Flyer— News agents and model shops

Aviation Modeller International (AMI) - News agents & model shops

BMFA News—Free by post to BMFA members

Control Line.

What are Control Line models?

Control Line (CL) models all have one thing in common - they all fly connected to the pilot's hand by lines, which restrict the flight path to a hemisphere and give the pilot control over the model. The simplest control uses two lines that allow the pilot to move the elevator that makes the model climb or dive. More complex systems use three lines, where the third line controls the throttle to allow the model to fly at less than full power. Some Speed models (see below) use only one line. This is known as "mono-line".

Just about all modern CL aircraft fly using stranded steel control lines that give a good margin of safety and the majority use internal combustion engines (glow fuel or diesel) that give more than adequate power. Electric power is also possible.

Many CL fliers fly just for fun and build models that give them pleasure in building and flying without regard to the rules that regulate competition flying. However, competition flying gives an added dimension and there are a variety of classes where regular contests are held culminating in the **BMFA** Power Nationals in August each year. These classes include:

Speed	Pilots fly one at a time against stopwatches. The fastest model wins.
Aerobatics	Pilots fly one at a time before judges. Describe specific shapes in the air.
Team Racing	Three pilots fly together. Racing with pit stops for refuelling.
Scale	Pilots fly one at a time before judges. Miniature versions of full sized aircraft. <i>See Scale section also ED</i>
Carrier	Pilots fly one at a time, take off and land on a model carrier deck.
Combat	Two pilots fly at one time each model has a streamer tied to its tail and each pilot tries to cut the other model's streamer.

Competition CL flying has many levels from club competitions, through to national and international competitions and culminating in European & World Championships.

How to Start.

By joining a club or seeking an experienced control line flier, you will be able to progress quickly and have your many questions answered. Choose a model that is easy to build and repair. This may well have a profile fuselage and be powered by a 1.5 cc - 2.5 cc engine (0.9 - 0.15 in³). Line length will be 35 - 50 (15-25 metres) feet and the model will have about a 30" (76 cm) wingspan.

Where to Fly.

Take advice from the club or contact your local authority to find out what the regulations are about flying in local open spaces. Flying control line models is not a dangerous sport but you will need to learn how to tackle starting an engine and setting up the flying session so that the risks are minimised. Learning with an experienced modeller will be easier, more fun and will help ensure that your model stays in one piece for longer!

What is the Cost?

Allow around £35 for materials or a simple kit of parts and approximately £55 for an engine. Many households will already have the simple tool kit you will need to start with but expect to add to your toolbox as you progress. At the end the model will cost a few pounds for finishing

and for a flying kit of control lines, fuel, propellers etc. The cost can be spread out over the construction period. Do not forget that most experienced modellers have all sorts of unused kit and a keen beginner can often beg or borrow bits and pieces to get you started.

Further Information.

Unfortunately, books on control line are mostly out of print but do turn up regularly on the eBay auction web site and in second hand bookshops. There are a number of web sites that have information and are a source of contact with others who have an interest. The BMFA web site is worth looking at, www.bmfa.org. Copies of the modelling magazines (*Aviation Modeller International* and *Radio Control Model Flyer*) also contain articles on Control Line Flying from time to time.

Contacts:

Kits and control line accessories including line and props etc:

PS Aeroproducts 46, Hillside Gardens, Edgware, Middlesex, HA8 8HE (Paul Winter) www.psaeroproducts.org

Engines, lines and props

Progress Aero Works Union Mill, Union Street, Macclesfield, Cheshire, SK11 6QG
www.paw.ac

Big range of control line kits, lines and tanks:

Hallam Models 69, Bolehill Lane, Sheffield, S10 1SA
(01142 665624) (Send a stamped self-addressed envelope for lists)

Plans for control line models are available from:

Model Activity Press, 5 Chiltern Business Centre, 63-65 Woodside Road,
Amersham, Bucks HP6 68A.

Email: modelactivity@btinternet.com

Model Flyer (Plans), ADH Publishing, Doolittle Mill, Doolittle Lane, Totternhoe,
Bedfordshire, LU6 1QX.

Email: modflymag@aol.com

Vintage Combat Plans

Tim Hobbins, 2 Clover Court, Brigg, North Lincolnshire, DN20 8FE
Send a stamped, self-addressed envelope for lists or email: tim.hobbins@fsmail.net

For more information and email help:

<http://members.aol.com/controllineUK> (email: controllineuk@aol.com)

www.controlline.org.uk (Barton Club)

www.bmfa.org.uk (National organisation - vital for insurance and model flying news)

www.combatflyers.co.uk (Combat Flyers Association)

The model press:

Aviation Modeller International and Radio Control Model Flyer
from your newsagents or W H Smith

Control Line Technical Committee 01-01-06
Acknowledgements to Steve Waller, Control Line UK

Radio Controlled Power

Radio Control Aerobatics.

What are Aerobatic Models?

Aerobatic model aeroplanes may resemble a full size aircraft or be developed specifically for the task of flying smoothly through a set of manoeuvres. The aircraft is controlled by a pilot using a radio transmitter which sends commands to the radio receiver and other electronics in the aircraft which make the aircraft follow the pilots instructions.

These aircraft may be powered by internal combustion engines or electric motors which will give a good power to weight ratio, allowing the model to be pulled vertically without effort. Lightweight electric models made from Depron may be flown indoors and their speed be little more than walking pace, the larger heavier models flying at speeds in excess of 80mph, need space in which to fly and a runway for take off and landing.

There are many classes of aerobatic aircraft, of which one class is specifically designed for precision aerobatics. These have to conform to international rules and fly through a set of predetermined manoeuvres in an imaginary rectangular box of some 520 metres long by 260 metres high at approximately 150 metres in front of the pilot and judges. These aircraft usually weigh around 4.5 kilograms (the maximum limit is 5kgs) and are powered by internal combustion engines of around 26cc, which may be two stroke or four stroke and may be supercharged and fuel injected. Electric motors are being developed to produce the same power now that Lithium polymer batteries are available. Precision aerobatic competitions are organised by the Great Britain Radio Control Aerobatic Association who also select the British team to compete at the European and World Championships. Visit www.gbrcaa.org for more information.

How to start.

Safety is paramount. Revolving propellers can be very dangerous and exhaust systems get very hot. Noise must always be a consideration when flying models, so follow the guide lines in the BMFA handbook. There are many developments which can help reduce the noise of an engine, and remember the public may be enjoying the quiet of the countryside. A competition aerobatic model is highly developed to keep noise to a minimum.

The best way to start flying radio controlled aircraft is to find a club and seek their advice before you spend any money. A trainer of around 1.5 meters (59") wing span usually with an engine of around 0.40 cubic inch capacity with four channel radio equipment, controlling ailerons, rudder, elevator and throttle is the norm. The configuration of the transmitter, known as Mode 1 or Mode 2 will be an important decision and any good club will provide the advice and an experienced instructor to help you through the early days of flying. Many hours of instruction will be required to fly safely, but practice is the key element.

How to progress onto flying precision aerobatics.

Use the model you are flying at the moment providing it will do a loop and a roll. All loops should be round. Central manoeuvres should be around the centre line of the box and end manoeuvres should be within the box. Lines should be level and straight, loops round and all arcs within the manoeuvre should be of the same radii. Wings should always be level and entry and exit to rolls and loops should hit the intended line of flight without hesitation. Wind correction should be with the use of rudder. Use of throttle through a manoeuvre is as important as any other control surface. Ask another club member to call the manoeuvres and count you

down to the centre line, so that you as the pilot, can concentrate on flying the model accurately through the manoeuvres.

Where to fly.

When you find a club they should have facilities to help you fly the model safely, but always follow the club rules. The control of radio frequencies is of high importance, so the club will have some system of making sure that no two pilots switch on their transmitters on the same frequency at the same time. The **BMFA Handbook** states that clubs should not operate within a two mile distance of each other to ensure there is no interaction between radio signals. Do not switch on your transmitter unless you are on a recognised flying site and have the clearance to do so, or for testing at home be sure there is no one flying within a two mile radius of your transmitter and then only switch on if the transmitter aerial is retracted.

What is the cost?

The cost of models vary from a ready built trainer referred to as ARTF (almost ready to fly) to thousands of pounds for a custom built aircraft incorporating composite materials for strength, lightness and accuracy. As well as the model, engine and radio equipment you will need auxiliary equipment to help you fill the tank, energise the glow plug and start the engine. £250 or so should cover your first trainer and equipment. As you progress you may wish to fly an aircraft designed for competition and use more sophisticated radio control equipment. Although the aircraft can be built from a basic kit the use of high tech materials increases the price and a professionally built, top of the range model could cost around £5000.

Further reading.

Most of the information you require will be found at www.gbrcaa.org or contact the Associations Public Relations Officer through the web site if you can't find the information you are looking for.

Radio Controlled Helicopters

What is a Helicopter?

A helicopter is a heavier-than-air aircraft that derives all of its lift and horizontal propulsion from a power driven rotor system rotating about a nominally vertical axis.

Ground effect machines (hovercraft), convertiplanes or aircraft that hover by means of propeller slipstreams deflected downward are not considered to be helicopters!

How to start?

Model helicopters, in common with their full-size counterparts, have a reputation for being tricky to handle. They are also very complex mechanically, perhaps the most complex of all models. In the early days, pioneers of model helicopters had to teach themselves the techniques necessary to master these machines. Nowadays, there is a vast wealth of experienced model helicopter pilots, who are only too willing to help beginners in their first tentative steps.

Be warned! A model helicopter is potentially an extremely dangerous device - especially in inexperienced hands! Before attempting to fly one, seek out expert advice. The **BMFA** maintains a list of clubs in most areas who should be able to assist novices in learning the art of flying a helicopter. Many model shops will also offer training on machines which they have supplied. In addition, there are several commercial flying schools offering training in flying and maintaining helicopters.

There are also many extremely good simulator programs available for computers, that will greatly assist in developing the necessary reactions for sustained flight.

Because of the cost of a model helicopter, and the potential hazards associated with its operation, they are NOT suitable for use by young children - except perhaps under close, expert supervision!

Where can I fly?

Legally, it is permissible to fly a model helicopter anywhere where there is no bye-law (or other law e.g.: air traffic control zones) prohibiting it.

However, just because it is permissible to fly one in the local park, doesn't mean it is a good idea! Experts can make flying one in a confined area look extremely easy, but such expertise can take years to accumulate. Holding a helicopter on the spot is one of the hardest manoeuvres to achieve. Additionally, whilst a helicopter may not be particularly fast compared to other aircraft, they accelerate extremely quickly! For these reasons, trying to learn to fly in a public space, or even in your own back garden is **NOT** to be recommended!

Most clubs have private sites where novices can learn without endangering members of the public, or even other modellers!

What is the cost?

To build a basic model helicopter from new, including all the radio gear and engine, is likely to involve spending several hundred pounds. A model capable of competing at international competitions may well be worth a few thousand pounds!

However, there are frequently good second-hand machines available - from pilots who are moving up the ladder, perhaps - that can significantly reduce the initial outlay.

As with purchasing any second hand complex machinery, always seek the advice of an expert before parting with any money! Car boot sales are generally **NOT** a good place for picking up a worthwhile machine!

What skills are needed?

A model helicopter is a complex machine, with a high level of maintenance required for reliable operation. Having said that, anyone with a good mechanical ability should have no problem building or maintaining one.

As to the flying, although this is tricky, it is not impossible! It can be compared to learning to ride a bicycle - there is a knack to it, and once mastered, progress is usually swift.

It helps to be able to do one thing with one hand, whilst simultaneously doing something different with the other!

Anyone who can play a musical instrument will already have some of the skills necessary!

Competitions.

There are several kinds of contests for helicopters. The only internationally recognised category is F3C aerobatics, which can be likened to fixed schedule ice figure skating.

Competitors fly a pre-determined schedule before a panel of judges, and the winner is determined by the accuracy and precision with which he performs the manoeuvres.

“3D” competitions involve violent aerobatics, which push both man and machine to the limits, frequently close to the ground. Although there is no fixed criteria, the object is to impress the judges as much as possible without wrecking the model!

There are also scale contests, and novelty events. Novelty contests usually involve seeing who can knock the most bottles off a table in 2 minutes, or fly most figure of eights around two bamboo poles in a similar time. Another popular contest is the “auto-spot” where the engine is cut, and the model glided down to a spot on the ground. Whoever lands nearest, wins!

Further reading.

At present, there are two dedicated helicopter magazines, Model Helicopter World, and Rotorsport. In addition, most other model magazines run helicopter articles fairly regularly.

Contacts:

The Aerobatic Helicopter Association
www.aha-online.org.uk

Scale Aerobatics, fixed wing.

International Miniature Aerobatic Club UK.

So you have just passed your BMFA `B` test and you want another challenge. Ever considered competition flying? The aim of **IMAC UK** is to promote the flying of scale aerobatic models in competition like their full-scale counterparts. For example, the models used are Extra's, Cap's, Yak's and Giles and are readily available in kit and ARTF (Almost Ready To Fly).

2006 saw the introduction of the Basic Limited class. This is a class newcomers who fly scale models of 1.778 meters (70") wingspan or less. The sequence of maneuvers to be flown are well within the capabilities of a pilot who has recently passed their **BMFA** 'B' Certificate.

There is a promotion system in **IMAC UK** starting in Basic class going through sportsman, advanced and finally unlimited. However if one thinks that the basic limited class is not challenging enough they can go into sportsman to start with.

Competitions are held around the country including the Nationals and Woodvale. Competition venues and dates can be found on the **IMAC UK** web site as well as in the **BMFA News** and in the popular magazines.

The maneuvers flown are taken from the `Aresti Catalogue of Aerobatics'. Starting with the basic maneuver shape for the limited basic class and progressively more complex as the classes go up through to unlimited.

The sequence of maneuvers are put into a schedule and is a turnaround sequence with maneuvers at center and both up and down wind limits. The limits become an imaginary box in the sky and are known as the 'Aerobatic Box'. The box limits are 70 degrees to the left, 70 degrees to the right and 70 degrees up into the sky from the pilot on center.

If you do not have a scale aerobatic model and you want to have a go at IMAC try a kit or ARTF from one of the following examples of manufactures.

Glen's Models, Black Horse, Goldberg, Cermark, Great Planes and Horizon.

If you get bitten by the **IMAC** bug like all disciplines in competition, you will become a better and more disciplined pilot. You will get to see and fly at other sites around the country and you will make new friends. We have become a friendly bunch in **IMAC** who are always happy to help one another.

For more information and how to get into **IMAC UK**, contact can be gained through our web site. www.btinternet.com/~b.colclough/imacuk.htm or 01432 851538 pm. On this site, you will see the competition calendar as well as joining forms. Another good site is the **US IMAC** web site www.mini-iac.com. This site has a wealth of Information.

Editors Notes — Pylon racer models have not been covered in this booklet. Please contact the BMFA Office if you require more information on this class.

Radio Controlled Silent Flight.

As you learn the basic skills of flying a radio-controlled glider probably the last thing on your mind is entering competitions.

However, even the keenest and most successful of silent flight competitors had to start somewhere.

Competition flying is the finest way to develop your skills beyond the basics, because in competitions you are testing your skills against your fellow flyers and in doing so you will be flying to new limits.....pushing your own performance 'envelope'.

There are as many and varied classes of competition in silent flight as there is in power. The variety goes from 1.5 meters (60") hand launched duration classes, through to scale glider competitions, launched from the slope or aero-towed behind a powerful tug model aircraft. In between you have speed, aerobatics, electric duration and pylon racing, flat field thermal duration, slope cross-country; in a word something for everyone.

The first place to look as a start point is your local club where you learnt to fly. Many clubs hold fun competitions or quite easy going club events which are a gentle way in. If you are having difficulty finding a silent flight club (it's a sad fact but in reality power flying and silent flight don't really mix very well, because of the huge differences in technique and equipment needed, and anyway who wants noisy power models disturbing the elegant silence of glider flying?).... and there are lots of them, you should contact the **BMFA** who hold a listing of Silent Flight orientated clubs, or the **British Association of Radio Control Soarers**, who not only provide the said listing of clubs to the **BMFA** but will also know where all the keen silent flyers are based even if there is no club to hook up with. (**BARCS**: Chris Moynihan, 01753 889825 or chris@cmoynihan.flyer.co.uk).

Traditionally the entry route into competition flat field thermal soaring competitions was with a 100-inch span hand towed model. If you learnt to fly on gliders this is probably the sort of model you learnt on. This is still a good way in, as the models are simple with only rudder and elevator control and possibly brakes as well; invariably they have comfortable dihedral to enhance stability and controllability.

More recently with the advent of cheapish efficient electric motors with much improved battery technology, there are now many competition classes for electric 'self-launching' powered gliders. This does away with lines, winches and towmen and solo flying becomes a doddle. One of these will also give you more airtime because a standard battery pack should provide about three climbs to an altitude of 200-metre for every charge. Electric silent flight has lots of popular competition classes from duration on limited size battery packs to full on pylon racing.....although these are still broadly captured under the heading of silent flight, such models have an awesome performance and bear no resemblance at all to gliders!

Yet another way in if you like slope flying is to go along with a purpose designed foamie 60-inch span pylon racer, head for the nearest slope used by the local flyers who will doubtless know the date and place of an upcoming 'foamie' race meeting. These are great fun...the modern foamie racers have a speed performance close to that of moulded models and if the worst should happen these racers tend to bounce rather than crumple.

Once at this stage in your chosen type of silent flight, the best advice is to take a look at a local competition, preferably with a club colleague who is already into the competition circuit who can

explain what is going on and remove some of the fears you may have about having a go. The **BMFA, BARCS and BEFA (British Electric Flight Association)** all publish their competition dates and venues on their web sites.

The joy of competition flying lies in the satisfaction of using the same environmental factors (thermals, slope lift etc) as your competitors and doing it better than them, or achieving a level of performance beyond your own previous expectations. Even if you don't win, which you most certainly will not to start with, you will pick up so many learning points that your level of ability will come on so quickly that you will soon be challenging for the top spots. Don't believe those who tell you that competitions take the fun out of flying and that it is all too serious; it is just the opposite and with gliding, competitions can be likened to all the types of sailing events as opposed to the ones for power boat. In glider comps you need judgement, the ability to read the sky and conditions and often a whisper light touch on the sticks....pure magic.

Glider comps are always friendly events because everyone needs the help of other competitors to take part fully, so everybody helps everybody else.

What is the cost?

Most competitions charge a small fee to enter, generally most of this money goes towards the prizes fund. Some of the larger national and international events are a little more expensive, however, it is well worth entering this type of event due to the high number of entries.

Scale modelling.

Within the scope of this booklet it is very difficult to guide the beginner into the world of scale modelling. This is because Scale is an “attitude of mind” rather than a clearly defined single class or type of model. Almost all of the types of models described in this booklet can be built and flown as a ‘scale’ model. A radio-controlled model can be a ‘scale model’. As can a control line model, a free flight model or a model rocket.

The one thing that is a constant is that the people who build and fly any sort of scale model ALL have a keen interest in re-creating, in miniature, the form, shape and atmosphere of a real flying machine. The interest can be shown in any era of flight from very early flying machines like the Cayley Glider to the Space Shuttle. In between are the aircraft for warfare, both WW1 and WW2, the aircraft for transport of people and freight, and those purely for recreation.

The choice of subject aircraft and type of model is almost endless but what makes scale so special is that in our world the end result is that our creations must FLY. This is not easy to achieve and it is true to say that the nearer you go to creating a highly detailed model, the more difficult it becomes to make it fly. If your interest leads you to the scale model, then throw out the idea of a four-engined Lancaster, which has working flaps and undercarriage. Start with a simple aircraft and make them fly, then much later you will have the skill and knowledge to tackle the complicated aeroplanes.

If you decide that building and flying scale models interests you, then the first step is to get some experience in building and flying sport models as described elsewhere in this booklet. When you have gained a little experience then it is a time to think about your first scale project. Discuss your plans with an experienced scale modeller who will be able to assist and advise you with your first scale project. This may be from a kit, a plan or almost-ready-to-fly.

As you progress you may find that your enthusiasm and skills increase to the point where you would like to compare your efforts with those of other modellers. Competitions for all types of scale models are held, sometimes within clubs or sometimes within groups of modellers with specific interests. The ultimate gathering for most scale modellers is the **British Model Flying Association Scale National Championships**.

It is only at the pinnacle of scale model flying that it becomes serious, for the vast majority of scale model flyers it is quite simply, Great Fun.

For further advice or help contact either the Technical Committee of your chosen model type or, particularly if you are interested in competitive scale flying, the **BMFA Scale Technical Committee**. www.bmfa.org

Editors Notes — From my own experience most scale contests require that the entrant has to produce scale documentation of the aircraft built. It is therefore important to be able to obtain documentation to the best standard before building the model type.

Also in some scale types there is a reduced standard class for beginners for instance the Clubman Radio-control Scale Contest.

Indoor Duration.

What are indoor duration models?

Quite simply they are free flight models designed to fly in the calm limited space of a clubroom, sports hall, school gymnasium or best of all a large space such as the airship hanger at Cardington near Bedford. All the specifications for the official **BMFA** indoor contest classes are to be found in the FREE FLIGHT rules book available from the BMFA office, price £3.00.

The larger the model the larger the space it needs to fly in. You can fly a Living Room Stick model in a living room or classroom.

The main types of models flown are those that are rubber powered but there are also gliders. These gliders are both hand launched and catapult launched. There are also CO₂ and electric powered models. However, I will concentrate on rubber-powered models.

How to start?

The **BMFA Dart** can be flown well in a school sports hall giving best flights of about 45 seconds. The follow up model is the Gyminnie Cricket (38 cm span, 20g wt, 1-2 min. flights). The next duration class should be a Novice Pennyplane (457.2 mm span, 2-3g wt, 10 min. flights) going on to EZB model (457.2 mm span, 1.2g wt, and 20 min. flights) and lastly F1D model (550 mm span, 1.2g wt, 40 min. flights)

The Living Room Stick class (177.8 mm span, 0.43g wt, 5-10 min. flights) is best made after building a Novice Pennyplane, however there is an almost ready to fly version available called the Butterfly which can be purchased from Flitehook at a reasonable price.

A good way to start is to go along to a flying event and have a look at the models. Most indoor modellers are only too happy to talk about their models.

Where to fly.

The key to indoor free flight is finding a suitable hall. Some Clubs hire school halls for 2 to 3 hours. Larger events are run in sports complexes. Most are held in winter for 8 hours on either a Saturday or Sunday. Flying is a mixture of fly-for-fun and competitions. The Indoor Technical Committee have run events in the summer at the Manchester Velodrome and the famous airship hanger at Cardington, near Bedford. Cardington is vast, 305m x 92m x 46m high, and had plenty of room for all types of flying, with the exception of IC engines and Radio Control. However at the time of writing both the above sites are unable to be used and new sites are being sought.

The **BMFA News** contains a Contest calendar giving dates and venues for Indoor events.

What is the cost.

Free flight indoor models are not expensive to make, as the amount of material used is small. However, the type of material used is not commonly available at your local model shop. There are two specialist suppliers in the UK, Flitehook and SAMS. There are also indoor suppliers in America who do mail order.

Raw materials to build a Novice Pennyplane will cost about £30 but you will have enough to make 4 or 5 models.

The following additional equipment will have to be made or purchased before you can go flying. A sturdy box made from corrugated card or plywood is required to transport and store your models. You will also need a rubber winder costing from £10. Later you will find it a good thing to have a Torque Meter that you can either make or buy, a Rubber Stripper that will cost you around £100 and a Roach Pole for steering the model that can be obtained from a fishing tackle shop for £30 upwards.

Further reading.

The two 'bibles' of indoor flying are "Building & Flying Indoor Model Airplanes" by Ron Williams and Indoor Flying Models by Lew Gitlow. Both are American and out of print. A look on the internet may also be of help.

Contacts.

For indoor materials contact: -

Sams Models, The Chapel, Sandon, Buntingford, Herts. SG9 0QJ

Phone – 01763 287606

www.samsmodels.demon.co.uk

Flitehook, 42 Player's Crescent, Totton, Southampton, Hants. SO40 9AZ.

Phone-023 80861541

General advice and information can be obtained from Indoor Technical Committee Members. Contact the BMFA Office for the name and phone number of your nearest one.

Space Models

What are *Space Models* – or *Model Rockets*?

Many things to many people! Simply put, Model Rockets are lightweight projectiles – normally made from a cardboard tube, with a plastic or balsawood nosecone and plastic or wooden fins. They are powered by commercially available *Model Rocket Motors*, which come in a range of powers, or *impulses*...to use the correct terminology. These contain a *propellant*, to boost the rocket away from the ground, a *delay element* to allow the bird to coast on upwards after propellant burn-out and an *ejection charge*, to blow out the recovery parachute, for a safe return to the ground. How high do they fly? Well this is up to you, *Rocket Scientist*, Model Rockets come in all shapes and sizes and powered by a range of motor impulses. Most commonly, altitudes range from 200-2,000 feet (80-800 m). A rule of thumb is that boosting to 100s of feet normally equals a safe recovery, whereas boosting to 1000s of feet equals losses!

At a more advanced level, scale models, gliders, gyrocopters and contest models can be designed, built and flown. In addition, links with *Personal Computing* exist - computer software is obtainable, to facilitate rocket stability determinations, altitude prediction and as an aid to design, across the spectrum. *Model Rockets*, or *Space Models*? The terms are interchangeable, with the former more common in the UK & USA, the latter in other parts of the World.

How to Start.

..Probably more easily than in any other facet of model flying! Starter Sets – typically by *Estes & Quest* – are available in hobby and toyshops and the brilliant instructions almost guarantee success. These Starter Sets contain a simple rocket kit – often with pre-moulded fin and nose assemblies, a recovery system in the form of a simple polythene parachute, a launch pad unit...PLUS, an *Electrical Launch Control System* – all Model Rockets are launched by this means and, not fuse & match!! **BMFA** publishes an easy to understand *Model Rocketry Safety Code*, which details the procedures to be followed when flying Model Rockets.

Organised Model Rocket meetings take place around the UK, where advice will be freely available...and progress assured! Replacement Model Rocket Motors, more advanced kits and building materials are available in many hobby shops and specialist outlets.

Where to Fly.

An organised get-together is recommended to guarantee success! However, many potential rocket flyers will be given a Starter Set for Christmas, or birthday and will want to go out and fly closer to home. Really, any large field, or recreation ground, clear of airports, busy roads and housing can be used – but check the local bye-laws first.

When to fly? It is best to choose a really calm day to start. Even powered by low impulse motors, Model Rockets will drift a long way under a parachute, if conditions are windy. In fact, when flying simple, lightweight rockets, substituting a coloured crepe paper streamer for the parachute will improve recovery prospects remarkably – much less wind drift and the coloured streamer easier to see on the ground, or undergrowth. **BMFA News** often contains details of Model Rocketry flying meetings around the country.

What is the cost?

Around £30 will get the novice off the ground – this is the approximate cost of an *Estes*, or *Quest* Starter Set, which normally contain three Model Rocket Motors – often 2 low power + 1

higher impulse - to get the enthusiast started. Model Rocket kit prices at the basic level cost from £10 to £50 and corresponding, easy-to-obtain, Model Rocket Motors £4 to £10 per pack of three, depending on the impulses chosen. When you get past the beginners' level, you can go on to medium and High Power Rocketry, with more exotic kits, motors and accessories available, however these models correspondingly increase in cost as the size and impulse figure increase.

Further Reading:

- **The Model Rocketry Handbook**
1st Century Edition ~ Stuart Lodge
ISBN 1-85486-229-4 ~ *Special Interest Model Books Ltd*
- **Model Rocketry – Space Modelling** ~ Stuart Lodge
ISBN 1 900371 06 5 ~ *Traplet Publications Ltd*

Both titles are available for under £10 and contain a wealth of information, hints & tips and useful contacts from global sources.

Contacts:

The British Model Flying Association ~ SPACEcom

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