



10, 9, 8...

The voice of UKRA!

*Volume 3 Issue 3
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**UKRA
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Editorial

By Mark Perman



Welcome to the third and final edition of 10,9,8 for 1999. The first thing you will notice about this edition of 10, 9, 8 is its size. Yes, we are now big enough to have and need a content page

It's been a great year for hobby rocketry in the UK. Attendance at the various clubs flying days has been growing steadily. The TV Radio and newspapers both local and National have provided some excellent coverage of our activities. UKRA is receiving more enquiries on the hobby than ever before, not only from those wishing to take up rocket flying as a hobby but also from schools, colleges, companies, trading standards offices Police and other government bodies

UKRA 99 ran well with lots of interesting flights as well as one or two spectacular failures nothing; I hasten to add, to do with the amount of socialising in the bar in the evenings "ahem mornings". The British weather made life difficult on the Sunday with very low cloud cover, which put an end to at least one Level II attempt. This was very unfortunate, as the individual concerned had travelled a long way.

The International Rocket Week (Yes, for those of you who have not been, an entire week of Rocket related activities) at Largs was a resounding success with the biggest turnout yet. As usual a number of rocketeer's came over from the continent to participate a truly "International" High Power event in the UK. The flying field was really something to see at the High Power launches on the Friday and Saturday.

AspireSpace ran the National Rocketry Championships at Heckington. Hopefully there will be an article on this event in the next edition. This is an Annual event for teams from Universities and was very interesting. Well worth a visit if you're in the area. Details of next years NRC will appear in 10, 9, 8 nearer the time.

K-Lob was unfortunately rather wet and a bit windy however some good flights were made and of course the attendance was up on the previous year.

I will not try to cover all the Club flying here just keep up the good work everybody and enjoy yourselves. Next year in addition to the bigger events we are all now familiar with and standard Club flying days there will be a new date for your diary. The BSMA are planning the 1st Canterbury Cup, see the article in this edition.

Something that has saddened me personally this year is the attitude certain clubs display, in their newsletters, to each other and there parent organisations. Our hobby is small but growing rapidly and the image we all present to the membership and general public is very important. Don't forget the public and other interested bodies pick up newsletters. So if you have or perceive a problem contact the other club/individual and try to sort it out. If this is not feasible pursue the matter through UKRA or the BSMA. Do not run-down/bad-mouth others in writing it is not necessary, damages our hobby and is generally dispiriting. Rocketry is an inspiring hobby lets keep it that way!

With the long winter nights and poor weather many of us start projects for the next flying season this sometimes leads people to think of motor/engine construction. A question that UKRA gets asked in relation to this is “is it possible to build rocket motors/engines and fly them under UKRA insurance”. This of course breaks down into two questions

- First - Is it possible to build rocket motors/engines at home in the UK. The answer from the Health and Safety Executive and the Police is a firm no. The manufacture of rocket motors/engines falls within the scope of the explosive laws. The police will and do prosecute people they find breaking the explosive laws.
- Secondly – Is it possible to fly a vehicle powered by a home made motor/engine under UKRA insurance. Again the answer is no, the insurance would be invalid as the motor would be illegal

To fly a motor/engine under UKRA insurance it must be commercially available in the UK and where necessary Classified and Authorised by the Health And Safety Executive. Commercially available Hybrid Rocket engines are perfectly acceptable as long as they meet the requirements of the Safety Code.

Just a small point on what type of information is included in the UKRA newsletter. Any article included in 10,9,8... reflects the opinion of the author. This also covers any Hints and Tips that are suggested. UKRA can not be held accountable for any information or suggestion offered. You will notice that we have included a small number of pictures in this edition, for those of you receiving the newsletter over the Internet this should not be a problem. However those of you receiving a paper copy will find that the reproduction quality of the pictures is not very good, we apologise for this but thought that on the whole it would be worth a try, do let us know what you think. Please do not hesitate to contact the UKRA editorial team on 01905 773 249 or by e-mail liz.mark@virgin.net if there is a specific point that you would like to address.

10,9,8... is the Voice of UKRA! That also means that it is the voice for the membership. If you have any articles, comments, club details or even a hint & tip that you would like to share then please contact the editorial team and we can discuss it in more detail.

I hope that you enjoy reading this edition and I look forward to seeing you all at the various flying events in the New Year!

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Meet The Challenge Be An ASTRONAUT

Do you think you are up to the challenge?

Most people will have heard about the millennium Dome, but very few know what else is being done.. In Leicester a new £48 million pound space centre is being built. This will not be ready until 2001-2 but some things are already in place!

The Challenger Learning Centre

This new centre at Leicester opened just a few weeks ago and is the first one outside of the USA and Canada. It provides for simulated space missions. One of these a '**Voyage to Mars**' is being offered to members of UKRA

What is involved?

First we need to select a crew!!

Then we prepare for the voyage!!

Then we go do it!!

When? The centre organisers have said that we can have a mission(s) on a Saturday

Due to previous bookings a date in March 2000 looks to be favourable.

The missions are each capable of taking between 20 to 30 persons. If we get more people wanting to take part we can run other missions later in the day. All people will get the chance to be flight crew and mission control crew.

What's the cost? Just £10 per head for approximately a two hour mission.

Where is the Challenger Centre? It's on the University of Leicester campus, Victoria Park Road, Leicester

For more information contact Pete Davy on 01529 460279 or E-mail

davy@btinternet.com

Early booking is advisable.

The UKRA Web Site

By Richard Osbourne Webmaster

Recently, the UKRA web site has been expanded and given a new image. The intention is to provide a central resource for UK rocketeers, with an emphasis on HPR. Following feedback from UKRA members, the new web site is now hosted under its own domain (www.ukra.org.uk) - a domain name that was actually registered for UKRA earlier in 1999, but now, through the good offices of UKRA and MARS member, Marcus Lauder, we are able to utilise the domain name to good effect on free web space.

The UKRA web site is currently a work in progress, and as such, visitors to the web site, will see changes to the site as it grows. Development of the new version of the

UKRA web site actually started earlier in the summer of 1999, and has been going on quietly since. The web site was not accessible until the start of October, when, to coincide with a BBC TV programme, Final Frontier, which provided contact details for UKRA as well as featured an article on UK rocketry, the web site was made live. Currently, the basic pages are on line - these include sections on UK rocketry records (a section which will be expanded over time), a basic links page of UK rocketry groups (currently in the process of being expanded), a list of motor classes and safe distances, basic contact information and an overview of UKRA.

The web site has a project plan that stretches on for over the next year, and shortly, a number of new sections on rocketry equipment reviews, the UKRA newsletter, a section on certification procedures, the full UKRA safety code, a section on UK rocketry history (with information on previous UK rockets), and a number of technical sections, will be going online. Following on from that will be a section with a regular UK rocketry news update, a Frequently Asked Questions section, a Media section, and possibly, online polls.

The UKRA web site is also designed to have content specifically for members, and to this end, work is underway on a password protected, members section of the UKRA web site. The members section will also contain online forms for members to send queries on specific topics to the UKRA committee, not to mention online interactive multiple choice tests, for those who wish to practice for their level 2 certification exam or their Safety Officer exam.

For those UKRA members who are interested in such things, the UKRA web site is hosted on a Linux PC running Apache web server. The web pages use Server Side Includes and any scripts used are written in the Perl scripting language. The reason for these choices were that they offer a robust and relatively easy environment for web site development and maintenance, not to mention, comprehensive web statistics (an essential element for the operation of a serious web site). Hopefully, once all the elements are in place, the web site will run itself to some extent.

It is hoped that the UKRA web site will evolve over time, into a useful asset for members, and an informative source of UK rocketry information for those interested in UK rocketry. Since the web site exists to serve members as well as the public at large, if anyone has any feedback or contributions that they would like to make to the development of the web site, then please feel free to contact UKRA.

How to Construct a Loud, Cheap, Multi-Tone Beeper Unit for use in HPR or Model Rocketry

By Christopher Key

Editor's Note this is a reprint of the very useful article we printed last time with a couple of modifications provided by Chris.

There are many techniques for tracking and successfully retrieving rockets ranging from miniature transmitters and receivers to placing powdered paint in the rocket. One of the most effective and cheap solutions is to use a beeper. It has much merit in that it alerts you to the rocket's position in the sky when returning even if at apogee, the

rocket was well out sight or in a cloud. It also allows the rocket to be easily located after landing.

I have found a design for a beeper unit that is ideal. The unit can be driven directly from a 9V battery and is extremely loud, 107db at 1m when using 12V. The sound can be changed to any of the following using simply a DIL Switch: - High Continuous, High Intermittent, Low Continuous, Low Intermittent and Alternate High - Low.

The components required are all available from Maplin Electronics (Telephone Orders 01702 554 000, Fax Orders 01702 554001). You will need the following:

Part Description	Maplin Order Code	Price
Beeper	KU60Q	£2.99
Battery Holder	CK65V	£1.19
Battery Clip	NE19V	£0.25
DIL Switch	JH08J	£1.00
Self Adhesive Pads (will make several)	HB22Y	£0.29
Epoxy Resin (will make several)	JL92A	£0.75
Total		£6.47

13) Attach the battery box to base of the beeper using a self-adhesive pad. to hold it in place, then add epoxy around it. It is a good idea to try and leave the mounting holes accessible as these can be used for attaching to a shock cord.

12) Bend the legs on the DIL switch outwards so that they are flat. Attach this to the side of the beeper using a part of a self-adhesive pad with the legs running horizontally when the battery box is at the base. Ensure that it is above where the 3 coloured leads exit the beeper, and that SW1 is away from the battery box.

11) Cut about 3 cm from the 3 coloured leads making sure that they can still reach the DIL Switch.

10) Strip the ends of the lengths of wire you just cut and the wires coming from the beeper. Only around 1-2mm of the core should protrude.

9) Solder the black lead from the battery clip to black lead on the beeper.

8) Place the beeper with SW1 at the top






7) Solder the red lead from the battery clip to the right hand side of SW1 and the red lead from the beeper to the left-hand side of SW1

6) Solder the orange lead to the left-hand side of SW2. The Yellow to the left-hand side of SW3 and the Green to the left-hand side of SW4.

5) Take the short length of orange wire you cut earlier. Solder it from the left-hand side of SW2 to the right of SW3. In the same manner, solder the Yellow from the left of SW3 to the right of SW4 and the Green from the left of SW4 to the right of SW2.

4) Hold the black lead next to the side of the DIL switch, with the soldered join directly in line with the switch. Epoxy over the soldered join to hold it in place. Epoxy over all other connections taking care not to get it in the switches.

3) Set up SW 2, 3 and 4 as follows for the given sound.

Desired Sound	Setting
High Continuous	
High Intermittent	
Low Continuous	
Low Intermittent	
Alternate High - Low	

2) Connect Battery and place in the holder. Attach the beeper with strong shroud line to the shock cord attached to the parachute. When packing the parachutes, make sure the beeper will not interfere with their deployment.

1) Flick SW1 to turn the beeper on just before the rocket is sat on the launch pad.

0) Launch!

UKRA Goes Bleep

By Mark Perman

At the AGM the subject of UKRA supplying equipment for the membership to use was brought up. Well, we have taken this on board, albeit in a small way given our limited funds. I think most of us have been in the position of watching our rocket deploy its recovery system successfully only to then drift out of sight never to be seen again. One answer of course is to fit a bleeper.

At K-Lob, Heckington, Phil Bulmer kindly assembled a small number of the bleeper kits described by Christopher Key above. These beepers fit comfortably inside a 75mm Dia. (3.0 inch) rocket. In the future, at events attended by Pete's Rockets, members will be able to hire a bleeper for £2.00 a launch, all proceeds to UKRA funds

Thanks again to Chris for the design and Phil for the assembly

UKRA Membership News

Hugh Gemell UKRA Membership Secretary

Following UKRA's AGM at Largs in August a number of important changes to UKRA's membership structure were agreed. The two main changes were:-

1. The introduction of a Full Junior membership level for under 18's to allow Juniors the benefits of UKRA and BMFA membership at a discounted membership rate.
2. The restructuring of the Family membership scheme so family groups can take advantage of the discounted BMFA family membership scheme.

In summary, UKRA will be offering the following memberships from the 1st January 2000

- 1) **Full senior Member:** Age 18+ who pay the full UKRA/BMFA rate. They can fly up to "M" insured, depending on certification level, they can vote, they can stand for election and can apply to become a safety officer.
- 2) **Full Junior Member:** Age Under 18 years of age who pay a lower UKRA/BMFA rate, they can vote but cannot stand for election or apply to become a safety officer. They can fly under the following rules :-
 - 16-17's can fly up to "M" insured, depending on certification level.
 - Under 16's can fly up to "G" provided that there is adult supervision (18+).
 - Both these groups would be bound to the UK laws regarding the age for purchasing the relevant such motors.
- 3) **Associate Membership** remains unchanged.
- 4) **Family Membership:** Including optional UKRA/BMFA membership for all the family. This will be based on the discounted BMFA family members scheme

The new UKRA Family Membership now offers a choice of either both BMFA & UKRA membership or UKRA Associate Membership for the family at substantially reduced rates. Family membership and can include a Senior Adult, their partner and children (if under 18 years).

The senior family member automatically receives full UKRA and BMFA Membership including third party flying insurance. You can then choose, for each of the other family members, whether they have Full UKRA/BMFA membership and flight insurance or UKRA Family Associate membership (nonflyer). So you can now decide the membership level for each family member to suit your needs. The whole family can benefit from BMFA membership/insurance or the rest of the family can join as associates or in fact any combination in between!

- 5) **Temporary Membership** remains unchanged.

Membership Rates for 2000

As you may be aware the membership rates were heavily discounted in 1999. In fact only £2 of each membership went directly to UKRA. This was by way of an apology to our members for the poor service experienced during the later part of 1998 and early 1999. Having under gone a degree of restructuring and refocusing I'm glad to say I think UKRA's service to its membership has improved greatly over the last 9 months. We have also forged very good links with the BMFA, CAA, and police authorities. During 2000 we hope to do a lot more! For this reason UKRA's Council have set the membership rates to a more reasonable level for 2000. This will allow us to continue improving and providing new services to you, our members. The Membership Subscription rates for 2000 are as follows: -

Full SENIOR UKRA Membership (18 years of age)	£36.00
Full JUNIOR UKRA Membership (under 18 years)	£18.00
UKRA Associate Membership (nonflying members)	£14.00
Upgrade to Full Senior UKRA Membership for existing Senior BMFA Members	£14.00
Upgrade to Full Junior UKRA Membership for existing Junior BMFA Members	£6.00
UKRA Family Membership	
- One Senior Family member (UKRA & BMFA membership)	£36.00
plus any combination of the following	
+ Optional Partner (UKRA & BMFA membership)	£22.00
+ Optional Each Child (UKRA & BMFA membership)	£14.00
+ Optional Each Family Associate (UKRA only - nonflyer)	£4.00

Temporary Membership Rates

1 month Temporary UKRA & BMFA Membership including flight insurance	£9.00
1 Month Temporary UKRA Membership for existing BMFA Members	£4.00

We would also like to here from you! What do you want out of UKRA? More flying sites, Equipment, Members Discounts at Rocket shops, UKRA Competitions. Let us know!

I hope to see you all in 2000 and wish you a merry Christmas and a happy new MILLENNIUM

British Rocketry - A New Start

By Adam M. Baker Aspirespace A2 manager

Who hasn't heard of the rocket man who lives in the north of England and is (or was) sponsored by Tate 'n' Lyle. Yes, the same one who crashed a large rocket onto and set fire to Dartmoor last May, and who more recently launched and successfully recovered a similar vehicle from a beach on the Mersey estuary.



Steve Bennett, fortunately, is not alone.... You might be surprised to know that no fewer than 12 amateur rocketry groups are active in the UK, and several more in Europe, most of them working with systems considerably more advanced than Mr.

Bennett's sugar power! The distinction between amateur rocketry and the more well known high power rocketry is that in the former, the design, construction and testing of rocket motors and vehicles tends to be on a scale considerably more powerful than can be purchased, although there is quite some overlap between the two.

By way of example, a recent hybrid motor powered amateur rocket called 'Hyperion' reached over 100,000ft altitude, and was successfully recovered. And a recent report from the amateur 'Reaction Research Society' in the USA detailed the successful testing of a 1000lb (~450Kg) thrust liquid engine. But, such lofty endeavours are not only the domain of the Americans....



During 1990-1991, a group of students from four UK universities designed, built and flew a solid motor powered rocket to an altitude of ~11,200ft in southern France, as part of an international rocketry competition. The rocket, Aspire 1, captured the British amateur rocketry altitude record at the time, and is shown on the right with some of the team

members.

Aspirespace formed shortly afterwards, with a twofold objective. Firstly, Aspirespace aims to launch a recoverable rocket vehicle into space and (here's the unusual bit), to recover it all afterwards, and secondly, it aims to encourage training in hands-on rocket engineering for as many young and old enthusiasts as it can contact.

Given that space nominally starts at about 50km, you'd be forgiven for guffawing and thinking 'well, if Aspirespace went to 11,200ft in 1991, and the current amateur UK record is still less than 20,000ft, then they're obviously dreaming.' Which is perfectly right, and to be frank, the first few years were spent largely getting to grips with (and discussing, endlessly) the magnitude of our goal we had set ourselves.

Things did however move on, and between 1994, when I became involved in Aspirespace, and 1996, the group obtained sponsorship to pay for the insurance to cover launching some solid rocket motor propelled high power rockets. These were some of the most powerful in the UK at the time, and gained a fair degree of publicity. ASRV2, the second launch and built to demonstrate new technology and practise range safety techniques, is shown below at launch:



The ASRV programme generated significant media coverage, taught us a few things about small rockets and highlighted the high premiums demanded by insurers for launch activities. It also produced a number of technical firsts, such as the first rocket-borne colour CCD video camera with an RF downlink. More importantly however, after one of these rockets was destroyed due to a fuel grain flaw in the motor, ASRV reinforced our commitment to the development of a series of hybrid rocket engines. At its simplest, a hybrid is half way between a solid, HPR type motor, and a liquid engine, such as powers commercial launch vehicles such as Atlas or Proton. Hybrid engines are ideal for experimentation by amateurs, being clean, relatively simple, and cheap.

From 1996 onwards, Aspirespace members delved deeply into the theory of sounding rocket design, held numerous meetings, went down many dead ends, and generally upheld Wernher von Braun's reported quote "we can beat gravity, but sometimes the paperwork is overwhelming". Finally, in early 1998, we realised that the only way forward was to stop talking and start building hybrid engines. "Pretty obvious" you might say, but then the Aspirespace membership at the time consisted mainly of poor students, and talk was cheap, and university meeting rooms abounded. Generating novel designs and minutes from meetings was also easy, but finding a workshop and the right materials to withstand a rocket motor exhaust was more difficult!

However, in May 1998, the Aspirespace H2 hybrid motor was ignited, using a combination of Nitrous Oxide (NOX) and polyethylene (HDPE) fuel, and we left the paperwork behind with a resounding roar. In August 1998, on the strength of our practical demonstration of the H2, Kneller Precision Tools & Instruments, based in Daventry offered us sponsorship. Shortly afterwards in September we presented our first research paper at the International Astronautical Federation congress in Melbourne. Over the remainder of 1998, we developed our relationship with Kneller and their parent company Score, worked on a series of models for hybrid combustion, and at the end of the year hosted a number of other groups like ourselves at the UK's 1st amateur propulsion workshop at the Bristol UKSEDS conference.

In early 1999, Aspirespace began to assemble its first cryogenic oxidiser hybrid motor, the H20. Learning how to handle liquid oxygen, designing a nitrogen pressurisation system, redesigning and some interesting materials procurement issues kept us busy for 4 ½ months. In mid-April we flow tested the oxidiser feed system and injector with liquid nitrogen at one of Score's factories in Scotland, and then followed it up the following weekend with the first ever hot firing of a British hybrid engine using a cryogenic oxidiser. The H20, integrated at BG Technology's test-site at Spadeadam (Northumbria), and shown below, burned for ~10s, developing 120Kg of thrust and consuming ~6Kg of propellant.



Ignition was successful at the first attempt, and despite considerable combustion oscillations, the specific impulse obtained was ~89% of that predicted. Not bad for a first attempt by a group of amateurs! Our sponsors were also impressed, Aspirespace gained much enthusiasm and credibility, and the subsequent analysis indicated that our choice of materials was correct for the combustion conditions.

We have already started on our next objective, a flight version of the H2 engine. The experience flying a hybrid rocket engine will give us, combined with a number of ground tests of the H20 cryogenic engine will lead to a direct forerunner to Aspire 2. Some of the objectives include an altitude of over 100,000ft, obtaining supersonic drag data essential for the design of Aspire 2, and practising very high altitude tracking and recovery techniques. We hope this will be a true 'Millennium' project, which will inspire and encourage amateur

rocket scientists and engineers across Europe. To set this work in its context, the last time this sort of development occurred in the UK was back in the 1960s, and culminated in the successful launch of Black Arrow and Prospero into orbit in 1971, ironically in the same month I was born! The support we have this time may be entirely industrial, but I believe Aspirespace, together with and perhaps some of the other rocketry groups in the UK will be the genesis of Britain's next launcher programme. The difference this time is that it will be a people's launch programme, in which anyone with sufficient interest, regardless of technical qualifications can take part. We welcome enthusiastic supporters, participants, and onlookers from all directions.

If you'd like some more information on Aspirespace, please send an email to me on:

A2-MANAGER@ASPIRESPACE.CO.UK

You can also visit Aspirespace's WWW page for some more up-to-date information, on <http://www.aspirespace.org.uk>.



Regulation of Rockets

By Mark Perman UKRA Chairman

Back in September we received the following letter, it outlines proposed legislation, which when it comes in to force will govern our hobby. As you can imagine it has been the cause of much e-mail traffic and telephone conversations. The letter has been scanned into Word, so the formatting is not quite the same as the original also I have deleted annexes C and D with there extensive listings of organisations, contact lists, for the sake of brevity.

The Councils response is included as well. If you have any questions or comments do not hesitate to contact a member of the Council

From: Group Captain P Roberts MRAES MIMgt RAF Assistant Director Airspace
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8AP/O6/O2/16

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Distribution:

See attachment Annexes C & D
13 September 1999

THE REGULATION OF ROCKETS

In view of recent advances in the technology associated with amateur rocketry this Directorate is of the opinion that the time has come to introduce a means of regulation of rocket launch activities.

The attached first draft Regulatory Impact Assessment (RIA) explains the background to the proposal. At Annex A you will find a draft of the addition to Article 76 of the Air Navigation (No 2) Order 1995; the proposed conditions for the launching of large rockets are at Annex B. You are invited to send any comments on the proposed Regulation and on the options and costs shown in the RIA to the person named below before 12 November 1999; comments will be reflected in the final draft of the RIA.

In the absence of comment this Directorate will assume that there are no objections to the proposed Regulation and will proceed to the next stage in the legislative process. Any comments will be made available for public view by the person named below unless the respondent indicates otherwise; in such a case the Directorate will respect the respondent's wishes.

Attachment:

Regulatory Impact Assessment - The Manner in Which Rockets are Launched.

A joint Civil Aviation Authority / Ministry of Defence service

Point of Contact for advice or response:

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The Regulation Impact Assessment for the Proposed Amendment to The Air Navigation (No 2) Order 1995 to Regulate the Manner in which Rockets are Launched First Draft

1. Purpose and Intended Effect of the Measure

1.1 The activities of the exponents of amateur rocketry have in the past been restricted by the low performance of the available rocket motors, to the extent that their rockets were considered in much the same way as fireworks. Recent developments in rocket engine technology, however, has resulted in the availability of

vehicles capable of lifting significant weights to much higher altitudes than was previously possible.

1.2 The regulation of the procurement, storage and use of the materials used to fuel the rocket motors is already adequately covered by the Control of Explosives Regulations issued by the Health and Safety Executive. A rocket, however, is not considered to be an aircraft since its flight is not dependant on the interaction with the atmosphere. Consequently the provisions of the Air Navigation Order (ANO) do not apply other than the general provision of Article 55 whereby 'a person shall not recklessly or negligently act in a manner likely to endanger an aircraft, or any person therein'.

1.3 Whilst small model rockets constructed mainly from cardboard and balsa wood pose little threat to aircraft the same cannot be said of the larger variants; the combination of weight and velocity of the more advanced rockets significantly increases the potential risk of damage to the aircraft structure or systems in the event of the rocket striking or penetrating the surface of the aircraft. In August of this year a rocket with a launch weight of 220 Lbs. reached a height of 20,000 feet, an indication of the degree of sophistication achievable by non-commercial rocketeers.

1.4 The proposed new regulation (Annex A) is intended to introduce degrees of control of the launching of rockets proportional to the risk posed to other airspace users, in much the same way as has already been done in respect of model aeroplanes. Toy rockets, that is rockets with a motor whose performance equates to that of a firework, have been specifically excluded from the provisions of this regulation. Thus the majority of over the counter model rocket kits or their home built variants may continue to be operated as in the past. Rockets whose motors exceed a defined upper level of performance could only be operated in accordance with a specific written permission from the Authority. Those rockets that fall within the intermediate group would be subject to the general provisions of the Article, mirroring the existing regulations that apply to the larger model aircraft.

2. Options

2.1 Four options have been identified:

Option 1 - Take no further action.

Option 2 - Introduce a system of self-regulation.

Option 3 - Legislate the launching of all rockets.

Option 4 - A combination of Options 2 and 3.

2.1.1 Option 1. Given the power of commercial "off the shelf" rocket motors now available and the sophistication of self build techniques this option is not considered appropriate. The unregulated firing of significant mass rockets into airspace commonly used for other aerial activities, both civil and military, poses an unacceptable risk to the safety of those aircraft and their occupants.

2.1.2 Option 2. Self regulation is a useful tool when it can be demonstrated that all, or at least the vast majority, of the participants in an activity are represented by one or more institutional bodies. Where such arrangements are in place, the operation of gliders and model aircraft are good examples, there is nevertheless a basic framework of legislation upon which the self regulation is based. This is a principle we would wish to see applied in the case of the launching of rockets.

2.1.3 Option 3. For reasons previously explained we believe that regulation should be tailored to the calculated degree of risk to other airspace users. The regulation of activities where the risk is perceived to be negligible or non-existent would not be appropriate.

2.1.4 Option 4. This option introduces progressive regulation which is consistent with the degree of risk to other airspace users. It would absolve the operators of small rockets from all regulation other than that of the duty of care. It would lay down a basic legal framework for the regulation of the more powerful small rockets supported by a code of conduct. In the case of large rockets it would permit the authority to determine the degree of protection to be provided.

3. Benefits

3.1 Experience has demonstrated, sometimes spectacularly, that the operation of rockets, particularly those which fall within the definition of large rockets, can be potentially hazardous to other airspace users and to persons on the ground. The introduction of this legislation will ensure a consistent and appropriate regulation of rocket launching activities.

3.2 The adoption of the do nothing Option 1 is not considered appropriate for the reason given above. Options 2 and 3 both contain elements which could enhance the safety of rocket launching but would be ineffective (Option 2) or over restrictive (Option 3) in their own right. For these reasons we recommend Option 4 which leaves small toy rockets substantially unregulated, the more powerful small rockets governed by a mix of statutory and self regulation whilst ensuring adequate control of the launching of large rockets. The proposed conditions for the launching of large rockets are attached at Annex B.

4. Compliance Costs to Rocket Operators.

4.1 Small Rockets. There are no anticipated additional costs to the operators of small rockets.

4.2 Large Rockets. It is proposed in the condition laid down in Annex A that large rockets should only be launched within a military danger area or other area which can provide similar levels of protection and warning. The cost of the use of a military range within a danger area will vary according to the degree of protection deemed necessary following an assessment by the range authority. This figure will vary from the cost of a basic license for use, typically £50, plus third party liability insurance, to the recovery of the commercial cost for the provision of range marshals,

emergency services and remediation. It is not possible to quantify these costs but they will be in the order of those necessary to safeguard a site which is not a range within a military danger area.

4.3 For launches where the rocket is expected to exceed an altitude of 66,000 ft the application would be referred to the British National Space Centre. This DTI agency will determine if the activity falls within the provisions of the Outer Space Act 1986, in which case a minimum licence fee of £6500 would be payable.

5. Results of Consultations

5.1 To be submitted at a later date.

6. Summary and Recommendations

	Option 2. Expected costs and benefits.	Option 3. Expected costs and benefits.	Option 3. Expected costs and benefits.
Participants	None	Full cost of protective measures irrespective of size of rocket	Full cost of protective measures to operators of large rockets only
Citizens	None	Enhanced safety	Enhanced safety

7.1 It is recommended that the UK Air Navigation (No2) Order 1995 be amended to require the regulation of small and large rockets in accordance with the provisions set out at Annexes A and B.

8. Contact Name and Address for Enquiries

Directorate of Airspace Policy
 Airspace Policy 6
 Room T 1 020
 CAA House
 45-59 Kingsway
 London WC2B 6TE

Distribution:

See Annexes C and D

ANNEX A

DRAFT AMENDMENT
 13 September 1999

Interpretation

118 (1) 'Rocket' means a device propelled by ejecting expanding gasses generated in its motor from self contained propellant and not dependent on the intake of outside substances. It includes any part of the device which becomes separated during the operation.

'Small rocket' means a rocket of which the total impulse of the motor or combination of motors does not exceed 10,240 Newton-seconds.

'Large rocket' means a rocket of which the total impulse of the motor or combination of motors is more than 10,240 Newton-seconds.

REGULATION OF ROCKETS

76B (1) This article shall not apply to:

- (a) an activity to which the Outer Space Act 1986 applies; or
- (b) a small rocket of which the total impulse of the motor or combination of motors does not exceed 160 Newton-seconds.

(2) The person in charge of a small rocket of which the total impulse of the motor or combination of motors exceeds 160 Newton-seconds shall not launch such a rocket:

- (a) unless he has reasonably satisfied himself that the flight can be safely made;
- (b) unless he has reasonably satisfied himself that the airspace within which the flight will take place is and shall throughout the flight remain clear of any obstructions including any aircraft in flight;
- (c) in controlled airspace unless the permission of the appropriate control unit has been obtained;
- (d) within an aerodrome traffic zone during the notified hours of watch of the air traffic control unit (if any) unless the permission of any such air traffic control unit has been obtained;
- (e) for aerial work purposes other than under and in accordance with a permission granted by the Authority.

(3) A person shall not launch a large rocket other than under and in accordance with a permission granted by the Authority.

- (4) For the purposes of this article a permission shall be in writing and may be granted subject to such conditions as the Authority thinks fit.

ANNEX B

CONDITIONS FOR THE LAUNCH OF A LARGE ROCKET

A large rocket as defined in the Air Navigation (No2) Order 1995 may only be launched in accordance with the following conditions:

Condition A.

Where the anticipated apogee will exceed 66,000 feet above mean sea level (amsl).

Any person who intends to launch a rocket, the apogee of which will, or might, exceed 66,000 feet amsl may only do so under and in accordance with a permission granted by the British National Space Centre.

Condition B.

Where the anticipated apogee will not exceed 66,000 feet amsl:

1. A rocket shall not be launched without written permission from The Directorate of Airspace Policy (DAP). The person in charge (sponsor) shall give DAP a minimum of six weeks notice of the proposed launch.
2. The sponsor must submit a safety case to demonstrate that the flight can be safely made. This shall include the following information:
 - a. The total impulse of the rocket motor(s) in Newton-seconds and nature of all propellants.
 - b. Details of the materials used in the construction of the rocket and its motor(s).
 - c. The predicted flight profile including details of allowances for meteorological variations with height.
 - d. The nature and radius of fragmentation in the event of an explosive malfunction of the motor(s).
 - e. Details of the system for destroying the rocket or ensuring a safe recovery in the event of a malfunction.
 - f. The nature of any residual hazard when the flight has terminated.
3. A means of electronic tracking shall be used when it cannot be assured that the rocket will remain within visual range of the point of launch.

4. The activity should be wholly contained within a Military range or training area with Danger Area status. Where this is not possible the person responsible must demonstrate that comparable safeguards will be established.
5. Where a launch takes place from Military or other Government owned land the sponsor must obtain a licence from the appropriate Land Agency and comply with any associated conditions.

UKRA's response:-

United Kingdom Rocketry Association
10 South Park Drive
Droitwich
Worcestershire
WR9 9BY

Telephone 01905 772 479

E-mail - liz.mark@virgin.net

09/11/99

Mr D R Cutler
Directorate, Airspace Policy 6
Room T1020
CAA House
45-59 Kingsway
London
WC2B 6TE

Dear Mr Cutler

On behalf of the Council of the United Kingdom Rocketry Association (UKRA) I would like to thank you for asking us to comment on the Regulation Impact Assessment and the proposed Legislation. For the main part we agree with the proposals made, however we do have a number of comments and questions.

“The Regulation Impact Assessment” paragraph 4.3

There is reference to a licence fee of 6500 pounds for launches, which the DTI believe, fall within the provision of the Outer Space Act 1986. Is this fee fixed or can a lower or zero fee be introduced for Research, Educational or Amateur (non profit) organisations where the financial implications of the imposition of the full fee would prevent such groups from undertaking launches above 66,000 ft ?

Annex B Condition A

Where does the figure of 66,000 ft above mean sea level come from. Should the figure be aligned with international definitions of space (From the reference to the BNSC the figure appears to be a definition for amateur space attempts based in the UK).

Annex B Condition B 1

Amend to allow for booking of a number of consecutive days or specified days to allow for launch postponements caused by the weather or technical problems.

Annex B Condition B 4

A listing of the comparable safeguards would be appropriate and helpful.

Annex B

Insert as “**Condition C**

Large rocket exemption

For rocket vehicles powered by commercially available rocket motors with a Total Impulse up to 40,960 Newton-second (O class) the regulations as laid down in 76B (2) only shall apply.”

Commercially available rocket motors are available to the model rocket flying community up to 40,960 Newton-second (O class). The UKRA Safety Code (see attached) was written to take account of the commercially available rocket motors. One of the functions of the UKRA is to promote safe model rocket flying and to that end we have put a great deal of effort into the production of a comprehensive (for a hobby) Safety Code and the encouragement of members to:-

1. Fly vehicles in accordance with the Safety Code.
2. Take the Range Safety Officers examination and thereby ensure that they have a good understanding of the issues involved when launching a rocket powered vehicle and also providing a source of Range Safety Officers to oversee launches.

Providing an exemption to the Total Impulse limit to cover the commercially available rocket motors provides a convenient split point between the activities of hobby rocket flyers and those individuals with aspirations to greater things.

It should be noted that although the rocket motors commercially available (to hobby flyers) are a great improvement on those previously available they are neither sufficiently large or of sufficiently high performance to act as credible space capable boosters (despite the claims of a number of groups).

The council of the UKRA believes that flying vehicles powered by a commercially available propulsion system with a total impulse of 40,960 Newton-seconds (O class) is safe for rocket flyers as long as the provisions of the proposed legislation and safety code are adhered to.

If you have any comments or questions with reference to the above, the United Kingdom Rocketry Association or model rocket flying in general do not hesitate to contact me at the address above.

Yours sincerely

Mr M Perman
Chairman
United Kingdom Rocketry Association

BMFA Saleable Goods

By Mark Perman

The following table gives a listing of items available for purchase from the BMFA. If you wish to purchase any of the items listed below please contact the BMFA direct

<u>ITEM</u>	<u>PRICE</u>	<u>QTY</u>	<u>COLOUR</u>	<u>SIZE</u>	<u>AMT</u>
SMAE ENAMELLED LAPEL BADGE *	£2.00				
BMFA ENAMELLED LAPEL BADGE *	£2.00				
BMFA POLYESTER WOVEN TIE- Navy *	£9.00				
BMFA BALLPOINT PEN *	60p				
BMFA LEATHER KEY RING *	£1.25				
BMFA RED LEATHER DRINKS COASTER *	55p				
BMFA COASTERS - SET OF SIX	£3.00				
CLOTH SEW-ON UNION JACK BADGE *	90p				
BMFA ROUND SEW-ON ARM BADGE *	£3.50				
SMAE ROUND SEW-ON ARM BADGE *	£3.50				
SMAE SEW-ON BLAZER BADGE *	£3.50				
BMFA BASEBALL CAP Red / Black / Blue	£3.50				
PIONEER BASEBALL CAP Navy/ Burgundy/ Green	£3.50				
PIONEER SWEAT SHIRT M,L,XL Navy	£11.99				
PIONEER T SHIRT M,L,XL Navy	£6.99				
BMFA LARGE UMBRELLA Blue/ White + Logo	£11.00				
BMFA DART KIT Bulk Discounts Available *	£2.00				
BMFA AEROGLIDE KIT *	£1.10				
BMFA FROG KIT *	£3.50				
BMFA GYMINNIE CRICKET KIT *	£2.30				
BMFA HELICOPTER KIT *	£2.00				
BMFA SHORT TUCANO GLIDER KIT *	90p				
NIPPER KIT *	£1.15				
TITAN II KIT *	£1.60				
WHIRLIGIG PROPELLER	30p				
TEACHER PACK- DART,AEROGLIDE,MANUAL*	£3.00				
MODEL BOX / BUMPER STICKER *	25p				
BMFA TRANSFERS Sheet of 4 Large Logos *	50p				
BMFA TRANSFERS Sheet of 12 Logos *	50p				
BMFA TRANSFERS Sheet of 24 Small Logos *	50p				
BMFA ROUND VINYL STICKER Reversed Logo *	20p				
BMFA SELF-CLING STICKER Reversed Logo *	20p				
BMFA VINYL STICKERS Sheet of 12 Logos *	50p				

ITEM	PRICE	QTY	COLOUR	SIZE	AMT
BMFA ROUND VINYL STICKER *	20p				
SMAE TRANSFERS Sheet of Asstd Size Logos *	50p				
SMAE TRANSFERS Sheet of 12 Logos *	50p				
SMAE TRANSFER Single Large Logo *	15p				
SMAE VINYL STICKER Single Large Logo - Blue *	15p				
SMAE VINYL STICKER Single Large Logo - Black*	15p				
SMAE VINYL STICKERS Sheet of 12 Logos *	50p				
SMAE VINYL STICKER Running Man Reversed *	30p				
PVA GLUE *	60p				
RUBBER LUBE *	60p				
TROPHY CENTRE BUTTONS BMFA or SMAE *	40p				
BMFA POLO SHIRT White/Grey M,L,XL	£11.00				
BMFA PREMIUM T SHIRT Blue M,L,XL	£7.50p				
BMFA STANDARD T SHIRT White only M,L,XL	£5.50				
BMFA BODY WARMER Navy M,L,XL,XXL	£18.00				
BMFA 3/4 LENGTH RAIN JACKET Navy M,L,XL,XXL	£33.00				
BMFA COLLEGE JACKET M,L,XL,XXL	£35.00				
BMFA FLYING JACKET Navy/Black M,L,XL,XXL	£35.00				
BMFA WOOLLY HAT Black,Bottle,Navy	£6.50				
TOTAL					
P&P FOR * ITEMS UP TO £5 = 50p OVER £5 =10% OF ORDER					
OTHER ITEMS - STANDARD P&P £3.00					
EXTRA P&P FOR JACKETS/BODY WARMERS £1.00					
GRAND TOTAL					

****SCHOOLS AND YOUTH CLUBS-SAVE ON KITS -CONTACT THE OFFICE DIRECT****
SEND TO CHACKSFIELD HOUSE 31 ST ANDREWS ROAD LEICESTER LE2 8RE
PLEASE MAKE CHEQUES PAYABLE TO BMFA
NB- JACKETS & BODY WARMERS HAVE TO BE ORDERED FROM OUR SUPPLIER
PLEASE DEBIT MY CARD NO: PLEASE ALLOW 28 DAYS

DELIVERY

SIGNATURE(NB- £5 MINIMUM FOR CREDIT CARD ORDERS)

DATECARD EXPIRY DATE.....

NAME

ADDRESS

.....

.....

DAYTIME TEL NO

Club Gate Guardians

By Mark Perman

UKRA has a small number of Nosecone/Forebodies, which are available to member clubs as Gate Guardians etc. The items are from the Blackcap rocket motor flight trial programme of the early 1970's. The Blackcap motor is the main propulsion for the Seawolf Missile. How did we come by the hardware? DERA were going to scrap them and be charged for it, so we offered to take them off their hands free of charge.

I am afraid that Buster the Rocket Retriever (shown in the picture to give scale to the nosecone) is not part of the deal. If your club/organisation would like one of these rare items for display contact UKRA on the following Telephone No 01905 773249



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Thrusting into the 21st Century

We would like to thank all our customers and wish everyone a happy New Year and a great new Millennium.

We will have available a large increase in the range of products that we carry.

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The new SafeEject ejection charge housings.
(These are completely sealed at the rear and use an electric match)

A completely new range of military and sounding rockets.

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WWW.Petesrockets.co.uk

We shall be manufacturing a range of high performance 29mm Fibreglass rockets, intended motor range 'F' through to 'I200'

Contact Pete's Rockets

Davy@btinternet.com

Tel 01529 460279

Fax 01529 461483

Unit 1 Southview Buildings

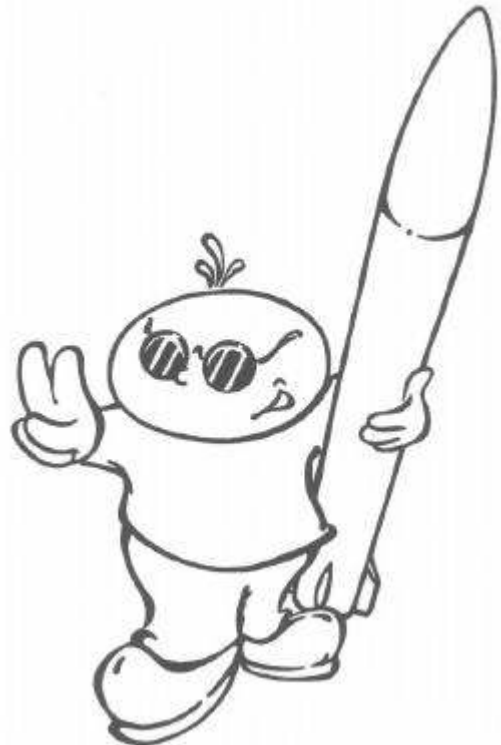
Burton Rd

Heckington

Sleaford

Lincs NG34 9QS

Please phone if you wish to visit our shop over the Xmas holiday Normally open 9-5 other times please call.



The International Rocket Week 1999 (A personal diary) (Or how to compress one years rocketry experience into one week)

By Mark C Turner

As a relative newcomer to the world of amateur rocketry, I was a bit worried about attending the 1999 International Rocket Week (IRW). Not, you understand, because I didn't know many of the other participating rocketeers, because in my job I meet new people every day. Nor was it because I had to travel to the picturesque surroundings of the Kelburn Country Centre in deepest Scotland, because I live only an hour's drive from the location. No. I worried that I would be surrounded by Rocket Scientists, technical experts and brilliant model makers who could make bog rolls fly to several thousand feet, and return to within a foot of the launch pad in a force 6 gale. I thought that with a little over a years flying experience to my credit, my models would be seen by the other enthusiasts as poor attempts at imitating the big boys.

I travelled to Ayrshire that sunny August Monday morning to find only a couple of other tents erected on the pavilion field. Meeting my good friend and the organiser of the IRW, John Bonsor, at the pavilion, he introduced me to Mark and Liz Perman, Chairman and Secretary of the United Kingdom Rocketry Association. We chatted for a few minutes until my first fear was realised. Yes, Mark was indeed a professional rocket engineer.

I spent the rest of that day meeting other flyers as they arrived, flying a couple of my models, and setting up my working space in one of the back rooms of the pavilion. This, I soon realised, was one of the big attractions for many of the rocketeers who attend the weeklong event. They viewed it as a time to concentrate on their latest creation without the distraction of every day life. They make rockets, they fly rockets, they eat 'rocket fuel menu's' at meal times, they read books about rockets, they convert beer cans and chocolate boxes into rockets, and generally hang about in small groups chatting about rockets.

By the second day the International Rocket Week had started to live up to its name with the arrival of Marcel from Holland and a contingency of aqua jet experts from Germany and Austria; Marcus, Karl (I'm Bavarian) and Jenny. These few joined the growing number of enthusiast that had started to fill the pavilion.

The centre of attention of the said pavilion soon became Pete's Rocket Shop. After the flurry of building activity that had accompanied Pete's arrival, it soon became clear that the items Pete didn't stock were obviously not worth buying anyway. A large collection of model and high power rocket kits, rip stop nylon parachutes and industrial strength epoxy resin gave me my first glimpse of what was to come later in the week.

On the Thursday, a small number of us travelled across the country to the Museum of Flight at East Fortune Air Field, where we had a fantastic day looking at the static display of rockets and rocket related exhibits. On our return to Kelburn we were surprised by the sudden increase in arrivals, indicated by the fact that the tents on the pavilion field now took up two rows!

That night the MARS crew began to arrive. Having heard of these guys over the preceding week I was not at all surprised to see them bring out three PC's and a kilometre of assorted cables. Then the rockets arrived, the likes of which I had only seen in the Rocket Garden in Florida! It was clear that Ben and his associates were here to launch some scary hardware.

Friday dawned and after the daily flying briefing in the pavilion, a few of the model flyers made their way out to the main flying field. In the company of an interviewer from BBC Radio 4, we had a delightful morning launching some spectacular models including a very successful sub-sonic flight of one of John's Wave-rider models.

After lunch a thirty-car convoy set off to Les's farm, about five miles from Kelburn. Having flown this site with John in the past, I volunteered to man the gate. After the last car had passed I took a slow walk up to the field where I was amazed to find about a dozen large launch pads arranged across half the length of the flying field. Before long, the sky cleared and I watched the first High Power launch of the week. Twice an hour throughout the afternoon, launch after launch took place. By the time evening came I was well and truly hooked, and that night I had to fight off the nagging feeling that sooner or later I was going to have to buy one of Pete's kits. This feeling was fuelled by the fact that two of my fellow rocketeers were suggesting to me which models would be best for a beginner.

Saturday morning saw many sore heads, but to my delight my wife and children joined me. At lunchtime the convoy once again left for Les's farm, only this time it was even bigger. The day was very clear, and as a family we watched launch after launch. My children were as amazed as I was on seeing the big rockets fly, and after a few words with my beloved, I was given the nod to buy one for myself.

Sunday brought wet weather, which dismayed the model and high power flyers, but delighted the aqua jet competitors who had assembled for this annual event. I had put in several hours during the week in the construction of a new aqua jet launcher for our team's entry, and at three o'clock we were first up to launch. The aqua jets, for those who have never seen them, are a fascinating and amusing alternative to modern rocketry. 1.5 litre soft drink bottles with soft noses and stabilising fins are pressurised to 80 psi and launched at 45 degrees down range. The winning team is decided by the overall team distance achieved. Unfortunately my team came last, but fittingly the reigning champions from the Paisley Rocketeers once again walked off with the title. That evening some competition model rocket flying took place on the main field until the light faded, then the rocketeers all gathered outside the pavilion for the end of week barbecue. Unfortunately I needed to leave early to get the kids home for bed, however by all accounts the evening went particularly well.

On the drive home, with the kids asleep in the back of the car, I told my wife all about the week. I told her about the tips and tricks that the other model makers had shared with me. I told her some of the stories the rocketeers shared, the people I had met, and the games we had played. I remarked on all the knowledge I had gained in both technical matters and in rocketry as a sport, and as I talked I remembered a conversation I had had with another newcomer to the hobby. He told me that he had

learnt more in three hours with other enthusiasts than he had in a year of reading books. Just think how much I had learnt being there seven days!

As we arrived home, I had already started making plans for my trip to the International Rocket Week 2000, and this time I knew there would be nothing to worry about.

UKRA Council

By M Perman

At the Annual General Meeting at Largs the results of the election to Council were announced. Shortly after the AGM the Council sorted out the posts for the coming year. A further addition to the Council was Bob Arnott who has been co-opted on to fill one of the vacant spaces on the council. The Council as currently constituted comprises

Chairman - Mark Perman

Vice-Chairman – Michael Williams

Secretary - Liz Perman

Membership Secretary/Treasurer - Hugh Gemmell

Head of Safety and Technical - Charles Simpson

Safety and Technical

Head - Charles Simpson

Deputy - Pete Davy

Secretary Rick Newlands

Mark Perman, John Bonsor, Robert Wark, Ben Jarvis,

Other Roles

Web Master - Richard Osborne

BMFA Liaison - Michael Williams

NOTAM/CAA - Pete Davy

10, 9, 8 team - Pete Davy, Richard Osborne, Michael Williams and Mark Perman, Bob Arnott and John Bonsor.

There are still a number of vacant posts on the council. If you would like to volunteer to help with the running of UKRA and help build a safe and secure future for our hobby send your resume to Hugh Gemmell at the UKRA PO Box and the Council will be pleased to consider you for co-option.

International Rocket Week 2000

**Kelburn Country Centre
Largs Ayrshire
August the 21st - 28th**

Open Experimental Flying 1/2A to K Possibly M Class
Competition Flying
Aquajet Flying
Talks
Social Events
Camping On Site
Quality Food On Site
Family Entertainment On Site
Local Hotel & B/B Accommodation
Local Attractions Including Viking Festival

Further Information:	http://www.gbnet.net/orgs/staar http://www.scotroc.force9.co.uk/largs/ E-mail largs@ecosse.net
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**Contact: John Bonsor, 15 Smith Avenue, Longbar, Glengarnock
Ayrshire, Scotland, KA14 3BN**



Fibre Glassing Rockets “From strength to STRENGTH!”

By Hugh Gemmell - UKRA Membership Secretary & Member of Sheffield Rocketry Association

Fibre glassing seems to be a little used technique in Model and High Power rocketry in the UK. Often only considered as a necessity on the highest performance rockets where super sonic speeds or size require construction techniques to deliver the maximum strength and durability.

Many people I have spoken to at flying meetings have not really considered fibre glassing as a construction technique. However, most are interested in its benefits and want to know more!

90% of model and high power rockets flown in the UK are constructed from either card or phenolic tubing. Although reasonably strong and easy to work with both possess inherent flaws. Card tubing is too flexible and crumples under relatively low loading. Phenolic tubing although considerably stronger is very brittle. Both materials perform well under flight conditions but fail far too easily under the slightest impact.

Early deployment of a chute or a hard landing often results in significant damage and lengthy repairs. How many of us have flown rockets only to find to our horror they've landed on the only lump of rock in the field!

This is where fibre glassing really comes into its own. A coating on any card or phenolic tube significantly increases its impact strength with surprisingly little increase in weight.

Having flown many high power and model kits, I found I was spending more time repairing kits than flying them. In almost all the cases I did not expect the kind of damage imparted by relatively minor scrapes and bangs. Oh, and not forgetting the odd early chute deployment at 200 mph!

As part of these repairs I started fibre glassing the damaged areas to give them extra strength. I quickly realised how easy fibre glassing is and what fantastic finishes could be achieved with relatively little effort. Even better no more tube spiral filling! The strength of these rockets has been vastly improved, now only a massive impact would cause significant damage. I now glass all my rockets as a matter of course!

If you're still not convinced, it actually takes about the same time to fill the spirals in as it does to glass a rocket. If you're going to spend that amount of time you might as well do something that will actually improve the construction of your kit!

Here are a few tips and techniques I have found get you the best results.

Fibre glass coatings consist of two components, the fibre glass cloth and an epoxy/hardener based liquid coating. Both products are readily available from most model shops.

Fibre glass cloth is usually sold in 1 square metre lengths and comes in a number of “weights”. The weight of cloth is determined by its thickness and is measured in ounces (oz). This is the weight of 1 square yard of the cloth.

A 1oz cloth is a very lightweight cloth, a 6oz cloth is about the heaviest modellers would use and would be suitable for larger rockets.

There are many good, readily available **Epoxy/Resin based liquid coatings** suitable for fibre glassing. The best I have found is “SP Epoxy Coating & Laminating Resin” from RIPMAX. The epoxy must have a long cure time to allow you to apply the coating before it sets. In almost all cases the cure times are temperature sensitive so always glass your rockets out of the sunlight and in a cool well ventilated area.

Other things you will need include, Cellulose thinners to clean up with (normal thinners will not do!), the usual tools, a very sharp knife, ruler, cutting board, ½-1” brush and a broom handle (all will be explained later!)

As with all types of model construction, *preparation is the key.*

Don’t cut the cloth to size after you have mixed the resin. Believe me it doesn’t work I’ve tried it! Prepare every thing first and it’s easy.

Glass wrapping airframe-tubing Glassing should be carried out after all the construction is complete. Except if the section has a coupler tube at one end. It’s best to glass first and glue the coupler tube in place after. That way you won’t stick fibreglass and resin to the smooth surface of the coupler.

Fillet the fins and Drill any vent/access holes first before you glass. It is far easier to trim the fibreglass around vent holes than it is to drill through the coating later.

Sand the whole airframe section first with a medium grit sandpaper or emery cloth, removing any imperfections. Effort here will reap rewards later!

There is no need to fill the tube spirals, as the glassing process will do that for you.

Once the model is ready for glassing we have to decide how many layers we are going to apply and select the weight of cloth.

For very small card rockets use one layer of 1-1 ½ oz cloth. For phenolic kits up to 4” use one 1 ½ -3 oz layer followed by a 1 ½ oz finishing layer. For Larger rockets use one or two 2-6 oz layers followed by a 1 ½ oz finishing layer. This is a very rough guide, the more you use the technique the more you will know what suits your kit best.

The next phase is to cut the cloth to size. Split the kit into its component parts i.e. payload, stages etc. and do each separately (Don’t glass the nosecone! it doesn’t need it).

You are looking to glass from the front of the fins forward to the nosecone in this phase.

Never be tempted to try and glass a long section with one piece. The longest length you want to apply at any one time is about 50 cm.

Measure the diameter of the airframe and length of the tube/section. When cutting the cloth you should allow a 1/2-1" overlap around the body and at least 2" extra at each end of the tube. Where the section is long split the cloth into manageable lengths (about 50cm long) but remember to overlap adjacent lengths by at least 2". Test the "cut out" sections on the kit first. I don't know how many times I've stuck the fibreglass on only to find its 1" to short around the airframe!

Now we are ready to apply the first layer. Remember the broom handle? Mount the broom handle (or similar) horizontally in a vice or bench and slide the airframe section onto it. That way you can support and rotate the airframe section and have two hands free to work.

Mix the epoxy/hardener, 30-40ml is ample to cover about 1/2 m of a 4" rocket airframe. Using the brush paint a light line of epoxy, about 1/2 " wide, along the length of the airframe. This should be as long as the cloth being applied. (See Fig. 1)

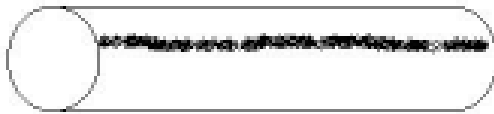


Fig. 1

Now take the cut cloth, carefully ensure it's the right way round, lay the edge of the cloth along the epoxy line. Using a "stippling" action work the epoxy into the cloth moving from the centre of the epoxy line towards each end of the cloth. This provides a good key for the cloth and frees your hands while you apply the epoxy to the rest of the surface. (See Fig. 2)

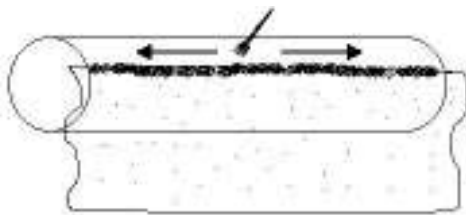


Fig. 2

Working from the Centre of the cloth along the body to each end stipple the epoxy onto the fibreglass in about 1" strips. (See Fig. 3)

Apply only a light amount of epoxy, you only want to wet the fibreglass. Applying heavy amounts of epoxy just means more sanding later on. Continue around the tube until the cloth overlaps and coats the whole diameter of the airframe.

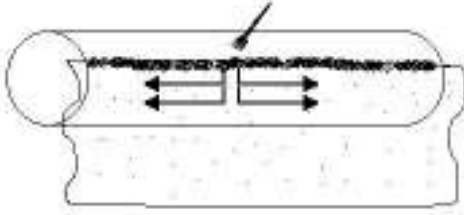


Fig. 2

Check the surface ensuring there are no kinks or air pockets in the fiberglass. If there are draw them out by lightly brushing along the tube towards each end. Don't be concerned with the frayed edge of the fiberglass this will sand out easily when dry.

Don't be tempted to use the remaining epoxy for any other sections you intent to glass. The epoxy will now be going off and although it looks liquid it will quickly become unusable. The best thing is to throw it away and start afresh with a new batch. Remember to clean the brush immediately in Cellulose thinners. You've only got a certain amount of time to do this before the epoxy sets and replacing brushed can be very expensive.

Allow the fiberglass to set completely before you prepare the surface for the next layer. Once dry you can trim the excess of the tube ends and any vent holes with a sharp knife. You should sand the fiberglass with a medium grit (240) paper. This will remove any excess epoxy and smooth out the overlaps. Be careful not to sand too aggressively, particularly with power sanders, as you can quite easily sand through the glass layer.

Apply any subsequent layers using exactly the same technique but avoid placing overlaps in the same position as previous layers.

Once the glassing is complete and the surface sanded smooth you can either paint the surface or finish it with a layer of the epoxy coating. I always apply a light layer of the epoxy with a brush first. This produces an almost mirror finish to the airframe and once lightly sanded provides an excellent key for paint. If you apply the epoxy finishing coat remember to turn the tube every 15 mins. until it is dry. This will prevent the "slow curing" coating from running down the tube.

Glass wrapping fins. Exactly the same techniques apply for strengthening fins. Measure the width of the fin and the surface length from about 1/3 up the fin, around the body tube and to 1/3 up the adjacent fin. Cut the cloth in a rectangle to those measurements. (See Fig. 4)

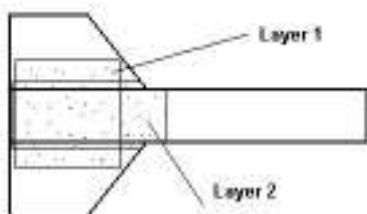


Fig. 4

You will need the same number of these strips, as there are fins on the rocket. The best way of applying glass fibre to fins is to start on one fin and work your way across the body to the adjacent fin. The cloth will tend to pull away at the fin fillet, stipple the cloth along the fin fillet to rectify this. I re-enforce the fin joint with a second strip, which covers the airframe between the fins and joins up with the airframe glassing. These go about 1/6 the way up each fin. This gives a consistent finish along the body and adds strength to the fin joint.

And that's about it! Give it ago. Try it out on a bit of scrap tubing first to test your technique. I guarantee if you fibre glass your rockets you will spend more time flying and less time repairing!

Safety Note: Working with fibreglass and Epoxy/Resin coatings can be dangerous and can cause long term health problems. Always fibreglass in a well ventilated area and use a dust mask. Always follow the manufacturer's instructions.

1st CANTERBURY CUP

By Stuart Lodge

**4-6 August [alternate 25-27 August 2000
Stalisfield, nr Canterbury, Kent, United Kingdom**

The FAI: CIAM Space Modelling sub-Committee is committed to building up a series of World Cup and Open Internationals throughout Europe approximately 500 km (300 miles) apart and to develop more interest globally. Development of domestic Model Rocketry is encouraging and it is time for the United Kingdom – with the support of BMFA to feature in the International Space Modelling Contest Calendar.

Introductory Bulletin

Organisers The British Space Modelling Association, Southern England Rocket Flyers and 'Rockets & Things' would combine to provide the organisation team, on behalf of BMFA. Contact addresses are shown below

Stuart Lodge	Tony Betts
25 Huntingdon Drive -	Rockets & Things'
Castle Donirigton	2 Waddenhall Cottages
Derby	Waddenhall
DE74 2SR UK	Petham
++44 (0) 1332 850329 (tel)	Canterbury CT4 5PX UK
++44 (0) 1332 263386 (fax)	++44 (0) 1227 700808 (tel./fax)
Email loggi.interspace@lodge28.freeserve.co.uk	Email y2ksoftware@btintemet.com

Contest Administration The guidelines contained within the FAI Sporting Code section 4b ~ General Rules for International Contests would be followed. The FAI contest would be open to all holders of a 2000 FAI Sporting Licence; domestic entrants in the non-FAI programme would need to be BMFA members. A local by-law prohibits model flying of any kind before 10:00 hours each day.

Contest Categories S4A-Boost Glider duration, S6A-Streamer duration, S8E-RC Rocket Glider duration, S8E/P-Rocket Glider Spot Landing (provisional rules) and

[S9A-Gyrocopter](#) duration. It is proposed that S6A & S8E be awarded World Cup status by the FAI:CIAM. In addition to the above, it is proposed to hold a small non-FAI programme, including 10Ns Egg Loft duration, Show models and possibly a kit contest. It is the organisers' intention to set up a 'Festival of Space Modelling over this weekend and not just an FAI contest ... although the latter would take precedence in any rescheduling due to bad weather. A more detailed event timetable will feature in a subsequent bulletin.

FAI Jury A selection will be made and published in a later bulletin, once the likely entry has begun to take shape. It is probable that most qualified UK potential Jury members will be participating in the competitions.

The Venue The following criteria were considered in the selection of the Stalisfield site, near the Kent cities of Ashford and Canterbury:-

- **Size** - Some 85 acres (~35 hectares) basic flying area, surrounded by 500 acres (~210 hectares) arable farming land - it has been reported that the farmer is tolerant of flyers retrieving models. The flying area is rough grass, with areas cut to provide take-off/landing facility for model aircraft using the site. Similar cut areas would be provided for the FAI Contest & sport rocketry launch areas over the relevant weekend.
- **Facilities** - The Stalisfield site is used by Radioflight Services for the professional instruction to novices of radio controlled fixed & rotary wing small aircraft and gliders; Charing Model Aircraft Club uses the site as a club field. Organised 'rocket meetings' already take place at the site. There are camping/caravanning facilities, drinking water, Portaloo toilets and 'junk food' & drinks available on-site during flying sessions.
- **Proximity to Channel Ports** ~ Stalisfield is ~30 minutes by car from Dover and Folkestone and ~45 minutes from Ramsgate, many Eurostar and domestic trains stop at Ashford & Charing, 10 - 15 minutes drive from the flying site.

Accommodation A Youth Hostel (81 beds) is available in Canterbury, with others in Dover and Ramsgate - current tariff £ 12-15 per night. Radioflight Services have a list of local guest houses and hostels with bed & breakfast facilities sympathetic to the needs of modellers ~ tariffs vary, but are moderate. Most accommodation is within 10 miles (16km) of the flying site. The cost to entrants would be low in comparison to real hotels in the area. Camping & caravanning is possible on the flying site. Arrangements could be made for competitors travelling from Mainland Europe, upon receipt of the entry form. Competitors would be encouraged to apply early for accommodation, remembering August is in the "high season" for holidays.

Entry Fees £25.00 for the FAI programme and World Cup, to include entry to the non-FAI programme, if desired. A lesser fee would be levied on those wishing only to enter the non-FAI events. An optional evening meal (banquet) on the Saturday evening would need to be paid for, in addition to the entry fee and accommodation.

Classification & Awards Some form of "goodie bag" and/or memento would be made available for each competitor. The first three finishers in each category will be awarded medals and diplomas.

Road Directions to Stalisfield

From Folkestone & Dover ~ From Dover take A20 (signs to Folkestone & M20) ... from Folkestone travel North on motorway M20, exit at junction 9. and take the A20 (signs to Lenham). 6 miles (9km) onwards is the village of Charing. At the next roundabout, take the A252, following signs to Canterbury. Drive to the top of Charing Hill, go past the petrol station on the right. Shortly, take a Left turn marked Throwley Forstal (indicated “formally B2077” on a yellow sign). After 1 mile (1.5km) follow the road past the Wagon & Horses public house and 1 mile (1.5]km) later, turn left into Housefield Road. 175 yards (165m) take a left turn (the road bears right) to Stalisfield. Less than 1 mile (0.75km) later turn right at a crossroads, the entrance to the flying field is 250 yards (220m) on the left

From Ramsgate - Take A253 (signs to Canterbury) and after 6 miles (9km) join A28. Leave Canterbury on A28 (signs to Ashford), at Ashford, join A20 (signs to Lenham). 6 miles (9km) onwards is the village of Charing. At the next roundabout, take the A252, following signs to Canterbury. Drive to the top of Charing Hill, go past the petrol station on the right. Shortly, take a left turn marked Throwley Forstal (indicated ‘formally B2077’ on a yellow sign). After 1 mile (1.5km) follow the road past the Wagon & Horses public house and 1 mile (1.5km) later, turn left into Housefield Road. 175 yards (165m) take a left turn (the road bears right) to Stalisfield. Less than 1 mile (0.75km) later turn right at a crossroads, the entrance to the flying field is 250 yards (220m) on the left

From London - Travel South on motorway M20, exit at junction 8 and take the A20 (signs to Lenham). Follow this road for 6 miles (9km) and at the roundabout (note ‘Little Chef’ restaurant on right), take the A252, following signs to Canterbury. Drive to the top of Charing Hill, go past the petrol station on the right. Shortly, take a left turn marked Throwley Forstal (indicated ‘formally B2077’ on a yellow sign). After 1 mile (1.5km) follow the road past the Wagon & Horses public house and 1 mile (1.5km) later, turn left into Housefield Road. 175 yards (165m) take a left turn (the road bears right) to Stalisfield. Less than 1 mile (0.75km) later turn right at a crossroads, the entrance to the flying field is 250 yards (220m) on the left

For the weekend of the 1st Canterbury Cup, attempts will be made to place temporary directions to the flying site

Rocketry Contacts and Flying Dates

By Liz and Mark Perman

All dates are subject to confirmation with the relevant clubs, please check prior to attending. Please let us know about others and we will include them. Also if your details are listed below please let us have the Main Contact, Flying Dates and Information for inclusion in the next issue.

One of the most commonly asked questions by members and people enquiring about model rocket flying in the UK is “where is my nearest club/rocket contact”. Obviously we have member’s details but we do not give them out without permission. As a way of increasing contacts within the hobby UKRA is proposing, initially on the

web site and later on in 10,9,8, to publish a list of individual contacts. If you are prepared to let your details be published do let Hugh Gemmell know via the UKRA PO box address.

AspireSpace

<http://www.gbnet.net/orgs/aspire/>

BIS (British Interplanetary Society)

Main Contact: General Enquiries
27/29 South Lambeth Road, London, SW8 1SZ

BNSC (British National Space Centre)

<http://www.open.gov.uk/bnsc/bnschome>

Main Contact: General Enquiries
Tel: 0171 2150807

The British National Space Centre is Britain's 'space agency'. Formed in 1985, it is a partnership, advising and acting for its partners - Government departments and Research Councils - to focus Britain's civil space activities. Its mission is to help win for Britain the best possible economic, scientific and social returns from national and international activities in space. BNSC's partners provide the funding for UK civil space activities. That funding, currently around £200 million every year, is spent 50% Earth observation, 26% Space science, 12% Satellite communications, 3% Technology and transportation, with the balance to administration, education and awareness. Overall, two-thirds of UK space spending is devoted to European Space Agency (ESA) programmes, and one third to our national programmes.

BNSC has some 40 staff working in policy teams at the London headquarters near Victoria in London, and a number of researchers at partner sites around the UK. These R&D teams are based at Rutherford Appleton Laboratory (the Central Laboratory of the Research Councils) near Didcot in Oxfordshire; the Remote Sensing Applications Development Unit, in Cambridgeshire and in Southampton; and the Defence Evaluation Research Agency, at Farnborough in Hampshire and elsewhere.

BNSC works closely with Europe in space (through the European Space Agency, its programmes and its research centres) in order to optimise our share of space activity, and cultivates links with other space-active countries, such as the USA, Japan, Russia, China, Canada and India.

British National Space Centre, Telephone: +44 (0)171 215 0806/7
151 Buckingham Palace Road, Facsimile: +44 (0) 171 215 0936
London SW1 W 9SS

British Space Modelling Alliance

Main Contact: Stuart Lodge
E-mail: loggi.interspace@lodge28.freemove.co.uk

The BSMA is the BMFA specialist body for space modelling

DCS (The Discovery Space Club)

Main Contact: Robert Law
Phone: 01505 815100.

The DCS formed in 1987 to inform public interest in astronautics and to monitor space activities makes extensive use of information and satellite technology and participates in on-line conferences with NASA during Space Shuttle launches. DCS members have visited the Kennedy Space Centre and Cape Canaveral, witnessing 'Shuttle and other rocket launches, and have regular contacts with local space support and media organisations there. Further visits are planned. Although primarily a "space watch" group the DCS does carry out occasional model rocket flying activities (sometimes in association with STAAR Research).

ERA (Eastern Rocketry Association)

<http://www.jcsoftware.freerve.co.uk/era>

H.A.R.T. (Hornchurch Airfield Rocket Team)

http://ourworld.compuserve.com/homepages/hart_rockets/

KRC (Kent Rocket Club)

<http://www.btinternet.com/~y2ksoftware>

LARCS (Lincolnshire Association of Rocket Clubs)

MARS (Middlesex Advanced Rocketry Society)

<http://www.mars.org.uk/>

PRS (The Paisley Rocketeers' Society)

Main Contact: John D. Stewart
PRS Honorary Secretary, 15 Bushes Avenue, Paisley, PA2 6JR, Scotland, UK.
Tel: 0141 884 2008.

The PRS, founded in 1936, was one of several pioneering amateur groups formed around the world during the 1920's and '30's, which took the first practical steps towards reaching space by rocket. Prior to WWII the PRS conducted some 85 flights encompassing research in rocket aerodynamics, thrust improvement and recovery methods. They also achieved the world's first stabilised 3-stage rocket flight, and pioneered camera-carrying rockets. Since 1965 the PRS has concentrated on the development of "AquaJet" rocketry, i.e. reaction propulsion by water and air pressure.

SERF's (Southern England Rocket Flyers)

<http://www.steve-moores.demon.co.uk/index.htm>

SRA (Sheffield Rocketry Association)

<http://www.cruiserd.demon.co.uk>

S.T.A.A.R. Research

(Space Technology Applications, Astronomy and Rocket Research)

<http://www.gbnet.net/orgs/staar/>

Main Flying Date:

2000 Flying event: International Rocket Week Monday 21st August to Monday 28th August inclusive.

Main Contact: John Bonsor

15 Smith Avenue, Longbar, Glengarnock, Ayrshire, KA14 3BN, Scotland, UK.

Or C/o Bobby Wark of ScotRoc. E-mail: bob@scotroc.force9.co.uk

STAAR Research, formed 1989 in Ayrshire, Scotland, has three main strands to its model and high power/amateur rocketry programme: -

- Public and educational rocketry through the "Rockets To Go!" and "Rockets Masterclass" workshops.
- Scale flight research applications, particularly on the Waverider aerospaceplane concept.
- Organisation and development of the annual International Rocket Weekend [since 1992 (formerly the Scottish Rocket Weekend/1986 to 1991)], expanded to the "International Space & Rocketry Week" from 1998.

Thrust Flying Club

http://ourworld.compuserve.com/homepages/thrust_for_space

1999 Flying dates:

Sunday 19th December. 2000 Flying dates TBA

Main Contact: Mike Williams

Tel: 01283 533848

100306.20@compuserve.com

Thrust has been in operation since 1997 and has an average group size of 20 people. All level of flyers are welcome with the range being certified up to J Class.

UKRA (United Kingdom Rocketry Association)

<http://www.scotroc.force9.co.uk/ukra/>

Main Flying Date:

2000 Flying event: Friday afternoon to Sunday inclusive. Date and venue TBC

Main Contacts: Hugh Gemmell (Membership Secretary)

Hugh@cruiserd.demon.co.uk Liz Perman (Secretary) Liz.mark@virgin.net