



10, 9, 8...

The voice of UKRA!

*Volume 3 Issue 2
July 1999*

NEW UKRA ADDRESS

**UKRA
PO BOX 1561
SHEFFIELD
S11 7XA**

Editorial By Liz Perman

Hi all! Welcome to the second edition of 10,9,8... for 1999.

The flying season has got off to a really good start! Turnout at Thrust flying days is growing steadily and the UKRA Annual Event was well attended, more details on that are included in a separate article.

We held our SGM (Special General Meeting) on Friday 25th June 1999 were the following motions were unanimously carried:

Motion 1: Raised by Charles Simpson

The UKRA member's handbook should be abolished and all documentation issued as separate documents. The handbook will remain in principle but all documents will retain their separate identities.

Motion 2: Raised by Liz Perman

Proposed alteration to the Articles of the Association 1.03.02 to reduce the minimum age limit of a UKRA Full Member from 18 years of age to 16 years of age. This brings us in line with current UK law regarding explosives licensing etc.

We are now in the run up to the International Rocket Week held at Kelburn Country Park, Largs from Saturday 23rd to Monday 30th August. Mark and I are really looking forward to it. There is even a rumour going round that we are going to fly some rockets! I'm sure it's not true but come along and see for yourself! Remember that the IRW is also the venue for this year's AGM where the usual business including UKRA Council Elections will be discussed.

This issue contains various articles on Classification of Motors, Aerotech kit-build and a mini UKRA99 review. Standard items include the Hints and Tips and the evolving Rocketry Contacts list.

Just a wee 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. Please do not hesitate to contact me 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 wee hint & tip that you would like to share then please contact me and we can discuss it in more detail.

Anyway, I hope that you enjoy reading this edition and I look forward to seeing you all soon at the AGM!

Tips on Using Electronics in your Rocket Projects

by Charles RJ Simpson TSC Chairman

Electronics 1

It is strongly recommended that all persons using electronic staging or recovery read the manufacturers instructions in order to comprehensively familiarise themselves with its operation. Also to try out the device using non-pyrotechnic components (i.e. test lamps) prior to its installation.

Electronics 2

Any "first time" users of electronics are advised to have a competent person (one with previous experience) to supervise the first installation and operation.

Electronics 3

Where a rocket uses electronic staging or recovery, it is important to realise that if an igniter fails and causes a motor to "chuff", there may have been enough movement to cause launch detection in the electronic equipment. To this end, a rocket using electronics, suffering igniter failure, being partial or complete, must not be approached until double the longest timed period of any of the devices in use, has expired.

Electronics 4

When prepping such devices, the utmost care must be taken with regard to the position of the arming screws, plugs or switches, when connecting the batteries, second stage ignitors or ejection charges.

Is That Motor Classified? Part Two By Pete Davy

In the last issue of 10,9,8...we were left with a lot of the motors requiring Classification and Authorisation with the H.S.E. at the time of that article in excess of 160 items had been applied for. All were granted and I have a complete list with all the individual HSE serial numbers. In order to save space and make it easier to understand I have prepared the following list of motors that approval was granted to.

The motors had to be uniquely identifiable so have been CAD with each of their possible delays. I only intend to list the reload designation. i.e. H128W would cover H128W-S, H128W-M, and H128Wl. Some are only available with plugged forward closures and some with extra long delays, again all of these have been CAD.

All the remaining Aerotech single use and non standard motors have been CAD. The only motors not CAD are the 'high power' single use ie those of 'H' and above impulse. The reason for this is that they are a different UN number and are more costly than the re-loads. Should you have any questions on the above please do not hesitate to contact me at Pete's Rockets.

Re-load Kit Designation

29mm	38mm	54mm	75mm	98mm
F37W	H73J	J90W	K560W	K458W
F62T	H123W	J180T	L850W	L952W
G54W	H242T	J275W	L1120W	M1419W
G104T	H112J	J460T	M1315W	M1939W
G75J	I161W	J135W		N2000W
H128W	I357T	J415W		
H238T	I154J	J800T		
H97J	I211W	K185W		
H180W	I300T	K550W		
H220T	I195J	K1100T		
	I284W	K700W		
	I435T			
	J350W			
	J570W			

Aerotech Arreaux and Initiator complete builds By Mike Williams

This article is a rewrite and a update of the Arreaux rocket kit complete build that appeared in 10,9,8 last year.

The Aerotech Initiator usually appears in the UK as part of a medium power starter set with a Mantis Launch tower, Interlok launch controller and associated gubbins. The Arreaux is a slightly more complex kit as it includes a payload section but has many constructional points in common with the Initiator. Indeed these similarities are shared with other kits such as the Mustang. This article is based on the construction of two Arreaux and one Initiator. If you have anything you want to add to this article please let me know.

Both are single stage rockets that come with 29mm motor mounts and quarter inch launch lugs. They are both made of cardboard and have ABS plastic nose cones and fins. Their internals are very similar and the description below is based on the Arreaux. Where major differences apply then they are pointed out.

The instructions that come with the kits are clear and well laid out. However, one annoying detail is that many of the dimensions are not marked on the diagrams only listed in the instructions. There is a natty little ruler printed along the edge of the page though.

I suggest getting all the bits out and checking that its all their and in reasonably good order. All three kits were but its worth checking. I did have one "quality issue" and that was with an eye bolt that should have been threaded but wasn't. Rather than complain I took the English way out and spent a couple of hours hand filing a thread onto it. It worked.

You will also find a few bits of odd tubing left over. These are motor mount converters to allow the mount to take various different 24mm and 29mm engines.

These mount converters used the same parts on both rockets and they are interchangeable.

Aerotech recommend the use of CA (super glue) more or less throughout the whole construction of the rocket. Now I'm an old fashioned boy and there are times when a bit of epoxy is a comforting thing. I built all three rockets using largely epoxy, mostly 30 minute Araldite. Even if you don't hold such views then I would still strongly suggest using epoxy for the motor mount, fin route and the shock cord attachments.

The motor is held in with a substantial hook, which is shown on *fig 1*. This hook has a small "lug" at one end that passes through the motor tube wall. The necessary slot should be cut with a scalpel rather than a modelling knife as suggested in the instructions. This is not unlike the engine retaining clip on some Estes kits but much more substantial.



Once this is done it is necessary to fit the two parts of the "fin-lok" system that support the fins and hold the motor retaining hook in place. On all the ones I fitted these needed considerable sanding and dry fitting in order to get a good fit. It is worth taking some time over this as if the fin-loks are too loose then they can also be difficult to fit. If they are too tight they probably just won't fit at all.

Dry fit all of the fin-lok system into the body tube to make sure that it all aligns before applying any glue at all to the rocket. Only when you are certain of the correct location should the fin-lok components be glued into place. Make sure that no glue gets into the slots of the fin-lok as these will hold the fins in due course. You can also glue the forward centring ring at this point. Do not attach the aft ring yet. On the Initiator, these rings are much larger and required quite extensive sanding that the Arreaux did not. Try dry fitting everything together a few times before committing yourself.

One possible problem is that the two fin-loks are not exactly aligned with one another. You can dry fit a fin to tell if this is done. Twist one of the fin-loks to align. Do all this completely dry. You don't want any glue anywhere near this operation.

During the dry fitting, slide the as yet unglued motor tube into the airframe and make sure that the fin-lok slots line up with the slots in the body tube. If you want to clear

out the slots on the body tube now do so with a scalpel and be very gentle or the finish of the rocket can be impaired.

At some point you need to fit the “Thrust Ring” and “Thrust Ring Flange”. These are the bits that stop the motor from shooting up inside the rocket (how embarrassing is that?) This is the one place I used CA based glue rather than epoxy. Glue the ring to the flange and then slide them in together using CA. They should then be pressed against the part of the motor hook that is pushed through the side wall of the motor tube. Either hold this in with a bead of CA or one idea I used was to use a very cheap and runny epoxy sucked up a drinking straw and then pushed out over the correct part of the motor hook. This is rather fiddly but less prone to disaster than the process described in the instructions. If you use a very fluid, slow setting epoxy then it will tend to flow round the Thrust Ring before it sets. It is important that you are completely happy that the thrust ring and flange are secure before working on the rest of the assembly.

If you have not done so already, use a scalpel to open up the slots for the fins and the launch lugs in the body tube.

The “Labyrinth” system, that is shown in exploded view in *fig 1* is a method of cooling the ejection gases from the motor before they reach and, potentially damage, the parachute. It uses a bit of iron mesh that looks a bit like an old fashioned pan cleaner.

First cut some 6mm slots in the fore end of the motor tube using a scalpel. Then pull the cooling mesh out slightly into a cigar shape. And then push it into the motor tube. Don't get any glue on it. Then sand and roughen up the “ejection gas baffle shoulder” so the epoxy will get a good grip. Put the glue of the plastic not the motor tube and make sure no glue blocks the holes on the bottom of the baffle. This joint will take the full force of the ejection charge so you don't want it coming undone. Once the glue is completely set then attach the “screw eye” by screwing it into the baffle flange. Use epoxy or CA to ensure that this will never come undone. Attach the elastic shock cord to the screw eye. Do not get glue on the elastic as this can weaken it.

On both rocket designs, the motor tube is considerably shorter than the body tube. Once it is all fitted together it can not be removed. Get it right now.

Put the motor tube into the airframe and dry fit the fins. Make sure that the motor hook does NOT line up with the launch lug slots. You can then dry fit the fins. Each one will go in with a satisfying click. Insert all three and confirm a nice fit. If there is a problem with this it is likely that glue or flashing has got into the fin-lok slots. Remove the motor tube and clean the slots up. Repeat as necessary for a comfortable fit. Be careful only to remove the minimum necessary to allow proper fitting or the fins will be harder to glue.

Remove the fins one at a time and cover the edge with epoxy. Allow the fin to glue solidly with the fin pointing upwards before doing the next one. If you have been kind to your components you will not need to use tapes and clamps and the like to hold the fin at right angles to the body tube.

Repeat for all fins. Once this is done then insert the aft centering ring with loads of epoxy and leave to set nice and solid.

Though it may seem awkward to put the launch lugs on after the fins I would suggest doing it this way round. Excess glue from the launch lugs could cause problems if they were fitted earlier. If you have the Initiator starter kit you can use the ¼ inch rod in the kit to make sure that the two lugs are aligned.

For the Arreaux only, I pretty much followed the instructions for the payload section. The one change I can suggest is to pull the payload section centering ring through the payload section with the shock cord elastic against 5 minute epoxy and hold it till it sets. The screw eye in the payload section should be as secure as the one in the motor tube. The pulling out of the payload section base would not be good. Make sure that all the parts are a very snug fit and that no glue gets onto the lower part of the coupler tube.

Attach the parachute to the shock cord about one third of the way from the payload to the body on the Arreaux and about one third of the way from the nose cone on the Initiator. Make sure that the parachute can not slide along the shock cord. When hung by the parachute the two sections should not bang into one another.

This leaves the painting and the decals. This is generally up to individual taste but one tip is that the decals are very sticky. Be careful or they will foul up during application.

Living with your kit

The Initiator is not as good a flyer as the Arreaux. That is not to say that they are not both fun but if you are after altitude then the skinny Arreaux is going to do better. Both are really “medium power” and will not operate correctly on the usual shop bought engines. Even a D12 is not powerful enough to lift them properly.

The motor choice for both kits is fairly varied. A good first engine for either kit is the Aerotech single use E15-4, or for the Arreaux the E15-7 is also OK. The best F motor is probably the F25 reloadable with a Medium delay in the Initiator and the F25 reloadable with a medium or long delay in the Arreaux. These RMS based motors and fit in the RMS-29/60 casing. I saw an Initiator go on an F40 that was really just a bit too much. The first Arreaux was lost after flying on a 29mm G40. This flew amazingly well but without radio tracking, and quite a lot of help you will loose yours as thoroughly as we lost ours.

The kits both come with the same set of motor mount adapters. This allows 24 and 29mm motors up to 100mm in length. The motor retaining hook is very tough and care needs to be taken as the motor is fitted.

In the initiator kit you get an Extra bit of tube that is unlabeled and badly documented. This is to act as a stand off for the rocket on the Mantis launch pad. It won't last long. A used single use E motor makes a far better choice.

Please remember these kits are cardboard and won't last forever. Also in the first of the Arreaux the labyrinth cooler had completely failed and it fell out in bits. On the Initiator the labyrinth cooler appears to have reacted with the ejection charge gas and is noticeably corroded.

Initiator starter kit

Apart from the rocket kit described above you get the Mantis launch pad and the Interlock Launch Controller. Generally these go together as the instructions tell you but there are a couple of points of note. The first is that the Interlock Launch Controller will only work with Aerotech copperhead ignitors when using the clip supplied. It would be simple enough to add crocodile clips in parallel with the copperhead clip while you are putting it together. A bit of soldering is required to make a good job of this.

The Mantis launch pad is rather over engineered. It has a really natty and useless alignment thread. Still it stands up and helps launch rockets. It has a plastic frame with aluminium legs and once its assembled its pretty robust and steady. Some of the castings on the two examples I have seen were not accurate. The place where this really matters is the mounting point for the launch rods. These consist of a revolving disk secured with long screws that can take 3mm 5mm and ¼ inch rods. The kit only supplied a two section ¼ inch rod and this is suitable for both the kits described above.

As originally shipped, the starter pack comes with an E and F motor. These can not be shipped with the kit in the UK. Ask your supplier about these.

Conclusions

These are both great rockets, the Arreaux is a particular favourite of mine. Stick an F25 in it and see it leap off the launch pad like a terrier. The Initiator is a good start for a medium power rocket and as part of the starter kit is good value for money but be prepared for a bit of work on the launch pad and controller.

One interesting thought for the Initiator would be to build it with three 24mm mounts for cluster firing. This couldn't really be retrofitted you'd have to put it in at first build. Please let me know how you got on.

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Beeper Construction By Christopher Key

This is how to construct a loud, cheap, multi-tone beeper unit for use in HPR or Model Rocketry. 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 Code	Order	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 the beeper. I would suggest using self-adhesive pad to hold it to the base of the beeper, then to add epoxy around. 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 self-adhesive with the legs running parallel to the battery box. 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 DIP 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 SW3 and the Green to 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 SW3 to SW4 and the Green from SW4 to SW1.
- 4) Hold the black lead next to the side of the DIL switch, with the soldered joint directly in line with the switch. Epoxy over the soldered joint 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! Good luck!

UKRA 99 Mini Review By Liz Perman

Just a few wee words on our Annual Event. A more detailed write up will be included in our next issue. Sorry, but there just has not been time to do all the information justice!

All the reports that we have had in have been very constructive! Everyone seemed to enjoy themselves and are looking ahead to the International Rocket Week at Largs.

The weather was beautiful on Friday and Saturday, what a shame it had to rain on Sunday! UKRA luck I guess!

Anyway, more specific statistics in the next issue.

**The 1999 International
Rocket Week**
Incorporating The International
Rocket Weekend
Kelburn Country Centre
Largs Ayrshire
August the 23rd - 30th

Open Experimental Flying 1/2A to K Class
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Further Information: <http://www.scotroc.force9.co.uk/largs/>
E-mail largs@ecosse.net

**Contact: John Bonsor, 15 Smith Avenue, Longbar, Kilbirnie
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Rocketry Contacts and Flying Dates By Liz Perman

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

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

Information:

BNSC brings together Britain's space activities. It is a partnership between government departments and research councils.

DCS (The Discovery Space Club)

Main Contact: Robert Law
Phone: 01505 815100.

Information:

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. DSC 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.freemove.co.uk/era>

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

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

1999 Flying dates: Saturday 7th August, Saturday 4th September and Saturday 2nd October

KRC (Kent Rocket Club)

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.

Information:

The PRS, founded in 1936, was one of several pioneering amateur groups formed around the world during the 1920' sand '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' sfirst 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>

1999 Flying dates: Sunday 8th August, Sunday 22nd August, Sunday 12th September, Sunday 26th September and Sunday 10th October.

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:

1999 Flying event: International Rocket Week Monday 23rd August to Monday 31st 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

Information:

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 26th September, Sunday 10th October and Sunday 19th December.

Main Contact: Mike Williams

Tel: 01283 533848

100306.20@compuserve.com

Information:

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 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