



## United Kingdom Rocketry Association

### Model Achievement Programme Handbook

#### **Introduction**

The Model Achievement Programme is for UKRA members and youth groups associated with UKRA members. The programme requires that the Model Rocketeer complete a range of tasks, exercising a range of skills, knowledge and experience.

There are three levels, which must be completed in order. A certificate is awarded upon successful completion of each level. Each level comprises one or more tasks either optional or mandatory. Each task involves a certifying flight, which must be carried out in the presence of a Model Achievement Programme Examiner. For each level, the mandatory task must be carried out first. The optional tasks may be carried out in any order.

#### **Registration**

All members will receive a copy of this handbook when they renew their membership. Junior members will also receive attainment cards. The attainment card records the progress of the Model Rocketeer through the programme. Senior members may apply to be Model examiners and run a scheme with a local youth group. They will then receive an information pack with sufficient attainment cards, task completion forms and task stickers for their needs. The programme is free to UKRA members. There are two modes of registration for youth groups, insured, and uninsured. The insured mode takes advantage of the BMFA group insurance scheme, the price is the cost of the BMFA insurance plus a small administration charge to

UKRA. The uninsured mode assumes that the youth group have made separate arrangements for insurance, and consists only of the payment to UKRA.

#### **Task Completion**

Prior to the attempt a task form must be filled out, stating the name of the Model Rocketeer, UKRA number, date, location, associate club membership (if appropriate), the task to be attempted, and a description of the rocket used. Each task must be completed in the presence of a Model Examiner. On successful completion of a task, the Model Examiner will sign the form and pass it to the Model Achievement Programme Committee. A sticker is awarded to mark progress on the achievement card.

Only one task may be attempted on any given day but, if a Model Rocketeer fails a task, the same task may be attempted again on the same day. Successful completion of tasks will be recorded on the UKRA website.

#### **Level Completion**

On completion of a level the Model Rocketeer will be sent a certificate. Once a particular level has been completed, the Model Rocketeer may move on to the tasks of the subsequent level. Remember, once you have completed your mandatory and optional tasks for any given level, there is nothing to stop you from completing all the other tasks in that level. In the future, the Model Achievement Programme Committee may introduce other awards to present to Model

Rocketeers who demonstrate such mastery of rocketry!

## **Examiners**

All Model Achievement Programme flights must be undertaken in the presence of a Model Examiner. Model Examiners must be full UKRA members, and are appointed after interview with a member of the Model Achievement Programme Committee and an RSO. If you want to become a Model Examiner, contact a member of the Model Achievement Programme Committee.

## **Level 1**

For Level 1 there is only a single, mandatory task, to be completed. RTF rockets are acceptable for Level 1.

### **Mandatory Task (Task 1.0)**

Prep and fly a model rocket, and recover it successfully. The rocket must be flown on a class A, B or C, BP motor and utilise a parachute or streamer recovery system. The rocket does not have to have been built by the Model Rocketeer.

## **Level 2**

For Level 2, two tasks must be completed, again a mandatory task, and additionally, one of a number of optional tasks, described below. It is recommended that kits are used for level 2 tasks.

### **Mandatory Task (Task 2.0)**

Build, prep and fly a model rocket, and recover it successfully. The rocket must be flown on a class A, B, or C, BP motor and utilise a parachute recovery system. The Model Rocketeer must build the rocket used to complete the task. RTF rockets are not acceptable for this or any other Level 2 task.

## **Optional Tasks**

### **Minimum Diameter, streamer recovery (Task 2.1)**

Build, prep and fly a minimum diameter model rocket, and recover it successfully. The rocket must be flown on a class A, B, or C, BP motor and use a streamer recovery system. The Model Rocketeer must build the rocket.

### **Helicopter recovery (Task 2.2)**

Build, prep and fly a model rocket, and recover it successfully. The rocket must be flown on an, B, or C class BP motors and utilise a helicopter recovery system. The entire rocket must be recovered using this system. The Model Rocketeer must build the rocket.

### **Glide recovery (Task 2.3)**

Build, prep and fly a model rocket glider, and recover it successfully. The rocket must be flown on a class A, B, or C, BP motor and utilise a glide recovery system. The entire rocket must be recovered using this system. The Model Rocketeer must build the rocket.

### **Fragile Payload (Task 2.4)**

Build, prep and fly a model rocket carrying a fragile payload. Both the rocket and the fragile payload must be recovered successfully. It is suggested that a hen's egg be used as the fragile payload. Other payloads may be acceptable, at the discretion of the Model Achievement Programme Committee. The rocket must be flown on a class A, B, or C, BP motor and may utilise any recovery system. The Model Rocketeer must build the rocket.

### **Cluster rocket (Task 2.5)**

Build, prep and fly a model rocket powered by two clustered motors, and recover it successfully. The rocket must be flown on a class A, B, or C, BP motor and utilise an appropriate recovery system. The Model Rocketeer must build the rocket.

### **Staged rocket (Task 2.6)**

Build, prep and fly a two-stage model rocket, and recover it successfully. The rocket must be flown using a class A, B, or C, BP motor and utilise an appropriate recovery system. The Model Rocketeer must build the rocket.

### **Level 3**

For Level 3, three tasks must be completed. As always there is a mandatory task. Additionally, the Model Rocketeer must choose two more tasks from the optional tasks listed below.

Level 3 is intended to present a much greater challenge. Generally, rockets must be scratch-built, with exceptions noted below, and the Model Rocketeer must produce evidence that the rocket will fly in a stable manner. This evidence may take the form of a computer print out from VCP, RockSim or similar program, or a working of the Barrowman equations. A swing test may also be required. The Model Rocketeer will be expected to answer simple questions on the importance of the relative position of the C.P. and C.G. of the rocket, and their relationship to stability.

### **Mandatory Task (Task 3.0)**

Design, build, prep and a model rocket and successfully recover it. The rocket must be flown on a D class of BP motor and utilise a parachute recovery system. The rocket must be designed and built by the Model Rocketeer. The certifying flight must be accompanied by a stability report.

### **Optional Tasks**

#### **Staged rocket (Task 3.1)**

Design, build, prep and fly a multi-stage model rocket, and recover it successfully. The rocket may be flown on any combination of A, B, or C or D class, BP motors and utilise an appropriate recovery system. The rocket must be designed and built by

the Model Rocketeer. The certifying flight must be accompanied by a stability report.

#### **Cluster Flight (Task 3.2)**

Design, build, prep and fly a model rocket powered by a cluster of motors, and recover it successfully. The rocket must be flown on A, B, or C class BP motors and utilise an appropriate recovery system. The Model Rocketeer must build the rocket. The certifying flight must be accompanied by a stability report.

#### **RMS Flight (Task 3.3)**

Prep and fly a rocket on a RMS. The motor must be G class or lower. The rocket must have been built, but need not have been designed by the Model Rocketeer. A kit is therefore suitable for this task, but a stability report for the particular rocket and motor combination is required.

#### **Scale Project (Task 3.4)**

Build, prep and fly a scale model rocket, and recover it successfully. The rocket may be flown on suitable A, B, or C or D class BP motors and utilise an appropriate recovery system. It is expected that the rocket be at least partially built from scratch. Simply assembling a kit of a scale prototype is not acceptable. A kit that requires significant conversion may be acceptable. If in doubt contact the Model Achievement Programme Committee. The Model Rocketeer must produce research, including scale diagrams and photographs to support the accuracy of the model. The certifying flight must be accompanied by a stability report.

#### **Special Project (Task 3.5.n)**

Model Rocketeers may suggest a project of their own devising. The Model Achievement Programme Committee must approve the project before commencement. The project must be of a sufficiently challenging nature to qualify as a

Level 3 task. An example of such a project would be to design and build a rocket to carry an electronic payload, or build and fly an electronic payload. Design and

construction of an ignition system would also be a good example. If you have an idea of your own, contact a member of the Model Achievement Programme Committee to discuss it.

## **FAQ (Frequently Asked Questions)**

### **Who can enrol?**

Any UKRA member can enrol.

### **How do I enrol?**

Send your details including membership number to the Model Achievement Programme Committee [map@ukra.org.uk](mailto:map@ukra.org.uk) or the usual UKRA PO Box no.

### **What does it cost?**

Nothing, it's included as part of your UKRA membership fee.

### **How old do I have to be?**

There is no minimum age, but you must do the task yourself!

### **Where can I get more information?**

For the latest information see the UKRA web site <http://www.ukra.org.uk>

### **What do I get?**

On enrolment you get an attainment card, to chart your progress. After completion of each task you get a sticker for the attainment card. After completion of each level you will receive a certificate.

### **Can I still do more level 2 tasks once I have a level 2 certificate?**

Yes, and you get a sticker for each additional task completed. The same applies to level 3.

### **When & where can I carry out my tasks?**

You can carry out a task at any launch where there is a Model Achievement Programme Examiner.

### **Who are the approved examiners?**

All UKRA RSOs are approved. In addition any UKRA member may apply to be approved examiners for the programme.

### **What does 'prep' mean?**

Prep is short for prepare. It means get the rocket ready to fly. This means setting up the recovery system, putting the igniter in the motor, and the motor in the rocket.

### **What's a recovery system?**

The recovery system is the device that makes sure the rocket will be able to fly again. Basically, the recovery system slows the rate of descent such that the rocket is not damaged when it lands. It might be a parachute or a streamer, which is deployed by the ejection charge of the motor. More sophisticated recovery systems include helicopter and glide. A helicopter recovery system deploys blades; a glide recovery rocket deploys wings, or moves the cg such that the rocket glides.

### **What does RTF mean?**

Ready To Fly. Estes and Quest both make a range of RTF rockets. They require little or no construction prior to flying.

### **What's BP?**

Black powder. Estes and Quest motors use BP as propellant.

### **What does CP mean?**

The CP or centre of pressure, is the point in the rocket around which the effect of aerodynamic forces is equal.

### **What does CG mean?**

The CG or Centre of Gravity, or 'balance point', is the point in the rocket around which the weight is equally distributed.

### **What's a 'cluster'?**

When two or more motors are used to power a rocket it is referred to as a cluster.

### **What does RMS stand for?**

RMS stands for Reloadable Motor System. The propellant is contained within a reusable aluminium casing. The user must assemble the motor & reload before use.