

ISSUE 177 - FEBRUARY 14, 2007

APOGEE

PEAK OF FLIGHT

N E W S L E T T E R

Model Rocketry

From the Shore of Norway

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- Defining Moments: Air Scoop
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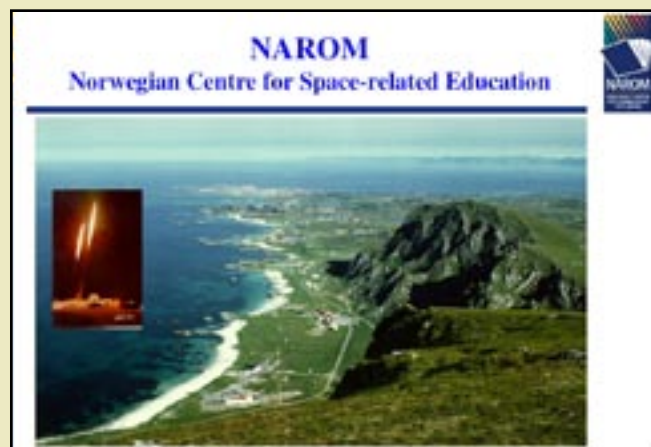
1130 Elkton Drive, Suite A
Colorado Springs, Colorado 80907 USA
www.ApogeeRockets.com e-mail: orders@ApogeeRockets.com
phone: 719-535-9335 fax: 719-534-9050

Model Rocketry Across the Seas in Norway

by Amund Nylund

Learn how they do model rocketry in lands that are varied in terrain and weather, not so unlike rocketry here in the U.S.A.

NAROM (Norwegian Centre for Space Related Education) is a daughter company of Andoya Rocket Range (ARR), and is located with ARR on the island of Andoya in Norway at 69 degrees north and 16 de-



Norway's island of Andoya

grees east. ARR has over 40 years of experience with scientific sounding rockets and balloons. NAROM was formed in 2000 to organize space-related educational activities, to promote recruitment, to promote appreciation for the benefits of space activities, and to stimulate interest for science in general.

The close proximity to the infrastructure and personnel at ARR provides important advantages with



Rocketry on the shore of Norway

respect to educational activities. NAROM organizes courses for students, teachers and others from primary school to university level. The courses combine theory with workshops and use of instrumentation at the range. The participants live together with the lecturers at the hotel at ARR. This provides a positive educational environment.

At NAROM the model rockets are an important part of a larger rocket concept used in many different space-related courses. The rocket concept includes water rockets (altitude about 50 meters), model rockets (altitude about 300 meters), student rockets (altitude about 8 kilometres) and large scientific rockets (altitude about 300 kilometres). The model rockets are used to introduce the students to rocket construction in terms of stability, drag, propulsion and so on. The students also do static firing of different model rocket motors where they can log thrust and analyze the curves.

By using a simplified simulation model which only

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About this Newsletter

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Newsletter Staff

Editor / Writer: John Manfredo

Layout / Cover Artist: Dave Curtis

Co-Editor and English Specialist: Michelle Mason

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uses Newton's Laws and the properties of the model rocket and rocket motor, the students are able to simulate the flight. Finally the students can launch their rockets, but of course, they have to use different methods of measuring the altitude. The different altitude measurements used vary from using trigonometry, motion equations, video measurements and altimeters. If there are different rockets and motors used, the participants have a competition of having the best correlation between simulated and measured altitude. If the rockets and motors are the same, they include a highest altitude competition.

There are many different kind of model rockets that are used for the different courses at NAROM, normally depending on the time available and skills of the students. The time the course participants use on model rockets vary from one to about four hours, so there is



Getting ready to launch an Oracle rocket

limited time for them to build more advanced model rockets. It is almost impossible to teach anyone rocketry in one hour, so during these courses the main focus is to stimulate the participants' interest for rockets. Dur-

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continued from page 3

**The author ready to launch**

ing the four-hour courses there is more time to focus on different aspects of rocketry while the participants are building their rockets.

The rocket program is adapted to the skills and levels of the different course participants. Younger students use ready-to-fly and low skill level rockets, while older students use more advanced model rockets. The teachers are introduced to both, but with special focus

**We do rocketry year-round****Oracle blasting off!**

on classroom kits.

Apart from basic rocketry and different calculations using physics and math, there are more aspects of the model rocket activities at NAROM. First of all, using model rockets is a great way to teach the participants to work in teams and experience the benefits and chal-

**Static motor test**

lenges of this form of work. Second, the participants understand the relationship between good work and of their rockets' flight characteristics, and how poor work

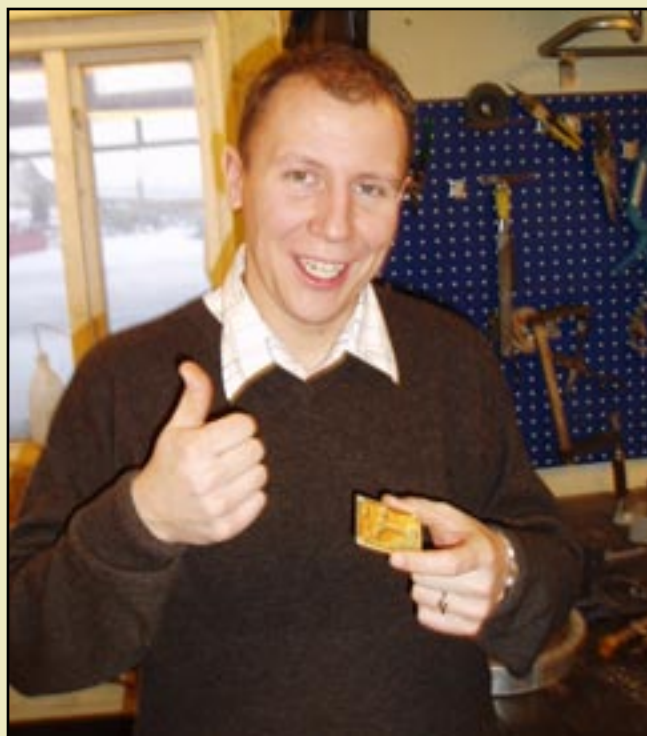
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can be threat to the safety of using model rockets. And finally, using model rockets completes the participants stay at Andoya Rocket Range after having a week full of space physics, space technology, scientific rockets and social activities.

About the Author

My name is Amund Nylund. I am 29 years old and work at NAROM (Norwegian Centre of Space related Education) at Andoya Rocket Range in Andoya, Norway. I have an MSc degree in Electronics and Telecommunication from NTNU (Norwegian University of Science and Technology). I have worked as a science teacher at an upper secondary school and electronics teacher at a university college before I started working at NAROM and Andoya Rocket Range in December 2004. I have a varied and interesting job, which basically involves running courses and developing rocket and electronics technology for old and new exercises. So, I am working on rockets both in work and in my spare time (best job ever?). I have a fiancé who is a nurse, which is good for me doing the work I do.



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TIP OF THE FIN

We sell the *Pratt Hobbies Go Box*, which is a real slick and powerful little launch controller ([see http://www.apogeerockets.com/go-box_controller.asp](http://www.apogeerockets.com/go-box_controller.asp)). It takes a 12-volt source to ensure that the igniter fires the first time. Often times, rocketeers don't want to lug a big car battery out to the launch field. After all, what's the convenience of having a small controller if you have to take along something with the weight of a heavy bowling ball?

**Picture 1**

Well, to help you out, I thought I would pass it along this little jewel I came across some years ago. Go down to an electronics store and find a small battery

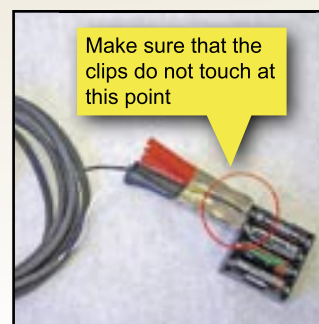
**Picture 2**

respective positive/negative mounts, make sure that they are not touching together so as to avoid shorting the connection (**Picture 3**).

Give this a try. It's pretty handy for going out to the field without the huge car battery!

pack holder for AA batteries (**Picture 1**). These will hold 8 AA's, which by coincidence total 12 volts of power.

Then take a couple of pieces of masking tape and apply one on each side of the hinges (**Picture 2**). When you attach the clips to the battery pack on their

**Picture 3**

Apogee
Grant Program

Apogee Components, Inc. is pleased to announce the second in a yearly grant program geared toward model rocketry education organizations!

The rules are simple:

1. Entrants must submit an essay to Apogee. There is no length requirement for the essay.
2. Any club, organization, school program, etc. is eligible for entry. This would include rocketry clubs or prefectures, 4H, scouts, etc.
3. The content and purpose of the essay is as follows:
 - If we gave you \$300.00, How would you use it to impact the rocketry community?
 - How many people you think it will reach?
 - How many people are involved in the organizing and running of the event?
 - How big of an effect it will have on the rocketry community?

4. One of the biggest things to keep in mind when composing your essay is
"How is what I am planning unique?"

There will be only one winner and recipient of the grant, which is \$300.00 toward any order with Apogee Components.

The deadline for entry is November 30, 2007.

Make sure it is post- marked by November 30th!

The grant winner will be announced on January 1, 2008.

What a great way to start off the new year!

Send your essay to me at:
johnm@apogeerockets.com

or send to

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http://www.apogeerockets.com/rocket_grant_money.asp

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Web Sites Worth Visiting

The National Space Science and Technology Institute (NSSTI) is a non-profit organization whose mission it is *"To enlighten, inspire, and engage students, teachers, professionals, and the public in the adventure and possibilities of space science and technology"*. They can be found at <http://www.nssti.org>.

One of the things that I like about this site is that they have an email list that you can sign up for, which will keep you informed on some really neat space happenings! For instance, the latest one that I received had some outstanding images from the Hubble Space Telescope. You can see one of these in Picture 1. This galaxy is 28 million light years from Earth and was voted best



Picture 1



Picture 2



Picture 3

picture taken by the Hubble telescope. The dimensions of the galaxy, officially called M104, are as spectacular as its appearance. It has 800 billion suns and is 50,000 light years across. Norm Black of NSSTI says, "These are real photos of very real things. Kinda puts your thinking back into humble perspective!"

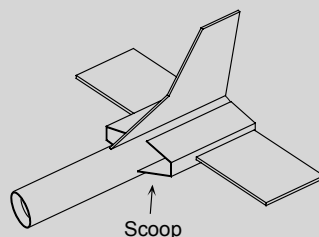
Another email that I got some time ago had a great visual model of the solar system, as seen in Picture 2. In this picture, Jupiter looks pretty large until you take a look at Picture 3 and see the size comparison against our Sun! Now Jupiter looks very small and the Earth is just a dot in comparison! There's a lot of good information here including a link to Space Science Education Programs. Take a visit, you won't be sorry you did!

DEFINING MOMENTS

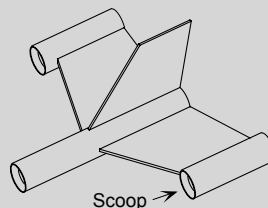
A **Air Scoop** allows air inside the aircraft. Adding this feature to your rocket can dramatically change its appearance. Construction of these components is fairly easy as they can be made out of cardboard, plastic, or balsa wood. Any opening to allow entry of the airstream flowing over the vehicle is considered a scoop. By and large, scoops are mostly put on for decoration and will have little effect on the aerodynamics of the model.

One model that incorporates this type of design into it is the Apogee SR-72 Darkbird, seen at http://www.apogeerockets.com/SR72_Darkbird_Kit.asp. The stealthy SR-72 aircraft blasts off on rocket power, taking you along on its super-secret mission. You'll be pleased by its awesome liftoff. It is both visually spectacular and an auditory blast. After climbing straight-up to fantastic heights on the roar of rocket power, the SR-72 transitions to its primary mission as a high speed aircraft.

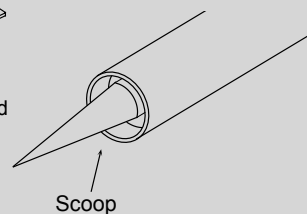
And when its mission is completed, it glides gracefully back to the ground, ready to take on its next top secret mission.



Air scoop made from flat cardboard



Air scoops made from short body tubes



Frontal air scoop is a great decoration for missiles

Air Scoop Graphic from Model Rocket Design and Construction www.apogeerockets.com

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Question & Answer

Our question for this issue comes from Jonathan Whanger, although many students write in about this topic. Jonathan says, "Hi, since I was a kid I've always been interested in rockets. This year in school we have to do a science project so I'm doing my project on rock-



ets. I was wondering if you guys have any information or ideas of the sort you could share with me. It would be very appreciated."

One of the best pieces of advice that I can give is to get a hold of 69 *Simple Science Fair Projects with Model Rockets* at http://www.apogeerockets.com/science_fair_book.asp. This book of projects contains experiments you can perform that will

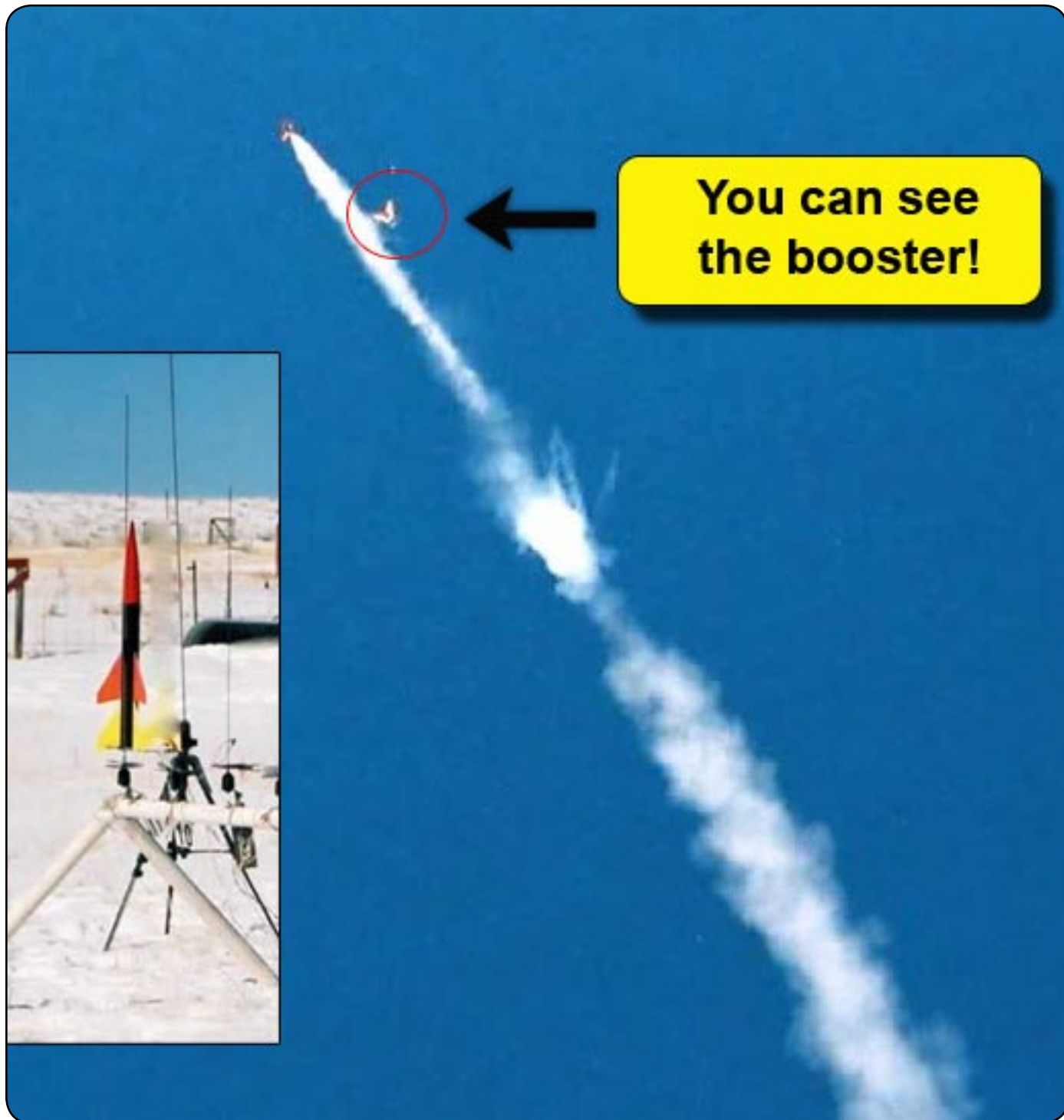
give results you can clearly see and understand. All the projects are easy to perform, so that even young



students can explore this exciting subject. Students will develop an appreciation for the foundations of science such as clear note taking and data gathering, concise thinking, adherence to procedure, curiosity, and patience.

I just finished working with my 5th-grade daughter on one of the projects in this book for her science fair. As you can see in the pictures though, don't procrastinate and wait until the snow comes and won't leave! Plan ahead! Who knows, maybe you will do as well as my daughter, who received a First Place in the District Science Fair!





A very cool photo of a Dynastar Rip-Roar (<http://www.apogeerockets.com/Rip-Roar.asp>) as it was staging at about 150 feet off the ground. (Picture courtesy Jeff Lane of Brandango.us)