



MASA Planet

Volume 9, Issue 2

NARCON

March 2006

Safety First!

New HPR Safety Code

Building on an excellent record

Ted Cochran
NAR 69921

This issue of the *Planet* contains the newest revision of the NAR High Power Rocketry Safety Code. It's been revised to simplify the wording, remove inconsistencies with existing the NFPA 1127 code, and to reflect changes to the NFPA code that are in the process of being adopted by the NFPA in its current revision cycle.

The biggest change is the removal of the alternate launch site dimension table, which required very large launch sites (e.g., three x three miles for an M motor). Instead, the requirement is that the minimum dimension of the launch site be half as large as the expected altitude of the rockets, or 1500 feet, whichever is greater. This will allow smaller fields to be used for relatively low-flying high-power rockets.

In addition, the requirement that the launch pad be 1/2 the minimum launch site dimension from the edge of the field has been changed; the launch pad must now be the minimum personnel distance from the edge of the field.

Safety, continued on page 2

ALSO IN THIS ISSUE

- 2** Bound for Pluto
- 3** Event Schedule; President's Corner
- 4** NAR High Power Rocketry Safety Code
- 6** Fun With Egglofting
- 7** Scale Modeling
- 8** Milestones; Parting Shots

Road Trip

NARCON 2006

Another most excellent convention in Kenosha

Several MASA members made the trip to NARCON, held for the third straight year in Kenosha, Wisconsin, the weekend of March 9. We were once again treated to an intense three days of workshops, presentations, panel discussions, lectures, along with a great vendors' area and the camaraderie that comes with spending time with people who are also interested in rocketry.

This issue of the *Planet* contains accounts of some of the sessions (the issue was delayed so this news could be fresh!). The authors have done a great job, but there is no substitute for experiencing NARCON for yourself. Make plans to go next year!

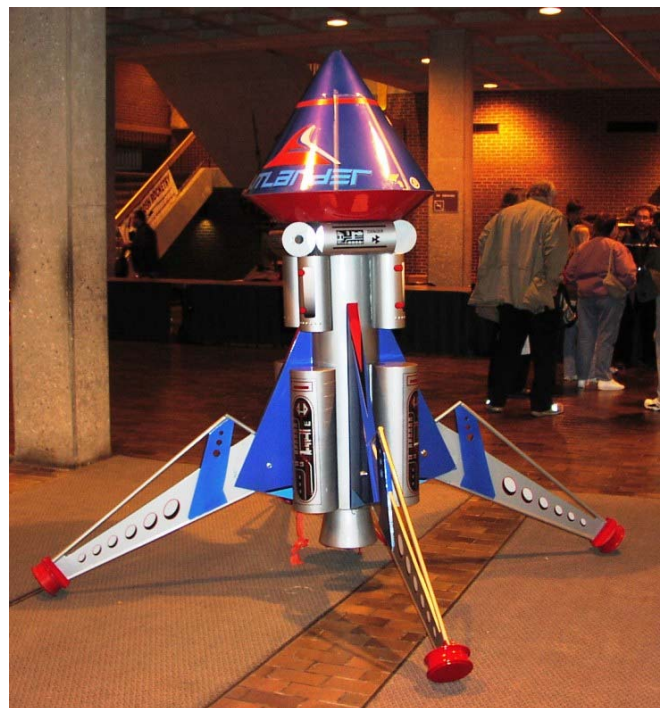


Photo by David Whitaker

This upscaled Outlander was the centerpiece of NARCON. It has already had a successful flight!

Safety, continued from page 1

This change removes an inconsistency with NFPA 1127, and will allow launch pad placement to be better optimized with respect to the site and the weather conditions at the time of launch.

Other changes include:

- prohibition against launching high power rockets on a trajectory that carries it over the heads of spectators,
- prohibition against launching high power rockets on a trajectory beyond the boundaries of the launch site,
- prohibitions against flying rockets of undetermined stability,
- changes to the minimum distance around the pad cleared of combustibles,
- recognition of the need to consider wind speed in achieving safe launch velocity, and
- a requirement that pyrotechnic charges and igniters have a means of disconnection from their power source until the rocket is at the pad.

Many of these changes, including the field size change, were supported by studies carried out by the NAR Special Committee on Range Operation and Procedure, chaired by NAR Trustee and former astronaut Dr. Jay Apt, approved by the Trustees last July and presented to the NFPA in February. NAR's approach is to base our recommendations concerning changes to NFPA codes on science, and there is empirical or analytic evidence in support of all of the changes described above.

We believe the High Power Rocketry Safety Code establishes a solid foundation for a continued record of outstanding safety in our hobby. If every one of us takes responsibility for reading, understanding, and practicing the safety code in our activities, we will continue to be successful in maintaining that record.

Please send any comments or questions to me at safety@nar.org.

Full Scale

Bound for Pluto

New Horizons launched to the ninth planet

On January 19, the \$675M New Horizons mission left for Pluto atop of an Atlas 5. The spacecraft took nine hours to pass the moon's orbit, 13 months to pass by Jupiter, and eight additional years to reach Pluto and its major moon, Charon, where it will spend 36 hours doing most of its remote sensing.

Designed at the Johns Hopkins University Applied Physics Laboratory, New Horizons has seven instruments, including a camera that should be capable of resolving 50 meters per pixel. The recent discovery of two additional moons by the Hubble Space Telescope adds some complexity to the mission, but there will be plenty of time to plan the closest approach.

I saw the probe last year in the clean room at APL, and was impressed by how small it is. It weighs just over 1000 pounds, and will be spin-stabilized during its voyage to the last unexplored planet of our solar system.



Pat Corkery/Lockheed Martin via Spaceflightnow.com

MEETING SCHEDULE

THURSDAY, APRIL 13 (ONE WEEK LATE)

Location: Science Museum of Minnesota

Time: 7 PM to 9 PM

Topic: Rocketry Web Sites--Rick Vatsaas

THURSDAY, MAY

Location: Science Museum of Minnesota

Time: 7 PM to 9 PM

Topic: Planes on Skis--Russ Durkee on his stay in Antarctica last winter

LAUNCH SCHEDULE

**NOTE: TIMES AND LOCATIONS SUBJECT TO CHANGE!
CHECK THE WEB SITE FOR UPDATES**

SATURDAY, MARCH 25

Location: Apple Valley High School

Time: 10 AM to 2 PM

Theme: TARC Qualifications

SATURDAY, APRIL 1: SPECIAL TARC LAUNCH

Location: Apple Valley High School

Time: 10 AM to 2 PM

Theme: TARC Qualifications

SATURDAY, APRIL 22

Location: Buffalo/Rockford

Time: 9 AM to 3 PM

TEAM AMERICA ROCKETRY FINALS

SATURDAY, MAY 20

Location: The Plains, Virginia

Time: 6 AM to 5 PM

Theme: TARC Finals

NATIONAL SPORT LAUNCH

SATURDAY, MAY 27 - SUNDAY, MAY 28

Location: McGregor, Texas

SATURDAY, MAY 27

Location: Nowthen

Time: 9 AM to 4 PM



Former Centuri owner Lee Piester signs memorabilia at NARCON 2006. Lee's Friday night presentation was full of interesting anecdotes from the earliest days of rocketry.

Photo by
David Whitaker

NAR News

NARCON Town Meeting

Ted Cochran

Mark Bundick hosted the NAR Town Meeting at NARCON last week, where he reviewed the state of the NAR and the activities of the NAR Board of Trustees. Here are some highlights:

- NAR Membership is stable, and the number of sections is up by one over this time last year. Finances are in similarly good shape.
- NAR Insurance will become primary insurance this year, which means it will apply before other insurance policies you may have, not after. This change will not result in a change to the dues structure.
- In response to NAR member feedback, Mark has appointed Trustee Jennifer Ash-Poole to the new post of Chief Technology Officer. Jennifer will be reviewing the NAR's technology infrastructure, including the web site, and will be developing a plan to update it as required.
- A revision to the High Power Safety Code was approved (see page 1 for more information).
- Details concerning NAR's plan to help kids fly 50,000 rockets for the first time will be available in the near future. This program will part of a series of events celebrating the fiftieth anniversary of model rocketry and the NAR, culminating at NARAM 50 in 2008.
- The NAR Education Committee released a new CD for teachers, and has an active newsletter.
- Our analysis of the legal decision by the Court of Appeals provides reason for optimism. Mark was very animated on this point!
- Anyone interested in volunteering to help in any of these activities, please don't wait to be asked! Go to the contacts directory at www.nar.org and look for something you'd be interested in helping with--then contact the person leading that activity and offer your services!



NAR High Power Rocket Safety Code

Approved March 2006

1. **Certification.** I will only fly high power rockets or possess high power rocket motors that are within the scope of my user certification and required licensing.
2. **Materials.** I will use only lightweight materials such as paper, wood, rubber, plastic, fiberglass, or when necessary ductile metal, for the construction of my rocket.
3. **Motors.** I will use only certified, commercially made rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer. I will keep smoking, open flames, and heat sources at least 25 feet away from these motors.
4. **Ignition System.** I will launch my rockets with an electrical launch system, and with electrical motor igniters that are installed in the motor only after my rocket is at the launching or prepping area. My launch system will have a safety interlock that is in series with the launch switch that is not installed until my rocket is ready for launch, and will use a launch switch that returns to the "off" position when released. If my rocket has onboard ignition systems for motors or recovery devices, these will have safety interlocks that interrupt the current path until the rocket is at the launch pad.
5. **Misfires.** If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher's safety interlock or disconnect its battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.
6. **Launch Safety.** I will use a 5-second countdown before launch, and will ensure that everyone in the launch site is paying attention and that no person is closer to the launch pad than allowed by the accompanying Minimum Distance Table. I will check the stability of my rocket before flight and will not fly it if it cannot be determined to be stable.
7. **Launcher.** I will launch my rocket from a stable device that provides rigid guidance until the rocket has attained a speed that ensures a stable flight, and that is pointed to within 20 degrees of the vertical. If the wind speed exceeds 5 miles per hour I will use a launcher length that permits the rocket to attain a safe velocity before separation from the launcher. I will use a blast deflector to prevent the motor's exhaust from hitting the ground. I will ensure that there is no dry grass within a clear distance of each launch pad determined by the accompanying Minimum Distance table, and will increase this distance by a factor of 1.5 if the rocket motor being launched uses titanium sponge¹ in the propellant.
8. **Size.** My rocket will not contain any combination of motors that total more than 40,960 N-sec (9208 pound-seconds) of total impulse. My rocket will not weigh more at liftoff than one-third of the certified average thrust of the high power rocket motor(s) intended to be ignited at launch.

¹ This is the technology most often used in "sparky" motors --Ed.

9. **Flight Safety.** I will not launch my rocket at targets, into clouds, near airplanes, or on trajectories that take it directly over the heads of spectators or beyond the boundaries of the launch site, and will not put any flammable or explosive payload in my rocket. I will not launch my rockets if wind speeds exceed 20 miles per hour. I will comply with Federal Aviation Administration airspace regulations when flying, and will ensure that my rocket will not exceed any applicable altitude limit in effect at that launch site.
10. **Launch Site.** I will launch my rocket outdoors, in an open area where trees, power lines, buildings, and persons not involved in the launch do not present a hazard, and that is at least as large on its smallest dimension as one-half of the maximum altitude to which rockets are allowed to be flown at that site or 1500 feet, whichever is greater.
11. **Launcher Location.** My launcher will be at least one half the minimum launch site dimension, or 1500 feet (whichever is greater) from any inhabited building, or from any public highway on which traffic flow exceeds 10 vehicles per hour, not including traffic flow related to the launch. It will also be no closer than the appropriate Minimum Personnel Distance from the accompanying table from any boundary of the launch site.
12. **Recovery System.** I will use a recovery system such as a parachute in my rocket so that all parts of my rocket return safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rocket.
13. **Recovery Safety.** I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places, fly it under conditions where it may recover in spectator areas or outside the launch site, or attempt to catch it as it approaches the ground.

MINIMUM DISTANCE TABLE				
Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Clear Distance (ft.)	Minimum Personnel Distance (ft.)	Minimum Personnel Distance (Complex Rocket) (ft.)
0 ² - 320.0	H or smaller	50	100	200
320.01 - 640.0	I	50	100	200
640.01 - 1280.0	J	50	100	200
1280.01 - 2560.0	K	75	200	300
2560.01 - 5120.0	L	100	300	500
5120.01 - 10,240.0	M	125	500	1000
10,240.01 - 20,480.0	N	125	1000	1500
20,480.01 - 40,960.0	O	125	1500	2000

Note: A complex rocket is one that is multi-staged or that is propelled by two or more rocket motors.

² A motor can be under 160 N-Sec of total installed impulse and still be a high-power motor if it has an average thrust that is greater than 80 Newtons or more than 62.5 grams of propellant. --Ed.

Fun With Egg Lofting

Bob Alway's NARCON presentation

David Whitaker

Bob Alway presented "Fun with Egglofting". Bob commented at the beginning of his talk that it really should be "The Holy Grail of Egg-Lofting". Bob was an amusing speaker. Bob initially covered some reasons why we egg loft. Basically Bob feels that egg lofting is a challenge. Eggs due to their shape, size and weight, constrain the size of the payload bay. Bob felt this is a good example of aerospace design to known constraints. Eggs are also fairly delicate which makes launching and recovering an additional challenge. Finally Bob stated that "Egg lofting is thrilling and gives you a chance to publicly humiliate yourself".

Bob passed around a variety of rockets, some designed for egg lofting from the very beginning and some not designed for anything. Bob commented that even the rockets that weren't designed for egg lofting, may be appropriate for competitive egg lofting depending on the field and field conditions. Several of the models Bob showed were actually scale models that had large payload sections. Bob also talked about Pratt egg capsules as well as commercially available egg lofting kits. Bob mentioned Aerospace Specialty Products (ASP) as a good company to get competition egg lofting kits from as well as 1/4 mil mylar and mylar tape.



Photo by David Whitaker

Bob demonstrated making a 1/4 mil mylar chute (with aid from Peter Alway). Initially Bob cut the mylar so he had a square piece. The mylar sheet was then folded over two times so it was four layers thick. The mylar was then folded from the center (now one corner of the square) into thirds using a Z fold. Essentially each fold was one-third of the chute. The mylar material was now 12 layers thick. The bottom of the chute material was cut to form an isosceles triangle. The height of the triangle was one-half the span of the chute. Bob puts mylar tape at the peaks of the chute and uses a hole punch to make holes. In the holes is tied braided fishing line (kevlar if possible). Shroud lines should be about 1.5X the shroud diameter for large chutes and closer to 2X the diameter of small chutes. Each hole is then covered on both sides with an additional piece of mylar tape. Bob recommended 52 inch chutes for serious egg lofting duration on very calm days. Normally you probably don't want to use chutes that are much larger than 36 inches due to the possibility of losing your egg loft.

Photo by David Whitaker

Bob demonstrated folding the very large chute. This consisted of holding the center of the chute and the lines (bundled together) so that the gores of the chute would hang down. The chute was then folded over several times and finally rolled to form a cylinder. Only one or two wraps of shroud line are placed around the packed chute to hold it together. The rest of the shroud line is neatly coiled on top of the packed parachute.

Bob also talked about the R&D project that he and his brother had done at a previous NARAM. Bob knew that piston launching is beneficial for egg lofting. Bob also suspected that piston launching worked better for heavy model rockets compared to light model rockets. Since egg lofters are fairly heavy, piston launchers can give a competitive advantage. I was surprised at how simple a piston launcher is and how easy it is to put one together. A piston launcher could be used with any launch pad fairly easily. Bob and Peter had done experiments to find the optimal piston travel. They found that even using 30 inch long piston tubes, that performance of the egg lofters continued to improve for the same impulse. Longer piston tubes are better but probably impractical.



Photo by David Whitaker

Gary Miller describes a wide variety of finishing products, including Kilz, various spackles and fillers, and tape.

NARCON 2006

Scale Modeling

Tips from Gary and Fran Miller

Gary and Fran Miller offered lots of great advice on scale modeling. They described everything from picking a prototype, and a scale, to finishing. I particularly enjoyed hearing some of Gary's techniques for adapting existing parts, such as body tubes, so that they better match the prototype. Some of Gary's techniques include using paper shrouds, turning parts turned on a lathe, and extending nose cones with epoxy.



Photo by David Whitaker

Fran Miller shows off some really nice scale models.

Gary also passed around some of his built up fins, made from sheet styrene with a sharp knife and attention to detail, complex fins with multiple bevels can be constructed using sheet-over-rib techniques. Gary recommends using through-the-wall mounting techniques for a variety of reasons. The joints can be very clean, and the technique allows painting to be done before final assembly of the model.

One of the best finishing tips I heard was that Kilz in spray cans is an extremely good filling material. I'm really looking forward to trying some of that stuff!

The *MASA Planet* is the official newsletter of the Minnesota Amateur Spacemodeler Association, Section 576 of the National Association of Rocketry. It is published bimonthly as a service to its members. MASA authors and photographers retain rights to their submissions, which are used by permission. The *Planet* is available in **color** on MASA's web site:

<http://www.mn-rocketry.net/masa/>

MASA's 2006 OFFICERS:

Mike Erpelding	President
Stuart Lenz	Vice President
Dave Whitaker	Secretary/Treasurer
Alan Estenson	Webmaster
Ted Cochran	MASA Planet Editor
Russ Durkee	Founding President

Submissions may be made to the editor at: masa.planet@mn-rocketry.net. (Volunteer quickly, lest you be asked to edit the Planet for five years!)

If your email address, U.S. Mail address, or phone number changes: Please send notice of your change to masa@mn-rocketry.net. Include your name, old email address, and new address. We depend on email for communicating important information. When an email address starts "bouncing", we lose contact with you.

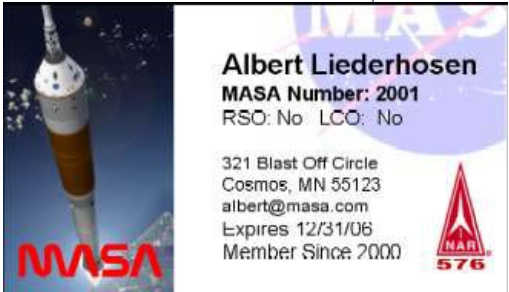
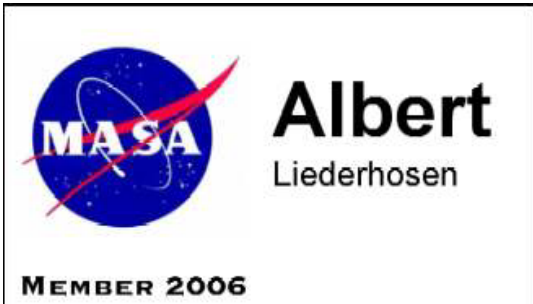
Milestones

Welcome New MASA Members!

Rick and Jacob Rider from Eden Prairie, MN
Dan Brudvig from Roseville, MN

Congratulations!

Congratulations to Rick Vatsaas for his Mark Thell-inspired 2006 MASA badge design:



PLACE
STAMP
HERE

ADDRESS SERVICE REQUESTED

4235 Dupont Avenue South
Minneapolis, MN 55409
MASA Planet 