MASA PLANET

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The Official Newsletter of the
Minnesota Amateur Spacemodeler Association
Established January 1998
2006 and 2007 NAR Medium Section of the Year
Host of NARCON 2007 and NARCON 2008
2008, 2009 and 2010 LAC Newsletter Award Recipient

NAR Section 576

Planet Table of Contents

MASA Directory

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Renew Your 2011 MASA Membership NOW!

It Could be Worth a $10 Hub Gift Card

By Carol Marple

If you submit your paid 2011 MASA membership by Sunday, March 20th, your name will be entered into a drawing for a chance to win one of two $10 Hub gift cards.

Two names will be drawn at random at the April 7th MASA meeting. You do not need to be present to win.

This incentive is available to renewing and new members (so let your rocket-flying friends know!). If you've already renewed your membership for 2011, your name will automatically be entered in the drawing.

To be eligible, your paid 2011 membership dues and completed 2011 membership application form must be received by our Treasurer, Gerald Meux, by Sunday, March 20th. Remember, you can sign up online, by mail, or in person at a meeting or a launch.

Check out the "Join MASA" page at:
www.masa-rocketry.org/joinmasa.htm

Please let me know if you have any questions.

Thanks,
Carol
MASA President

What is the NFPA, and Why Should You Care?

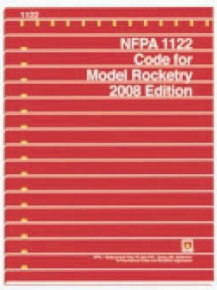
By Ted Cochran, NAR 69921

The National Fire Protection Association is a non-profit organization that was established in 1896. Its mission is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education. To that end, it develops and disseminates more than 300 consensus documents intended to minimize the possibility and effects of fire and other risks, including the codes that affect rocketry.

Rocketry Codes

The codes that affect sport rocketry are NFPA 1122, Code for Model Rocketry, NFPA 1127, Code for High Power Rocketry, and NFPA 1125, Code for the Manufacture of Model Rocket and High Power Rocket Motors. The NAR has been involved with NFPA since 1966, when our organization made the decision that the development of a national code would be preferable to fighting battles over the legality of model rocketry in thousands of local jurisdictions around the country. The tradeoff, which is still a topic of debate in some circles, is that restrictions are imposed upon fliers in jurisdictions that don't care, but in return for our freedom to fly in many jurisdictions in which our hobby would otherwise be severely restricted or banned entirely. In most states or local jurisdictions, NFPA rocketry codes are sometimes adopted as law, often incorporated by reference, and almost always respected by local officials, who have the authority to formally or informally permit activities in the absence of explicit laws.

Rocketry codes were developed and are maintained by the NFPA Pyrotechnics Committee, a technical committee of about 30 voting members, with expertise in a variety of areas and representing a balance of interests, all appointed by the NFPA Standards Council. The Pyrotechnics Committee also maintains NFPA 1123 and NFPA 1124, which are codes for the manufacture, transportation, storage, and use of consumer and display fireworks and pyrotechnic special effects. The committee's members include representatives of fireworks manufacturers such as Grucci and Zambelli, rocket motor manufacturers such as Cesaroni (Anthony Cesaroni), Estes (Mary Roberts), Quest (Bill Stine), and Aerotech (Gary Rosenfield), user organizations including NAR (J. Patrick Miller) and Tripoli (Darren Wright), regulators such as CPSC, BATF, and state and local fire marshals, and independent experts in pyrotechnics, safety, firefighting, and related areas. I am on the committee as an independent expert, based mostly on my professional experience in my real-life job.



Standards Development Process

NFPA rocketry codes are revised every three years in a formal process that takes about two years to complete. NFPA 1125 is in the 2011 Annual revision cycle, and NFPA 1122 and 1127 are in the 2012 annual revision cycle. Each cycle has five main steps which are as follows (using the 2012 cycle for the dates):

1. Call for Proposals (July 2010)
2. Report on Proposals (November 2010 to June 2011)
3. Report on Comments (August 2011 to February 2012)
4. Technical Session (April to June 2012)
5. Standards Council Issuance (August 2012)

Call for Proposals. The revision process is opened with a call for proposals that asks any interested party to submit specific written proposals on the code. The proposal form is available on NFPA's website and is also in every copy of every code. The technical committee may also submit proposals at this time.

Report on Proposals (ROP). Once the deadline for proposals has passed, the technical committee meets to address every proposal that has been received (including the ones from the technical committee itself). Each proposal is accepted, modified, or rejected, and a technical substantiation is provided for each action. These actions are gathered into a document called the Report on Proposals, which is voted on by the committee. To pass, the proposals must receive a majority of the votes of those eligible to vote, and two-thirds of the votes of those actually voting. Once passed, the ROP is posted for 60 days for comment by any interested party.

Report on Comments (ROC). The resulting comments are gathered and reviewed by the technical committee. No new proposals can be considered at this time, just modifications to the proposals that have already been considered. After due consideration, the committee must accept, modify, or reject the comments (and the changes they may require in the proposals), and the ROC must be voted on by the committee. To pass, the ROC must receive a majority of the votes of those eligible to vote, and two-thirds of the votes of those actually voting. Once passed, the ROC is posted for comment by any interested party.

The NFPA Association Meeting. If there are still issues with the proposed changes to the code, motions may be made to amend the proposals at NFPA's Annual Meeting. (This is uncommon, especially when the Technical Committee has done its job well and used the consensus process). The resulting document, with amendments, if any, is forwarded to the NFPA Standards Council.

NFPA Standards Council. The Standards Council is responsible for hearing any appeals and then issuing the revised code.

In summary, the public has an opportunity to provide feedback in every stage of the process, and it is designed to drive the adoption only of changes for which broad consensus has been reached by multiple stakeholders.

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NFPA Continued

The Revision Process as Seen From the Inside

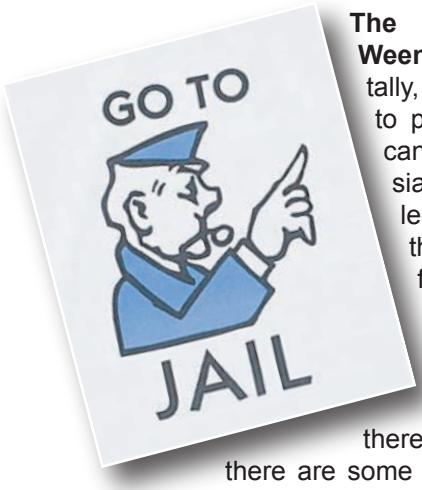
Public participation. Despite the many opportunities for involvement by members of the public, proposals are not common. In fact, there were none at all for NFPA 1122 and NFPA 1127 in the current cycle. Some issues are raised by the public to individual committee members, and we in turn make proposals to fix them. Given that, the absence of open public comments could mean that the technical committee members are doing an excellent job, and there are no issues that members of the public in general or the rocketry committee in particular believe are worth the trouble to write up.

It is also possible that the development process, as open as it is, is not sufficiently well-known to rocketry enthusiasts. To that end, I've put the links to NFPA and the rocketry codes at the end of this article. If you believe that a change is needed to any or our codes, please submit it!

Code revisions. In the absence of public proposals, the technical committee members do the heavy lifting to submit proposals to make sure that the code is up to date and reflects lessons learned in practice since the last revision. Committee proposals may be driven by user organizations, manufacturers, enforcement agencies, or the independent experts. Typically, more than half the proposed changes involve fixing citations to other documents (like FAA and ATF regulations) that have changed since the last edition of the code, and perhaps to fix a typo or two in the current edition of the code. Many of the other proposals are noncontroversial. A few will require extensive discussion and may end up being significantly changed or even withdrawn before making it into the revision process. The rocketry-affiliated members of the Pyrotechnics Committee meet before the whole committee does to ensure we all agree on a position, because almost by definition if the rocketry folks don't have a consensus, the whole Committee won't reach one, either.

Controversy? Only rarely. The NFPA works very hard to ensure that codes are developed by consensus and that they are fact-based—hence the plethora of opportunities for the public to make suggestions and comments. The technical committees in general, and the Pyrotechnics Committee in particular, do not make it a practice to try to ram code changes through the system. The reliance on science and empirical data helps here—In reality, disagreements over code revisions often arise more from reliance on opinion as opposed to data, so it is not uncommon to defer a proposed revision for a cycle or two in order that more data may be gathered. This may disappoint the advocates of a code change, but it has the effect of ensuring that appropriate data is gathered and of preparing the community for the change when the data show that it is warranted, thus leading to better adoption, and ultimately better effectiveness, of the change. The consensus process is sometimes slow, but it is ultimately effective. The last big controversy that I know about involving rocketry concerned the initial development of NFPA 1127 and whether NFPA should issue a high power rocketry code at all. The deciding favorable vote in that instance was cast by the NAR representative Pat Miller.

Exciting Committee Meetings? Not so much. The actual process to write good codes is tedious and difficult, even when there is agreement on the goal of a proposed change. Every change cycle permits us to take advantage of lessons learned in the field, provided we all agree on what those lessons are. There is always tension between various stakeholders, and between those who want to create a new rule and those who want to try some other approach, such as policy changes in the user organizations or voluntary changes by manufacturers. The NFPA's goal is to avoid making new regulatory requirements in the absence of consensus, and consensus can be difficult to achieve. But even when consensus is present, the process of actually writing down a new requirement can be challenging. It is not uncommon for us to take a half hour to agree on the exact wording of just one sentence—trying to make it clear, not overly restrictive, and yet effective. The last ROP meeting resulted in two dozen proposals that all had to be vetted this way. There are some who enjoy this process; most of us see it as worthwhile only because it results in clearer, more specific language that helps build consensus.



The Attack of the Safety Weenies? Not really. Fundamentally, what we do in NFPA codes is to provide a set of rules which can be followed to enable enthusiasts to practice rocketry legally, without having to jump through all the hoops that fireworks users, explosives operators, and other enthusiasts that use things that go bang have to jump through. As I mentioned earlier, there is a tradeoff here: Granted, there are some places in the country where there are few limits to this sort of fun (black-powder anvil lofting, anyone?), but there aren't many such locations. In most places, most of activities involving pyrotechnics are illegal without a special permit. In order to provide a frame-

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NFPA Continued

work for legal rocketry, there has to be a set of accepted rules that distinguishes our hobby from those activities that are forbidden by local authorities. That doesn't mean that activities that don't fall within NFPA codes (TRA's research activities, for example), can't be done at all—Enthusiasts have three choices to stay completely legal: Follow NFPA codes, limit non-compliant activities to areas in which it is legal, or get a special exemption or permit from local authorities for non-compliant activities. In short, NFPA doesn't usually make non-compliant behaviors illegal, because in most places, they already are.

On the other hand, many of the suggestions that I personally hear about NFPA codes call for more restrictions. It is easy to sympathize with these suggestions, especially when they are based on a particular incident. However, it is important to remember that NFPA codes apply across the country, and have to be based on facts. We can't generalize from a single incident, because what is inappropriate for a suburban launch site might be entirely safe for Black Rock desert.

The code that gets written is usually somewhat vague for that reason, for example:

4.10.1 *A high power rocket shall be launched only if it contains a recovery system that is designed to return all parts of the rocket to the ground intact and at a landing speed at which the rocket does not present a hazard (NFPA 1127, 2008).*

The last clause of that code, "…and at a landing speed at which the rocket does not present a hazard," was added as a result of the Apt committee recommendations. Clearly the exercise of determining the "landing speed which does not present a hazard" has been left to the reader. One reason for that in this particular case is that while we all agreed that requiring the rocket to be designed to recover intact was an insufficiently rigorous requirement for safety, we didn't want RSOs, to say nothing of local authorities, to have to calculate kinetic energies for simulated descent speeds, either. Instead, it is left to the flyer to ensure that the recovery system design is appropriate.

We also want to avoid writing code that could turn an accident into a code violation. Hence it is common to see codes refer to the intent of the flyer or the likelihood of the result; for example,

4.17.1 *No person shall ignite and launch a high power rocket horizontally, at a target, or so that the rocket's flight path during ascent phase is intended to go into clouds, directly over the heads of spectators, or beyond the boundaries of the launch site, or so that the rocket's recovery is likely to occur in spectator areas or outside the boundaries of the launch site (NFPA 1127, 2008, emphasis added).*

It is not uncommon for a rocket to experience a malfunction (such as main deployment at apogee) that results in recovery outside the boundaries of the launch site. But if a particular recovery system design is flawed to the extent that the main comes out at apogee more often than not, the savvy flyer will correct the design so as to ensure that it is not "likely" to recover outside the launch site.

The code changes that are adopted are, in my experience, based on some combination of three factors:

- Changes in technology (APCP, hybrid motors, sparky motors) that are not fully anticipated by the existing code
- Changes in the regulatory environment (CPSC, FAA, ATF) that requires the code be amended for consistency
- Repeated unpleasant experiences (e.g., fires caused by rocketry activities, insurance claims for damaged automobiles) that lead to careful studies (such as the Apt committee's *Launching Safely in the 20th Century* report) that confirm the issue and support a remediation.

Consumer vs. High Power Rocketry. One under-appreciated aspect of the rule-making process regarding rocketry is that the NFPA in general and the Pyrotechnics Committee in particular make a big distinction between consumer products and those available to knowledgeable users. Model rockets are considered consumer products, and much effort is devoted to ensuring that members of the general public without special knowledge can fly them safely. High Power rocketry is considered a specialist arena, requiring certification and a variety of extra safety measures (e.g., RSOs, first aid kits, fire suppression tools, warning systems). Just as F and G motors with average thrust or propellant weight above the model rocket threshold have been classified as HPR in the past, the code has had to be changed to accommodate G-impulse hybrids and G-impulse sparky motors—these motors are small enough to be model rocket motors, but require special expertise. The goal is to make a wide variety of interesting technologies available to enthusiasts without creating unnecessary risks for the general public. In short, a much higher level of safety is required for anything classified as a model rocket motor, even if that means that small motors end up requiring huge HPR fields to legally fly.

In conclusion, serving on an NFPA committee can be rewarding, in that it allows us to carve out new areas for sport rocketry enthusiasts to play in, while also allowing us to apply new

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NFPA Concluded

knowledge and lessons learned to increase the safety of our hobby. I personally believe that NFPA rocketry codes have enabled the hobby to continue to exist by providing a uniform set of standards for us to follow and for local authorities to require. This in turn enables a stable and predictable market to exist for rocketry manufacturers.

I encourage you to read and follow the NFPA codes (they're available free online to all who complete a brief signup form), and to become involved in the code revision process if you're interested. It's another good way to pay forward.
For more information:

NFPA Overview
http://www.nfpa.org/assets/files/PDF/CodesStandards/Directory/NFPADirectory2010.pdf

NFPA 1122, Code for Model Rocketry
http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1122

NFPA 1125, Code for the Manufacture of Model Rocket and High Power Rocket Motors
http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1125

NFPA 1127, Code for High Power Rocketry
http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1127

Also, see sidebar on Page 6

Contributors to this issue of the MASA Planet.... Thank You!

- Ted Cochran
- Carol Marple
- Alan Estenson
- Jeff Taylor

To contribute pictures, stories, build reviews, or just about anything, email to jeff.taylor@mn-rocketry.net

Pay It Forward at the Next MASA Launch

Many MASA launches have visitors that just come out to enjoy watching a day of rocketry or to see what a club launch is all about. A lot of these visitors are first-time rocketeers or have never even tried building or launching a rocket.

Because of this, MASA is starting a new "Visitor Fly It/Take It" program, where these first-timers can pick out a simple rocket from a box, fly it that day, and keep it for free.

Consider building a beginner kit to donate to this worthy cause and pay it forward to the next generation, and to potential new club members.

Book Review

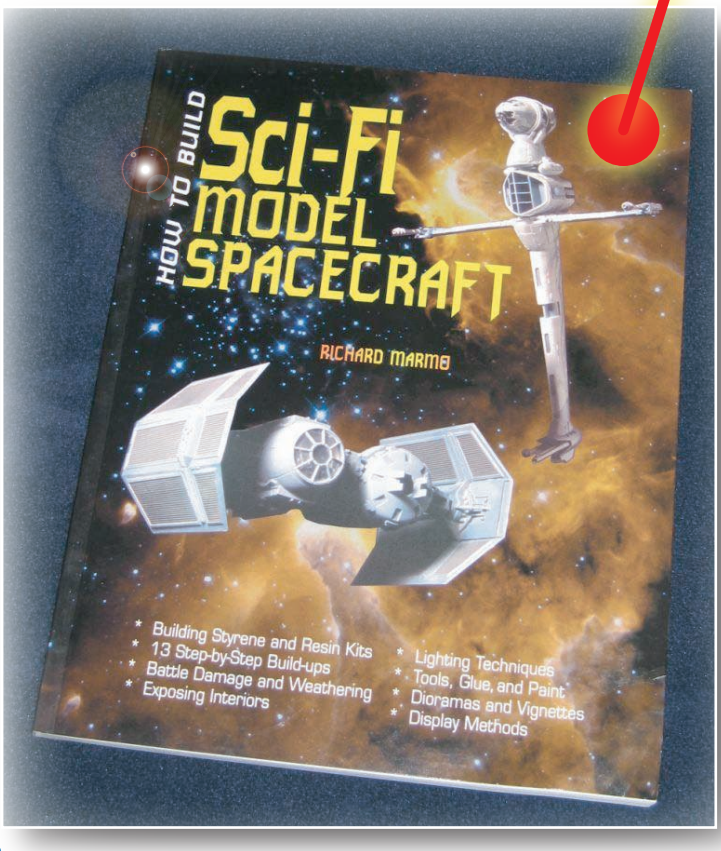
"How to Build Sci-Fi Model Spacecraft"

Review By Alan Estenson

While I honestly haven't built a plastic model kit since I was a teenager, I'm always interested in expanding my modeling skills. This book isn't about building flying model rockets; instead, it's about building sci-fi themed display models. After covering topics on glue, paint, and tools, it jumps into a chapter on building injection-molded polystyrene plastic kits where the author leads the reader through the construction of three different models. Because flying rocket kits commonly use styrene plastic parts, many of the tips and techniques are directly applicable. Next, the book covers resin model kits, then construction of dioramas, painting & masking techniques, detailing, and finally display methods. Since some small rocket companies use resin nose cones, the chapter on building cast resin kits is also useful for the model rocketeer.

It took me a few hours to lightly peruse this book. I picked up some neat ideas on painting techniques, detailing, weatherizing, and making a model look "worn" instead of shiny/new. If you would like to improve your skills, or you're simply partial to cool sci-fi models, this book is well worth picking up.

"How to Build Sci-Fi Model Spacecraft" by Richard Marmo
Specialty Press, 2004, 128 pages
ISBN-13: 978-1580070645
About $17 on Amazon.com



Current NFPA 1122 and 1127 Proposals

Proposed revisions to NFPA 1122 and 1127 are currently making their way through the 2012 revision cycle. Here's an overview:

NFPA 1122 Proposals

- Seven changes to reflect new citations in regulations and other technical issues
- Remove water rockets from the scope of the code
- Increased safe distances and additional monitoring requirements for mass launches of model rockets (when more than 10 rockets are to be launched, minimum safe distance will be 1.5X predicted maximum altitude and spotters will be required to monitor landing area).

You can read the gory details here:
http://www.nfpa.org/Assets/files/AboutTheCodes/1122/1122_A12_%20ROP_ballot.pdf

NFPA 1127 Proposals

- Nine changes to reflect new citations in regulations and other technical issues.
- Remove propellant weight as a consideration in distinguishing between model rocket motors and high power motors.
- Permit hybrid motors to be smaller than 160 N-sec (but they'll be certified as HPR just the same).
- Permits HPR rockets with less than 160 N-sec of total impulse (e.g., baby hybrids) to be flown on smaller sites (still need to be 1500' from highways and other FAA-defined hazards).
- Allow modification of motors when allowed by the manufacturer (e.g., to adjust delay time).
- Allow RSO to delegate responsibilities to others (e.g., in large launches).
- New requirements for arming and disarming on-board pyrotechnics:
  - Requires that pyrotechnics not be armed until rocket is in launch position,
  - Requires that pyrotechnics be disarmed before removing the rocket from the launch position,
  - Limits the number of people at the pad when the rocket is armed.
- Increased safe distances for mass launches of high power rockets (more than two rockets requires a two times the safe distance for a complex rocket of the largest motor being used, or 2500 feet, whichever is less) and requires ten-foot spacing between pads for rockets that are simultaneously launched.
- Clarifies that the minimum clear distance for sparky motors shall be cleared of all combustible material.

You can read the gory details here:
http://www.nfpa.org/Assets/files/AboutTheCodes/1127/1127_A12_ROP_ballot.pdf

Book Review

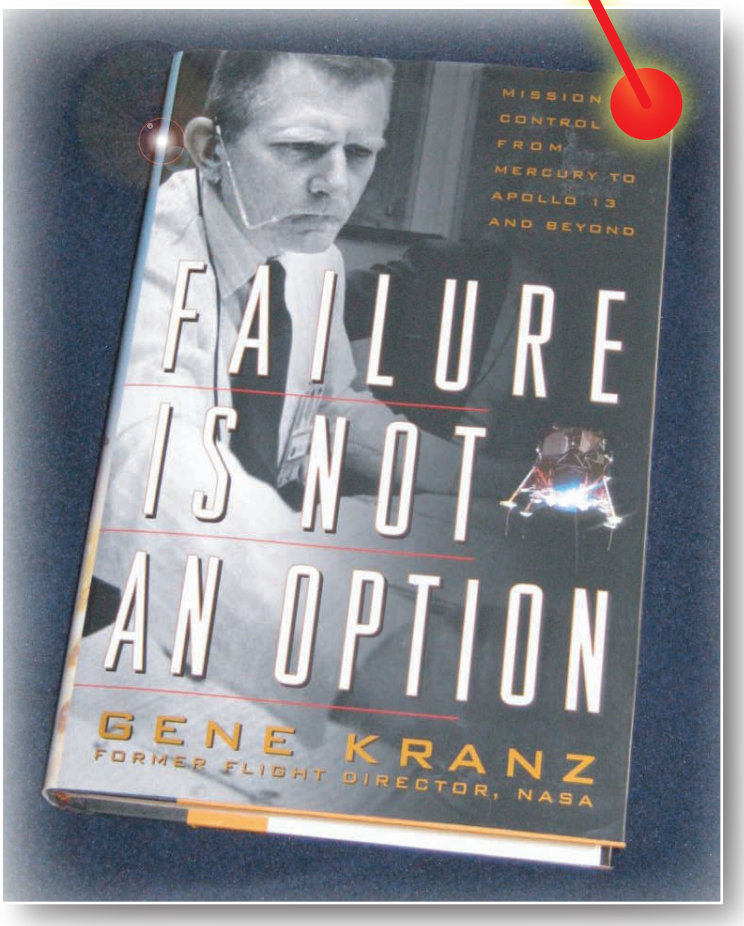
"Failure is not an Option"

Review By Alan Estenson

Because I came along too late to experience any of it firsthand, I have a fondness for reading about the space programs of the 1960s. I've enjoyed books about Mercury, Gemini, Apollo, launch vehicles, launch facilities, spacecraft, astronauts… "Failure is Not an Option" takes us back to that same era, but from a different perspective – that of the workings of Mission Control and the experiences of legendary Flight Director Gene Kranz.

The book opens with Kranz's arrival at Cape Canaveral prior to the first Mercury missions and concludes with his final shift as a Flight Director during Apollo 17. (He went on to other positions and didn't retire from NASA until 1994.) Particular attention is given to Apollo 13 – from which the title of the book is drawn. I thought that this book was fascinating. Not for the writing style; it's a bit dry, and very matter-of-fact. Rather, for the detailed look it provides at the critical environment of ground control and how it developed throughout that first decade of manned spaceflight.

"Failure is Not an Option" by Gene Kranz
Simon & Schuster, 2000, 416 pages
ISBN-13: 978-1439148815
$11 to $18 on Amazon.com

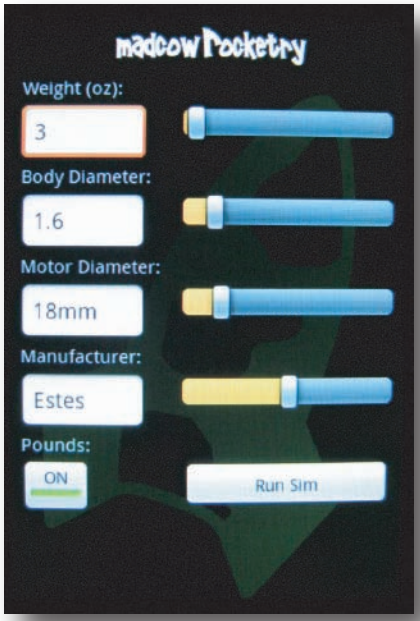


App Review

"RocketSim" for Android Smartphones

Review By Alan Estenson

Back in 2009, I gave in to the 21st century and bought a smartphone. Since then, I've dreamed of having a useful rocket application for it. Unfortunately, while I was aware of at least one rocket app for iPhones, there didn't seem to be anything for my Android phone. Recently, I heard that Mad Cow Rocketry had released a rocket simulation app, simply called "Rocket Sim", for Android. From the description and screen shots, it looked promising, and it only cost a buck, so I went for it.



My phone is pretty underpowered compared to newer models, and starting up the Rocket Sim app takes about 45 seconds. The screen then shows four display boxes and adjustment sliders for setting weight, body diameter, motor diameter, and motor manufacturer. The Weight slider can change the rocket's weight anywhere from 1 to 120, in either ounces or pounds, in increments of 1. Tapping on the weight box brings up the virtual keyboard to enter the weight directly. Unfortunately, if you try to enter any fractional weight, say 2.2 ounces, the program crashes. Direct entry for the other boxes is not enabled.

The Body Diameter slider only lets you choose from certain common tube sizes: 1, 1.6, 2.2, 2.6, 3.1, 4, 5.4, 6, 7.5, and 10 inches. Strangely, it doesn't include BT-20 (~0.75 inches) or BT-5 (~0.5 inches). The Motor Diameter slider lets you chose from 13, 18, 24, 29, 38, 54, 75 or 98mm. The Manufacturer slider refers to the motor brand. It lets you choose from Aerotech, Cesaroni, Estes, Hypertek, or Quest.

To use the app, you just set the weight, body diameter, and motor diameter, then choose a motor manufacturer and tap the "Run Sim" button. After a pause for calculation, a screen comes up with simulation results for every engine in the selected diameter by the selected manufacturer.

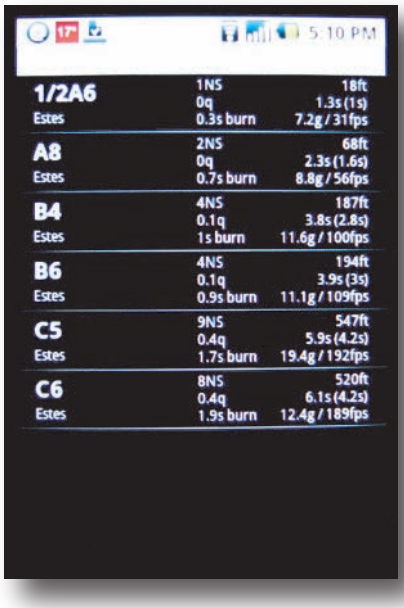
Choosing the trusty ol' Big Bertha as a test case, the Estes catalog lists a rocket weight of 2.2 ounces, diameter of about 1.6 inches, and expected altitude of about 500 feet on a C6-5 motor. Since my own Big Bertha weighs 2.8 ounces, I put in 3 ounces for the weight, 1.6 for the diameter, 18mm for the motor diameter, and Estes for the manufacturer. After running the sim, the screen shows results for the Estes 1/2A6, A8, B4, B6, C5, and C6 motors.

Tapping on the results screen brings up a help window to remind you what the various numbers mean. For each motor, the results include the total impulse of the motor in Newton-seconds, the max Q in pounds, and the total burn time in seconds – all in the middle column. The right column includes the max altitude in feet, time to apogee in seconds, estimated delay time in seconds, maximum acceleration in g's, and maximum velocity in feet per second. Very low accelerations and very high velocities are highlighted in red.

For the Big Bertha, the Rocket Sim C6 motor results say to expect a max altitude of 520 feet with estimated delay time of 4.2 seconds. Let's compare that to trusty ol' wRASP; it says 502 feet and 4.2 seconds. For one more comparison, RockSim says 564 feet. So, it looks like Rocket Sim's simulation results are comparable to those from other programs – at least for this case.

Want to see what your Big Bertha would do on a D12? Just hit the "back" key on your phone, move the engine slider from 18 to 24, and run the sim again. This time, results for the Estes C11, D11, D12, and E9 appear.

How about a mid-power rocket? An Aerotech Initiator would be 14 ounces, 2.6 diameter, 29mm motor, and Aerotech motors. Because the program runs simulations for every 29mm Aerotech motor, it takes about 20 seconds before the results appear on my phone. The Aerotech catalog says that the Initiator will reach 1120 feet on a F25-6. This sim estimates 1024 feet and a delay of 5 seconds. For a G40-7, Aerotech says 1770 feet while Rocket Sim says 1513 feet and a 6.4 second delay.



While Rocket Sim appears to be a handy tool, it is definitely not a full-featured rocket flight simulation program. For example, it doesn't let you change the ambient conditions (temperature, launch altitude, etc). It doesn't let you specify or modify the rocket's drag coefficient. It doesn't allow you to save or load a rocket configuration, or save or email the simulation results. It doesn't do clusters or multi-staged rockets. It also doesn't allow you to edit the available rocket engines or add new ones. As noted, it also has some bugs, but that's not unusual for a version 1.0 application. Hopefully, they'll be fixed in a future release.

Despite all those limitations, my conclusion is that this is definitely a useful app for the smartphone-equipped rocketeer. Out at a launch and trying to decide what engine to put in a particular rocket, or what delay length to use? Just pull out your phone and use Rocket Sim to help you decide. Plus, at a price less than the typical bottle of soda, it's a bargain!

"Rocket Sim" by Micoda Holdings, Inc.,
www.micodaholdings.com
Available for $0.99 on the Android Marketplace (also available for iPhone). App version 1.0 reviewed on a T-Mobile G1 running Android v1.6

MASA PLANET

2011 Meeting Schedule

Subject to Change

Check MASA Website or Yahoo Group for updates

MASA April Meeting
Thursday, April 7 - 7:00 pm to 9:00 pm
Location: Buzz McDermott's House
12003 Isanti Street NE, Blaine
Topic: Airbrushing Demonstration and Discussion

MASA May Meeting
Date: TBD - 6:00 pm to 10:00 pm
Location: Alan Estenson's House
7006 Ives Lane N, Maple Grove
Topic: Rocket Build Session and Arcade Party

MASA June Meeting
Thursday, June 2 - 7:00 pm to 9:00 pm
Location: Science Museum of Minnesota - St Paul
Topic: TBD

MASA July Meeting (i.e., Summer Picnic)
Saturday, July 16
Time: TBD
Location: TBD

2011 Launch Windows

Subject to Change

Check MASA Website or Yahoo Group for updates

All MASA Launches are "Misfire Alley"
(bring your own launch pad and controller)

MASA March Launch
Saturday, March 26 - 10:00 am to 1:00 pm
Location: Elk River VFW

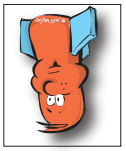
Apple Valley TARC Qual Day and Bonus Launch
Saturday, April 2 - Time: TBD
Location: Apple Valley High School

MASA April Launch
Saturday, April 23 - 9:00 am to 3:00 pm
Location: Nowthen

MASA May Launch
Saturday, May 21 - 9:00 am to 4:00 pm
Location: Nowthen

3rd Annual MASA Summer Regional Contest
Saturday and Sunday, June 4 and 5 Time: TBD
Location: Nowthen

Scheduled dates, times and launch sites are subject to change due to weather and/or field conditions. Check the MASA Web Site or MASA Yahoo Group for up-to-date changes.



MASA PLANET

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