



# LUNAR'clips 2009

Livermore Unit of the National Association of Rocketry

Volume 16, Number 1.6180339887

April Fools 2009

## Next LUNAR Club Meeting: Umbrella Nozzle Tractor Rocket Motors

The next LUNAR Club Meeting will be held Wednesday, April 1st, 7:30 PM. The topic is Umbrella Nozzle Tractor Rocket Motors, presented by our own esteemed Dr Lirpa Sloof.

Meetings are held in Community Room B of the Livermore Public Library, 1188 South Livermore Avenue, Livermore, CA. See the LUNAR website for detailed driving directions.

## Next LUNAR Launch: Indoor Micro-Micro-Micro-Maxx Precision Altitude Contest

The next LUNAR launch will be held indoors, after the talk by Dr. Lirpa Sloof, and will feature MicroMicroMicroMaxx build session, and a precision altitude contest, using the celestial navigation rocket tracking techniques pioneered by Dr Lirpa Sloof.

High-power saucers up to 1/8A are also allowed if they do not apogee past the top of the LUNAR standard 4-foot launch rod.

## In This Issue

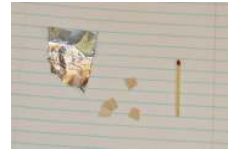
### Local Rocketeer Loves Waiting In Line!



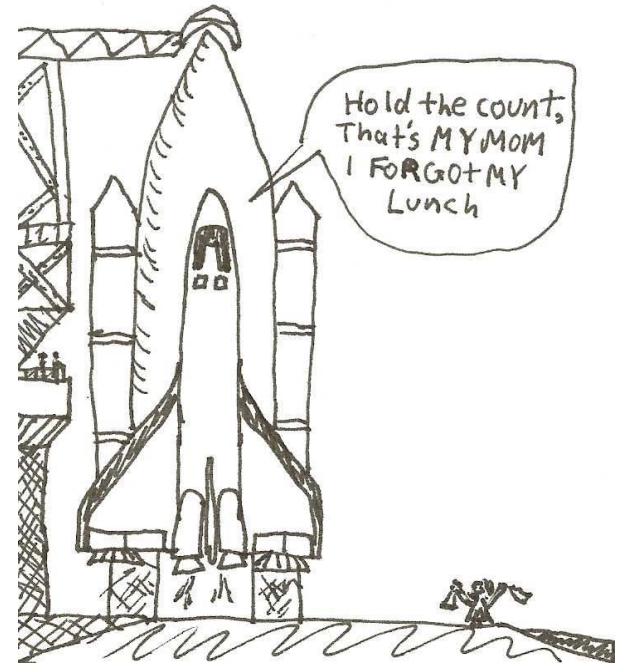
### New Prime Number Discovered!



### What Can You Build With This?



### Comics



## The LUNAR Explorers Society!

... And more!

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## Local Rocketeer Loves Waiting In Line

Local rocketeer Dave Frump is a regular at LUNAR rocket launches. If you've been to a recent LUNAR launch, you've probably seen Dave.



Sometimes Dave arrives early, really early, like the day before the launch. Sometimes Dave even comes without rockets. Dave says he "just loves waiting in line."

Often Dave can be seen waiting in the RSO check-in line, holding a rocket or two, talking with friends. Dave seems to know all the folks in the RSO check-in line.

Dave has found that he can save a lot of money by standing in line, but never launching. The secret, he says, is "when it gets close to my turn with the RSO, I usually find some reason to step out of line and go back to my car and fool around with the rocket a bit." What usually does the trick is forgetting something important, like the rocket motor, or wadding, or a fin or launch lug. Then he goes back in line, joining the end.

Dave estimates he can go almost all the way through the RSO line "maybe 10 or 12 times at a launch." That's a lot of motors he doesn't burn, so lots of money saved. "And you just can't beat the sheer joy of standing in line. I have a lot of friends there. LUNAR is

a great bunch of folks, they've been a community, a real support for me."

At some of the busier LUNAR launches, the RSO check-in line can stretch for an hour and a half or more. Dave says during those marathon sessions, he doesn't need to work so hard to get out of line and back in. "On those days, I might only cycle through a couple or three times."

Dave says, "It all started when my girlfriend and I were looking for something inexpensive to do together. After I got laid off, we couldn't afford to go to any concerts any more. We always used to camp out overnight to get tickets for a big show. LUNAR lines are world-renown for being super long. I thought it would be just like old times."

The girlfriend didn't embrace standing-in-line with the same enthusiasm as Dave. "She's been gone for a while. She drove off in a huff, in the trunk was one of my oldest rockets (an Estes Astron Sky Hook)," Dave explains, "and I sure will miss that old rocket."

Dave would like to share the experience he's gained from standing around at LUNAR rocket launches. "I'd like to give a talk at the club meeting some time, how we can kinda take the edge off, lose the hectic-ness of the launches. Think of all the money you'll save."





## Historical Fact Department



## “Prime Number Explorer” Rocket Discovers New Prime Number

LUNAR member, science whiz, and rocket enthusiast Biff Studmuffin has discovered a new prime number, using his Estes #0891 rocket “Prime Number Explorer.”



“With one nose cone, two sets of five fins, and three decals, I knew it couldn’t miss,” says Biff. “And that massive A3-2 was sure to power the rocket to great heights, but I knew I could recover it.”

Prime numbers have been known since antiquity. Primes are numbers not evenly divisible by any other number. The first few primes are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, etc.

Biff flew the Prime Number Explorer at a recent LUNAR launch. Watching the rocket recover under 13-inch parachute, before the rocket touched ground, it was apparent that the rocket had discovered a new prime number.

“I really didn’t expect to catch a new prime on the first launch!” Biff exclaimed. “I had a whole pack of A3-2s for the day’s work. But I didn’t need to use them. I went home a happy man.”

For the follow-on project, Biff plans to launch twenty-nine Prime Number Explorer models. “A mass-launch of these will create a giant quantum computer, which will make searching for the 47<sup>th</sup> Mersenne Prime really easy.” Biff explains the mechanism: “Each rocket will either discover or not discover another new prime, and taken together, each rocket represents one qubit in the Mersenne exponent.”

Biff hypothesizes that the exponent of the 47<sup>th</sup> Mersenne is the same as his home telephone number. “That would be a clear message of the grand interconnectedness of the universe. And maybe I could get a date.”



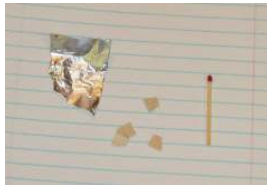
## Building Micro-Micro-Micro-Maxx Rockets by Bill Orvis, LUNAR #309, NAR #84455

### Building Micro-Micro-Micro-Maxx Rockets

Being very much into the small these days and heeding the economy's hint at being frugal, I decided to design a rocket project that is even smaller than the MicroMaxx. Hard to do; yes? I mean where do you get an engine smaller than a MicroMaxx??? In a box of matches that's where. Here is all that fuel sitting around being used to light camp fires and barbecues when it could be used to make things fly. What a waste.

What could be better? Take a look at a match. Not only does it include fuel, but the body of your rocket as well. All you need to add are fins and a combustion chamber.

I tried to figure out how big an engine this is, so I scraped off the propellant from a single match and tried to weigh it on an ancient scale my Great Grandfather used to use to measure medicines as a veterinarian. The smallest marking on the scale is 0.1 gm and the scale didn't move so I guess we will go with that. An A motor has 3.1 gm of propellant so  $0.1/3.1 = 0.03$ . I don't have any idea what the average thrust is and there is no delay or ejection charge so we will just call this a 0.03A?P.



The Estes Alpha III is an old standby for model rocketry so my new design is modeled after it, at least as much as I can with a rocket made out of a match stick. Figure 1 shows the parts for the Micro-Micro-Micro-Maxx Alpha; a match stick, four fins, and some foil.

### Building the Micro-Micro-Micro-Maxx Alpha



Glue the four fins onto the bottom of the match stick. The fuel goes in the front to get the CG forward. Wrap the tip with foil making a nose cone and combustion chamber. Slip a pin between the foil and match stick to create a nozzle to direct the thrust towards the back. You can direct it towards the front if you want but it will fly better if it is thrusting out the back.

Figure 2 shows the completed rocket that just needs to be painted to be done. Paint it in the colors of an Estes Alpha III and you are done.

### Micro-Micro-Micro-Maxx Launch Pad

As you might expect, the Micro-Micro-Micro-Maxx Alpha will not fit on the standard LUNAR launch pads. In fact, the Micro-Maxx launch pads are still way too big. I built the Micro-Micro-Micro-Maxx Launch pad by bending a paper clip as shown in Figure 3. This holds the rocket in launch position. To launch it, hold a lit match under the nose cone and away it goes.



### Micro-Micro-Micro Future

My next project will be to build an engine with a single grain of rifle powder. I expect LUNAR to host a grain of powder altitude contest.

## Micro-Micro-Micro-Maxx CATO by Bill Orvis, LUNAR #309, NAR #84455

### Micro-Micro-Micro-Maxx CATO

During the first test launch of the Micro-Micro-Micro-Maxx Alpha, we experienced the world's smallest CATO. It appears that the nozzle was too small for the fuel grain used and blew out the forward closure. As you can see in the picture, the 0.03A-P engine has a significant amount of fire coming out the front which is not conducive to a successful flight. We will need to work on enlarging the nozzle or strengthening the forward closure.

*Note the fingers in the picture for scale.*





## Umbrella Nozzle Tractor Motors

by Dr Lirpa Sloof, LUNAR Member

### **Umbrella Nozzle Tractor Motors**

Looking at the development of rocket nozzles over time, the next step is intuitively obvious. Obvious to me, anyways. But that's why I am called "Doc", and you are just "regular."

Early workers Tsiolkovskii, Goddard, and Von Braun, all understood the De Laval convergent-divergent compound nozzle (invented in 1890) we are all familiar with:

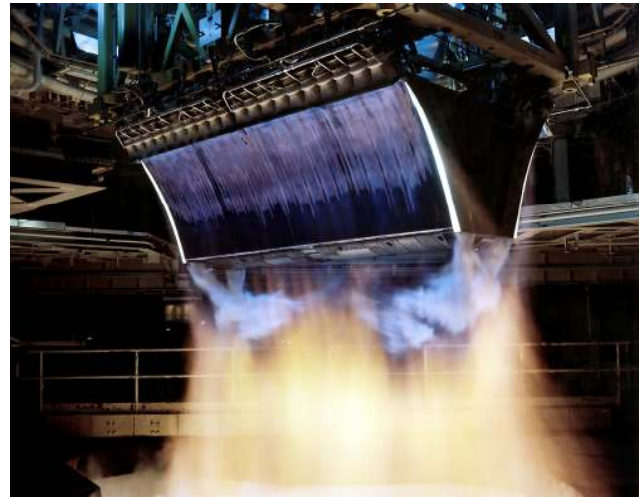


*De Laval convergent-divergent nozzle from a V2 rocket motor*

In recent years, the aerospace community has experimented with "aerospike" nozzles. Aerospikes attempt to compensate for ambient atmospheric pressure, at the cost of weight at the wrong end of the rocket. Aerospike nozzles have a divergent section on the inside, which supports complete expansion of the exhaust and therefore efficient thrust generation.



NASA Dryden Flight Research Center Photo Collection  
<http://www.dfrc.nasa.gov/Gallery/Photo/index.html>  
NASA Photo: EC04-0113-146 Date: March 30, 2004 Photo By: Carla Thomas  
A closeup of one of the Cesaroni Technology, Inc. - constructed aerospike nozzles used in the Dryden Aerospike Rocket Test.



*Aerospike nozzles, photos by NASA Dryden.*

By imagining the aerospike inside out, I have invented the umbrella nozzle. A rocket motor exhausting out the umbrella nozzle will pull like a tractor, not push. The motor can be deployed on the top of a saucer-like vehicle.





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## Puzzle Of The Month: Match the Rocketeer With Their Garage



LUNAR President David Raimondi



LUNAR Member-At-Large Alan Thym



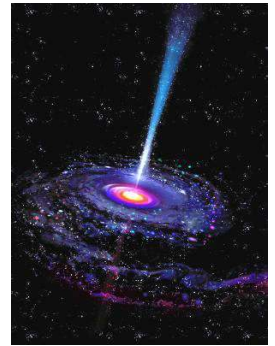
LUNAR Member-At-Large Charlie Wittman



LUNAR Member Bil Kellerman



LUNAR Member Dr Lirpa Sloof





## Rocket Workshop Roundup

### Basic Shop Tools and General Purpose:

**DRILL PRESS:** A tall upright machine useful for suddenly snatching flat metal bar stock out of your hands so that it smacks you in the chest and flings your beer across the room, denting the freshly-painted vertical stabilizer which you had carefully set in the corner where nothing could get to it.

**WIRE WHEEL:** Cleans paint off bolts and then throws them somewhere under the workbench with the speed of light . Also removes fingerprints and hard-earned calluses from fingers in about the time it takes you to say, "Oh shit!"

**ELECTRIC HAND DRILL:** Normally used for spinning pop rivets in their holes until you die of old age.

**SKILL SAW:** A portable cutting tool used to make studs too short.

**PLIERS:** Used to round off bolt heads. Sometimes used in the creation of blood-blisters.

**BELT SANDER:** An electric sanding tool commonly used to convert minor touch-up jobs into major refinishing jobs.

**HACKSAW:** One of a family of cutting tools built on the Ouija board principle. It transforms human energy into a crooked, unpredictable motion, and the more you attempt to influence its course, the more dismal your future becomes.

**WISE-GRIPS:** Generally used after pliers to completely round off bolt heads. If nothing else is available, they can also be used to transfer intense welding heat to the palm of your hand.

**WELDING GLOVES:** Heavy-duty leather gloves used to prolong the conduction of intense welding heat to the palm of your hand.

**OXYACETYLENE TORCH:** Used almost entirely for lighting various flammable objects in your shop on fire. Also handy for igniting the grease inside the wheel hub you want the bearing race out of.

**TABLE SAW:** A large stationary power tool commonly used to launch wood projectiles for testing wall integrity.

**HYDRAULIC FLOOR JACK:** Used for lowering an automobile to the ground after you have installed your new brake shoes, trapping the jack handle firmly under the bumper.

**EIGHT-FOOT LONG YELLOW PINE 2X4:** Used for levering an automobile upward off of a trapped hydraulic jack handle.

**E-Z OUT BOLT AND STUD EXTRACTOR:** A tool ten times harder than any known drill bit that snaps neatly off in bolt-holes thereby ending any possible future use.

**BAND SAW:** A large stationary power saw primarily used by most shops to cut good aluminum sheet into smaller pieces that more easily fit into the trash can after you cut on the inside of the line instead of the outside edge.

**TWO-TON ENGINE HOIST:** A tool for testing the maximum tensile strength of everything you forgot to disconnect.

**CRAFTSMAN 1/2 x 24-INCH SCREWDRIVER:** A very large pry bar that inexplicably has an accurately machined screwdriver tip on the end opposite the handle.

**AVIATION METAL SNIPS:** See hacksaw.

**PHILLIPS SCREWDRIVER:** Normally used to stab the vacuum seals under lids and for opening old-style paper-and-tin oil cans and splashing oil on your shirt; but can also be used, as the name implies, to strip out Phillips screw heads.

**STRAIGHT SCREWDRIVER:** A tool for opening paint cans. Sometimes used to convert common slotted screws into non-removable screws.

**PRY BAR:** A tool used to crumple the metal surrounding that clip or bracket you needed to remove in order to replace a 50 cent part.

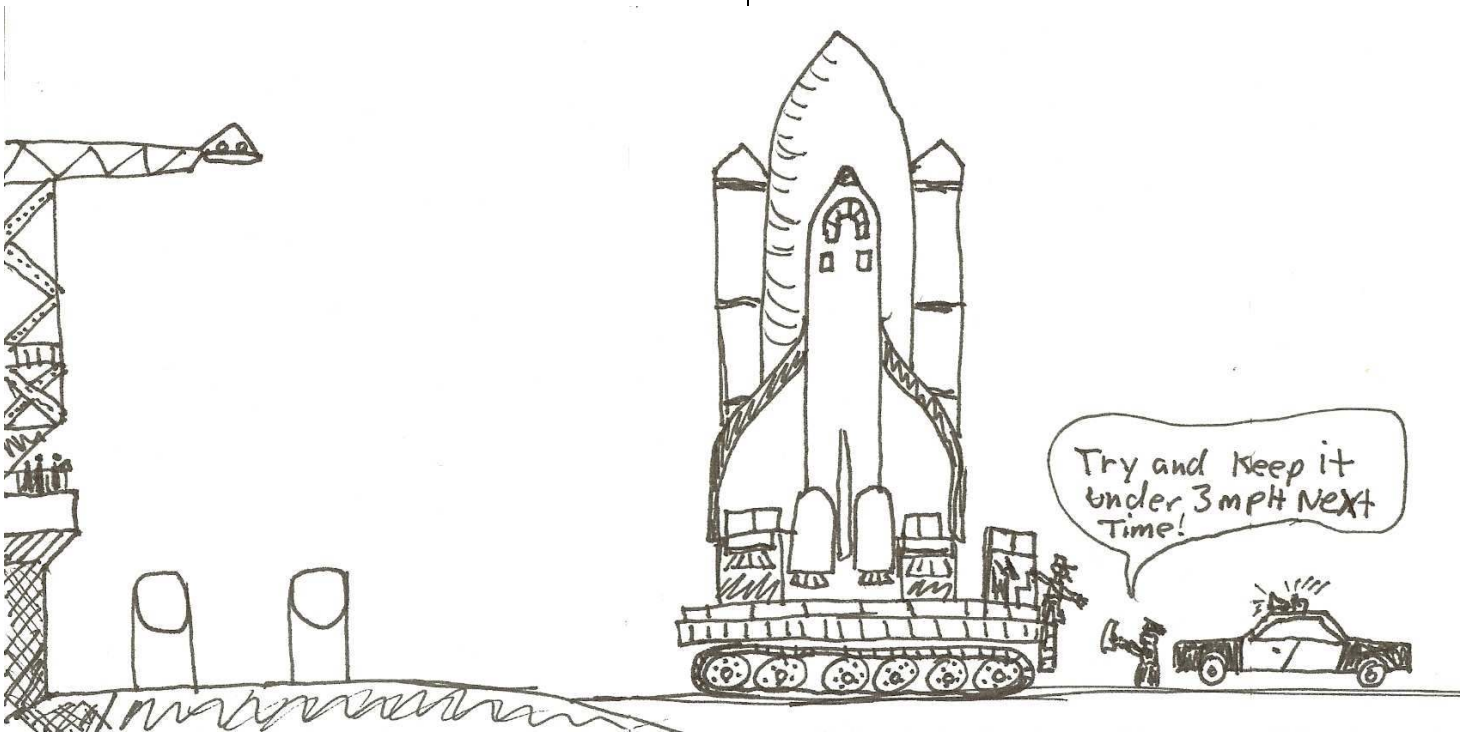
**HOSE CUTTER:** A tool used to make hoses too short.

**HAMMER:** Originally employed as a weapon of war, the hammer nowadays is used as a kind of divining rod to locate the most expensive parts adjacent the object we are trying to hit.

**MECHANIC'S KNIFE:** Used to open and slice through the contents of cardboard cartons delivered to your front door; works particularly well on contents such as seats, vinyl records, liquids in plastic bottles, collector magazines, refund checks, and rubber or plastic parts. Especially useful for slicing work clothes, but only while in use.

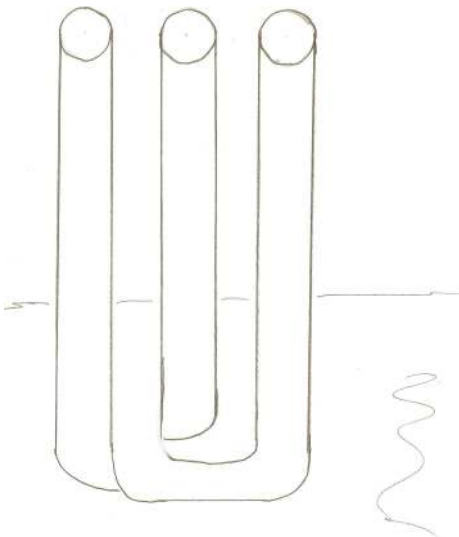
**DAMMIT TOOL:** Any handy tool that you grab and throw across the garage while yelling "DAMMIT" at the top of your lungs. It is also, most often, the next tool that you will need.

## Those Wacky NASA Guys!



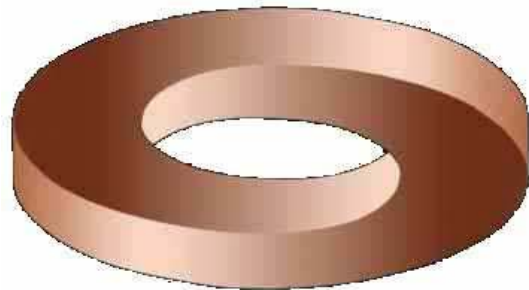
### Construction Project: Rocket Rack

This nifty rocket rack is easy to construct, perhaps using spare materials you may already have in your workshop. The rack is suitable to hold three one-fin rockets, one three-fin rocket, or maybe a Trident, or ACME Spitfire.



### Construction Project: Centering Rings

After you finish the rocket rack, you may want to cut out some of these nifty centering rings.



### From The Editor – Seriously

Thanks to Alan Thym for the funny comics, Bill Orvis for the Milli-Micro-Nano-Pico-Femto-Atto-Max, Maddi Sojourner for when-the-going-gets-tough-the-tough-go photoshopping, Steve Kurlinski for posing as that guy, James Marino for putting up with Dr Sloof, and the Lunch Bunch guys for the garage pictures. Yes the issue number is a real number, figure it out.





The LUNAR Explorers Society  
by Bill Orvis, LUNAR #309, NAR #84455

## ***The LUNAR Explorers Society***

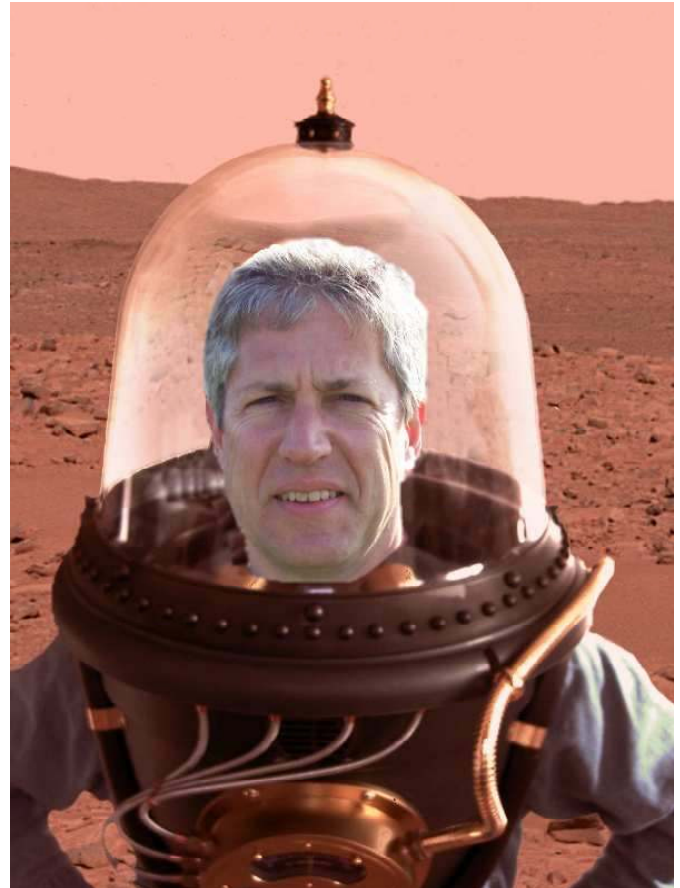
The LUNAR Explorers Society is a group of like minded men, women, kids, cows, horses, dogs (cats are too smart to join) and anyone else we can coerce to join that are seeking to advance steam energy into space travel. Steam energy is the most basic energy in the universe, combining all the elements in its creation; Earth (coal), Air (steam), Fire, and Water. What better energy to use to visit the stars and planets.

Shown in Figure 1 below is the LUNARSteamerOne on its way to Mars from the Snow Ranch spaceport. This rocket encompasses the latest in steam technology with multiple brass boilers and water tanks. It also uses the new electric light technology to light the way to the stars.



With our fearless leader guiding the way, the LUNARSteamerOne makes its way to the stars. Mars is its first target; the Red Planet. We have deduced that it is a steam technology paradise. I mean, where else could you have so many rusting railroads that it would turn the ground red.

Figure 2 shows our noble leader and Steamanot sending back his first message from the surface of Mars. What's that you said??? Come and get you??? No coal and water for the return trip?? You want to go home??? I guess we need to start working on a return vehicle.





## Join The LUNAR Build-A-Rocket-By-Mail Club

LUNAR has started a club for folks who really enjoy building rocket kits. Each month you receive, by mail, another piece of a real rocket kit!

Imagine, if you had started with us last year, you would be really close to completing your Quest Cyclone – the very same model we're using at this year's Maker Faire! With nearly a dozen parts, over the last year many of us have enjoyed the carefully planned construction and the excitement of getting a new part every month.

Hurry and sign up for the next big project: The Mighty Saturn V! That's right, we're building Saturn Vs! With over 440 pieces in this finely detailed kit, at one piece each month you'll have plenty of time to carefully trim, sand, primer, paint, and detail to the finest construction standard ... We've planned ahead: We're not doing it for this year's 40<sup>th</sup> Anniversary, the entire thing will come together just in time for the 87<sup>th</sup> Anniversary of the Apollo 11 Lunar Landing in 2056! How exciting will that be! You might be the first one there.

## BATFE Giving Out FREE RELOADS At Snow Ranch

Local BATFE Agent Justin Case has had enough of being on the bad-guys side. Because of Judge Reggie Walton's recent ruling on our long-running NAR/TRA case, Justin decided to join the good-guys in LUNAR, and make amends for the so-many-years of trouble for rocketeers caused by the agency.



Photo by Steve Jurvetson, (cc)

Justin has promised to hand out FREE RELOADS to every rocketeer, at the next Snow Ranch launch!

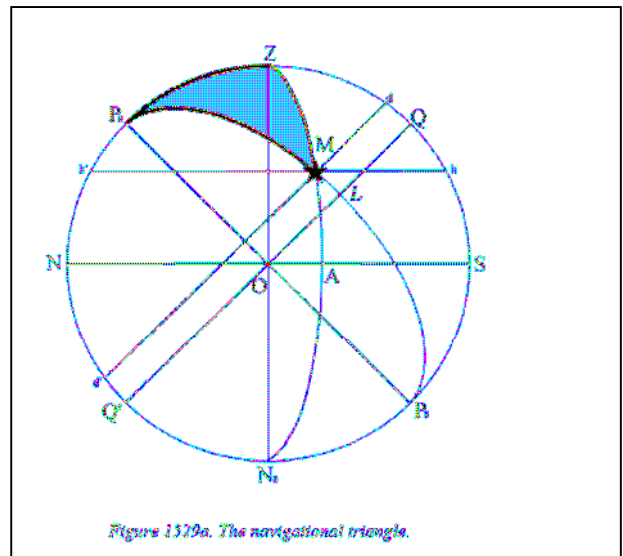
## Extreme Precision Rocket Altitude Tracking via Sextant

LUNAR member Dr. Lirpa Sloof has written the equations and method for rocket altitude tracking, using a sextant, to obtain extreme precision.

Ordinary visual rocket altitude tracking, using a theodolite, is accurate to within a degree or so. Depending on the baseline, that degree can translate in to plus or minus several feet.

By using a high quality sextant, with a resolution of tenths of a minute of a degree of arc, the error can be reduced to fractions of an inch.

The Navigational Triangle, according to Bowditch (American Practical Navigator):



Dr. Sloof will present his method of modified-lunar-distance sighting and reduction at the next LUNAR meeting. Dr. Sloof says that the mathematics and arithmetic is not a problem, but getting the rockets to hold still at apogee is a problem.





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## Who you gonna call?

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## Who We Are...

### LUNAR is the Livermore Unit of the National Association of Rocketry, Section #534

LUNAR is located in Livermore, California, about fifty miles southeast of San Francisco. We are organized to supply a safe, educational and legal means of furthering the hobby of model and high-powered rocketry in northern California, to aid and encourage the development of all club members' knowledge and expertise in the area of rocketry, to promote youth education and community involvement, and to engage in scientific, educational and related activities. LUNAR is open to rocketry hobbyists of all ages to further the sport and science of hobby rocketry within the NAR (National Association of Rocketry) and Tripoli safety codes. These codes have allowed hundreds of millions of model rocket launches by hobbyists since the late 1950s without serious injuries.

LUNAR also supports assorted rocketry activities of community youth groups. We have hosted launches (and in some case building sessions) for the Boy Scouts, Girl Scouts, 4H, YMCA Adventure Guides, the GATE program, and LARPD Science Camp.

### Launches

Section launches are usually held from 9:00 a.m. to 1:00 p.m. on the **third Saturday of the month**. Generally these are *sport launches*, although we occasionally hold sanctioned *contest launches* for points in the NAR national contest standings, *theme*

*launches* where we focus on a particular class of rocket, and *night launches*.

LUNAR's Snow Ranch launch site accommodates all rockets from 1/4-A to M motors, with a 15,000 foot maximum altitude. The LUNAR Board requests notification of L and M flights a week before the launch date. Contact the LUNAR Members At Large directly, or post a message on [general@lunar.org](mailto:general@lunar.org).

### The LUNAR Hotline - (925) 443-8705

The Hotline is available to provide up-to-date event information. It's a good idea to call our Hotline to verify the date of the next launch or meeting.

On launch days, the Hotline recording is updated by 7:00 AM to reflect the Go/No-Go status of the launch. On launch days with questionable weather, it is especially important to call the Hotline to get the latest information. You can also leave messages on the Hotline.

### Meetings

Section meetings are held bi-monthly. These meetings cover general section business, and typically include presentations by club members or other experts on some aspect of the hobby, ranging from simple building tips to advanced science and engineering principles. Officers' meetings are held bi-monthly, alternate months from the section meetings, and typically concern administrative details.

The LUNAR annual meeting is held during the first quarter of the calendar year at a time and place announced to the membership. At this meeting, officers are elected and other club business is conducted.

### World Wide Web site!

LUNAR maintains a Web site at <http://www.lunar.org>

You will find a lot of stuff to see on the web site, and it always has the latest information about LUNAR and our activities. For example, you'll find our latest launch and meeting calendar, directions to our launch site, a gallery of photos from past launches, the on-line issues of the LUNAR'clips (the section newsletter), our section bylaws, pointers to member rocket pages, pointers to other rocket and space related information on the Internet, ... and lots more!

### Membership

Your membership fees support the costs of launch operations, equipment maintenance, meetings, newsletter, outreach events, and other public services. Join LUNAR now! Yearly fees: Youth (to age 11) is \$6; Junior (ages 12-17) is \$6; Adult (over 18) is \$25. Become a Contributing Member for an extra \$20 (\$26 Youth & Junior; \$45 Adult), and your flight cards are free.

# 2009 LUNAR Calendar

Launches at Snow Ranch or NASA/Ames Moffett Field (see website [www.lunar.org](http://www.lunar.org) for directions)

Meetings at Livermore Public Library, Community Room B, 1188 South Livermore Avenue, in Livermore.

**WARNING!** Times and dates are subject to change with little notice. Setup starts an hour before the listed time and teardown and packing up usually takes an hour after the listed time. For launch confirmation call the LUNAR Hotline (925) 443-8705 after 7 AM on launch day. Visit the LUNAR web site at [www.lunar.org](http://www.lunar.org) for the latest information.

<p style="text-align: center;"><b>January</b></p> <p>Jan 3, 9am: Snow Ranch Launch Jan 15, 7:30pm: Club Meeting: Elections Jan 17: Low Power Launch, Moffett/Ames</p>	<p style="text-align: center;"><b>February</b></p> <p>Feb 7, 9am: Snow Ranch Launch Feb 19, 7pm: Board of Directors Meeting Feb 21: Low Power Launch, Moffett/Ames</p>	<p style="text-align: center;"><b>March</b></p> <p>Mar 7, 9am: Snow Ranch Launch Mar 19, 7:30pm: Club Meeting: Model Rocket Competition Mar 21: Low Power Launch, Moffett/Ames</p>
<p style="text-align: center;"><b>April</b></p> <p>Apr 4, 9am: Snow Ranch Launch &amp; Auction <b>Interceptors</b> Apr 16, 7pm: Board of Directors Meeting Apr 18: Low Power Launch, Moffett/Ames: <b>Contest: OSL, A-SD, PD</b></p>	<p style="text-align: center;"><b>May</b></p> <p>May 2, 9am: Snow Ranch Launch May 16: Low Power Launch, Moffett/Ames May 21, 7:30pm: Club Meeting: Mark Annis, Space Shuttle</p>	<p style="text-align: center;"><b>June</b></p> <p>Jun 18, 7pm: Board of Directors Meeting Jun 20, 9am: Low Power Launch, Moffett/Ames</p>
<p style="text-align: center;"><b>July</b></p> <p>Jul 16, 7:30pm: Club Meeting: topic TBD Jul 18, 9am: Special Low Power Launch at Moffett/Ames: <b>40<sup>th</sup> Anniversary of Apollo 11</b></p>	<p style="text-align: center;"><b>August</b></p> <p>Aug 15: Low Power Launch, Moffett/Ames Aug 20, 7pm: Board of Directors Meeting</p>	<p style="text-align: center;"><b>September</b></p> <p>Sep 17, 7:30pm: Club Meeting: Quest Force 5 Kitbash Build Session Sep 19: Low Power Launch, Moffett/Ames <b>Contest: STA, A HD, 1/4A FW</b></p>
<p style="text-align: center;"><b>October</b></p> <p>Oct 15, 7pm: Board of Directors Meeting Oct 17: Low Power Launch, Moffett/Ames</p>	<p style="text-align: center;"><b>November</b></p> <p>Nov 7, 9am: Snow Ranch Launch Nov 19, 7:30pm: Club Meeting: topic TBD Nov 21: Low Power Launch, Moffett/Ames</p>	<p style="text-align: center;"><b>December</b></p> <p>Dec 5, 9am: Snow Ranch Launch Dec 17, 7pm: Board of Directors Meeting Dec 19: Low Power Launch, Moffett/Ames</p>



## LUNAR

c/o Membership Chair  
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