



# The Launch Rack

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*National Association of Rocketry Section No. 439*

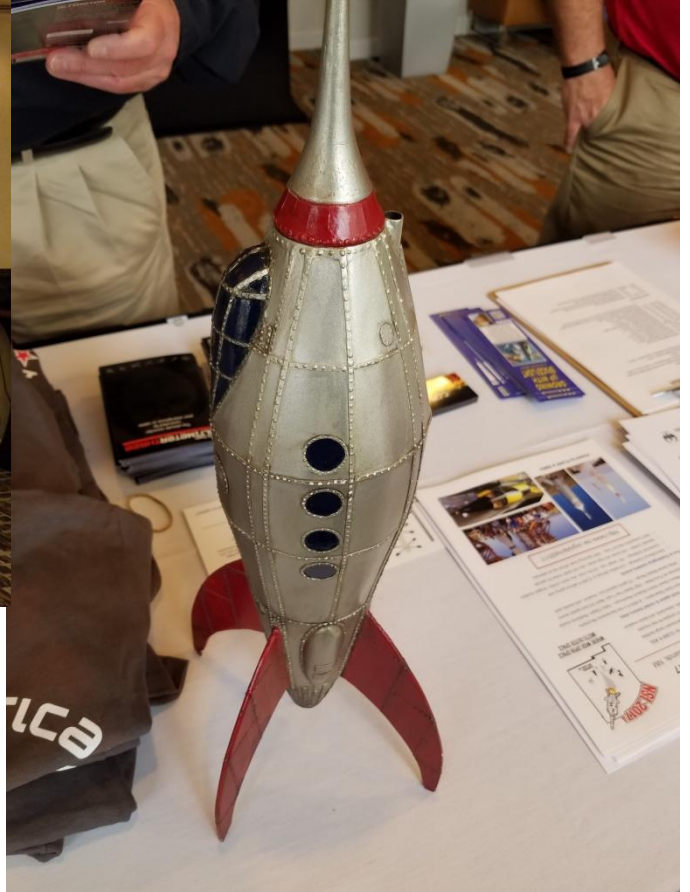
New Jersey's Oldest Model Rocket Club

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\*\*\* 2014-2015 LAC NEWSLETTER AWARD HONORABLE MENTION \*\*\*

\*\*\* 2016 LAC NEWSLETTER AWARD RECIPIENT \*\*\*



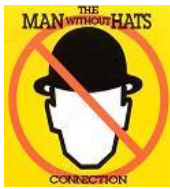
**SOLD  
OUT**  
**NARCON 2017**





# President's Message

Arnie Klein



**Great News:** The large rocket eating tree next to our launch pad was blown down about a month ago and cut up and the only thing left is a large stump. This tree has been eating hundreds of rockets for decades. When it fell over, it fell on the cow fence and damaged it, but it has now been repaired. I counted the rings on the tree it was 47 years old there was no rot, so the tree must have cracked higher up in the trunk when the wind hit

it. The North Branch Park will now be a much better place to launch, the only down side will be that there will be no shade tree to hid under, but I consider this a great trade off. The February launch was good the weather was warm but there was a high wind that limited the type of rockets launched, I counted 21 rockets launched only one rocket was lost to a tree.

On another subject one of the rocketeers showed me a great altimeter he had, it is a Jolly Logic Altimeter 2, that he got for \$50 from Amazon it gives you ten flight parameters displays them on a liquid crystal screen, it is small and lightweight, and fits in a small rocket tube. Another nice thing about it, is that it does not require it to be hooked to a computer to see the results.

The March launch went well, the temperature was warm, and the wind was low on the ground but high in the upper atmosphere. We had a bunch of cub scouts show up, and we launched their Alpha rockets. A total of 20 rockets were launched three landed in trees and two were recovered from the trees. The April launch was scheduled early in the month on a Sunday, and people must have forgotten about the launch because no one except me showed up, and that is unfortunate because the weather was warm and it was a good day to launch, so I had to take down all the launch equipment by myself after setting it up. From now on I will not set up the launch gear until someone else shows up. This is the third time this has happened to me.

-Arnie

~~Lackey's~~  
**The Editor's Pad**

Dr. "It's the Trooth" Bob Kreutz

IF it'll FIT - I'll Print IT!

If not, I'll probably print it anyway...



To all our loyal readers and subscribers out there that took offense to the last issue of the Launch Rack (April), you can go pound salt. To our readers who were not singled out for ridicule and are now offended that we did not offend you, we apologize. We will endeavor to correct this short sightedness in future issues. Simply contact the editorial staff and give your name, club or organization and the degree of insulting mockery you wish to receive: unpleasant, distasteful, nasty or disgusting. Leaving a credit card number will certainly help!

Back to the morphing of our club president in each issue.... Yes we have been put on notice that this activity is not, well say, warmly accepted by the Grand Poobah. But has anyone thought about it from the other side of the looking glass? That this is not some subversive plot against our glorious leader? Could it in fact be just



Jarnold Hochkleiner  
NOR President

the opposite? That is, an honoring of our club president or a subtle poke at the other half of the morph? Take a look at this issue's photo: Jarnold Hochkleiner. Might the NAR President actually take offense at being "inKleined"? Would Mr. Spock? Donald Trump? Or how about all the others on last issue's cover? Did we insult Arnie? Did we insult John Hochheimer? Or did we honor them both? Well, I

ask you all now - which is it? Are you a big ender or a little ender? (if you recall Gulliver's Travels...)

Seriously, I appreciate and owe a debt of gratitude to our Great Leader, for lending himself and his image, to this bimonthly activity. We all do. So thanks Jarnold! Uhh, Arnie. <G> Otherwise, any takers?

~~Lackey~~  
**WANTED: New Editor For The Launch Rack**  
**I'm Done. Time to break camp and move to**  
**North Carolina with the Rest of New Joisee**  
All Interested Parties Please Contact:  
**Dr. Bob Kreutz: [orbitboybob@comcast.net](mailto:orbitboybob@comcast.net)**

## Countdown!

2017

Please **Note:** All Launch Dates are

**SATURDAY** Except where noted.

- Jan 28 - Sport Launch (Festival of the New Moon Launch)
- Feb 25 - Sport Launch (Eve of the Annular Solar Eclipse Launch)
- Mar 25 - Sport Launch (Launch of the Vernal Equinox)
- Apr 2 [SUNDAY] - Sport Launch (Pre-Jovian Opposition Launch)
- May 20 - Sport Launch (Great Mercurial Elongation Launch)
- Jun 25 [SUNDAY] - Sport Launch (Aestival Solstice Launch)
- July 22 - Sport Launch (Delta Aquarian Meteoric Launch)
- Aug 26 - Sport Launch (Thanks for the Eclipse! Launch)
- Sept 23 - Sport Launch (Launch of the Autumnal Equinox)
- Oct 28 - Sport Launch (Orion's Annual Meteoric Launch)
- Nov 25 - Sport Launch (Launch THIS You Turkeys! Launch)
- Dec 30 - Sport Launch (Grand Hibernial Solstice Launch)

**2017 Schedule has been released! Bob Z's has confirmed with North Branch Park.**  
Our WebMaster Rob Nee says: Check the GSSS Website! If you go to the launch dates page on the new website there is more info. You can add calendar subscriptions to most phones and Google Calendar. If the launch dates change they show up on your phone or in Outlook automatically!

NEW URL --> <http://www.gsss.club/launches.php>

## RE:ENLISTMENTS

>>WELCOME<< ((BACK))

**ONE & ALL FOR 2017!!!**

**I don't think we'll get many more  
after that last issue....**





# THE SOAPBOX

## STAND UP AND SHOUT!

Shout, shout, let it all out  
These are the things I can do without  
Come on, I'm talking to you, come on...

Here you can say what you want: So SOUND OFF GSSSS – right here on anything you would like! May similar minds come together - or secret plans be revealed...

In years past, GSSS would attend NARAM in force. There were several reasons. A large portion of the club was interested and active in competition rocketry. There were ample members in all 3 age divisions. The club had a good point accumulation and standing as an NAR Section, capable of vying for the national championship section. GSSS actually received National Reserve Section Champion at NARAM-34 in 1992 (second place.) GSSS members enjoyed socializing with each other and in the camaraderie of other rocketeers at NARAM. A week's vacation doing nothing but rockets – well, that was pretty cool, too. All those remain excellent reasons to attend what is now referred to as the National Rocketry Festival (but still abbreviated "NARAM.")

Of course, to do something like that again, would most likely require many of the prerequisites to be in place. Something we do not have at present. But, there may be club members today that have interest in attending the national meet as individuals. The thing is, no one knows who might have interest or who may be going. After all, the garden destination spot this year is nicknamed: "The Big Icky!" Regardless of the nomenclature and that Muskegon is the vacation paradise for this year, Michigan has a long and colorful relationship with rocketry. The CD for the event is Bob Always who was my roommate for the last WSMC in Slovakia. Both he and his brother Peter (author of Rockets of the World) have been avid rocketeers for longer than most of us. Both have been instrumental in furthering the development and promotion of organized rocketry and in other words, they know what they're doing.

I, as one club member, am heading to NARAM the end of July. I'm going out early to try out for the 2018 US Spacemodeling Team. I'm inviting any club member who plans to go to contact me. It would be great to see a GSSS contingent flying under the club flag once again. In this small way, we might organize like days in the past.



## LETTERS RELATED TO ISSUE #200

Congratulations on the 200th Launch Rack!

Best wishes and  
congrats again on the  
LR.

Ole Ed

Hi Bob,

We just wanted to say congratulations on this amazing milestone! Unless you have been involved with putting something like this together it's hard to appreciate all the time and hard work it takes to produce it. The Launch Rack is always informative, interesting and in many ways, entertaining. We love it! By now it should be obvious to everyone why you and Launch Rack took NAR top honors last year. We look forward to each edition and wish you and GSSS continued success!

Verna & Randy (DeArmand)

## LETTERS RELATED TO APRIL'S ISSUE

On Mar 24, 2017, at 10:31 AM, dr. bob kreutz

<[orbitboybob@comcast.net](mailto:orbitboybob@comcast.net)> wrote:

GSSS Members, Subscribers and Friends,

Well, I hope I have a few friends left after this issue....  
because NO ONE WILL BE SPARED!

"...and their daughter Ellie."

BWAAAAAAHHHAAAAA!!!

Hell. That's where you're going. Straight there. To hell.  
Expect the worst.

Pardon me. I need to go schedule a haircut...

James Duffy

James, (aka: Mr. Daffy)  
Is that anywhere near Nowy  
Targ, Poland???  
Perhaps a nice Mullet this  
time?

Dr. Bob



Huh? I don't get it.

Ole Odd

Sent from my iPod

"Ole Odd" --

OK. Sure. Uh-huh. That's about what I expected from you.....

You may not get it - but you sure got it. So suffer. Oh and

Thanks!!!!

DrB

Hi Dr Bob,

CAN'T claim I've read it all yet, but...*WHAT AN ISSUE!!*

Reckon I should've featured in the array, I've done more screw-ups than the rest of the guys you featured, put together. I'm gonna be penning a history of Space Modelling's World Cup in the foreseeable future...let me have any info that seems relevant. Must go, I need to read *The Launch Rack* in more detail. Please find an image attached.

ciao...stuart

[\[\[...one hour later....\]\]](#)

Not so Dear Dr Bob..



AHHHGH...I do feature, along with Team GB! We've declared war for less than this...this will be raised (razed..) in BMFA Council...FAI-CIAM sub-Committee...Joze Cuden's front room. You will pay for this America...bank details on request. The end of the world is nigh.. ciao...Big Stu

The bigger they come, the harder they fall, eh, old friend... ? I would imagine the rest of your countrymen might feel the same – but not as bad as a few others!!! You simply should never have had taxed the tea in Boston.... To ARMS, To ARMS – The British are COMING!

Nice!

Please keep me on this list.

Heading to playa Del carmen on sun for a week.

Topless beaches!!!

**Kevin Kuczek**

But Kevin, will you be bringing any rockets??? Try to have a good time even if you can't, but I'm sure you can get one there in your pocket or somewhere....

DrB

Oooooooooo what you said. Looks good to me.

Jack (Sarhage)

With your permission Grand Editor, of course....

DrB

Doc!

Laughed out loud at work when I opened your spoofmanship! Some really funny stuff! I choked on my oatmeal when I saw "Devo O'Brian"! And Duffy's doppelganger is uncanny! Superb! How do you do it? Are you using some cool feature of Google image search? Good thing I don't do FAI no mo'!

- Horse Not A Hero (Ross Hironaka)

Ahhh. These things "just come to me" over time. Lots of time! With our friends, most times it just writes itself!

Besides, there ARE older Duffy videos out there....

.....I'll just have to take a look for you!

Thanks Ross!

DrB

Gaybo Morsh – Andy Griffith, really?

Give me a break!

Your brain ain't right!

Jay Marsh

What an inspiring accolade! Would you have preferred Mike Meyers?

T'was the original concept you know...

Thank You (?) Jaybo!

(best you thank ME before next April...)

DrB



Dr B,

Thanks for this. Boy, you must have put some effort into working this lot out. Quite brilliant! Anyway, most impressed with your magazine.

Kindest regards,

John (Jacomb, BMFA)

In all honesty John, you were probably the one who came through the April Issue closest to "unscathed." My deepest apologies. I will endeavor to do you up right (or do you in...) next time!

Dr. Bob

March 19<sup>th</sup>

April 16<sup>th</sup>

May 21<sup>st</sup>

June 18<sup>th</sup>

July 16<sup>th</sup>

August 20<sup>th</sup>

September 17<sup>th</sup>

October 15<sup>th</sup>

November 19<sup>th</sup>

December 17<sup>th</sup>

SoJARs 2017 Launch Schedule



Website: <http://www.sojars.org/>

**Received info about Jackson Hobby - GSSS Discounts**

**Subject: (Club Member Discounts)**

Please let your members know by putting in your newsletter and putting on your web page, to show their club cards so they can get 10 % off non net rocket items. Please ask store personnel for details. If they don't show their club cards we don't know if they're in a club or not.

Jackson Hobby Shop  
2275 W. Countyline Rd.  
Bennetts Mills Plaza  
Jackson, NJ 08527

732-364-3334  
[www.jacksonhobby.com](http://www.jacksonhobby.com)  
Tues. Wed. Thurs. Fri. 11-6  
Sat. 11-5

# NARAM-59 Competition Events Announced



NARAM-59 will be held as part of "Rocketry Festival 2017" and is scheduled for July 29 (Saturday) through August 4th (Friday), 2017. Contest Director for NARAM-59 will be Robert Alway. An FAI World Cup event is

also planned, along with high power and other fun events.

Launch site will be Muskegon, Michigan Wastewater treatment facility, at the same site as NARAM-54 (home of the "Big-Icky!").

NARAM "Festival" Hotel is:

**Crowne Plaza Grand Rapids**

5700 28th Street SE

Grand Rapids, Michigan 49546

Make your hotel reservation using this link:

<https://aws.passkey.com/go/NARAM59>

## EVENTS

Open Spot Landing

C Altitude (Tracked)

B Super-roc Altitude (Altimeter)

C Payload Altitude (Altimeter)

B Eggloft Altitude (Tracked)

G Helicopter Duration (C and Team Divisions)

D Helicopter Duration (A and B Divisions)

C Flex-Wing Duration

Scale

Concept Scale

Research and Development

FAI World Cup

US Team Selection

Optically Tracked altitude events will most likely be tracked to ejection, use of tracking powder advised.

Only commercially available altimeters approved by the NAR Contest Board and publicly announced as approved at least 60 days before any contest where they are used may be used in competition. These altimeters may not be altered or modified in any manner, including use of power sources which are outside the voltage range published by the altimeter manufacturer.

An altimeter must meet the following requirements to be approved by the Contest Board: Uses barometric measurement techniques to record relative flight apogee altitude above launch pad altitude. Resolution of 2 meters or better in readout. Accuracy 2 percent of recorded altitude or 2 meters, whichever is greater. Sampling rate of 10 per second or greater. Audio or visual readout directly from the altimeter. Capable of being automatically or manually placed in a state of readiness to record new flight data. This state must be audibly or visibly verifiable.

See Appendix G of the Sporting Code for a list of current contest certified altimeters

## ECRM-44

**ECRM will be held on June 17-18, 2017 at the Old National Park, Mount Airy, MD.**

### Events

**1/2A Streamer Duration**

**B Eggloft Duration**

**Open Spot Landing**

**Random Duration**

**Classic Model**

**1/2A Rocket Glider Duration**



## CONGRATULATIONS!

They say Model Rocketry can make for some strange bed-fellows and we've all seen that, but this team was one made in Heaven (or maybe a World Championship!) We all wish Kevin Johnson from Team USA and Esther Rouras-Misse from Team Spain a lifelong marriage of health, happiness and prosperity!



And may you be blessed with many little "gold medals..."

*Live Laugh Love*





**NARCON has a capacity limit of 200 attendees and has hit this limit as of February 9. Registration is closed and walk-ins cannot be accepted.**

That was the headline you were greeted with at the NARCON-2017 page for this year's convention. It was probably one of the best and most well attended NARCON's in recent NAR history. Needless to say, if you didn't attend – You MISSED IT!

The NAR Convention for 2017 (NARCON 2017) was held from Friday February 24 through Sunday February 26th, 2017 at the Crowne Plaza Dulles Airport Hotel. The location was just down the road from Dulles Airport and the Udvar-Hazy Center of the National Air and Space Museum. The convention was hosted by NOVAAR, the Northern Virginia Association of Rocketry and the Event Director was past NAR President: Trip Barber.

NARCON 2017 featured a huge amount of how-to and technical content in its programs. There were 28 different one-hour seminars on Saturday covering topics in rocketry and spaceflight; an NAR Town Hall with the NAR President, and an R&D competition with \$1000 in cash prizes (sponsored by Aurora Flight Sciences.) Both were on Friday evening. A wide array of manufacturers were showing off their products, Friday night and all day Saturday. The guest and keynote speaker at the banquet Saturday evening was **Lee Piester**, the founder of one of the hobby's original and iconic companies: **CENTURI ENGINEERING**.

Let's list some of the notable speakers and their topics in various space and rocketry related fields. In the array of topics that follows, absolutely no one's interest was left un-covered. If you couldn't find something that was of personal interest to you, well then, maybe you should find another hobby...

#### Professional Rocketry & Spaceflight

**NASA Sounding Rocket Flight Operations** Phil Eberspacher, NASA, Chief of the NASA Sounding Rockets Program Office, NASA Wallops Flight Center.

**Air-launching NASA Satellites from the South Pacific** Will Marchant, UC Berkeley, Space Sciences Laboratory at the University of California, Berkeley's Mission Operations Team representative responsible for operating two observatories after their launches on Pegasus from Kwajalein. Also a long-time NAR member.

**NASA James Webb Space Telescope** Jon Arenberg, Northrop Grumman, Chief Engineer, Space Science Missions, Northrop Grumman Aerospace Systems.

**NASA's Sounding Rockets** Dan Moses, NASA, Program Scientist, Heliophysics Division and Program Manager for Sounding Rockets, NASA Headquarters. Also a long-time NAR member.

**NASA Orion Manned Spaceflight Program** Jimmy Spivey, NASA, Orion Program Executive (acting), Human Exploration and Operations Mission Directorate, NASA Headquarters

**licensing Commercial Spaceflight** Randy Repcheck, FAA Deputy Division Manager of the Regulations and Analysis Division in the FAA's Office of Commercial Space Transportation. Also a long-time NAR member.

**The Future Scene at the Cape Canaveral Spaceport** Pat McCarthy, Florida Spaceport, Director of Spaceport Operations for Space Florida, the state agency fostering the growth of the aerospace industry in Florida. Pat has worked at the Cape Canaveral Spaceport in various positions since 1988. Also a long-time NAR member.

#### Team America Rocketry Challenge

**3-D Printing Rocket Parts** Doug Cullen

**Altimeter Design & Operation** Dan Wolf

**Finishing and Painting Rockets** Carl Curling

**RockSim Design & Flight Simulation for TARC** Tim Van Milligan

**Model Rocket Stability & Aerodynamic Equations** Jim Barrowman

**Flight Testing in TARC** Trip Barber, NAR TARC Manager

**Post-TARC Student Rocketry Programs** John Lyngdal & Ken Biba

#### Model Rocketry

**Stine & Desind Collections at the Smithsonian** Brian Nicklas,

Smithsonian, Reference Archivist at the National Air and Space Museum's Archives Division since 1988, author of the Museum Publication [The Complete Smithsonian Field Guide to American Missiles](#).



**Making lightweight Fiberglass Bodies**

Tim Van Milligan

**2016 World Space modeling Championships** John Langford, USTMngr

**Getting Started with Gliders**

Mark Bundick

**What's New in Designing for Helicopter Duration**

Chris Flanigan

**Steampunking Your Rocket**

Ted Cochran

**The New Look of NAR Competition**

Ed LaCroix

#### High Power Rocketry

**How FAA Manages Airspace & Waivers**

FAA Representative

**Dual Deployment Systems & Techniques**

Ben Russell

**Flying HPR in Australia**

Adam Martin

**Fiberglassing HPR Rockets**

Bart Merkley

**GPS Systems in High Power Rocketry**

Will Marchant

**Flying HPR to Above 20Kft**

Jerry O'Sullivan

**Level 3 HPR Certification**

Elaine Russell

The weekend was typical: you could walk into a restaurant or watering hole and run into a plethora of modelers who you would know or who were already in the midst of some interesting or technical conversations. I ran into Bruce Canino (former Editor of the Launch Rack) SoJARs



President, on numerous occasions! Here's a shot from Houlihans, from the front end of table (L-R): Jay Marsh, Don Carson, Kevin Johnson, Esther Roura (obscured), Scott Branche, Jim Filler, Edward LaCroix, Terrence Willard, Wolfram Kapinski, Tom Lyon & Ann Miesoll. Not shown: Dr. Bob Kreutz, Sir Walter Raleigh, et al.

Walking out into the parking lot, one would find a very interesting visitor: a full sized (pronounced: "Real") Black Brandt-VC, which was brought in by the Goddard Space Flight Center "guys." Would have been best if there had been some announcement: A guest at the hotel, who just so happened to be and FBI employee, called the cops, not understanding why there was a rocket in the hotel parking lot! Come on! Having a rocket in your parking lot is as common as if, well, it were in your own driveway – Right?



Saturday evening's dinner banquet was the culmination for the event with huge give-a-ways, door prizes, results of the cash prize R&D competition and the keynote speech by



Chris Flanigan:

[Predicted and Flight Data for an 18mm Piston Launcher](#)

Stoil Avramov:

[Advanced Technics and Materials for building S4A Wings](#)

Matt Steele:

[SI Analysis for 2016 World Championships](#)

Tim Van Milligan:

[Drag of Launch Lugs, Rail Buttons, and Launch Guides](#)

Dan Wolf:

[Digital Pressure Sensor Emulator for Altimeter Testing](#)

<== A Note on Presentations and Reports ==>

The NARCON website now has all of the presentations



that were used in the breakout groups on model rocketry, high power rocketry, and T. A. R. C. available as downloadable Acrobat PDF files through

links from the title of each breakout group on the Saturday schedule page: <http://www.nar.org/site/narcon-2017/schedule/saturday/> The groups without linked presentations used hands-on demonstrations. The presentations for the professional spaceflight sessions presented by government and industry speakers cannot be shared.

All five of the R&D reports presented at NARCON 2017 are also available as linked downloads from the titles of the reports on the Friday schedule page: <http://www.nar.org/site/narcon-2017/schedule/friday/>

Lee Piester, on the founding and history of Centuri Engineering, the model rocket company of many "old-timers" youth. Chris Flanigan took top honors in R&D and a \$500 dollar prize with his report on piston design. Additional awards went to Stoil Avramov and Matt Steele. A list and links to the reports are below:





**...AND JUST IN CASE YOU FIND YOURSELF IN NEW MEXICO THIS SPRING:**



**NATIONAL SPORT LAUNCH**

**May 26 – 30, 2017**

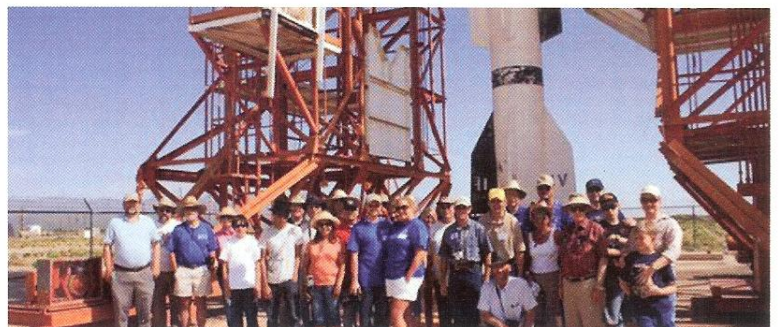
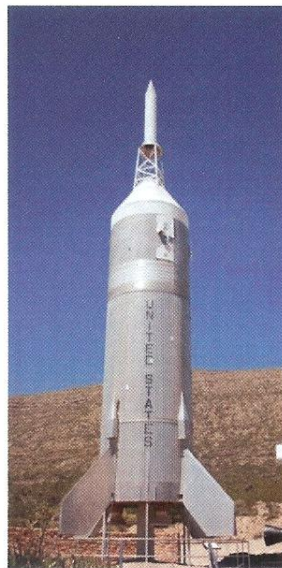
**Alamogordo / White Sands, NM**



**WHERE WIDE OPEN SPACE  
MEETS OUTER SPACE**

- **Three-day Launch with Waiver to 12,500 ft AGL**
  - Desert launch site with permanent range facilities
  - Up to single N motor or complex M total impulse
  - Short drive to hotels, restaurants, and space museum
- **Special Tours of local space & rocket history sites**
  - The Sunspot Solar Observatory – at 9200 ft in the Sacramento Mountains
  - New Mexico Space History Museum Warehouse – Delta Clipper, Redstone missile
  - Holloman Air Force Base – High Speed Test Track, Mach 8.6 land speed record
  - White Sands Missile Range – V2 gantry special tour, museum, and missile park
- **Fun & Challenging rocketry events**
  - Sierra Blanca Challenge – cumulative altitude to 12,003 ft without going over
  - Centennial Challenge – 100" length max, 100 N-s max, any motor combo, longest duration
  - Upscale Contest – mid-power and high-power, any non-scale rocket kit upscale
  - NAR Competition Record Trials – NAR Sporting Code official record attempts

<http://www.nar.org/site/ns12017/>



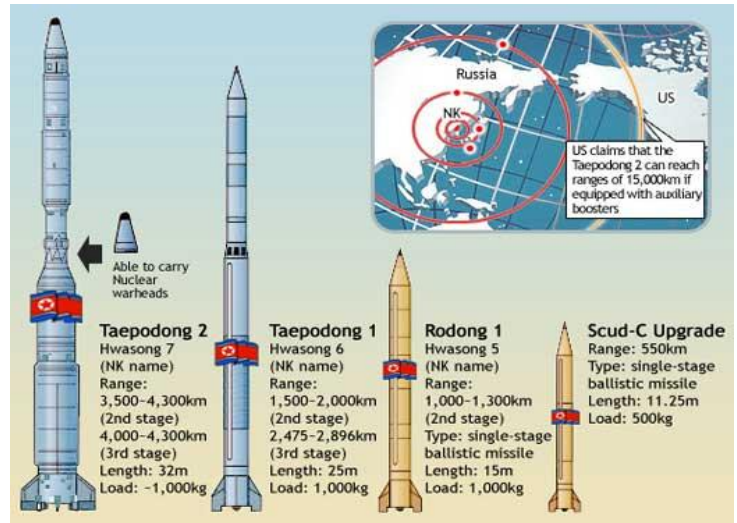
**Hosted by FLARE & SMRA**





Just what do you mean by...?

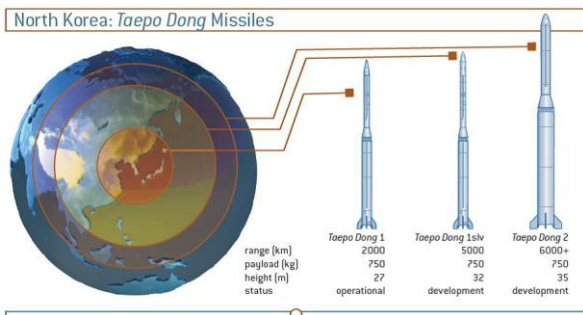
# "NORTH KOREAN FAT BOY"



## Kim Jun Un

OR

## Taepo Dong - 2



The Taepo-dong-2 (TD-2) is said to be a two or three stage missile with a range estimated at approximately 3,650-3,750 km with a 700-1,000 kg payload. Other sources credit the TD-2/NKSL-X-2\*\* with a range in excess of 4,000-4,300 km. North Korea has given various names to the Taep'o-dong missile, such as No-dong-3, Hwasong (Mars)-2 and Moksong (Jupiter)-2 and of course, the Ttungbo Sonyeon (Fat Boy)-2 [동보 소년-2].

Kim Jun Un, on the other hand, is currently one of numerous North Korean Dictators.

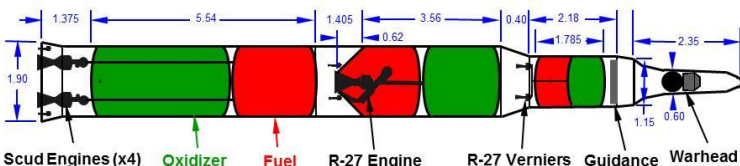
According to Kim Kil Son, who stated that in 1987 (prior to his defection) Kim Jong Il gave on the spot guidance to the Number 2 Research Center saying that "If we can develop this we have nothing to fear. Even the American Bastards won't be able to

bother us. Whether we live or die, we must quickly develop the Ttungbo Sonyeon."



Estimated KN-US Internal Configuration

As of late 1999, no flight test of this missile had been reported although these missiles have been observed on display in North Korea. (As with many other such activities in North Korea, apparently much of the work on North Korea missiles is done underground.) This is also reportedly the case in Iran. All of these North Korean engines are using highly corrosive and highly toxic so called storable propellants. These engines can only undergo one test firing before they have to be torn down cleaned out and reassembled for further firings, installation on launch vehicles for a flight test, or missile deployment. This



© 2015 John Schilling/38 North

require 10-15 years to develop an ICBM capable of delivering a chemical, biological, or nuclear warhead.



# Navy Builds Ramjet Missile with Model Rocket Engines and a Credit Card

The result is propulsion for a long-range deep strike missile, developed in six months.



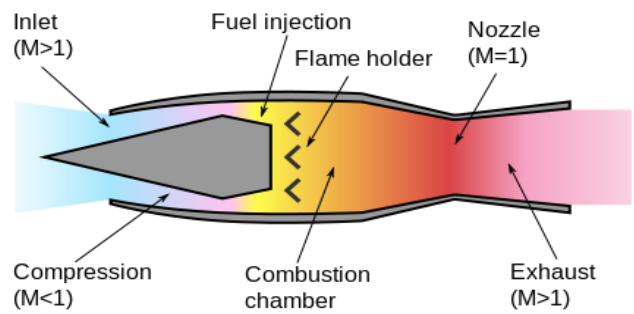
By [Kyle Mizokami](#)

U.S. Navy engineers at the Naval Air Warfare Center Weapons Division recently designed and flew a prototype ramjet missile in just six months. The engineers not only met their deadline, they flew the missile using off-the-shelf equipment, items so inexpensive they were paid for with a credit card. The result is a missile that could join the fleet in 3-4 years.

The United States military is currently in the midst of a major strategic shift. The post 9/11 era has seen the armed services concentrate on fighting insurgencies and anti-terrorism operations. While American involvement in such conflicts will persist for the foreseeable future like it or not, the U.S. must also contend with an increasingly aggressive Russia and China. Deterring conflict with such "near peer" competitors will require smart, fast, highly responsive weapons capable of striking targets at great distances.

One important technology for this goal is ramjet propulsion. First conceived 90 years ago, ramjet propulsion involves using a missile's forward motion to push air into its engine. This pushes oxygen into the combustion chamber where, mixed with fuel, it provides thrust. In theory, this is a simpler technology than the traditional use of a compressor to shovel air into the engine, and can propel objects at speeds of up to Mach 6. In addition to being faster, ramjets can travel three times as far on the same amount of fuel as a standard rocket motor. The result is a missile that gives enemy air defenses less time to react and flies farther than conventional missiles.

The downside to ramjet propulsion is that needs to be fed air in order to work so aircraft or missiles can't use it to take off from a complete stop. Instead, the object being propelled needs a booster, like a rocket motor, to quickly accelerate it to speeds where the ramjet is receiving enough air to take over.



Engineers at the Naval Air Warfare Center Weapons Division in China Lake, California were recently challenged to design and fly a ramjet missile engine in six months. This is a lightning-fast timetable in a world where it takes 20 years to develop a fighter plane. Still, the team was able to get the job done by staying small, buying cheap, and testing often.

Matt Walker, head of the Airbreathing Propulsion Section at NAWCWD, told *Naval Aviation News*, "If you have a small team, you can just get together and draw on a whiteboard on the fly and not have to worry about getting the large team involved and buy-in from everyone." This also meant keeping defense contractors, which tend to move slowly and conservatively and with an eye for profit, out of the design process.

The '60s Talos surface to air missile was an early ramjet design.



The team needed to find a rocket capable of boosting the ramjet. Instead of developing one on their own, they used a model

rocket engine that cost \$900. They were even able to buy the parts with a credit card, avoiding the time-consuming defense acquisition process. The ability to simply order an and have it delivered instead of starting up a rocket motor factory made the process even faster, and the low, low cost meant they could afford to test often.

The team also assumed from the outset that their designs would fail, a lot. But it also knew it would learn from each failure and could quickly incorporate lessons learned. By the third launch, they had a working scramjet missile propulsion unit.

The team is continuing to work on their missile project, refining the design to make it more practical. Instead of having the rocket as a booster stage that falls off after acceleration is complete, the team is making the rocket and ramjet share a single body that shares the combustion chamber. The team also believes they could have a working missile for the fleet in 3-4 years.



# Which Astronaut Are YOU?



Here's a great little game to play that I found on one of the rocketry lists. If you were actually one of the astronauts of the past – Who would you be? Well, I took the 29 question multiple choice data entry “quiz” – and I answered quite truthfully, not trying to guess my way to Neil Armstrong or John Glenn. Just like a paternity test, the results are in and I was actually surprised at the results! Never expected this one, but your Newsletter Lackey could have been....

**Dr. Bob...**

**You could have been:**

## Yuri Gagarin

This Russian astronaut was as crazy as he was brave. He was the first human to go to space. Upon re-entry, his capsule malfunctioned and, despite experiencing G forces seven times what should have knocked him unconscious, he was able to stabilize his plummeting capsule

and then parachute to safety and even crack a joke when some farmers found him upon landing. Not often do you find people who can keep that kind of a sense of humor!

Have some fun! Go to the URL below, enter your info and see which Astronaut you could have been! Be sure to get back to me, let's find out what kind of Astronauts our readers are!

<http://www.quizony.com/which-former-astronaut-could-you-have-been/index.html>



Matt Steele reports: For the Space Symposium, my friend Dave Meyers delivered a new display model for Orbital ATK.

This is Orbital ATK's NGL - Next Generation Launch vehicle. Likely another one for Fantasy Scale, but it is cool!

Dave and I worked together at Estes. He is the designer of the Sweet V, Condor ARV, and all the Cox control line models, as well as others. As you can tell, he is an exquisite modeler.

Dave uses a band saw to cut the foam on the large models, and a laser to cut intricate nesting's for desk top models. The payload fairing is 8.5" in diameter, the main body 6" and the strap ons are 2.5" in diameter.

Those are GEM-60s as the strap-on motors. GEM-40s are out of production. The GEM-60s are currently flown on Delta IV.



**Orbital ATK NGL, its HUGE!**

## Parting Shots - (or) - "Whasuup" in Space?

### Uggghhh Astronauts of the Future Will Feast on Calorific Bars



NASA food bars for Orion

If you thought Thanksgiving leftovers were bad, spare a thought for astronauts of the future. NASA has whipped up a calorie-laden bar that astronauts may be forced to nosh on during future deep space missions - and it looks downright gag-worthy. At the

International Space Station, astronauts have 200 meal options to choose from, bringing plenty of variety into their space diets. But feeding a crew on deep space missions, such as to Mars, presents a unique challenge for NASA. Astronauts will be traveling inside NASA's Orion spacecraft. Since they won't be able to receive additional cargo deliveries or dispose of trash, they'll have to take only what they can carry. That means a calorie-laden breakfast bar may be the perfect choice for saving room. "When you have 700 to 900 calories of something, it's going to have some mass regardless of what shape it's in, so we've taken a look at how to get some mass savings by reducing how we're packaging and stowing what the crew would eat for breakfast for early Orion flights with crew," Jessica Vos, deputy health and medical technical authority for Orion said in a statement.

"When you think about multi-week missions in Orion, having just one package for breakfast items for crew will help us limit the space we need to store them," she said. The bars are currently a work in progress and NASA is working on getting the taste just right since the space agency knows food choice can be a big influence when it comes to morale. The food bars have been taste tested by humans inside HERA, a three-story habitat at Johnson Space Center where NASA is exploring the impact long term isolation, such as a trip to Mars, would have on humans. So far, NASA said they've received feedback on the "flavor, texture and long-term acceptability of the bars that food scientists are using to hone the range of options available." Aside from the bars, NASA is also exploring ways for astronauts to grow part of their food supply on long-haul missions. During his year in space, Scott Kelly tended to a space garden and even had a chance to dine on "Outredgeous" red romaine lettuce that he grew in space. NASA's first Orion test mission with crew is set for 2021.

## The Launch Rack

LAC Newsletter Award Recipient-2016

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*OMG, Did you read that trash in the last issue? You didn't believe any of it - did you? As the disclaimer said, there wasn't a shred of truth in the entire issue. Well pardon the Editors folks, that was the whole idea... Look at it this way, we promise 6 issues a year. Consider April as a bonus. And if you weren't singled out for ridicule this year - there's always the next!!!*

The Launch Rack is the official publication of the Garden State Spacemodeling Society and is published for the enlightenment and entertainment of the membership. It is published bi-monthly (or more frequently) and is read by the NAR President AND the LAC Newsletter Award Committee - so you're in good company!. (So Far!!!)

You are invited to send your articles, photos, letters, valuables and hard earned cash to the editor for his enlightenment, entertainment, and eventual publication. This periodical is by and for the membership.

Articles appearing here may be used by others provided credit is given to the author and this newsletter.

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*This Box NOT Checked...*

**You're Good!**

**So this is Not your last Issue**

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