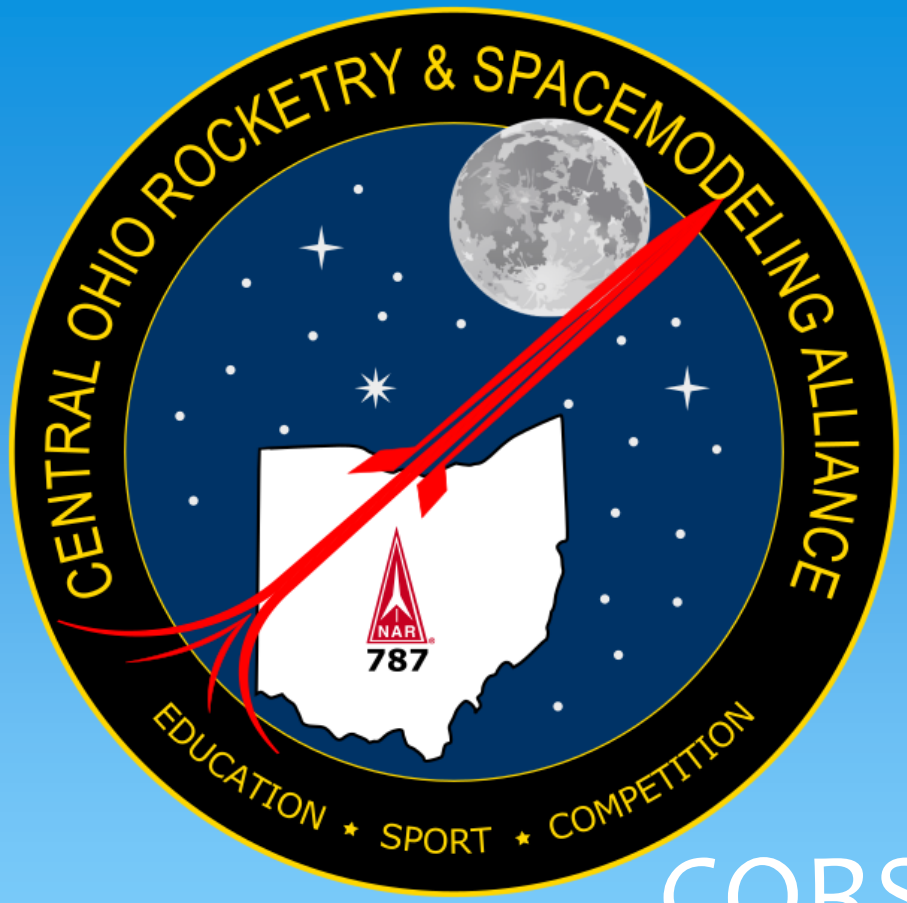


CORSA 2016 February Meeting

Welcome

* Introductions
* Our new Otterbein Alliance - Special thanks to Dr. David Robertson & Dr. Arron Reinhard
* Officers
* Site Updates LPR/MPR & HPR
* Hidden gems of the NAR web site

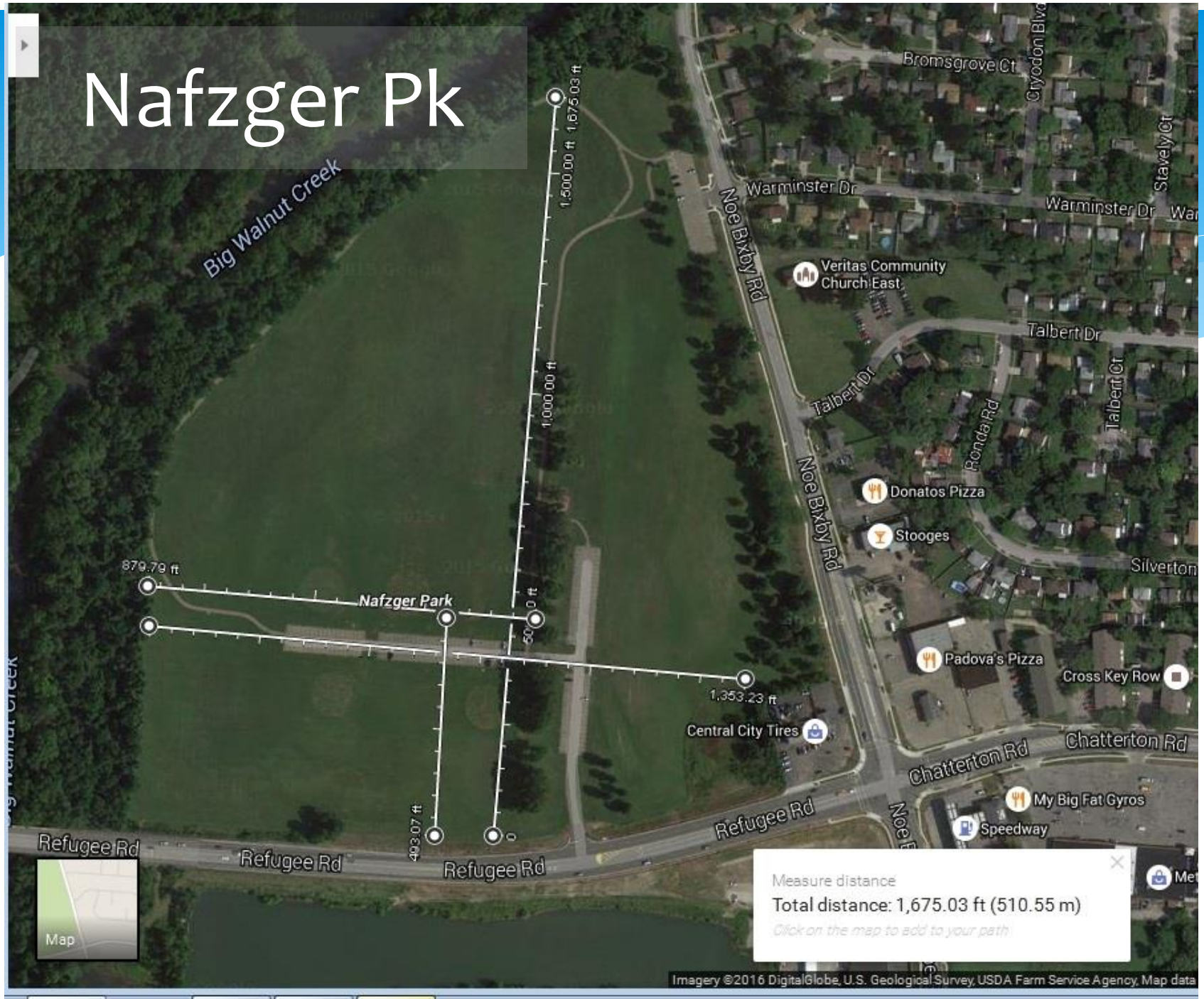
Officers

* Director – Lloyd Newman
* Deputy Director – Joe Posey
* Recording / Financial Officer – Ed Hingsbergen
* Senior Advisor – Paul Demus

LPR/MPR Sites

* Objective 1,000’ x 1,000’ to support TARC teams
* 3 sites identified as potentials
* All sites are in Franklin County
* We can use as many sites as we can find. Keep looking

Nafzger Pk


Big Walnut Creek
Bromsgrove Ct
Cryodon Blvd
Stavely Ct
Warminster Dr
Warminster Dr
Noe Bixby Rd
Veritas Community Church East
Talbert Dr
Talbert Dr
Ronda Rd
Talbert Ct
Noe Bixby Rd
Donatos Pizza
Stooges
Silverton
1,675.03 ft
1,500.00 ft
1,000.00 ft
879.79 ft
Nafzger Park
1,353.23 ft
Padova's Pizza
Cross Key Row
Central City Tires
Chatterton Rd
Chatterton Rd
My Big Fat Gyros
Speedway
Refugee Rd
Refugee Rd
Refugee Rd
Refugee Rd
Map
Measure distance
Total distance: 1,675.03 ft (510.55 m)
Click on the map to add to your path
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Hilliard Bradley HS
Sign in
512.33 ft
1,072.20 ft
817.23 ft
148
27
Hilliard Bradley
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Walker Rd
Map
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3D Earth view is not available
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Send feedback
200 ft

Prairie Township

HPR Sites

* 7 sites identified as potentials
* 4 in Delaware County
* 3 in Licking County
* All of the sites have had a drive by site inspection
* The best field in each county has been identified
* Contact with property owner is next

Hidden Gems of the NAR web site

* Logging in
* Updating User Information
* Member only access to R&D reports
* Increase your safety knowledge
* TARC
* NARTREK
* Competition

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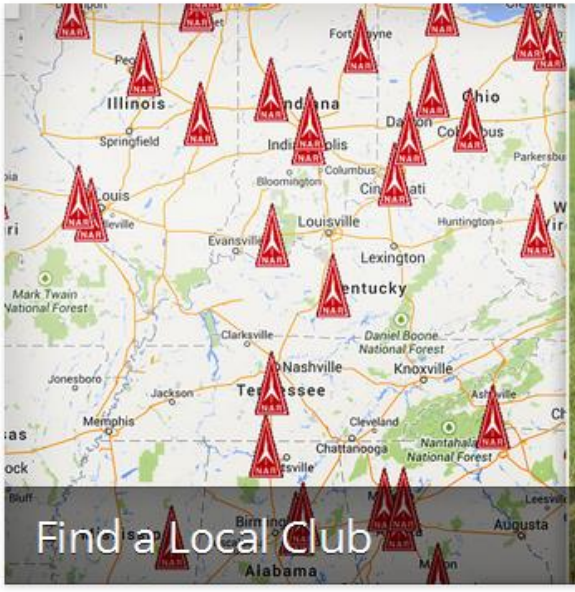

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TSO	
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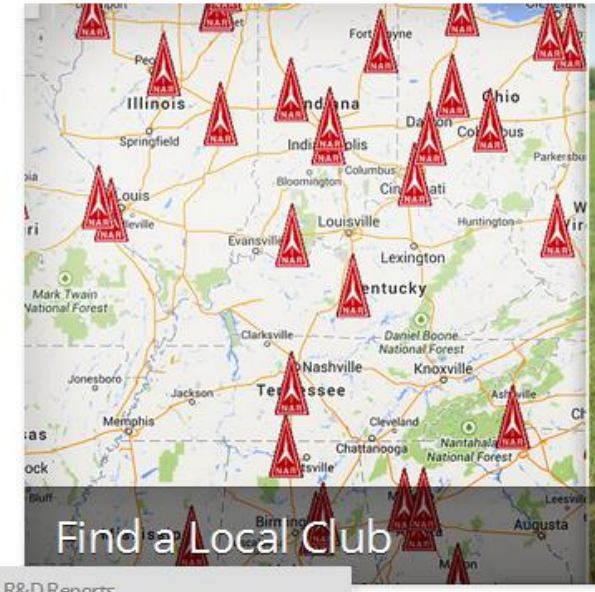

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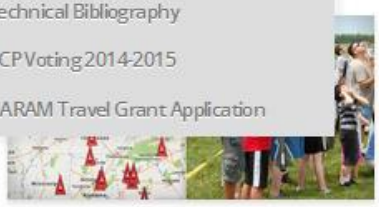

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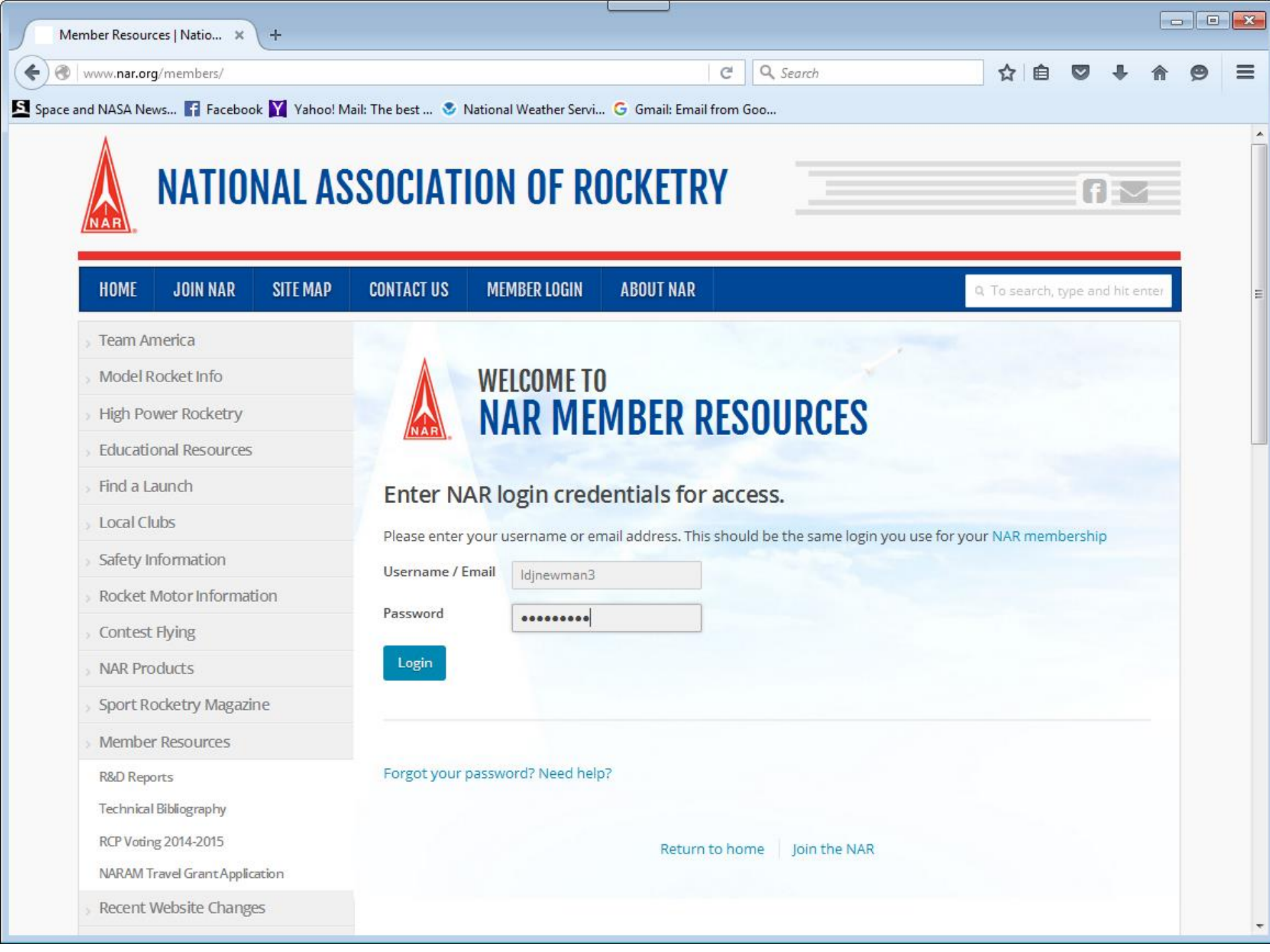
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Other Reports

Journal of the MIT Rocket Society, November 1972

Journal of the MIT Rocket Society, January 1974

Journal of the MIT Rocket Society, August 1974

Journal of the MIT Rocket Society, January 1975

Journal of the MIT Rocket Society, July 1976

The Pulse RC Journal of the MIT Rocket Society, March 1977

Journal of the MIT Rocket Society, April 1980

Analysis of Freon-12 Rocket Engine (T.Fetter, MITCON, 1970)

Design & Construction of a Wind Tunnel (B.Braufmann, MITCON, 1982)

Effect of Base Fairings on Engine Thrust (B.Parks, R&D, 1986)

MITCON Proceedings, 1971

MITCON Proceedings, January 1972

MITCON Proceedings, 1973

MITCON Proceedings, 1974

MITCON Proceedings, 1975

NARAM-19 and Prior Reports

Rear-Engine Boost-Glider Research, (Gordon Mandell, NARAM 5 R&D, 1963)

Basic Missile Aerodynamic Stability, (Luther Gurkin, NARAM 6 R&D, 1964)

Front-Engine Boost-Glider Research, (Gordon Mandell, NARAM 6 R&D, 1964)

Flexwing Boost-Glider Research, (Gordon Mandell, NARAM 7 R&D, 1965)

Theoretical Prediction of Center of Pressure (Jim & Judy Barrowman, NARAM 8 R&D, 1966) extended edition with many updates courtesy of the Barrowmans

Black Powder Engines in Tandem (D.Frost, NARAM 12 R&D, 1970)

Assumed Mode Flutter Analysis of Glider Wings (M.Micci, NARAM 17 R&D, 1975)

Internal Ballistics of Estes C6 Motor (T.Barber, NARAM 13 R&D, 1971)

Dynamics of the Closed-Breech Launcher (T.Barber, NARAM 14 R&D, 1972)

Pressure & Temperature Dependent Properties of BP Propellant (T.Barber, NARAM 15 R&D, 1973)

Investigation of the Physics of the Zero Volume Piston Launcher (G. Landis, NARAM XX R&D, 1975) Part 1 & Part 2

Tandem Model Rocket Engines (T.Barber, NARAM 17 R&D, 1975)

Effect of Shock & Temperature Cycling on D12 Failure (C.Flanigan, NARAM 18 R&D, 1976)

Streamer Duration Configuration Optimization (T.Barber, NARAM 19 R&D, 1977)

Total Impulse Test Stand (A.Celetti & R.Lawson, NARAM XX, XXXX)

The Effect of Shock and Temperature Cycling on the Failure Rate of D12 Engines, (Chris Flanigan, NARAM 18, 1976)

Development of Liquid Thrust Augmenation System (L.Audin, NARAM XX, XXXX)

NARAM-20 through NARAM-25

Effects of Shock, Humidity & Temperature on D12 Failure, (Fred Shecter & John Langford, NARAM 20 R&D, 1978)

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Effects of Shock, Humidity & Temperature on D12 Failure, (Fred Shecter & John Langford, NARAM 20 R&D, 1978)

Boost Glider Vertical Flight Analysis (G.Landis, NARAM 24 R&D, 1982)

Boost-Glider Sling Pod (A.Rose, NARAM 23, 1981)

Design Optimization of Free Rockets (A.Jones, NARAM 22, 1980)

Development & Testing of Improved Helo Model (A.Rose, NARAM 25, 1983)

Development of a Two-Axis Open Sight Optical Tracker (T.Barber, NARAM 20 R&D, 1978)

Effect of Glider Turbulation on Max Altitude (M.Bundick, NARAM 23, 1981)

Ignition Dependent Behavior of Rocket Engines (T. Barber, NARAM 20, 1978)

Investigation of the Fall of a Ping-Pong Ball (G.Gregorek, NARAM 24, 1982)

Minimum-Error Data Reduction Method (G.Landis, NARAM 23 R&D, 1981)

Quartic Method of Applying Barrowman CP (G.Crowell, NARAM 21, 1979)

Rotational Motions in Rocket Flight Dynamics (C.Phillips, NARAM 21, 1979)

Rotor Twist on Rotaroc Models (Team Zunofark, NARAM 25, 1983)

Streamer Duration (C.Sykos, NARAM 22, 1980)

NARAM-26

Effect of Extreme Cold on BP Motors (R.Gaff, NARAM 26, 1984)

Liftoff Velocities of Piston Launchers (M.Steele & G.Gassaway, NARAM 26, 1984)

Streamer Folding Techniques (B.Kaplow & A.Jones, NARAM 26, 1984)

NARAM-28

Chapter 5

EFFECT OF EXTREME COLD ON MODEL ROCKET MOTORS (GAFF)

Author:

Ric Gaff
331 3rd St.
Northfield, IL 60093

Entered in Research and Development competition
at NARAM-26, August 16, 1984.

ABSTRACT

In 1980 the MIT Rocket Society published results of Fred Shecter's work concerning failure modes in D12 motors. His work with cold cycling of motors was especially interesting since winters in the Midwest tend to be quite cold. Shecter found that cold seemed to have little effect on the failure rate of D12's. Since motors are often exposed to extreme cold during shipping and storage, I decided to run some tests under more extreme conditions to check Shecter's results.

Two dozen B6-4's bought from a local hobby store were frozen at -45 C. and static tested in two batches. The first batch was fired while still cold, the second after having warmed to the local ambient temperature. Of the first group of motors, fired while still frozen, 10 failed catastrophically. Two had split casings and 8 suffered blow-throughs, while two operated normally. Motors of the second group (allowed to return to ambient temperature) all operated normally.

These results tend to support Shecter's data concerning the effects of low temperatures on model rocket motors. Only when fired cold is a motor likely to fail catastrophically. A thawed-out motor appears to suffer little chance of failure.

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AmSpam: American Spacemodeling magazine
HMR: The Handbook of Model Rocketry, G. Harry Stine
HPR: High Power Rocketry magazine
MITJ: Journal of the MIT Rocket Society
MR: The Model Rocketeer magazine
MRM: Model Rocketry Magazine
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SR: Sport Rocketry magazine
TAMR: Topics in Advanced Model Rocketry, by Caporaso, Mandell, & Bengen
XR: Extreme Rocketry magazine

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Wind Tunnel Testing of Various Camber Lines Using a Multiply-Flapped Airfoil, Guppy Youngren, MITJ Jan 75, 25p.
Wind Tunnel Testing of Boost Glider Airfoils, Guppy Youngren, MITJ Jan 74, 5p.
Wind Tunnel Testing of Thin Flapped Airfoils, Guppy Youngren, MITCON Proceedings 71, 2p.
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In 1957, the first professionally-manufactured rocket motor was designed and produced for general consumer use. Made from safe materials and propellants, it freed the rocket enthusiast from the dangerous business of engine construction and allowed him to concentrate on mastering general disciplines such as aerodynamics, stability, construction, and payload operation. Coupled with a Safety Code containing basic rules for range operations and flight procedures, a safe, educational and fun hobby was born.

Since those early days of 1957, over 500 million model rockets have been launched, and our simple Safety Code procedures have almost totally eliminated accidents and injuries. The safety of the hobby has been summarized by the NAR in a one page document and also in a thoroughly-documented booklet written by the hobby's founder G. Harry Stine that you can use with public safety officials, schools and others who wonder if our activity is safe. It is!

The NAR Promotes Rocketry Safety Codes

The hobby's excellent safety record is solidly rooted in a successful Safety Code program. The NAR Safety Codes are made up of about a dozen simple, common-sense rules and guidelines, and are included with every kit, engine, and catalog sold in the US. General sport rocketry is distinct from "amateur rocketry," which is generally recognized as anything involving design and manufacture of non-commercial motors and propellants, or rockets whose construction is not in conformance with the NAR Safety Codes.

The NAR created and maintains three Rocket Safety Codes:

Radio Control Rocket Glider Safety Code
Standards and Testing Committee
Insurance Questions
Report a Malfunctioning Engine
Rocket Motor Information
Contest Flying
NAR Products
Sport Rocketry Magazine
Member Resources
Recent Website Changes

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The NAR created and maintains three Rocket Safety Codes:

The Model Rocket Safety Code
The High Power Rocket Safety Code
The Radio Control Rocket Glider Safety Code

Each code was developed with input from sport rocket flyers, industry experts, professional engineers, scientists and public safety officials. In many cases, extensive experimental testing and analysis was done to enhance previous code versions. The NAR constantly reviews its Safety Codes for adjustment due to changes in technology and public policy. In 2005 the NAR did a comprehensive study of rocket range safety and produced a detailed analysis of the causes and corrections for safety issues. The report from this study became the basis for significant updates to the NAR High Power Safety Code. The study's recommendations on "best practices" for setting up and running a range safely have been summarized in a training briefing for use by NAR groups and in an article describing best practices to use in setting up and running a safe rocket range.

The NAR Works With Safety Officials

The NAR maintains active voting representation on the Committee on Pyrotechnics of the National Fire Protection Association (NFPA). The NFPA's 65,000 members include public safety officials, government regulators and industry specialists. Together, they work to provide federal, state and local officials with model codes for insuring public safety. The NAR is a proud member of this organization.

The NAR Conducts Rocket Motor Testing

The NAR has over 45 years of experience testing and certifying rocket motors to performance standards developed and promoted with the NFPA. We can provide you a complete list of NAR Certified Rocket Motors, tested by NAR to

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HIGH POWER ROCKET CERTIFICATION

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The NAR Provides Liability Insurance Coverage

Today, that perfect local launch field is likely to belong to a school system, park department, or private landowner who insists on being covered by insurance before allowing you to fly. While we're proud of our safety record, it helps to know that NAR members are covered by $5 million worth of personal liability insurance to give that site owner added peace of mind! In addition, NAR Sections can purchase separate insurance to cover the site owner separately!

The NAR Trains Safety Officers

NAR Trained Safety Officer education is a self-paced program intended to educate high-power-certified (Levels 1, 2, and 3) NAR members by exposing them, with guidelines and mentors, to "real world" situations. Participants in this program will be required to complete rocket check-in and range safety officer tasks on an operating high power range. To participate in this training program, you can download the Safety Officer Training Program Manual.

NATIONAL ASSOCIATION OF ROCKETRY

TRAINED SAFETY OFFICER PROGRAM

PDF of the Trained Safety Officer Program

Introduction (2012 Revision):

It has been over a decade since the NAR's Trained Safety Officer (TSO) program was last revised. NAR policies, regulations, and technologies have changed during that period. This revision updates the safety officer guidelines to reflect those changes.

Model rocketry was created in the late 1950's as a means by which non-professional individuals could build and fly their own rocket powered models. The hobby was structured to safely pursue an activity that has a potential for personal injury and property damage. The use of manufactured motors to minimize the mixing and handling of propellants was a major factor in model rocketry's safety success. Safety procedures for the construction and operation of the models, based on aerospace industry practices, were another factor in this excellent safety record.

Hobby maturity and technology advancements permitted the use of more powerful motors and more sophisticated models. High power rocketry describes the step beyond model rocketry. Safety procedures for high power rocketry evolved from model rocketry. This document augments those safety procedures with practical guidance for individuals experienced in model rocketry and familiar with high power rocketry. The intent of this guidance is to assist individuals in performing safety officer functions on a high power rocket range. This guidance is based on experience, regulatory documents (e.g. FAA FAR Part 101), and codified practices (e.g. NFPA 1127). Note that regulatory or codified practices shall supercede guidance in this document if conflicts occur.

The primary safety officers are the Range Safety Officer (RSO) and the safety check-in officer. The RSO is responsible for safe operation of the rocketry range. The RSO shall have the final authority to approve the launch of a model. The

NATIONAL ASSOCIATION OF ROCKETRY

SAFETY INFORMATION

A Safe Activity? Absolutely!!

anufactured rocket motor was designed and produced for general consumer use. opellants, it freed the rocket enthusiast from the dangerous business of engine concentrate on mastering general disciplines such as aerodynamics, stability, ion. Coupled with a Safety Code containing basic rules for range operations and nal and fun hobby was born.

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The NAR created and maintains three Rocket Safety Codes:

EDUCATIONAL RESOURCES

RESOURCES FOR TEACHERS AND YOUTH GROUP LEADERS

Free Resource Downloads – You are welcome to take advantage of our field experience in educational rocketry by using the set of free online resources listed provided below. Our guides are produced by members who have helped teachers and youth group leaders like yourself all over the United States, and are chock full of practical suggestions.

NAR Email Education Resources, Newsletter, and Resource Portal – Would you like to have a rocketry program at your school or know more about how to use rockets to teach math and science? Please take advantage of our field

Sport Rocketry Magazine
Member Resources
Recent Website Changes

Newsletter, and our free Rocketry Resource Portal You and your students will be "go for launch."

Adventures in Rocket Science Educator Guide – Produced by a partnership with NAR and NASA through the NASA Explorers Institute, this 166 page guide contains 25 progressive rocketry activities designed for 4-H Clubs, Boy and Girl Scouts, after-school programs, and other informal education venues. It can also be used in K-12 classrooms since all lessons meet national science standards and teach motion, velocity, and acceleration through inquiry and measurement. The material begins with elementary level activities with simple air launched straw rockets, moves into water bottle rockets and concludes with NAR model rockets and high school level exercises. This guidebook will prepare your students to form a rocket club or get them ready to enter TARC. [6MB PDF file]

NASA Rocketry Resources. NASA publishes a wide range of online reference resources on rocketry suitable for classroom and student use, ranging from basic rocket science theory to specific information on the basics of model rocketry. These are nicely inexed on a single page on the NASA Glenn Reserch Center educator website.

How to Build a Model Rocket.
NAR volunteers have produced 9 pages of excellent basic tutorial material on how to build a model rocket and a 45-minute instructional video for rocketeers of all ages on all the steps and techniques involved in building and flying a basic model rocket. This instructional video has been divided into six short segments of 4 to 9 minutes duration and posted online by the NAR's TARC partners, the Aerospace Industries Association on their YouTube site. The six segments are:
Part 1: How Model Rockets Work
Part 2: Components of a Rocket
Part 3: Construction
Part 4: Finishing the Rocket's Fins
Part 5: Assembling the Rocket
Part 6: Painting the Completed Rocket

Basic Rocketry Presentation. If you need a short presentation that explains what the hobby is all about, how rockets work, and who the NAR is, try "This is Rocketry", a 20-slide presentation developed by the NAR specifically for school audiences.

NAR Educator Rocketry Resources. The NAR created a CD-ROM filled with valuable and useful rocketry resources for teachers and youth group leaders. The CD is no longer available as a disc, but you can download and copy the contents online through the Rocketry Resource Portal at this link.

Robert L. Cannon Education Grants – The NAR offers support to teachers who use rocketry in their classrooms via our Robert L. Cannon Education Award program. You're eligible to apply for our grants if you're currently holding a

to contact me directly. – Ted Cochran, NAR President

Free Resources for Our Educator and Youth Group Leaders

- STEM School Curriculum Using Model Rocketry. A curriculum written by professional educator Tom Sarradet for middle and high school level classes that meets STEM educational objectives using rocketry, primarily through the process of designing and building a payload-carrying rocket for the Team America Rocketry Challenge. (PDF)
- Safety Overview – Explain rocketry safety issues to your parents or principal with our two page guide. (PDF)
- NAR Model Rocket Safety Code – The official code of rocket safety, used as reference by the National Fire Protection Association, in a PDF form for easy printing. (PDF)
- Rocket club development plan for 4H – How to start an Informal Education Rocket Program such as with 4-H or an afterschool club with this plan for progessive activities to grow your group.
- Scout/Youth Group Guide – Flying rockets as a class activity? You can't be without these hints and checklists to make your launch a success. (PDF)
- Science Fair Guide – Help your students prepare for a science fair with our five page manual, containing tips for organizing a project, presentation ideas and suggested projects. (PDF)
- Paper Tiger Rocket Plans – Need a low cost rocket your students can build? Try our a proven design originated by a middle school teacher. (GIF)
- Ultra Low Cost Launch System – Got rockets but need a low cost launch system? Ted Mahler's set of plans and instructions can put a fully functional launcher in each student's hands for about $5. (HTML)
- Educator's Brochure -A brochure about NAR rocketry explaining our education resources. You can call NAR HQ to order, or download from here. (PDF)
- Girl Scout Patch Program -Brownies to cadettes can earn a patch in Rocket Science 101.
- NAR Rocketry Basics – A 12-page tutorial on how rockets are put together, what makes them stable, how to build them, and how the motors work.

NAR Kids Fun Pages

Families have fun on the flying field, but what about the children that are too young to launch with the big kids? Do you ever have youngsters on the range that need a little something extra to keep them busy? Offer them the activities on these pages. They are rocket related games that they will enjoy on the field or in the classroom!

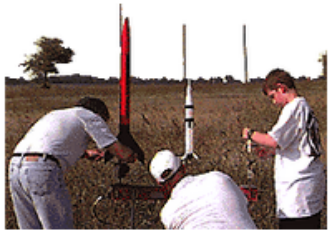
Rocketry Range Scavenger Hunt

Mars Rocket Maze

NARTREK SKILLS PROGRAM

Are you a rocketeer under age 18, member of the NAR or not? Check out our new NARTREK Cadet Program designed especially for you!

What is NARTREK?

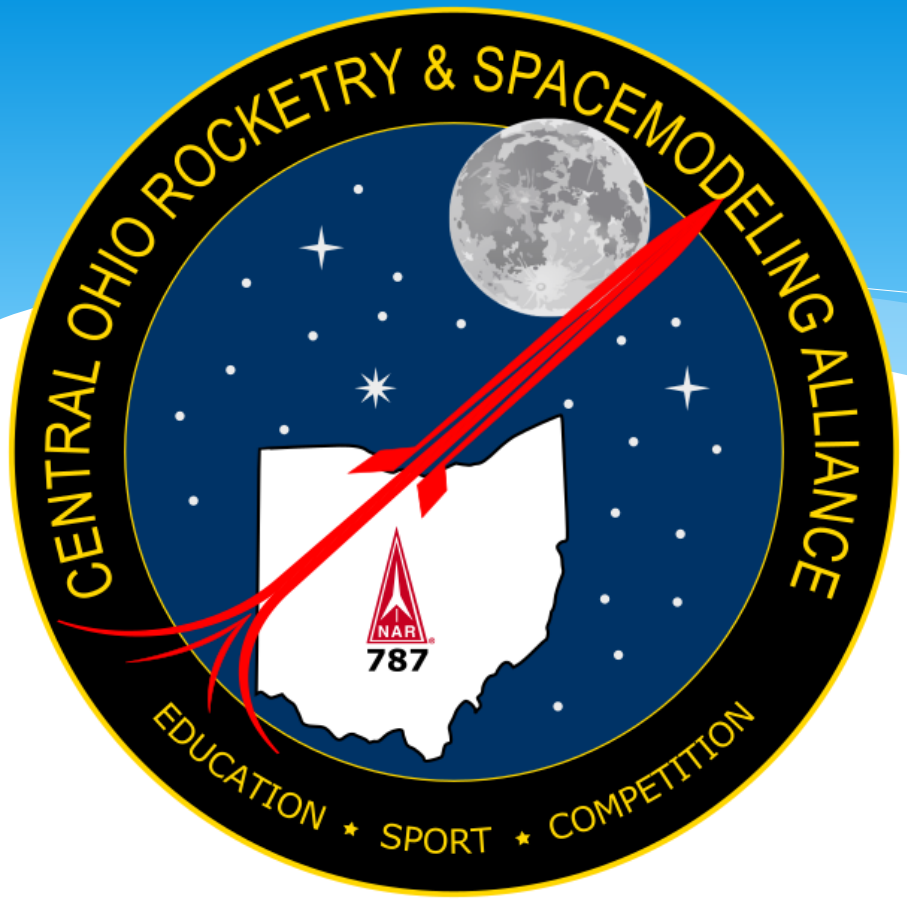


NARTREK stands for "National Association of Rocketry Training Rocketeers for Experience and Knowledge." It consists of a series of achievement levels in rocketry, each requiring more skill to complete than the previous one. As each level is finished, you receive an Achievement Certificate and a jacket patch certifying your accomplishment. You are under no time limit. You progress at your own pace.

- is a self-paced program designed to improve your knowledge and skill in rocketry step by step.
- is for all modelers — young and old!
- is a program for modelers working alone — as well as for modelers affiliated with NAR Sections.
- operates on the honor system.
- is administered from a central point by a staff of experienced volunteers who will work with you by mail to help solve your problems.
- uses commercially-available rocket kits whenever possible.
- uses existing publications and books available from NAR Technical Services, manufacturers, and other easily available sources.
- is designed to be low-cost to you. NAR makes no profit from the NARTREK program. You buy your own kits, motors, equipment, and publications.

NARTREK is a program designed for you, with patches and certificates for each achievement level and recognition of your progress in NAR publications. When you complete the entire NARTREK program, you will be capable of

See you next month!



* Next Meeting March 8th
* Web - centralohiorocketry.org
* Facebook – facebook.com/centralohiorocketry