

Introduction to NAR Competition  
NARCON 2004  
March 12-14  
UW-Parkside  
Kenosha, WI



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Alternate Title

Everything I needed to know about contest  
rockets I learned from my Estes Wizard.



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## What NAR Competition Is Not



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## What NAR Competition Is Not

It is not TARC. TARC is a problem solving, engineering/design, team type competition.

NAR Competition has some elements of that, but it is arguably more performance oriented.



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## What NAR Competition Is Not

It is not a single event, winner take all type of competition.

However, awards are given for single events and single flight performances.



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## What NAR Competition Is Not

It is not a competition where the entry that is the best design wins, or where the entry with the best craftsmanship wins, or where having the best strategy wins, or where having the most reliable entry wins, or having the best recovery team wins.

Instead, it is a complex relationship of all the above along with a little luck that results in a winning entry.



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## So, What is NAR Competition?

It is a performance based model rocketry competition that rewards contestants whose models fly higher, fly longer, exhibit better craftsmanship, or in other ways outperform other entries.



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## What is NAR Competition?

NAR Competition is age based.

- A Division 7 to 13
- B Division 14 to 18
- C Division 19 and above



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## What is NAR Competition?

NAR Competition is a series of local, area, and regional contests plus a national contest held each year.

National Championships are awarded each year in each age division as well as a section (club) champion.



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## Where are NAR Contests in Wisconsin?

WOOSH typically hosts two regional contests each year. One in the spring and one in the fall.

Other contests are held in Michigan, Minnesota, Illinois, Iowa, and Indiana.

Upcoming contest events are listed in the NAR *Model Rocketeer* newsletter, *Sport Rocketry* Magazine, and on the Internet at the NAR website, <http://www.nar.org>



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## What are the Contest Events?

- Altitude Events (my rocket went higher than yours)
- Duration Events (my rocket stayed up longer than yours)
- Craftsmanship Events (my rocket looks nicer than yours)
- Miscellaneous (my rocket did something else better than yours)



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## What are the Altitude Events?

- Altitude
- Cluster Altitude
- Eggloft Altitude, Dual Eggloft Altitude
- Payload Altitude (one ounce sand lofting)
- Super-Roc Altitude (a waste of perfectly good body tubes)
- Precision Altitude



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## What are the Duration Events?

- Streamer Duration
- Parachute Duration
- Eggloft Duration, Dual Eggloft Duration
- Boost/Glide
- Rocket/Glide
- Super-Roc Duration
- Helicopter Duration
- Precision Duration



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## What are the Craftsmanship Events?

- Sport Scale
- Scale
- Plastic Model Conversion



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## What are the Miscellaneous Events?

- Spot Landing
- Drag Race
- Research & Development

## Why Fly In NAR Competition?



# Why Fly In NAR Competition?

For Money or Financial Gain?



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# Why Fly In NAR Competition?

For the Fame?



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## Why Fly In NAR Competition?

For other rewards?



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## Why Fly In NAR Competition?

To win a cool looking trophy?



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## Why Fly In NAR Competition?

Most people fly NAR Competition because it is a fun activity to do with rockets. It increases your craftsmanship skills and is a unique combination of design, construction, strategy and rockets.

Most competitors are really nice people to get to know. You will establish friendships that will last your entire life.

To quote NAR President Mark Bundick, “because it’s neat.”



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## How Do I Get Started?

Start with the 3FAANC (Three fins and a nose cone) events:

- Streamer
- Parachute
- Spot Landing
- Altitude
- Precision Duration & Precision Altitude



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## How Do I Get Started?

If you can build an Estes Wizard, you can build a competitive streamer and parachute duration model rocket.



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## B Parachute Model versus Estes Wizard

Same: Both have three balsa fins, a plastic nose cone, and a piece of 18mm body tube.

Different: 48" external Kevlar Shock Cord, 24 - 30 inch plastic chute, possibly no launch lug.

Take away: Except for the shock cord and chute, there is *no* difference between a Wizard and the B Parachute Models that took first place in A and B Divisions at last year's National Meet.



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## Generic 3FAANC Designs

Body Tube Length - 6-9" for 13mm, 8-11" for 18mm.

Fins - Duration

Clipped Delta - Root chord = 2x body diameter

Tip chord = body diameter

Span = 2x body diameter

1/32" or 1/16" balsa for 1/4A - A

3/32" balsa for B, C

- Altitude

Clipped Delta or Eliptical 15 or 20 mil G10



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## Generic 3FAANC Designs

Chute Material - Thin plastic (1/4 mil drop cloth), mylar

Chute Size - 12" to 21" for 13mm, 18" to 30" for 18 mm

Streamer Material - Micafilm (ask hobby store to order or order from Tower Hobbies), Happy Birthday streamer

Streamer Sizes - 4" x 40" for 13mm, 6 x 60" for 18mm, larger sizes after experience grows.



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## Streamer and Parachute Common Problems/Solutions

### Separations -

- Use external Kevlar, 3 to 4 times body tube length
- Use lariat loop
- Good streamer attachment

### Parachute Wads -

- Use Powder Bag
- Fold with Z folds
- Use smaller chutes until reliable deployment achieved
- Correct amount of wadding



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## Eggloft Event Strategies

Egglofter Types -

“Egg on a stick” - 3FAAEC (three fins and an Egg Capsule)

Shrouded Type - ASP “Eggstravaganza”

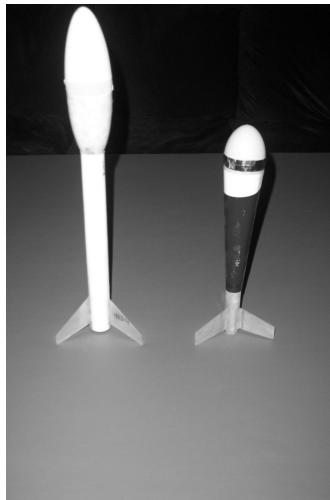
Shrouded types good for duration - room for larger chute

Egg on a stick type is good for altitude - less weight and drag  
however, 18mm size leaves little room for recovery system



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## Typical Egglofters



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## Eggloft Event Strategies

Egg Capsules - Use CMR type from Pratt Hobbies or ASP or Custom Elite (Apogee Nova Egg Cone) to start. Migrate to "Easter Egg" Type.

Shock Cord -

2' to 3' section of Kevlar (150/200 pound for single,  
250/300 pound for dual)

2' section of round or 1/4" wide elastic

Parachute - heavy plastic (1/2 mil, Estes chute) with shroud lines over the top for eggloft altitude, multi-line for duration



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## Eggloft Event Strategies

Egglofters are a variation on 3FAANC. Easy to build. Recovery is the main challenge. Need good long shock cord. Chute needs to be packed well with lots of powder for easy opening.

Egglofters weathercock into the wind. Angle rod away from the wind to keep going straight.

Good guidance is important. Use 3/16" rod, pop-lug or tail cone. Start with fixed lugs, for top lug use a wire loop.



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## Eggloft Event Strategies

Eggstraveganza kit from ASP is a good competitive egglofter.



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## 3 FAANC Altitude Events

Competitive altitude models are 3FAANC models.

Fins need to be as small as possible, smooth, and straight.

“Waferglass” (G10 material) is popular

Use fin jig to insure fins are straight

Shock cords are internal

No launch lug

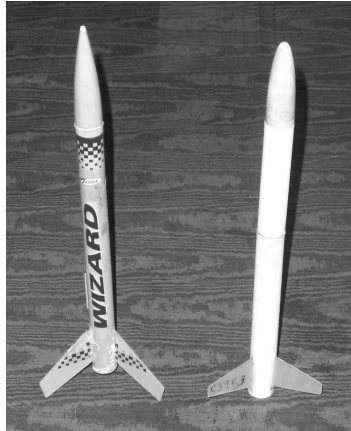
Smooth and aerodynamic as possible



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### 3 FAANC Altitude Events

Payload models are a simple variation of a standard 3FAANC entry. A 19 mm tube with a payload section for B and C engine classes (most common type). Parachute required for recovery.



### 3 FAANC - SuperRoc

Super-Roc is an event where your score is determined as follows:

Duration - length (cm) x duration (sec)

Altitude - length (cm) x altitude (m)

Rockets for this event are 3FAANC with more body tubes.

## SuperRoc Problems/Solutions

Structural failure, crimping - Sometimes a less than maximum length rocket is best. Especially in windy weather. Use longer tubes to reduce number of couplers (Totally Tubular, BMS, ASP). Reinforce tubing or thicker tubing.

Separations - Use a longer shock cord.



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## Altitude Events - Other issues

At most NAR contests altitude event rockets are tracked to ejection. "Tracking Powder" is used to assist the trackers in locating the model in the sky. If the trackers don't see it, you can't win. Use red or pink chalk powder. Fill a 1 to 2 inch length of the body tube. Some competitors pour it into a wadding "cup".

Winning flights have one thing in common. The flight path is near vertical. Adjust launcher to point *with* the wind to minimize weathercocking. Wait for a calm to launch. Wait for good tracking skies.



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## Non 3FAANC Events

At most contests, there will be a helicopter, boost/glide or rocket/glide event. Some will have two of them or all three. For beginners, simple straightforward models are good to serve as trainers. For boost/glide, the Edmunds Deltee is a popular first glider kit. QCR also makes some good glider kits although the instructions may be difficult to follow for beginners. For these events, test flying is essential. Start with one basic plan or design and work with it until you have consistent flights.

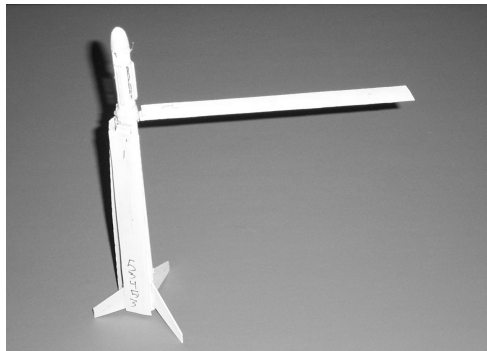
Watch at area competitions for those whose gliders are good performers and ask those competitors about their designs. Ask them to show you their models. Also ask them to examine your glider or HD model and solicit advice. Most BTCs will be happy to share what they know.



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## Helicopter Duration

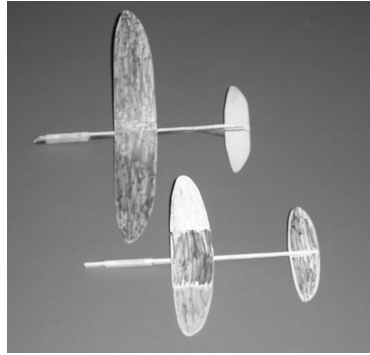
This is almost a 3FAANC event. It starts out that way, then rotors are added. George Gassaway's Rotoroc design is the most popular type by far due to its simplicity and consistent performance.



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## Boost/Glide Duration

Order publications from NARTS that contain glider plans such as the MIT Competition Handbook and others. Build and try them out. Other good first B/Gs include the Turnup, Zephyr, and Golden Girl.



## Glider Construction Tips

Examine and select wood carefully for gliders, especially make sure the boom is straight and not warped.

When airfoiling the wing, balance on finger at centerline to insure left and right wings weigh the same.

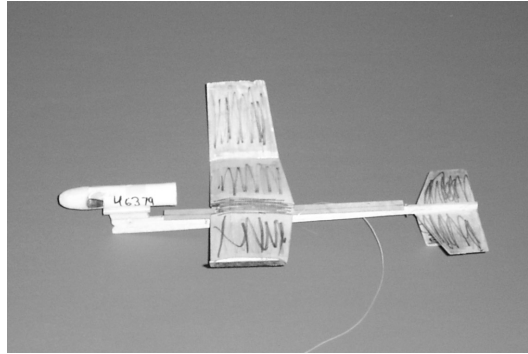
Use rulers, right angles, weights, and homemade jigs to insure all parts are aligned straight.

The key to a good glider is that there are no warped parts or misalignments during assembly. Use yellow glue, double glue joints and check alignment while drying.

Build three at a time. Out of the three you will get one good glider, one okay, and one dog.

## Rocket/Glide Duration

What goes up as a rocket must come down as a glider.  
No detachment of any parts. Need to change something  
to go from rocket stability to glide stability.



## Rocket/Glider Types

- Slide Wing - Most prevalent type
- Swing Wing - Less stress on Wing
- Sliding Pod - Simple and reliable, extra mass
- No Moving Parts - Balance can be tricky but a reliable approach if it transitions okay.
- Flop Wing - Usually combined with slide wing
- Pop-up Elevator - Popular for low impulse

## Rocket/Glider Tips

Rocket gliders are fun to experiment with. Try different glider types from NART plans, newsletter plans, and QCR kits to experiment.

Select one type and work with it until you have it perfected.



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## Craftsmanship Events

Sport Scale is the most popular of these by far. Focus on the finishing part. Seams should be filled. So should the grain. The paint job should be smooth and lines between colors clean. Don't worry about mission points or building complex prototypes until you have mastered the above.



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## Construction Aids

Parachute Building Board - This is a piece of cardboard with a series of concentric circles sizes 12", 15", 18", 21", 24" and 30". Eight lines are drawn out from the center. Chute material is taped to the board, lines drawn, and chute cut out.

Flexie Building Board - Same as for parachutes except outlines for various size flexies are drawn on the board.

Fin jig - make from steel or aluminum bar stock or other straight materials. Good for attaching thin G10 fins.

CMR type tube cutter.

Estes tools & fin jig.



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## Flying Strategy

Discussions on how to fly a contest could go on for the rest of this convention. Here are some general tips.

1. Take your time while preparing a model for launch. Powder and fold chutes carefully. Put in wadding carefully. Etc.
2. Watch the skies and the wind. See where other contestants models are going. If it looks like recovery will be difficult, consider flying a "brick" for the first duration flight.
3. Schedule flying around the weather conditions, but all things being equal, fly the higher weighting factor events first.



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## Flying Strategy (cont.)

4. Try to get a qualified flight in every event before taking a second flight in an event you've already qualified in.
5. Many regional meets have six events. It can be difficult to complete all your flights. Pace yourself accordingly.
6. Look for thermals if time allows. This is a science into itself and also an art form. At larger meets with multiple timers, you can try to piggyback on a BTCs thermal.



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## Flying Strategy (cont.)

7. Volunteer to serve range duty. For new competitors, this will probably mean serving as a timer. Timing other models will help you learn what works and what doesn't by observing the flights of others.
8. Try to have backup models for every event in case one of your rockets thermals away or prangs.
9. Always return your models after the flight, even if not required. Check your time or altitude. Keep a log book of your flights.



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## Flying Strategy (cont.)

10. Have fun. Talk to the other contestants. Listen to their stories. You can learn a lot that way and it is fun. Try to stay for the entire meet and attend the closing ceremonies/awards.



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## Contest Logistics

CB-1-70 registration form filled out first. Must be signed on back and also requires parents signature. Don't forget to bring your NAR license. Contest Director may require that you show it.

Some contests use individual flight cards. Others use log sheets for each contestant. For contests with individual flight cards, fill out the Name, Event, NAR number, and Division. The rest is filled out by the check-in person.

Take rocket, engine and flight card to check-in. Engine needs to be checked, and rocket needs to be okayed for safety. Then you will be given a pad assignment.



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## Contest Logistics (cont.)

Proceed to the pad. Take as much time as you need and when ready, indicate to the LCO or RSO that you are ready to launch. Once they have the needed range crew ready (timers, trackers), your rocket will be launched.

After the flight, return the rocket to the rangehead to get it marked returned. Standard duration events require one qualified flight to be returned. Payload events require any flight whose score is to count to be returned. Non-payload altitude events do not need to be returned.



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## Competition Resources

The United State Model Rocket Sporting Code (Aka The Pink Book) is the rule book for NAR competition. Each NAR member is entitle to one free copy. Write to NAR HQ to request yours. Also available online at the NAR web site ([www.nar.org](http://www.nar.org)).

NARTS has several competition plan books available. Request a catalog or check it out on the NAR web site.

The NAR web site also has several contest plans.

The WOOSH web site had some contest info and plans too.



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## Competition Resources

A partial list of vendors who sell competition kits and supplies:

ASP Rocketry - kits, scale kits, competition materials such as fin material, streamers, chutes, egg capsules, Kevlar, mylar tape, and other goodies.

Balsa Machining Service - tubes, nose cones. Also do custom work for scale models (nose cones, transitions, etc.)

Pratt Hobbies - Lightweight nose cones and egg capsules.

QCR - A full range of contest kits.

Totally Tubular - Body tubes, Centering rings, mylar and other goodies.

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## Competition Resources

WOOSH BTCs you can contact for help:

Dan Wolf - 414-328-5193, [dan\\_chris\\_wolf@compuserve.com](mailto:dan_chris_wolf@compuserve.com)

Pavel Pinkas

Kevin Wickart

Gary and Fran Miller

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# Questions

