April 7, 2017

Dear Team America Rocketry Challenge Contestant,

Congratulations! You are a finalist for the Team America Rocketry Challenge. Your team's local qualification flights have earned you an invitation to attend the Team America Rocketry Challenge National Finals the weekend of May 12-14, 2017 at Great Meadow in The Plains, VA. 812 teams from 46 states entered this year's competition and your qualifying score was one of the 100 best. You can be proud of your achievements in aerospace design and rocketry.

To accept your spot in the National Finals please fill out and return the registration form that the registered supervisor for your team will be receiving. Do so either online using the TARC Portal (preferred), by fax, or by email. All forms must be received by **Tuesday, April 25, 2017**. If we do not receive all forms from your team by Tuesday April 25, 2017, we will offer your spot to an alternate team. If you will not be able to attend the fly-offs, please let us know as soon as possible so that we may offer your spot to one of these alternate teams.

The enclosed information should answer your questions about procedures, lodging, and other aspects of the National Finals. It also addresses many of the questions that we have been receiving from teams over the last several months concerning event rules, legal rocket designs, etc; please read the entire document carefully. In case of conflict, the official rules take precedence. Remember that the exact model you fly at the National Finals must have previously been test-flown successfully, and you will not be able to do any test or practice flights at Great Meadow before your Finals flight.

Please contact us at miles.lifson@aia-aerospace.org if there are things that you need to know about registration that are not covered by this letter. If you have questions about motors, rules, or anything else rocket related please ask them by posting a question on NARTARC, our online Yahoo group forum. We check this every day, and would like to answer your questions publicly for everyone to benefit.

We look forward to meeting you at the National Finals!

Sincerely,

Miles Lifson
TARC Manager
Aerospace Industries Association (AIA)

Trip Barber
TARC Manager
National Association of Rocketry (NAR)

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2017 Team America Rocketry Challenge Finals

Finals Schedule and Event Logistics

TEAM AMERICA ROCKETRY CHALLENGE 2017 TENTATIVE SCHEDULE

Friday, May 12
Friday's contestant briefing is at Metz Middle School, 9950 Wellington Road, Manassas, VA 20110

Friday Morning	Breakfast Reception on Capitol Hill
9:00 AM – 4:00 PM	NAR set-up for Saturday contest at Great Meadow (no flights)
5:00 PM – 6:00 PM	Metz Middle School Issue NAR uniform items to NAR range crew
6:00 PM – 9:45 PM	Metz Middle School Contestant registration & rocket pickup
6:00 PM – 7:00 PM	NAR range crew briefing (auditorium)
7:30 PM – 8:45 PM	Contestant team briefing (auditorium)

Saturday, May 13
All Saturday events will be held at Great Meadow, 5089 Old Tavern Road, The Plains, VA 20198

6:30 AM	Contestant Registration & Egg Issue open
6:30 AM	Pre-Flight Check-In opens (1st 24 teams)
7:30 AM	Great Meadow gates open for spectators
8:00 AM – 8:15 AM	Opening Ceremony/National Anthem
8:15 AM – 9:15 AM	24 team 1st launches (Goddard 1 launch window)
9:15 AM – 10:00 AM	18 team 1st launches (Stine 2 launch window)
10:00 AM – 11:00 AM	24 team 1st launches (Goddard 3 launch window)
10:00 AM – 3:00 PM	Team Rocket-Building Competition (Exhibit area)
10:00 AM – 3:00 PM	Team Plane-Building Competition (Exhibit area)
10:30 AM – 2:30 PM	Team Presentation Competition (Spring House)
11:00 AM – 2:00 PM	Contestant and staff lunches available
11:00 AM – 11:45 AM	18 team 1st launches (Stine 4 launch window)
11:45 AM – 12:30 PM	17 team 1st launches (Goddard 5 launch window)
12:45 PM	1st NAR High-Power Rocket Demonstration (Raytheon Range)
1:00 PM	Deadline for returning egg/altimeters post-flight (1st flights)
1:15 PM or earlier	Announcement of top 42 teams from preliminary round
2:00 PM – 4:00 PM	Ice Cream Social for teams
2:30 PM – 3:15 PM	1st-24th team 2nd launches (Goddard 6 fly-off launch window)
3:15 PM – 4:00 PM	25th-42nd team 2nd launches (Stine 7 fly-off launch window) ** WEATHER PERMITTING **
4:15 PM – 4:35 PM	2nd NAR high-power rocket demonstration (Raytheon Range)
4:30 PM	Deadline for returning egg/altimeters post-flight (2nd flights)
5:00 PM - 6:00 PM	Award Ceremony (dinner tent)
6:00 PM - 8:00 PM	BBQ Dinner

Friday Daytime:

Team America Rocketry Challenge staff will be out at the launch site at Great Meadow from 9:00 AM until 4:00 PM on Friday setting up equipment for the fly-off. Teams may come out to look the field over during this time, but NO TEST FLIGHTS can be supported and there are no other test-flying sites available locally.

AIA will be hosting a breakfast reception for TARC participants on Capitol Hill on Friday, May 12th. All teams are invited to bring their rockets. If you are interested in attending, please indicate this on your RSVP form. **Space at this reception is limited and will be allocated on a first-reply basis.** To allow the maximum number of student participants, only one adult chaperone per team will be permitted to attend.

TARC sponsor Aurora Flight Sciences will be hosting an optional BBQ Dinner and Facility Tour on Friday afternoon. **Full information and RSVP information (first-reply basis) is** available at http://fluidsurveys.com/surveys/rocketcontest/aurora-bbq-sign-up/.

Friday Contestant Briefing:

Contestant registration and briefing is Friday night at Metz Middle School, 9950 Wellington Road, Manassas, VA 20110. Metz Middle School is 6 miles from where the hotels are. The roads will be busy, so plan your trip accordingly. The briefing will start at 7:30 PM. You should plan to arrive no earlier than 6:15 PM and no later than 7:00 PM in order to pick up your registration materials before the briefing. Rocket engine orders that were made in advance to Performance Hobbies or Animal Motor Works and rockets shipped ahead to Aurora Flight Sciences will all be available for pickup at this event starting at 6:00 PM and will also be available on the flying site Saturday morning.

We will announce the decision at the Friday contestant briefing if the weather forecast for Saturday is so unfavorable (heavy rain or wind above 20 miles per hour) that the fly-off must be postponed to Sunday. This has not happened in the previous fourteen years, so keep your fingers crossed!

Saturday Flying Schedule:

All events on Saturday will take place at Great Meadow, 5089 Old Tavern Road, The Plains, VA 20198. To get there, take I-66 exit 31 (which is 16 miles west of the Manassas hotels, toward Front Royal), turn left on Highway 245, away from the town of The Plains and toward the village of Old Tavern, and follow the signs about 2 miles to Great Meadow, which will be on your left.

There is a huge amount of parking at the launch site; all of it is free and close to the launch range.

Teams assigned the first launch window time slot (6:30 AM check-in opening, 8:15-9:15 AM liftoffs) should plan to be at the flying field by 6:30 AM on May 13. Other teams may choose to arrive later than this, but each team should arrive at least two hours before its assigned rocket flight window time. All teams should plan to remain at the flying site until the conclusion of the award ceremony at 6:00 PM on Finals day. The barbecue after the award ceremony will end before 8:00 PM Saturday. Teams should be flexible enough in their plans to be able to stay for a May 14 (Sunday) fly-off if bad weather on Saturday forces postponement.

Attendance:

Teams that are selected to attend the Finals must confirm their participation with the form that was sent to all supervisors no later than **Tuesday, April 25, 2017**. Alternate teams will be notified by Wednesday, April 26, 2017 if a primary team has declined their invitation. Occasionally a team will drop out after April 25th so at this point we will contact alternate teams in the order of their ranking to see if they would like the spot.

We ask that any team that attends do so with an adult chaperone, preferably the supervising teacher, and at least one of the students; it is not mandatory that every student team member attend, but the more the better.

You may not add team members after your initial qualification flight attempt, except in the special case described in the TARC rules where a school has more than three teams whose scores are better than the Finals cutoff and has to limit Finals participation to just three teams in accordance with the rules. Please submit an add/drop form if you choose to drop team members. All team members who are registered as of the date of the fly-off (regardless of whether they attend the fly-off) will share equally in any prizes awarded to a winning team. All team members on the final team should have contributed to the designing, building, and/or launching of the team's entry.

TRAVEL

There are no additional event fees for those teams selected for the Finals, however travel expenses to attend are the responsibility of each team. The entire team does not necessarily have to come to the Finals, but for a team to compete at least one member plus a supervising adult must attend.

The nearest major airports to the launch site are:

- Washington Dulles (IAD): 17 miles away
- Reagan National (DCA): 35 miles away
- Baltimore-Washington International (BWI): 70 miles away

Teams must provide their own transportation to get from the hotel to the launch site, and to/from any airport. If you are flying in this means you will need to rent a vehicle for local travel. In planning your travel, please keep in mind DC rush hour: I-66 westbound from the DC area to Manassas and beyond is very heavily congested and very slow-moving by 2:00 PM on Fridays.

FOOD:

Student contestants and team supervisors with credential badges will receive complimentary lunch, ice cream, and BBQ dinner. Punches will be made in TARC credential badges for each of these; there are no meal “tickets”.

There will be a food and beverage vendor on the field for lunch and anyone else that wishes to purchase food. Free water will be available throughout the day.

We will end the day on Saturday with a BBQ dinner after the award ceremony. Parents and other spectators can purchase tickets for this event for $20; please send payment for these tickets with your attendance confirmation form.

SITE RULES:

Great Meadow is an incredible venue that we wish to preserve for future years. Please be sure to observe the following site rules.

- Please do not bring cooking devices to the field. Coolers are OK.
- Glass bottles are not permitted.
- Drone flying is not permitted.
- Dogs are not permitted (service animals exempted).

LODGING:

Teams are responsible for making their own lodging arrangements. We have reserved blocks of rooms--mostly with two beds--at the **first three hotels** listed below. These are reserved under the group names listed below for the nights of Thursday, May 11 through Saturday, May 13. Hotels with our group reservations are all at I-66 exit 47 in Manassas, VA. Take Highway 234 (Sudley Road) north (exit 47B if westbound) or south (exit 47A). All of the hotels are within the first two blocks after the exit.

Please call the hotel and use an individual credit card to make a reservation. Tax on rooms adds 10% to the rates below. **These rooms will be released on April 18 if not reserved by then**. All the hotels are within a few blocks of each other and are surrounded by restaurants and shopping. If you wish to make hotel reservations at places other than the three TARC hotels, you should pick among the other hotels listed below that are also at I-66 exit 47 in Manassas.

TARC Hotel	Exit	Address	Phone Number	TARC Rate
Quality Inn Manassas	I-66 Exit 47A	10653 Balls Ford Road, Manassas, VA 02109 tell them you are with "Team America Rocketry Challenge" and ask for "**Manager's #4 rate**"	(703) 368-2800	$72.00 + tax
Days Inn	I-66 Exit 47A	7249 New Market Ct., Manassas Use code: **TARC** or **NAR**	(703)369-1700	$64.99 + tax
Red Roof Inn Manassas	I-66 Exit 47A	10610 Automotive Drive, Manassas Use code: **B192TARC17**	(703) 335-9333	$84.99 + tax
Other Hotels in Same Area				
Comfort Suites	I-66 Exit 47A	7350 Williamson Blvd., Manassas	(703) 686-1100	
Courtyard by Marriott	I-66 Exit 47B	10701 Battleview Pkwy., Manassas	(703) 335-1300	
Hampton Inn	I-66 Exit 47A	7295 Williamson Blvd., Manassas	(703) 369-1100	
Best Western Battlefield Inn	I-66 Exit 47A	10820 Balls Ford Road, Manassas	(703) 361-8000	
LaQuinta Inn & Suites	I-66 Exit 47B	6950 Nova Way, Manassas	(703) 393-9966	
Holiday Inn Manassas Battlefield	I-66 Exit 47A	10424 Balls Ford Road, Manassas	(571) 292-5400	
Wyndham Garden	I-66 Exit 47B	10800 Vandor Lane, Manassas	(703) 335-0000	
Holiday Inn Express	I-66 Exit 47B	10810 Battleview Pkwy, Manassas	(703) 393-9797	

2017 Team America Rocketry Challenge Finals

Additional Competitions: Rocket-Building Competition, Plane-Building Competition, Presentation Competition

Additional Awards: Team Outreach, Engineering Notebook, Outstanding Team Advisor, Outstanding Mentor, and Special Awards

ROCKET-BUILDING COMPETITION: SPONSORED BY LOCKHEED MARTIN AND ESTES INDUSTRIES

All of the student teams who made it to the TARC Finals have developed good model rocket-building skills, so we have set up an event to let 40 of these teams compete to show off these skills. Teams can sign up for this competition starting at 6:15 PM on Friday night, prior to the contestant briefing. Teams will only be permitted to sign up for a time slot after their team's assigned launch window time. Alternates will be signed up to take the place of any team that ends up making the fly-off round and is therefore unable to participate in the building competition during the time slot they signed up for. Teams that sign up for the last round of the rocket-building competition that make the flyoffs must yield their spot in rocket-building to an alternate.

Teams will have a 75-minute time slot between 10:00 AM and 3:00 PM on Saturday to build a flight-worthy rocket out of a bag of rocket parts. The parts will be provided. Every team will get an identical bag of parts (free of charge) and 10 teams will be building on adjacent tables during each of the four time slots. We will provide basic tools (yellow carpenter's glue, X-acto knives, sandpaper), but teams are free to augment these with their own tools and building supplies – but not with extra rocket parts.

The purpose of the competition is to build a creative, well-assembled rocket that has in it the required components to permit it to fly, such as an engine mount and recovery system, and that in the judgment of the event judges could probably fly stably. However, these rockets will not be actually flown at the TARC Finals. Teams may pick them at the end of the day after judging and go fly them elsewhere, though.

Cash prizes ($500) and a plaque will be awarded to the team with the best rocket in each of two categories:

1. Best craftsmanship
2. Most creative design

BALSA PLANE BUILDING COMPETITION: SPONSORED BY THALES USA

As a platinum sponsor of TARC, Thales USA is intent on promoting innovation and design at all ages and levels. To do so, we've arranged to host a balsa-wood plane building competition. Team advisors will receive a ticket in their registration materials Friday night. These tickets are assigned to a specific timeslot following the team's rocket launch. The competition will take place at the Thales tent in the Exhibit Area. Make sure your team brings your ticket with you to be allowed to participate in this event. Teams of parents, children, and other visitors will be invited to participate without advanced registration between 2:00 PM and 3:00 PM.

The goal is to build a flight-worthy plane. Everyone participating will have supplies provided to them free of charge. The purpose of the competition is to build a creative, well-assembled plane that will fly the farthest. Each team will have up to three attempts to fly their plane on the designated "runway," where we will measure and record the distance traveled.

The TARC team with the farthest distance recorded will be acknowledged with a $500 cash prize and a plaque sponsored by Thales USA.

Time slots for the Balsa Plane Building Competition are as follows:

Team Launch Time	Team Launch Window	Balsa Building Window
8:15 AM – 9:15 AM	Goddard 1 launch window	10:00 AM – 11:00 AM
9:15 AM – 10:00 AM	Stine 2 launch window	11:00 AM – 11:45 AM
10:00 AM – 11:00 AM	Goddard 3 launch window	11:45 AM – 12:30 PM
11:00 AM – 11:45 AM	Stine 4 launch window	12:30 AM - 1:15 PM
11:45 AM – 12:30 PM	Goddard 5 launch window	1:15 PM - 2:00 PM
N/A	General Public	2:00 PM - 3:00 PM

TEAM PRESENTATION COMPETITION

Aerospace engineers must not only do good design, construction, and flight testing work, they must be able to communicate to others what they have done and how they did it. We are offering an optional presentation competition to interested Finals teams. This competition will be limited to fifteen finalist teams that will be selected from among those that submit a draft presentation by April 28 as described below. Finalists will be announced no later than Monday, May 8. Presentations will be held between 10:30 AM and 2:30 PM Saturday during the Finals; any teams that are presenting but that also are likely to make the second (fly-off) round of the Finals will go early.

Presentations must have an electronic component (which will be the only component used for preliminary evaluation). PowerPoint is preferred; these may be converted to Adobe Acrobat PDF files to reduce digital size for transmission. The presentations must include the following topics which will be judged for selection:

- Design and construction process – How was the rocket designed? How were the dimensions, materials, and motors selected? How was the rocket built?
- Teamwork – How did each member of the team contribute to the rocket design, construction, flight testing, or other elements of the team's operation, and to the presentation?
- Flight testing process – How did the team use flight testing to refine the design and make adjustments that resulted in a great score?
- Lessons learned – What lessons did the team learn from their TARC experience about how to do an engineering design and construction project, and how would they change their approach for a future TARC entry?

Participating teams will be asked to give a six-minute presentation on their TARC rocketry project experience to a panel of judges and an audience of aerospace industry sponsors, then handle a 2-minute question and answer session with the judges. Teams that volunteer for the presentation must have three or more members attending the Finals, and at least three different student members of the team must have a speaking role in the presentation. Prizes will be awarded for 1st place ($500), 2nd place ($300) and 3rd place ($200), with a plaque also going to 1st place.

Judging criteria:

The final presentations will be judged on the following criteria:

- Delivery – Do the speakers have a smooth and clear delivery? Do their voices, poise, and eye contact make a favorable impression? Notes may be used, but should not be just read aloud.
- Organization – Does the presentation have a logical organization? Do the speakers make clear what was done and how it was done?
- Visual Aids – Do the speakers use visual aids appropriately? Were the slides helpful or distracting? Did the speakers use any other aids such as models, sub-assemblies, etc.?
- Familiarity with subject – Do the presenters demonstrate adequate knowledge of the subject? Did they answer questions fully and clearly?
- Time – Speakers may use 6 minutes for the presentation (plus 2 minutes for questions). Did they adhere to the 6 minute limit and finish their presentation within it?

Submitting:

Teams wishing to participate should submit their initial presentations electronically (only!) to TARC_Presentations@yahoo.com by 5:00 PM (Eastern Time) Friday April 28, 2017. The size of this submission must not exceed 2 megabytes. From these submissions, 15 finalists and two alternates will be notified by Monday, May 8, 2017. Teams may (and are encouraged to) revise their report up until the turn-in deadline of Friday evening May, 12th (no later than 8:00 PM) at the finals.

TEAM OUTREACH AWARD

TARC 2017 features a special 101st spot at the TARC Finals for a team judged to have had the best outreach program among teams who submitted outreach applications, but would not have already made the cut-off to attend the finals. To be eligible, the team had to submit an outreach program application and fly at least two valid qualifying flights. A special award for the team with the best overall outreach program among all teams will be awarded at the National Finals. We will recognize the winner of the overall outreach competition at the Finals. The winning team will receive a plaque and a cash prize of $500.

ENGINEERING NOTEBOOK AWARD

For the second year, a prize will be awarded at the National Finals to a team that skillfully crafts an engineering notebook that documents their design cycle for the Team America Rocketry Challenge (TARC). Teams from across the country have already submitted entries to be judged by a panel of engineers from TARC sponsor companies. The winner will be announced at the National Finals (and may or may not be a finalist team). The team will receive a plaque and a cash prize of $500.

OUTSTANDING TEAM ADVISOR AND OUTSTANDING MENTOR AWARDS

TARC grows bigger and better every year thanks in no small part to the teachers and mentors who inspire and encourage students to excel in our program. We want to gather stories and share the excellent work of TARC's unsung heroes.

This year we will be recognizing one or more outstanding team advisor/teachers and outstanding TARC mentors. To nominate a team advisor or mentor (or both) for these awards, write a short summary (one page max; photos – no more than two -- are optional but encouraged and do not count towards the page limit) of how your teacher and/or mentor went above and beyond to support your team and make TARC a great experience for the students. Team advisors/teachers may only be nominated by students. Mentors may be nominated by team advisors and/or students. Nominations are open to all teams, not just national finalists, but the awards will be announced at the National Finals.

Nominations should be submitted to miles.lifson@aia-aerospace.org by April 18th at 5:00 pm ET.

SPECIAL AWARDS

In addition to the prizes and places based on rocket flight performance, four teams will be selected by judges on the field at the Finals for the following awards:

- Best Rocket Craftsmanship sponsored by Lockheed Martin
- Best-Dressed Team (uniform/costume) **See flyer for more information**
- Spirit of TARC (combination of teamwork, sportsmanship, team spirit) sponsored by Boeing
- Most Innovative Approach to Mission sponsored by Raytheon

Plaques for these categories will be given out at the awards ceremony.

TEAM AMERICA ROCKETRY CHALLENGE

Best Dressed Team Competition!

Think your team has what it takes to be named "Best Dressed" at the 2017 TARC National Finals? Be sure to show up to Great Meadow decked out in team uniforms/costumes to be considered for this year's award!

What: Best Dressed Team Competition

Where: Photo Booth – Exhibit Area

When: 12:00 pm – 2:00 pm

Winning team will be announced at the awards ceremony at the end of the day.

Be sure to take your own photos and share them on TARC's Facebook, Instagram and Twitter pages @RocketContest! #TARC2017

2017 Team America Rocketry Challenge Finals

Rocket Engines, Finals Procedures, and Rocket Design and Construction

APPROVED ROCKET ENGINES

Your rocket must be powered only by commercially-made model rocket engines that are safety-certified by the NAR and listed on the **final** NAR Engine Certification List at www.rocketcontest.org.

Performance Hobbies will support advance (pre-paid) orders for delivery at the Finals. They have engines of all types, plus other supplies such as parachutes. **IF YOU CANNOT TRAVEL BY AUTO TO THE FINALS WITH YOUR ENGINES (see below) YOU SHOULD ORDER THEM IN ADVANCE, FOR DELIVERY ON-SITE AT THE FINALS.** Do not count on Performance Hobbies happening to have the motor that you need at their sales operation at the Finals, please order whatever you need in advance and it will be delivered to you Friday evening at TARC Registration. Performance Hobbies is operated by Ken Allen and can be reached at:

Performance Hobbies
www.performancehobbies.com
kensrockets@rocketmail.com
(202) 723-8257

If you are planning to use a Cesaroni brand reloadable rocket engine, you may alternatively make arrangements for onsite (Friday evening) delivery of this type of motor (only) through Animal Motor Works, www.amwprox.com by contacting Gloria Robinson at Gloria@amwprox.com or (603) 566-2904.

If these vendors do not have what you need in stock when you call, then go to one of the TARC online vendors (Wildman Rocketry at www.wildmanrocketry.com; Balsa Machining Service at www.balsamachining.com; or Apogee Rockets at www.apogeerockets.com) and order motors for delivery to your team, shipping them to Aurora Flight Sciences as described below (there will be a HAZMAT shipping fee).

Shipping Rockets and Launch Equipment:

It is ILLEGAL to put model rocket engines, igniters, or other pyrotechnic materials in your baggage on an airplane, **DO NOT TRY THIS**. It is also illegal to ship a rocket motor by UPS or USPS without disclosing to the shipper what you are shipping, and these shippers will not accept motors for shipment by private individuals.

You may ship your model rockets and launching equipment to us and they will be given to you at the contestant briefing on May 12. A vendor with the proper license may also ship engines that you have ordered to this location. **Make sure you use a shipper that utilizes a tracking system to confirm delivery of your rocket, do not call Aurora Flight Sciences.**

Trip Barber/Team America
c/o Aurora Flight Sciences Corporation
9950 Wakeman Dr.
Manassas VA 20110
Hold for Team America Team #_____, _____ High School

FINALS PROCEDURES

Students Only:

All elements of rocket design, preparation, and flight are to be done by student members of teams. Only student team members -- no teachers, mentors, parents, or non-team members -- may go into the team check in area, onto the flying field, pad, or approach the pad which includes assisting with rocket preparations before flight. Anyone can help on recovery if the rocket drifts outside the main flying field area.

Time Management:

Each team will be assigned a 45 to 60 minute "launch window," preceded by a one hour "prep window". **These time assignments will be posted on our website www.rocketcontest.org no later than May 8, 2017, and are not negotiable. You must fly during your assigned window.** Between 18 and 24 teams will be assigned to each launch window period, and each may fly at any time during that period. You will not be allowed to set up your rocket or launch system on the flying range until your prep window time slot begins, which is the beginning of the launch window period before your own launch window. You should plan to be done setting up by the time your launch window opens. You should plan to be issued your egg and to present your rocket to us for pre-flight safety and rules-compliance (parachute) inspection prior to this prep window. This means that you should plan to be on the flying field at minimum of **two hours prior to your launch window** -- earlier if you still need to do registration on the field because you were not at the Friday evening contestants' meeting. The first launch window will open at 8:15 AM on the Finals flight day (with a 7:15 AM prep window), so teams who get assigned this window should be prepared to be on the field by 6:30 AM on Saturday, May 13.

You must fly your rocket during the launch window, and will be disqualified and must clear the pad if you fail to achieve liftoff during this window. Misfires are not an excuse for missing an assigned launch window -- so do not wait until the last moments of your window to fly.

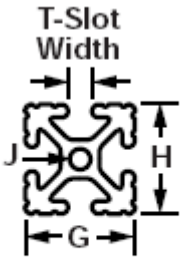
The top 24 to 42 teams based on scores from first flights (all of which must be completed by 12:30 PM) will be asked to make a second flight during one or two final “fly-off” rounds to be held between 2:30 PM and 4:00 PM. These will include the 5 teams who each had the best score in their respective initial flight round, plus the 19-37 next best teams overall. If late-afternoon thunderstorms with lightning develop which require closing the range early for safety reasons (this has happened four times in the last fourteen years, including in 2016) then this flyoff will be limited to the 24 teams promised in the TARC 2017 Rules, flying in one round. Otherwise we will fly two rounds, a total of 42 teams. The flyoff teams will be notified as soon as possible after 12:30 PM but no later than 1:15 PM. The top 40 places in TARC 2017 (20 places if there are only 24 second flights) will be awarded to these teams, ranked on the basis of the SUM of the scores from their two flights. Any team that cannot make a second flight will be ranked behind all teams that do make a second flight. The remaining places beyond 40th (or 20th) will be ranked on the basis of first flights only.

Primary and Backup Models:

We recommend that you bring two models to the Finals, if possible. If your primary model lands in a tree, power line, or other dangerous place where it is visible to the judges but cannot be recovered safely, or if you experience a rocket engine catastrophic failure as judged by the Range Safety Officer (burst engine or complete failure of the ejection system, with the cap still retained in place on the ejection charge), or if you have an altimeter failure (an altitude reading of greater than zero but less than 50 feet after a normal qualified flight) the judges may allow you to have a second flight. Otherwise only one initial flight attempt is allowed. If a rocket clears the pad and becomes airborne, this is considered a "flight attempt". If there are any "backup" flights allowed, there will be a few time slots reserved for this purpose in the last first-flight launch window of the day (11:45 AM-12:30 PM).

Equipment:

The launch system provided for contestant use will have individually-assigned, well-spaced sturdy three-legged pads with the team's choice of either a single, 6-foot-long, 1/4-inch diameter launch rod or a 6-foot-long "1010" (1 inch on a side, ¼ inch center slot) T-slot launch rail on an adjustable base (see photo below) and one pair of high-current 12-volt electrical igniter leads with a single pair of micro-clips at the end. These will provide 18 amperes from our launch system from a car battery through 60 feet of 16-gauge wire, which will light any igniter or cluster of up to 4 igniters. Teams are not required to use the launch system and rod or rail that we provide. They may bring their own launch pads, towers, rails, or other hardware, "clip whips" to light clusters of motors from our single pair of micro-clips on the ignition wires, and even their own electrical launch systems if they need anything different from what we provide. Such individual launch systems must comply with the NAR Safety Code requirements and will be subject to our safety check and approval. A minimum rod diameter of ¼ inch and rod/rail length of 6 feet is required.



Rail
(End View)

Returns:

All teams that have a safe and otherwise qualified flight must return their model including the egg and altimeter to the "Returns Table" for post-flight inspection of the egg and recording of altimeter reading. This must be done no later than 1:00 PM for first flights, which is 30 minutes after the final "launch window" for the first-flight rounds closes; and it must be done by 4:30 PM for flights from the final fly-off round(s). We will have several 35-foot extendable poles available to assist teams in plucking rockets from trees if this unfortunate circumstance occurs.

NAR MEMBERSHIP AND INSURANCE

You are not required to be a member of the National Association of Rocketry to participate in this contest as a teacher or team member. But we certainly encourage membership, and you may need to become a member if you need insurance coverage for rocket flying in addition to whatever coverage may be provided by your personal insurance.

Your NAR membership includes personal liability insurance to cover YOU against liability claims from rocket activities conducted in strict accordance with the NAR Safety Code. This individual insurance does not cover others (such as your school or the owner of your launch site.)

ROCKET DESIGN AND CONSTRUCTION

First and foremost, read the Model Rocket Safety Code of the NAR, and the Team America rules, very carefully. These answer many questions about what is allowable and what is not. We have been asked many questions of interpretation, and have provided answers both individually and via the FAQ on the website. If you are in doubt about your design's compliance with our rules, it is better to ask us early than to find out at the Finals that what you did is not allowable. Remember that your rocket cannot weigh more than 650 grams at liftoff (with egg and rocket engine or engines) or have more than 80 Newton-seconds of total impulse in all of its rocket engines put together. It must use body tubes of two different diameters for its exterior structure. The smaller-diameter of the two must be used for the lower (motor and fin) end of the rocket and must not be greater than 42 millimeters (1.65 inches, corresponding to body tubes generally called BT-60) in diameter, and the larger one must be large enough to contain the egg (which may be up to 45 millimeters) plus padding and altimeter. Each tube must have no less than 150 millimeters (5.91 inches) of exposed length, and it must have a height when standing on a table of no less than 650 millimeters from the bottom of the fins or other lowest part of the structure to the tip of the nose. The rocket must separate into and recover in at least two separate pieces, with one of them containing the egg and altimeter, but not the expended rocket motor. This part must recover by parachute, the rest by any safe means.

We ask that you spend some time on the exterior appearance of your rocket to make it look good, preferably by painting any bare paper tube and wood parts, but the absolute requirement to paint the entire rocket that was originally in the TARC 2017 rules has been cancelled.

Some of the common topics of questions we have been asked about rocket designs have been:

Design Changes:

You are free to change your team's design in any manner that you wish up until the moment you check in at the Finals. You are not required to use the same design that you flew for your "qualification" flight. If you make the second (fly-off) round you can use a different model than the one you flew in the first round. All rockets flown at the Finals must have been test-flown previously. Please put your TARC team number on the rocket that you fly at the Finals.

Engine Selection:

Make sure that you have or can get the rocket engines you plan to use with your design at the Finals, or change your design to suit the engines that you can get. Some teams have problems with very slow liftoffs that make their rocket vulnerable to tipping over in flight ("weathercocking") in windy conditions. This is the result of an inadequate thrust-to-weight ratio for the rocket. If the average thrust of your engine(s) in Newtons (the unit of measurement of thrust that is labeled on the engine) is not greater than 20 times the liftoff weight of the rocket in pounds, then your rocket is underpowered and may weathercock. For example if you are using 3 Estes D12 engines, the average thrust is 3 x 12 = 36 Newtons. 36 divided by 20 is 1.8, so this cluster of three engines should provide enough thrust for safe liftoff of a rocket weighing up to 1.8 pounds. One D12 cannot safely lift more than 0.6 pounds. This is a rough rule of thumb for your use in safe rocket design, not a rule that we will enforce at the Finals.

Staging:

Use of more than one stage is not permitted.

Commercial vs Custom Parts:

The flight vehicle must be made by the student team members. You may use commercially-available "off the shelf" component parts (body tubes, nose cones, egg capsules, etc.) and may adapt rocket kits for the event -- or you can scratch-build components if you prefer. If some company should release a kit specifically for this event or for the NAR "Eggloft" contest event you would not be allowed to use such a kit. Having a custom flight vehicle part fabricated by a composite or plastics company or custom wood machining company (even if it is to your design) does not constitute sale of a "standard off the-shelf product" and is not allowed. Having a mandrel fabricated to your specifications that you wrap fiberglass on to make your rocket body (for example) would be OK. In this case the company is making a tool that you are using, but you are making the part that flies**.** 3D printed parts are fine as long as the team did the design and printing.

Metal Parts:

You may only use non-metal parts for the nose, body, and fins of your rocket, those parts that are the main structure of the vehicle. Fiberglass is OK. You may use miscellaneous metal hardware items such as screws, snap links, engine hooks, electronic circuit boards, and (if you wish) commercial re-loadable metal rocket engine casings.

Egg:

Your rocket must contain one egg (oriented in any manner) throughout flight. We will provide a tray full of eggs for issue to the contestants, all of them measured to be no more than 45 millimeters in diameter or 60 millimeters in length and between 55 and 61 grams in weight, and all of them marked with their weight to the nearest 0.1 gram.

Recovery:

Your rocket separate into two or more pieces during the recovery phase of its flight, and one of these pieces must contain the egg and altimeter but not the expended rocket motor. This portion must recover by parachute. If the pieces tangle during recovery and do not separate as intended prior to landing the flight will be disqualified. Breakage of fins or other parts on landing is not disqualifying.

Time will be recorded from the moment of liftoff to the moment that the first part of the rocket section containing the egg and altimeter touches the ground, ceases its descent (e.g. lands in a tree), or disappears from the sight of the timers.

Rockets may not be controlled by human intervention; radio control is prohibited. If your rocket communicates with a ground-based computer during flight this computer must be handed over for custody to a designated event official during the rocket's flight and cannot be touched by a team member during the flight. Flight control systems carried onboard the rocket such as electronic or other forms of timers, altimeters, etc. that control duration in some safe manner are permitted. They may not use pyrotechnic charges (black powder, pyrodex, or small rocket motors). They may use burn-through wires or standard igniters. If they are designed to sense acceleration or deceleration of the rocket as the basis for starting an ignition or ejection sequence through an igniter or other trigger, then there is a great risk that they can trigger on the ground or in your hands if you drop or jog the rocket while carrying it. Such systems must have a power switch, plug, or other disconnect mechanism that permits you to maintain them in a completely "safe" configuration until they are placed on the launching pad, and will not be allowed to fly if they do not.

The field for the Finals is not huge (see the site map posted on the www.rocketcontest.org website), but with winds of 20 miles per hour or less (the NAR Safety Code limit) a rocket that stays up no more than 50 seconds will remain on the field. We will have some 35 foot poles to help pluck rockets out of the lower portions of trees, if you are unlucky on recovery. We have never had a payload portion of a rocket lost to a tree at the TARC Finals.