

# High Frontier Operating Guide

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# High Frontier Operating Guide

## Overview

1. High Frontier is operated under the Tripoli Commercial Safety Code (Safety Code).
2. Tulsa Rocketry's Launch Director is responsible for the overall operation of the launch and is responsible for ensuring that all requirements defined in the Safety Code are met.
3. Tulsa Rocketry's Range Safety Officer is responsible for minimizing the risks to spectators, personnel, and property involved in the handling, preparation, and launch operations and enforcement of the Safety Code.
4. Tulsa Rocketry's Prefect is responsible for enforcement of Safety Code and ensuring that Tripoli's liability insurance is not put in jeopardy.
5. All activities are subject to the Launch Director, Range Safety Officer, and Prefect's approval and they may cease operations or deny any flight as deemed necessary.

## Important Information

Launch Director:	Paul Reed
Range Safety Officer:	Hal Ellis
Prefect:	Paul Reed
Emergency:	9 1 1
Pawhuska Fire Dept and Ambulance:	(918) 287-1234
Pawhuska Police:	(918) 287-4210
Indian Electric Coop:	(918) 295-9500 (Emergency)

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## Range Layout

1. Orange safety fencing will be zip tied to steel posts provided by city of Pawhuska in holes drilled in the ground according to Diagram 1.
2. Pads will be position according to Diagram 2.
  - a. 12 low power pads at 50 ft from the flight line and 6 ft to the north
  - b. 2 mid power pads at 100 ft from the flight line and 25 ft north of the start of the low power pads
  - c. 4 pads designated as the 20's pads 143 ft to the south of LCO and 144 ft west of the flight line. Pads shall be at least 40 ft east of the runway.
  - d. 4 pads designated as the 40's pads 143 ft to the south of LCO and 284 ft west of the flight line. Pads shall be at least 40 ft west of the runway.
  - e. 1 pad designated as the 90's pads 408 ft to the north of LCO and 25 ft east of the fence line. This area shall be pre-burned by the Pawhuska Fire Department.
  - f. A bucket will be placed 500 ft east of the 90's pad to denote the safe distance.
  - g. Additional buckets will be placed at an angle between the east 500 ft bucket and the north end of the flight line to denote the safe distance from the 90's pad. A space will be provided in the line of buckets at the north end of the flight line for the fire department to park their truck and so they can have easy access to the field.
  - h. Spectators and campers are not allowed within 20 ft of the line of buckets as an additional safety distance.
3. LCO will be to the west of the flight line by 10 ft and just north of the fence leading out to the low power pads.
4. Spectators are not allowed any point west of the line extending from the flight line going south.

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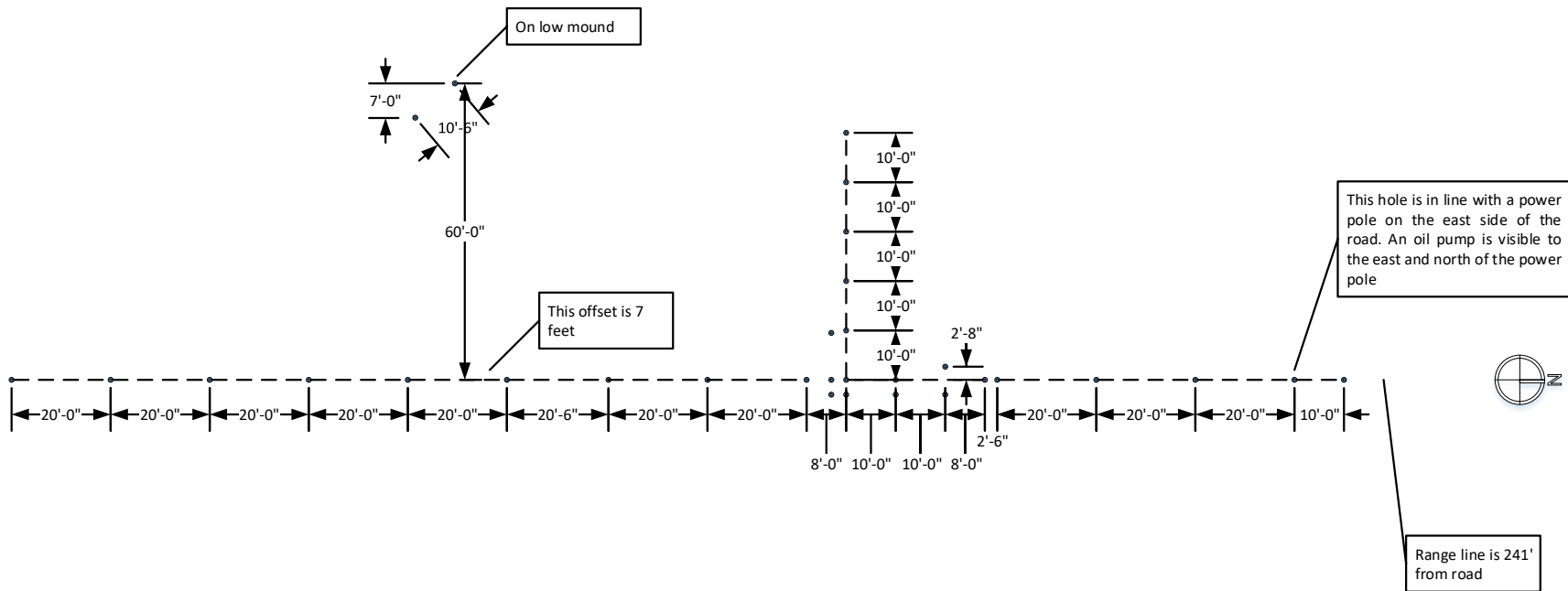


Diagram 1 – Fence Layout

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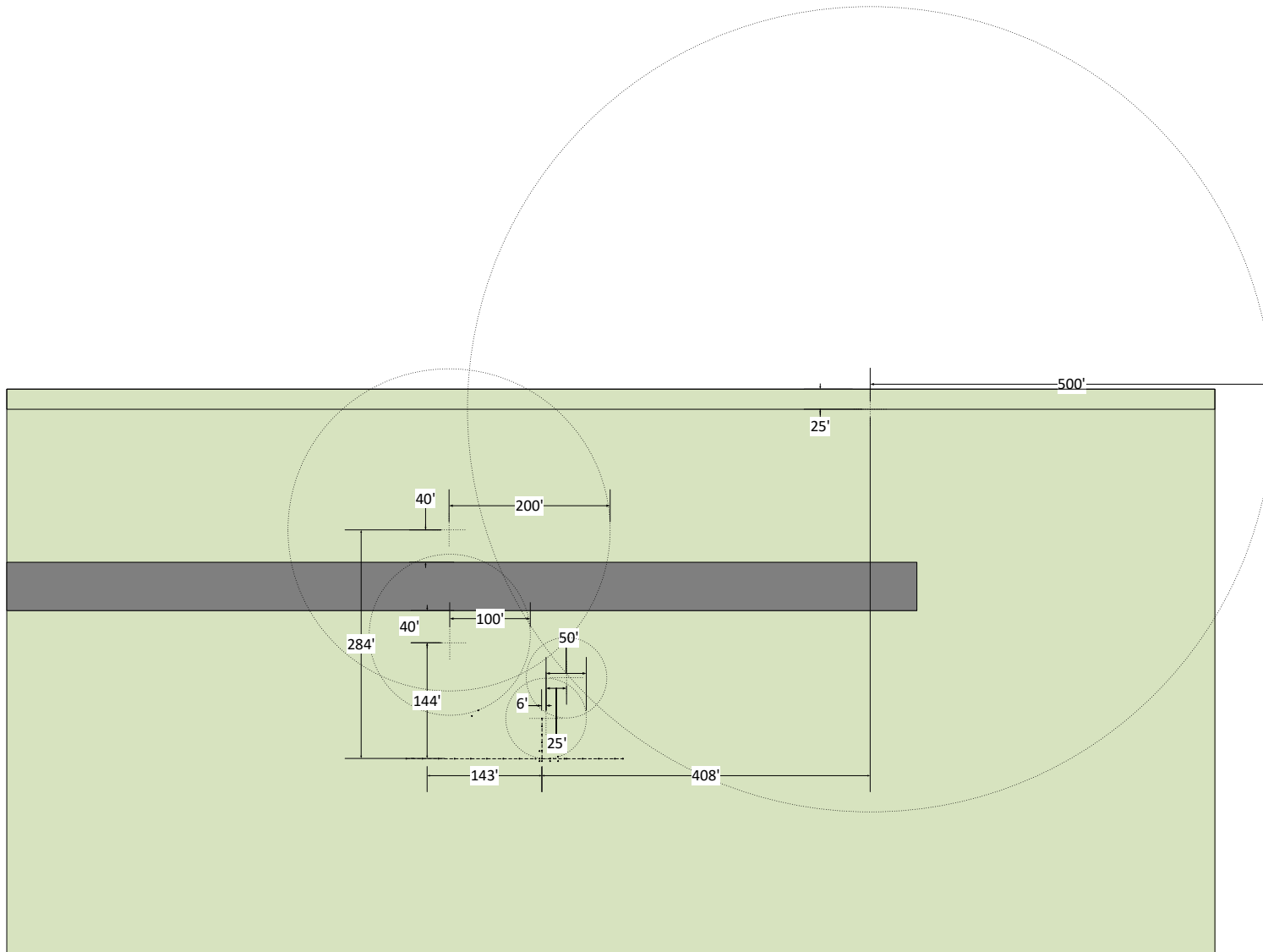


Diagram 2 – Field Layout

# High Frontier Operating Guide

## Daily Schedule

### Friday

1. Setup begins at 10 AM.
2. 11:30 AM to 1 PM, break for lunch.
3. Afternoon matinee for setup crew after setup is complete. Scheduled from 1 to 5 PM.
4. Put away electronics and secure field for the night.

### Saturday

1. Setup of registration, range safety, and LCO stations.
2. Get electronics setup.
3. Position the Buffalo based on the wind direction.
4. Range operations begin at 9 AM.
5. 3 PM – Big Daddy Drag Race.
6. 3:30 PM – Award Closest to the Buffalo.
7. 4 PM – Award winner of Big Daddy Drag Race.
8. 4:30 PM – Award Grand Prize Drawing.
9. 5 PM – Flight operations cease.
10. Secure 40's and 90's electronics.
11. 8 PM – Night launch.
12. Put away electronics and secure field for the night.

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## Sunday

1. Setup registration, range safety, and LCO stations.
2. Move 20's and 40's pads to 90's location and setup for drag races.
3. Get electronics setup.
4. Position the Buffalo based on the wind direction.
5. Checking of drag race rockets starts at 8:30 AM.
6. Range operations begin at 9 AM with Warlock Drag Race.
7. Minnie Magg Drag Race.
8. Move 20's and 40's pads back to their locations.
9. Resume normal operations.
10. 11 AM – Award drag race winners.
11. 3:30 PM – Award Closest to The Buffalo.
12. 4:30 PM – Award Grand Prize Drawing.
13. 5 PM – Flight Operations Cease.
14. Tear down field and pack trailers.

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## Registration

1. Youths under 18
  - a. Fill out registration form. Have parent list all youths names.
  - b. Have parent sign registration form.
  - c. Write fliers name on a badge.
  - d. Place an X in the cert level for the badge.
  - e. Write parents name on back of badge.
  - f. Give each youth half of a ticket and stamp their hand.
  - g. Put other half of ticket in drawing can.
2. Adult fliers over 18
  - a. All fliers must have current (unexpired) Tripoli or NAR card to fly.
    - i. Flier can join Tripoli on the field if needed. Find the Prefect.
    - ii. Cannot fly anything with an expired card.
    - iii. Make a check next to the fliers Tripoli or NAR number on the registration form indicating it has been verified.
  - b. Online Registration
    - i. Flyer should have preprinted registration form and badge
    - ii. Verify flier has paid
    - iii. Have flier sign the registration form.
    - iv. Check if flier had a t-shirt order (see below).
  - c. Walk up registration
    - i. Paid Tulsa Rocketry members can register for free and get a staff badge. Consult the member directory.
    - ii. \$20 for both days for everyone else.
  - d. Have flier fill out registration form and sign
  - e. Fill out flier badge.
    - i. Write certification level on badge.
    - ii. L0 does not get any stripes on badge.
    - iii. L1 or higher gets number of stripes on side of badge according to level. Use highlighters to make stripes.
  - f. Have flier sign the form.



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## 4. T-Shirts

- a. For shirts ordered online, shirts should have name of flier on package.
  - i. Check quantity and sizes of shirts.
  - ii. No substitutions for online orders.
  - iii. Verify shirts have been paid for.
- b. Prices for shirts
  - i. S – XL is \$15
  - ii. 2XL is \$17
  - iii. 3XL is \$18
  - iv. 4XL is \$19
- c. Cash is preferred, but we will take a check made out to “Tulsa Rocketry”.
- d. Mark down sale on t-shirt inventory.
- e. No refunds.

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## Flight Safety Review

1. Flight Safety is responsible for ensuring the flier has followed the safety guidelines related to stability, construction, propulsion and recovery.
2. All fliers regardless of age must have a badge.
3. All fliers must fill out a flight card and check the box agreeing to the rules.
4. If there is anything unusual about the rocket or there is any doubt about the rocket, contact the Launch Director or Range Safety Officer
5. For model rockets flying A – C engines made from a kit
  - a. No certification required for person doing the review
  - b. Verify that engine used is recommended for that kit.
  - c. Verify that engine is securely retained.
  - d. It is OK for igniter to be in motor. Igniter should be held in with plug or tape.
  - e. Verify no loose or broken fins, no zippers or damage to airframe that would affect flight, and external components like launch lugs are securely attached.
  - f. Verify model can be held by nose cone without coming apart and nose cone is not on too tight as to prevent ejection of parachute.
  - g. Verify that wading or other means of protecting the parachute has been used.
6. Flight Safety for all other rockets
  - a. Must be made by a L2 or higher certified person, except rockets with an M motor that must be reviewed by a L3 certified person.
  - b. Any complex or unusual rockets must be reviewed by Launch Director or Range Safety Officer.
  - c. Verify motor is not a “Sparky”. No sparky motors are allowed.
  - d. Verify that flier is certified for motor being used, except for certification flight.
  - e. If this is a certification flight, have Prefect, TAP, or appropriate NAR representative(s) inspect flight depending on certifying body.
  - f. Verify that motor being used for flight has enough thrust for weight of rocket.
  - g. Verify that construction of rocket is appropriate for the power level.
  - h. Ask where CP is and how it was determined. May be skipped for unmodified rockets made from kits.
  - i. Verify that CG is ahead of CP by at least one caliber.

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- j. Verify that electronics are unarmed and can be safely armed at pad. There should not be anything beeping.
- k. Verify that there is not an igniter in the motor for any composite motors.
- l. Verify that motor is securely retained.
- m. Determine if flight needs to be a “Heads Up” flight due to nature of rocket. Complex or unusual rockets must be marked “Heads Up”. If unsure, ask Launch Director or Range Safety officer. Mark flight card if it should be heads up.
- n. Ask if the flight will exceed 15,000 ft. If so, approval is needed from Launch Director.
- o. If there are issues, have flier step out of line and address.
- p. Sign or stamp flight card if there are no issues.

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## Launch Control Operation

1. LCO must be a L2 or higher certified flyer.
2. Responsible for making sure sky and range is clear to launch.
3. Controls access to the pads and conducts launch operations according to Range Operations guidelines
4. Controls overall range arm status
  - a. Ensures that high power launch controller is not armed when high power pads are being accessed and any remote shows armed.
  - b. Ensures that low power launch controller is not armed when low power pads are being accessed.
  - c. Coordinates with high power pad manager to make sure remotes are in the “Safe” position when they are being accessed.
5. Announces when range or portion of the range is open or closed to fliers.
6. Verifies there are no aircraft in the area when launching and ceases launch operations if there are any aircraft in visual range.
7. Controls operation of any drone that has been given authorization to fly by Launch Director.
8. Ensure all spectators are on their feet for any “Heads Up” launch.
9. Verifies any flight under parachute will not interfere with the next launch.
10. Provides audible countdown over PA prior to launching any rocket.
11. Presses launch button and visually tracks flight until main parachute is deployed.
12. Calls “Heads Up” over PA if any rocket or parts of a rocket are coming down in or near the spectator area.
13. Conducts drawings for kits every half hour and the Grand Prize drawing per the guidelines.
14. Conducts the Closet to The Buffalo Contest per the guidelines.
15. Makes any public service announcements as required.

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## Pad Assignment

A – E	Low Power Pads 1 – 12
F – G (under 80 Ns )	Mid power pads 15 - 16
F – G (over 80 Ns)	20's
H – I	20's
J – K	40's
L – M	90's
N – O	Not allowed
Complex	Call Paul or Hal
Unusual	Call Paul or Hal
Unsure	Call Paul or Hal

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## Low Power Pad Manager

1. Provides general assistance to fliers loading rockets.
2. No special requirements for this position.
3. Assists LCO with aircraft and rocket spotting.
4. Shows fliers how to switch rods.
5. Makes sure flier is using appropriate sized rod.
6. Shows flier how to use standoff and ensures rocket is not sitting on blast deflector.
7. Shows flier how to attach clips to igniter.
8. Verifies igniter continuity.
9. Makes sure rods are pointed away from spectator area and are within 5 degrees of vertical.
10. Collects flight cards and ensures they are arranged properly at LCO.
11. Measures distance for Closest to The Buffalo contest and records distance on flight cards.

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## High Power Pad Manager

1. Provides assistance to high power fliers loading rockets.
2. Must be a L1 or higher certified flier.
3. Restricts access to high power pads to L1 or higher registered flyers.
4. Assists LCO with rocket and aircraft spotting.
5. If low power pads are being launched,
  - a. Keeps fliers from getting closer than 100 ft to low power pads.
  - b. Directs fliers to south end of flight line from 20's and 40's pads.
  - c. Directs fliers to north end of flight line from 90's pads.
6. Ensures remotes are in "Safe" position before allowing fliers to load rockets.
7. Shows fliers how to switch rails and rods and that the correct rod or rail is being used.
8. For the 90's pads
  - a. Rail should be removed from pad and then the rocket loaded on the rail
  - b. Erect the rail and rocket on the pad and secure rail.
  - c. Make sure the pad is staked down
9. Verify that all rods and rails are securely attached to the pad. Especially the 90's.
10. Show fliers how to lower the rod or rail by pulling the pin and tilting it back.
11. Show how to angle and swivel the rod or rail.
12. Verifies the rod or rail is pointed away from the spectator area and is within 5 degrees of vertical.
13. Show the flier how to use standoffs and verifies rocket is positioned over and not sitting on the blast plate.
14. Assists the flier with attaching igniter clips. This must be done after any electronics are armed.
15. Help flier verify continuity of igniter.
16. Arm the remote after all rockets have been loaded.
17. Collect flight cards and ensure they are arranged properly at LCO.

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## Range Operations

1. This is an active airport.
  - a. Always check for planes before launching.
  - b. Pause launching if a plane is in the area.
2. Low and Mid Power pads can be loaded while High Power pads are being loaded.
3. Low and Mid Power pads can be launched while High Power pads are being loaded.
  - a. High Power pad manager will direct flyers to exit field to south end of flight line while Low Power pads are being launched.
  - b. Stop launching if flyer gets within 100 ft of low power pads.
4. Low and Mid Power pads cannot be loaded when launching from High Power pads.
5. Low Power, Mid Power, and High Power 20s and 40s can be launched while 90s High Power pads are being loaded.
6. Wait before launching the next rocket until it is determined that a rocket will not
  - a. Land in or near the spectator area
  - b. Has descended to the point where it is unlikely it will be a danger to the rocket being launched



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## Drawings

1. The Launch Director is responsible for ensuring sufficient kits have been procured
2. Registration will give each youth under 18 a ticket and keep the duplicate ticket which will periodically be taken to the LCO.
3. Registration will stamp the hand of each youth given a ticket with a unique stamp for the day.
4. Youths do not need to register to be entered in the drawings.
5. The LCO will conduct a drawing for rockets approximately every 30 minutes between launches.
6. The LCO will randomly draw a ticket and announce the number.
7. The LCO will verify the ticket number before handing out the prize.
8. The LCO will hand the flyer back their ticket for the grand prize drawing at the end of the day.
9. The LCO will place the drawn ticket aside to be entered in the grand prize drawing.
10. If a drawn number is not claimed, the ticket will be placed back with the other tickets.
11. The grand prize will be drawn at 4:30 each day.
12. All tickets are eligible for the grand prize drawing. Winning tickets for rockets will be added back with the rest of the tickets before drawing the grand prize.
13. The ticket holder must be present to win the grand prize. If the number drawn is not claimed, a new number will be drawn until there is a winner.
14. Drawings will cease after the grand prize is handed out.
15. All tickets will be discarded at the end of the day.

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## Closest to The Buffalo Contest

1. The Treasurer is responsible for ensuring that sufficient cash is on hand for the prizes for each day.
2. Contest is open to all registered fliers under 18 years old.
3. Each morning the Buffalo will be placed no less than 50 ft from the closest low power pad and no less than 50 ft from the flight line in the general direction of the prevailing wind if possible. The Launch Director is responsible for making sure the Buffalo is repositioned each morning.
4. Flight Safety will encourage all youth flyers to enter in the contest.
5. The LCO will determine which rockets need to have distances measured based on the rankings and if the rocket is entered in the contest
6. The Low Power Pad Manager is responsible for measuring the distance from the buffalo to each rocket entered in the contest and relaying the measurement to the LCO.
7. The LCO will write the distance on each flight card for each flyer entered in the contest and rank the cards based on distance. Flight cards for the Buffalo contest will be kept separate from other flight cards.
8. The contest ends at 3:30 PM each day.
9. The LCO will call out flyers based on distance starting from the closest distance and hand out prizes to flyers that are present. If a flyer is not present, the next ranked flyer will be called until 1st, 2nd, and 3rd prizes have been awarded.
10. Prizes are as follows
  - a. 1st - \$25
  - b. 2nd - \$15
  - c. 3rd - \$10
  - d. Only one prize per flyer

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## Big Daddy Drag Race

1. Rocket must be similar in dimensions and shape, within 10%, to the Estes Big Daddy kit.
2. Drag Race will use D12-5 motor and will be limited 9 rockets in one heat
3. Stock igniters only
4. No certification required to participate
5. If there is more than one heat, a final drag race will be held with the winners from each heat.
6. Drag races will be held at low power pad location
7. All entries must complete flight cards and go through flight safety review
8. Winner will be contestant that
  - a. Tip of rocket is first to clear rod
  - b. Is recovered in a flyable condition
9. High speed video and photography will be used to determine the winner. Launch Director has final say on winner.
10. A trophy will be awarded to the winner in each class

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## Warlock Drag Race

1. Rocket must be similar in dimensions and shape, within 10%, to the Loc Precision Warlock kit.
2. Drag Race will be run in two classes, each launched separately
  - a. Aerotech J570, limited to 4 entries per heat
  - b. CTI J425, limited to 6 entries per heat
3. Flyer must be L2 or higher certified to participate
4. If there is more than one heat in any class, a final drag race will be held between the winners in each heat of each class using a motor of the Launch Directors choice
5. Drag races will be held at 90's pad location
6. All entries must complete flight cards and go through flight safety review
7. Winner will be contestant that
  - a. Tip of rocket is first to clear rail
  - b. Is recovered in a flyable condition
8. High speed video and photography will be used to determine the winner. Launch Director has final say on winner.
9. A trophy will be awarded to the winner in each class
10. Winner's rockets for each class will be represented on next year's t-shirt

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## Minnie Magg Drag Race

1. Rocket must be similar in dimensions and shape, within 10%, to the Loc Precision Minnie Magg kit.
2. Drag Race will be run in two classes, each launched separately
  - a. Aerotech I357, limited to 8 entries per heat
  - b. CTI I345, limited to 8 entries per heat
3. Flyer must be L1 certified or higher to participate
4. If there is more than one heat in any class, a final drag race will be held between the winners in each heat of each class using a motor of the Launch Directors choice.
5. Drag races will be held at 90's pad location
6. All entries must complete flight cards and go through flight safety review
7. Winner will be contestant that
  - a. Tip of rocket is first to clear rail
  - b. Is recovered in a flyable condition
8. High speed video and photography will be used to determine the winner. Launch Director has final say on winner.
9. A trophy will be awarded to the winner in each class
10. Winner's rockets for each class will be represented on next year's t-shirt