Launch Director

The Launch Director will be a member of the ROC Board of Directors, a ROC Officer, or designee. The launch director may fulfill any of the roles specified below, so long as it does not interfere with maintaining oversight of the launch.

The primary role of the LD is to ensure that the requirements defined in the Safety Code for running a Sanctioned Launch (i.e. insured launch) are met.

The LD shall confirm that adequate safety equipment is on site including a portable fire extinguisher, first aid kit, and cellular communications.

The LD shall have contact numbers for local fire departments, police, emergency medical, and electrical power grid authority personnel.

The LD handles the assignment/delegation of subordinate role responsibilities (e.g. RSO). If the Launch Director chooses to not assign/delegate a particular role to someone else, then the LD shall assume those responsibilities onto themselves. Note: if the LD assumes the role of RSO, then the LD must be certified Level 2 or higher.

Most often, the LD and the RSO have a very tight relationship and either one can shut down the range for any reason (e.g. Safety, weather, change in AHJ approval, etc.)

Range Safety Officer (RSO)

The Range Safety Officer's primary responsibility is to assure the range is safe to launch, retrieve, and load model and high power rockets.

> **CARDINAL PRINCIPLE: Limit the exposure to hazardous situations to a minimum number of persons for a minimum time, consistent with safe and efficient operations. The RSO shall carry out the Cardinal Principle through their monitoring and execution of the Range Operations and Flight Operations outlined below.**

The RSO has authority to take necessary steps to ensure the launch is conducted safely, including pausing or cancelling the launch.

The RSO has final authority in granting a flyer authorization to launch.

The goal of the RSO is to minimize the risks to personnel and property involved in the handling, preparation, and launch operations of model and high power rocket launches.

- The RSO will review the launch plans and facilities, and make reasonable efforts to prevent incidents that might endanger human life or safety or cause damage to property
- Although the risk of such an incident can never be completely eliminated, the launch should be carefully overseen to minimize the risks involved, while enhancing the probability for success
- The RSO should always be in direct communications with the LCO, FSRs, LD (or designee) and at least one board member (normally via ROC business band radios and/or face to face)
- The RSO in conjunction with the LCO should verify those loading and retrieving rockets are aware of other flight activities taking place

RSO REQUIREMENTS

The RSO must be:

- A current member of the National Association of Rocketry or Tripoli Rocketry Association, in good standing
- Certified level two or three
- Experienced in high power rocketry
- Knowledgeable about rocket theory and hobby rocket motors
- Familiar with the rocketry safety regulations (NAR and Tripoli Safety Code, NFPA 1127, etc.)
- A safety conscience individual

At low volume launches, the RSO may also perform FSR duties, if there is no conflict with RSO duties, but should have no other roles or responsibilities while RSO.

Launch Control Officer (LCO)

The Launch Control Officer is in charge of operating the Launch Control Panels, launching rockets, and communicating launch activities to flyers and participants. The LCO shares responsibility with the Pad Manager for ensuring that unauthorized people are not allowed onto the range.

- Ensure the range and sky are clear before launching any rocket
- Arm each bank just before you are going to fly it. Disarm it as soon as you are finished with it
- For each bank you launch, check for Red cards before starting to launch the bank
    - Make sure you know why a flight is on a Red Card:
    - Is it a cert flight?
        - Verify that the appropriate witnesses are watching any cert flights
    - Is it a high altitude flight?
        - Coordinate with the FAA Authorization Holder to ensure any necessary high-altitude windows are open before launching high altitude flights (>7000' AGL)
- Ensure pads are angled away from the safety area and spectator areas
- If rockets drift near the safety zone, stop launching until the pads can be re-aimed
- If you're flying an "L" or "M" motor, make sure that the necessary banks are unoccupied and no one is within the minimum safe distance (this would apply for all motors but particular attention should be paid to L and M motors)
- Check the sky for aircraft, and check the range for people who are where they shouldn't be
- If range and sky are clear:
    - Read the significant information from each flight card
    - Count down
    - Launch the rocket
- Monitor each flight until the recovery system has deployed
- **Monitor a flight to the ground if it will land near anyone**
- If you (or your spotter, if you have one) see a rocket drift (or fly) over the spectator area, call "Heads Up!" and point out the location of the rocket, repeating as necessary until the rocket is safely on the ground
- If flights begin to consistently drift toward the Safety Zone or Parking Area, suspend launching until the pads can be re-aligned for safe flight
- In the event of a misfire, **LEAVE THE ROCKET THERE** and keep everyone away for **at least five minutes**. Announce that the flyer will need to replace their ignitor when the next group goes to that bank.
    - Hand the flight card back to the PM.
        - The person whose igniter misfired will need to go out with the next group going to that bank of pads to replace the igniter.
        - If there are lines, or at the LCO's discretion, ask the flyer to pull the rocket, correct the issue, and get a new pad assignment.

Flight Safety Reviewer (FSR)

The Flight Safety Reviewers are responsible for ensuring each rocket has been checked before each flight, and also for ensuring that the flight cards are filled out correctly and completely, and that the flyers are authorized to fly. Each FSR must be HPR certified to at least Level 2.

The FSR must first verify that:

- The flyer is wearing a wristband of a color indicating that they have registered to fly on the current day, have paid their range fees, and have signed the liability waiver. All flyers — including ROC Executive Members — must register, pay their fees, sign a liability waiver, and obtain a wrist band before flying
- The flyer is certified to the appropriate level, if flying a high-power motor. Ask to see the flyer's current (unexpired) NAR or TRA membership card if there is any question
    - Note that motors with higher than 80 Newtons of average thrust and "sparky" motors require Level 1 cert, regardless of thrust category– G125, F240, etc…
    - Multiple motors totaling over 160 NS requires certification
- The flyer has filled out the "bold" sections of the flight card legibly and completely, and has initialed the card where indicated to acknowledge personal responsibility for his flight

The following information **MUST** be present and legible on the flight card:

- Flyer name
- Flyer current cert level and TRA/NAR number(s) (if HPR flight)
- Date
- Motor(s)
- Launch rod or rail size
- Initial to acknowledge personal responsibility.
- When reviewing a red card
    - Determine how high (for high altitude)
    - If it is a certification attempt
        - Is the appropriate paperwork complete
        - What level, what organization, and who is the witness
    - For other "special" flights, why are they "heads up" and what provisions are there to ensure safety

The FSR should then inspect the rocket and question the flyer in order to reasonably assure that the rocket will make a safe flight. Some of the items to consider for every flight:

- Are the launch guides secure?
- Is the motor retained securely?

- Is the motor certified and approved by the California Office of the State Fire Marshall? (It is the flyer's responsibility to identify the motor and produce documentation for FSR examination.)
- Is the rocket construction sufficient to survive flight on the installed motor(s)?
- Is the rocket stable? (Ask the flyer about the CP location and how it was determined, and obtain the CG by balancing the rocket.)
- Will the rocket drag- or pressure-separate?
- Will the rocket recover safely?
- If electronics are used, how are they "safed" and "armed", and what precautions have been taken to ensure that they function as planned?
- If motor ejection is used, is the delay appropriate for the flight?

If the FSR is not satisfied that the rocket will make a safe flight, then **the FSR SHALL refuse to allow the flight.**

Pad Manager (PM)

The Pad Manager is in charge of assigning pads to flyers, and shares responsibility with the LCO for restricting access to the range area.
As soon as the rockets on a bank of pads have flown, the PM should collect flight cards and assign flyers to the empty pads on that bank, based on the size of rod/rail needed, and the size of the motor (both should be marked on the flight card).

In assigning pads:

- The flight card MUST have been initialed by the RSO or FSR.
- The flight card must be legible, and include the name of the flyer, motor, certification information, and rod or rail size.
- Anyone under 18 **MUST** only be assigned pads on the front row, unless accompanied by a responsible adult flyer.
- Only flyers over 18 years of age may fly off the middle or back rows without supervision.
- The Front row is only for motors up to "G"
    - *NOTE: This does not include high average thrust (>80N) or "sparky" motors, or rockets with more than 160 NS total—they must be treated like "H" motors. (e.g. G125, F240, F101, etc.)*
- The Middle row is only for motors up to "K" or Complex rockets (clusters/airstarts/staging) up to "J" total impulse.
- The Back row allows flights up to "M" or complex rockets up to "L" total impulse.
- Complex "M", those with more than 1 motor and more than 5120Ns total installed impulse, must be flown from beyond the back row--contact a Board Member for assistance.

Do NOT assign any pads unless those pads are already EMPTY.

If there are any people already loading rockets on a bank, avoid assigning any more people to that bank, even if there are empty pads on that bank.

As soon as a side is open to load, send out one, and only one, batch of people to each of the three banks to load their rockets, as a group. If you have Pad Helpers, send them out with the groups.

If the LCO hands you a card for a misfire, put it back in the slot for the pad to remind you that the pad is still in use, so you won't assign anyone else there. When the person who had the misfire comes back with a new igniter, wait to send them out with the group that is loading rockets on the empty pads at that bank. If there is a line, or at the LCO's discretion, a rocket that failed to launch should be pulled from the pad and reassigned after the flyer ensures it is prepped for flight.

When the LCO finishes launching a "side", hand him the cards for the next "side", arranged Front bank, Middle bank, Back bank, with cards arranged in numerical order within each bank.

For special (red card) flights or flights from “away” or hybrid pads, notify the LCO that there are special flights in that group.

If there are any red cards indicating the need for high altitude windows for that “side”, remind the LCO to coordinate with the FAA Authorization Holder

FAA Authorization Holder

Will be responsible for:

- Ensuring the waiver is open before any high power launches
- Calling the FCC to open high altitude waivers as needed
- Closing high altitude waivers when all rockets are below the normal waiver altitude
- Closing the waiver at the end of the launch

As needed, the FAA Authorization Holder may transfer duties to another responsible individual.

Pad Helper

Help folks that may need assistance in finding their assigned pad or getting their rocket ready for launch. Particularly helping youngsters and their families hook up their rockets to the front-row pads.

- Check leads and ignitors on front-row pads for shorts and pulled wires.
- Direct traffic as the different parts of the range open and close.
- Assist in ensuring launch safety.
- Help RSO/LCO/PM in assuring launch rod/rails are appropriately angled downrange

Registration Volunteer

Check flyers in, collect appropriate fees, and provide wristbands color coded to the flyer's certification level.

- Verify every flyer or spectator has a current waiver or fills one out.
- Fees are listed on registration log sheets, and when someone checks in or makes a purchase it should be logged in the appropriate column.
- Flyer's certification level should be verified on their **current** NAR or TRA membership card before issuing a high power wristband.
    - They must be in good standing with either NAR or TRA to be certified
    - For any question contact a board member
- Cash is placed in the cash box, and appropriate change returned to the flyer. Checks are placed in the cash box also.
- If someone wishes to pay by credit card, contact a board member, or designee, who is on the Square account.
- If there is a request for a high power certification flight or Level 2 test, contact a board member.
- Direct youth groups to check in with designated board member.

For any questions, contact a board member. There will normally be at least one designated board member assisting/overseeing registration.