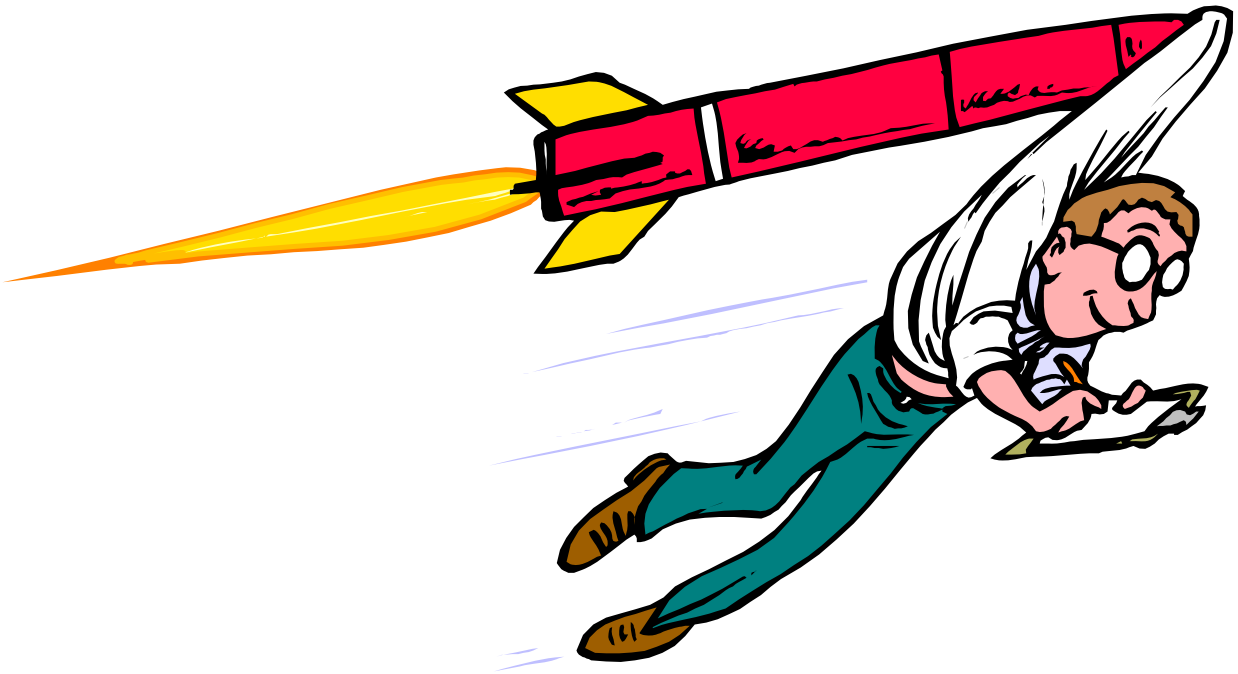

Range Safety Officer Operations Manual

Presented by the
Blue Mountain Rocketeers
National Association of Rocketry
Section # 615

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Introduction

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

Hobby maturity and technology advancements permitted the use of more powerful motors and more sophisticated models. "Mid-power" and "high power" rocketry describes the steps beyond model rocketry. Safety procedures for both mid-power and high power rocketry evolved from model rocketry. This operations manual augments those safety procedures with practical guidance for individuals acting in the capacity of Range Safety Officers (RSO's) at launches hosted by the Blue Mountain Rocketeers.

Intent

The intent of this operations manual is to assist those individuals acting in the capacity of RSO in performing standardized rocketry safety inspections on a rocketry range. The criteria for these safety inspections is based upon experience, regulatory documents (i.e. Federal Aviation Regulation 101), and codified practices (i.e. NFPA 1127.) Note that regulatory or codified practices shall supercede guidance in this document if conflicts occur.

Basic RSO Duties

The primary safety officers at BMR rocket launches are the Range Safety Officer (RSO) and the Launch Control Officer (LCO). The RSO is responsible for pre-flight inspection and approval of hobby rocket vehicles within a specified motor impulse range. The LCO is responsible for control of the range and the actual launching of the rocket vehicles themselves. **The RSO shall have the final authority to approve or disapprove the launch of a vehicle.** The RSO is responsible for verification of the vehicle's flightworthiness. The RSO inspects the rocket vehicle for structural integrity systems condition (i.e. recovery system, motor restraint), motor certification, and dynamic properties (i.e. Center of Pressure and Center of Gravity.)

As one of BMR's Range Safety Officers, through your actions, you will be instructing other BMR members, thereby increasing the level of safety awareness at our launches to continue the hobby's legacy of safety.

Rationale

As a general rule, at all BMR launches, model rocket vehicles containing rocket motors of "E" impulse or larger require inspection and approval from a RSO, with subsequent "sign-off" on the flight card prior to launch. Why only "E" and above? Why not all model rockets regardless of impulse? There are several points of documentation which support this rationale.

Statistical data has been consistently gathered from flight cards and through direct observation from literally thousands of model rocket vehicle flights posted since 1995 by the Blue Mountain Rocketeers. This data indicates that the majority of catastrophic failures (CATO's), in-flight instability and recovery system failures experienced at our club launches have occurred within the "E" through "I" impulse range.

The subsequent analysis of this data to determine the causation of these failures resulted in the identification of three dynamic factors:

1. The use of reloadable rocket motors usually begins at the “E” impulse level in the 24mm and 29mm motor casing sizes. Very rarely, if ever, has a reloadable rocket motor in the “A” through “D” impulse range been encountered at a BMR launch.

2. By its very design and nature, the use of reloadable rocket motor technology increases the likelihood of the introduction of human error, particularly in the area of motor assembly, thereby creating the increased potential for motor failure, and;

3. As a general rule, as the impulse level increases, the complexity of the rocket vehicle increases (i.e. clusters, staging, air-starts, electronics, etc.) thereby increasing the potential for failures, resulting in potential property damage or personal injury.

With this data in mind, it was determined early on that the focus of BMR’s Range Safety Officer program as well as rocketry vehicle safety inspections should begin with the “E” impulse level and above.

Range Safety Officer General Requirements

All RSO’s of BMR must be current, actively participating members in good standing with the club.

All RSO’s should be members of the National Association of Rocketry and/or the Tripoli Rocketry Association in order to be covered by the liability insurance of that organization.

Each RSO must attend BMR’s Range Safety Officer Training and orientation as outlined within this manual.

All RSO’s must be level 1 or level 2 certified through either the National Association of Rocketry and/or the Tripoli Rocketry Association.

A specific exemption to the requirement above may be made for persons who are not level 1 or level 2 certified, provided the person is a current member of BMR, and is a current NAR/TRA member who completes the training as outlined in this manual. These persons may be allowed to safety inspect rockets containing a motor or combination of motors equal to but not exceeding the “E” through “G” impulse range, which are more commonly referred to as mid-power model rocket vehicles. In all cases, no RSO will be allowed to safety inspect a rocket containing a motor or combination of motors in the “H” and above impulse range unless they are HPR certified through NAR or TRA to the level of the rocket motors being inspected.

Guidelines for the Safety Check-in Process

The following procedures are intended to offer guidance and general outlines for the acceptance or rejection of model rocket vehicles presented to the RSO for inspection prior to launch. In addition to the physical inspection, the RSO should question the flier about his or her model rocket vehicle. Ask them if they have any worry areas and what, if anything, they have done to minimize that worry.

Other questions may be directed towards specific features of the model rocket vehicle. Ask if the flier has flown the model before with the installed motor and recovery system. If, for example, electronic

recovery or staging is being attempted for the first time, ask the flier how they tested the operation of these systems prior to flight. If a lack of knowledge or skills is evident from the conversation, then consider performing a more extensive inspection of the model.

Questions to Ask

Questions 1 through 3 provide administrative guidance. Questions 1 and 2 are necessary to assure compliance with Consumer Product Safety Commission (CPSC), NFPA 1127 user requirements, as well as provisions of NAR HPR certification procedures. Question 3 is intended to assure compliance with the Federal Aviation Administration (FAA) Part 101 requirements.

1. **Is the flier over 18 years of age?**

   If not, he or she cannot legally use high power motors or mid-power motors, either reloadable or single use motors of any power class that are composed of Ammonium Perchlorate Composite Propellant (APCP). The exception to this is if these motors are being used under the immediate direction and control of a parent or legal guardian. In the case of high power rocket motors, the parent or legal guardian must be certified to the level of the motor being used.

2. **Is the flier certified to the power level being flown?**

   Both the NAR and TRA are self-policing organizations. If the rocket contains motors or a combination of motors that require high power certification through the NAR or TRA, you must ask to see the flyer's NAR or TRA membership card in order to both confirm current membership and certification level.

3. **Will the flight of the model rocket vehicle "bust" BMR's waiver?**

   The performance of the model rocket vehicle must be evaluated to determine compliance with the waiver altitude limit (in BMR's case, this is 5,000 feet). Many fliers use computer simulation software such as WRasp, RAS, Rocksim or WinRoc to determine the anticipated altitude of model rocket vehicle/motor combinations. When in doubt, ask the flier for a copy of the simulation they ran on the model rocket vehicle. If there is still further doubt, it is best to seek the guidance of another RSO.

   When estimating performance, be conservative by using a lower value for the Coefficient of Drag (Cd). Most airframes will have a Cd between 0.65 and 0.75. Use a Cd value between 0.45 and 0.50 for a conservative estimate of airframe performance. Cluster combinations will not be addressed on most performance tables. A computer simulation will provide the best estimate of the model rocket vehicle's performance. If a simulation prediction is not available, then total the impulse of all motors and the average thrust of all motors. Use this number to identify a similar single motor model rocket vehicle for comparison. If the model performance is within 15% of the waiver altitude limit, do not permit it to fly without a high fidelity prediction. In this case, 15% of BMR's 5,000 foot waiver would be equal to 750 feet, or 4,250 feet total altitude. Staged models present a similar issue. Since staged models will typically have less drag and higher performance than clustered models, the method previously described is less reliable. Use the method suggested for evaluating clusters, but allow a larger margin for error. If the model rocket vehicle is within 25% of the waiver altitude limit (equal to 1,250 feet, or 3,750 feet total altitude) do not permit it to fly without a high fidelity prediction.

Questions 4 through 7 concern rocket motors. The NAR Safety Code and BMR require the use of certified rocket motors. Question 4 addresses this requirement. Question 5 and 6 are intended to verify the correctness of the motor choice and to identify potential safety hazards associated with the igniter. Question 7 addresses the potential hazard with some reloadable designs.

4. **Is the motor certified?**

   Current rocket motor certification listings are available on the NAR's Internet website at www.nar.org. They are also printed periodically in issues of *Sport Rocketry Magazine.* **It is the responsibility of each BMR Range Safety Officer to be familiar with this list.** When in doubt, seek the advice of another RSO.

5. **Is the motor or motors adequate to safely fly the model rocket vehicle?**

   If available, consult the manufacturer's recommended lift-off weight. In lieu of this, a good rule of thumb is to use the "5 to 1" thrust-to-weight ratio method in determining adequate motor selection.

Model drag and weather conditions should also be considered. For example, high drag models (caused by basic model design or poor finish) will not go as high as a streamlined model rocket vehicle. Low average thrust motors (such as Aerotech's Black Jack propellant formulations) in windy conditions allow more weather cocking of the model rocket vehicle. The altitude may be limited due to this weather cocking, thereby causing the chosen delay to be too long. Remember that motors with longer delays have lower recommended lift-off weights than the same motor with a shorter delay. If still in doubt, ask the flier for his or her performance predictions and the prediction method for the model rocket vehicle.

6. **Is the igniter a low-current igniter?**

   Quest Q2G2 igniters and electric match current requirements are low enough that some launch systems may set them off with the continuity checks. With the exception of black powder model rocket motors, igniters should not be installed in rocket motors until the rocket is securely seated on the launch pad. A good way to safely secure an igniter is to tape it to the outside of the model rocket vehicle. (NOTE: Some of the smaller Aerotech 24mm reloadable rocket motors must be assembled with the igniter in place due to the narrow propellant grain geometry. Use common sense when evaluating this requirement!)

7. **Ask the flier if they are using a motor-based ejection charge, and if so, did they remember to install it?**

   Yes, in the past some fliers have forgotten to install the ejection charges at BMR launches. Due to some very sharp club RSO's, this potentially hazardous situation was identified during the safety check in inspection. Some motors rely on a tape disc to retain the black powder in the ejection cavity. Discs with dry adhesive or lubricant contamination on the forward face of the cavity may reduce the paper disc adhesion. Deceleration forces may cause an ejection charge failure. It is suggested that the flier back up the paper disc with masking tape around the edge to prevent it from coming free.

Physical Inspection Guidelines

Items number 8 through 15 cover the physical inspection of the basic model rocket vehicle structure and recovery system. As a RSO, it will be necessary for you to actually handle the model rocket vehicle during this phase of the safety check-in inspection. Ask the flier if there are any safety hazards (i.e. electronics-based flight systems) which may be activated by handling the model rocket vehicle.

Electronics-based ejection charges should never be armed until the rocket has been safely placed on the launch pad.

The RSO should use common sense and good judgment when pulling and pushing on model rocket vehicle parts. The effort needs to be sufficient to find marginal installations or construction, but not so great as to damage a properly built model rocket vehicle.

8. **Examine all "slip fits", such as the nose cone or payload shoulder, which are intended to separate in flight.**

   It is unacceptable for the nose cone (or payload) to separate under its own weight. If it does, the nose cone (or payload) may "drag separate" just after motor burnout. Drag separation typically occurs at the highest velocity. The effect is often recovery system failure from excessive loads. A loose nose cone (or payload) can be tightened by the addition of masking tape to the shoulder.

   Does the nose cone (or payload) slide free without excessive effort? A tight nose cone (or payload) can be caused by several problems. Paint or over-spray in the body tube or on the shoulder may cause stickiness in the sliding area. A light sanding or dusting with talcum powder can reduce the stickiness or remove the over-spray. A burr may also form at the edge of the body tube. Again, a light sanding can correct the problem.

   Check that the nose cone, if used as part of the payload section, is firmly installed. The object is to prevent the loss of the nose cone and the payload contents in flight.

   Consider the comment, "It's flown before" with caution. Temperature and humidity affect the fit of airframe parts. Parts may swell or contract, and finishes may soften in the heat of direct sunlight. A smooth fit at Spring Fling in April may become a test of muscle and patience in the heat of Blue Mountain Blast in June.

9. **Examine the launch lugs, rain buttons or T-rails.**

   Are the launch lugs, rail buttons or T-rails firmly attached to the model without evidence of cracking at the joints? Are the lugs, rail buttons or T-rails adequately sized for the size of the rocket vehicle?

   Suggestions are 1/4" minimum for model rocket vehicles up to 3.3 pounds; 3/8" to 1/2" lugs for model rockets up to 20 pounds, and 3/4" or larger lugs for model rocket vehicles over 20 pounds. Single launch lugs should be at least six inches long and mounted at the rocket vehicle's Center of Gravity (Cg). Two lugs, each spaced a minimum of two body diameters from the Cg are preferred.

The separated lugs are preferred because they better resist rotation of the model rocket vehicle on the launch rod from winds. Rotation of the model rocket vehicle on the launch rod may cause binding during launch.

Check the launch lugs, rail buttons or T-rails for paint buildup or burrs on their inner surfaces. Paint or burrs may cause binding on the launch rod or within the launch rail. A rolled sheet of sandpaper can be used to remove burrs or paint from inside launch lugs.

10. **Examine the fins.**

Are the fins mounted parallel to the roll axis of the model rocket vehicle? In other words, are they glued on straight? Attempt to wiggle the fins at their tips. There should be no movement and minimal flexing. If the fins flex, is the fin material appropriate for the model rocket vehicle? Model rocket vehicles powered by "H", "I" or "J" impulse rocket motors should use 1/8" plywood or fiberglass G10 material at a minimum. Higher powered models and high aspect ratio fins (large fin span versus fin chord) require additional strength to resist launch loads and possible fin flutter problems. Laminated or built up fins should be checked for evidence of delamination. Bubbles may indicate delamination. Tapping the fin with a heavy coin such as a half-dollar will give a "dead thud" if delamination is present. Examine the fin roots for cracks. Minor "hairline" cracks may be acceptable if the fins are not loose or if the fins are mounted using "through the wall" construction. Check the fins for warpage. There should be little, if any warpage.

11. **Examine the rocket motor installation.**

Verify, if possible, that the rocket motor installed in the model rocket vehicle is what the flight card indicates. If in doubt, ask that the motor be removed from the rocket vehicle for verification. Pull on the motor to make sure it is firmly restrained in the model. If the motor is friction fitted, then it should not move when strongly pulled. A positive means of motor retention such as a motor clip or bolted washers is preferred. Verify that the motor cannot move the retention device aside and then eject. A wrap of tape around the motor retention clip(s) to restrain them against the motor is suggested.

12. **Can the motor "fly through" the model rocket vehicle?**

Push on the motor nozzle end of the motor. The motor should not move forward within the motor mount tube, nor should the motor mount tube move within the airframe of the model rocket vehicle. Try to determine the type and quantity of adhesive used in construction. Any evidence of "hot melt" adhesives should make the model rocket vehicle suspect. Motor mounts should typically be mounted with epoxy adhesives with a sufficient quantity to form fillets at the centering ring to body tube joints.

13. **Is the model rocket vehicle stable?**

Find the Center of Gravity (Cg) of the flight-ready rocket vehicle, with motor(s) installed and recovery system packed, by finding the model's balance point. Where is the Cg relative to the leading edge of the fins? On a single staged model with only a rear set of fins, the Cg should typically be forward of the forward root edge of the fins.

Canards, wings, forward swept fins and strakes will require the Cg to be further forward. Multi-staged models must be evaluated for each stage. Ask the flier to show the Center of Pressure (Cp) location on the model (and less each stage for a staged model). Most fliers will have the

Cp clearly marked on their model rocket vehicles already, but don't always expect this to be the case. Request to see the calculations when in doubt.

The Cg must be at least one body diameter forward of the Cp in each flight phase. Note that sub-scale model rocket vehicles may, in most cases, also be flown to show stability of the full-size model rocket vehicle.

Hybrid powered model rocket vehicles must also be examined carefully for stability. Unlike most solid fueled model rocket vehicles, the Cg of a hybrid model may actually move aft (to the rear) during flight. The rearward Cg shift may destabilize the model rocket vehicle. To be conservative, determine the Cg of a hybrid model rocket vehicle with the solid fuel component in place, but without the oxidizer loaded.

14. **Recovery system inspections**

If the model appears neglected or of marginal construction, or the builder does not display good knowledge of model rocketry practices during the safety inspection, ask to inspect the recovery system. Pull on the shock cord several times. The shock cord must not be cracked, cut, frayed or burnt. Discoloration from ejection operation is typical and generally not a problem. Make sure that the shock cord is securely mounted in the model rocket vehicle. Make sure any knots in the recovery system will not loosen or slip. Recovery system hardware, including screw eyes and swivels, need to be strong enough for recovery loads, mounted to solid structure as necessary, and all fasteners are tight. Inspect "quick links" to verify that they are not likely to pull apart under recovery loads. Is parachute protection from the ejection charge adequate and nonflammable? Verify that the parachute is undamaged, including no loose suspension lines and no tears or burns which may spread during recovery. Is nonflammable, bio-degradable (no fiberglass) wadding being used?

15. **Vent holes**

Does the booster section have a vent hole? Typically, a 1/8" to 3/16" hole is drilled in the booster section just behind the nose cone or payload shoulder area. This hole is intended to vent the model rocket vehicle's internal pressure to the outside. It is recommended practice on high performance (high altitude) models because it prevents the internal pressure from prematurely separating the nose cone or payload section.

16. **Check for open holes between the motor mount tubes**

If the model rocket vehicle contains a multi-motor cluster, look for any open holes between the motor mount tubes. Are the holes sealed to prevent ejection charge gases from venting out?

17. **Black powder / composite motor combinations**

If black powder and composite motors are mixed in a cluster, are the composite motors the first to be ignited? Composite motors are harder to ignite than black powder motors. The model must not separate from the ignition system before the composite motors are ignited.

18. **Series or parallel?**

Are the motor igniters for the cluster wired in parallel, not in series? Check for shorts which may prevent igniter failure.

19. **Are the igniters matched?**

    Are the igniters “matched?” Are they of the same or different manufacture? Igniters having different current requirements may not light at the same time. Igniters that light quickly may ignite their rocket motors prior to the ignition of other motors in the cluster. The model may leave the pad before all the other motors are started.

The following four items concern the use of electronic systems for parachute or staging operations. Item 4 addresses problems particular to the use of mercury switches. Although generally obsolete and unreliable, less knowledgeable fliers may still attempt to use a mercury switch for staging. It is understood that not always will the electronics be available for direct, physical RSO examination. It is here that the RSO will need to rely on the flier’s knowledge and skill base through specific questions in order to make a determination to allow the model rocket vehicle to fly or not.

20. **Ask if electronics are used in the model rocket vehicle.**

    In particular, verify that any on board electronics systems are being used for parachute deployment or staging operations. Examine the electronics for items that may dislodge (i.e. motor igniters) or break during flight. Are heavy items such as batteries, adequately supported to prevent coming loose from flight stresses?

    How did the flier verify the functionality of the electronics? When was the last time the electronics were checked? Are the batteries fresh? If the recovery is altimeter-based, has the flier verified its operation, such as in a bell jar with a vacuum pump?

21. **Individual safety**

    Will the use of the specific electronics package expose the flier to accidental discharge during arming or disarming? Does the electronics package indicate whether or not it is armed?

22. **Safety checklist**

    Although not a requisite to approving the flight of a model rocket vehicle, does the flier have a checklist or reminder to arm the system prior to flight and disarm the system upon landing?

23. **Mercury switches**

    Mercury is a very toxic and difficult substance to handle. Due to both the environmental and personal contamination risks involved should a model rocket vehicle containing a mercury switch crash, the use of mercury switches is not authorized at any BMR launch. There are much better, widely recognized and accepted alternatives to the use of mercury switches currently available on the market.

FINAL RECOMMENDATIONS FOR NEW RANGE SAFETY OFFICERS

Trust, but verify.

For the most part, rocketry enthusiasts who attend BMR launches are trustworthy, responsible individuals. They err on the side of safety as a general rule. However, the continued loss of launch sites throughout the Pacific Northwest are forcing many people to seek a new place to fly their rockets, which means BMR is seeing more and more people we don't know attending our launches. Be sure that when you get that flight card in your hands that you make sure all of the spaces on the card are filled, and that those spaces that are filled contain correct and proper information. Don't sign off on any flight card until you are confident you have done everything within your power as a RSO to insure that the flight will be a safe one.

Don't let personal prejudice or opinions influence your determination to allow or disallow a flight.

For example, in the past, some flights have been disallowed because they used braided elastic shock cords rather than tubular nylon. If the model rocket vehicle is a kit that came supplied from the manufacturer with an elastic shock cord, this is perfectly acceptable. As the weight of the model rocket vehicle increases, then tubular nylon may well be the proper choice, but tubular nylon is not ***THE*** exclusive material of choice.

Do not let personal conflicts get in the way of allowing a flight. Just because you may not like a person is not grounds for you to disallow a flight. If the rocket passes all of the safety inspection criteria, then it should be allowed for flight.

Be courteous and helpful.

Care should be taken to work with each flier should a problem be identified with their model rocket vehicle. Should a problem be identified, take the time to explain why the situation is a problem, and share with them the steps needed in order to remedy the problem. Many times, such problems can be resolved at the launch site with a little help from others, thereby allowing the flight to take place later on. Should the flight be disallowed, take the time to explain the reasons behind your decision. Usually the flier will understand when the RSO takes the time to explain things. By handling yourself in this manner, this is called "professionalism" and it exemplifies the BMR concept of "service to membership."

Be understanding and fair, but firm.

Take the time to listen to the flier, but at the same time, be firm in your resolve. If you have disallowed the flight for obvious safety reasons and/or concerns, then stick by your decision. No RSO within BMR has the authority to overturn the decision of another RSO. **The RSO's word is final,** and most fliers with any launch experience will readily know this. If the RSO is courteous, fair and helpful, they will generally have no problems. If however, you are experiencing problems with a particular flier, do not create a scene or become embroiled in an argument on the range. Refer the flier to the Launch Director, Section Advisor or a BMR Board member.

The RSO is under no obligation to allow model rocket vehicles to fly. In all cases, the RSO's primary responsibility is to insure the safety of the group by verifying the flightworthiness of mid-power and high power model rocket vehicles. If, in the RSO's best judgment, a model rocket vehicle is unsafe, then it shall not be passed for flight. If technical doubts are present, then the RSO should consult

with other RSO's to arrive at a consensus. The flier's excuses, including long drives and launch expenses should not compromise the RSO's decisions.

Above all, have fun, learn from your experiences as a Range Safety Officer, and take the time to pass on to others what you learn from your experiences as well as putting them to use in your own pursuit of the hobby of model rocketry!

For More Information:

To inquire about the National Association of Rocketry's Training Safety Officer Program, contact the NAR at 1-800-262-4872, or log on to the NAR's website to download a free copy of the training program in PDF format at:

http://www.nar.org/pdf/TSO.pdf

Acknowledgements:

Model rocketry and high power rocketry safety codes courtesy of
The National Association of Rocketry
http://www.nar.org

BMR Range Rules courtesy of
The Blue Mountain Rocketeers

Blue Mountain Rocketeers Range Rules

All aspects of the NAR Safety Codes for model and high power rocketry will be observed.

In order to avoid invalidating NAR insurance, only rocket motors certified by NAR, TRA or CAR will be allowed. No experimental motors (EX) will be flown.

Rocket motors of "A" through "I" impulse are allowed. Rocket motor flights larger than "I" impulse must be submitted to the BMR Board of Directors for review and approval no later than one week prior to the intended launch date. This is to verify that the flight will not break the waiver, to insure the recovery of the rocket remains within the boundaries of the launch site, and to prepare for any special ground support equipment needs.

A HPR Incident Review Board will review any launch or recovery incidents involving high power rockets. The Review Board will report directly to the Board of Directors, who in turn will advise the Section Advisor of the necessary steps to reduce the possible recurrence of the incident.

When the wind speed exceeds five (5) miles per hour, a launch rod velocity of at least four times the wind speed will be required of all rockets flying on "H" impulse or larger rocket motors.

As per NFPA 1127, no igniters will be placed within rocket motors of "G" impulse or larger until the rocket has been safely placed on the launch pad.

A flight card will be filled out for every flight.

All rockets being flown on motors of "E" impulse or larger must be safety inspected by a Range Safety Officer (RSO) and signed off as such on the flight card before coming to the Launch Control Officer (LCO) for a pad assignment.

Based on their judgment, any RSO can deny any rocket that in their opinion is unsafe to fly. Any decision of an RSO to deny a flight is final. The burden of proof that the rocket will not exceed the waiver falls on the flyer. A hard copy print out of an altitude simulation program from a proven, commercially available rocketry computer simulation program is acceptable proof.

Scale, unproven and/or scratch built designs, regardless of impulse, that are conducting their maiden flight, will be termed a "heads up" flight, and will be launched from one of the HPR pads, providing the optimum safe distance that our range layout can provide between it and spectators.

Any rocket utilizing any electronic recovery system(s) will automatically be termed a "head's up" flight. On board altimeters for the sole purpose of recording maximum altitude are exempt.

The Launch Control Officer (LCO) has total control over launch operations. No one but the LCO will be in control of the launch control system, other than for training purposes. A child or adult may be allowed to count down and launch their own rocket by permission of the LCO, with the LCO directly attending.

The area behind the LCO table has been fenced off and warning signs posted for group and individual safety. After the LCO has announced that the range is closed, no one is allowed past the fenced portion of the range or beyond the warning signs, except for photographers or persons directly involved in the recovery of rockets down range, at the discretion of the LCO.

If your rocket lands beyond the fenced area or beyond the warning signs, you must wait until the LCO announces the range is open before proceeding to recover your rocket.

All persons operating in the capacity of Range Safety Officer (RSO) or Launch Control Officer (LCO) will be active, participating members of the Blue Mountain Rocketeers in good standing with the club, who have satisfactorily completed in-house club training in these fields.

The Blue Mountain Rocketeers is a youth model rocketry club. As such, a "zero tolerance" stance has been taken with regard to substance abuse. Any person attending a BMR launch, who is observed in the process of consuming intoxicating liquor and/or drugs, or is deemed to be under their influence will be asked to leave the launch.

Every reasonable effort has been made to insure group safety. However, personal safety is the responsibility of the individual. Rocketry enthusiasts who participate in the launch activities of the Blue Mountain Rocketeers do so with the understanding and knowledge of the inherent safety risks involved with the hobby of model rocketry, and assumes all liability incurred for property damages or injuries caused by them. Further, by their participation in launch activities, they also agree to hold harmless the Blue Mountain Rocketeers, its officers and members for any personal damages or injuries incurred as a result of their direct or indirect participation in launch activities.

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