Pre-Launch Checklist

General Safety

- ❏ Ensure that at least two people are using this checklist to prep for launch
- ❏ Ensure that a trained Range Safety Officer is present
- ❏ Have first aid equipment and at least one phone available for use nearby
- ❏ Designate a “rapid response” person or persons to be the one(s) to perform duties such as administering first aid in the case of an emergency
- ❏ Designate spotters to keep track of the rocket’s descent and to point out its location as it falls
- ❏ Have adequate fire suppression equipment available for use nearby
- ❏ A fire blanket has been placed under the pad if conditions at launch are dry enough to require it

General Rocket Construction (To be done after prepping avionics and reloads)

- ❏ Ensure computer simulations have already been run of the rocket in its current construction state before launch to analyze both normal and ballistic scenarios
- ❏ Check that all fins and lugs are secure and aligned
- ❏ Check that the body tube is in good condition
- ❏ Check that the motor and ejection system are in good condition, are functional, and are securely installed
    - ❏ Ensure the proper motor and ejection have been selected for the desired flight profile and that they are certified by NAR, Tripoli, or CAR
    - ❏ Check the reload motor for proper build-up, paying special attention to the O-rings
    - ❏ Ensure the ejection charge is properly installed, and is the proper amount according to the table at the end of this checklist (Figure 2)
    - ❏ Check that the motor mount is secure, is in good condition, and will not deflect motor thrust
- ❏ Check that the recovery system is in good condition, is functional, is securely installed, and is strong enough to withstand recovery loads
    - ❏ Check that shock cords are securely attached and are not cracked, burned, or frayed
    - ❏ Check that shroud lines are not burned or tangled
    - ❏ Check that all hardware, such as snap swivels and screw eyes, is in good condition and secure
    - ❏ Check that parachute protection is installed properly and is in good condition
- ❏ Check that the electronics bay is in good condition, is functional, and is securely installed
    - ❏ Have each altimeter checked the **night before** the flight
    - ❏ Ensure the altimeters are properly installed
    - ❏ Check that the avionics are initially disarmed and that an “Arm before flight” reminder is in use

- ❏ Check that the electronics bay is properly vented and that wires do not cover any ports
- ❏ Check that the drogue and main wiring are in good condition
- ❏ Check that all electronics bay hardware and electrical connections are secured against acceleration forces
- ❏ If appropriate, check the settings of the mach lock-out / mach delay
- ❏ Ensure the battery or batteries being used are charged and in operational condition, and secure battery positions with masking tape
- ❏ Check that the ejection charges are properly set up
- ❏ Close and secure the electronics bay

Flight Check

- ❏ Check the nose cone and any stage or payload couplers for a secure and proper fit
- ❏ Check that the motor is securely installed
- ❏ Check for continuity, resistance, and cracks or flaws in the pyrogen of the igniters; all igniters must touch the propellant, have adequate electrical current flowing to them, and have no shorts
- ❏ If clustering, ensure thrust symmetry
- ❏ Check that staging delay is less than one second
- ❏ Ensure that the center of gravity and center of pressure are in their expected positions
- ❏ Perform manufacturer's checking instructions on the avionics
- ❏ Check that shear pins are installed for main parachute compartment
- ❏ Ensure drogue ejection will not cause main to deploy

Pad Distance

- ❏ Only the minimum number of personnel are at the pad to prep for launch
- ❏ All team personnel and spectators are a safe distance from the pad based upon a minimum distance table; use the table at the end of this checklist (Figure 1)
- ❏ Ensure barriers are in place to keep spectators away from the launch area

Pad Installation

- ❏ Ensure the launch controller is disarmed prior to installing the rocket onto the pad
- ❏ Ensure the launch pad is stable and is an adequate size for the rocket being used
- ❏ Ensure that enough electrical current will reach the igniters of the rocket
- ❏ Verify that the igniter clips are clean and the leads are secured to the pad
- ❏ Verify that the rocket moves smoothly on the launch rail; clean the rail and rocket as necessary
- ❏ Ensure that the igniter clips are clean and secure them to the pad; install igniter into motor
- ❏ Connect launch leads to motor igniter
- ❏ Arm the avionics system once the rocket is on the pad
    - ❏ Ensure that the Raspberry Pi systems are all turned on!

Flight Trajectory

- ❏ Ensure the launch and the flight will not be angled towards any spectators
- ❏ Double check that the rocket will not fly higher than its permitted clearance waiver; know the expected performance of the model
- ❏ Check cloud bases and winds and make sure the skies around the launch area are clear
- ❏ If needed, use a wind speed indicator to avoid launching during extremely windy intervals
- ❏ Ensure there are no obstructions or hazards in the launch area

Beginning the Launch

- ❏ Shortly before the countdown, give a loud announcement that the rocket will be launched; if applicable to the situation, use a PA system
- ❏ Ensure that all spectators are aware of the launch and that parents are in close contact with all children
- ❏ When launching, give a loud countdown of “5, 4, 3, 2, 1, launch!”

MINIMUM DISTANCE TABLE				
Installed Total Impulse (N-sec)	**Equivalent Motor Type**	**Minimum Clear Distance (ft.)**	**Minimum Personnel Distance (ft.)**	**Minimum Personnel Distance (Complex Rocket) (ft.)**
0.00 - 160.00	G or smaller	0	30	30
160.01 - 320.00	H	50	100	200
320.01 - 640.00	I	50	100	200
640.01 - 1280.00	J	50	100	200
1280.01 - 2560.00	K	75	200	300
2560.01 - 5120.00	L	100	300	500
5120.01 - 10,240.00	M	125	500	1000
10,240.01 - 20,480.00	N	125	1000	1500
20,480.01 - 40,960.00	O	125	1500	2000

Note: A complex rocket is one that is multi-staged or that is propelled by two or more rocket motors

Figure 1. Minimum clear distance and personnel distance by installed total impulse.

Ejection Charge Sizing Chart - 8PSI

- Use 8 PSI for drogue ejection - (Grams 4f powder)
Suggested use - twice this amount for main ejection

Tube diameter	**Compartment length**			
	12”	**18”**	**24”**	**48”**
3”	**.35g**	**.53g**	**.7g**	**1.4g**
4”	**.62g**	**.93g**	**1.2g**	**2.5g**
6”	**1.4g**	**2.1g**	**2.8g**	**5.6g**
7.5”	**2.2g**	**3.3g**	**4.4g**	**8.8g**

Figure 2. Ejection charge sizing chart for 8 PSI.

Image sources:

Special Committee on Range Operation and Procedure. *Launching Safely in the 21st Century*. (2005, October 29). Retrieved October 15, 2017, from http://www.nar.org/pdf/launchsafe.pdf