

Task List High Powered “Cert” Rocket Launching

Purpose: Ensure successful launching of high powered rockets (sometimes called cert rockets).

Description: This document outlines launching of high powered rockets. The rockets are usually built from scratch and are relatively simple, but teach fundamental design techniques, building techniques, and how to launch a rocket.

1 SAFETY REQUIREMENTS

1.1 Launching

- 1.1.1 Follow all the directions provided motor manufacturers when assembling the motor.
- 1.1.2 Follow the direction of the Tripoli Range Safety Officer (RSO). Keep a safe distance from the rocket launch pads and do not approach the launch pads unless RSO give the signal it is safe to approach. Tripoli designates a line to stand behind which is usually behind the launch tent.
- 1.1.3 Be alert the entire time near the launch range for a signal that a rocket has failed to deploy a parachute and is descending at a fast rate.
- 1.1.4 If a rocket is on fire, extinguish the fire before handling the rocket.
- 1.1.5 When handling motor during assembly (Sec. 2.1) and clean-up (Sec. 3.2), use nitrile gloves.
- 1.1.6 MSDS's will be brought in a binder in a trip leader's car or in a tool bag.

2 Launching

2.1 Motor Prep/Assembly

- 2.1.1 Follow the manufacturer's provided instructions on how to assemble the motor. CPSS has motor casings, but the casings can be rented at the launch site.
- 2.1.2 Nitrile gloves are recommended during this process.
- 2.1.3 Be sure no grease gets on the motor grain. This will cause improper operation of the motor, resulting in failure to ignite or continue burning.

- 2.1.4 The provided amount of black powder with the motor is more than needed. Use about $\frac{1}{2}$ to $\frac{3}{4}$ of the provided amount of black powder. Pour carefully into designated part of the motor casing.
- 2.1.5 Cap the motor ejection with the provided sticker or tape and keep the nose cone of the rocket pointing to the sky to keep the recovery charge intact.

2.2 Rocket Prep

- 2.2.1 Roll the parachute and pack it into the rocket body. Ensure there is enough shock cord for the parachute to deploy.
- 2.2.2 Ensure a pressure hole is drilled into the body tube above the piston. This will mitigate the chance of early parachute deployment.
- 2.2.3 Securely fasten bolts and washers to ensure motor casing does not fall out once motor stops burning. Hand tight is suitable.
- 2.2.4 Keep the rocket upright while the motor is installed.

2.3 Launch Pad Prep

- 2.3.1 Approach the launch pad only when the RSO gives permission to approach. The RSO will designate a launch pad.
- 2.3.2 Strip the ends of the igniter wires.
- 2.3.3 Insert the igniter into the rocket and attached the remaining wire to the launch pad. Do this with tape or winding the excess wire around the launch pad. This relieves stress from the igniter ensuring the igniter leads don't remove the igniter.
- 2.3.4 Attach igniter leads to the launch system using the alligator clips and perform a continuity test.
- 2.3.5 Evacuate the launch pad.
- 2.3.6 Tripoli Rules and Regulations can be found on the Tripoli website.
<http://www.tripoli.org/>
- 2.3.7 Actual launch instructions will be taken from the RSO during the launch event
- 2.3.8 Any off nominal behavior instructions will be taken from the range safety officer

3 Rocket Recovery

3.1 Recovering Rocket

- 3.1.1 Approach the launch pads when the RSO gives permission to approach.

- 3.1.2 Keep an eye out for any rockets that may be coming down in the vicinity while searching for the rocket in the surrounding fields.

3.2 Motor Clean-Up

- 3.2.1 Wear nitrile gloves when removing and cleaning rocket motor casing.
- 3.2.2 Do the process on a paper towel so residue can be easily cleaned and disposed.
- 3.2.3 Use buck-shot and vinegar to clean inside of the motor casing to remove the bulk of motor residue after the motor liner has been removed.
- 3.2.4 Completely clean grease using a paper towel.
- 3.2.5 Dispose of all waste parts, tape, paper towels, etc. into a trash bag.