

Parachute Duration

NARCON 2022

Terrill's Rules of Thumb:

- Use thin, light material for the parachute canopy. Best choices are; ¼ mil Mylar from ASP at <https://www.asp-rocketry.com/> , OR 0.31 mil HDPE plastic sheet from home improvement store drop-cloth.
- If you do not use aluminized Mylar for the canopy, add color with markers or ink to at least 50 % of the surface, 75% is better. Use bold, dark areas of color.
- Bigger is better! If you can't build the lightest model, build a bigger 'chute. Keep the loading (g/m^2) on the parachute as low as possible. Consider building a bigger model that takes a MUCH larger parachute to get a low parachute loading.
- Use a minimum of 8 shroud lines. 12 is best for 'chutes up to about 1 meter in diameter where I go up to 16 lines.
- Cut your shroud lines to 1.5 times the diameter of the parachute. Get the mass of the recovered airframe far below the canopy to reduce oscillation.
- Never fold the parachute more than once from peak to skirt. Thin materials do not tend to unfold aggressively.
- Pack your parachute in a clean, dry place. Avoid packing at the field if at all possible. NEVER pack a parachute on the bare grass or ground. Moisture is the enemy! Dew from the grass, sweat from your hands, or sticky exhaust residue will 'glue' the delicate material together. Field pack of a parachute should be done on a table, in a car, in the trunk, on the tailgate of a truck, or just about anywhere that is dry and out of the wind. Mylar and HDPE parachutes can be packed a day, a week, a month, or even a year ahead of time and still deploy cleanly! My record is a parachute packed for more than 5 years with a clean deploy. (Yes, really!)

Resources:

- ASP Rocketry for "Hang Time" parachutes, precut Mylar canopies, Mylar tape, and complete duration model kits.

- “Pro Wrap” nylon rod winding tread. www.mudhole.com Use size A or B. Size D is great for sport models.
- Apogee “Blue Streak” adapts well to competition. Check www.apogeerockets.com It doesn’t have tons of room for a parachute, but is a simple 3 fins and a nose cone (3FNC) model. Also consider the “Avion” kit. With weight reduction and a larger parachute, it could do OK. Apogee also carries the “Hang Time” ¼ mil Mylar parachutes!
- Check out old reliable models from Estes: the “Wizard” and the “Alpha”. The “Alpha” could benefit from a longer body tube to allow for a larger parachute. www.estesrockets.com Both of these models will be more competitive if built lighter. Consider substituting balsa nose cones, and elimination of the motor hook, rubber shock cord, etc.
- Markers and ink can be found at www.dickblick.com I have had good results with the Sharpie “Magnum” markers. I like Blick “Studio Marker Refills” for bottled ink.

Common PD Failures:

- “Line over the top” failures seem to happen when too much shroud line is outside the parachute package and the lines get pulled backward due to friction with the inside of the body tube. Keeping all of the shroud-lines inside the packed canopy eliminated this for me.
- “Bird’s nest failures” shroud-lines and shock cords tangling with each other or the model happen when the packed parachute must exit the body tube through a tangle of lines. Keep shock cord beside or behind the parachute so that the ‘chute exits into “clean” air.
- Burned lines or melted canopy result from using wadding. I have eliminated this problem by switching to foam plugs for ejection. It took a tooling investment (home made tools) to be able to make several sizes.
- Twisted lines. This is caused by wrapping lines around the outside of a folded canopy or by rolling of the parachute in relation to the lines. Try to un-twist shroud lines and shock cords at every opportunity. Twist creeps in with handling.
- Canopy stuck shut. Dirty hands, moisture, or too little talcum powder on inked parachutes cause this type of failure.

- Canopy did not unfold and inflate. Trying to fold too many times or squeezing all of the air out of a parachute can cause this. I fold only once, top to bottom. If the 'chute will not fit, I switch to a smaller size or to a bigger model!

General Guidelines for Competition:

- Learn from others. Get a mentor either locally or at a distance.
- Use online resources like those at www.nar.org
- Copy success until you know enough to design new solutions. Proven model designs, materials, and techniques can get you up to speed while you develop the knowledge to strike out on your own. Someone who practices with a mediocre model will do better than the person who shows up with an unproven “super” model.
- Practice to improve your process. Seek refinement, not repetition.
- Keep a notebook and make flight logs whenever you can remember to do so. Looking back at flight logs can refresh your memory and help you recall what worked and what did not. Take video or photos to analyze failures and fix them.
- If you aren't having fun, stop and go fly a sport model. The process should bring satisfaction. The momentary stress of the competition should give way to satisfaction of a job well done. If you go from stress to stress, then reevaluate your approach and your motives.
- Once you can get qualified flights every time, then start finding ways to improve in other areas. You may want to consider lighter materials, new construction methods, and whether you want to invest in tooling to try these things.
- Learn to compete by competing. Put stress on yourself and use every competition to learn the game and learn the process. The stress of competition is “concentrated fun”! Being under a little pressure can force you to solve problems that crop up.
- If duration competition did not get you excited, then perhaps altitude or craftsmanship (like scale models) might be your ticket!