

May 22, 2019

Modified competition flight instructions for Space Grant Midwest High-Power Rocket Competition.

**NEW DATES:**

1. Do competition flights no later than Sept. 29, 2019 – submit documentation (described below) within 24 hours of doing the flights.
2. Post-flight report (as described in handbook) due by 5 p.m. Central Time on Monday, October 15, 2019 (but we encourage you to do it within 2 weeks of your flights).
3. Announcement of final results by October 31, 2019.

Submit the competition flight documentation described below within 24 hours of doing your two competition flights and no later than September 30, 2019. This means you must fly no later than the weekend of September 28-29, 2019, though we strongly encourage you not to wait till the last moment. Indeed, fly right away (or at least over the summer) if you possibly can.

Competition flight videos (described below) can be cropped to show just key details (except for Bonus challenge videos, if any, which should be complete) but otherwise they can be quite raw – no need for carefully editing/processing. Be sure your video clips include audio (if your video system has audio) so that the motor burn can be heard - this will help us with video synchronization. If you can synchronize (or even display) clock information on the videos, even better.

In place of judges we will require that all teams have a Level-2-certified non-student “observer” to oversee their launches. This probably will be your team mentor, if present, but could also be someone involved in running the launch (like a Tripoli or NAR rocket club member). To minimize the burden on this person, they simply need to verify in writing (by sending us e-mail) that (a) the two launches occurred on the same day (no more 1-hour prep time requirement) and (b) that the rocket flew safely (flew vertically, remained stable through ascent, deployed a 2-parachute recovery system, landed at a reasonable rate (eyeball  $\leq$  24 ft/sec), landed with all parts still attached) and (c) was undamaged after each of the two competition flights.

*NEW – DESCRIPTION OF VIDEOS: As evidence of their success each team must submit video footage of the following for each flight: (a) video showing the launch from the viewing stands and/or from the pad (i.e. near the base of the launch rail) and (b) video showing the rocket as it landed (before recovery) then after being picked up (as evidence that it isn't damaged) and (c) on-board video (if doing that Bonus challenge) and (d) narrated video (see next paragraph) with no cuts showing the ground station data screen (if doing either telemetry Bonus challenge).*

*The narration on that last video should say things like “launch-by-visual” and “apogee (or drogue ejection)-by-visual” and “landing-by-visual” interspersed with statements like “launch-by-telemetry (if you transmitted that)” and/or “apogee-by-telemetry (if you transmitted that)” and/or “Bonus 1 data-by-telemetry (then read it off orally from the ground station screen BEFORE the rocket lands (which is to be reported visually, if seen, or at least estimated))” and/or “Bonus 2 data-by-telemetry (then read it off orally from the ground station screen within 5 minutes of landing (which is to be reported visually, if seen, or at least estimated))”.*

In addition, submit a copy of your on-board non-commercial sensor suite log (csv or plain text preferred), a copy of your ground station log if doing either Bonus telemetry challenge (this submission is optional, but strongly encouraged), plus an altimeter data file (one file will suffice for

each flight – must NOT be from a pressure-only altimeter device (like an Altimeter Two or Altimeter Three) for the supersonic flight) from which the judges can extract (a) peak altitude and (b) peak velocity and (c) peak acceleration, for use in the FM1 formula. Also be sure to indicate exactly which motor you used for each flight so the judges can look up (a) total impulse and (b) maximum thrust, for use in the FM2 formula. For example, files from a Raven3 or Raven4 or TeleMetrum altimeter would be acceptable, but not from a pressure-only Stratolgger altimeter (or at least not for the supersonic attempt).

The Figure of Merit (FM) equations remain unchanged from the handbook. The only change to the Flight Score formula is that “10 points for timely flights” now means “2 successful flights in a single day” – no more deduction of points for taking over 1 hour to prep for either flight (but still try to be efficient – without compromising safety, of course).

Note that your Post-Flight report, due by mid-October but we recommend you do this as soon after flying as is practical, will discuss your analysis of flight data and your observations (which might be assisted by making these videos). Thus you don’t need to include analysis/commentary along with the documentation submitted right after the flights. Remember to offer as much evidence as you can in your Post-Flight Report (preferably from multiple sources, both commercial and non-commercial) that your rocket did in fact go supersonic because non-supersonic flights, even “successful” ones, are worth fewer points.