

My Level 2 Certification June 25, 2011 – NERRF 7

By Dave Lang - NAR # 90891

I completed my NAR Level 2 high power certification at NERRF 7 in Pine Island NY. I used my newly completed Performance Rocketry X-celerator rocket which was designed by Gary Tortora and sold exclusively through Rocketry Warehouse. The kit retails for \$179.00 and is worth every penny. I bought it for \$99.00 when Rocketry Warehouse had their Black Friday Sale in Nov. 2010. That was an absolute steal for an all fiberglass rocket with two G10 beveled fin sets and an avbay!

The X-celerator is a 4" diameter x 82" kit with 54mm motor mount. The only modification I did was to add a 1" wide switch band to the avbay and an Aero Pack 54mm motor retainer which extended the length to 84".

I decided to use a CTI J355 Red Lightning motor which according to Rocksim, would propel the rocket to a safe 3311 feet for this first flight. I built a sled for the avbay to house my Perfect Flite MiniAlt/WD primary and Raven II secondary altimeters running redundant charges for both apogee and main deployment. Main chute was set to deploy at 500 feet. I set the Raven to deploy 1.5 seconds after the Perfect Flite to avoid the possibility of simultaneous charges going off. I used 1.75 grams of FFFF black powder for the apogee charges and 1.5 grams for the main charges. This was determined by calculation and confirmed by ground testing prior to real flight. The CTI motor's election charge was removed before flight. Videos of both tests are

here: <http://www.youtube.com/watch?v=HS5cQdjMpRA>

and

here: <http://www.youtube.com/watch?v=i3VH0Tftq4s>.

I had just bought a Jolly Logic miniature recording altimeter which I attached to the nosecone's Kevlar shock cord. This would be a third way to verify the actual altitude. For tracking, I chose a Garmin Astro 220 handheld GPS unit with a DC40 hunting dog tracking unit mounted in the nosecone in its own avbay. This worked out quite well as I was able to walk directly to my rocket after it landed out of sight a half mile away from the pad. These dog tracking units are becoming popular and I like the fact that the Astro 220 handheld unit can track up to 10 dogs (rockets). The system works like this: The DC40 unit in the nosecone receives a GPS signal from the GPS satellites above and transmits its position continuously to the handheld receiver. The receiver records the track of the DC40 and allows you to walk to the unit by following a compass arrow. Real nice! Click [HERE](#) to see construction details of the nosecone.

I also attached a Boostervision high definition camera to the booster section to record the flight which it did.

For NAR level 2 certification, I wrote the written exam a week prior to the flight. What was now required was an inspection by my certification team; in this case Howie from our club was to be the primary team member with Matt from NY State as the secondary. They both had their Level 2 certifications.

By the time I finalized preparation and was ready for inspection, Howie was now totally involved with his build and his certification team. So Matt became the primary inspector of my work with some comments from Howie who had seen a lot of my construction and assembly details already. After Matt's sign-off I carried my X-CELERATOR to the RSO table to have it weighed and inspected once again. All went well and off to the high power pads I went with my 14.6 lb rocket. I had already armed the GPS tracking system and a Jolly Logic Altimeter Two prior to getting RSO'd. Both units were in the nosecone which had been shear-pinned in place with three 2-56 Nylon screws. Ounce at the launch pad, I installed the igniter, armed the Perfect Flite and Raven altimeters and turned on the Boostervision camera. I then walked to the spectator area to wait for the launch.

It wasn't long before my rocket was heading aloft to 3302 feet (Rocksimed it at 3311') arcing away from us as it climbed. I saw the apogee separation and heard both primary and secondary charges go off. A 6 foot long orange streamer made it easy to track as it fell to main deployment at 500 feet. I saw it land just

beyond the far edge of the farthest soybean field. Howie handed me the Garmin Astro 220 GPS receiver which had tracked the rocket perfectly.

I followed the Garmin about half a mile (.525 Mi. to be exact) to the landing site. I realized as I approached the edge of the field that the rocket was not visible and had landed beyond the field. Thinking it was in the next field with high vegetation, I climbed up a berm to discover that the rocket had landed entirely in water in a swampy section of the back river which was between me and the field where I thought it would be. The booster section was closest to me; half submerged having landed in reeds with the video camera luckily out of the water. The camera wasn't even wet. I could see the forward section with altimeter bay was mostly submerged. The nosecone was bobbing in the water with the Garmin DC-40 submerged too! I'm amazed the signal got through the water. The 70" Parachute was farthest from me lying on the water's surface.

To say the least, I was pretty upset that we had 1000 acres of field and my rocket chose to land in water. I tried using my cell phone to call Howie to get the recovery team out to the river with a grappling pole, but his battery had died. So rather than walk the half mile back I decided to wade in to get the rocket. I grabbed the booster section with camera first, making sure to keep it high and dry and placed it on dry ground after first disconnecting the shock cord that attached it to the other components. I did this while still hanging on to the detached cord so it would not drift away from me. I then pulled the rest of the rocket and chute across the water by the shock cord watching the Avbay sink deeper as I pulled. Yikes! The chute filled with water and was difficult to pull as it submerged like a gigantic bucket. When I lifted the forward section with avbay out of the water there were no altimeter beeps and I could see through the fiberglass that the avbay was totally flooded with water which was now peeing out of every vent and crack. I turned the arming switches off. When I picked up the nosecone it too had partially filled with water. Once all the components were back on the edge of the field, I opened up the GPS bay in the nosecone and the Garmin GPS tracker was soaked but still happily blinking away. Luckily it's waterproof. I shook out as much water as I could from the nosecone and Avbay and re-assembled everything on the field and carried the otherwise unscathed rocket back to our canopy where both Howie and Matt were waiting. There wasn't so much as a scratch on my new polyurethane paint job! Howie had to go fly his level 3 project so I waited until later on for my sign off. By the time Howie was back he was a level 3 so could sign me off by himself which he did. (NAR level 2 requires two level 2 or one level 3 person to sign off a level 2 certification). It was a good day despite the water landing and running shoes that were totally soaked. Gary Tortora the designer of the X-CELERATOR came by to congratulate me on my successful level 2 certification. That was cool!

Loading the four black powder ejection charges, two parachutes, setting the two altimeters, installing the video camera.



Loading The Garmin GPS tracker into the nosecone.



Matt inspected my construction and assembly and signed it off for inspection by the RSO



Off to the Range Safety Officer for final inspection.



Rocket is weighed, inspected and I'm asked how I verified the center of pressure, center of gravity, what deployment method I'm using, size of motor etc. etc.



The RSO has cleared me to launch notifying the Launch Control Officer that this is a certification flight.

NorthEast Regional Rocket Festival Flight Card		Assigned pad	
Flyer Name: DAVE LANG		Heads Up? Yes	
Town: Williston	State: VT	Cert Flight? Yes	
Rocket Name: X-CELERATOR			
Make: Performance Rocketry		Colors: Blue / silver	
Expected Altitude: 3300'	Diameter: 4"	Length: 93"	
<input type="checkbox"/> Cluster <input type="checkbox"/> Staged <input type="checkbox"/> Air Start <input type="checkbox"/> Exceeds 5500 feet			
Engines: (Number, Type & Manufacturer of each) CTI J355 Redline			
Electronics: 1 Perfected Flite M.W. Alt w/b Raven II ASTRA DC40 GPS tracker			
Comments: L2 Certification			
Recovery: <input type="checkbox"/> Parachute Size 70" Colors Red			
<input checked="" type="checkbox"/> Dual Deploy Main Chute at 200 feet			
<input type="checkbox"/> Streamer <input type="checkbox"/> Glider <input type="checkbox"/> Motor Ejection <input type="checkbox"/> Recover Nose Separate			
Launcher Requirements			
Low Power Rod Size <input type="checkbox"/> 1/8 <input type="checkbox"/> 3/16 <input type="checkbox"/> _____		High Power Rod Size <input type="checkbox"/> 1/4 <input type="checkbox"/> 3/8 <input type="checkbox"/> 1/2 <input type="checkbox"/> _____	
High Power Rail Size <input checked="" type="checkbox"/> Standard <input type="checkbox"/> Extreme <input type="checkbox"/> Unistrut <input type="checkbox"/> Away Cell <input type="checkbox"/> _____			
RSO Weight: 14214.6		RSO Initial: LVA	
Comments:			

Off to the launch pad.



Loading the rocket onto the launch rail



Tilting back up.



Attaching the igniter to the launch controller



Arming the altimeters and turning on the video camera



Verifying both altimeters and ejection charge continuity by listening to the coded beeps from the altimeters.



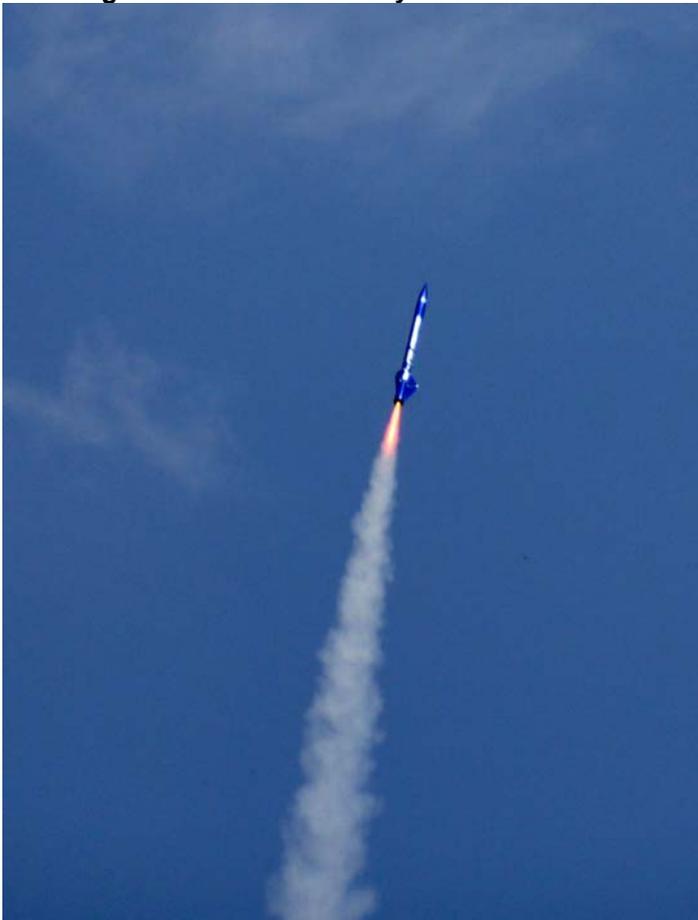
Ready to go!



3-2-1- Yahoooooo!



Off she goes into the wild blue yonder.



Approaching the end of the field with no rocket in sight. The GPS says I have another 100 yards to go!



My first glimpse was of the parachute near the far bank.



There it is!



Safely reassembled on the field with Garmin units by its side. The Launch site is way off in the background.



Bringing the recovered rocket back to my certification team to verify there is no damage and that it is capable of flying again with no repairs.



I'm certified!!



Gary Tortora, the designer of this rocket comes by the next day to congratulate me.

