

Volume 8

Issue 4

ROCKETS

MAGAZINE

THE BIRTH, LIFE AND DEATH
OF THE FULL-SCALE "P" ATRIOT

Spring Grove High-Powered
Roketry Program 2014:
THE BLACK MAMBA

Tagg Dog Tracker
for Rockets

TARC

From the Team's Point of View

The Founding of Tripoli:
Its Earliest Days

*GETTING IT UP DOWN UNDER-
FLYING WITH THE AUSSIES
PART 2-LEVEL-THREE SUCCESS*

Red Glare XVI

News and Review

THE BIRTH, LIFE AND DEATH OF THE FULL SCALE “P”ATRIOT

By Greg Kreiger Team SCAM

Finally on the pad, minutes away from flying

When I was first getting into the hobby of high-power rocketry, my quarter-scale Patriot was my favorite bird to fly. For years I always asked the question of whether or not a full-scale Patriot was possible. After I helped Dennis Watkins launch the first O motor in Indiana, at Thunderstruck 3 in 2012, the talk of building a full-scale Patriot became even more real. A few months after Thunderstruck 3, I found out I had a noncancerous brain tumor, which needed to be removed. This took a lot out of me, as brain surgery is not something to take lightly. With a lot of prayer to the Lord and a very awesome group of skilled doctors and nurses, my surgery went well.

Dennis Watkins, whom I had got hooked into the hobby many years before, came up to me and said to find out what we would need and how much it would cost to build the full-scale Patriot. After this the next question was to see who all in the club would be interested in building another group project, splitting the cost. Well, that's all it took, as many of the group members wanted to be part of something big.

After the decision was made to go ahead and take on the build of a full-scale Patriot, the question of how to construct it was asked. Through a couple of meetings with the group, we came up with a design that we thought would be durable while keeping the weight down. Since the rocket was 16 inches in diameter, we decided to construct an inner wall system. This would allow us to maximize the strength we needed while at the same time keeping the weight to a minimum. To construct this, we had Mike Gross draw the rocket full scale on a CAD program; after that was done; the files were then sent to George MacAleese, who owns his own CNC machine. We then cut centering rings and stringers that would interlock to an inside 12-inch tube.

Designing this system was such a team effort, and it paid off. Someone in the group mentioned how this was like putting a plastic model kit together. After we had the internal structure built and bonded together, we took the 16-inch-diameter sono-tube that had been fibreglassed and marked where the fins would be going. Then Mike Law and Greg Kreiger took turns with the dermal tool, cutting the slots out. After this was complete, it took pretty much the whole team working quickly to spread epoxy on the inside of the tube and on all the stringers. The team then took the fibreglassed outside shell and slid it over the internal structure. This same process was used for the payload section.

The nose cone was a pretty cool project on its own; once again, after getting a profile for the nose cone,

Greg standing next to the booster section for size



The Payload section between the booster and nose cone



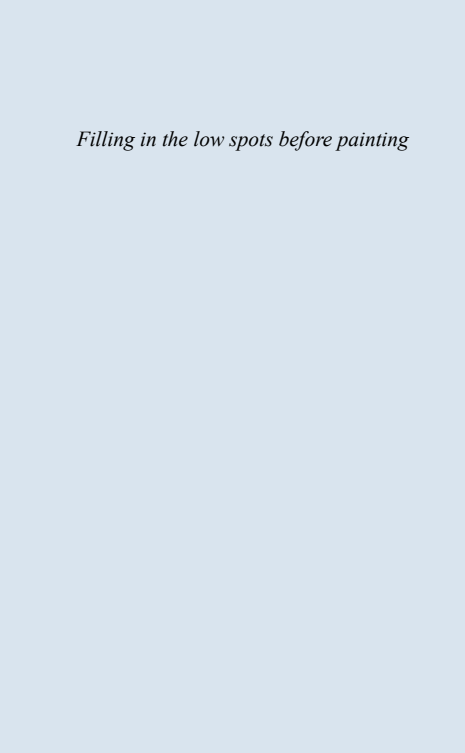
The Booster section

FREE
 Cert Casing ~ G Hardware
10% off
 Your first order use code
 BecauseIamSpecial
 www.AMWPprox.com
 978-766-9271

We Stock...
 Cesaroni
 Parachutes
 Accessories
 Kits



Foam covered in fiberglass to make the nose cone



Filling in the low spots before painting



George MacAleese cut CNC circles of pink ridged foam insulation. After that was done, the rings were glued together in the tapered shape of a nose cone. Then there were strips of heavy fiberglass laid down to give us a nice strong shell. After the heavy strips were laid down, we used lighter fiberglass to give it a smoother finish. When we were done with the fiberglass layers, we sanded the nose down to give us an even smoother surface. After that, we filled in with Bondo any ridges that were still noticeable. After the Bondo cured, we sanded the nose cone smooth, and it was ready for prime and paint. After the two flights we saw that the nose cone was a testament to how well we build it, as both times it stuck in the field upon landing with no damage.

The finishing was typical of what anyone would do for their high-powered rocket, but on a larger scale. This was accomplished through the hard work of the whole team. To get the finish smooth after the fillets were poured, we roughed the body tubes up with sandpaper and then cleaned off all of the dust with rubbing alcohol. After this we put some spackle all over the rocket to fill in any imperfections in the fiberglass. Once again, we sanded it all back down using a higher-grit sandpaper, and we then followed up with the rubbing alcohol once again. After it was all clean and dried out, we thinned out some epoxy, and then brushed it all over the rocket. It worked somewhat like self-leveling concrete and gave the rocket a very smooth finish for paint. When this was all complete, we packed it all up and sent it off to Mike Gross's house for painting, and Mike did a fantastic paint job on the bird, which pictures can't show. The decals, by Mike Hayes from Sticker Shock, were also applied at that time.


After a few months of a team-project proposal, designing, and actual construction, the full-scale Patriot was no longer just a dream. It had grown into a reality. The last step needed was to do some ground testing and to receive our Class 3 waiver from Washington, D.C. After the ground tests were complete, we hauled the huge bird over to Mike Gross's house for paint and decal application. He thought the rocket might take a week to paint, but that turned into just a few days, as he was working very hard and fast to see the finished paint scheme come to life. After the painting was done, the team then hauled the bird back to Mike Law's for final preparation for the long trip down to Thunderstruck 4. With much thought and coordination, the Patriot fit very nicely and firmly into the trailer. We had to ensure that none of the paint was scratched and no components were broken.

As a club we were really hoping to launch the Patriot on the Saturday of Thunderstruck 4, but as we looked at the forecast and were getting the Patriot unloaded on Friday morning, the decision was made early that we would be going Friday, in the early afternoon. When starting to prepare the Patriot that day, we found that everything was going together well, with no problems. Every member of the team was contributing to getting this huge bird together for the flight and double-checking each other's work to make sure we did not overlook

Recovery system testing.



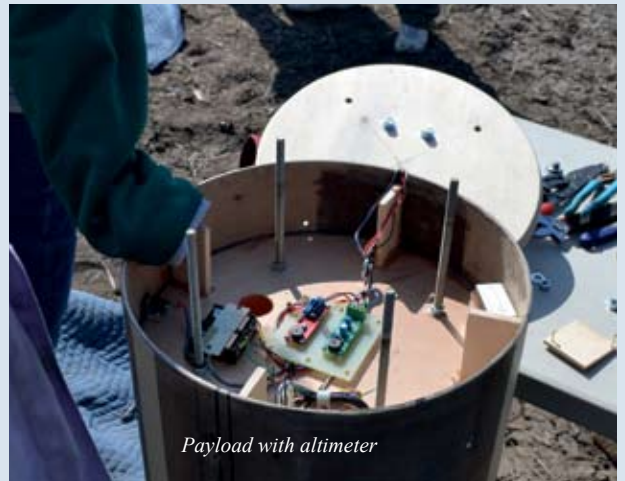
Python rocketry
Want to make a big rocket ?
An up or down scale ?
Can't find a nose cone ?
Don't want the hassle of trying to make one ?
Custom nose cones,
almost any size or shape made by
Python ROCKETRY



Made with high density foam.
Just cut, or glassed.
Very reasonable prices.
info@pythonrocketry.com
for more info or quote.
www.pythonrocketry.com



Air foil buttons



Payload with altimeter



On the pad one step closer to flight



Going on the pad with help



Everything on the field at the start of assembly

something.

Finally we received the okay from the LCO to go ahead and haul the Patriot out to the away cell. Fortunately for us, the tilled fields were dry, and we were able to drive the booster and the heavy launch tower to the pad.

We got the payload sections out to the tower. On our arrival, the reality of putting this huge bird on the rail and sending it soaring into the sky was starting to really set in. It was like the feeling you get when going for your Level One or Level Two certification: Did we do everything correctly? Have we forgotten anything? We first put the booster section on the rail, followed by the payload section. After arming the on-board camera, we put the Patriot into its upright position. This took all of the team's muscle to not only lift the rocket itself but also to deal with the weight of the launch tower. Arming the electronics was the final step; after getting good tones and beeps, we were ready to go. The group took some pictures and then left the area while Dennis Watkins hooked up the igniter. The countdown was initiated.

With the push of the button, the P-8000 roared to life, and the noise was very deep. The rocket flew very straight. A few seconds after burnout, it was very apparent that we had a premature separation. As the rocket tumbled to the ground, we saw that everything was still connected. As the two tethered pieces got closer to the ground, the main charges blew, and the chute started to deploy, then, as quickly as it had deployed, the chute folded up again, and the rocket crashed into the ground. With an empty rocket weight of about 260 pounds, we were sure the damage was going to be extremely bad. Well, when we arrived at the scene, we were very surprised to find that the only damage was to the booster tube. Everything else was completely fine.

As for the parachute failing, many might have thought it had become tangled as it opened, but it became very apparent that one of the three large ejection charges had singed the shock cords, and the force on the line when the chute opened had snapped one of the two, causing the chute to lose air. When we got back to the launch line, the question on everyone's mind was; could we fix this beast and fly it again?

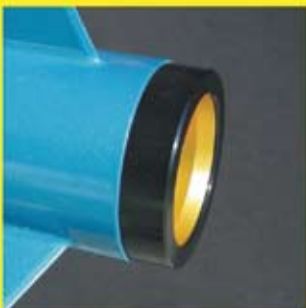
The decision did not take long, and it did not take us long to rebuild the damaged booster tube and aim to fly again at Thunderstruck 5.

For the second flight, we went up on the same P-8000 by Cesaroni. The rebuild pretty much consisted of stripping the body tube off of the internal structure of the booster section. We then fiberglassed a completely new tube, then slotted it to slide around the fins as we bonded it back on the internal structure. After that was cured, we added another hole in the altimeter bay to house another GoPro camera, and we also put an angled mirror to take video looking down the side of the rocket. When looking back on the first flight we wanted to do everything we could to prevent an early separation from happening, so we added a tube that would allow the air pressure inside the rocket to be regulated. Once again, it was off to paint, and we were just waiting on the class 3 waiver to come through and for good weather.

AERO PACK INC TOOL-FREE THREADED MOTOR MOUNTS

» Quick-Change Motor Retainers, Tailcone Motor Retainers, Min-Diam Motor Retainers, Motor Adapters «

» SS Ball Bearing Swivels, SS Hardware, 1010 & 1515 Low-Drag Rail Guides, J-B Weld, Laser Engraving «



54mm Standard Retainer



75mm Flange Type Retainer



54mm to 3.9" Tailcone Retainer



Minimum Diameter Retainer

sales@aeropack.net

<http://aeropack.net>

phone: 858.566.2900

When we arrived at Thunderstruck 5 on Friday the wind was gusting at over 40 mph. Needless to say, no one was flying that day. We were able to get the Patriot out and prepped for the next day. With the easy design, the prep was fairly fast for the size of rocket. After the prepping was finished, there was nothing to do but wait for Saturday.

When Saturday came, it was obvious that the full-scale Patriot was gaining some attention from people who had seen it fly the previous year, people who had heard about it from the previous year, and even people new to the hobby. I am pretty sure the favorite question we heard from people new to the hobby was “Does that really fly?” Well, after the long haul out to the pad, we set it up and waited for the countdown. The rocket once again roared to life, and it flew straight as an arrow. The flight went just as planned until the main charge. When the main blew, the chute never opened, and the rocket once again slammed into the ground. There was hope as we had built this rocket like a tank, and the rain from a few days prior had made the field very soft. Unfortunately this time we were not so lucky. The only thing that survived was the nose cone.

As a group we had no complaints about the flights. In the hobby of rocketry there is always the risk of something going wrong, and the bigger, faster, and more complicated they get, the more chance there is of something going wrong. As a group we were part of rocketry history in the state of Indiana, as we were the first to launch a Class P motor, back at Thunderstruck 4. More importantly, with hard work and sacrifice, we as a group launched a rocket weighing over three hundred pounds, and it traveled over 14,000 feet, twice. Now the question is “what’s next”?

Lastly I would like everyone who had something to do with this project to be recognized in the article. So here is the team and some others who made this all possible, not once but twice. As for next year, there are some ideas starting to swirl about what we could do, but nothing solid yet.

Meet the team:
Brian Ivanovic
Greta Ivanovic
Jason Ivanovic
Dennis Watkins
Mike Law
Valerie Law
Seanna Law
Mike Gross
Jenny Gross
Brandon Gross
Tim Hegemier
Greg LaMaster

Joe LaMaster
Tim Jones
George MacAleese
Justin Mullens
Bill Hutson
Greg Kreiger
Dave Wyss
Mark Rodgers
Craig Marmeyer

Special Thanks to:
Indiana Rocketry Club, Tim @ Wildman Hobbies,
Mark Hayes @ Stickershock, Scott Case @ SC Precision, PJ Pilgrim ✈



Finally arming



The chute is out but can't catch any air



Stuck the nosecone



Zipper to the first centering ring

