



Success! Gas Training Flight & Cluster Balloon Flight

by Jonathan R. Trappe

In the early pre-dawn hours of May 14th, we launched the first gas balloon flight in the Carolinas in over 20 years. The flight lasted over 6.5 hours, tracked directly over the Raleigh-Durham (RDU) Class 'C' airspace, and successfully accomplished every test I had hoped to undertake.

It was quite an event. I've been to 30 countries, all over the world-- in villages where no one spoke a word of any language I knew-- and this flight ranks up there with any adventure I've ever taken.

Details of the flight follows, while some of the highlights include lifting off in the dead of night, flying through the dawn, flying over the busy RDU controlled airspace with heavy FedEx planes coming in for landings around us, a little Bonanza flying directly underneath us, and crew meeting us at our landing with warm breakfast, 53.31 miles after we launched. If you are a casual reader, you might enjoy skipping to the photos; there is a complete debrief for those interested in the gas flight.

This was a test flight using a proven gas balloon, flown along with two gas cluster balloon cells. This allowed me to perform a number of tests on the cells, while still flying under a previously tested envelope.

Thank you so much to everyone who made this flight happen, and brought me directly to my next stated goal of a cluster flight!

Details:

Our flight was delayed several days by severe weather. The rock star experienced gas pilot arrived Thursday night. We picked up the balloon on Friday, and started scrubbing the weather data, looking for our opportunity. To give you an idea of what we had to work with, let me quote the headlines of our local newspaper, *The News and Observer*: "Towns count dead after tornadoes. Cleanup begins after at least 22 people died in a trail of destruction across three states. BIG WIND IN N.C." (Do you see the capitalization of 'big wind in N.C.' I didn't add that capitalization for emphasis-- it is really like that in the newspaper.)

Clearly we didn't have a weather window, at least initially. Troy Bradley, the experienced gas pilot, was



Jonathan R. Trappe and Troy Bradley during training flight.

gracious enough to extend his stay, and a beautiful weather window came Tuesday night, May 13th. My executive at work allowed me to schedule a day away from work, and we were good to fly!

Through the gracious permission of the owners, I had arranged to use the North Raleigh private airport, where Carolina Sky Sports operates and holds their drop zone activities. This is a wonderful airport, which helped us tremendously. They had given us permission to use a certain launch field, but when the helium came, the gas provider surprised us by asking where our forklift was. Uh, we didn't have a forklift! And, you can't unload the bulk gas banks without a forklift. Apparently everyone that takes bulk gas deliveries has a forklift-- but I don't have one.

We had to go, hat in hand, to the airport owners and ask to use their forklift. They were just letting us use their field as a favor, but now we needed their help with equipment and an operator. The little forklift couldn't drive over the grassy hills to our intended launch site, so they gave us a new site, next to the hangars and multi-million dollar airplanes, let us use their forklift-- and provided a forklift operator to unload the gas. This was all done as a welcoming gesture-- there was no compensation-- they were just amazing people. (THANK YOU Paul and Nancy! Thank you Carolina Sky Sports!)

About a month prior to the flight, I had called the RDU tower and reached a controller named Curtis Cash. I asked for permission to fly over and around the RDU Class C (without a transponder) on an upcoming gas flight. After asking a number of questions, Curtis told me it would be “no problem whatsoever.” Great! At our intended launch time, in the dead of night, there is not a lot of commercial traffic-- no passenger flights arrive or depart RDU in the dead of night. The only big jets flying at that hour are providers like FedEx and UPS.

We departed to the airfield around 9:45pm Tuesday night, and I called the RDU tower to confirm our flight. I got the same controller, and he remembered me calling a month earlier (not a lot of gas flights calling for clearance, one might guess). He gave us a radio frequency to monitor, and he let us know that they would be keeping an eye out for us. Immediately after launch, we radioed RDU and got a different controller, who said “I have been briefed about your flight” so it worked GREAT for us to call ahead to inform them, and obtain their permission. No surprises for them, and a welcome reception for us.

We arrived at the airfield at 10:30 pm, and began layout of the gas balloon, installing the valve, and preparing for inflation. Three wonderful volunteers from Carolina Sky Sports joined the rest of our volunteer crew as we prepared for inflation, and we were happy to have them.

Tom Tomesetti, an experienced commercial balloon pilot, and a near 20-year veteran of flying in the area, ran the helium inflation banks. As we performed the ceremonial opening of the first valve, the gas started screaming into the balloon inflation appendix. I was not expecting a sound like this! I expected a peaceful, quiet gas inflation-- and instead the sound was a tremendous, continuous roar. Inflation continued for approximately 1.5-2 hours, as Tom cracked open new cylinders, moved the inflation hoses

from bank to bank, and drained each bottle into the envelope.

The balloon stood up like nothing I’ve ever seen. First a blob of gas in the envelope, then an expanding mass-- then slowly up skywards, sagging-- continuing inflation until it became mostly inflated, with the top of the envelope peaking maybe 50 feet above the launch field.

While the big envelope was filling, I inflated two cluster cells off of two 219 cubic foot ‘K’ cylinders: one standard cluster envelope, and one micro-vent envelope. The inflation of these was quick, easy, and wonderful. It took perhaps 5-10 minutes each, once we had everything in place. It will still be quite an operation to inflate 55 of these, and assemble them into the cluster. However, unlike the large gas balloon, there will be several stations operating simultaneously. I have eight quick-fill hoses and plan to make eight stations, so we can have eight separate balloons inflating at a time.

We attached the two gas cluster cells to the gondola, which contributed about 25 lbs net lift. (Approx. 10 lbs from the micro-vent cell, and 15 from the standard cell. Note that these numbers are weird, versus the expected lift from 219 cu ft. It seems apparent that the amount of gas in a 219 cu ft tank varies considerably tank-to-tank.) It makes sense that the micro vent cell had less lift, in that it has tubing and valves that it must also lift.

When inflation was complete, the balloon didn’t seem full. We had 13,968 cubic feet of gas, and the envelope is 14,000 cubic feet. Still, the envelope wasn’t packed. I’ve emailed the manufacturer of the balloon, Bert Padelt, to see what his thoughts are. Perhaps some of the cylinders in the banks were not full; perhaps we had a leak.

During inflation, we had filled 12 sandbags to 25 lbs each. In addition, we had two 22 pound water bladders. However, it was only in a dream that we would be able to launch with this much ballast. We unloaded 10 bags of sand before we were light enough for the crew to move us to a more open area, to prepare to weigh off.



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So, there we are: 1:55 in the morning, inflation complete, ready to launch. We had 2 bags of sand, 2 bags of water. That isn't a lot of ballast. During our pre-flight briefing with flight services, they asked if we wanted to know the unlit towers in the area. We did-- and the briefer went on for five minutes. For a rural area, this place is packed with unmarked towers! Flying at night, we knew we wanted to climb sharply up to at least 500 feet above the tallest area tower pretty quickly; we didn't want to hang out at treetop level, less we go through a tower or its guide wires before we knew it.

To get light enough to be neutrally buoyant, we dumped a full bag of sand. Then, working with our final bag of sand, we started ballasting slowly-- and that got us started! We started a light, gentle ascent, blowing to the north northeast. However, because of those towers, we didn't want such a light, gentle ascent. We wanted to pop up over the level of the towers! We dumped another 20 pounds of sand, to try to get a good ascent going. Perhaps there was an inversion layer, perhaps we were overcoming false lift that had benefited us at launch-- but we weren't getting good altitude. We switched to water ballast, and emptied half a flask.

And we were off to the races. We climbed up through 3,000 feet, which would get us clear of any local towers, and we didn't stop for a long time after that. We climbed up through a mile high, and kept going.

As we did this, we encountered different winds, and our track reversed. We crossed back over our earlier track, and we blew to the southwest. This is directly towards the city of Raleigh, with the Class C airspace. (And me with no transponder. I've got to get me one of those.)

We talked to RDU, and as I mentioned, they were expecting us, and gave us no indication that they had any issues or concerns. We would continue talking with them for the next six hours.

Our flight track continued to the southwest, and straight to Raleigh. For those in the local area, we blew over Falls Lake, over 540, near Triangle Town Center mall, and into the city of Raleigh.

It was something. We did our best to check in with chase crew on the ground every 30 minutes, with limited success. We sometimes were able to raise them on aircraft radios. We never got them on the walkies. Voice cell service was essentially useless. SMS messages, however, worked for a segment of the flight.

We did stay in touch with the SPOT satellite tracker. I pressed the 'ok' button on my satellite tracker 15 times during the flight, and it sent my lat/long position out

three ways: by e-mail to a predefined list, by SMS to a set of cell phones, and it updated a URL on the internet for those tracking from a distance. (The SMS portion actually had the lat/long cut off, because the text of my 'ok' was too long. This is a good lesson learned: make it short, so the chase crew gets your position on their phones.)

For most of the flight, when I would press the 'ok' button on the tracker, I would get an SMS message myself. So, it was reassuring to know that the satellite device was sending out the message, and it was routing to phones.

We tracked almost straight towards the RDU airport. Amazingly, I flew almost over my house. Not a problem, but not intentional. I could see my neighborhood clearly, and passed about one mile from my home. What a treat!

Then, we crossed the giant black void that is the Umstead State Park. It is much larger than I ever gave it credit for-- and it was just this vast black space, surrounded by lights on the sides, that stretched under us. We were about two miles off the end of a secondary runway, before passing the airport and hooking into the approach area for the primary runways, and the big jets. Note that we were not in the class 'C' airspace. That tops out at 4,400 feet here, and we were well over 1,000 feet higher than that.

But, we were also in the approach path. We were higher than the planes coming in, which meant that we had planes going under us. We had a giant FedEx plane go by and a Bonanza pass directly underneath us. As we looked off to the northeast, we could see we were perfectly lined up with the big runways at RDU.

The gas balloon was quite the talk of the aircraft radios that morning. ("What kind of an aircraft?" "Is that a manned gas balloon?") The controllers couldn't get any radar signature off of us, but we regularly called in our position, and the controllers advised other traffic of our position. It was cool when the other aircraft would see us. The controller informed one aircraft that was coming in near us of our position, which had us scanning the skies looking for that plane. Wherever he was, that plane responded back to the tower that he saw us-- though I never was sure what airplane it was.

Note that by this time, the dawn has come. You know how I said there are only FedEx and UPS planes in the dead of night? Well, it isn't the dead of night anymore, and RDU is kicking to life. We didn't clear the 10 nautical mile Class C ring for a couple more hours yet, until about 8:00 am.

As we approached about 9 nm out from RDU, I started conducting additional tests on my cluster cells. To this point, they were full, strong, steady, and perfect. At 7,000 feet, filled from 219 cu/ft tanks, these cells were awesome. Steady as a rock. (Ok, I guess you don't want to be trying to fly under rocks, so that is a bit of a mixed metaphor, but you get my meaning.)

We initiated one of the tests: venting gas from a cluster balloon, using the micro vent. At 7,000 feet, and six hours, lift was consistent. The balloon was reporting about 10.5 pounds of lift, compared with about 11 on the surface. So, no leaks in the micro vent!

I opened the vent, and observed the following:

First vent, 30 seconds, lost 2 pounds lift; second vent, 1 minutes, lost 1.5 pounds lift [1.5 minutes total, 3.5 pounds total lift lost]; third vent, 2 minutes, lost 1 pound lift [3.5 minutes total, 4.5 pounds total lift lost]. You can see the venting slowed down quickly. To get a couple pounds out, no problem. To get all the lift out-- you have to pop or release it. It would take literally an hour or more to drain the full cell out of the micro vents. But, I'll have seven of them-- so the first five pounds is pretty easy, times seven $7 = 35$ pounds of lift. That is a lot for this system.

During these micro vents, the sun was also warming the envelope. So, despite venting 5 lbs lift, we climbed during this time.

We were clearing the 10nm ring of RDU, and were faced with a large lake, and then miles of trees in front of us. At this point, our western progress had slowed to about two miles per hour.

It was approaching 8:00 am, and we had some adverse weather forecast for later in the day. We had also flown over many fields that looked just fine to land in. We were also light on ballast-- 5 lbs sand, 1.33 bags water. Big lesson: more ballast = more options.

We didn't want to be in the position where we were saying "man, I wish we had taken one of those fields back there...." so, we ini-

tiated our descent.

I initiated a vent from the main gas cell using the blue line. I let the valve 'snap' shut, and we popped up a bit-- you can see it on the GPS track. Then-- a descent. Not too steep, not too far. We came down from about 6,500 feet to 5,150 feet, and then leveled off.

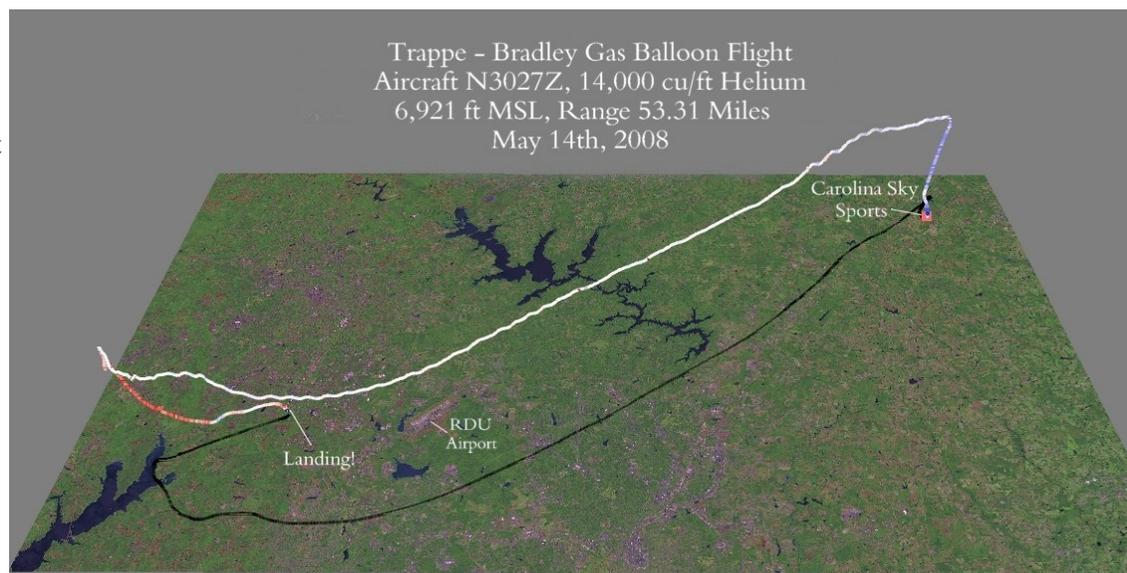
We didn't want to level off, so we initiated the next big test of the cluster cells: we popped one of the suckers! We popped the non-micro-vent balloon-- the regular balloon, that was reporting about 15lbs lift at take off. I pulled the balloon down to the gondola-- took my very sharp knife-- and POOOOM! (Troy remarked "That was cool!") And it was-- I could watch the giant chloroprene scraps fall for a mile below us-- they served as a low-level wind indicator.

And that got us into our sharpest descent. It would have taken us all the way to the ground, straight towards some giant hummers. We released ballast twice, five pounds each time. This arrested our descent, and had us tracking....back towards the airport at 18-24 mph.

We were now under the RDU class C shelf, but knew we would penetrate the inner ring of that Class C, at a very busy time of the morning, so it was time to land.

We crossed the hummers, and had a big, giant field, right next to a tiny field with big trees. Can you guess which field we were lined up with? Not the big one.

We came down to a few hundred feet, aiming for the small field, just beyond some tall trees. Right at treetop level, we started to shift towards power lines, and that was it-- we valved hard, and came straight down through the branches of a 100 ft tree. The tree was kind enough to arrest our descent!



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And there we were, landed-- with crew not 100 feet from us! Directly across the street, a waste water treatment plant. Ok, ok, wasn't the most romantic place to land. I'm not saying we landed "in" the facility, but it didn't smell right.? (We didn't exactly kiss the ground on landing. I think I'm still on the hook for some kind of shoe cleaning for the crew chief.)

Some details:

- Distance flown: 53.31 miles
- Max altitude: 6928 ft MSL
- Max climb: 505 fpm
- Max descent: 545 fpm
- Max speed: 24 mph
- Min speed: 0 mph

So, the planned gas test flight completed with tremendous success! The gas cluster cells performed phenomenally, and I feel better than ever about using them as my sole envelopes.

Thank you, thank you to everyone!

CLUSTER BALLOON FLIGHT

Jonathan Trappe flew his cluster balloon flight on June 8, 2008. The flight accomplished everything he had hoped for, achieving the altitudes and distances he desired. Jonathan has submitting an article to *Balloon-ing* which will describe the entire flight, so only a few highlights are provided here. Information is taken from Jonathan's email to your editors.

Photos are of the chair Jonathan used for the flight with the helium tanks used to inflate the balloons. The other photo is from altitude during the flight.

The crew came together at the airfield at 3 am. They worked with 55 tanks of helium, in eight stations, to fill 55 balloons. One popped on inflation, so the flight was made with 54 balloons. Inflation took about 1.5 hours, so all was ready well before sunrise at 5:59 am.

Jonathan ascended to over 13,000 ft MSL, twice. He spent brief times at 14,783 ft MSL and traveled at 32mph at 1,100 ft and 0.7 mph at 6,300 ft. Jonathan carried oxygen and had a transponder that worked off of AA lithium batteries (put together by Mark Caviezel).

He had his own discrete code from Raleigh-Durham's ATC.

After three hours, he had covered 30 miles and was 60 miles from the coast. The decision to land was made because of the flight direction - toward the coast, the current speed of 35 mph, the forecast 95° F temperature for the day and the desire not to land in thermals during the middle of the day.

Jonathan landed the cluster in 12 mph winds, backwards. He dragged across a muddy field releasing balloons until he used his 'automatic deflation system', hitting the trees at the edge of the field, rupturing 35 cells. He was safe on the ground when a curious onlooker arrived prior to his crew arriving.

Jonathan's flight was covered in the local newspapers, and he had instant fame, of a sort, when he went to Starbucks for papers with the story and coffee the next morning. ■

