Chuck gives the BeeTwo a good luck kiss before launch.

Flight of the Bee Two Revisited

by Chuck Nozicka

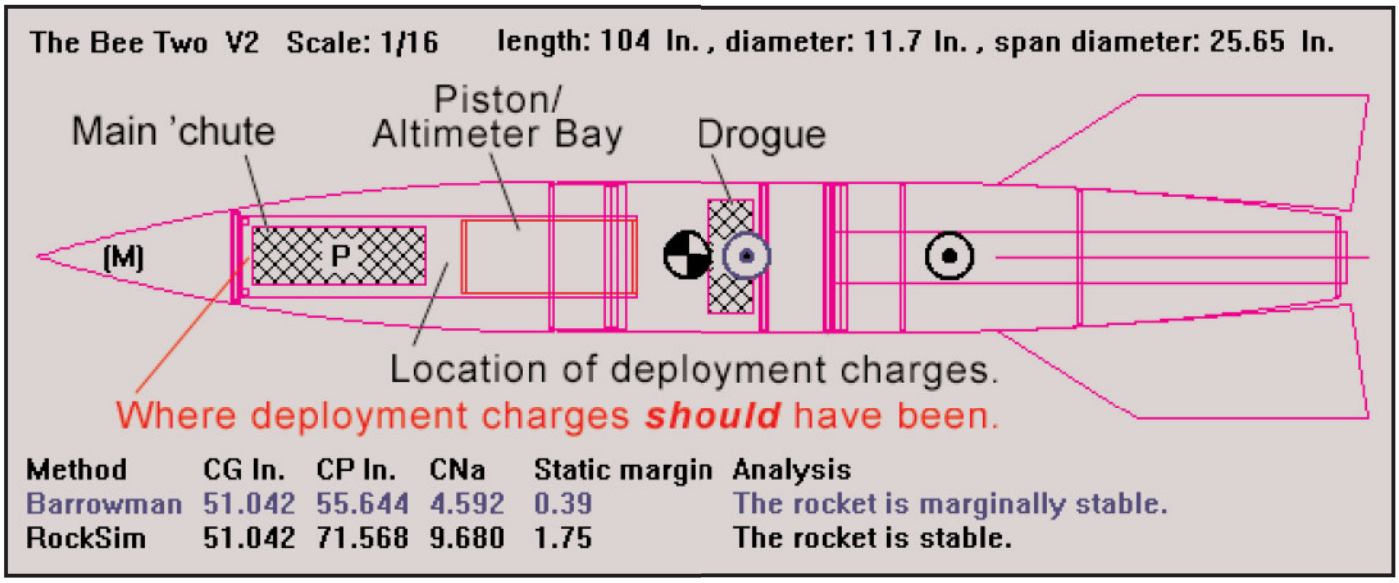
The Bee Two is a 1/5-scale Performance Rocketry V-2 that was modified to fly with dual deployment recovery. Its original flight was featured in the March/April 2003 issue *Sport Rocketry* magazine. That flight featured successful single-phase deployment at apogee of the Sky Angle main parachute. The rocket was launched on an Aerotech L1011 motor. The white lightening motor produced spectacular flight pictures. I modified the Bee Two to fly with dual deployment by fitting a six-inch by 48-inch airframe within the large nosecone. A 6" tube coupler, 12 inches long, was fitted with bulkheads on either side with an inner 54 mm airframe to serve as the altimeter bay. The altimeters are contained within this smaller airframe nestled in the larger piston/altimeter bay. The entire altimeter bay is fitted as a piston within the 6" airframe located in the nose cone. Sheer pins secure the piston/altimeter bay.

The piston/altimeter bay is vented with 1/2" tubing to a port two feet below the top of the rocket airframe. This allows the altimeter bay to unaffected by the turbulence created by the nose cone during boost and isolates it from airframe (drogue compartment) pressurization during drogue deployment. The altimeter bay must be isolated from the drogue chute compartment because deployment of the drogue could interfere with the altimeter function. A resetting of the altimeter or premature main deployment could result.

Dual Deployment Design

At apogee, charges separate the nose cone from the main airframe and deploy the drogue chute. The altimeter bay remains as a piston in the upper airframe contained within the nose cone until the main parachute is deployed by charges later at a preset altitude. For this first dual deployment flight, the altimeter bay was fitted with twin Adept ALTS 25 altimeters. I have used these altimeters extensively in numerous "Baby M" flights and found them to be exceedingly reliable. They were set to deploy the main chute charges at 1200 ft. A sky angle parachute (XL size) was placed in the 6" nose cone airframe and the piston/altimeter bay was secured in front of it. The charges were placed just rearward of the parachute protected by two Nomex chute protectors and 18" pilot chute was connected to the top of the main parachute canopy to help pull it out when the piston/altimeter bay separates from the nosecone parachute bay at 1200 feet.

Our flight took place at the Bong Recreational Area at the June Tripoli Wisconsin Association launch. An Animal Motor Works M1850 green gorilla was selected as the motor. This would give us an estimated flight altitude of 5,000 ft. The iridescent green flame trailing the



bright yellow V2 would hopefully make for some great launch photographs. On the morning of the flight, skies were overcast with a ceiling of approximately 4,000 ft. Surface winds were 10 to 20 mph with upper winds in excess of 20 knots. The Bee Two was prepped with the hope that the skies would clear. And as perseverance usually pays off, eventually the skies broke and blossomed into a beautiful sunny afternoon allowing our flight to take place. Over the years I have found never to give up on a launch day in the Midwest. The weather can change in a matter of minutes (but usually hours!), and perseverance usually allows for a flight that was thought not possible.

With the help of Frank Noble and Dan Byra the bird was placed on a 10 ft. rail (with a good luck kiss) and the countdown commenced. At zero, LCO Frank Nobile pressed the launch button and the motor roared to life almost immediately. A bright iridescent fluorescent green flame was seen chasing the Bee Two into the skies—a beautiful majestic boost. The Bee Two climbed steadily. After motor burnout, a noticeable windcocking effect was observed. This hyperbolic flight path seemed to delay deployment of the drogue for several seconds.

As the Bee Two made a large arch over the blue Wisconsin sky, I watched nervously hoping that my altimeters would deploy! After what seemed an eternity, the drogue deployed seconds after the V2 reached true apogee. It deployed without a problem and the Bee Two fell with nosecone, drogue, and the main airframe separated by approximately 50 ft. of 1/2-inch tubular Kevlar. As our skies were clear, we watched the entire flight. The large yellow Bee Two was chased by a large trail of (AMW) white tracking smoke as it fell under the small drogue chute. It was a truly awesome flight.

At approximately 1,000 ft. the piston could be seen to deploy from the airframe in the nose cone. Using binoculars the small pilot chute was seen to strip from its 1/4-inch Kevlar attachment. The main chute did not deploy from the airframe. The Bee Two continued to fall with drogue only until it landed in a forested area thick with heavy brush in the Northwest corner of the Bong launch area. We feared the worst: that there would be considerable damage to the airframe and nose cone. This is a rather large heavy bird weighing 42 lbs. without the motor.

Several hours of hunting through the

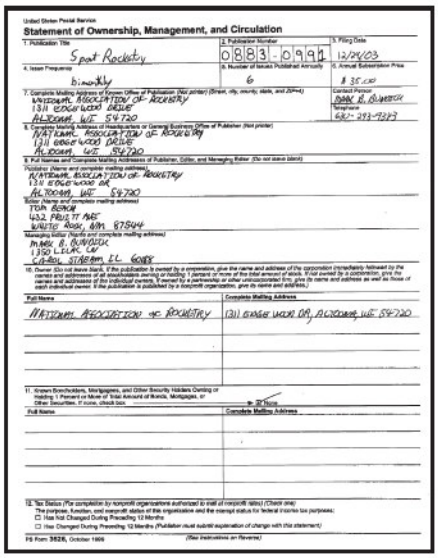
Frank Nobile looks on as Norm Heyden helps Chuck prep the altimeter piston and place it in the nosecone.
Photo by Jack Svetlik.

The altimeter bay was draped over several medium sized bushes, the altimeters beeping out an apogee altitude of 3,858 ft. The flight's altitude probably was limited by the large amount of windcocking that the Bee Two sustained during the latter part of its flight.

There was only minimal damage to two of the fins, which was easily repairable. There was no damage to the electronics, the main recovery components, or the airframe itself. Mike Dybal and Dave Zupan graciously helped me clear the bird from the brush and carry it back to the launch site. Back at the launch site, the other TWA Flyers watched as Mike Dybal returned the intact rocket majestically on his shoulder in a display of "Rocket Recovery Triumph." Another large rocket was recovered at Bong with minimal damage—a victory for all the flyers in attendance!

As each flight is a learning experience, what did I learn (or re-learn) from this flight?

1. That large rockets with a large amount of forward weight in the nosecone tend to windcock. This windcock effect limited the ultimate altitude, but not the beauty of the flight.
2. It is always better to push than pull. Next time using the same recovery system I will place the charges behind the parachute so that when the charges deploy, the pressure will not only push the piston out, the backpressure should help force the parachute out of the bay. I have retested this system, and have every reason to believe that with this minor modification the system will work fine.
3. I will again—no matter how easy I think the rocket will be to recover—never, never, never again fly without my Walston rocket retrieval transmitter.
4. Six tics later: There are a lot of tics in the summertime at Bong. No matter how hot it is, long pants—not shorts—are the order of the day!
5. High Power fliers are the best people in the world. Who else would search for hours in the brush and help carry your 42-pound rocket out of a tic infested thicket? Thanks again to Dave and Mike! Thanks also to Frank Nobile, Dan Byra, and Ed Dewey for their assistance with this flight and, more notably, its recovery!



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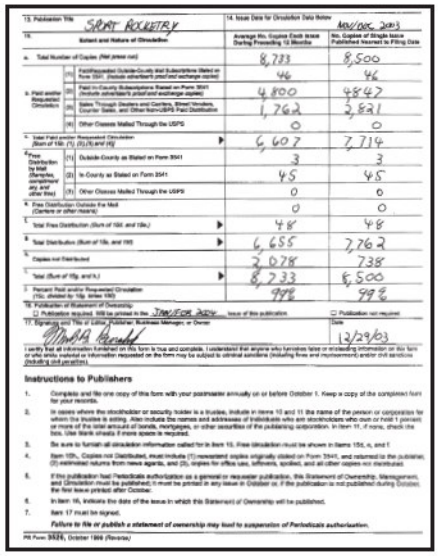

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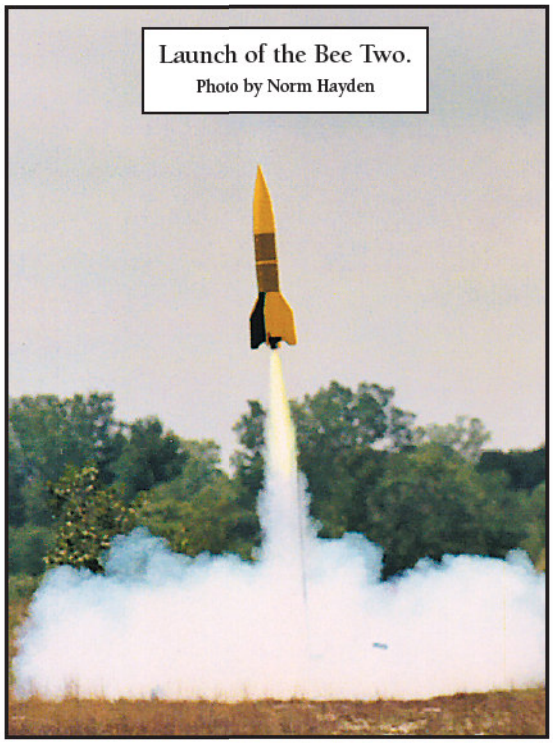

Launch of the Bee Two.
Photo by Norm Hayden

brush commenced, I was aided by Dave Zupan and Mike Dybal, two veteran fliers who have a knack of always being able to recover someone else's the rocket. The Bong brush was heavily overgrown. Eventually, Dave Zupan spotted the yellow drogue draped over some heavy brush. As I slowly approached, I feared the worst. The nosecone was embedded approximately 8" into the soft earth. The main chute was still in the parachute bay and all the shock cord lines were intact.