THE CANADIAN ROCKET RESEARCH SOCIETY

LAUNCH REVIEW (2010-2013)

originally published under 'my own private rocket program'

(above) Wilfred Ashley McIsaac takes a step back and inspects his Astrobee D III rocket shortly before it crashes into a cornfield on June 29th. The accident was a low point in the Canadian rocketmail program however McIsaac would redeem himself before the year was out.

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PREFACE

The proceeding is a detailed retrospective examining *The Canadian Rocket Research Society's* launch schedule over the past thirty-six months (2010-2013). Included in this final report are pictures, graphs, charts, diagrams, media articles, as well as My Own Private Thoughts which will help try to explain the recluse life of this rocketeer and the motives behind his actions. For anyone interested in high powered rockets, NASA, spaceflight, engineering, program management, fast speeds and high altitudes, than *'My Own Private Rocket Program'* is the story for you. Now renamed *The Canadian Rocket Research Society Launch Review (2010-2013).*

The paper includes:

-Detailed analysis of all three high powered rocket launches from 2012 is carefully inspected.

-A month-by -month program review makes the report easy to follow.

- A behind the scene look at making history and the launching of Canadian rocket mail.

PROLOGUE

MY OWN PRIVATE MISSION STATEMENT

On November 11th of 2010 I began *'My Own Private Rocket Program'* at the airfield of a World War II era military base several miles from one of Canada's most unusual natural wonders, Lake on the Mountain in Prince Edward County, eastern Ontario. Four days before the launch of my A2-R13 rocket

which was scheduled to lift-off from the taxi strip of the retired CFB airbase for a Remembrance day ceremony, I was given the go ahead to conduct a test launch down the road at the Picton Flying Club.

It was a brisk overcast Sunday morning on November 7th when I set off down an old country highway leading to the base. A rather peculiar feeling came over me as I reached the top of the 200 foot mountain and turned down the last stretch of road. Unexpectedly, I felt as though I had stepped back in time. A 1940s military base, changed little if any over the past 60 years, was impossible not to notice in the near distance. Turning off the highway through the main gate, I observed an deserted guard post immediately to the right that remained intact. I paused for a brief moment almost expecting a young soldier to jump out in front of the car and stop me from proceeding any further. As I continued into the base the smooth pavement gave way to a bumpy gravel road. Military barracks still held together by the original wood paneling flanked either side of the car. Green lead based paint is flaking off most of the buildings. Not far up ahead on the right hand side a row of oversized aerodromes run parallel to an extraordinary triangular shaped airfield. On the left side near the end of the road an older rustic aviation lookout tower incessantly watches over the asphalt runways.

Being a huge World War II aficionado myself, It is hard not to imagine the frenzy of activity around this place during the early 1940s as the British Commonwealth Air Training Plan (BCATP) became the countries top priority with the Battle of Britain now in full swing. The Royal Air forces #31 Bombing & Gunnery School was conceived in April of 1941 at the base. Young pilots flying Avro Ansons, Ferrie Battles, and other aircraft were training extensively everyday waiting for their chance to enter the field of battle across the Atlantic in Europe. The incredible sacrifices the young men & women willingly made for the sake of future Canadians like myself was impossible for me to ignore. My Grandparents were among them.

An hour later the test launch using an old Estes rocket renamed the A1-T turned into a complete disaster. In front of three elderly gentlemen who belonged to the flying club, the rocket motor blew up on the launch pad as the nose cone flew off the top and the recovery system jettisoned, now hanging over the side of the launch vehicle . The rocket had not moved an inch. Because at the time I lacked the proper igniters and support equipment, I foolishly attempted to fire a copperhead igniter using my high powered controller and twelve volts of electricity. The added amperage no doubt caused the black powder model rocket motor to explode instantly. A small defect in the motor or motor casing may have been exacerbated by the higher temperatures and the source of the accident as well. Nevertheless, my three bewildered spectators watched for several minutes in disbelief while the rocket smoldered on the pad . There would be no test launch today. Little did I realize at the time the embarrassing incident would turn out to be a prophetic moment for future events.

The accident was eerily similar to the Mercury Redstone # 1 test flight which took place in early 1960 after the NASA rocket lifted off the pad only a couple of inches before the main engine shutdown. As the eighty-three foot Redstone settled back down onto the launch platform, the capsules recovery systems were activated and ejected out from the top of the Mercury spacecraft like a cork in a wine bottle. For several hours afterwards the parachutes hung precariously over the sides of the Redstone booster fluttering in the wind until the rocket and spacecraft were safe enough for a crew to approach and remove the volatile fuel.

After the smoke cleared from my own aborted launch I eventually packed up my gear and headed back down the mountain, this time with my tail between my legs. My conviction in launching even the smallest of low powered model rockets had been shaken. It was over ten years since my last rocket had lifted off and that was from a completely different century (1997), and millenium for that matter, just like the base itself. Perhaps I had lost my touch. Not to mention losing the confidence of the three men in attendance who were already apprehensive of a rocket being launched over their public airport.

As I drove down the hill and watched the old army base disappear in my rearview mirror, the majestic beauty of the area including Lake on the Mountain disappeared. From this moment moving forward I

made a commitment to myself and to the memories of the fallen young soldiers at the base; to return on Remembrance Day with my head held high, and to somehow begin making a difference, using only the thrust from my rockets, to create a better world around me.



(left) The A1-T model rocket right before its black powder motor explodes on the launch pad during an November 7th, 2010 exercise. (center) CFB Picton hasn't changed much since the days of World War II. (right) An overview of the airfield where the A2-R13 was launched from back on November 11th, 2010 to unofficially kick off my private rocket program.

"When looking back on the past twelve months 'my own private rocket program' has experienced many ups and downs following a commitment I made in 2010 to building and launching larger and more complicated high powered rockets than ever before."

WILFRED ASHLEY MCISAAC DECEMBER 2012

LAUNCH SCHEDULE 2012

(NOTE: Due to poor weather conditions all three test flights had to be postponed (scrubbed) from their originally scheduled launch date.)

MAY 11th, 8:00 pm (only evening launch); Astrobee (Aerotech) was launched carrying five pieces of Canadian mail onboard along with the Astrologger 54 electronics package from the Gananoque airfield in eastern Ontario. The rocket reached approximately 600 to 700 feet in altitude while both the payload and main booster were recovered safely.

May 11th, 8:30 pm (only evening launch); A2-R13 was launched at the Gananoque airfield carrying a miniature Canadian flag on board as well as a simple line of sight science experiment that was to be jettisoned at apogee *(micro glitter balls)*. Approximate altitude was estimated at no less than 4000 feet. The rocket left the launch pad without incident but visual contact was lost almost immediately because of the setting sun. Neither the experiment nor rocket were ever spotted during the flight. The

A2-R13 was never found. Two subsequent searches of the airfield and surrounding area turned up nothing. *

JUNE 29th, 10:0 am; Astrobee D III was launched carrying seven pieces of Canadian mail along with two onboard cameras (Gopro and Booster Cam) from the Gananoque airfield. After three strap-on boosters failed to ignite, the rocket was unable to reach the necessary altitude needed to safely deploy its recovery system. Moments later the Astrobee D III nose dived into a cornfield from approximately 1200 to 1600 feet destroying itself on impact.

NOVEMBER 6th, 11:45 am; Astrobee D IV was the fourth and final launch of the Canadian rocketmail program carrying twelve pieces of Canadian Mail onboard. Dual electronic bays (EB1 and EB2) located inside the nose cone and aft of booster were tested. Although the integral side boosters failed to ignite, the launch (under 1000 feet) was considered a success after the payload including the mail was safely recovered shortly down range. The Astrobee D IV flight test project will continue into 2013

* following the A2-R13 disappearance on May 11th no two launches were scheduled back to back again.

LAUNCH VEHICLES 2012

(NOTE: All weights include fully loaded rockets with launch motors and payloads installed.)

A2-R13 ***LIFT-OFF MASS*** ***.96 lbs*** ***LAUNCH DATE*** ***May 11th***

ASTROBEE D ***LIFT-OFF MASS*** ***3.30 lbs*** ***LAUNCH DATE*** ***May 11th***

ASTROBEE D II ***LIFT-OFF MASS*** ***2.95 lbs*** ***LAUNCH DATE*** ***concept***

ASTROBEE D III ***LIFT-OFF MASS*** ***2.87 lbs*** ***LAUNCH DATE*** ***June 29th***

ASTROBEE D IV ***LIFT-OFF MASS*** ***3.42 lbs*** ***LAUNCH DATE*** ***November 6th***

ASTROBEE D IV (B) ***LIFT-OFF MASS*** ***3.60 lbs*** ***LAUNCH DATE*** ***December 11th***

(postponed till spring)

FLIGHT DATA AND ROCKET SPECS

A2-R13

Date: May 11th, 2012 **Launch Vehicle:** A2-R13 rocket **Stages:** 1
Motor: Composite G80 (Aerotech) **Total Weight:** .96 pounds (438 grams)

Height: 43”/3 foot 5” **Diameter:** 1.9” **Thrust/Weight Ratio:** 28.12:1
Total Impulse: 120 N-sec/ 27 pounds **Propellant Consumed:** 62.5 grams
Motor Burnout: 1.7 secs. **Delay:** 13 seconds **Altitude:** 4000 feet (min)
Flight Path: Vertical **Payload:** Miniature Canadian flag. Micro glitter ball experiment.
Launch Notes: After rocket left the launch pad it was never seen again.

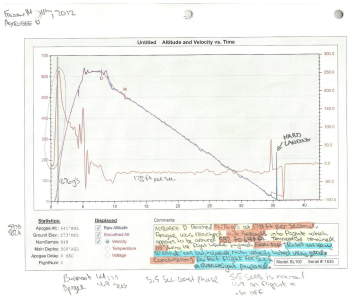
Weather: Temperature: 68 f **Humidity:** 19% **Atmospheric Pressure:** 102 kpa
Wind: Nil **Cloud Type:** none **Launch Time:** 8:30pm

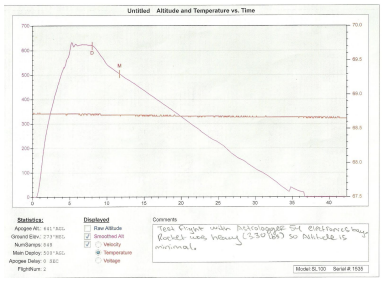
The A2-R13 rocket reached the highest altitude of the program during its final launch on May 11th.

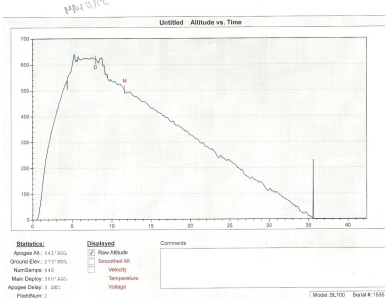
ASTROBEE D 8:00pm

Date: May 11th, 2012 **Launch Vehicle:** Astrobee D **Stages**: 1
Motor: Composite G77 (Aerotech) **Total Weight:** 3.30 lbs
Height: 68.5”/5 foot 7” **Diameter:** 2.6: **Thrust/Weight Ratio:** 7.15:1
Total Impulse: 105 N-sec/23.6 pounds **Propellant Consumed:** 58.1 grams
Acceleration in g’s: 9.76 **Velocity:** 178 feet per second **Motor burnout**: 1.4 secs.
Delay from launch: 4.9 secs. **Barometric sensor:** 641 feet (min) **Altitude:** 600-700 feet
Flight Time: 36 secs. **Payload Temperature:** 68 F **Guidance:** Weather cocking
Flight Path: Vertical **Payload:** Astrologger 54 electronics package/ 5 pieces of mail
Launch Notes: The Astrologger 54 Cooling system functioned properly. Flight was a success. Payload was overweight.

Weather: (see A2R-13 launch above) **Launch Time:** 8:00 pm





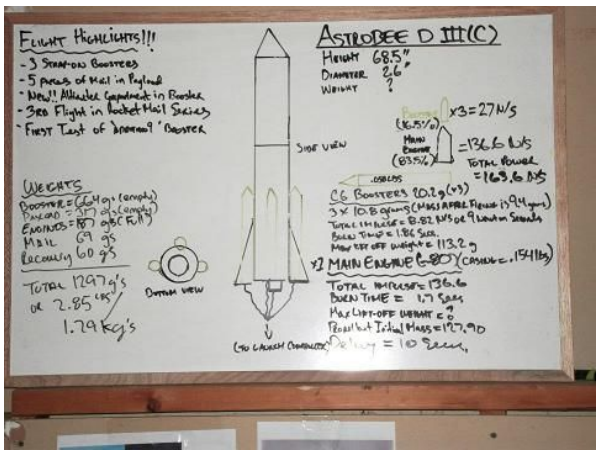


May 11th flight data courtesy Stratologger SL100 and MarsA4 flight computer.

ASTROBEE D III

Date: June 29th, 2012 **Launch Vehicle:** Astrobee D III **Stages:** 1 ½
Motor: Composite G80 (Aerotech) /Black Powder C6 (x2) B6-3 (x1) boosters (Estes) **Type:** Solid Hybrid*
Total Weight: 2.87 lbs **Height:** 68.5" or 5 foot 7" **Diameter:** 2.6"
Propellant consumed: 112 g's **Thrust/Weight Ratio:** 12.78:1 was actually 10.69:1
Total Impulse: 163.6 N-sec/36.7 lbs **Motor Burn:** 1.7 secs. **Delay**: 10.79 secs.
Main Motor Thrust: 136.6 N-sec/30.7 lbs **Booster Motor Thrust:** 27 N-sec/6 lbs
Booster support: 16.5% of total power **Approximate Apogee:** 1200 to 1600 feet
Motor Burnout: 1.7 secs **Flight Time:** under 20 secs. (rocket nose dived into corn field.
Guidance: Weather cocking **Payload:** 2 onboard cameras/ 7 pieces of mail/ Stratologger SL100
Flight Path: Parabolic
Launch Notes: Only main motor fired (30.7 lbs). Rocket crashed several hundred yards from launch site. All three strap-on boosters failed to ignite. Forgetting to turn on Stratologger SL100 was a mistake made after ignoring the checklist:(Launch vehicle was stable in flight but unstable on launch pad due to high wind gusts. Launch was delayed.
* *Solid Hybrid refers to two different types of solid rocket fuel (composite and black powder) used on the same rocket stage.*

Weather: Temperature: 73.4 f **Humidity:** 69% **Wind:** sw 20 km (gusts up to 25 km)
Cloud: clear **Launch Time:** approx 10:30 am



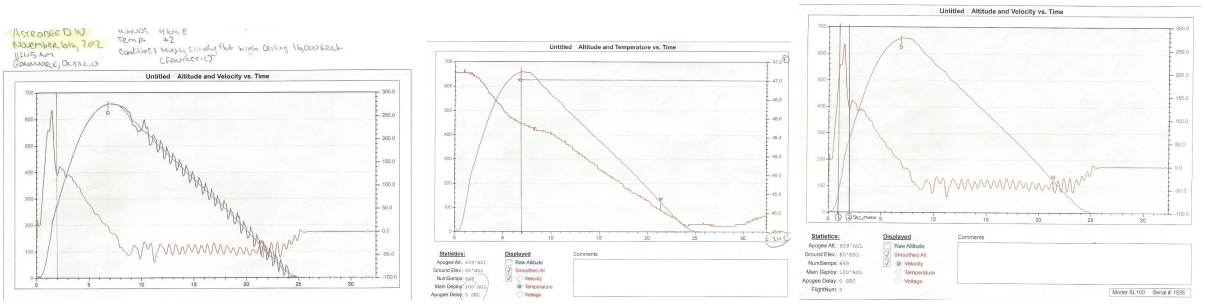
Astrobee D III rockt specifications

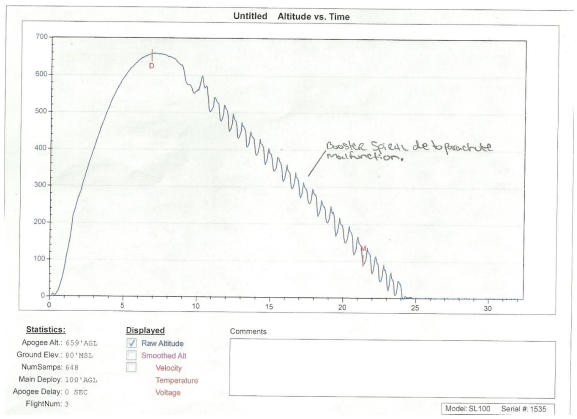
ASTROBEE D IV

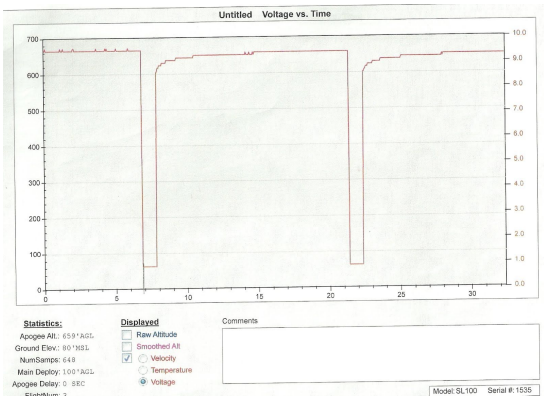
Date: November 6th, 2012 **Launch Vehicle:** Astrobee D IV **Stages:** 1 ½
Motor: Composite G80 main (Aerotech)/Black Powder D12 (x2) boosters (Estes) **Type:** Solid Hybrid
Total Weight: 3.42 lbs **Height:** 68.5" or 5 foot 7" **Diameter:** 2.6 **Thrust/Weight Ratio:** 11.6:1
Total Impulse: 176.7 N-sec/39.71 pounds **Propellant Consumed:** 112.36 grams
Main Motor Thrust: 136.7 N-sec/30.7 lbs **Booster Motor Thrust:** 40 N-secs/ 8.98 lbs
Booster support: 22.63% of total impulse and 37.75% of max thrust

Apogee Altitude (EB2): 659 feet (barometric ground discrepancy puts altitude over 800 feet minimum)
Motor Burnout: 1.7 secs. **Delay From Launch**: 7 secs. **Flight Time:** 24 secs.
Payload Temperature: Between 47 F and 45.4 F **Guidance:** Weather cocking
Flight Path: Parabolic **Payload:** EB#1 & EB#2/ 12 pieces of mail
Launch Notes: Only main motor fired (30.7 lbs). EB1 did not return any data. Stability of Astrobee D IV was excellent. Rocket steered itself correctly into wind (weather cocking).

Weather: **Temperature:** 35.6 f **Wind:** e 4 km **Cloud type:** mostly cloudy/ high ceiling (16,000)
Launch Time: 11:45 am







November 6th flight data courtesy Stratologger SL100.

JANUARY TO MARCH

ENGINEERING AND CONSTRUCTION

In January the scale Astrobee D high powered rocket by Aerotech was chosen to be the main launch vehicle for all flights in 2012. The decision was also made to conclude my rocket mail program which began on October 31st, 2011 with three final launches in 2012 using the new

test rockets. This would mean the vehicle design project would run parallel with the Canadian rocket mail project. After a third assignment referred to as 'The Astrologger 54' was created in the late spring, the decision was made to amalgamate all three projects into a single program named *'My Own Private Rocket Program*'. This would be a mass undertaking for just one person with limited mobility, however, I decided to move forward anyway.

Here is a list of program priorities which needed to be considered early on:

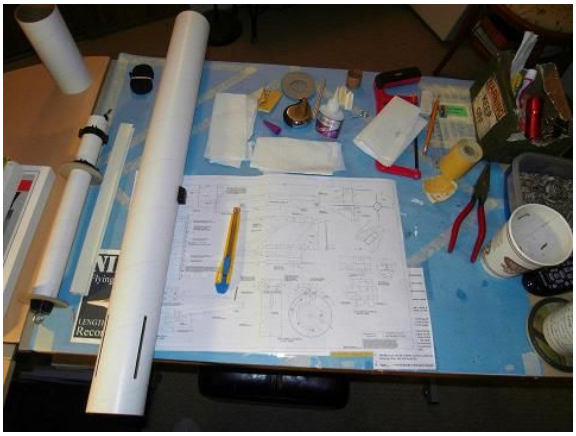
Budget (personal savings)
Launch vehicle construction/ launch vehicle upgrades
NASA Research
High powered rocket research (Levels 1 to 3)
flight mechanics research (fluid dynamics such as weather cocking)
Studying altimeter bay design and operations
Flight computer training (Marsa4 and Stratologger SL100)
Payload design and upgrade (venting and safety padding for starters)
Astrologger 54 planning and designing
Canadian rocketmail design (includes cover and letter of authenticity)
Ignition systems (hybrid igniters would have to be made)
Recovery systems testing (parachutes)
Onboard camera testing and placement (Gopro and Booster Cam)
Photography (documenting the program through pics)
Secure launch facilities (lease agreement at Airport/Rocketport)
Marketing and Advertising (includes Facebook, Youtube, and Rocket Reviews.com)
Writing cover stories for the media
Test schedule
Flight schedule
Checklists

An outline of the new program was completed soon after along with the construction of the two Astrobee D test vehicles. This particular rocket was chosen for several reasons. First, again because of poor health and financial restraints, designing and building a completely new rocket from the ground up was not an option. Second, the Astrobee D was no slouch, standing 5 foot 7 inches tall (68.5") with a 2.6 diameter. The payload bay near the center of the rocket was large enough to carry enough mail and science experiments as I needed. And finally, when possible the program would be modelled after Twentieth Century rocketry from the 1930s and 1940s along with NASA's efforts from the late 1950's and early 1960's when rocket development and space exploration were still in its infancy . The original Astrobee shares a common bond with the U.S. Space Administration, belonging to NASA's first successfully produced family of sounding rockets starting with the larger and more powerful civilian rocket named the *Aerobee*.

In 1958 two Aerobes were delivered to Canada from the United States and launched from the

firing range in Churchill, Manitoba. This pair of high altitude rockets were the first to reach space from Canadian soil. The vehicles carried mail onboard as well as science experiments capable of unlocking the mysteries of the Aurora Borealis. The rockets were lost however when they crashed into the frozen waters of Hudsons Bay in the Canadian arctic. They have never been found.

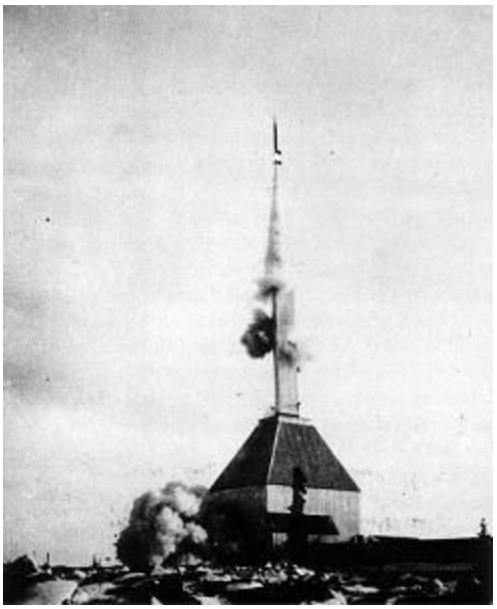
Following the completion of the two scale Astrobee rockets in my program, the next phase of adding payloads and complex flight computers would commence.



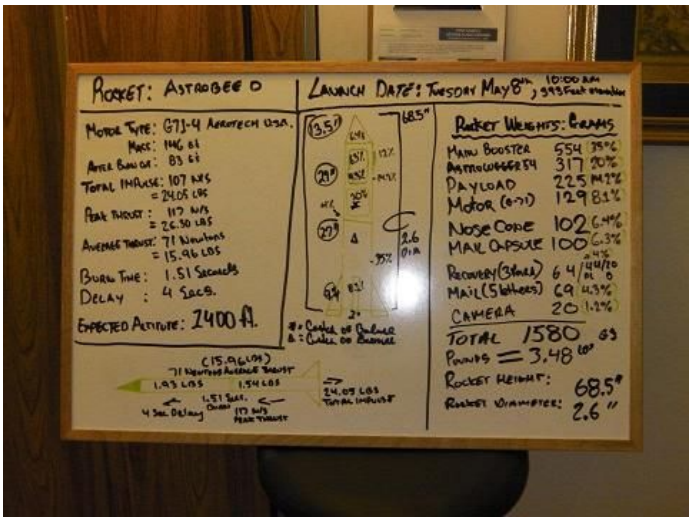
Two Astrobee D scale rockets designed by Aerotech in the United States are selected as the launch vehicles for the remainder of the program. Following in the footsteps of NASA, two units are built in case one is lost to an accident. Budget cuts forced NASA to end this kind of superfluous duplicity in their missions subsequent to Voyager 1 and 2 in 1977.

(left) The Astrobee D and the Astrobee D II rockets are completed in the late spring . The Astrobee D II never flies however the experience gained in its design was instrumental for future projects. (center) The Astrobee D III and its three smaller strap-on side boosters. (right) The Astrobee D IV is a vast improvement over the II and III models employing two larger integral side boosters and two separate electronics bays (EB1 and EB2) located at

opposite ends of the rocket. Although the Astrobee D IV did not begin construction until August, the experience attained from the first two upgrades (Astrobee D II and III) proved to be a big help when deciding the final configuration.



The Aerobee launches from Churchill Manitoba beginning in 1958 were an integral part of Canada's early days of high altitude research.



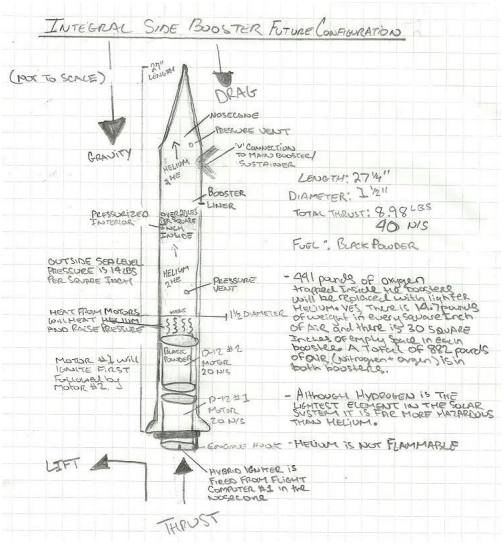
Dissecting a rockets performance parameters became standard practice in 2012.

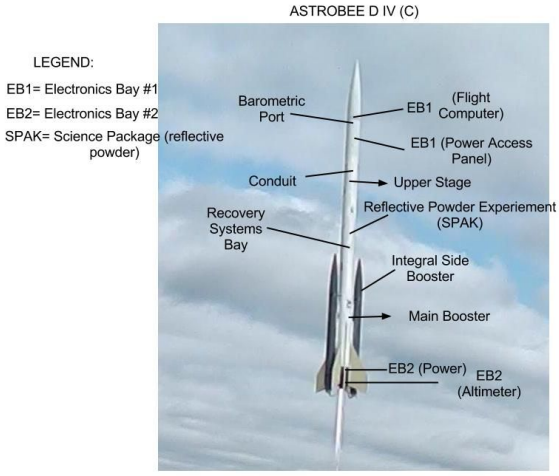
RECONFIGURING THE ASTROBEE D

When reconfiguring a rocket there are many things needed to be considered. First of all, when a scale rocket is built properly, the *Center of Mass* (known also as the *Center of Gravity*) is always a prescribed distance above the *Center of Pressure*. Any deviation away from this can cause your rocket to topple end over end during the flight and have you running for your life. Every Time you order a high powered rocket the first thing you usually notice in bold letters when you open the box is **'DO NOT MODIFY THE DESIGN OF THIS ROCKET',** and it would be wise to follow this warning. The manufacturer is basically telling you that they already went ahead and did the hard work for you, designing, testing, and ultimately certifying the rocket for flight. All you have to do is go outside, light the candle, and enjoy the ride.

When I began the engineering and construction phase of the program involving the Astrobee D II, III, and IV, I knowingly took on this responsibility myself and with open arms. After All, what good would a rocket program be if I was not willing to get my hands dirty and build and test my own rockets.

(left) The large integral side boosters attached to the Astrobee D IV increased the rockets center of pressure while lowering the center of gravity with the added weight. After making several changes including installing EB#1 inside the nose cone to help offcenter the weight, new testing on the rockets *Center of Gravity* and *Center of Pressure* passed with flying colours. The November 6th test flight which was originally scheduled to be strictly a stability test also proved the novel design to be flight certified. (right) Not only does the outside of a high power rocket appear cosmetically kindred to most NASA rockets. Take a look under the surface skin and you'll find even the smallest of technological similarities on each rocket as well.





(left) Future plans for the Astrobee D IV integral side boosters include adding a second D12 motor and pressurizing the rockets interior with one of the lightest elements in the solar system, helium. The development into a more advanced high powered rocket will be more accurately referred to as a 'flight project' rather than the more comprehensive 'program' designation. (Right) The Astrobee D IV © rocket will take flight in the spring of 2013.

APRIL AND MAY
PAYLOADS AND FLIGHT COMPUTERS

Immediately following the first successful flight of my Canadian rocket mail program back on October 31st, 2011, which carried seven letters inside the payload bay of an ARCAS scale rocket, the decision was made to have flight computers and/or altimeters onboard all future launches. When the pair of Astrobee D rockets were finally completed in March, I had developed an in depth knowledge of the launch vehicles and could now begin designing a specialty electronics bay to ride along with them.

The Astrologger 54 would take my program to the next level. Named after the companies who produced the two systems, the Astrologger 54 or AL54 could not only help out in the actual launching of my rockets, but could indeed bring back vital information which would assist greatly in configuring future launch vehicles for safer and more reliable flights. A dual ball bearing cooling system was first introduced to the AL54 to help force outside air through the length of the unit before the air was vented back outside. This successfully accomplished some major obstacles in rocketry. First of all, now a proper barometric reading could take place during the course of the flight using ambient air brought in from the outside. This corresponded with concerns in the rocketry community that barometric readings taken inside of a sealed

payload bay were not as accurate as previously thought.

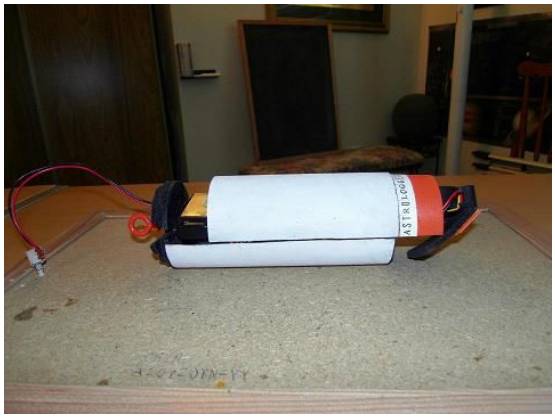
My invention using a tiny and lightweight computer fan corrected this matter by gently corralling the swirling air outside the launch vehicle to the electronics inside the AL54 without affecting any other results. After making one lap around the Astrologger 54 the air simply was vented back outside. This also helped in cooling the electronic boards which would especially come in handy during those hot and humid Canadian summers. Shock resistant liners were used as well to prevent any electrical surges and/or disturbances from taken place.

Static tests got underway with the AL54 in April and flight simulations were occurring by the end of the month with the AL 54 in launch mode fastened inside the Astrobee D's payload bay. Besides static testing and flight simulations, a vibration experiment was setup to enforce the proper stresses on the AL54 as would occur during an actual real time launch. The system was hooked up to my computer which would instantly tell me, as I *'shook'* the vibration experiment myself, if something had failed including either connection to the duplicate 9 volt power supply. The AL 54 went through hours and hours of monotonous testing before it became flight certified in early May.

Following the first and only successful Astrobee D test flight on May 11th with the Astrologger 54 onboard, the unfortunate decision was made to cancel the Astrologger 54 development project indefinitely. From this two separate electronics bays named EB#1 and EB#2 would be built inside opposite ends of the rocket. Electronics Bay # 1 was located in the nose cone while Electronics Bay # 2 fitted inside a miniature compartment between the fins near the aft of the booster. The new configuration saved weight and made the electronics more accessible for the next phase of the program.

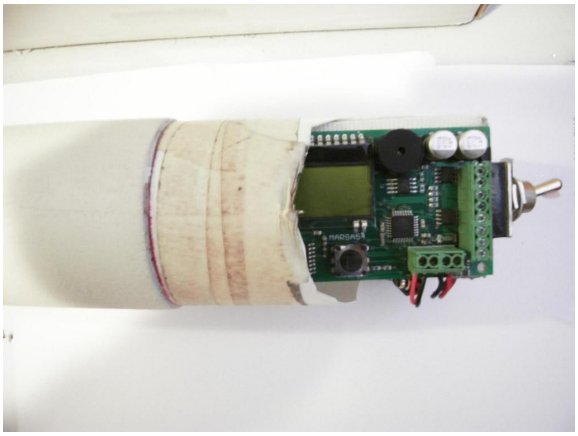
Besides dealing with temperamental electronics my launch program focused on rocket mail and flying covers/letters using 2012 postage as well as the entire collection of 1936 Gerhard Zucker *'First Canadian Rocket-Flight'* stamps as listed in *The Air Mails Of Canada And Newfoundland* reference catalogue.

My four rocket launches (including October 31st, 2011) have been and are to date the only flights in Canadian history to have successfully been flown and recovered using official Canadian rocketmail stamps. Added to this is the fact the stamps were actually produced in 1936 by the infamous German born rocket engineer/businessman named Gerhard Zucker. Incredibly the Canadian stamps had never been launched in this country until 75 years later when the first of my four mail flights took place on October 31st, 2011 in eastern Ontario outside Gananoque. Overall 31 covers with my own *Certificates Of Authenticity* inside were successfully flown and recovered during the four launches. Most envelopes were officially cancelled at the nearest post office in the town of Gananoque. The remaining covers were mailed directly from that same post office.



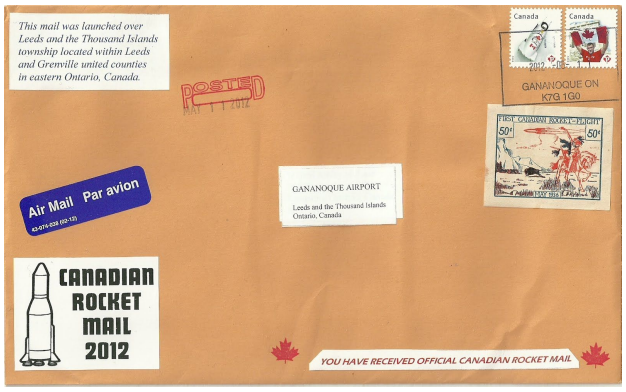
(above) The Astrologger 54 was a portable electronics bay that slid inside the payload bay of an Astrobee D rocket. The unit was 8 ¾" long with a 2.5" diameter, and weighed only 85.2 grams. Two 9 volt batteries powered the MARSA4 flight computer as well as the Stratologger SL100 altimeter. (top right) The Astrologger 54 cooling system brought in air from the outside thanks to a miniature computer fan, circulated it around the electronics bay using very small piping and a air deflector, than conviently vented the air back out. When the Astrologger 54 was set in the proper position inside the Astrobee D's payload bay, it was easy to test the unit by placing a tiny piece of tissue paper over the air intake port. If the cooling system worked properly, suction from the rear of the fan inside would hold the paper in place. Because blowing air moving across the computer boards could cause false readings, the cooling system was designed to bypass this sensitive equipment and flow directly to the much warmer power supply near the front of the unit. A plethora of tests and flight simulations proved the design to be completely reliable. In the rocketry community the altimeter bay or in my case the Astrologger 54 is usually ejected from the payload bay when the rocket nears apogee. Because I had a mail capsule stacked on top of the unit and the Astrologger 54 was not designed to leave the confines of the payload bay, this was simply not possible.

EB#1 and EB#2



(above) Based on what I learned from building and operating the Astrologger 54 , the two electronic units were separated and circumscribed to opposite ends of the rocket including the nosecone and aft of main booster. The two new compartments were conveniently renamed EB#1 and EB#2 (Electronics Bay #1 and Electronics Bay #2)

CANADIAN ROCKET MAIL



The mail cover above with a Gerhard Zucker *'First Canadian Rocket-Flight'* postage stamp attached is a good example of the type of mail covers flown inside my rockets. (left) This cover is from the May 11th test launch which carried five letters onboard. (right) McIsaac loads the payload bay with twelve letters prior to the November 6th liftoff that concluded the program.

MY OWN PRIVATE ROCKETPORT IN EASTERN ONTARIO

(left) Looking down runway # 2 at the Gananoque airfield gives someone a good indication of the space available for launching high powered rockets. Three 2,530 foot runways are surrounded by miles and miles of farmers fields.
(right) An old hangar dating back to the days of World War Two adds an historic ambiance to the property.

GANANOQUE AIRPORT/ROCKETPORT

Airfield type: Public **Location:** Gananoque, Ontario **Elevation:** 395 feet/ 120 m
Runways: 3 **Length:** 2,530 feet/ 771 meters (each) **Surface**: Asphalt
Cost per launch: $50.00
Airport notes: Was used as a relief airfield for the RCAF during WWII. The triangular runway design at Gananoque was employed to help service the British Commonwealth Air Training Plan (BCATP) and is an eerie reminder (along with the hangar) of a war fought long ago. Picton airfield has the same triangular shape of course.
Personal notes: Having a chance to fly my rockets at two separate former World War II airfields (CFB Picton and Gananoque relief airfield) was a great honour. The launches were moved to Gananoque from Picton, Ontario in Prince Edward County in 2011.

MAY TO NOVEMBER

TEST LAUNCHES

The test launch phase of the program resumed on May 11th for the only evening launches of the season. It was also the only time I attempted to fly multiple high powered rockets on the same day. I would finally get my chance to see the Astrologger 54 in action. An abbreviated 5.5 second flight was planned (before parachutes deployed) over the airfield in a vertical flight path. The Astrobee and its cargo took to the sky under a thunderous thrust just after 8 pm. The entire launch vehicle weighed in at 3.30 pounds while the heavier payload upper stage, carrying the Astrologger 54 as well as five letters inside a mail capsule, came in at 1.93 pounds. The launch was successful reaching between 600 and 700 feet. It should be fairly noted included in earlier

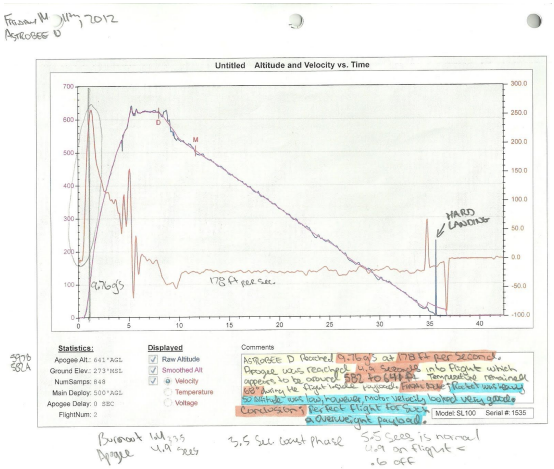
estimations of altitude was the Elevation of the airfield as well as a poor understanding of barometric readings.. The Astrologger 54 worked as expected recording some valuable flight data while proving the AL54 model was of sound design. The noise from the rocket thrust at liftoff was so loud it disturbed hundreds of birds in the area just settling down for their early evening rest. By the time the rocket landed the confused winged creatures were busy chirping and circling the area before eventually returning to their nests.

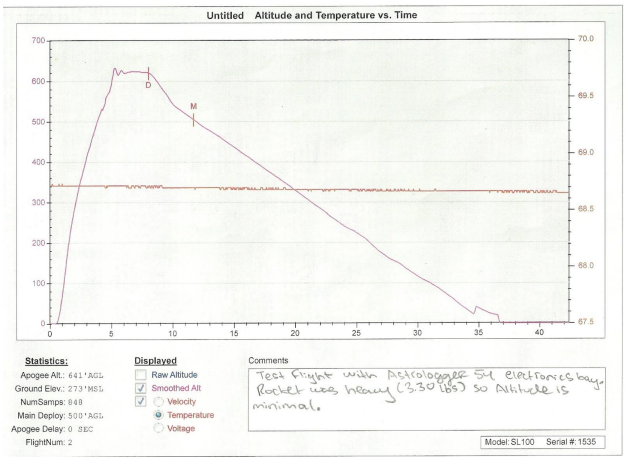
A second launch took place that evening when the A2-R13 rocket roared off the pad at 8:30pm as the sun began to set. An experiment was onboard to jettison *'Micro Glitter Balls'* from the recovery bay after apogee had been reached. It was hoped that when being released into the atmosphere the highly reflective substance would light up the evening sky with a quick flash. Shortly after launch took place however there was no trace of the experiment or the rocket for that matter. Because of the extreme altitude reached at over 4000 feet, the rocket may have caught a thermal updraft and drifted for miles downrange. *'Missing'* posters and an exhaustive two day search yielded no leads.

MAY 11th ASTROBEE D LAUNCH PHOTOS

One of the best photos of 2012 shows my dad, Rennie McIsaac, holding the booster end of the Astrobee D rocket while I carefully install a solid fuel motor. He has been present and helping out at every launch and deserves a lot of credit.

(left) Me and the Astrobee D high powered rocket take a moment and pause for a picture during the May 11th test launch, the only evening flight of the program. (right) The Astrobee D roars off the launch pad .





Flight data from the May 11th launch displays a lot of information including a large spike at the end of the flight. This accounts for the hard landing on the tarmac that only caused minor cosmetic damage.

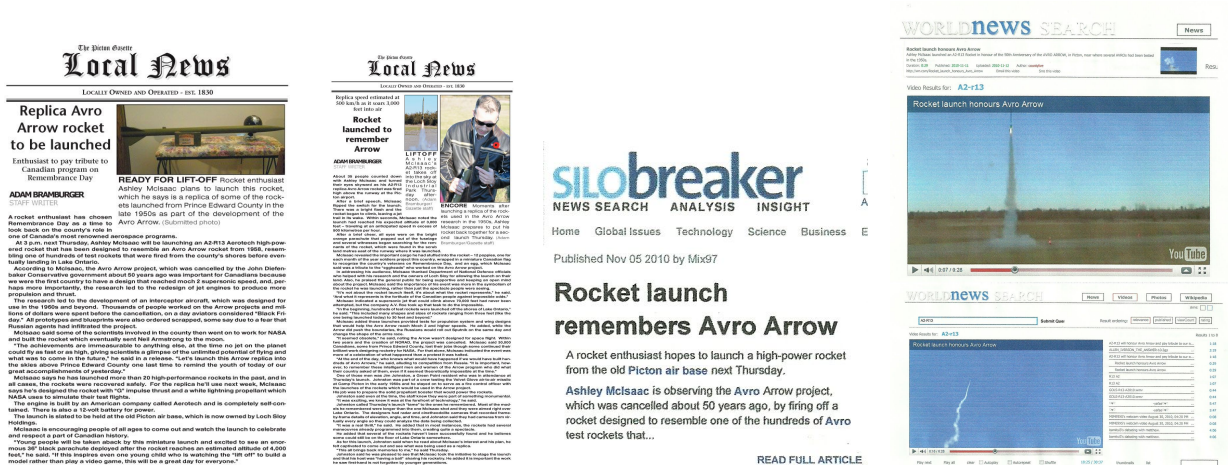
MAY 11th A2-R13 LAUNCH PHOTOS

(left) The A2-R13 rocket moments before it blasts off on May 11th from the Gananoque airfield and just minutes after the Astrobee D and its precious cargo were safely recovered

shortly down range. (right) One of the most powerful motors in my arsenal, the G80-13, lifts the A2-R13 rocket to an altitude over 4000 feet and into oblivion . The rocket was never seen or heard of again.

MY OWN PRIVATE ROCKET FACTS
DID YOU KNOW?

A FINAL SALUTE TO THE A2-R13 HIGH POWERED ROCKET



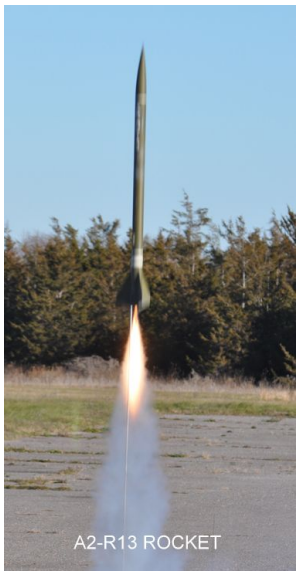
News of the A2-R13 Remembrance Day rocket launch would be well received by the media back in 2010 and was a great way to unofficially kick off 'my own private rocket program' over two years ago.

In the fall of 2010 I decided to resume launching high powered rockets after almost fifteen years away from the sport. Thanks to my mother, Diane McIsaac, my rockets were kept in a safe place over this time which allowed me to pick up seemingly where I had left off 13 years earlier. The launch vehicle she had saved was soon converted from the Aerotech Arreaux high-powered rocket into my own slightly modified design renamed the A2-R13. Among the changes made to the rocket was the extension of the recovery system bay to make room for a very large 36" black parachute.

Behind the support of family, the Canadian military, and local residents, the launch date was soon set for November 11th and would take place at the old military base in Picton, Ontario inside Prince Edward County. The small payload bay near the top of the rocket carried a single uncooked grocery store egg wrapped inside a miniature Canadian flag along with 12 poppies. A crowd of around 100 spectators showed up to watch the launch. I made a short speech prior to lift-off to remember and thank all of our soldiers in the Canadian armed forces past and present for their courage and commitment to this great country over the years. The engineers of the Avro Arrow program from the 1950s were also honoured while being represented by the egg in the payload bay. Two of them actually showed up to the launch and I later was given a chance to speak with them.

The A2-R13 performed perfectly during the flight reaching an altitude of approximately one kilometer (3400 feet). The rocket finally returned safely to the ground and after traveling all that distance directly in front of a crowd of anxious and applauding onlookers. Myself along with my Father, who happened to be standing right next to me, were very pleased with the way things had

worked out. The November 2010 Remembrance Day Ceremony in Prince Edward County was no doubt the first of its kind. At no time in Canadian history had a rocket launch including its onboard cargo paid such respect to the brave men and women of the Canadian Armed Forces. It was truly an honour.



(above) The A2-R13 rocket lifts-off from the Picton Aerodrome in Prince Edward County on November 11th 2010 in front of a crowd of around 100 spectators. (right) The payload consisted of twelve poppies wrapped inside a miniature Canadian flag as well as an uncooked grocery store egg. The egg returned to the ground without a crack on it.

Following the success of the first Astrobee D flight in May, the next big step in the program could now be taken. Strap-on boosters were added around the base of the next rocket for an additional 16% more power. This included a pair of C6-0 Estes black powdered motors along with a single B6-3 motor of the same manufacturer. All three were daisy chained to one another while the B motor carried a small parachute inside. Technical details of how the system actually worked have yet to be released. What can be said is that attempting to manually launch a single Composite main motor along with three strap-on black powder side boosters at the same time using two separate electrical launch controllers was extremely difficult. Timing was everything and I would not recommend it. I commonly refer to this combination of two contrasting types of solid fuels (composite and black powder) used on a rocket stage at or near the same time as *a 'solid hybri*d'.

When the Astrobee D III lifted-off shortly after 10:00 am on the morning of June 29th all appeared normal. The pre designated flight path was going to take the Astrobee D III on a parabolic arch over the WWII relief airfield where it would land downrange near the center runway. The G80 composite motor with a lengthy 10 second delay from motor burn out to parachute deployment was the main sustainer engine in use. As the rocket lifted off it was impossible to know however the three strap-on boosters failed to ignite on the launch pad as planned. With the additional booster power lost the small strap-on rockets literally became dead

weight for the duration of the flight. After reaching a peak altitude much lower than expected *(estimated near 1600 feet)* , the Astrobee III never had time to release its dual deployment system and the rocket nose dived into a cornfield several hundred yards from the launch site. Following an exhaustive ten minute search the wreckage was finally located by a member of my ground crew and the news wasn't good.

The rocket was completely destroyed when it plowed into the farmers field at over 100 miles per hour. Both onboard cameras including an expensive Gopro were unsalvageable. Having been strapped to the outside of the launch vehicle gave them little protection. Inside the payload bay however seven pieces of Canadian mail received only minor damage and more importantly had survived. Damages were estimated at a whopping $1000 including $500 in camera equipment lost to the accident. The crash nearly devastated the program. As mentioned earlier however, in following NASA protocol of building two rockets/spacecraft instead of just the one, was about to pay off for '*My Own Private Rocket Program*' as well.

JUNE 29th ASTROBEE D III LAUNCH PHOTOS

(left) The Astrobee D III is being readjusted on the launch pad following several delays caused by high winds. Two of the three strap-on boosters can be seen near the base of the rocket along with the miniature booster cam above (black). (right) Preparing for lift-off with a member of the ground crew looking on.

This sequence of lift-off snapshots shows a stable Astrobee D III beginning its parabolic flight over the airfield. The launch had to be delayed several times because of wind gusts up to 25 km h.

(left) The Gopro camera lies half buried next to a small crater caused by the rocket's nose cone after it slammed into the ground at an incredibly devastating speed. No video of the launch and crash could be salvaged. (right) The payload upper stage is buckled from the force of impact while seven mail covers inside received only minor damage.

THE FINAL REPORT

Astrobee D III Canadian mail rocket crash report from June 29th, 2012.

Astrobee D III after the doomed flight. *The crash site.*

On the morning of June 29th, 2012 at approximately 10:30 am, the Astrobee D III high-powered rocket was launched in eastern Ontario from an old World War Two airfield outside the small town of Gananoque in the Thousand Islands. The six foot rocket weighed 2.87 pounds (1.30 kg) and was carrying two on-board cameras including a high definition Go pro. An electronics package was also placed in a small compartment between the fins in order to record all relevant flight data. Seven pieces of mail with Gerhard Zucker postage attached were located in a protected payload near the center of the vehicle.

The weather was clear however the wind was gusting heavily (approx. 25 km/h) at times and delayed the launch for several minutes. The 3 strap-on boosters as well as the main engine were installed to the rocket without incident. Due to the unpredictable wind gusts some significant stability problems occurred while the rocket was secured to the launch pad. The Go pro attached near the top of the rocket exacerbated this issue as well. As the count down approached however, everything seemed to be in order.

When the rocket was finally ready to lift off, a quick and final check of the igniters was done. A prelaunch checklist was unfortunately ignored at the launch site which was to make sure none of the vital steps were overlooked. There is little doubt this was a huge mistake. Among the items on the list was the electronics package in the tail that unfortunately was never turned on. No data was retrieved because of this simple error.

As the rocket began slowly lifting off from the pad shortly after 10:30am, on a parabolic projectory, it was impossible to tell at the time if the boosters had ignited or not. Approximately two seconds after the Astrobee D III ascended into the sky, a single strap-on booster detached and fell to the ground from an estimated 50 to 150 feet. The other two boosters remained with the main vehicle and were later found at the crash site. At this point in time only one of the booster motors have been recovered however it's black powder charge remained unused. The other two unfired booster motors were never retrieved from the cornfield and are assumed still armed. The three igniters bundled in a package and responsible for detonating the strap-on boosters was found at the crash site with at least one igniter still intact. If the boosters had detonated properly at lift-off, the igniter bundle would have definitely remained at the launch pad and not hitched a ride to the crash site almost five hundred yards away.

The flight was scheduled to last 10.79 seconds before the parachutes were to be jettisoned for a safe return. Prior to the launch the conclusion was made that if the boosters failed to produce an extra 16 ¾ more power, the rocket would most definitely not be able to reach its expected altitude of 2500- 2800 feet. With the apogee well below what was previously calculated as a safe height for parachute deployment, the Astrobee D III never had time to release the recovery system and nose dived at top speeds from an estimated 1200-1600 feet into a cornfield several hundred yards away. The small black powder charge in the main composite motor (to release parachutes) was detonated although it is difficult to tell if this occurred on impact or just prior. A 'zipper' effect did occur to the first stage main booster suggesting a very late deployment took place.

After a brief ten minute search the rocket was spotted in a cornfield 300 to 400 yards south/east of the launch pad by team member James Ryschlo. Not everything was destroyed in the crash however while the altimeter (in the off position) has since been retrieved safely along with seven pieces of slightly damaged mail. The letters were in the partially crushed upper payload of the Astrobee III and after some work were ultimately retrieved by my father, Ronald McIsaac.

CONCLUSION

Failing to ignite, the strap-on boosters added dead weight to the already heavy rocket. This including the 16% loss of power due to the inactive boosters proved to be catastrophic and the most reasonable explanation for the rocket crash. An exhaust hole in the main booster which was used for the very first time in the program to vent hot gases into the atmosphere proves inconclusive as the cause of the failed main vehicle separation. The flight itself was very stable and the fact that two of the three boosters remained with the main vehicle for the entire flight lends credence to the strap-on booster successful design. The elastic bands connected to the three strap-on boosters were suppose to burn away shortly after lift-off but never had a chance with no ignition. The crash as well as the poor launch site conditions will delay the final flight of the Canadian rocket mail program into late October or early November.

(left) 'The Final Report' was a detailed analysis of the June 29th crash. (right) The Astrobee D III wreckage along with the Zucker mail covers are put on display subsequent to the June 29th crash.

Losing the Astrobee D III rocket in the June 29th accident was a big setback to the program. Now, down to just one launch vehicle and with the entire program budget for 2012 spent, a new direction had to be decided on. Even though I was confident in both the Astrologger 54 and Astrobee D III concepts, both projects had to be sacrificed for the sake of the program. No two flight computers/altimeters would ever ride next to each other on the same flight again. Comparable to the President of the United States and his Vice President never being allowed to fly together out of fear both would be lost in a plane crash.

Thankfully, on the flight of June 29th the AL54 had been replaced with a single compartment altimeter bay located between two fins in the aft of the booster. This housed the Stratologger SL100 and necessary power supply. Steps were taken to secure the electronics bay with crash pads should an unfortunate accident take place Incredibly the small flight computer survived the Astrobee D III doomed launch completely undamaged. The upper stage of the rocket absorbed most of the impact. Another lucky break was the main flight computer (MarsA4) was not onboard the rocket because EB1 (electronics bay #1) , which would be located inside the nose cone on later flights, was still in the development stage.

From all of this EB1 and EB2 (electronics bay #1 and electronics bay #2) would be conceived. Each unit was safely secured to opposite ends of the rocket. Another precaution was taken when I decided to use large integral side boosters instead of smaller strap-on rockets. Similar to the strap-ons the integral side boosters were modified *Estes* model rockets. After going over the specifications, integral boosters *(built into the rocket)* were found to be less difficult to manage and more importantly much easier to improve upon (additional motors) in the future. The added weight of the ride along boosters was negligible when compared to the D12 motors powering them. The Russian *Proton* rocket is also designed this way.

The Astrobee D IV was scheduled to fly during the one year anniversary of the first launch of the rocket mail flights but had to be postponed because of high winds in the area caused by Hurricane Sandy. The Halloween flight was pushed back until November 6th when conditions were nearly perfect. Since the early days of the Cold War both NASA and the Russian programs would usually attempt to launch their satellites and spacecrafts on significant dates such as anniversaries.

At approximately 11:45 am on November 6th the main G80 motor came to life and the Astrobee D IV ironically nicknamed the 'SuperBooster' was on its way. Again booster ignition problems relegated the overall power /thrust to just the center sustainer motor. Of the 39.71 pounds of thrust available only 30.7 pounds was used. The launch vehicles performance however proved its design was more than capable, remaining stable for the entire 8.7 second flight. Because the redesign was so extensive I had originally planned for a test flight to take place utilizing only the sustainer motor anyway.

During the late 1950s NASA started test flying the three engine Atlas rocket (2 boosters and 1 sustainer) employing only its twin integral side boosters. The flights were referred to as the Atlas A test launches. I wanted to follow the same systematic approach however due to financial restraints resulting in cost cuts, only a limited supply of fuel and other launch necessities were available.

Although the boosters failed to fire and there were other minor issues during the November 6th launch including a back-up systems malfunction, the test flight was considered a resounding success. The payload returned to the ground safely under its own parachute and all twelve letters were recovered. As soon as the covers were cancelled at the Gananoque post office an hour later, my Canadian rocket mail program was finally finished. More importantly the Astrobee D IV remained intact and would live to fly another day.

ACTUAL FLIGHT SIMULATION WITH EB#1 FLIGHT COMPUTER

Future launches with the Astrobee D IV series of launch vehicles will use the MarsA4 flight computer located in Electronics Bay # 1 to detonate all booster rockets as well as providing redundant backup systems to insure booster ignition. The computer will also fire a back-up black powder charge located inside the top of the recovery systems bay to insure parachute deployment shortly after apogee is reached. This feature also assists in projecting the payload upper stage away from, and that it does not come in contact with, the first stage booster after the two structures separate.

Altitude (Barometer): 1009 feet
Velocity: 300 feet per second
Acceleration: 4.88 g's
Motor Burnout: 2.1 secs.

Pyro #1: Fired when launch was detected.
Pyro #2: Fired when launch was detected.
Pyro # 3: Fired ½ sec. after apogee was detected.

(Note: Flight simulations are static exercise involving igniters and e matches but no motors. Actual launches can take place while in the comfort of your own living room. This is incredibly helpful when getting comfortable with any altimeter or the more complicated flight computer.)

THE AUTONOMY OF THE ASTROBEE D IV WILL SURPRISE YOU

Todays state of the art altimeters, timers, and flight computers have become more and more accessible to rocketeers around the world like myself and not just to government run Space Agencies. These onboard electronics now have the incredible ability to add some truly

autonomous thinking to ameteur high powered rockets, and the Astrobee D IV is certainly no exception. Only after the rocket is prepared for lift-off and placed on the launch pad with all systems running, can the intelligent machine inside finally depart from its maker and begin processing decisions for itself. At this point the only manual chore left for the rocketeer to do is to simply press the launch button, the rest is up to the rocket.

While the vehicle waits on the launch pad for someone to initiate lift-off, the onboard electronics are already busy gathering information related to the surrounding environment including ambient temperatures and barometric pressure. The *Stratologger SL100* (EB# 2) for example stores 28 data points of information every 1.4 seconds prior to lift-off being detected. The altimeter can also be programed to be less sensitive during wind gusts preventing false readings or from triggering an incorrect command. The rocketeer simply lets the altimeter know that it is windy outside and to proceed with caution before initiating any preprogrammed instructions.

The MarsA4 (EB#1) is one of the smartest systems available to the rocket community on the market today. The flight computer recently gave rocketeers the option to download an algorithm known as the *Kalman Filter*. Also referred to as a linear quadratic estimation, the miniature processor has the ability to record and process essential flight information in real time. With this available data, a mathematical estimation of the known variable can be quickly calculated and then compared to the actual real time information, filtering out any distractive electronic noises along the way. In an instant the *Kalman Filter* is programmed to make very accurate and urgent decisions effecting the overall success of the flight.

In other words as the rocket lifts off from the launch pad at incredibly high speeds, the *Kalman Filter* on board is busy converting streams of incoming data into calculated or educated guesses based on everything it has learned during the flight up to that point. Now more precise conclusions can be processed and performed by the *Kalman Filter* based on actual real time flight data, and what has already been received and learned from the flight data, in order to execute future pre programmed tasks more accurately and on time. In the case of the Astrobee D IV for example; detonating the integral side boosters after launch is detected and firing the back-up black powder charge inside the recovery systems bay at the appropriate moment after apogee is reached. I may program the flight computer myself but it is the *Kalman filter* who ultimately makes the final judgment on event deployments according to everything it has learned since the flight began.

Even after the flight has come to its conclusion and the rocket has reached the ground safely, the onboard electronics don't just shut down but actually assist you in tracking down your rocket. If after a few minutes the rocket still hasn't moved from where it had originally landed, the Stratologger SL100 assumes you are having troubles finding the vehicle and automatically goes into what is referred to as a *'hibernation mode'*. A short time later, a loud *'warbling'* sound will emanate from the altimeter every few minutes until physical contact with the unit is made again. Because the hibernation mode preserves the onboard power supply (9 volt battery) as well, this can go on for up to three months or until the rocket is retrieved.

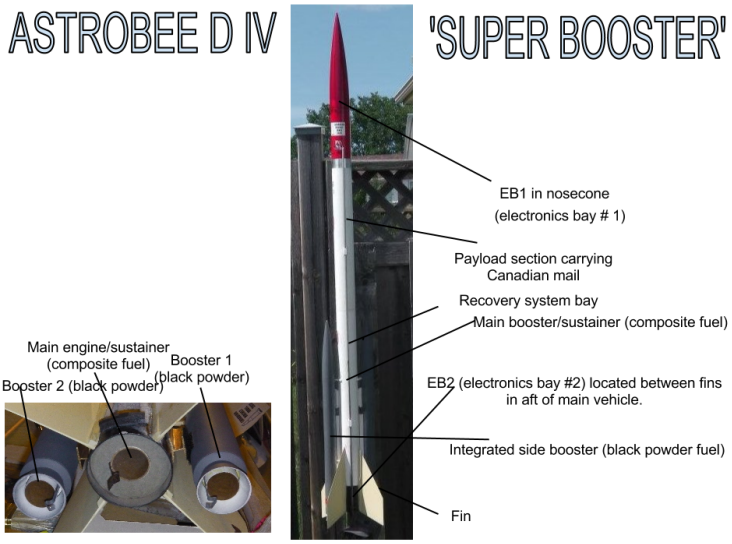
In the late 1960s and early 1970s NASA's Saturn V rocket operated on very limited computer power during the Apollo programs voyages to the moon. In fact, if all the memory was added together from onboard all six lunar landings, there still wouldn't be enough to exceed what was

inside my May 11th, 2012 Astrobee D test flight carrying the Astrologger 54 electronics package onboard. Early NASA space probes *(Mariners)* were able to receive and send no more than 14 data points (per second) from the spacecraft to receiving stations on Earth using the vehicles low gain backup antennas.

Unfortunately it wasn't until near the end of *'my own private rocket program*' did I start really getting comfortable with the electronics onboard my Astrobee D IV rocket. This followed many hours of monotonous testing and flight simulations.

(left) The Astrologger 54 and its dual electronic boards are spread out and examined. *Kalman Filter* type software has recently been uploaded to the MarsA4 flight computer. (right) The most powerful rocket ever made, the Saturn V, had far less computer memory on board its Command and Lunar modules during the moon landings than any of my Earth bound flights of 2012. (photo courtesy NASA)

NOVEMBER 6th ASTROBEE D IV LAUNCH PHOTOS

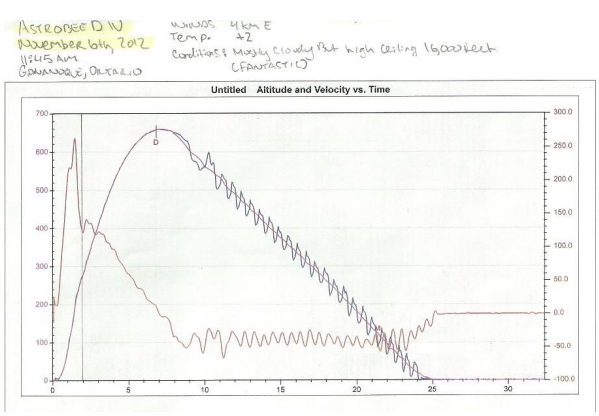


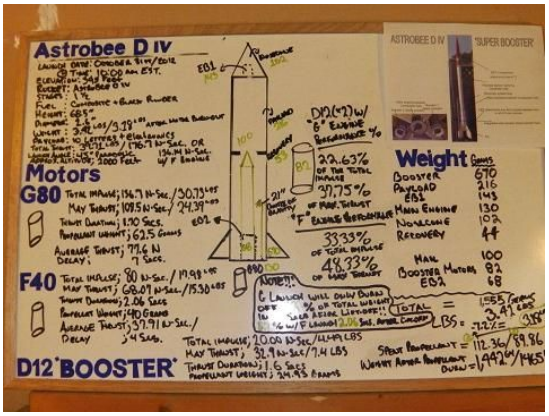
Schematics of the motor assembly and a cross section of the Astrobee D IV high powered rocket.


(left) The Astrobee D IV is loaded with the *Solid Hybrid 1 ½* stage propellants; a G80 main and twin D12 side booster motors. Ignition of all three motors proved to be very difficult when dealing with two different kinds of rocket fuel, composite and black powder, The main (composite) needed more of an ignition spark than the black powder boosters so a pair of electronic controllers were used. The two controllers were powered separately using a 12 volt (Aerotech) and 4 double A's (Estes) batteries respectively to initiate ignition. My own hybrid igniters which are explained in a later section had to be created to fire the boosters. In future flights EB#1 will be in charge of detonating all the boosters as well as operating a full proof back-up system. (right) I take a final look downrange before the countdown begins.



Great launch pics of the Astrobee D IV shortly after take off as well as a single snapshot of the upper stage following its safe return to the ground under a bright orange parachute. The image on the left is on the 'World News' web site.





Flight data from the November 6th launch shows the spiral descent of the booster stage after the recovery system failed to deploy properly. The booster received only minor damage. The payload bay returned to the ground under its own smaller parachute without any problems.

MY OWN PRIVATE ROCKET FACTS
DID YOU KNOW?

ARCAS ROCKET CARRIED PETITION ONBOARD TO HELP SAVE CANADA' S AIR & SPACE MUSEUM IN DOWNSVIEW PARK

On October 31st, 2011, I began my rocket mail flights in Gananoque Ontario on a cool clear Fall morning. The mail covers and Zucker postage onboard the ARCAS rocket that day has been thoroughly covered by the media and on my Facebook page. But did you know there was

also an online petition inside the rocket titled 'Help Save The Canadian Air & Space Museum' which was signed by over fifty people. The petition included a short cover letter along with comments and user names from those who participated online. It was then sent to the Museum along with a $50.00 donation from myself. Although this did not stop the museum from closing its doors, the uniqueness of the video petition has received nearly 1000 views on my Youtube channel while continuing to peak peoples interest from around the world.

The link is below.

https://www.youtube.com/watch?v=WyRxVrjUBSE&list=UUPNtt8NpwkFmOVRTzvnJ6yA&index=4

CANADIAN ROCKET MAIL LAUNCHES *(Date, rocket, payload, altitude)*

October 31st, 2011: ARCAS, 7 letters, Altitude est. 2500 feet
May 11th, 2012: Astrobee D, 5 letters, Altitude 600-700 feet
June 29, 2012: Astrobee D III, 7 letters, Altitude 1200-1600 feet
November 6th, 2012: Astrobee D IV, 12 letters, Altitude est. 800 feet

Note: all letters on board the flights contained current 2011 and 2012 Canadian postage as well as Gerhard Zucker *'First Canadian Rocket-Flight'* Postage stamps from 1936. A grand total of 31 letters were either cancelled or sent out from the nearest post office in the small town of Gananoque in the Thousand Islands.

TESTING SUPPORT EQUIPMENT

(left) Hybrid ignition systems to fire the *Solid Hybrid* 1 and ½ stage rocket had to be created from scratch and was tested throughout the year using 1.5 meter electrical matches and easy lit solar igniters. (center) Following stability issues with the 68.5" Astrobee D rocket, support equipment had to be made with material from around the house. 'The Claw' will clutch the launch vehicles middle section just above the center of gravity for all

future flights. Moments before liftoff the unit will manually retract to a safe distant from the rocket and launch pad. (right) Balsa wood replaced the industry standard launch lug as the only piece of the launch pad to make contact with the rocket. My simple design improved stability by at least 100%. NASA used balsa wood during the early days for a variety of reasons including ablative protection on returning capsules from space.

DECEMBER
THE PROGRAM COMES TO A QUIET END

DECEMBER 11th ASTROBEE D IV LAUNCH POSTPONEMENT

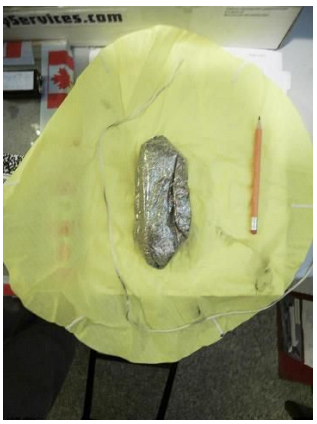
(left) My father looks up at a fully loaded and very unstable Astrobee D IV (B) rocket moments before the launch was postponed. (right) It's time to pack it in for the season, lets go home.

On May 14th, 1973, thirteen days before I was born, the National Aeronautics and Space Administration (NASA) launched Skylab into low Earth orbit, an orbital workshop that was constructed from a fuel tank of the third stage (SIVB) in a Saturn V rocket. The same launch vehicle responsible for sending men like Neil Armstrong to the moon in 1969. After the Apollo program concluded, there was still expensive hardware laying around Cape Canaveral with nothing more to do. From all these left over parts the Skylab orbital workshop was conceived, built, and flown to low earth orbit followed by three successive three man team flight crews to help study, among other things, the sun as well as effects on the human body caused by long term stays in outer space.

The Apollo program cost an estimated $25 billion and incredibly was able to land twelve men on the moon safely and return them to earth between 1969 and 1972. Some critics would argue however it wasn't until NASA created the world's first true space laboratory out of this same hardware did the Space Administration along with the American taxpayer finally get their moneys worth . After the four mail flights came to an end in *'my own private rocket program',* and I still had hundreds of dollars of rockets and flight hardware laying around my house, the choice was as logical as the one NASA made thirty-nine years earlier. The Astrobee D IV (b) would be my Skylab.

With this being said and with my mail flights already concluded, the final test launch of the Astrobee D IV (b) was scheduled to take place on December 11th, ensuing another week of weather delays. However, due to some severe stability problems the Astrobee D IV (b) encountered while resting on the launch pad, the decision was made with the encouragement of my father to scrub the test flight indefinitely.

Although more launches of the Astrobee D IV rocket series (C model) are expected to take place in the spring of 2013, the program which can be traced back to 2010 and the ill fated flight attempt of the A1-T in Picton Ontario, had finally come to a conclusion.



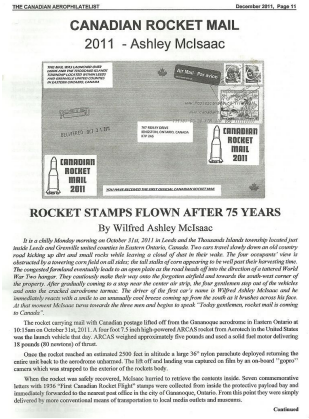
The science experiment onboard the May 11th A2-R13 rocket flight was duplicated later in the year and rescheduled to take part in the December 11th launch that ultimately was postponed. When the Astrobee D IV (C) test flight does lift-off in the spring of 2013, 97 grams (or ⅛ of a pound) of reflective powder will be ejected from the rocket at or near apogee to help study wind direction at higher altitudes along with recording the line of sight. This type of experiment was first conceived by the American rocket pioneer Robert Goddard using flash powder. The Russians released sodium gas clouds during a pair of 1959 trips to the moon flying autonomous probes named Luna 1 and 2. The Luna 1 probe released its sodium gas cloud 113,000 kilometers from Earth in order to create an artificial comet.

THE WORLD RECOGNIZES MY ROCKET MAIL PROGRAM IN 2012


WORLD NEWS

Covers are Canada's first rocket mail


German engineer's mail finally sees liftoff


CANADIAN ROCKET MAIL

2011 - Ashley McIsaac

ROCKET STAMPS FLOWN AFTER 75 YEARS

By Wilfred Ashley McIsaac

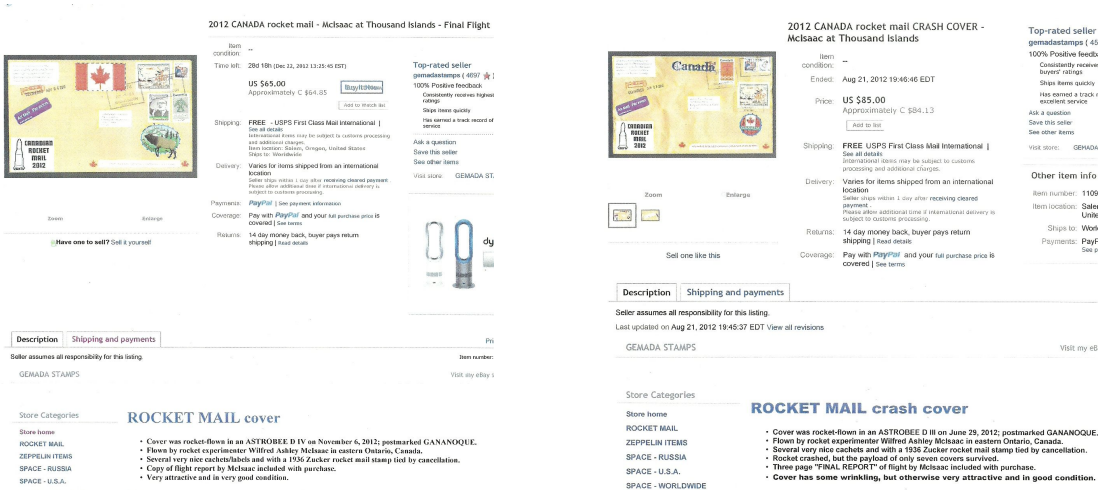
News stories from around the world covered all aspects of my Canadian rocket mail flights in great detail.

A good story will never go unnoticed by the media. Over the past twelve months more and more interest in *my own private rocket program* was gaining momentum and being well received by the international community. Magazines, Newspapers, as well as online media outlets wrote attention grabbing headlines such as ***'Covers are Canada's first rocket mail'*** or ***'German engineer's mail finally sees liftoff'*** and ***'Canadian Rocketmail: Gerhard Zucker stamps will continue in 2012'*** just to name a few. Because local as well as national Canadian news outlets were less enthusiastic about my story, I reached out to the International Community and was welcomed with open arms.

From World News to Stamp Magazine the excitement towards my rocket launches was palpable. What started out as a rocket story, turned into more of a philatelic story by the end of the year. After all, No rocketmail flights had ever taken place in Canada using official rocket mail postage and later recovered safely. Also was the fact that the postage I used was Gerhard Zucker *'First Canadian Rocket-Flight'* stamps from 1936. The set is recognized by the *'Air Mails Of Canada And Newfoundland'* as the first and only Canadian rocket mail postage designed to be actually flown in a rocket. For seventy-five years the stamps never left the ground until the first of four of my mail flights soared into the sky on October 31st, 2011 carrying seven covers onboard.

(left) Canadian rocket mail on display. (right) World News choose this cover to help feature my rocket mail program.

MY OWN PRIVATE ROCKET COVERS GO FOR SALE ON EBAY



(above) My rocket mail covers from all three launches in 2012 can be found on Ebay through a company named Gemada Stamps. (right) The 'crash covers' from the June 29th accident seem to be the most popular and start at just $85.00 US.

Besides my Mother and Father making remarkable sacrifices in seeing my dreams become a reality, developing professional relationships with people across North America and around the world sharing similar interests as mine proved to be of great value. One of these individuals I was very fortunate to meet and who has single handedly supplied my program with the entire series of Canadian Zucker stamps was a gentleman from the west coast of the United States named George Morrison. George and I quickly developed a rapport with one another after I had discovered he was selling the 1936 *'First Canadian Rocket-Flight'* stamps in excellent condition on his web page. Before long George was sending me (at no charge) more and more of the Zucker postage along with current Canadian mail stamps. His trusting nature and professionalism was instrumental in the success of my rocket mail program and I would like to take the time now to thank Mr. Morrison for everything he has done for me. We have never met face to face before but I look forward to perhaps meeting him one day in the future. Thanks again George.

'MY OWN PRIVATE ROCKET PROGRAM' GIVES BACK

When the rocket mail flights were completed on November 6th, It was time to do something that would separate me from other rocketeers over the past eighty years who unfortunately have tried to exploit this unusual style of mail delivery. Before the program had finished I made a pledge to donate what I could to the *Arthritis Research Foundation of Canada* from most of the proceeds raised from my mail covers being sold on Ebay. I suffer from Arthritis as well as a disabled left ankle which has gone through two unsuccessful reconstructive surgeries in 2009 and 2010. *'My Own Private Rocket Program'* was conceived shortly there after to assist in my rehabilitation. Both mental and physical. On December 4th the promise I made was fulfilled when I sent $200.00 to the Foundations home office located in Toronto.

What the future holds for me is, like my rockets, very much up in the air. No matter what happens in the future however, I'll never forget the year 2012, when *'My Own Private Rocket Program'* made a small difference in the world, just as I had set out to do in the first place, back on that overcast Sunday morning in November of 2010.

Arthritis
RESEARCH FOUNDATION

EPILOGUE

For those of you ever wondering what the difference between going to the local park and launching a model rocket for some good old fashioned fun with friends and family, and developing a full scale rocket program using flight computers, complicated payloads, and high powered rockets, I hope this report gave you the answer. As you have just read, there is a big difference.

At times the overwhelming work I had brought upon myself during the past twenty-four months was both physically painful and mentally exhausting. Just ask my father who witnessed my frustration on a number of occasions. However, ever since my first attempted test flight on November 7th, 2010 using the A1-T model rocket that never ended up leaving the launch pad, my six recorded rocket flights (as mentioned in this report) have traveled a total distance of 25,482 feet (4.8 kilometers) while carrying a variety of unique payloads onboard which at times garnered the attention of the world. Was it all worth it? one might ask. Without hesitation, yes it was.

With all this being said, having had the opportunity to travel to exciting destinations in the past such as New York City, Washington D.C., Las Vegas, Los Angeles and Mexico to name just a few; without any doubt my lifes greatest adventure, no matter what the future holds, will always be the time I managed *'My Own Private Rocket Program'*.

Me and my father in Picton , Ontario on November 11th, 2010 just minutes before

the A2-R13 rocket blasted into the sky. Without knowing it at the time, my lifes greatest adventure was about to begin.

ROCKETEERS NOTES: It should be duly noted a lot of information remained absent from this report for two specific reasons. First, I wanted to write a reasonably length summary that was easy to follow as well as fascinating to anyone both inside and outside the rocketry community. Second, some of the topics covered in this report are very original and like a magician, a rocketeer never gives away all of his secrets.

A SPECIAL THANKS TO:

George Morrison, Gemada Stamps
Colin Dow, Sigma Rockets
The Canadian Rocket Store Team
Leading Edge Hobbies
Chris Hargreaves, The Canadian Aerophilatelist
Tom, Gananoque Airport
Perfectflight
MARSA4
My Father, Rennie McIsaac, photography/recovery
My Mother, Diane McIsaac
James Rychlo, YouTube editor
Greg Falcon, Recovery
Arthritis Research Foundation
Canadian Stamp News
Stamp Magazine
Wonderful World Of Stamps
The Picton Gazette
World News
Estes
Aerotech

RELATED MATERIAL

For those of you who are interested in a complete summary of my Canadian rocket mail program which focuses on the philatelic aspect of the flights, click on the link below or go to 'My Own Private Rocket Program' Facebook page.

https://docs.google.com/document/d/1ILJp8yS9heOxPvOyFQyv803dXNAON1tyg7CoPAmXEZs/edit

A two part documentary concerning the November 11th, 2010 Remembrance Day launch of the A2-R13 rocket can be found on my Youtube Channel. The documentary also pays tribute to the Avro Arrow while the video has gone viral with nearly 10,000 views.

The flight video of the October 31st, 2011 ARCAS rocket launch with an onboard high definition Gopro camera is nearing 12,000 views and is also worth watching. It may be the best high powered launch ever caught on camera so check it out. My channel link is below.

https://www.youtube.com/user/artkickstart?feature=mhee

The Canadian Rocket Research Society is now on FACEBOOK FB
The Canadian Rocket Research Society videos can be found on YouTube