



Earthrise

The Canadian Association of Rocketry Newsletter

Volume 3, Number 1

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Content

Send your articles and photos to the editor by mail or the Internet.

Earthrise Editor

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I can scan photos, but if you mail your article, please send it in an elec-

Submission

Our goal is to publish Earthrise quarterly in February, June, September, and December. In order to provide ample time to edit, print and distribute, please have your content to the editor no later than the following dates:

Issue 1: This one...

Issue 2: May 1

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Canadian Association of Rocketry

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Calgary, AB

T3L 2P1

A Word From the Big Chair

Dave Ross

2001 was a busy year and lots happened thanks to many people who volunteered their time and energy to CAR. Several key roles have changed hands over the past few months and I will take this opportunity to express our collective thanks to; **Terry Rea** for his time as webmaster, to **Bill Morgan** for serving on the executive as Secretary/Treasurer, **Neal Hickey**, Earthrise editor, and to welcome their replacements; **Ian Stephens** to the webmaster position, and **Tim Remple** as Secretary/Treasurer. For the time being, I will take on the editing of Earthrise as Neal was kind enough to set up and pass on the templates that he created for MS Publisher.

This issue marks the end of my first year as CAR chairman, and the beginning of year two. The Winter season is full of plans, promises, good intentions, and resolutions. Spring holds great anticipation of warm launches and long days. Summer, the fulfillment of plans made good and Autumn, a mix of pride of accomplishment, and of fixing things that didn't work out quite right.

So it is with Earthrise as well; Here we are in mid-winter and 2002 promises to be a very exciting year in Canadian rocketry! February seems to be a good time to publish Earthrise, lots to write about, as this issue presents lots of new and exciting developments.

I hope you all have exciting projects in the works, and sincerely wish you all the very best for

Earthrise Submission Incentives

Dave Ross

Free Stuff
Free Stuff

Towards the end of last season the number of Earthrise submissions really dropped off fast. By the time September rolled around there just didn't seem to be much desire to sit with pen in hand. In anticipation of a similar rise and fall this year, CAR HQ is holding out the following carrot:

Anybody who submits an article that is published in Earthrise 2002 will receive a \$75.00 gift certificate from the supplier of his or her choice, on the list of "Official CAR Sponsors". Look for these sponsors to have banner ads in each issue of Earthrise. A complete list of eligible suppliers will be e-mailed to you when we choose to include your submission. The sooner you send it in, the better. If your article doesn't make the next issue, don't worry, it may still make the one after.

CAR—Motor Testing

CAR Motor Testing Committee



The Canadian Association of Rocketry has been in existence for 36 years, and in that time has seen many changes in the sport of model rocketry (MR). Perhaps the most significant changes have occurred in the last decade and a half, with the development and growth of high power rocketry (HPR) as a separate but closely related facet of the sport.

With high power rocketry gaining popularity as it has in the US, Canada and abroad, various new motor manufacturers have come into existence, some to serve only the HPR market, others to serve both the MR and HPR sectors. Some have come and gone, others exist to this day, others are yet to be.

In the earlier days of high power rocketry, only one association existed to provide member services to the HPR sport - the Tripoli Rocketry Association. These early days marked the transition from localized experimental launches to a nationwide recreational activity. Originally, the association made no requirements of motor manufacturers, in other words any manufacturer, legitimate or not, was free to transport motors to a Tripoli sanctioned launch and offer them for sale. This had both positive and negative results. On the positive side, manufacturers continually brought new and interesting products to the market. One unique facet of early TRA launches was the ability to show up at a launch and be surprised by motor manufacturers offering new products, even "specials" made in limited quantities and "one-offs" for specific customers. Generally, this system was not problematic and was a point of interest of the activity for many. It became evident, however, that certain manufacturers were misrepresenting the performance and/or reliability of their products, either wittingly or in some due to a lack of technical expertise and test capability.

It was perhaps inevitable that the TRA needed to gain some form of control over the situation in order to foster and maintain credibility with federal authorities and insurance underwriters. The National Association of Rocketry (NAR) had required certification testing of model rocket motors for many years at this point. Thus, the TRA instituted the Tripoli Motor Testing and Listing Committee with the purpose of evaluating and testing any products destined for use at TRA sanctioned launches.

...CAR—Motor Testing

This system has helped immensely in "weeding out" products that were unsafe, inconsistent or unreliable. In time, the NAR made a decision to embrace HPR within its organization, and subsequently the two organizations formed a reciprocal agreement whereby motors certified for use by one organization were allowed to be used at sanctioned launches of the other.

The CAR, like the NAR, originally existed solely to oversee MR activity. As is inevitable, interest in HPR within Canada grew, with the result that early HPR activity in Canada began when rocket enthusiasts returned from US launches with HPR motor products and launched in a clandestine fashion. Over time, the CAR embraced high power rocketry and sanctioned launches have become a regular occurrence.

In Canada, for any explosive article to be sold, used, possessed, etc. it must not only be classified for shipping purposes, but also must receive explosives classification and be authorized per the Explosives Act and Regulations. An explosive is only "authorized" after the Explosives Regulatory Division (ERD) of National Resources Canada (NRCan) has reviewed test data and technical specifications, deemed the product safe and suitable for sale and use, and placed that product on the authorized explosives list.

Because of this requirement, it may seem that this authorization procedure would be sufficient scrutiny for the CAR to endorse use of product. This is true to a point, but several problems recently have come to light. One is that the Canadian Explosives Research Laboratory (CERL) is limited in static test capability, as they have only required the ability to test model rocket motors to date and good quality load cells are expensive especially considering their usage is infrequent for this purpose. Secondly, CERL generally has a backlog of other tests in line resulting in extended waiting periods. Additionally, the HPR market in Canada is relatively limited, and the cost of testing has to date been prohibitive to manufacturers, resulting in very little HPR product being authorized. One final twist is that there are now and may be more in the future, hybrid rocket motor systems that utilize no explosive ingredients whatsoever and this plus other design features exempts them from jurisdiction by NRCan. However, Transport Canada must have reliable test data in order to provide launch authorizations where these products are involved.

It was thus proposed that the CAR institute a Motor Test Committee of its own, and endorse a

The CAR Motor Testing Manual is currently 27 pages and will likely be 35 to 40 in its entirety, and will be posted on the CAR website or available from CAR HQ once it is completed and ratified. The readers digest version, in bullet form, is as follows:

Purpose:

- To verify that model and high power rocket motors made available to CAR members are reliable and safe.

(Continued on page 20)

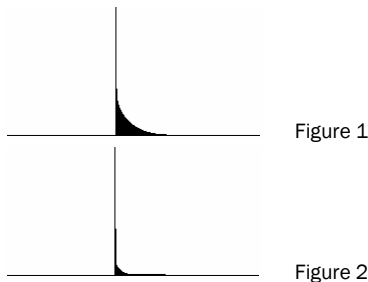
Glue Fillets Revisited

Leon Kemp

Glue Fillets Revisited

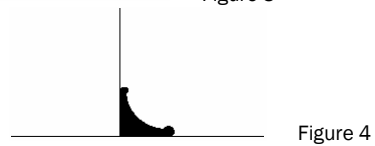
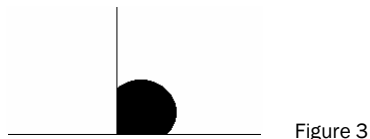
I recognise that many of us have been building rockets for years, and that filleting fins is a process we all take for granted as being a simple process. However, I have seen some poor procedures based on a misunderstanding of the nature of the glues most commonly used. For purposes of this discussion I have chosen to separate the glues into two categories, which are those with volatile solvents, and those without. The emphasis of this article will be solvent-based glues.

Glues with volatile solvents include cyanoacrylates, water or urethane based wood glues, and silicone adhesives. These are the glues of primary interest here, because all solvent-based adhesives contract during curing. Improper application of the glue can result in minimal strengthening of the joint. It is a common practice to apply a glue fillet, and then run your finger along the joint to form a concave bead (see figure 1). As the glue dries, it shrinks down, and results in a very small area of reinforcement (see figure 2). It appears to still be a reasonable reinforcement, as we can see the layer of glue, and can see the curvature of the fillet. Because we only see the top surface, we do not recognise the actual weakness. Most of the fillet actually provides no reinforcement, with only a small amount of glue in the corner actually strengthening the joint, which is then more likely to fail.



The correct procedure is to leave the full convex bead in place (see figure 3), and allow the glue to cure down into a concave fillet (see figure 4). This can result in a bit of a lip (see figure 4), which can be removed or reduced with a small diameter round file. This technique ends up with a strong layer of glue along the full span of the fillet, and it will have a better chance of standing up under launch / recovery stresses.

...Glue Fillets Revisited



Some experimenting will be necessary to determine how much a specific volatile glue will shrink while curing.. My personal favourite wood glue is Lee Valley Tool's GF202. This is a



fibre-filled gap-filling glue with very high shear strength (over 4200 psi). It shrinks down approximately 60%, which means that a full rounded glue bead will shrink down to a nice convex fillet.

Figure 5 is a photo of a finished fillet on a rocket. I have rarely had a fillet done in this



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Roc Lake 5

Max Baines

Roc Lake 5
June 28, 29 and 30, 2001
Near Lethbridge, Alberta

The Lethbridge Rocketry Association is pleased to advise that plans are now well underway for this year's Roc Lake 5 HPR Launch near Lethbridge.

Once again, we have an impressive array of big flights planned. Darcy Moser advises that his CAR L4 project is complete, and health allowing, he will be attempting his L4 cert on an M1315. Barry Mackadenski has completed construction of his Mega-Nuke, and has his Hypertek M1010 in hand. Gary Jennings has almost completed repairs to his Albatross, and plans his L4 attempt on an M1419. Max Baines has his 4 inch diameter Black Brant II complete, and an M1315 in the magazine, and will be flying this combination for a ripping sport flight to 15000.

We are pleased to advise that Anthony Cesaroni and Mike Dennett from CTI plan on attending this year's event. Anthony has an assortment of M flights planned, and Mike Dennett has completed fine tuning his 3 inch diameter full Hypertek M project that got grounded at the last instant last year. And Barry Lynch from LOC Precision has also committed to attending, and is talking about a Laser LOC on a Hypertek L.

Cesaroni Technologies Inc. has also indicated that they are working very hard towards having the new Pro54 motors completed in time for Roc Lake. The new propellant formulation is complete, and the first run of 10 nozzles have arrived at CTI, so they are already test firing a few of these and working the bugs out. These new motors promise some very different



...Roc Lake 5

characteristics, and should be the perfect solution for fairly heavy weight projects. Also, there may potentially be a second propellant formulation for the Pro38s available by Roc Lake.

If the availability of 75 and 98 mm motors improves, it is my understanding that there are 3 other large flights almost ready to fly, and I hope to have some form of announcement on these developments in the near future.

Our L'Il Nuke altitude competition already has over 20 people signed up.
Rules are as follows:

Barry will manufacture a series of Nukes with the following modifications:

- 1) A 38 mm motor mount
- 2) A 10 inch payload section

The required motor will be the Cesaroni H110

The Finished rocket must have a body tube length (NOT including nosecone) of not less than 26 inches. NOTE- IF you use all of the 10 inch payload it would have a body tube length of 30 inches, so you can shorten the design by up to 4 inches. At least 6 inches of the Body Tube must be of stock diameter, however the balance of the body tube can be modified or transitioned as you like. Open Season on Fin Design.

You must utilize the LOC nosecone - HOWEVER_ the nose cone can be modified. When the nose cone is inspected, at least the shoulder has to be LOC issue.

AND FINALLY

The competition is called "NAME YOUR TUNE"

The winner is based on how close your actual flight came to your predicted altitude. Thus, if you predict 5500 feet, and you achieve 5325 feet, you have 175 demerits. The person with the fewest demerits wins.

BUT

In order to encourage creativity in design and the highest altitude possible, there will be bonus points awarded in the following manner.

Any flight under 5999 feet = no bonus

A flight of 6000 to 6999 feet receives a 2% bonus

Take your actual flight (say 6500 feet) plus 2% bonus means you can deduct 130 demerits. So if you had predicted 6700 feet, achieved 6500 feet your net demerits are 200 demerits less the 130 bonus demerits = 70 demerits.

Any flights between 7000 and 7999 feet will receive a 4% bonus. Thus a flight of 7500 feet would receive a 300 demerit bonus. See the math above.

My Fast Easy Ejection Charge

Dean English

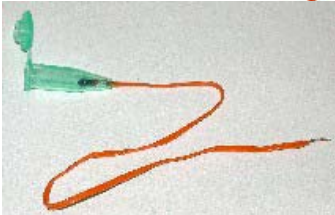
This is not my idea but I thought others could benefit from my experience. While surfing the net I came across this very cool idea for making an easy ejection charge. Pratt Hobbies sells this item made up with an igniter. I work for a Lab at the University of British Columbia and we use these Micro Centrifuge tubes all the time. So that got me thinking.....



If I cut the end off, I could slide the igniter through the hole



It just so happens that these graduated micro centrifuge tubes hold 2ml of fluid. So in the lab I carefully measured out 1.0 grams of FFF Black Powder (BP) and it was very close to the 1ml mark on the tube. I did the same for 1.5 grams and 2.0 grams, they also were very close to the corresponding graduated marks on the tube.



I slide the igniter so it is almost to the bottom of the tube.



I wrap the bottom end of the tube with tape to prevent any of the BP from spilling out. I pour in my BP, pack the top with cellulose wadding, snap the lid on and I have a ejection charge made up in a matter of minutes.

Coast Rocketry is now selling these tubes

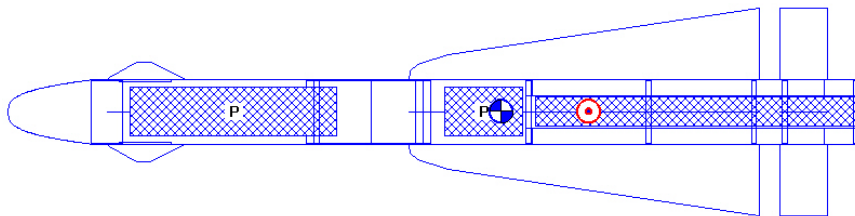
Falcon AIM-4D A Level 4 Project-Part 1

Dave Buhler

My original level 4 project was to be a 1/3 scale Black Brant II. Everything was completed most of the paint was on, ready to go....I took the model over to Dave Ross's place to have it inspected as required for the L4 process and also to test fit the motor in the mount. Well this is where the problem started, pushed the motor in, 12" to go then THUNK.....WHAT!!!! After some analysis, it was painfully discovered that I made the motor mount TOO SHORT. Never having seen a M1315 motor I just took the measurements off the Dr. Rocket site, 32", and made a tube this long. Well, after measuring what the actual length was, it turned out I cannot read tape measures very well (tape must have been upside down, yaa that's it) the length turned out to be 23". After the heart sinking a bit, I turned to looking for another project. At our meeting space in the Calgary Aerospace Museum, there was this older air-to-air missile the Falcon AIM-4D, it was always in the back of my mind for a good project, but farther back my brain was going "but look at all the fins/work". It is a pretty rocket, sooooo that part of the brain conversation won; little did I realize....

I found on the Jim Ball site, <http://www.yellowjacketsystems.com/jimball/scale-data/scale.htm> where Keith Carlin of BC had uploaded a bunch of pics with measurements for the Falcon. Well as with most of my projects it usually starts with about a month and a half of just planning. I created the Rocsim file of the out lines, fin placements, proper motor mount length, two stage deployment separation points, electronics bay.... Going through this planning process really helped in seeing the potential problems I would face, as with any scale

Falcon Scale: 1/10
 Rocket length: 82.000 In. , diameter: 6.155 In. , span diameter: 19.905 In.
 Rocket mass 48.361 lb. , Selected stage mass 48.361 lb.
 Engines: [M1315W-0]

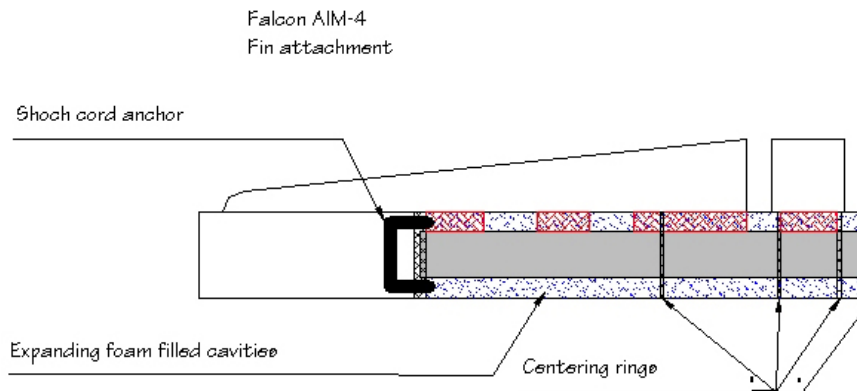


Method	CG In.	CP In.	CNa	Static margin	Analysis
Barrowman	47.569	55.997	23.225	1.37	The rocket is stable.

...Falcon AIM—4D A Level 4 Project—Part 1

project. I had a limited length to deal with, more than 1/3 of the rocket was to be motor, so I had to plan the rest of the space allocation accordingly. Figure 1 shows the Rocsim layout. The length of the main chute compartment was determined from the actual chute size (12') plus harnesses. It worked out quite well.

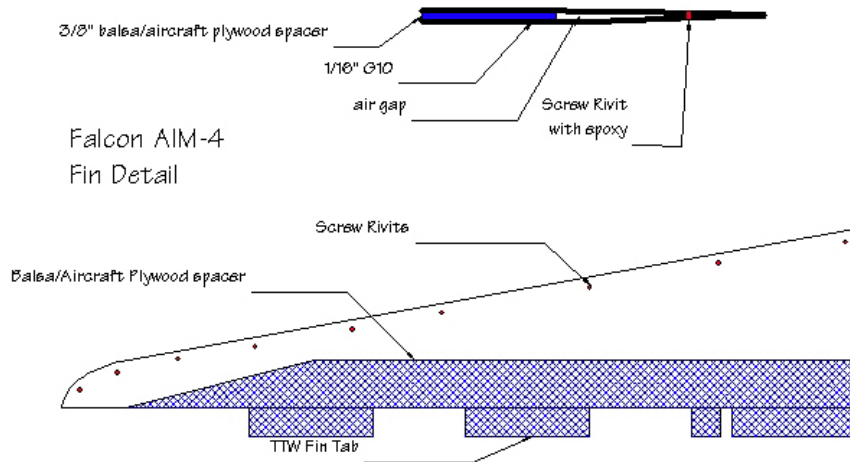
There is a lot to consider with a project this size. I tackled the design from the back to front (recovery to launch) but there is always some decision interaction the other way also. I had a chute that was 12', I knew the length I required to fit this in. The chute would bring down 50lb rocket at about 19-21 fps so this was my max weight, no problem I should be only 35 lbs. with motor (as you will note in Figure 1 the weight was a bit more than I counted on). Drogue chute was sized to drop at about 50-55 fps. This would fit in the tiny space I allocated for it. That



also gave me about 12" for the electronics bay. The model was already heavy enough to keep from going mach so this fit the next criteria I needed to have (I only have an Adept 2s and it is not mach safe). My Secondary electronics was a staging timer I had designed built and tested.

The next to plan was the fins. I had a stash of G10 around so this seemed destined to be the material to use. At the time, I was also looking into some information on fin flutter and failures because of structural stresses at higher speeds from the resulting vibrations. Looking at the design of the original Falcon, I decided to even scale the fins, root to tip thickness. The

...Falcon AIM—4D A Level 4 Project—Part 1



root dimension was 1/2" to 1/8 at the tip, this melded well with the research that a varied fin thickness reduces the chance of a vibration setting up and also the fact that the fin root was about 3 feet long, another suggestion to reduce vibrations. Figures 2 and 3 shows the fin construction. With all this weight of two sheets of G10 for each fin, I changed the design slightly to create fin tabs that would be inset into the tube at multiple points rather than one long TTW connection. I also added multiple holes in the tabs to act as rivet points for the glue and to reduce some weight even more. I also used a screw rivet idea to keep the leading edge bound mechanically along with epoxy. The same was done to the smaller rear fins.



...Falcon AIM—4D A Level 4 Project—Part 1



Body tube was 6" Sono Tube with several layers of 6 oz cloth. Slots were cut out to accommodate the fins. The upper centering ring was triple 1/4" airply. The shock cord mount was a 5-inch square post mount with large washers to spread the load around during deployment. The motor tube with centering rings glued on was slide into place then each ring on both side where glued to the tube wall. Note that Sono tube has a wax layer

on the inside and this has to be removed for the glue to adhere properly. The tube slots allowed for properly creating the ring fillets on both sides. Once this was all set up the cavity between motor mount and body tube was filled with expanding foam. I waited for this to cure for a week or so then cut out the fin slot holes right to the motor mount. The plan here was to pour the glue into the small slots and as the fin was pushed in the glue would flow upward toward the body tube and create a large glue/surface bond. It actually worked out very well. With out adding fillets on the outside surface the fins would not flex at all. Figures 4-6 show a bit of the fin installation and alignment.



Fin alignment was first done through careful measuring and cutting of the fin slots to ensure it was parallel to the tube. Secondly, I created a jig from 1/4" hard board that fit closely on the

L4CC Update

Dave Ross

The Range Safety Officer at CAR launches is responsible for checking rockets prior to launch approval. However, because of time constraints, the RSO can only judge the essential "look and feel" of a rocket. This does not allow judicious assessment of engineering details or safety features that may be required for high impulse motors, complex rockets, high altitude flight and recovery.

The Level 4 Certification Committee (L4CC) is the group of CAR approved people who have demonstrated the experience necessary to "Pre-RSO" a rocket of complex nature and high impulse. (i.e.: Greater than L impulse). Details regarding the Level 4 process and requirements can be found on the CAR website, or in the CAR certification study guide.

This L4CC committee was initially seeded by using Tripoli TAP committee members and CAR executive members in this capacity.. Now that we have several successful M class flights at CAR launches, it is appropriate to formally name the CAR L4CC.

Anthony Cesaroni Ontario

Max Baines Alberta

David Buhler Alberta

Mark Ouellette Quebec

Vince Chichak Alberta



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Draco Version 1.2

Marc Ouellette

October 25th 2001, the big start for the launch of Draco 1.2. Myself, Pierre Laurendeau and Jean-Simon Bourgault, all from A3MAQ (the Quebec Rocketry Club) are on the road to North Carolina with Draco 1.2, a 17' rocket and a 20' launch tower on a trailer. First stop: U.S. customs, only a month and half after the events of September 11th. After 2 or 3 minutes of explanation and a few photos, the Customs official said: "Good luck guys and have a good trip", without unwrapping everything (cool !!). We're now in the U.S., destined for Whitakers NC.



Friday the 26th, afternoon, we were the first to set camp in a field full of cows. (???) Saturday morning, after a freezing night (0 celsius) all the flyers, and Ken from Performaces Hobbies, arrived on site to distribute the reloads. I had prepaid for an M1939, but since the fire at the Aerotech plant, the reload stock was really poor. With 3 grains of an M1419W, a grain of a

L952W, a nozzle of an M2400T, and cutting an N lining, we were able to build my M1939W. (ouf !).

We worked all day Saturday to erect the tower, and prep the rocket for a Sunday afternoon launch.. Sunday was the experimental day for the Whitakers Club, and they gave me special permission to launch Draco. This new version of Draco has 2 altimeters, an R-DAS with 3 axis



...Draco Version 1.2

accelerometer, a temperature sensor, a GPS and a transmitter in the first bay. In the second bay a WRC-2 controlling two explosive shear pins and a 16' back-up chute. We used more than 23' of 2 inch strap, a 6' drogue and two 16' main chutes (plus the back-up) in the recovery system.

Sunday the 28th, at 2:00 we were ready to launch, but the weather was bad; Freezing cold with a 15 MPH wind, so I decided to wait until 4:00. Around 3:30, we armed all the electronics and opened the laptop to receive the telemetry, Jean-Simon was designated to track the rocket with a Yagi antenna, Pierre was the cameraman, and I was in charge of the back-up system. After the usual countdown, Draco roared in a beautiful white cloud and rose perfectly straight to 3800'. The 6' drogue chute opened exactly at apogee and after a short descent, the two main chutes deployed at 1200'. One line (of sixteen) of one main chute was tangled, and so the back-up chute was deployed and the rocket landed gently in a cotton field, a thousand feet away. A cotton field is not a good place to land. Cotton is full of small thorns, like thistle. Ouch !



Mark Lloyd, one of my T.A.P. members signed- off my certification form with congratulations. Finally, I certified TRA L3 , CAR L4. All the telemetry worked very well but we lost the GPS signal when the rocket reached apogee and the nose tilted down. A GPS antenna has to always point to the sky in order to track satellites. On my next project, Draco 2, a two stage (N to M) 23' rocket, I built the telemetry module with four folded legs designed to land with the GPS, and the transmitter antennas, pointed up.



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RSO Certification Program Update

Dave Ross

The CAR RSO Certification Program was initiated 1 year ago, with this past season being used as a “Grandfathering period” in order to seed the program, and take into account the current experience already accumulated in HPR to date. I would like to thank all those who took the time to submit their experience resumes and congratulate those that qualified for an RSO Level.

The following descriptions are over simplified, however they are an easy reminder of the RSO level descriptions: RSO L1 - Button pushing, RSO L2 - HPR Launch hosting, RSO L3 - Away Pad management. Given the number of rockets launched in Canada, and hence the number of buttons pushed, I expect the number of RSO L1's to increase dramatically. They are the principal volunteers at a typical HPR Launch.

RSO L2's provide some relief for Transport Canada. In lieu of sending a representative from TC's regional office, Transport Canada will now have the option of approving a CAR RSO certified representative to oversee operations on their behalf. This should facilitate HPR launch approvals when no TC personnel are available to travel.

Currently there are only a couple of launches a year with “away cells” for larger projects in Canada, so the need for more L3 RSO's is limited. However, it only makes sense that TC will seek the highest level of experience available for any approved launch. As always, the more experience, the better.

Here then is the initial list of Qualified RSO's that are available to Transport Canada when they consider approving an application to launch HPR in Canada.

RSO L1:

Dominique Martel

Philip Cianchi

RSO L2:

Yves Lacombe

Pierre Laurendeau

RSO L3:

Ken Latam

Max Baines



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2003 Calendar

Dave Ross



Included with this issue is a 2002 Calendar. Lots of good pictures get taken every year. Some wind up on websites, others make it into Earthrise, and some are never seen by the general rocketry community at all. With this in mind, here is fair notice that there will be a 2003 Calendar published, in or around December of this year (2002).

Take lots of pictures. Save some really good ones for the CAR 2003 Calendar and over the

...CAR—Motor Testing

(Continued from page 5)

- To verify manufacturer's performance specifications, and generate a database of motor data for use by CAR members.
- To generate independent and credible static test data that can be submitted to NRCan to facilitate the authorization and explosives classification procedure.
- To generate independent test data for hybrid motor systems exempted from NRCan ERD procedures, for review by Transport Canada for launch authorization.
- To generally increase credibility of the CAR with Canadian Federal authorities and other rocketry associations as well as to help ensure continued and adequate insurance protection.
- To ensure that no illegally manufactured or imported products are offered to CAR members putting them, other CAR members, spectators, the general public and property at potential physical or legal risk.

Benefit to members:

- Consumer protection
- Performance data for performance prediction
- Better response time for new products and reduced cost of testing increases motivation of manufacturers and can result in greater product selection

Benefit to manufacturers (primarily Canadian):

- Acceleration of authorization procedure and reduced testing cost could allow products into Canadian market more quickly and economically.
- Reciprocal agreement with TRA and/or NAR will facilitate entry of Canadian products into US or foreign market, and vice-versa.

Personnel:

Committee chairman. Primary contact point for manufacturers and CAR executive. Chairman will schedule test sessions, organize testing staff, compile or assist in compilation of data, submit data to CAR and appropriate agencies as required. Chairman will delegate these various responsibilities if required.

Committee members. Selected by CAR executive based on technical abilities, location, willingness and ability to participate, and interpersonal skills. Members will attend and assist in test sessions. Total number of members should be sufficient to provide redundancy to accommodate personal schedules. Members should be

...CAR—Motor Testing

located in reasonable proximity to a test facility. Membership should be comprised primarily of personnel not involved in the manufacture of rocket motors to ensure impartiality. There may be representatives from motor manufactures on the committee as long as the previous requirement is enforced.

Test facility and equipment:

CTI has offered use of their test equipment until the CAR is able to procure test equipment of its own. CTI staff will train CMTC members in calibration and use of the equipment, and oversee test equipment operations, however CMT personnel will be responsible for conducting the testing and have full control over all procedures. CTI welcomes representatives from other manufacturers to oversee testing of their products to ensure fair and impartial treatment.

Test standards:

The CMTC will adopt the TRA motor procedures and requirements as they are a reasonable test standard, and to assist in procurement of reciprocal agreement with TRA by means of standardization.

CMTC general responsibilities:

- **Manufacturer status.** CMTC will require the motor manufacturer to supply adequate proof that the motors have been manufactured and transported in accordance with the Explosives Act and Regulations, before they are accepted for testing. This is required to ensure liability protection for members and the CAR, as well as to prevent unfair competition to manufacturers who have made the effort and investment to be in compliance with Federal regulations.
 - **Performance testing.** The test stand will be equipped with a load cell suitable for the maximum impulse level of the motor to be tested. Force/time and delay interval data will be acquired. Post analysis will be used to determine a total impulse, average thrust, burn time, and delay time. A standardized motor designation will be assigned to the motor based on the test results.
 - **Operating instructions.** CMTC personnel will review the instructions supplied with the motor or motor system to ensure that all relevant issues are adequately addressed so that the end-user will be able to properly assemble
-

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Rumors that Vince Chichak had visited the Calgary Rocketry Association display proved to be erroneous....

