MASA Planet

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Safety First!

The Safety Fanatic Gets Burned

A cautionary tale about change management

Ted Cochran, NAR 69921

The June TRA launch was the first good opportunity I've had to launch enRaged, my curvy Renegade kit-bash constructed last winter. As some of you will recall, it's set up for a seven motor cluster, using four 13 mm motors and three 19 mm motors. I decided to fly it full up--four A10s and three C6-7s. That's a lot of Estes igniters, so I brought Thumper along to help out. [Aside: Thumper is a pad-side relay box with several lead-acid batteries, an 80 Amp industrial contactor, and a bunch of very heavy duty wire. In the past it's been used to light seven copperhead igniters simultaneously, and has been used extensively by TARC teams for their massive clusters.]

Because this was to be enRaged's first flight, and because there were so many motors involved, I was very deliberate during preparation. I checked each igniter with an ohmmeter before and after installation, and carefully twisted adjacent leads together in preparation for using a clip whip.

The rocket was RSO'd, and I brought it and Thumper to the pad. I touched the leads from the firing console together to ensure that they were dead, and hooked them up to Thumper, and of course the relay didn't operate (It makes a pretty hefty thunk when it does).

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Road Trip

TARC 2004

Hope Christian Academy Treks to the Finals

Art Gibbens

9:00 am, May 20, 2004: Lift-off from the Academyís parking lot occurred while the rest of the school cheered for us and sent us off to the very first national science related competition that the school had been invited to in its 29 year history. It was a huge deal for every one of the students and all the parents that turned out to send us on our way. We had been loaned a 15-passenger van from the church that one of the elementary teachers attended. All I needed to do was change the oil, which took all of a half hour. It sure was nice to have everyone in the same vehicle and enjoy the AC all the way.

Ted Cochran

HPR salvo follows F18 fly by at TARC opening ceremony

All five students were able to go, and three parents went as chaperones, including me for a total of 8 people in the van. We took the last seat out so we could stow all our luggage and support equipment. We also made sure we had a CD adapter for the vanís tape player, which allowed us to listen to music the whole way.

We had made reservations in Bloomington, IL at the Williamsí hotel, a family that used to go to our church, but moved there about 3 years ago when Dave accepted a position at State Farm HQ. It was only an 8-hour trip to their house. We had planned on a 12-hour trip to the Days Inn where we would

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be spending the next two nights. It ended up being about 13 and we lost an hour with the time zone switch. We walked into the preparation meeting as it was starting. We cut that way too close!

At the Williams' the kids took turns at the laptop using RocSim to recalculate how much weight they needed in the nosecone to offset the weight of the streamer in the booster. This took about 2 hours to figure and then record it to a table on two sheets of paper. Let me state here that the goal of our team was to hit 0, but be satisfied if they got within 20 feet. This team had really done their homework, considering their previous performances to extrapolate the needed weight.

While traveling through West Virginia and Maryland, one of the students had recorded an eclectic mix of music that included the song from "How the Grinch Stole Christmas". So they practiced the different parts about a dozen times and then videotaped the results and it turned out pretty funny. "You're a mean one, Mr. Grinch...." Ah, the memories!

After the meeting that Friday night, we got together to go over the launch one last time. I also surprised them with matching shirts in the school colors to identify the team. They all had their names stitched into them on the front with the school logo on the back and TARC 2004 on the right sleeve. The first of many mementos for these kids to have for the rest of their lives.

The morning of the launch dawned beautiful with no wind, a heavy dew and temps in the low 70's. Ideal launching conditions for the first round of launching, which they had drawn.

They selected their eggs and walked through the gate to begin the preparations for launching. They presented their rocket and discovered that they needed to show the judges their working altimeter so they had to take apart their payload section in front of the judges. The judges really liked the use of pencils and BT-20 tubing to secure the altimeter in the cargo bay. Then they had to go back to the prep area and re-assemble the rocket to be given a pad number.

They got out to the pad and connected all the leads just like they had practiced, raised their paddle and waited. Finally Mach-9 lifted off of the pad straight and true. The sustainer lit and the booster recovery system worked as designed, returning it safely to the ground.

www.rocketcontest.org

Hope Christian Academy's TAR 2004 Official Team Portrait

The sustainer continued upwards with nary a twist or wiggle, turned over and the parachute came out just perfectly! It drifted down and landed in the tall turf just over the hump of the hill and out of sight.

As adults, all we could do is watch and wait to see what they would post on the official team results board. I was close enough to hear the result over the radio before it was posted. DQ! Ugh! We must have cracked an egg, is what I thought. As they walked through the gate they showed us the offending ovum. Sure enough, an unusual crack off-center from the fat end of the egg, looking like a stress fracture, not an impact puncture. The hard part was that they had a score of 1264, or 15 because of the rounding factor. No other team beat that score until after lunch, mid-afternoon. At the end of the competition, only two teams beat that score officially all day, and 4 teams tied it. This is what I shared with them at the end of the day - that they had beaten 93 of the teams in altitude calculation. (In the days following the competition information was released showing that another team had beaten our score, so we had only beaten 92 of the teams.) They had no reason at all to hang their heads, because they had gotten the hardest part right.

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MEETING SCHEDULE

SATURDAY, JULY 24
Location: VFW field in Otsego
Time: 10 AM - 4 PM
Annual MASA Summer Picnic!

THURSDAY, AUGUST 5
Location: Science Museum of Minnesota, St. Paul
Time: 7 PM to 8:45 PM
Topic: Rocket electronics

THURSDAY, SEPTEMBER 2
Location: Science Museum of Minnesota, St. Paul
Time: 7 PM to 8:45 PM
Topic: Clustering!

LAUNCH SCHEDULE

NOTE: TIMES AND LOCATIONS SUBJECT TO CHANGE! CHECK THE WEB SITE FOR UPDATES

SATURDAY, JULY 17
Location: VFW field in Otsego
Time: 10 AM - 4 PM
MASA Launch

SATURDAY, JULY 24
Location: VFW field in Otsego
Time: 11 AM - 4 PM
Annual MASA picnic and Launch

SATURDAY, JULY 31 THROUGH FRIDAY, AUGUST 6
Location: Great Meadow in The Plains,Virginia
Time: All day, every day
National Association of Rocketry Annual Meet

SATURDAY, AUGUST 28
Location: TBD
Time: 10 AM - 4 PM
MASA Launch

SATURDAY, SEPTEMBER 25
Location: TBD
Time: 10 AM - 4 PM
MASA Launch

Contest Corner

Official Results: MASA's First NAR Meet

Place*	Contestant	Flt 1	Flt 2	Total	NAR Pts*
B Parachute Duration (MASA Open Record: 148/89/-)					
A Division					
	Nelson, Justin	35	48	83	
C Division					
1	Lenz, Stuart	281	14	295	80
2	Cochran, Ted	72	149	221	48
3	Whitaker, David	138	49	187	32
4	Jarosch, Kenneth	98	41	139	16
	Frisvold, Lee	41	78	119	
5	Estenson, Alan	88	32	120	8
6	Grimm, Lee	21	86	107	8
	Myers, Jim	80	DQ	80	
7	Nelson, Mark	32	30	62	8
A Streamer Duration (MASA Open Record: 34/-/49)					
A Division					
	Nelson, Justin	21	11	32	
B Division					
7	Cochran, Seth	DQ	12	12	8
C Division					
1	Whitaker, David	146	61	207	80
	Myers, Jim	24	67	91	
2	Jarosch, Kenneth	31	56	87	48
	Jarosch, Paul	DQ	46	46	
3	Grimm, Lee	33	DQ	33	32
4	Estenson,Alan	13	17	30	16
	Frisvold, Lee	12	15	27	
5	Cochran, Ted	26	DQ	26	8
6	Nelson, Mark	15		15	8
8	Schwartz, Larry	6		6	8
-	Lenz, Stuart	DQ	DQ	0	0
A Boost Glider Duration (MASA Open Record: 47/-/44)					
B Division					
6	Cochran, Seth	29		29	18
C Division					
1	Cochran, Ted	46	145	191	180
2	Lenz, Stuart	34	51	85	108
3	Estenson, Alan	24	34	58	72
4	Whitaker, David	26	27	53	36
5	Grimm, Lee	47		47	18
	Myers, Jim	6	5	11	

* NAR members receive official points and placements.

NAR Volunteers (most of them, anyway) pose for group photo at the end of the successful TARC event.

www.rocketcontest.org

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On the day of the launch the two prevailing thoughts about how our egg cracked were these: the ejection charge did it or impact with the ground. Upon watching the videotape that Mathias took of the entire flight we have ruled out the ejection charge, as it occurred within 20 feet of turn over at apogee and was not that hard. Having watched the whole video over and again many times, our best guess is that they flew a cracked egg from the get-go. Harrison had difficulty getting the egg and padding in the second time, after the judges had to see the altimeter. You can see him pushing too hard to squeeze the air out of the protective plastic bag to be able to squeeze it into the bay. In addition to this observation we suspect they selected a weak egg. This is harder to prove and adds a whole lot of speculation to the equation. But watching the videotape of the landing, we're convinced that the payload section hit no harder than it ever had before when we had successful launches. So we're pretty sure that they cracked their egg when they were loading it back in the second time. Hindsight being 20/20, we wished they would have taken it apart, inspected for the crack and redone the loading a third time. It was a hard lesson to learn, but we're grateful for the videotape documentary to see what the possibilities were and eliminate the ones that were least likely.

It was great to see all the support for the teams that were there. It was a hoot to mingle with some of the muckety-mucks in the industry, and to share their enthusiasm for this hobby. What a privilege to be able to rub shoulders with some of the greats in the industry as well like Vern Estes and Homer Hickum. A small highlight for me was to shoot the breeze with a number of the NAR officials during the day as they worked the crowd. These are great people with big hearts doing a wonderful service for the youth in our country. I know I sure appreciated their seemingly tireless efforts throughout the whole day. I have a newfound respect for the folks of the NAR.

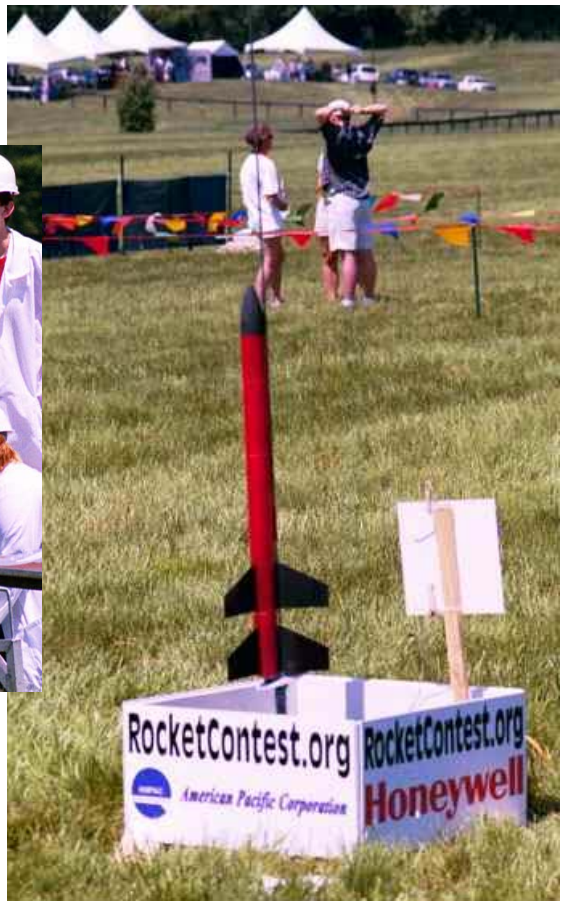
During the trip home, there was much discussion and plans being made on how to win next year's TARC competition. We talked about a number of things to make their basic design more trouble free. They really learned a lot watching some of the other teams get their rockets ready.

During the annual graduation awards ceremonies back home on Friday night May 28th, the whole team was recognized at the end of the evening and the whole school and amidst oohs and aahs, parents/relatives were able to see the rocket that we had flown in Virginia. Then the principal pulled out his surprise for the whole school. Every student was given a rocket kit to build over the summer and on one of the first field trips in the fall, we'll have a launch to put them all into the air. Yes Ted, I'll have an outreach report to follow. Maybe we'll change the name of the school to Hope Christian Rocket Academy.

Outreach

The week after TARC, Rocket League conducted its own Finals for 300 elementary and middle school kids. Over 100 launches were conducted during a late-afternoon launch. See www.hightechkids.org/IRL2004/ for details.

More Photos from the TARC 2004 Finals



Photos by Ted Cochran

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I plugged the firing leads into Thumper's jacks--red to red, black to black--and draped them over the clamp under the blast deflector. Then I carefully started to hook up the clip whips, keeping the clips from touching each other or the blast deflector. When that was done, I hooked up one of the alligator clamps on the leads from Thumper to one clip whip. The other alligator clamp from Thumper wasn't quite in the right place--there was a clip whip clip in the way. I unhooked that clip, and moved the end of that clip whip lead toward the unused alligator clip from Thumper. Then I took that alligator clip and carefully attached it the clip whip.

The rocket launched instantly.

I had unhooked one clip whip lead, so two of the A10s didn't light, but all five of the other motors did. They were quite loud, and smoky, too. And hot.

I had the best view in the house!

I remember jumping back at the sound and sight of the motors lighting. I ended up on my back next to the pad, watching the rocket soar up and away over my head. It was a great flight, and a good recovery, and I had the best view in the house. But I was also somewhat angry and embarrassed that I was lying there, and puzzled as to what could have happened. How had all my safety precautions been defeated?

I got up and checked myself out before going to look at the wires. I had a nice line of soot across the top half of my chest from the exhaust deflecting off of the blast plate. My shatterproof prescription sunglasses were also coated in soot (better them than my eyes!) And, the finger that was holding the Thumper clip was singed--it looked awful, but the flame was so brief that only the very outer layer of skin had been burned--painful in the short run, but not even as bad as a sunburn in the long run. But it was a near miss.

Once I knew that I was in one piece, I turned my attention to figuring out why my rocket had tried to barbecue me. Having carefully designed Thumper in accordance with all the safeguards I could think of, I was quite sure that someone had screwed up.

I quickly determined that I was correct--someone *had* screwed up.

It was me.

I had plugged the firing leads into the charger jacks, not the igniter jacks, so they'd had 12 volts on them the whole time. Now that I have a wounded pride to go with my wounded finger (the finger healed in a couple of days, but the pride is taking longer :-), I'll do penance by explaining what went wrong, in hopes that you can avoid a similar fate.

I really did pay a lot of attention to the original design of Thumper--I fully intended it to be used to help launch large clusters (including AP clusters), and I knew that anything with batteries in it needed to be carefully designed and built.

The original Thumper had two large binding posts for the 10 gauge launch leads. The launch leads had large fork connectors crimped on them. The charger connectors were female banana plug sockets (one red, one black), and it was quite impossible to connect the launch leads to the charger jacks.

I kept this same arrangement when I rebuilt Thumper (bigger weatherproof box, better handle, more batteries, better internal connections, but the same outside configuration). Sometime late in the last TARC season, somebody broke one of the connectors off of the launch leads. I didn't have any spare fork connectors large enough to fit, but I did have--you guessed it--plenty of banana jacks. These plug quite nicely into the ends of the stainless steel binding posts, and are pretty good at handling high currents. I don't recall ever thinking about the need to preserve the connection incompatibility I originally designed into the system. I used a black one and a red one, because that's what I had.

I thus set myself up to go down a garden path, and everything that followed helped add to the surprise. I plugged the leads into the place that they "obviously" belonged. Further, I touched the clips together from the console and got no spark, so (in my mind) I was safe.

The lesson is that, even when you think you've gone overboard in designing and building something for safety, you can always mess it up when you maintain it or "improve" it later on. Thumper now has a spring-loaded cover over the charger jacks, and it will soon get a buzzer across the contactor outputs in case it gets welded. The buzzer wouldn't have helped save me from enRaged, but you can't be too careful!

Outreach

Volunteering at TARC

Mike and Ted's Excellent Adventure

Ted Cochran

Once again this year, Mike Erpelding and I were part of the massive NAR range crew for the TARC finals. As was the case last year, the weekend began with Friday night briefings: one for the range crew, and one after that for the contestants. The enthusiasm of the contestants was awesome!

Ted Cochran

Contestant briefing nearly fills the Osbourn Park auditorium.

Saturday brought gorgeous weather (albeit a bit warm and sticky for those of us from the northland :-). We were at the range at 6:00 AM, helping to set up and to repair the damage from a line of thunderstorms that blew through the previous night. Contestants started to arrive early (of course), and we were ready for them!

Mike and I both had new jobs this year: Mike was a returns judge: He was responsible for keeping track of the recovery poles, assisting in their use, and assessing whether rockets were safely recoverable (if they couldn't be safely recovered, the team was awarded another flight opportunity). I was responsible for coordinating the judging of the special awards, which were a new feature in 2004. These awards were each sponsored by an AIA member, and included construction awards (e.g., best craftsmanship, best-looking rocket), engineering awards (best control strategy, best GSE), team awards (teamwork, sportsmanship, school spirit), operations awards (best recovery story), and demographic awards for things like the largest team and the team from farthest away.

In a change from last year, the range crew wasn't nearly as spread out. In fact, check-in, special awards judging, and returns judging were all in the same tent. This got a little hectic at times, but it was also a great way for NAR folks to get to know each other.

As you may surmise from the pictures spread throughout this issue, the opening ceremonies were awesome. The National Anthem was sung by volunteer contestants next to an ROTC color guard. Immediately thereafter, we were treated to a low altitude pass by a pair of Marine F18s. They lit afterburners and departed the far end of the field with a bone-shaking roar. That was followed by a ripple-launched salvo of high power rockets, which left great smoke trails hanging in the sky.

The day passed very quickly. I had to look at every rocket and talk at least briefly to every team. Although the low winds reduced the workload for recovery judges early on, they were kept busy assisting in other positions. The competition was closer than last year, with more teams qualifying, and getting closer to the target, on average, than last year. There were nevertheless a few egg darts from failure to stage, cruise missiles from partial ignition of cluster rockets, and other, um, interesting flights.

There were plenty of activities for kids to do before or after their launch: NASA brought a trailer and a giant 1/10 scale inflatable shuttle model, various other government agencies had booths to visit, and Homer Hickam was once again giving autographs.

The breezes picked up a bit during the day, and Mike eventually did get a chance to exercise his recovery prowess: He trekked over a mile with a team to extract a rocket out of the top of a very tall tree. They brought it back, still entangled in branches and leaves, to earn the award for best recovery story.

The awards ceremony featured talks by folks from NAR, AIA, NASA, Senator Enzi, and Homer Hickam, among others. Following tear-down, the NAR volunteers all retired to the Holiday Inn for a reception.

Several hundred pictures from the event are on the TARC web site: http://www.rocketcontest.org/.

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http://www.mn-rocketry.net/masa/

Submissions may be made to the editor at: masa.planet@mn-rocketry.net. (Volunteer quickly, lest you be asked to schedule and, just for fun, reschedule, the next MASA Picnic.)

If your email address, U.S. Mail address, or phone number changes: Please send notice of your change to masa@mn-rocketry.net. Include your name, old email address, and new address. We depend on email for communicating important information. When an email address starts "bouncing", we lose contact with you.

Parting shots

Ted Cochran

Mark "Rock Star" Thell helps Westwood Elementary students prep and load a rack of rockets during MASA's sixth annual outreach launch there.

MASA Planet

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