



T.H.O.R.

The Heartland Organization of Rocketry

THOR's Hammer

The official newsletter of The Heartland Organization of Rocketry!

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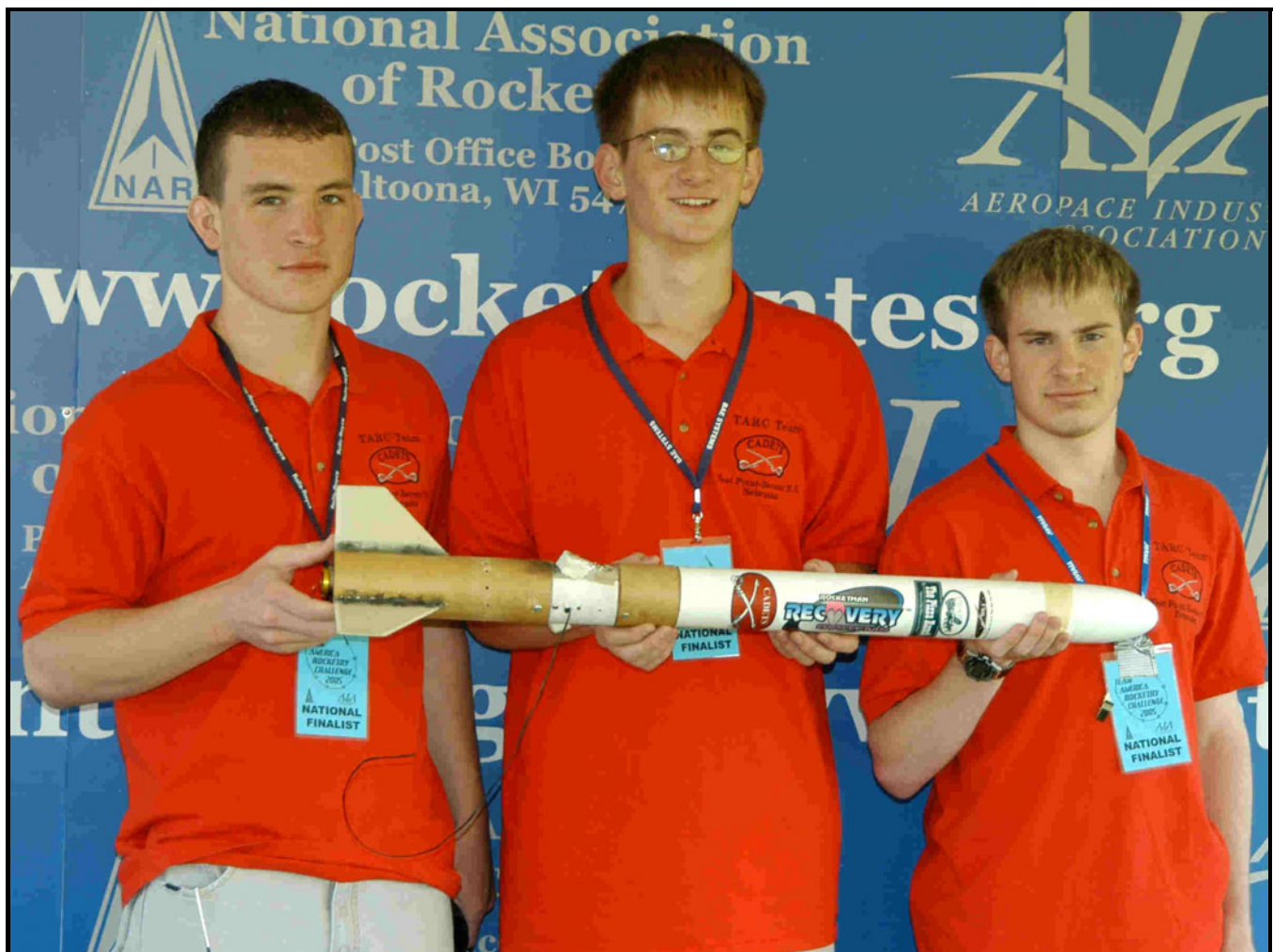
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August 2005

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Volume 12 Number 5



Congratulations go to Andrew Wimmer's team from West Point/Beemer Junior/Senior High School for being one of the 100 finalist teams in this year's Team America Rocketry Challenge! From left to right: Ryan Kuester, Andrew Wimmer, and Jace Ronnenkamp. (from <http://www.rocketcontest.org/>)

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Internet Links of Interest

<http://www.nerocketry.org/>

THOR's official web page. Has information on our club, launch dates, and history.

<http://www.tripoli.org/>

Home page for the Tripoli Rocketry Association.

<http://www.nar.org/index.html>

Home page for the National Association of Rocketry.

<http://www.rocketryonline.com/index.cgi>

Rocketry Online is an excellent source of model and high power rocketry related news and information.

<http://spaceplace.nasa.gov/en/kids/>

Home page for NASA's Space Place program of which THOR has participated in since 2003.

<http://www.giantleaprocketry.com/>

Giant Leap Rocketry has been THOR's main vendor at our high power launches since 2002.

<http://www.kloubusters.org/>

Home page for the K.L.O.U.D.Busters Tripoli Prefecture of the state of Kansas.

August/September 2005 Calendar

August

Event: August Meeting.

When: Tuesday the 2nd, 7:00 to 10:00 PM.

Where: La Vista Community Center.

Event: Low Power Launch.

When: Sunday the 7th, Noon to ?

Where: La Vista Sports Complex.

Fee: Free.

Description: Low power sport flying.

Event: High Power Launch.

When: Saturday the 20th, 9:00 AM to 5:00 PM.

Where: Pickrell, NE.

Ceiling: 15,000' MSL (13,650' AGL). Window to 23,000' MSL possible with 72+ hour advance notice.

Fee: \$5.

Description: High power and low power sport flying.

For More Information: Check the rocketry hotline for any delays or cancellations if weather looks questionable.

Event: Offutt AFB Air Show.

When: Saturday the 27th and Sunday the 28th.

Where: Offutt AFB, Bellevue, NE.

For More Information:

<http://www.offuttairshow.com/AirShow/>

September

Event: AIRFest IX.

When: High power commercial flying from Friday the 2nd through Sunday the 4th. Experimental flying on Monday the 5th.

Where: Argonia, KS.

Description: This is the awesome high power launch held each year by the Tripoli Kansas Prefecture. The KLOUDBusters have a very excellent field to fly from and this site has been used for several LDRS's. Many members from THOR have attended the AIRFest launch in the past.

For More Information:

<http://www.kloubusters.org/airfest.html>

Event: September Meeting.

When: Tuesday the 6th, 7:00 to 10:00 PM.

Where: La Vista Community Center.

Event: Low Power Launch.

When: Sunday the 4th, Noon to ?

Where: La Vista Sports Complex.

Fee: Free.

Description: Low power sport flying. Will be rescheduled if needed to match the date for *Field of Wings*.

Event: Balls 13

When: Friday the 16th through Sunday the 18th.

Where: Blackrock, NV.

Description: The big, national, experimental high power rocket launch of the year!

For More Information: <http://www.ahpra.org/b2k.html>

Event: High Power Launch.

When: Saturday the 17th, 9:00 AM to 5:00 PM.

Where: Pickrell, NE.

Ceiling: 15,000' MSL (13,650' AGL). Window to 23,000' MSL possible with 72+ hour advance notice.

Fee: \$5.

Description: High power and low power sport flying.

For More Information: Check the rocketry hotline for any delays or cancellations if weather looks questionable.

Nebraska Heat VIII

Article by Richard Burney. Pictures by Richard Burney, Kevin Trojanowski, Jason Vennard, and Tom Henry

Nebraska Heat VIII was held on the weekend of Friday the 17th through Sunday the 19th. Unlike last year's Nebraska Heat, this event lived up to its name with highs being around 90 all weekend. Friday was probably the calmest day while the winds on Saturday and Sunday were typically around 10 to 15 MPH... one of our members, Bill Richardson, recently discovered that nearby Beatrice is one of the top recommended places in the state for building a wind farm! Go figure! At least we do get some occasional good days at our site.

Friday, June 17th...

Friday was probably the best day for flying with the winds being under 10 MPH; I still cannot understand why the EX day at these big launches almost always seem to have the best flight conditions! As usual, Friday was used as setup day.

There were only two EX flights on Friday, but they were quite spectacular.

Tom Kernes, who was only able to attend Friday's launch, flew his *RCDP Flash* on a Redneck Rocketry M1500 Wimpy Red propellant motor. Tom's *RCDP Flash* reached a speed of about 1,100 MPH and an altitude of 16,100'. An all time altitude record for our site... at least it would be until Sunday! Tom flew this rocket on an AeroTech M1315 to an altitude of over 18,000' at the XPRS launch at Black Rock back in September for a successful Level 3 flight. For more on this rocket, check out Tom's website - <http://www.buckwestern.com/rockets/>.

After having flown it on a whole variety of K and L motors over the last few years, Matt Jones' V-2 was ready to be flown on its ultimate motor yet: a Dextrose sugar L motor made by our own Scott Pearson. Scott's L motor created a nice rich and thick smoke cloud as the V-2 headed on its way. Unlike many of Matt's other flights with this V-2, this was a straight up flight with no arcing. Matt's V-2 reached an altitude of over 8,000 feet. Though the rocket held together, the power of this L motor managed to shove the motor mount assembly out of its original position and up higher into the rocket. This might end up being the last flight for Matt's big V-2, but what a way to go!



Matt Jones' V-2 at liftoff on a Scott Pearson Dextrose sugar L motor. (Trojanowski)

Saturday, June 18th ...

For Saturday, it was pretty much blue skies all day with a high around 90 degrees. The winds were coming out of the south/southeast at about 10 to 15 MPH; if you had a high flying rocket with the chute(s) coming out at apogee, you had a long walk ahead. The rolling hills, thick brush, and crops of corn and beans at our site didn't help much in recovery either. All together, **27 flyers** conducted a total of **41 flights**. Motors burned were as follows: **A - 8, B - 9, C - 4, D - 3, E - 1, F - 1, G - 3, H - 3, I - 7, J - 2, K - 3, L - 2, M - 1**. Kent Burnett was present representing Giant Leap Rocketry mainly selling motors and some other supplies.

One of the first flights of the day was Greg Rothman's recently redesigned *SL2*. It was flown with a Hypertek K240 with a Magnetic Apogee Deployment (MAD) device for parachute deployment and a Perfectflite altimeter. After parachute deployment at apogee, Greg's rocket drifted somewhere up north. After searching both Saturday and Sunday for it, Greg was unable to find his rocket. Hopefully it will turn up at a future launch or one of the local farmers will find it.

The big flight of the day was Jason Vennard's 6" diameter upscale of the BSD Thor. This was Jason's Level 3 flight. It was powered by a Pro75 M1400 and had two Missile Works RRC2's for parachute deployment. Jason's Thor went straight up to over 8,200'; one of the RRC2's beeped out an altitude of 8,221' while the other beeped out 8,328'. The rocket came down to 1000' without any chutes and then the main deployed, gently lowering the rocket a few hundred feet southwest of the flightline resulting in a very short walk. Congratulations on an awesome flight, Jason! Jason's brother Matt Vennard got in a flight with his own 4" BSD Thor during the afternoon on an AeroTech I211.

After breaking 11,000' with his *Pearl Necklace* rocket two months earlier on a K550, Don Rice was going to attempt to for even higher altitudes with a Pro54 L730. Just a few hundred feet up, the coupler apparently broke apart under the stresses and the broken rocket spun around in the air and came down several hundred feet to the north. Don was able to get all the sections of his broken rocket back. If Don is able to get this rebuilt or builds an improved version from the ground up, I have no doubt that Don could break 20,000' with this design.

After Don got the case cleaned up, it was handed off to me to have an L730 flight in my *Mobile Rocket Gundam* rocket. Up until a few days earlier, I was planning on just having a few smaller flights under my belt, but with the 20th anniversary of my first model rocket flight just two weeks away, I wanted to celebrate with something big. Like on almost every other flight, I had an RRC2 for parachute deployment with a Missile Works PET2 timer for backup. With the wind not as strong as it

was at AIRFest 10 when I last flew this rocket on an L730, it went straight up to 3,639' and landed about a third to half a mile to the north in some two foot tall corn. Next to Jason's flight, a lot of people have commented about how great this flight was. Special thanks goes to Dan Cramer for helping me carry this beast out to the pad and for helping me carry it back. Also thanks go to Troy Muller for helping spot the rocket; he even spotted Denis Gilbert's PML Mini-BBX nearby which was in some very thick weeds.

Right while Dan and I were recovering my rocket from the corn field, Bill Richardson flew his PML Endeavor on a Pro54 K660. Though Bill has flown this on the K660 and even the L730 before, the rocket somehow came apart at about 6,000'. Most of the rocket, except for the nosecone landed less than a hundred feet from where Dan and I were repacking my rocket. When Dan and I headed south with rockets in tow, Bill was soon reunited with his rocket. Soon afterwards, the nosecone was returned to him. Other than some zippered tubing, Bill's Endeavor was in otherwise good shape.

The third and last K flight of the day went to Barry Connor and his PML Bulldog. After originally prepping for an L730, Barry had to switch back to a K660 due to the fact that the L730 is plugged and that Barry's Bulldog needed a motor ejection charge. After heading high into the sky, Barry's Bullpup drifted somewhere up north and west. After spending the rest of the day and Sunday looking for it, Barry's big Bullpup is still out there.

Continuing this bad trend, Joe Michel's 4" BSD Thor joined the rocket MIA list. Joe's Thor was flown on a J350. Most of Joe's dual-deployment flights go without a hitch, but this time the main came out at apogee resulting in his Thor drifting off way up to the north and west. It's nice that we have had a reliable field to fly from for almost a decade, but the mix of hills, weeds/brush, and crops a lot of times results in many a missing rocket during the summer time months.

After we were done flying, some of us once again went to the Super China Buffet in nearby Beatrice. After 8:00, some of us came back to do some night flying. In the past, we usually have a half-dozen or so people flying, but tonight Nick Stich and I were the only flyers to do any flying after it turned dark. Nick flew one of his big Crayon rockets which had clear transparent fins lit up by LEDs and a clear nosecone with a flashing strobe. Though normally stable, this Pro38 H153 flight quickly went unstable and the rocket tumbled into the nearby weeds. Other than some of the lights not working, the rocket was okay. All the remaining six flights were done by me using my Estes Snitch (two C6-0 flights), Estes Phoenix (a D12-3 and an E9-4 flight), and my *Macross VF-X* rocket (two D12-5 flights). All of my rockets used glow sticks for being spotted in the dark.



Left: Bruce Lee pulled range duty all weekend long. A few weeks earlier, Bruce's radial artery was severed in a freak accident on the first day of shooting of *Master Blasters* for the Sci Fi Channel. Right: Greg Rothman and Doug Buhrman prep the Hypertek hardware for Greg's flight. (Burney)



Greg Rothman and Kevin Rich arm Greg's SL2. Greg's SL2 had a great flight on a Hypertek K240, but due to the upper level winds, it drifted out of the area and Greg was unable to find it. (Burney)



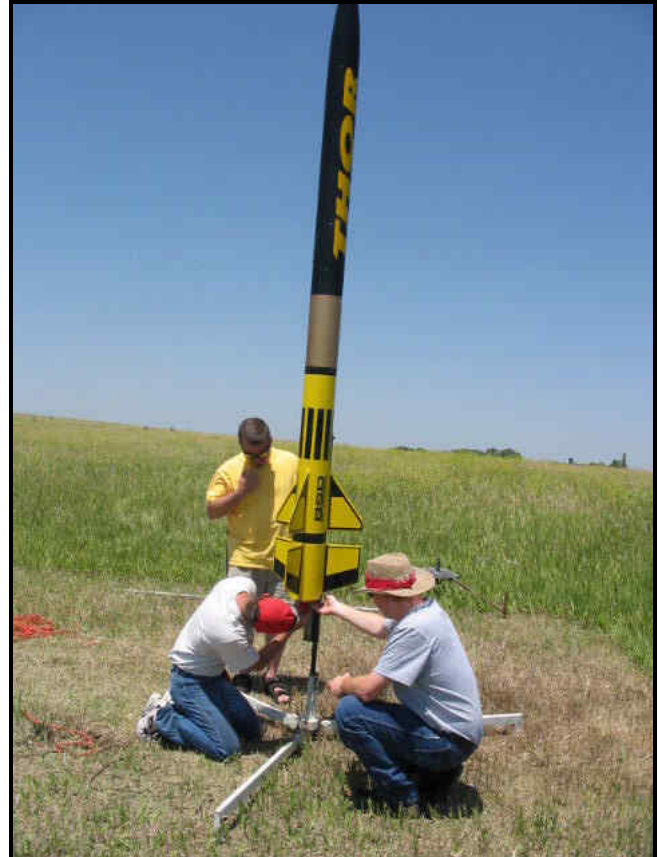
After having flown it to over 11,000' at Fire on the Farm VIII, Don Rice tried to go even higher with his *Pearl Necklace* with an L730. In the center picture, the rocket can be seen coming apart. (Burney)



Left: Don's rocket can be seen spiraling around in the air still thrusting. Right: Don and Rick Bosworth with the recovered remains. Better luck next time! (Burney)



Jason Vennard (right) and his brother Matt prep Jason's big Thor. (Burney)



Left: Jason, Matt, and sons gather for a picture. Right: Jason, Matt, and Joe Michel at the pad. (Burney)



Flight sequence of Jason's Thor on an M1400. Awesome flight! (Burney)



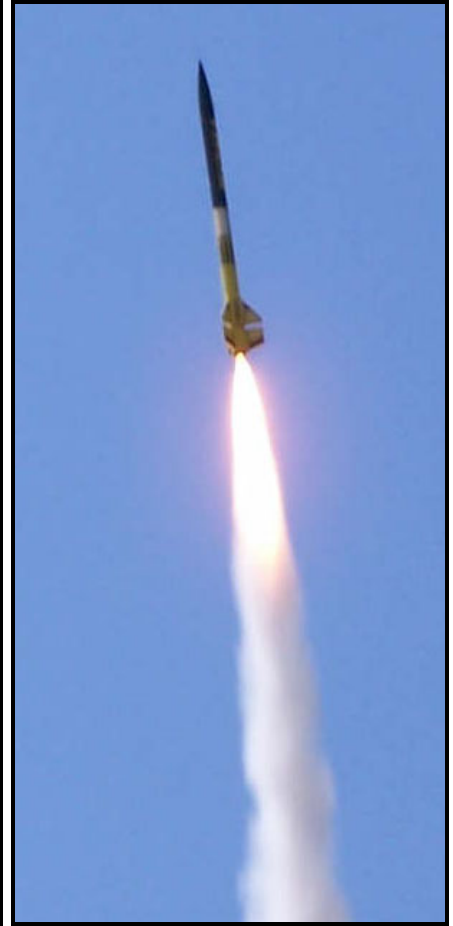
Jason and his son (right) and nephews post flight. Congratulations, Jason! (Henry)



The second biggest flight of the day was Richard Burney's (me!) L730 powered *Mobile Rocket Gundam* which went to an altitude of 3,639'. A great way to celebrate 20 years of model rocketry! (Burney)



Left: Barry Conner installs the igniter into his PML Bulldog while Richard Burney watches on. Center and right: Other than it being lost, it was a great flight. (Left and Center – Vennard, Right – Burney)



Joe Michel flew his 3" BSD Thor with a J350 on Saturday. (Vennard)



Time for some night flying! Left: Nick Stich and Jerome Tonneson with Nick's Crayon rocket. Right: Richard Burney's Estes Snitch, Estes Phoenix, and Macross VF-X. (Burney)

Sunday, June 19th ...

As with Saturday, Sunday turned out to be another windy and hot day. All together there were just **12 flyers** getting in **17 flights**. But considering that two of those were M flights, it was still a pretty eventful day. Motors burned were as follows: **A – 2, C – 2, G – 4, H – 6, I – 2, J – 3, K – 2, and M – 2.**

One of the very first flights on Sunday morning was once again my *Mobile Rocket Gundam*. For this flight, I decided to go with an AeroTech K1100; this motor would easily cut through the breeze and the rocket wouldn't go to high resulting in a short walk. I didn't know how short of a flight this would turn out to be. About a second or two after motor burnout, the forward section apparently drag separated resulting in a very early parachute deployment. The "zipper proof" coupler was zippered, the nosecone apparently smacked into the fin canister punching a hole into the avionics bay section, and all the shroud lines on the main chute (a PML 84" chute) were severed. The smaller Rocketman chute help slowed the rocket a little bit on its way down. Though the landing was hard, none of the fins broke out of their mounting brackets, but one of the sections of tubing between two of the fins popped out. Because of this rocket's modular design and that most everything is assembled using screws and brackets, it should be easy to rebuild. Also, this flight demonstrated that I should be more mindful of drag separation occurring with these big rockets and this will help me with my Level 3 rocket's design. During the afternoon, I also flew my LOC Minie Magg on an H242 and my recently repaired *Final Fantasy VII* on a Pro38 I285. Unfortunately, my *Final Fantasy VII* is now keeping company with Barry's, Greg's, and Joe's rockets!

The most spectacular flight of the day was Scott Chaffin's Level 3 rocket, *Beyr-Beyr* (pronounced Bear-Bear). This rocket is 4.2" in diameter, stands 125.5" tall, is made of primarily carbon fiber, and weighed 24 lbs fully loaded. It carried on board both an RRC2 and a Perfectflite MAWD. The motor for this flight was a Hypertek M1000. A drogue was to come out at apogee with the main at 1,000'. *Beyr-Beyr* was launched early Sunday afternoon straight up to 16,336'... a new altitude record for our site! Unfortunately, the main deployed at apogee carrying the rocket off a few miles. Scott had a transmitter onboard and was able to locate the rocket in about half-an-hour. Though the early parachute deployment disqualified Scott from getting his Level 3 that day, in my book this was a great flight. Scott plans to try again in August.

Though pretty much all the flights on Sunday were G power and above, there was one notable low power drag race. Bruce Lee was the most recent recipient of the two Estes Alphas that are part of the **Alpha 40 Project**. Both of these Alphas have been flown in almost every state in the union starting all the way back in 1999. Nebraska is one of the last

states in this tour. Bruce had just received both rockets a few days earlier. Both were simultaneously flown in a drag race on A8-3's during Sunday afternoon.

The other M powered flight for Sunday was Don Rice's stretched, sport-scale version of the Exocet anti-ship missile. It went straight up on a Pro75 M1400. Great flight, Don!

One of the last spectacular flights of the day was George and Andrew Wimmer's *Controlled Insanity*. For this flight, it had a central Pro38 J400 Smoky Sam, two Aerotech H268 Redlines which would airstart 2 seconds into flight, two AeroTech H97's which would airstart 3 seconds into flight, and two AeroTech G64's which would airstart about 5 seconds into flight. Some combination! About 3 seconds into the actual flight, both H268's pressurized about half-a-second apart from each other. Possibly due to a weak battery from one of the PET2 timers, the H97's igniters never lit. Finally, one of the G64's lit about six seconds into flight; the igniter for the other G64 fired, but the motor did not. Though not ever motor lit, this was still an awesome flight!

Conclusion...

All together, a total of about **67 flights** took place over the three day weekend. Though the number of flights weren't that many, considering that we had four M flights and a fair number of L's and K's at this launch, it was still a very memorable event. A special thanks goes to all who made Nebraska VIII a reality. ✨



Bruce Lee (left) and Scott Weihe with the two Alphas from the Alpha 40 Project. Both of these Alphas have flown in almost every state since June of 1999. (Burney)



Mobile Rocket Gundam was flown once again on Sunday with a K1100. Unfortunately, drag separation resulted in an early, and messy, parachute deployment. (Left and Right – Burney, Center – Vennard)



It may be damaged, but *Gundam* will fly again! (Burney)



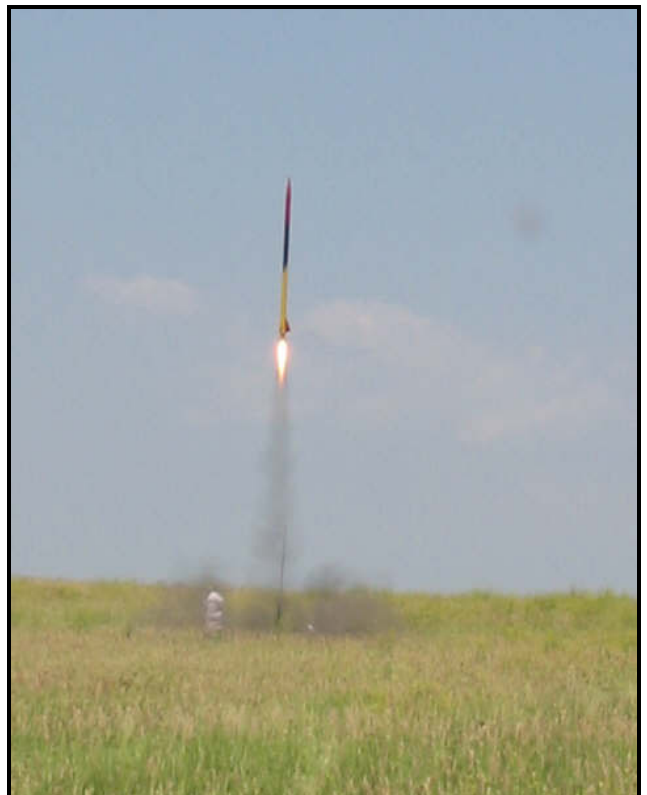
Matt (left) and Jason Vennard get ready for a J350 powered 4" BSD Thor drag race. With all the Thor rockets around, this launch should have been called the *BSD Thor Invitational!* (Burney)



Left: Only Matt's Thor got off the ground; due to a recovery issue, the payload section separated and landed near the pads. Right: Jason's was given a new igniter and flown a few minutes later. (Vennard)



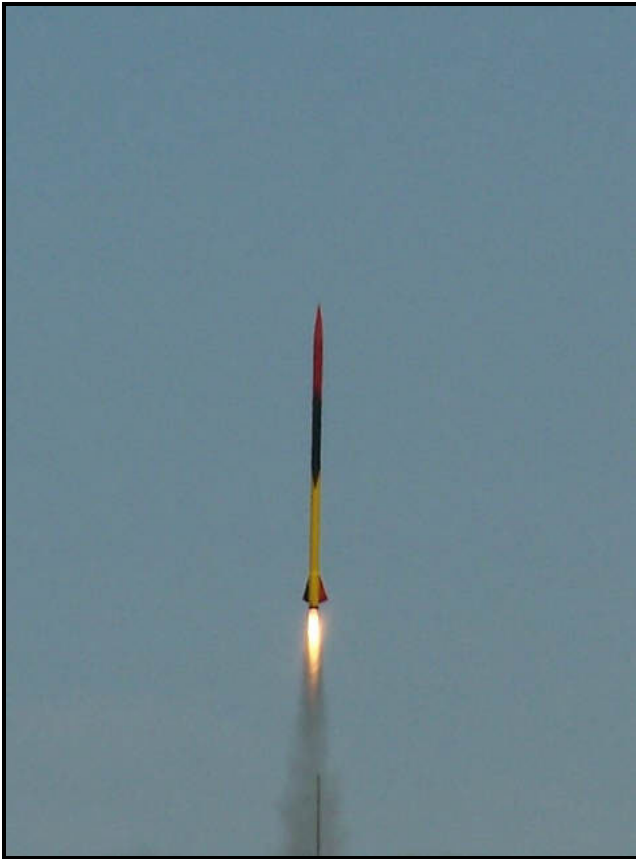
Kevin Trojanowski and Greg Rothman help Scott Chafin set up his *Beyr-Beyr* on the Hypertek fill stem. One of several Hypertek flights during the weekend, this was the largest one by far. (Burney)



Left: Scott poses with his rocket. Right: *Beyr-Beyr* at liftoff. (Burney)



A very nice, close up shot taken by Kevin Trojanowski. (Trojanowski)



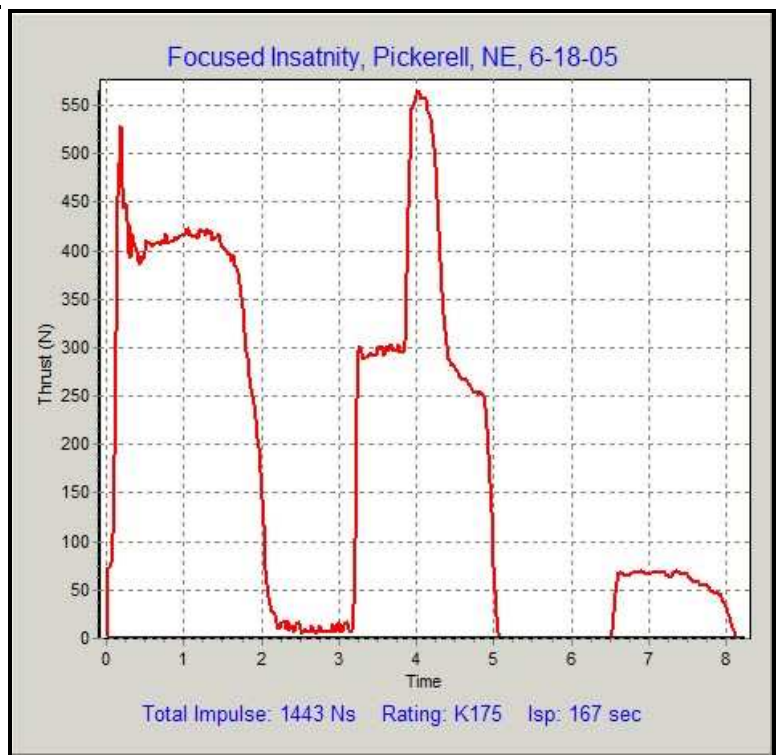
Additional shots of this Hypertek M1000 powered flight. Due to the main chute coming out at apogee, Scott was unable to get his Level 3. Other than that, a great flight. (Vennard)



Don Rice and his big stretched, semi-scaled Exocet missile. This M1400 powered flight, was its third M flight to date. Definitely a great performer! (Burney)



Left: Andrew (left) and George Wimmer prep their *Controlled Insanity*. Right: Liftoff on a Pro38 J400 Smoky Sam. The rocket was to airstart three, twin sets of motors every few seconds. (Burney)



Left: the two H268's can be seen starting up in midair. Right: Andrew e-mailed me this chart recorded by one of the altimeters showing the thrust spikes during flight. A second after burnout of the J400, the two H268's unevenly kicked in. None of the H97's lit. Only one of the G64's lit at the end. (Burney)

Space Tourism: Keeping The Customer Satisfied

By Leonard David - Senior Space Writer (posted: 24 June 2005 6:41 a.m. ET at www.space.com)



The welcome sign is up. Future space travelers are likely to be headed to Mojave, California's inland spaceport to fly on outbound spaceships. (William Deaver/Mojave Desert News; Billboard design/Mike Massee)

The welcome sign is up at Mojave, California—the proud home of SpaceShipOne, the piloted craft that achieved the first privately bankrolled suborbital flight.

Last year's notable suite of runs to the edge of space by the rocket plane has raised expectations of a money-making, booming market for passenger-carrying spaceliners.

Taking the lead in the space travel business is Sir Richard Branson and his Virgin Galactic spaceliner operation. It is based on a much larger, multi-seat version of SpaceShipOne. Price per passenger seat: \$200,000.

Suborbital spaceships not only can whisk tourists to the outskirts of the atmosphere, they can have other advantages too. As spaceports are planted in spots around the planet, there is already chatter about a new form of "point-to-point" express mail package delivery.

Still, the promise of big dollar markets for public space travel remains front and center. A study done by a think tank a few years ago underscored that fact. It reported that the overall space tourism market could generate revenues in excess of a billion dollars per year in about a decade-and-a-half from now. A big chunk of that cash is expected to come from suborbital space tourism.

Turn up the volume

"The biggest difficulty we've faced in the space business is the lack of volume," said Peter Diamandis, Chairman and Founder of the X Prize Foundation, based in Santa Monica, California.

Diamandis said that volume brings increased learning, safety, robustness and decreased cost. "The potential for hundreds and thousands of flights driven by the personal spaceflight market will end up benefiting the rest of the space market, from military to satellite launch," he told SPACE.com.

As more and more people take part in personal spaceflight, Diamandis added, there will be a ripple effect in other sectors. "We are likely to see a decrease in insurance rates as the base of insurable launches increases, a decrease

in spaceport range costs, a decrease in materials and components, and a larger skilled workforce."

The bottom line for Diamandis: "Everyone wins."

Early adopters

The budding suborbital and follow-on orbital space travel marketplace has sparked the need for training of businesses and individuals.

That's the belief of George Tyson, Chief Executive Officer of the Orbital Commerce Project, Inc. of Oviedo, Florida. He is developing a school devoted to the training of personnel to take part in and help shape the commercial human spaceflight industry.

"Part of this training involves educating the general public," Tyson said. Regarding the market for passenger space travel, don't expect an immediate rush of folks trying to get to the ticket counter, he predicted.

"As with any new industry, it will start slow," Tyson noted. "The 'early adopters' who can afford the initial trips will pave the way for future tourists. Once a company begins to fly tourists and shows a profit, outside investment will flow more freely into the industry," he said.

People making money will accelerate entry to market of new firms, Tyson suggested, providing the impetus for the lowering of prices and increased innovation.

"I predict that we will see orbital tourism three to five years after the first suborbital tourist flight and actual hotels, laboratories...in orbit one to two years after that. A commercial Moon base would not be far behind. In other words I see the human race taking the first steps in becoming a true space faring race by the end of this decade," Tyson said.

Freefall fanatic: a strapping market?

While the dawn of a space faring race may be close at end, the projected \$200,000 fare suggested by Virgin Galactic for a few minutes of suborbital weightlessness does raise the question: Just how large is the freefall fanatic market?

According to Jane Reifert, President of Incredible Adventures, Inc., headquartered in Sarasota, Florida, "Over promising" can come back and bite you in the backside. She admits being on a bandwagon of urging civilian flight operators to be frugal with their promises.

"Every time I see an article mentioning the amount of zero-gravity one will experience during a suborbital flight, I cringe," Reifert said. "I can imagine people placing deposits on \$200,000-plus flights, thinking they'll be able to float around like participants on an aircraft that provides a zero-gravity experience. In reality, given the proposed size of the various suborbital vehicles being developed and safety constraints, participants will be required to stay strapped in their seats."

That does not mean the weightlessness won't be a unique and incredible experience. It will, Reifert quickly added. "It just may be a huge disappointment if it's not what they've been properly prepared to expect."

Inflating expectations

As the name of Reifert's company suggests, they are in the business of giving adventurers healthy doses of high speed in fighter jets, off-the-wall weightlessness onboard parabolic diving airplanes, as well as excursions to the edge of space.

Reifert argues that the best way to market civilian space opportunities might be to highlight the "Christopher Columbus" or explorer angle.

"The spirit of adventure and sense of the unknown should be highlighted. A suborbital company that positions itself as an airline may be unintentionally inflating expectations," Reifert said. Passengers have come to expect airline flights to take off and land on schedule and deliver a degree of predictability. At least initially, space travel operators should anticipate glitches and delays. Video cameras will break down and weather will wreak havoc, she said.

"When we sell space training in Russia, we are very careful to point out Star City is not Disney World and that is what makes the experience both slightly unpredictable and uniquely incredible," Reifert concluded.

Pampering the passengers

Experts at Paragon Space Development Corporation in Tucson, Arizona are looking into what it takes to have rubbernecking travelers enjoy a suborbital experience.

Taber MacCallum, Paragon's Chief Executive Office, along with Grant Anderson, Vice President of Engineering, sense that, for the most part, passenger spaceliner builders are deep in nuts and bolts, financing and logistics – but pay little attention to comfort and care of the commuter that will ultimately foot the bill.

They are definitely safety conscious, but not human-factors centered, MacCallum said.



The view out the window at suborbital heights, courtesy of SpaceShipOne pilot, Brian Binnie. (Scaled Composites/Brian Binnie)

MacCallum and Anderson have pieced together a preliminary list of do's and don'ts for space travel operators to keep in mind, such as:

Free movement in microgravity: By far the most entertaining aspect is the ability to feel your body being liberated from a two-dimensional existence to a 3-D existence. While room will be limited, the ability to float and move will be a big plus if it can be done without everyone kicking each other in the face. That takes training prior to flight in the small confines of a space vehicle.

No bulky suits, helmets, or masks obstructing field of view or movement: The added experience that a suborbital flight gives you over a parabolic flight is the view. This may be the major objective of most tourists - to get a unique view. Astronaut wings give you bragging rights at parties, but the view is what they will remember and relate to their family and friends back home.

Clear windows: A foggy or frosted window may be reason for passengers to want their money back. A robust and well-designed humidity/condensation control system is a must. Six to eight people breathing do put out a large amount of water that must be removed from the air.

Low or no noise during microgravity conditions: Most non-space persons don't realize how noisy a spaceship can be. Cooling pumps, fans and gas valves all contribute to the noise. This should be minimized for at least the microgravity portion of the flight.

Bathroom breaks

Then there's another sticky issue: How best to take care of the space sick traveler.

Paragon's MacCallum and Anderson said that active control of odors from vomiting is a must, as is rapid removal of airborne vomit.

"Paying \$200,000 to dodge last night's dinner – someone else's -- will sour the experience," MacCallum told SPACE.com, and would rein in post-flight enthusiastic selling to your next clients by previous clients.

Another arena for concern is how to handle bathroom breaks.

Some stopgap, back-up provision for at least urination should be provided with privacy provisions needed: not a bathroom, but a curtain or other way to isolate a space traveler. Care must be taken to handle and eliminate odors quickly, MacCallum and Anderson advised.

"Despite all desires for each passenger to 'wring themselves out' before the flight, excitement and adrenaline tend to encourage both urination and bowel movements," MacCallum said.

Turns out, even in the unnatural realm of space...nature can call. ✦



In the early years, passenger space travel will have its ups and downs. Paying customers will need a lot of tender loving care if the market is to sustain itself and grow to projected dollar numbers. (Space Adventures Ltd.)

Rutan's White Knight Carries X-37 Space Plane Aloft

By Leonard David - Senior Space Writer (posted: 21 June 2005 07:34 pm ET at www.space.com)

The X-37 -- an unpiloted, reusable spaceplane -- made its first captive-carry flight today under the wings of the White Knight, flying above Mojave, California desert.

The Boeing, Defense Advanced Research Projects Agency (DARPA), NASA-supported vehicle had undergone a systematic step-by-step pre-flight checkout.

At the Mojave, California Spaceport Scaled Composites' White Knight carrier plane had previously taken the X-37 for repeated runs down the runway -- all in preparation for today's liftoff and return landing of the twosome.

Tagged by DARPA as an Approach and Landing Test Vehicle (ALTV), the X-37 will undergo captive carry flights, followed by high-

altitude drop tests through the summer, according to DARPA spokesperson, Jan Walker.

The X-37 project is exploring commercial and military reusable space vehicle market applications, be they on-orbit satellite repair to the next-generation of totally reusable launch vehicles.

Today's flight of the White Knight/X-37 took place early this morning. It was one year ago to the day that the White Knight released SpaceShipOne for its first suborbital run, piloted by Mike Melville.

Designed by Scaled Composites, the multi-purpose White Knight was used to haul that firm's SpaceShipOne to altitude for release. The rocket plane made a series of piloted suborbital flights last year, winning the Ansari X Prize of \$10 million for back-to-back suborbital flights.

No official word as yet on when the first drop of the X-37 from the White Knight is slated. ✦



The White Knight carries the X-37 into the air. (Alan Radecki)



<http://spaceplace.nasa.gov/en/kids/>

Moving a Mountain of a Dish

By Patrick L. Barry

Your first reaction: "That's impossible!"

How on earth could someone simply pick up one of NASA's giant Deep Space Network (DSN) antennas—a colossal steel dish 12 stories high and 112 feet across that weighs more than 800,000 pounds—move it about 80 yards, and delicately set it down again?

Yet that's exactly what NASA engineers recently did.

One of the DSN dishes near Madrid, Spain, needed to be moved to a new pad. And it had to be done gingerly; the dish is a sensitive scientific instrument full of delicate electronics. Banging it around would not do.

"It was a heck of a challenge," says Benjamin Saldua, the structural engineer at JPL who was in charge of the move. "But thanks to some very careful planning, we pulled it off without a problem!"

The Deep Space Network enables NASA to communicate with probes exploring the solar system. Because Earth is constantly rotating, a single antenna on the ground can communicate with a probe for only part of the day, when the probe is overhead. By placing large dishes at three locations around the planet—Madrid, California, and Australia—NASA can maintain contact with spacecraft around the clock.

To move the Madrid dish, NASA called in a company from the Netherlands named Mammoet, which specializes in moving massive objects.

(Mammoet is the Dutch word for "mammoth.")

On a clear day (bad weather might blow the dish over!), they began to slowly lift the dish. Hydraulic jacks at all four corners gradually raised the entire dish to a height of about 4.5 feet. Then Mammoet engineers positioned specialized crawlers under each corner. Each crawler looks like a mix between a flatbed trailer and a centipede: a flat, load-bearing surface supported by 24 wheels on 12 independently rotating axes, giving each crawler a maximum load of 194 tons!

One engineer took the master joystick and steered the whole package in its slow crawl to the new pad, never exceeding the glacial speed of 3 feet per minute. The four crawlers automatically stayed aligned with each other, and their independently suspended wheels compensated for unevenness in the ground.

Placement on the new pad had to be perfect, and the alignment was tested with a laser. To position the dish, believe it or not, Mammoet engineers simply followed a length of string tied to the pad's center pivot where the dish was gently lowered.

It worked. So much for "impossible."

Find out more about the DSN at <http://deepspace.jpl.nasa.gov/dsn/>. Kids can learn about the amazing DSN antennas and make their own "Super Sound Cone" at The Space Place, <http://spaceplace.nasa.gov/en/kids/tmodact.shtml>.

Giant Deep Space Network antenna in Madrid is moved using four 12-axle, 24-wheel crawlers.



THOR Meeting Minutes

Compiled by Bruce Lee, President (May Meeting)
and Richard Burney, Secretary (June Meeting)
Pictures by Richard Burney

THOR Meeting Minutes 5/3/05

Attendance: Mike Miller (visitor), Bruce Lee, Larry Drake, Kevin Trojanowski, Greg Rothman, Doug Buhrman, Denis Gilbert, Doug Holverson, Jon Damme, David and Charles Austerberry.

Meeting starts at 19:00.

Talked about the 400 Estes rocket Scout launch.

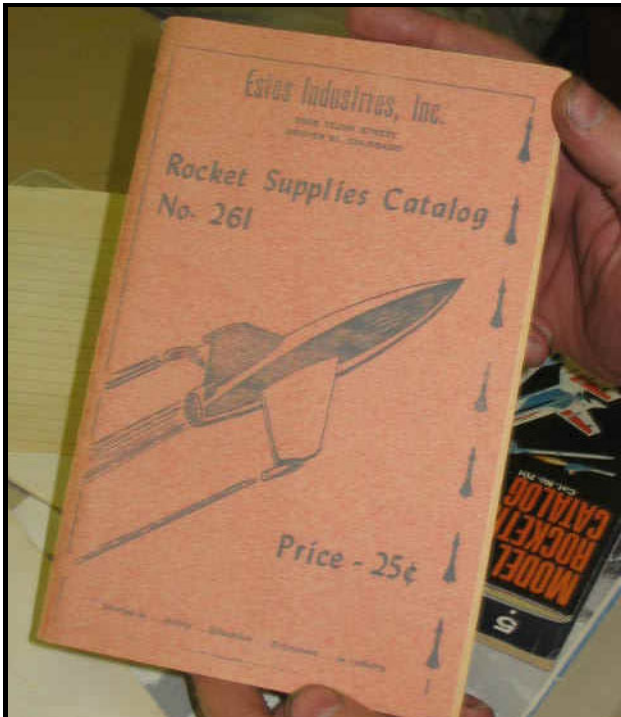
Denis Gilbert is going to do a Boy Scout merit badge with **Larry Drake**.

Bruce Lee will be at **Master Blasters** June 5th thru June 11th.

Larry talked about his **Little Joe 2**.

Greg showed his DVD of the **FOTF** launch. FOTF DVD's are available for \$10 each; money goes to the club treasury.

Doug Buhrman talked about enhancements to the new digital launch controller that he made.



Doug was able to sell his mint 1961 Estes catalog for \$961 on eBay!

Doug Holverson told us that the 1961 Estes catalog he had sold for \$910. He will be selling old Estes TR reports on eBay next.

Meeting adjourned at 21:30.

THOR Meeting Minutes 6/7/05

Attendance: Richard Burney, Bill Richardson, Kevin Rich, Greg Rothman, Nathan Warner, Andrew Wimmer, Elliott Wimmer (visitor), Ann Beckenhauer, Kevin Trojanowski, Rick Bosworth, Doug Holverson, Tom Kernes, Denis Gilbert, David Austerberry, and Charles Austerberry.

Meeting starts at 19:20.

Andrew Wimmer shows some footage of the test flights leading up to the West Point/Beemer Junior/Senior High School team entry into the **Team America Rocketry Challenge** 2005 contest. Andrew's team entry got a recorded flight of 85.1 seconds which got their team 66th place out of 100 entries. Andrew passes around the actual rocket used in the contest along with the medal his team won along with pictures. While every other team used a conventional two-stage arrangement, Andrew went for something very unorthodox. The airframe looked like a conventional single-stage rocket. When the central G motor burned out, the motor mount assembly would slide out the rear end while two side-canted A10's would fire. During Andrew's tests, he had a flight duration of 60 seconds dialed in with his design, but thermals at the event resulted in the much higher time in the air. Andrew plans on doing a write-up of his TARC experiences for the newsletter in the next few months. Congratulations, Andrew, for getting into this year's TARC contest!

Doug Holverson had put some of his digital video rocket flights footage from last September on DVD. Since the Community Center didn't have a DVD player for Doug to show it on, Doug passed out some still shots he had printed off from the video. Doug reports that he is selling his remaining **Fun Rockets** stock on **eBay**.

Tom Kernes won't be able to represent **Giant Leap Rocketry** at **Nebraska Heat VIII**, but **Kent Burnett** will be there selling motors for Giant Leap.

According to Tom, about 20 people have not paid their membership dues for 2005. Membership dues are needed to pay for things such as the room we use at the Community Center, the Porta-Potty at our launches, Hypertek gear, etc. so people... **PAY YOUR DUES!!!**

Ideas for coercing members into pay their dues (ie. a membership card that members would need to bring to the launches) are discussed.

Richard Burney shows some of the digital pictures he took at the 5/21 launch.

Meeting adjourned at 20:27. ✨



Left: Andrew Wimmer wears the t-shirt given to participants in this year's Team America Rocketry Challenge. Right: The medal Andrew's team received for participating in the contest.



Kevin Trojanowski and the West Point TARC entry. Andrew's design stood out from all the entries in the unique way it staged. Decals from the sponsors (including Andrew's school) are on the rocket.



T.H.O.R.

**The Heartland
Organization of
Rocketry**

What is THOR?

The Heartland Organization of Rocketry (THOR) is both an officially sanctioned Prefecture of the Tripoli Rocketry Association (Tripoli Nebraska #46) and Section (#562) of the National Association of Rocketry. THOR strictly adheres to the safety guidelines established by both rocketry associations.

THOR has been actively involved in the hobby of model rocketry (low power, high power, and experimental) in southeast Nebraska and southwest Iowa since the early 1990's. THOR members, along with their projects, have appeared on national television programs such as *Rocket Challenge* (The Discovery Channel), *Extreme Machines* (The Learning Channel), *Junkyard Wars* (TLC), and *Ripley's Believe It Or Not* (TBS).

When and where does THOR meet?

Meetings are usually held the first Tuesday of the month at the **La Vista Community Center at 8116 Parkview St., La Vista, NE** – turn east at the Sinclair Gas Station on 84th St. and go a block east (look for the big US flag). Visitors are welcome to attend.

When and where does THOR fly?

From March through November, THOR conducts one low power launch (1/4A – F class) and one high power launch (1/4A – N class) each month. Low power launches are held at the soccer fields south of 66th and Harrison in La Vista, NE. High power launches are held east of Pickrell, NE which is 30 miles south of Lincoln. THOR conducts at least two three-day high power rocketry events each year: **Fire on the Farm** and **Nebraska Heat**.

THOR's Hammer...

THOR's Hammer is the official newsletter of THOR. On average, it is published on a bimonthly basis. *THOR's Hammer* is available, in PDF format, through its website (<http://www.nerocketry.org/>) or is mailed to those without Internet access. Members are welcomed to contribute articles and pictures to the newsletter.

For additional information...

For any additional questions or to check on the status of an upcoming launch, call THOR locally or toll free at ***PENDING*** (there is a voice mail option at the end of the message). Interested parties may also write their inquiries to the address at the right and are also welcome to contact any of THOR's officers.

**THOR Membership Application
Personal Information**

Name: _____

Address: _____

City: _____

State: _____ Zip Code: _____

Phone Number: _____

E-mail: _____

Hobby Information

How long have you been in model rocketry: _____

Do you belong to a national rocketry organization - enter your membership number to the applicable organization:

NAR# _____ TRA# _____

Are you certified for high power rocketry – check mark your applicable TRA and/or NAR Certification Level:

Level 1 _____ Level 2 _____ Level 3 _____

Membership Rates

Half year membership rates will be divided by 2 and will add \$1. Write you check payable to "The Heartland Organization of Rocketry" or "THOR". Mail check and form to the below address or bring to the next meeting.

- Family Membership - \$36
- Senior Membership (18 and over) - \$24
- Junior Membership (18 and under) - \$12
- Correspondence Membership (members over 50 miles away from Omaha) - \$10

I agree to comply with THOR's policies as pertains to the safety guidelines set forth by Tripoli and the NAR. Failure to do so or conduct deemed unbecoming may result in expulsion from the club.

Signature: _____

Dated: _____

**The Heartland Organization of Rocketry
8210 S. Cherrywood Drive
Lincoln, NE 68510**

Membership in The Heartland Organization of Rocketry is open to all interested parties.