

MASA PLANET

OFFICIAL NEWSLETTER OF THE
MINNESOTA AMATEUR SPACEMODELER ASSOCIATION



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Calendar

Upcoming Events:

- **Holiday Party:**
Saturday
December 7
5:00—9:00 P.M.
- **Meeting:** Thursday
January 2
7:00—8:45 PM (TBD)
- **Launch:** Saturday
January 23, 9-4
Location TBD
- See page 11 for
more events and
details



November/December 2013

Volume 16, Issue 06

NAR Section #576

Established 1998

Holiday Party

We're pleased to announce the 2013 MASA Holiday Party! The party will be held on Saturday, December 7, 2013 at Bailey Nurseries in Newport. All MASA members, their families and guests are invited to attend.

Please RSVP by posting to the masarocketry email list or by emailing Neal at nthiggins@gmail.com. Please include the number of people attending and which food item(s) you will be bringing.

The basic detail are below:

When

Saturday, December 7
5:00 PM to 9:00 PM
Social hour at 5; Dinner around 6

Where

Bailey Nurseries - HR Building
1345 Bailey Road
Newport, MN 55055

(I-494 and Bailey Road in Newport)

For more details about food, gift exchange, and door prizes, follow this link:

<http://masa-rocketry.org/news/2013/2013-06.htm>

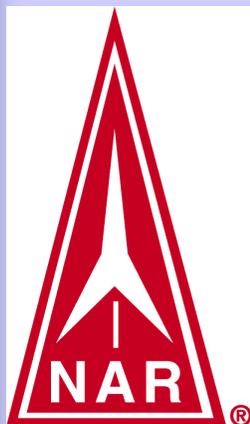
Officers for 2014

Below is the slate of officers as of this date for 2014.

Presiden—Neal Higgins (accepted)
Vice President—Jeff (accepted)
Secretary/Treasurer—Carol Marple (Accepted)
- Current Sec/Treas Chris Feld indicated he would run again if nominated

Nominations are open until midnight of December 7, 2013. Elections will beheld at the January 2014 meeting.

<http://www.mn-rocketry.net/masa/mreports/2013/2013-11.htm>



November Meeting Notes

Discussions:

- MASA could use more rockets for the Fly-It, Take-It box. FITI rockets are kept on hand at MASA launches. Visiting kids may pick out a rocket, are provided with an engine, get to fly it and take it home. If you would like to build and donate any FITI rockets, please keep them fairly simple and make sure that they can fly on an "A" motor.
- A discussion was held on the possibility of having more official volunteer positions within MASA. One suggestion was to have a Club Safety Officer. Discussions about this idea will continue in January.
- Neal is looking for nominations for the 2013 Prang Award. If you remember some "suitable" flights from this year, please send Neal an email!
- MASA is expecting to receive some NAR Safety Grant money to pay for the PA system equipment replacements/upgrades that were made this summer.
- Lost rockets—find 'em! It's important not to leave lost rockets out in crop fields—especially the bigger rockets. If they get swallowed up by a combine at harvest time, they could cause significant damage!

Semroc Retro Repro Goblin

By Michael Farrell

Michael Farrell, L2, NAR 94280, TRA 14413

I bought the Semroc Goblin kit because I love the classic Goblin profile – somewhat squat, long nose cone, but light and with a mount for short 24mm engines. It's a quick and easy build and a simple paint scheme, and with adapters it will fly on everything from A-D's. Rocksim predicts ~1,500' on a D12-7, ~1,600 on a D21-7. Since the fin roots are flush with the tube bottom and the recovery is a crepe streamer, I built mine with epoxy fillets (60 minute poured into taped off areas). The fins are 1/8" balsa, a little thicker than usual for a kit this size, so my hope is that it has a lot of hard landings in it.

Jeff, MASA VP, built the kit at about the same time (with a much finer finish quality), and we discussed the kit's



apparent marginal stability. I believe that he added nose weight to his. I've flown mine unmodified several times on C11-7's to about 850', and so far so good. I added a small custom finishing touch or two, and it's now one of my favorite low power rockets among the fleet.

The Hobgoblin

After I built my level two cert rocket, I had some spare sections of 4" LOC/Precision body tubing sitting around looking for a scratch project. That's when the idea for the upscaled Goblin hit me, and a quick check of the standard LOC nosecone profile confirmed it; all I had to do was cut fins and body tubes to the right sizes, and the Goblin could be easily upsized. Rocksim has useful scaling functions, so it was easy to determine the right body tube length and fin sizes for a 4" diameter frame. All I really had to do was figure out the maximum motor mount size I wanted to use and let Rocksim configure the fins with the appropriate tab depths for through-the-wall construction. I've made the investment in 38mm AeroTech/

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Sirius Rocketry Eradicator Build

By Brian Uhlenkamp

NAR #39595SR L1 I picked up the Sirius Rocketry Eradicator kit immediately when it came out in May. I liked its style, overall size, and the mid-power just fit my needs. The "stepped" 3 inch upper body tube and the smaller 2.26 inch body tube with two 3 inch tail rings made it look really nice and unique. I liked the long strakes on the fins along with the vanes at the body tube transition.



Photos by Brian Uhlenkamp

The Eradicator is a well put together kit. It has thick walled body tubes, a polystyrene nose cone, a long 29 mm engine mount tube, Kevlar® shock cord mount, elastic shock cord, and 30 inch ripstop nylon parachute (from Top Flight Recovery). It has laser cut 1/8 inch plywood centering rings and fins. The kit also includes its own positive retention motor retainer, a quick link for parachute mounting, plus both 1/4" launch lugs and 1010 rail buttons. A very detailed 12-page instruction sheet with building tips is included. Best of all, there are two full color decal sheets, including a special "serial number plate", which is unique for each kit. Everything is included in this kit, no need to purchase any separate items to get it to the flying field.

I built the kit as recommended. I built the entire model with Titebond III wood glue except used 15 min. epoxy for installing the motor mount. The detailed 12-page instruction sheet makes it very easy. It doesn't have pre-slotted body tube for the TTW

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F32T's vs. E30T's (& OTHERS) VS. COSTS

(A PERFORMANCE/BENEFIT ANALYSIS & COST/BENEFIT/ANALYSIS)

By Ken Jarosch
NAR 56442 TRA 10290

Prologue

I don't know how these get started, but a simple question often leads me to research, which then gets to article size.

While reducing our large inventory of unused rockets and motors, the question of F32T's SU vs. E30T's SU came up. Nine Aero-tech rockets come with the 24mm adaptors and many of our Estes Style rockets come with 3-3/4" motor mounts. Using F32T's instead of the bulk rate E30T's from Aerotech's www.valuerockets.com was in question.

The E30-4T SU/E28-4T(2) RMS are our minimum motors of choice in the following rockets: 10.5 oz. Broad Sword; 11.1 oz. *L.B. (Longer-Better) Bertha; 14.4 oz. Shadow; 11.7 oz. Optima; 10.2 oz. *Big Daddy; 15.8 oz. *Executioner I; 15.8 oz. *Ultra Blast Lite; 12.2 oz. Maxi Honest John and the Aero-tech 16.5 oz. Arreaux (Aero).

* indicates rockets with 24mm 3-3/4" motor mounts.

The 4" dia. "Blast Lite" was designed by Allen Vanneste in June 1994 Sport Rocketry, on page 27. Rocket Diagrams Sponsored by: Rising Star Hobbies.

The "Executioner I" was repaired and modified in my Article "Baffles and More" in March/April 2010 Sport Rocketry, on pages 23 & 24.

The 29mm "Arreaux" (Aero) is Aerotech's trademark rocket. In this comparison the 4-7/8" 24mm motor adaptor tube was used with the 2-1/8" 'E' spacer for 2-3/4" motors.

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Continued from p. 2



RouseTech hardware and it provides for a nice range of mid to high power, so I went with that, headed to Hub Hobby, picked up the motor mount tubing, birch plywood fin stock, recovery harness, Nomex, centering rings, a bulkhead and coupler tubing for a payload section, and got started.

The motor mount assembly was made with a bolt in the top centering for anchoring the Nomex protected Top Flite tubular nylon sewn-loop recovery harness.

The payload section was made with a

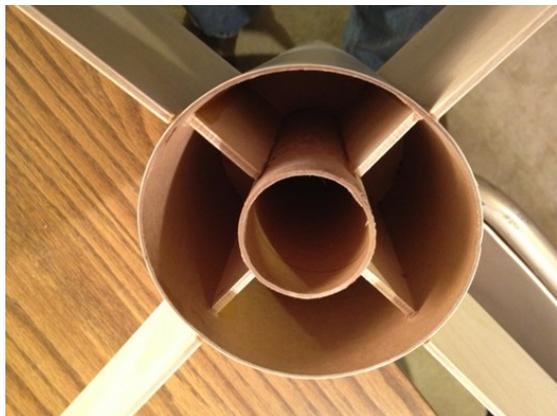
retainer harness for the nose cone with a tight friction fit instead of permanently gluing it in or drilling for rivets.

To cut the body tubing to length, I made a couple of practice cuts using a heavy paper cutting guide wrapped tightly around the tubing. Going slowly, I found it to be pretty simple to roll the tube and allow a sharp X-acto blade to make a clean cut over multiple passes. To cut four fin slots, I used my Estes tubing marking guide and then went very slowly and carefully free-hand with the X-acto. I wasn't concerned about perfection, just getting the slots longitudinally aligned. Any minor cutting flaws would be covered by fillets.



Since I don't have a shop or any serious woodworking tools, I needed a way to cut the fins I'd marked on the plywood with the fin template I'd printed from Rocksim. I taped the four small sheets of birch plywood all tightly into a stack and headed to Burnsville one afternoon to visit the folks at American Workshop to make use of their band and table saws. Ten bucks and about ten minutes later, I had four identically cut fins that should be stout enough for the hard landings required for shorter recovery walks.

Since the fins are mounted through the wall, I built the motor mount to have three centering rings with the middle ring spaced to be tight against the top of the fin tabs. The bottom ring is double the thickness of the upper rings and positioned to be tight against the bottom of the tabs. This left four compartments between the tabs that I filled with expanding epoxy foam to encapsulate the fins for further structural muscle.

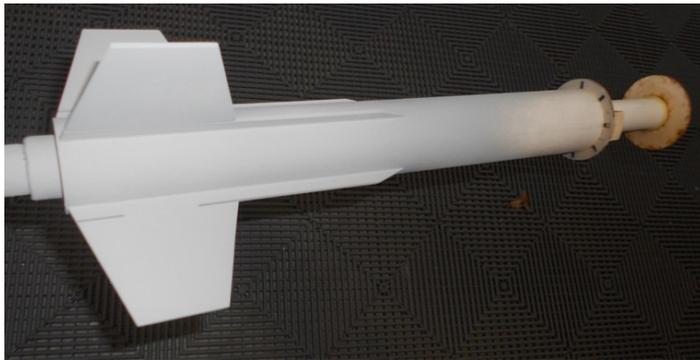


Internal fin fillets were used to prevent the foam from expanding through the slots in the body tube. To keep weight down, I cut some small tubes from BT-20 and glued them into the intertab compartments to create void spaces within the expanding foam. They reduce the amount needed but still allow the foam to secure the fin tabs where the moment would be greatest under lateral stress, at the motor mount tube fillets.

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Sirius Rocketry Eradicator Build, continued from p. 3

fins, but it has good instructions and a wrap-around guide for cutting the slots. It was quite simple and quick and lets you brush up on that skill. It has two options in the instructions for installing the tail rings, I chose installing them during the build and painting around them vs. installing pre-painted later. I did however prime and sand the lower fin area prior to installing the tail rings. I also put thin CA on the inside of the tail rings and sanded them smooth for some strength and easy finishing.



I did two modifications; one was use an Estes 29mm motor retainer vs. the supplied positive motor retention. That is only my preference as the supplied motor retention would be adequate. I also substituted some white one-piece 1010 rail buttons (from Dog House Rocketry) vs. the supplied 3-piece nylon 1010 rail buttons-again, just a preference of mine. I installed wood blocks under the rail button locations for screwing into. I also used part of the 3-piece nylon button pieces under the lower tail ring to put some support behind

that button and to finish so the “threads” wouldn’t show. Again, these are simply preferences of mine.

I spray painted the model with Rustoleum Painters Touch Ultra Cover 2X white primer, some sanding, and then Rustoleum Painters Touch Ultra Cover 2X Gloss white. I spray painted the nose cone with Testors Gloss Gray (#1238) Enamel. I then brush painted the tip with Testors Gloss Black (#1147) Enamel with some masking. I also brush painted the tail rings with the Testors Gloss Gray (#1138), and between the two fins with the Testors Gloss Black, both with some masking. I left the Estes Retainer as is, it’s gray finish almost exactly matched the Testors Gray.

Once the paint was fully cured, it was time for the two sheets of decals. They take some time since there are so many, but they really finish the model off nicely and give it some real character. For final finishing I applied two coats of Future Shine.

I like the way the model turned out in the end. It’s a great build; it gives you many chances at several building techniques. The painting and decaling lets you hone those skills as well. I ended up at 19.25 oz. vs. the approx. 17.3 oz on the instructions, not surprising; I’ve never been known to build light. I finished this in mid-June, and flew it the first time on a G40-7W at the end of June. I forgot to put an altimeter in it, but I’m sure it flew close to the predicted 1400 ft. However, it drifted and descended slowly, but was able to recover, so for the next flight I reefed the chute some. I look forward to flying my Eradicator again, probably on a G40W-7 again!



(Continued, p. 6)

Sirius Rocketry Eradicator Build, continued from p. 5



Semroc Retro Repro Goblin, continued from p. 4



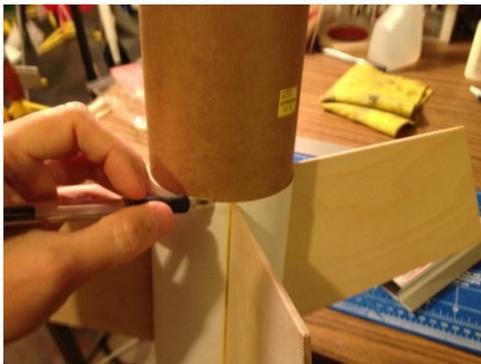
Once the base centering ring was glued in, a narrow ring cut from coupler tubing reinforced the body tube below the ring, and the area was primed black. Then the Aero Pack motor retainer was epoxied to the exposed motor mount with JB Weld.

The fin edges were sanded before the fins were glued into the slots and to the motor mount. External fillets are wood glue under poured epoxy. At this point, the rocket was flyable and ready for finishing, which is not my strong suit. However, since they get pretty beat up, I don't sweat it.



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Upscaling the Goblin is hardly an original idea. Neal, our club president, flies his veteran six inch Green Goblin (although no six inch Spider Man nemesis rocket that I've seen), sometimes on a K motor. Ted, our national NAR president, achieved his L3 cert this year with a huge 10" red white and blue themed Goblin. A search on the internets will quickly show dozens of pictures of variations on the same. In fact, there's a fellow who flies with Tripoli Minnesota who had the exact same idea as I

(sort of like Descartes and Newton) but who has already finished and flown his a few times this year.



I'll pick a color to distinguish mine, perhaps pumpkin orange, and I hope to fly the Hobgoblin in 2014. Thanks MASA, let me know if you'd like the Rocksim for the Hobgoblin.



Post Script

The unpainted maiden and final flight of the Hobgoblin happened with Tripoli at their North Branch field on 11/2. A beautifully straight ascent to about 1,250 feet on an AeroTech G80-4 Blue Thunder (29mm with an Aero Pack 38-to-29 adapter) was followed by a VERY late ejection (about 10 feet from the ground on a ballistic descent, it was actually about a G80-13 in spite of what the label said), and the Hobgoblin died violently. C'est la vie, c'est la rocketry.

My approach to the fin setting was validated as one of the fins broke across the grain at the frame under impact rather than snapping loose from its mounting. That's food for thought, because had the fins not been so strongly internally attached, that section likely would have been repairable with not much more than a coupler, glue or foam, and new tubing after cutting the ruined body away. The motor mount and nose cone were undamaged, so I'll rebuild it around the surviving parts.

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Blast Lite



Executioner I



Arreaux

All of the Estes rockets were modified with heavier shock-cords with screw-eye attachments and nylon chutes adding to the weight increase.

The E30T/E28T motors used were the full 100% 'E' at 40N-sec. These would fly the rockets to about 700 to 1000 ft. The current SU E30T's are only 34N-sec motors representing a 15% loss of total impulse or a 70% 'E'.

Part 1

Performance/Benefit Data

The out-performance of the F32T's vs the E30T's will use the Aero-tech Catalog 2009-2010 Projected Altitude Data with the then 40N-sec motor and then adjust for the current 34N-sec motor as the divisor.

The F32T is a 57N-sec motor. The old E30T = 57N-s/40N-s = 1.425 total impulse ratio. Current E30T = 57N-s/34N-s = 1.676 total impulse ratio.

This makes the F32T look 18% better because of this loss of Force in the base E30T. Ratio of Ratios = $1.676/1.425 = 1.176$ or almost 18% ratio gain.

The nine Aerotech rockets (From lightest to heaviest) using a 24mm adaptor are as follows:

1.9" in diameter:

- "Cheetah" - 10 oz. 32"L (3)
- "Mustang" - 11 oz. 32"L (4)
- "IQSY Tomahawk" - 11 oz. 41"L (4)
- "Arreaux" - 12 oz. 43"L (3)
- "Barracuda" - 14 oz. 56"L (3)

2.6" in diameter:

- "Wart Hog" - 14 oz. 37"L (4)
- "Initiator" - 14 oz. 39"L (3)
- "Strong Arm" - 18 oz. 44"L (4)
- "H.V. Arcas" - 22 oz. 56"L (4)

Notes:

Weights are kit weights.

(#) indicates number of fins, adding to the drag.

Results of Performance / Benefit Analysis

THE F32T Out-Performance directly taken from the catalog before (adjustment for the current E30T's) is as follows:

Base expected on T.I. Ratio = 42.5% (67.6%)

A) 1.9" rockets:

- a. Cheetah 58% (68%)
- b. Mustang 74% (87%)
- c. IQSY Tomahawk 64% (75%)
- d. Arreaux 63% (74%)
- e. Barracuda 84% (99%).



Initiator

H.V. Arcas

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- B) 2.6" rockets:
- Wart Hog 61% (72%)
 - Initiator 98% (115%)
 - Strong Arm 93% (109%)
 - H.V. Arcas 103% (121%)

These rockets are pushing beyond the E30T's limits making a 57N-sec motor a better choice.

The F32T's out-performance increases with weight, length, diameter, number and type of fins. This somewhat non-linear increase is largely due to fin drag. Compare by number of fins and type! Note: The Initiator's high numbers while only having three fins. The rocket has thicker swept cranked-back fins.

While the original research was for 24mm SU AP motors, these rockets are 29mm, so the (others) must include the F20W Econo-Jets. Also, the F35W RMS and the F32T SU performance are identical in the catalog.

NOTE: The performance of the 24mm F32T's SU, 29mm F20W's SU and the 24/60 F35W's RMS are listed as performance identical but their costs are not.

Part 2

Cost / Benefit Data

Using 2013 motor data and current Retail Prices/Best Discount Prices we'll see what we get for our money.

CURRENT MOTOR SPECS

Motor	Total Impulse	Max Thrust	Burn Time	Lift-Off Weight
E28T	40 N-s	50.5 N	1.2 sec	16 oz
E30T	34 N-s	49.3 N	1.0 sec	16 oz
F39T	50 N-s	59.5 N	1.3 sec	18 oz
F20W	55 N-s	52.1 N	2.7 sec	22 oz
F32T	57 N-s	61.3 N	1.7 sec	22 oz
F35W	57 N-s	55.2 N	1.6 sec	22 oz
F40W	80 N-s	68.1 N	2.1 sec	30 oz

Reference: www.valuerockets.com & www.thrustcurve.org. This data covers from a full 100% 40N-s 'E' to a full 100% 80N-s 'F'.

CURRENT MOTOR COSTS

Motor	Retail Price	Discount Price	Promo Price
E28T	\$ 8.33	\$ 5.66	\$ 5.23
E30T	\$ 22.49 *	\$ 14.99*	\$ 7.00
F39T	\$ 9.66	\$ 6.43	
F20W	\$ 20.00	\$ 13.50	
F32T	\$ 16.99	\$ 11.29	
F35W	\$ 10.50	\$ 7.00	\$ 6.60
F40W	\$ 13.99 **	\$ 9.39 **	
24/60 Hardware	\$ 44.99	\$ 29.99	

*Includes Cost of Required Sonic Igniter (\$1.50R / \$1.00D)

** plus HAZMAT FEE or local best price

Reference: www.valuerockets.com & www.hobbylinc.com



24/40 & 24/60 hardware, 24/70 & 24/95mm Single Use

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Unit Price Comparison

For Current SU F32T/E30T T.I. Ratio $57/34 = 1.676$. Using promo best price of E30T, $\$7.00P \times 1.676 = \11.73 equiv. price. F32T at $\$11.29D$ is a better price. The F32T out-performance in PART 1 makes that motor a superior choice.

For Current RMS F35W/E28T T.I. Ratio $57/40 = 1.425$. Using promo best price of E28T, $\$5.23P \times 1.425 = \7.45 equiv. price. F35W at $\$6.60P$ is a better price. The F35W out-performance in PART 1 makes that motor also a superior choice.

Break-Even Analysis — F32T vs. F35W

But the RMS F35W requires a 24/60 casing at $\$44.99R / \$29.99D$. So the difference in SU-RMS price will pay for the 24/60 HDW. ie using best price of both you get $\$11.29D - \$6.60P = \$4.69$ savings at each burn. The HDW priced at $\$29.99D / \$4.69 = 6.39$ motors you have a Break-Even point.

Looking at the F40W/E28T T.I. Ratio $80/40 = 2.00$. That makes the price equiv. of $\$16.66R / \$11.32D$ above the F40W actual prices and not an issue.

Looking at the F40W/F35W T.I. Ratio $80/57 = 1.404$. That makes the price equiv. of $(\$10.50R \times 1.404 = \$14.74R)$ and $(\$7.00D \times 1.404 = \$9.83D)$. This means that at retail the F40W is slightly better buy. But at discount you have to get it for $\$9.83$ local.

Part 3

Summary Analysis

Performance/Costs/Benefits:

(GOOD)	E30T's/E28T's
(BETTER)	F32T's
(BEST)	F35W's

The E30T's/E28T's are great minimum motors of choice in the large Estes Style rockets and small 1.9" diameter Aerotech rockets.

The F32T's and F35W's are best cost and out-performance motors in those rockets and minimum motors of choice in the mid size Aerotech rockets from the Wart Hog to the H.V. Arcas.

The F40W's will pick up the slack where the F32T and F35W's leave off.

Thrust Curve Comparisons

See Aerotech Catalog 2009-2010, page 4 for F32T's vs. E30T's thrust curves. The F32T's out-performance with higher Total Impulse, Max. Thrust and Longer Burn Time are clearly seen in this graph. The F32T's curve falls between the E30T and E15W with elements of both motors.

Looking at page 7 of this same catalog for F35W's vs. F39T's thrust curves; you will see how this 'White Lightning' motor has only a little flatter curve than the 'Blue Thunder' F39T.

This is almost a propellant reversal (merging) between the F32T and F35W, maybe due to the Length/Diameter ratio.

Aerotech Rockets

Since the Aerotech Rockets come with a 4-7/8" 24mm motor adaptor and a 2-1/8" 'E' spacer for 2-3/4" 24/40 motors, just cut that 'E' spacer into two parts. (A 1" section and 1-1/8" section.) Use both for 24/40 motors and the 1-1/8" as an 'F' spacer for the 3-3/4" 24/60 motors.

The F32T's and F35W's are niche motors. I have not seen much written about them, so I had to go through this research and article.



24mm adaptor, 'E' space, cut 'F' spacer, 24/40 and 24/60 hardware

MASA DIRECTORY

Established 1998

Founding President: Russ Durkee

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Webmaster

Alan Estenson — estenson@mn-rocketry.net

Club Yahoo Group

<http://groups.yahoo.com/group/masarocketry>

MASA Calendar

Holiday Party

Date: December 7, 2013

Time: 5:00 P.M. — 9:00 P.M.

Place: Bailey Nurseries—HR Building

1345 Bailey Rd, Newport, MN 55055

Meeting

Date: Thursday, January 2

Time: 7:00—8:45 P.M.

Place: TBD

Topic: TBD

Launch

Date: Saturday, January 25

Time: 9:00 A.M. — 4:00 P.M.

Place: TBD

Space Quote

It's a very sobering feeling to be up in space and realize that one's safety factor was determined by the lowest bidder on a government contract. — Alan Shepard



For more detailed information, please go to the

MASA website at

www.masa-rocketry.org/events

MASA PLANET
C/O ANDY HEREN
3711 BRIAN ST.
EAU CLAIRE, WI 54701



Mailing Label Here

MASA

Minnesota Amateur Spacemodeler Association, founded in 1998, is an active rocketry club with members from the Twin Cities and surrounding areas of Minnesota and western Wisconsin. MASA is dedicated to the safe and enjoyable pursuit of the rocketry hobby. MASA is a registered section (Section #576) of the National Association of Rocketry (NAR). MASA has been recognized by the NAR as “Medium-Sized Section of the Year” in 2006 and 2007, has received the NAR’s North American Rockwell Trophy for best newsletter in 2008, 2009 and 2010, and has hosted NARCON (the NAR’s Annual National Convention) in 2007 and 2008. MASA has an official club launch on the 4th Saturday of each month (weather dependent) year round at one of several different flying sites located in Nowthen, White Bear Lake and Otsego. We also hold monthly club meetings on the 1st Thursday of each month, typically held at the Science Museum of Minnesota in St. Paul. We host a Club Picnic in July and a Holiday Party at the end of the year. MASA also participates in numerous rocketry-related outreach activities including Cub Scouts, Girl Scouts, schools, 4H, TARC and USLI to name a few. Visitors, spectators, and prospective members are always welcome to join us at club events! MASA welcomes rocketeers of all ages and experience levels. MASA members share their building and flying experience to help you hone your skills and become a better and safer rocketeer. Flying in a club environment keeps you in touch with the latest rocketry techniques and products, as well as offers encouragement and support through camaraderie of fellow club members. You do not need to belong to the NAR (National Association of Rocketry) in order to join MASA. However, we do encourage you to consider NAR membership. (Find out more about the NAR at www.nar.org) You can find more information on the MASA web site, www.masa-rocketry.org, or email us at masarocketry@rocketmail.com.

For more information, or to join MASA ,go to www.masa-rocketry.org



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