



MASA Planet

Volume 8, Issue 1

January 2005

Safety First!

Happy New Year!

May all your rockets fly every bit as high as you wish! (But no higher...)

Ted Cochran, NAR 69921

This issue of the *Planet* includes the current list of NAR-approved rocket motors, through H-impulse. (If the new field works out, I may have to add I and J motors for next year!). The motor data for the model rocket motors (G and below) isn't too hard to collect, although it isn't to my knowledge all in one place like this, so I hope you enjoy it.

Getting good data for the high power motors is a bit more difficult, for a variety of reasons, and the data that are available from the manufacturer don't always agree with those available from the testing group. When in doubt, I left the table blank.

I'm hoping this situation gets cleaned up fairly rapidly, because it's important to have reliable motor data to make predictable, safe flights. A weaker-than-expected peak thrust, or a longer-than-expected delay, and your nice new rocket becomes land fill.

I also included a list of possibly-available-but-expired motors for you to watch out for. I've seen expired motors for sale now and then, and still have some in storage, and it's good to remember which ones you can use, if only so you can be confident you'll be covered by insurance if something goes wrong!

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Outreach

Girl Scout Launch

A fine Saturday in Lakamaga

Andy Heren

Ah, a beautiful, sunny day in November. This November. November 13. What to do with such a great day? Clean the gutters? Rake the leaves? Nah...there's got to be something better.

What sounds like a fun Saturday? For five of us MASA members that Saturday was helping 90 Girl Scouts build and

launch model rockets at a Girl Scout Encampment at Camp Lakamaga.

Ted Cochran, Mike Erpelding, Ken Jarosch, and Paul

Jarosch and I went to guide these girls in their rocket building. We all know how much we love our hobby, but nothing adds to

our own enthusiasm like helping young people discover rocketry.

Most of the girls had never built a rocket or even seen one launched!

We started in the morning with building sessions at 9:00, 10:00, and 11:00. Each session contained about



Girl Scouts, continued on page 2

2005 MASA Membership Dues

This issue of the MASA *Planet* is the annual freebie. It is sent to members registered as of December 2004, mostly to make sure that you have the chance to read this notice :-).

2005 Dues (\$10 Individual, \$12 Family, \$5 Junior) are now due. We strive to keep dues at a minimum level. Your money goes to pay for such items as club informational printings, newsletter printing and mailing, yearly NAR section dues, educational materials, gifts to landowners, and contest prizes.

The next *Planet* will be sent by U.S. mail only to those who have renewed their memberships and who have in addition requested that it be mailed to them. [It costs a little over \$1 to print and mail a single issue of the *Planet* to a single MASA member, so obviously we keep the dues down quite a bit when members get the newsletter on the web.]

To renew, visit:

<http://www.mn-rocketry.net/masa/joinmasa.htm>

While you're on line, consider donating some of the dues increase MASA hasn't ever had to the NAR legal fund. As you may have heard, things are progressing, albeit slowly, on the legal front. The judge has allowed NAR and Tripoli to appeal the BATF's decision to list APCP as an explosive. He has also allowed us to include BATF's recent egregious web posting on rocket motors in our litigation. In my opinion, NAR has good counsel, and a good approach to this effort. All that is needed is your contributions! Click on the donation link at: <http://www.nar.org/index.html>



Ken Jarosch, Paul Jarosch, Mike Erpelding, Ted Cochran, and author Andy Heren had a great day!

30 girls who built the Estes E2X. At each session Ted walked the girls through the steps with assistance from the rest of us. (He offered me the microphone for the second session, but being a newer MASA memberÖ)

It was at this first session that I learned a new reference for the shock cord mount ñ the tadpole. Ah, the things a teacher can learn. As each hour wound down the girls finished their rockets with decals and markers.

After an early lunch we headed to the great outdoors to get the range set up. We found a wonderfully wide field on a sunny, warm day. At 1:00 group one converged on the range and were instructed how to add wadding and were given their motor. We filled all twelve pads and launched the first group

We also had successful launches at 2:00 and 3:00. We had extra time in the middle group, so the girls were given an option of launching again with a "C." About 8 girls took the challenge of launching again with the possibility of losing their rocket. Only one was lost in the woods (we didn't want to intrude on the hunters).

Each launch session was punctuated by the launching of Paul's *Cato*, with its showering of parts at ejection, and Ted's *Silver Comet* with twirling parachute. They proved to be a good gag and an awesome display of "D" power, respectively.

We finished the day with only a few rocket/nosecone separations and only that one lost rocket.

We passed out quite a few MASA brochures and received many enthusiastic "thank-yous" at the end. Hopefully we recruited a few more people to the hobby. I don't know about the rest of the guys, but I look forward to the next outreach opportunity. What a great way to spend a Saturday!



MEETING SCHEDULE

THURSDAY, JANUARY 6

Location: [Science Museum of Minnesota, St. Paul](#)
Time: 7 PM to 8:45 PM
Topic: 2005 MASA Officer Elections

THURSDAY, FEBRUARY 3

Location: [Science Museum of Minnesota, St. Paul](#)
Time: 7 PM to 8:45 PM
Topic: TBD

THURSDAY, MARCH 3

Location: [Science Museum of Minnesota, St. Paul](#)
Time: 7 PM to 8:45 PM
Topic: TBD

NARCON 2005: NAR's ANNUAL CONVENTION MARCH 11 THROUGH MARCH 13

Location: Kenosha, Wisconsin
<http://www.narcon2005.org>

THURSDAY, APRIL 7

Location: [Science Museum of Minnesota, St. Paul](#)
Time: 7 PM to 8:45 PM
Topic: TBD

LAUNCH SCHEDULE

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

SATURDAY, JANUARY 22

Location: White Bear Lake
Time: 10 AM - 4 PM
MASA Launch

SATURDAY, FEBRUARY 26

Location: White Bear Lake?
Time: 10 AM - 4 PM
MASA Launch

SATURDAY, MARCH 19 (A WEEK EARLIER THAN USUAL)

Location: TBD
Time: 10 AM - 4 PM
MASA Launch

SUNDAY, APRIL 10

Team America qualification deadline

SATURDAY, APRIL 23

Location: TBD
Time: 10 AM - 4 PM
MASA Launch

OUTREACH OPPORTUNITY

SATURDAY, JANUARY 22

Location: Benilde St. Margaret's School, St. Louis Park
Park: Minnesota First Lego League Championships
Time: 9 AM - 1 PM
Model Rocket Display to kick off Fourth Annual Rocket League Competition!

President's Corner

Happy New Year!

Greetings MASA Members,

I hope that 2005 will bring a lot of joy and happiness to our club.

Starting out on a happier note than last year; we now have one additional launch site to use. The new Fricke farm will make a great launch site! Since other crops are planted there in addition to just sod, unlike the Blaine field, we will have to grow accustomed to the new flying hazards cash crops present. It may take a while to get use to "the lay of the land" as where to setup the pads, practicing less straight up launches, tracking beacons/buzzers, etc. It should be a lot of fun! We will also have to learn exactly what our new boundaries on this launch site.

Once again it is time to renew your MASA memberships. I discovered that there are a couple glitches in our membership contact information. If you have moved or changed your e-mail address in the past 2 or 3 years, please fill out a membership application when you renew your membership. One MASSY prize was delayed a week; because it came back to me return to sender. Usually 5-10 e-mails come back to me as not being a valid address. I usually let them bounce back for about three mass e-mails before I delete them from my list. Please help the club officers serve you better by making sure we keep you informed.

I would also like to thank Lee Frisvold for doing an excellent job serving as MASA Secretary/ Treasurer for two terms. Lee made it a lot easier being club president. When I couldn't attend a launch, Lee was there to make sure some equipment was set up and that flight cards were available. Lee did his best to keep me informed with the latest ever changing club contact list. Thanks Lee!!

I would also like to thank Ted Cochran for his continued dedicated service to MASA and the sport rocketry hobby. Ted has excelled as editor of the MASA Planet. The Planet is now at a point where it is compared to the section newsletters from all of the major NAR sections nationwide. MASA may be relatively new; but with Ted's work and the work of dozens of other MASA members, we are becoming a great section. Ted has also served as Vice President this past year. Ted was the main MASA contact for both the National and the Minnesota Girl Scout Jamborees.

Ted also continues to do numerous outreach projects in the metro area. Ted has now been elected to the NAR Board of Trustees. We all can rest a little easier with Ted fighting for our hobby nationally. I hope he will still have some time to fly rockets with us! Keep up the good work Ted!

Respectfully submitted,

Mike Erpelding
NAR # 79922
MASA President



Hope Christian Academy Celebrates TARC

Launching another great season....

As many of you are aware, Hope Christian Academy went to the TARC 2004 finals last year. Because we did so well, the principal, Randy Krussow, decided to celebrate. What he did was order over 70 rocket kits, enough for every student in the school and handed them out at the awards ceremony at the close of the school year last year. He also announced that the students had all summer to build them and that there would be a field trip to launch them in the fall. When the students arrived back at school in the fall they found out that the date was set for November 12, 2004.

Randy got two different Estes kits and the last choice was from a company named Pitsco that the students could choose from. Pitsco's slogan is "Innovative Education". They have really good instructions. The real downfall of the kit was that the students had to roll their own body tubes. Worse than that was that Pitsco supplied a plastic tube to be shared amongst the students as a mandrel. It was tough to share the tube because all the students were working at home and when you got it, you found that because it was pliable,

your tube wasn't round when you were done. I would not recommend them for a first kit. Only a handful of those 50 rocket kits made it to the launch pad.

So we went out to Borner's Farm that afternoon and were greeted to upper 40's, sun and a slight breeze, almost absolutely perfect launching weather, especially for mid-November in Minnesota! Lenny Borner had pulled the soybeans out of the field we were going to use only a week or so before we got there. It was a great field to launch from, nice and flat, with a crew cut.

Many of the students got their rockets completed that week and I only had to turn one rocket away because there wasn't a launch lug on it. We had only about an hour and a half to launch because we had to get the students back to the school before their busses left to take them home at the end of the school day.

For this launch I pulled out my old saw-horse style 4 launch rod stand and controller I had built about 10 years ago. This is a double throw/safe launcher, but does not use a key switch. It uses toggle switches for each set of leads, as well as a separate push button for each lead to launch. It also requires the use of an automotive battery, as there are no relays in the system. It is stone simple primitive; yet safe, functional and effective.

Every student was allowed to launch their own rocket after a count down from 5 from the whole group standing waiting their turn. This was a great way to



make sure everyone was watching while we were launching.

Out of the 49 flights, we only lost 2 rockets. The first one was lost because it landed in a dreaded rocket eating tree. The second one lost was on its second flight of the day. It got up about 50 feet and went horizontal and out of sight over into the neighbor's field. We did not have permission to venture there, so it was left.



If you look at the launch report you can see that there were only 6 single flights. Only two of these resulted in rockets being unable to launch again, both with melted parachutes. The other four didn't want to fly again. We also had one fence post with Tristan Rankin's rocket. It had flown successfully on its maiden voyage with an A8-3, so he was given a B6-4 to put it up a little higher but the ejection charge was kind of weak, so it simply turned over and went straight in about 50 feet from the launch site. There is a picture of Tristan standing next to his rocket. A great majority of the flights were simply fun for the students to launch and recover.

We also had 4 dads and two moms come out to the launch to assist in the prepping and recovery of the rockets. Two of the dads wanted to know when we were going to do it again. One was really interested and was going to Google to find the MASA website to

get more information about our club. We may do another launch in the spring as we build up to TARC 2005, to continue keeping Team #3081 encouraged and in the hunt for an invitation to the finals again this year.



Student Name	Rocket Name	Number of flights
Spencer Mead	Hi-Flier	2
Tristan Rankin	United States	2
Angie You	Hi-Flier	4
Ricky Jenkins	Venture	2
Philip Gibbens	Alpha 3	2
Carise Allen	Tofu	4
Justin Mead	Steadfast	4
Joseph Wilson	Stingle	2
Jacob Gevais	Hi-Flier	2
Joseph Latermus	Viking Research	3
Jacob Miller	Red Thing	4
Bryanne Stites	Daffodil	1
Christa Krussow	K-3	2
David Schallock	Space Hauler	2
Joseph Schallock	Space Bus	1
Savanna Mead	Hi-Flier	3
Abbey Krussow	Stripes	1
Josh Allen	No Name	3
Hannah Gibbens	Economy	2
Grace Krussow	Alpha	1
Mathias Gibbens	Mole	1
Randy Krussow	Big Bertha	1
	22 rockets	49 flights

My Rocket Story

Andy Heren

My entrance into model rocketry began in the summer of 1995. In 1990 I moved to Springfield, IL, to teach fifth and sixth grade. I had only 3 days before the school year started, so I was in a frenzy. In my classroom cabinet I found an Alpha kit and an "Estes Educator" binder. I brought to mind a neighbor of mine when I was little, Steve, who used to launch rockets. The kids in the neighborhood would come to watch. Having enjoyed that memory, I put it aside and got on to school preparations.

In 1995 I was cleaning that same cabinet when I again found the Alpha. I thought again of Steve and looked through the enclosed catalog. On my next trip to the west side of town, I stopped at a hobby store. I got a new 1995 catalog and my excitement grew as I looked at the many rocket kits. Soon, with a Michaels 40% off coupon in hand, I got my Airwalker starter kit. I carefully built my rocket and went to a nearby field for my first launch. I held my breath as I counted down and pushed the button. I remember laughing as I watched the rocket streak skyward. That was it. I was hooked! My wife, who has multiple hobbies, responded with, "Finally! You've got a hobby!"

Soon after, I built the Alpha. Then the Wizard, which is the first rocket I lost. It is interesting to note that the movie, *Apollo 13*, came out that same summer. Was that also an influence?

As the summer ended and the school year approached, I thought, "There has got to be a way to use this in school." I started looking for educational materials. Thus my interest in rocketry and space science was ignited.

In 1996 I moved to Eau Claire to teach fifth grade. That spring I used model rocketry for the first time in class. We built our rockets and quietly went out to launch.

The next year I was constantly asked when I we would be doing rockets. That spring we invited the whole school to watch. It was quite exciting as the little kids counted down for us (many times before we were ready!).

The next year we built again in spring. For the 2001-2002 school year I decided we would build in fall so I wouldn't have to listen to the constant questions about

rockets. Another reason was that that year I started my rocket club. The first 2 years I had 5-6 students. During the 2003-2004 school year my club grew to 15! The principal pointed out that that year's fifth graders had been watching us launch every year since they were in kindergarten. The anticipation to be in my class and get to build a rocket was strong! Also over the years I have built rockets with the Tiger Cub Scouts at school and I judge in 4-H.

I have never had students complain about rockets being "stupid" or "boring."

I joined the NAR in 1998 and joined MASA in January of 2004. I went to NARCON 2004 and would encourage others to attend this year, since it is close by in Kenosha, Wisconsin. It is a terrific time being with other rocketeers. The workshops were excellent and it is so much fun just sitting talking with others so addicted to the hobby and listening to the conversations of seasoned veterans.

Hopefully I can keep rocketry strong in my school and spread the excitement to others!

Snapshot



Delta 4 Heavy maiden launch December 21.

Technical Data

Certified Motor Data Table

Just in time for the flying season!

The rules with regard to motor use, in very brief form:

- **A FAA Waiver** is required for all flights with more than 125 g propellant weight.
- Except for certification attempts, a **Level 1 Certification** is required for HPR motors, defined as having more than 62.5g propellant OR more than 80 N average thrust OR more than 160 Nsec total impulse

Information, where available, is based on digging through a lot of web sources and believed but not guaranteed to be accurate.

Key:

Organization data in black

Motor may not be used under Notification Rules

Mfr data in red

Motor may be used conditionally

Designation	Mfg.	Size (mm)	Prop Mass (grams)	Tot Imp (N-sec.)	Peak thrust (N)	Avg thrust (N)	Burn Time (sec)	Cert. Org.	Decertified date, Add'l Notes, Restrictions
1/4A Motors									
MicroMaxx-1	Quest	6 x 26	0.4	0.18	1.23	0.22	0.82	NAR	1/12A0.2-1
MicroMaxx-2	Quest	6 x 26	0.5	0.35	3.21	0.45	0.66	NAR	1/8A0.35-0.5
1/4A2-2,4	Apogee	10.5 x 38	0.8	0.57	5.4	2.5	0.23	NAR	Expires 12/31/2005
1/4A3-3T	Estes	13 x 45	0.8	0.59	5	2.4	0.25	NAR	
1/2A Motors									
1/2A2-2,4,6	Apogee	10.5 x 38	1.5	1.22	4	1.9	0.63	NAR	Expires 12/31/2005
1/2A3-2T,4T	Estes	13 x 45	2	1.09	7.6	3	0.36	NAR	
1/2A6-2	Estes	18 x 70	2.6	1.13	7.9	3.4	0.33	NAR	
A Motors									
A2-0,3,5,7	Apogee	10.5 x 57	3	2.5	4.8	1.9	1.3	NAR	Expires 12/31/2005
A10-PT	Estes	13 x 45	3.8	2	12.6	2.4	0.85	NAR	Expires 12/31/2005
A10-3T	Estes	13 x 45	3.8	2	12.6	2.4	0.85	NAR	
A3-4T	Estes	13 x 45	3.3	2.22	5.8	2.2	1	NAR	
A8-3,5	Estes	18 x 70	3.3	2.32	9.7	3.2	0.7	NAR	
A6-4	Quest	18 x 70	3.5	2.1	11.8	5.2	0.4	NAR	
B Motors									
B2-0,3,5,7,9	Apogee	10.5 x 89	6	4.8	5.5	1.9	2.5	NAR	Expires 12/31/2005
B7-4,6,8,10	Apogee	13 x 45	2.8	5	14.8	6.7	0.74	NAR	Expires 12/31/2005
B4-2,4	Estes	18 x 70	6	4.3	12.8	4.2	1.03	NAR	
B6-0	Estes	18 x 70	5.6	4.33	12.1	5	0.86	NAR	
B6-2,4,6	Estes	18 x 70	5.6	4.33	12.1	5	0.86	NAR	
B6-4	Quest	18 x 70	6.5	4.6	14.4	6.2	0.75	NAR	
C Motors									
C4-3,5,7	Apogee	18 x 50	4.5	8.9	11.3	3.8	2.4	NAR	Expires 12/31/2005
C6-4,7,10	Apogee	13 x 83	7	10	21.1	7.6	1.3	NAR	Expires 12/31/2005
C10-4,7,10	Apogee	18 x 50	4.9	9.6	25.7	10	1	NAR	Expires 12/31/2005
C5-3	Estes	18 x 70	11.3	9.1	21.9	5.3	1.7	NAR	Expires 12/31/2005
C6-0,3,5,7	Estes	18 x 70	10.8	8.8	14.1	4.7	1.9	NAR	
C11-0,3,5,7	Estes	24x70	12	8.8	21.7	10.9	0.81	NAR	
C6-0	Quest	18 x 70	12	8.6	13.4	5.3	1.6	NAR	
C6-3,5	Quest	18 x 70	12	8.1	10.8	4.7	1.7	NAR	

Designation	Mfg.	Size (mm)	Prop. Mass (grams)	Total Imp (N-sec.)	Peak Thrust (N)	Avg thrust (N)	Burn Time (sec)	Cert. Org.	Decertified date, Add'l Notes, Restrictions
D Motors									
D21-4,7	Aerotech	18 x 70	9.6	19.6	32.1	20.8	0.94	NAR	
D7-RC	Aerotech RMS	24 x 70	10.5	18.5	11	6.5	2.9	NAR	Expires 12/31/2005
D9-4,7	Aerotech RMS	24 x 70	10.1	18.8	20	10	1.9	NAR	
D13-4,7,10	Aerotech RMS	18 x 70	9.8	19.3	23.6	12.7	1.5	NAR	
D15-4,6	Aerotech RMS	24 x 70	8.9	20	31.4	16.5	1.2	NAR	
D24-4,7	Aerotech RMS	18 x 70	8.8	20	39	21.2	0.94	NAR	
D3-3,5,7	Apogee	18 x 77	9.8	18.4	10.6	2.9	6.4	NAR	Expires 12/31/2005
D10-3,5,7	Apogee	18 x 70	9.8	18.8	25.1	13.4	1.4	NAR	Expires 12/31/2005
D11-P	Estes	24 x 70	24.5	17.5	26	9.4	1.9	NAR	
D12-0,3,5,7	Estes	24 x 70	21.1	17	29.7	10.2	1.7	NAR	
E Motors									
E6-4,6,8,P	Aerotech	24 x 70	21.5	38.7	20.1	6.4	6.1	NAR	Expires 12/31/2005
E15-4,7,PW	Aerotech	24 x 70	20.1	39.7	28.8	15.1	2.6	NAR	
E6-RC	Aerotech RMS	24 x 70	21.5	37.5	11.9	5.3	7.1	NAR	Expires 12/31/2005
E7-RC	Aerotech RMS	24 x 70	17.1	29.4	11.6	5.4	5.4	NAR	Expires 12/31/2005
E12J-RC	Aerotech RMS	24 x 70	30.3	34.2	18.3	11.2	3.1	NAR	Expires 12/31/2005
E16-4,7	Aerotech RMS	29 x 124	19	37.7	37.2	18.8	2	NAR	
E18-4,8	Aerotech RMS	24 x 70	20.7	36.5	30.1	17.1	2.1	NAR	
E23-5,8	Aerotech RMS	29 x 124	17.4	35.3	38.2	22.5	1.6	NAR	
E28-8	Aerotech RMS	24 x 70	18.4	39.7	50.5	32.5	1.2	NAR	
E30-4,7	Aerotech	24 x 70	19.3	39.5	48.3	32.4	1.2	NAR	
E9-4,6,8,P	Estes	24 x 95	35.8	28	19.5	9.0	3.1	NAR	
E9-0	Estes	24 x 95	35.8	28	19.5	9.0	3.1	NAR	Expires 12/05
F Motors									
F10-4,6,8	Aerotech	29 x 85	40.7	76.3	28.2	10.7	7.1	NAR	Expires 12/31/2005
F20-4,7	Aerotech	29 x 73	30	60.5	52.1	22.6	2.7	NAR	
F21W-4,6,8	Aerotech	24 x 95	30	55	42.0	22.0	2.5	TRA	
F23FJ-4,7	Aerotech	29 x 73	32	52.9	48.7	23.8	2.2	NAR	
F25W-4,6,9	Aerotech	29 x 98	35.6	77.9	46.8	25.6	3.1	NAR	
F32-5,10,15	Aerotech/RV	24 x 124	37.7	79.2	55.6	29.1	2.7	NAR	Expires 12/31/2005
F50-4,6,9	Aerotech/PML	29 x 95	37.9	76.8	79.6	53.7	1.4	NAR	
F72-5,10,15	Aerotech/RV	24 x 124	36.8	74.9	98.8	61.9	1.2	NAR	Expires 12/31/2005
F12-2,5	Aerotech RMS	24 x 70	30	43.2	23.5	14.7	2.9	NAR	
F13-RC	Aerotech RMS	32 x 107	32.3	62.1	20.0	12.2	5.1	NAR	Expires 12/31/2005
F16-RC	Aerotech RMS	32 x 107	62.5	75.5	26.4	13.3	5.7	NAR	Expires 12/31/2005
F22-4,7	Aerotech RMS	29 x 124	46.3	65	31.2	19.6	3.3	NAR	
F23-RC-SK	Aerotech RMS	32 x 107	37.8	67.4	36.0	19.4	3.5	NAR	Expires 12/31/2005
F24-4,7	Aerotech RMS	24 x 70	19	47.3	41.0	22.2	2.1	NAR	
F37-6,10,14	Aerotech RMS	29 x 99	28.2	50.7	46.5	31.7	1.6	NAR	
F39-6,0	Aerotech RMS	24 x 70	22.7	50	59.5	37.3	1.3	NAR	
F40-4,7,10	Aerotech RMS	29 x 124	40	78.1	68.1	37.9	2.1	NAR	
F52-6,8,11	Aerotech RMS	29 x 124	36.6	73	79.0	51.4	1.4	NAR	

Here are some motors you may still have, and may still be able find, that have expired certifications. You can no longer fly these at NAR launches.

Estes A10-0T Expired 12/31/2003
Quest B6-0,2,4 Expired 12/31/2003
Quest C6-7 Expired 12/31/2003
NCR F62-4,6,9 Expired 12/31/2004

Designation	Mfg.	Size (mm)	Prop Mass (grams)	Total Imp (N-sec.)	Peak Thrust (N)	Avg thrust (N)	Burn Time (sec)	Cert. Org.	Decertified date, Add'l Notes, Restrictions
G Motors									
G25-5,10,15	Aerotech	29 x 124	62.5	117.5	41.2	22.2	5.3	NAR	Expires 12/31/2005
G35-4,7	Aerotech	29 x 98	50	100.8	76.2	34.7	2.9	NAR	discontinued
G38FJ-4,7	Aerotech	29 x 98	55	87.7	78.2	40.2	2.2	NAR	
G40W-4,7,10	Aerotech/PML	29 x 124	55.1	113.7	66.9	37.2	3.1	NAR	
G55-5,10,15	Aerotech/RV	24 x 177	62.5	119.6	84.7	49	2.4	NAR	Expires 12/31/2005
G80-4,7,10	Aerotech/PML	29 x 124	56.9	116.3	105.2	77.5	1.5	NAR	
G12RC	Aerotech RMS	32 x 107	51.1	87	20.6	10.2	8.6	NAR	Expires 12/31/2005
G33-5,7	Aerotech RMS	29 x 124	72.2	98.4	50.9	30.1	3.3	NAR	Requires L1 Cert
G54-6,10,14	Aerotech RMS	29 x 124	46	81.1	81.6	53.7	1.5	NAR	
G61W-S,M,L	Aerotech RMS	38 x	60.9	120			1.9	TRA	Pending
G64-4,8,10	Aerotech RMS	29 x 124	62.5	118.8	98.3	56.8	2.1	NAR	
G67R-S,M	Aerotech RMS	38 x	57.6	110			1.6	TRA	Pending
G75J-S,M	Aerotech RMS	29 x 194	114	148	98.4	67.8	2.2	TRA	Requires L1 Cert
G77R-S,M	Aerotech RMS	29 x	55.4	105			1.4	TRA	Pending
G79W-S,M,L	Aerotech RMS	29 x	58.6	115			1.5	TRA	Pending
G101T-S,M,L	Aerotech RMS	29 x 125	46	85	100	85	1	TRA	Requires L1 Cert
G104T-S,M,L	Aerotech RMS	29 x 125	43.9	81.5				TRA	Requires L1 Cert
137G60-12A	Cesaroni Tech	38 x 125	78.4	139.4	103	70.3	2.0	TRA	Requires L1 Cert
G69-12A	Cesaroni Tech	38 x 125	62.5	128.8				TRA	
G79SS-13A	Cesaroni Tech	38 x 125	82.7	129	95.9	79.9	1.6	TRA	Requires L1 Cert
G35-6,10	Ellis	29 x 65	62	124.2				TRA	
G37-6, 10, P	Ellis	29 x 181	62	110.5				TRA	
G40-P	Kosdon	29 x 206	48.4	120				NAR	Expires 12/31/2005
G75-7	Kosdon	29 x 206	67.5	150				NAR	Req L1; Exp 12/05
H Motors									
ALL MOTORS H AND ABOVE REQUIRE LEVEL 1 CERTIFICATION									
H45W-10,15	Aerotech	38 x 194	186	289.3	102		6	TRA	Req FAA WAIVER
H55W-6,10,14	Aerotech	29 x 191	93	157.1	113.3		2.45	TRA	
H125W-S,M,L	Aerotech	29 x 330	185.7	321.8	307		2.6	TRA	Req FAA WAIVER
H73J-S,M	Aerotech RMS	38 x 152	125	188.6	97.1		2.55	TRA	
H97J-S,M	Aerotech RMS	29 x 238	140.9	191.2	111.5		2.23	TRA	Req FAA WAIVER
H112J-S,M	Aerotech RMS	38 x 191	187.5	265.7	121.7		2.92	TRA	Req FAA WAIVER
H123W-S,M,L	Aerotech RMS	38 x 152	125	246.8	174.2		1.76	TRA	
H128W-S,M,L	Aerotech RMS	29 x 194	92.2	177.9	168.7		1.27	TRA	
H148R-S,M,L	Aerotech RMS	38 x 152	115.1	208	198.5		1.43	TRA	
H165R 10,15, P	Aerotech RMS	29 x 194	83.1	165	200.5		0.99	TRA	
H180W-S,M,L	Aerotech RMS	29 x 238	123	236.8	228.5		1.3	TRA	
H210R 10,P	Aerotech RMS	29 x 238	110.8	220	265		0.99	NAR	
H220T-6,10,14	Aerotech RMS	29 x 238	106.4	215.4	275.7	215.4	1	NAR	
H238T-S,M,L	Aerotech RMS	29 x 194	83.8	178.4	263.4		0.71	TRA	
H242T-S,M,L	Aerotech RMS	38 x 152	110	246	276.6		1	TRA	
H268R-10,14,P	Aerotech RMS	29 x 333	166	320	338		1.16	NAR	Req FAA WAIVER
H143SS-13A	Cesaroni Tech	38 x 185	165.4	247	167	142.4	1.73	CAR	Req FAA WAIVER
H153-13A	Cesaroni Tech	28 x 185	143.9	258				CAR	Req FAA WAIVER
H275-10	Ellis	29 x 275	163	23.5				TRA	Req FAA WAIVER
H48-P	Ellis		145	214				TRA	Req FAA WAIVER
H50-6,10	Ellis	29 x 279	142	264.3				TRA	Req FAA WAIVER
H135-11	Kosdon	29 x 291	112	240				NAR	
H70-P	Kosdon	29 x 291	81.7	180				NAR	
H70-P	Prop Polymers	38 x 464	318.3	237				CAR	Req FAA WAIVER
H70-P	R.A.T.T. Wks	29 x 457	108	177.4				TRA	
H110-13A	Cesaroni Tech	38 x 606	145.6	271	156	131	2.1	TRA	Req FAA WAIVER

The *MASA Planet* is the official newsletter of the Minnesota Amateur Spacemodeler Association, Section 576 of the National Association of Rocketry. It is published bimonthly as a service to its members. MASA authors and photographers retain rights to their submissions, which are used by permission. The *Planet* is available in color on MASA's web site:

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

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Submissions may be made to the editor at: masa.planet@mn-rocketry.net. (Volunteer quickly, lest you be asked to host the next MASA Holiday Party!)

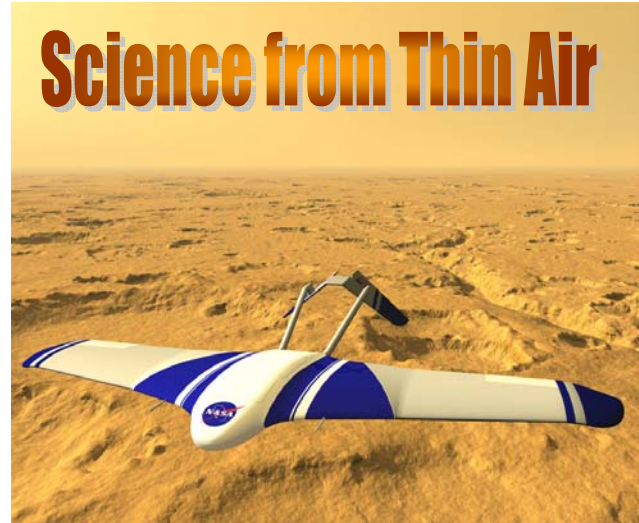
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MASA 2005 Badge Design Contest

Vote early and often!

<http://n.1asphost.com/masabadge/masa2005Badge.htm>

Parting shot



<http://marsairplane.larc.nasa.gov/platform.htm>

It's Baaaaack! Rocket League returns this Spring with a contest theme involving Boost Gliders.



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