



MASA Planet

Volume 8, Issue 2

March 2005

Safety First!

On The Nose

Bigger rockets need better attachments

Alan Estenson, NAR 69539

At a North Branch launch last summer, I was acting as NAR observer and paperwork-filler-outer for a fellow MASA member's level 2 certification flight attempt. His rocket, a spiffy LOC/Precision I-roc, made a lovely boost on a 38mm "J" motor. Parachute deployment happened about at the right time, but then, awwwwww nuts, I saw that the nose cone had "slipped the surly bonds" of the recovery harness and was tumbling a solo passage back to earth. That's a No Joy on the cert attempt, Houston.

No, he didn't forget to attach the nose cone to the recovery harness. No, the recovery harness didn't snap; he knew better than to use elastic, so the rocket was equipped with tubular nylon. No, it wasn't smote down by the fiery wrath of the rocket gods from their thrones upon the lofty heights of the VAB...

What did happen?

It's pretty simple. He had attached the recovery harness using that convenient plastic loop molded into the nose cone. At parachute deployment, that large and heavy 5.5" diameter nose cone decelerated suddenly enough to overstress and break that completely inadequate bit of plastic.

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Outreach

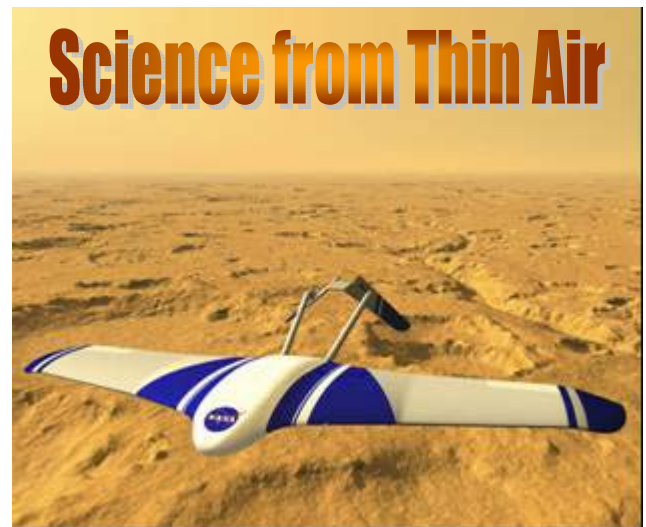
Rocket League Returns!

Boost gliders to fill the skies over local schools

Ted Cochran, NAR 69921

Rocket League kicks off its fourth year of fun this Spring with a new challenge involving boost gliders and simpler requirements that focus on practical experience with aerodynamics.

The goal of the program, which is sponsored by the nonprofit organization Innovations in Science and Technology Education (INSciTE), is to use an intrinsically interesting activity to challenge kids to do



real science. We're trying to enhance kids' interest in science and technology--in particular, kids in fourth through eighth grades, with emphasis on urban schools. The aerospace industry needs a diverse group of people who are comfortable solving complex technical problems in a group setting, but many kids aren't exposed to science in a way that engages and maintains their interest. INSciTE has sponsored Lego League for the past seven years, and the program has grown to involve over 2000 participants. Even better,

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longitudinal survey data has demonstrated significant impact in fostering kids' interest in science and technology.

Rocket League has grown from just over 50 participants in its first two pilot years, to over 200 kids last year. This year, we hope to again double the number of participants.



Rocket League teams may elect to compete in one of three increasingly challenging divisions, and the more challenging the division, the better the reward! Each team will be asked to build a rocket-launched glider. The glider will be flown in a model rocket and allowed to land. The teams will then report on the performance of their gliders. Teams in advanced divisions will build gliders that carry a

weight (a nickel coin) that simulates the presence of an instrument package.

Mercury Division: Mercury Division teams need to fly a rocket-launched glider that stays in the air as long as possible without flying out of sight. The score for a flight is the number of seconds it stays in the air, provided the team gets it back! Teams that qualify in the Mercury Division are eligible to win a bronze or silver medal, depending on their rocket's performance.

Gemini Division: Gemini Division teams have the same mission that Mercury Division teams do, except that Gemini Division teams need to have a dummy payload (a nickel) in their gliders. The scoring criterion is the same. Teams that qualify in the Mercury Division are eligible to win a bronze, silver, or gold medal, depending on their rocket's performance.

Apollo Division: Apollo Division teams also need to fly a rocket-launched glider that carries a nickel as a dummy payload. The goal is to stay in the air as long as possible, and to land as close to the launch pad as possible. The score for a flight is the number of seconds the glider stays in the air. However, the team

must measure the distance from the launch pad to the landing site, and subtract one second for every ten feet of distance between the glider' landing site and the



launch pad. If the final score is negative, the flight does not count. Teams that qualify in the Apollo Division are eligible to win a silver or gold medal, depending on their rocket's performance.

In addition to individual medal awards, the top two teams in each division will win trophies.

Rocket League teams can also score points for completing three preliminary competitions involving hand-launched gliders. The idea is to challenge the teams to learn how to build airworthy gliders prior to launching them in competition. Watch for an announcement about the final launch!



MEETING SCHEDULE

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: Contest Rockets: Mike Erpelding

THURSDAY, MAY 5

Location: [Science Museum of Minnesota, St. Paul](#)

Time: 7 PM to 8:45 PM

Topic: RSO/LCO Training: Ted Cochran

THURSDAY, JUNE 2

Location: [Science Museum of Minnesota, St. Paul](#)

Time: 7 PM to 8:45 PM

Topic: Tube Fin Rockets: Alan Estenson

LAUNCH SCHEDULE

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

SATURDAY, MARCH 19 (A WEEK EARLIER THAN USUAL)

Location: Buffalo/Rockford

Time: 10 AM - 4 PM

Stomp Rockets, Green Rocket Drag Race

SATURDAY, APRIL 2 (TENTATIVE)

Team America Qualifying Launch

Apple Valley High School

SUNDAY, APRIL 10

Team America qualification deadline

SATURDAY, APRIL 23

Location: TBD

Time: 10 AM - 4 PM

Odd Rocs; MASA Sectional Contest 1/2A BG, C-SD MR, Open Spot landing, Drag Race

FRIDAY, MAY 6 THROUGH SUNDAY, MAY 8

National Sport Launch

Plaster City, CA (<http://www.nsl2005.org>)

SATURDAY, MAY 21

Team America Rocketry Challenge Finals

The Plains, VA (<http://www.rocketcontest.org/>)

SATURDAY, MAY 21 (A WEEK EARLIER THAN USUAL)

Location: TBD Time: 9 AM - 4 PM

Fat Boy and Comanche Drag Races

OUTREACH OPPORTUNITY

THURSDAY, MAY 12

Location: Long Lake Regional Park

Time: 6 PM to dusk

Cub Scout Pack 626 Outreach Launch

President's Corner

Happy Spring!

Greetings MASA Members,

March is proving to be a busy month for MASA. Andy Heren gave an excellent presentation on his trip to the Kennedy Space Center, at the March MASA meeting.

Stuart Lenz and myself worked a club table at the Marscon 2005 Science Fiction & Fantasy convention, Friday March 4th and all day Saturday March 5th. Eight people picked membership applications. A few convention goers seemed very happy to find out that there was a model rocket club in the metro area. I have a feeling that this was a good endeavor. We will know how successful it was over the next couple months.

TARC teams continue to fine tune their rockets for this years competition. Kimball Area High School had a successful qualification flight on Sunday March 6th, with a time of 49 seconds. They will be working hard to improve their time for the next attempt. I would like to thank Glen Overby for making the 2 hour trip out to Kimball today to be my guest NAR observer! Thanks Glen! I'm sure that MASA will be very busy shortly with many TARC launches as we approach the Monday, April 11 deadline.

Many MASA members are busy preparing to go to NARCON 2005 in Kenosha, WI on March 11-13. Both Ted Cochran and myself are doing presentations at NARCON this year. Keynote speaker will be Ky Michaelson on his 77 mile space shot rocket. I got a sneak peak of the nosecone at Marscon, but I'm waiting to hear his presentation tailored to a rocketeer crowd. Vern and Gleda Estes will also be guest speakers at NARCON.

The March MASA launch is being scheduled on Saturday, March 19 at the Rockford/ Buffalo site. This is one week earlier than normal due to Easter. I'm planning on filing a Notification for this launch, in the event that any TARC teams want to come and fly, or for some G powered flights.

The April launch should be a lot of fun with our first NAR sanctioned contest of the year. The events include: 1/2 A Boost Glider Duration, C Streamer Duration- Multi round, Open Spot landing, Drag Race Contest Director: Mike Erpelding

Notes: A drag race event is conducted "Tournament Style" with several rounds to the finals. Each heat is worth 3 points. 1 point- first motion 2nd point- lower altitude 3rd point- touches the ground the last Winner moves on to the next round and so on.

I'm looking forward to a fun and safe flying season!

Take care,

Mike Erpelding

NAR # 79922

MASA President

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Some of the fault may lie with the kit provider for, well, providing such a silly bit of, err, kit. Some of the fault may lie with the kit builder for not recognizing it as a potential failure point. Some of the fault may lie with me for not noticing it when I performed the pre-flight inspection of that rocket.

Okey-dokey, you say. What can I do to my rockets to prevent this from happening to me, you say?

Simple. Install a GOOD attachment point in the base of the nose cone.

First, let's back up a bit. That molded plastic loop is typically adequate for rockets up to around 2" diameter (unless it's a minimum diameter bird in which you're about to shove a "J".) However, my opinion is that the plastic loop definitely shouldn't be used on any rocket larger than 2.6" diameter. In fact, cut it off completely so that you'll never ever be tempted to use it.

Here's what I've done for years to create a solid attachment point in plastic nose cones that are from 2.6" up to 3.9" diameter. In the center of the nose cone is a convenient, thick-walled hole. Measure the diameter of that hole. Now, go to your local hardware store and buy an eyebolt with coarse "wood screw" or "lag" type threads. You want to pick out the largest eyebolt that will fit in that hole in the nose cone, so that the threads will get as much bite as possible into the plastic. Be careful though, if you try to use one that's too big, you could crack the plastic! I usually spend a few more pennies to buy a stainless steel eyebolt over the zinc-plated one.

Test fit the new eyebolt in the nosecone. Turn it in until there are no



exposed threads; it might take some effort as you're tapping threads into the plastic. Now, take it back out. Mix up a bunch of runny 15 or 30 minute epoxy and pour it into the

nosecone through that center hole. Make sure that the sides of the hole are well coated too. Now, install the eyebolt again. Prop the nosecone somewhere



pointy-end-up so that all the epoxy will run down to the bottom end. When that epoxy hardens, it will help secure the eyebolt and reinforce the bottom of the nose cone.

One more thing, your nose cone needs a vent hole somewhere on its base so that pressure inside the nose cone can equalize to exterior pressure. After all, you just put a solid plug in the vent hole that it used to have, and you don't want your nose cone to crack open when you take it to Denver. It doesn't need to be a big hole; 1/8" or so is probably fine.

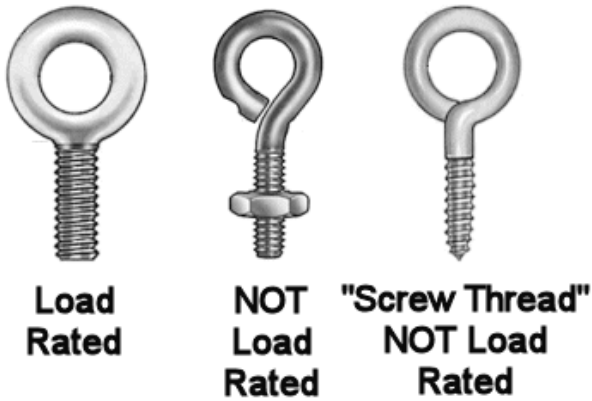
I've modified many plastic nose cones using this method, and I've never had the new attachment point fail. The only real drawback is that it will add a couple ounces to your rocket's weight. If weight is that critical, then you might have to take your chances with the plastic loop.

Now, there will be at least a few readers who raised an eyebrow over that eyebolt that I told you to buy a few paragraphs back. Yes, that type of eyebolt will not have a solid loop; there will be a small gap at the base. No, it does not have a load rating. No, it is not designed for a "lifting" application. However, for "normal" rockets up through 4" diameter, I think that this type of eyebolt is more than adequate. (A 50-pound minimum diameter M-powered bird is not "normal".) Just make sure that your recovery harness cannot possibly slip out through that small gap in the loop.

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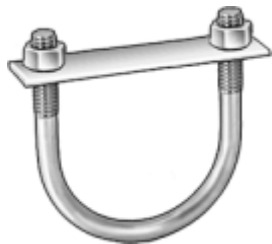
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You can buy forged steel, load rated eyebolts if you desire. You'll find a variety of them available from



McMaster-Carr (www.mcmaster.com). Technically speaking, they're intended only for vertical loads and not the side loads that could happen during recovery system deployment. Still, they will be much stronger (and many times more expensive) than "open" eyebolts from the hardware store. Unfortunately,

they're only available with machine threads, so installing them would require a bit more thought.



Finally, I tend to be even more paranoid with rockets that are bigger than 4" diameter. For those, I modify the base of the

nose cone and install a hefty u-bolt as the attachment point. The accompanying photo shows the modified nose cone for my LOC I-roc. Of course, after tightening the u-bolt nuts inside the nose cone, ship-in-a-bottle kits will seem trivial.



Tech Tip

Fin Alignment

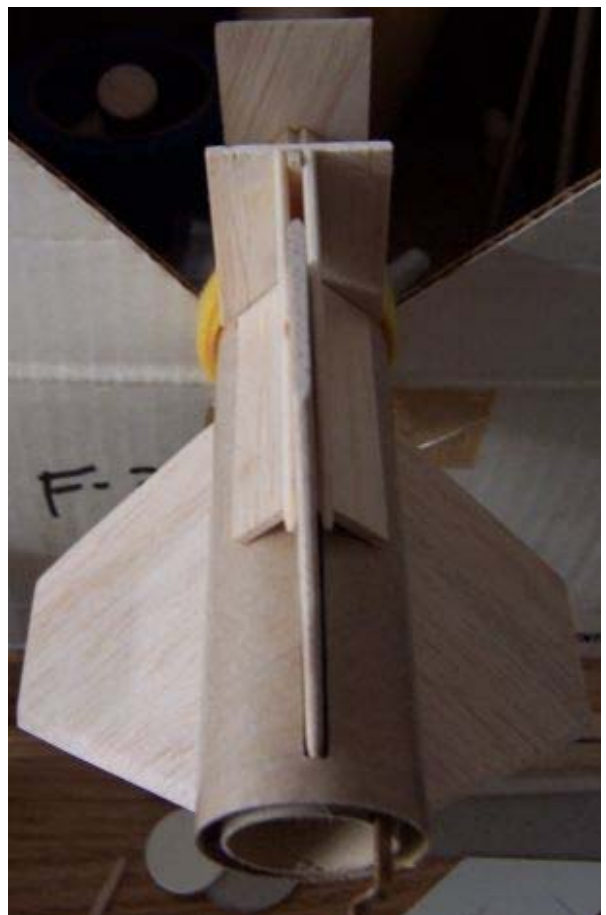
An easy addition to a classic jig

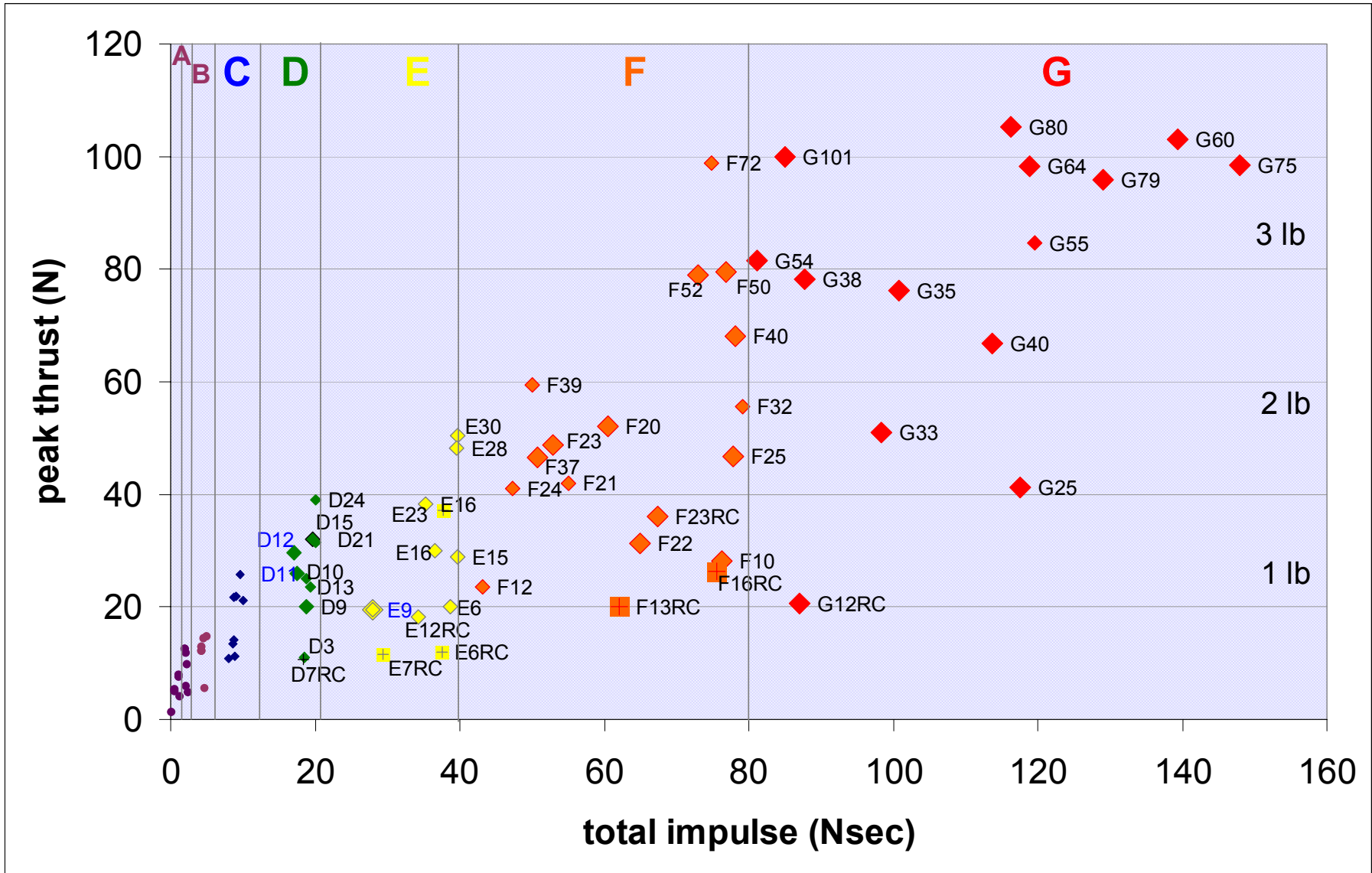
Glen Overby

I've always been looking for an easy way to attach fins to body tubes.

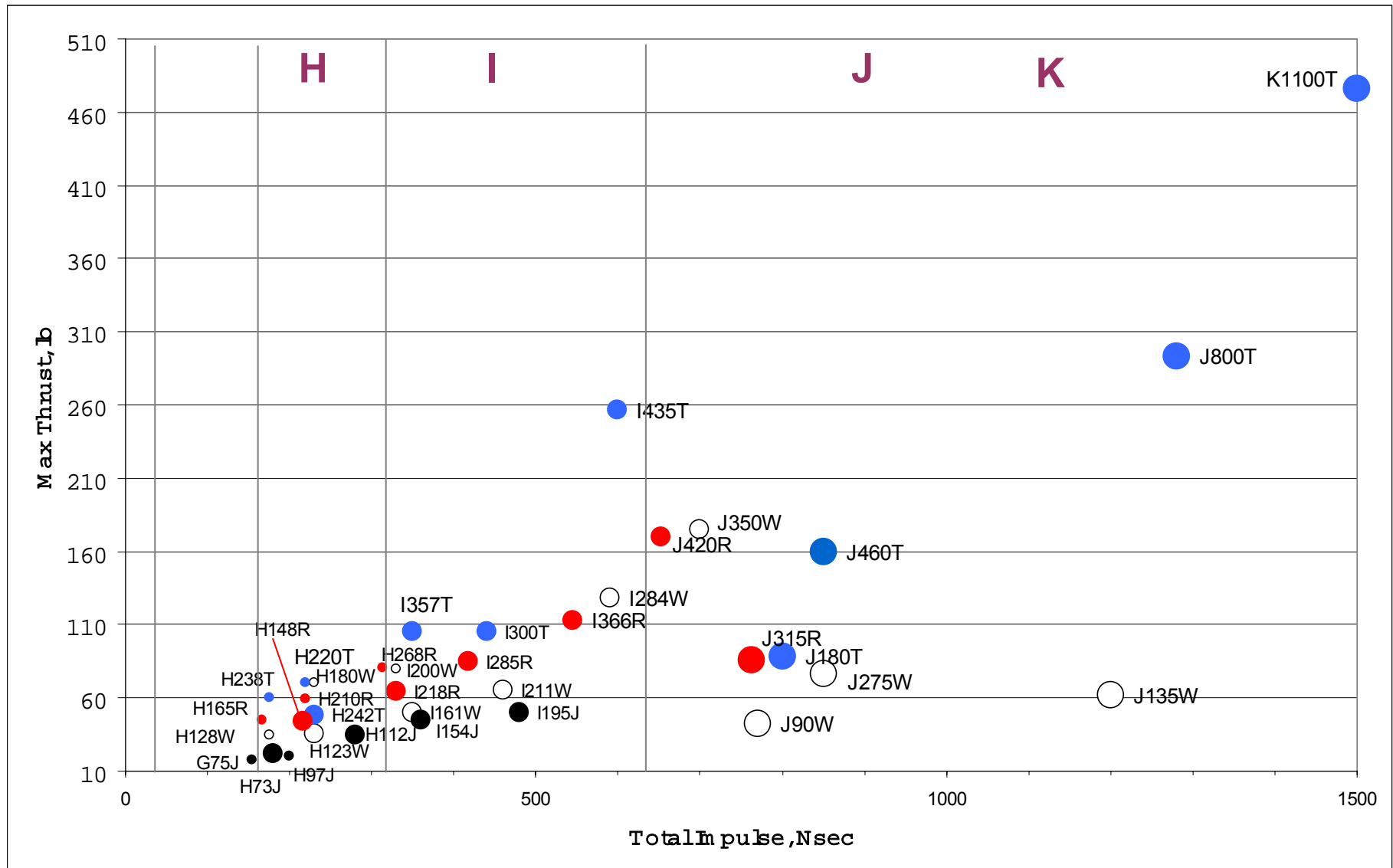


In his book "Model Rocket Design and Construction", Tim Van Milligan gives a design for a tool that will hold a fin straight along the length of the body tube. I added a second dimension to this tool: supports to hold a fin straight out from the body tube.





This handy chart lists all motors through "G" impulse certified as of February, 2005 as a function of total impulse and peak thrust. The size of the dots is a function of motor diameter (18mm, 24mm, 29mm, 38mm). D and higher impulse motors are labeled, with black powder motors labeled in blue.



Here is another handy chart. It lists Aerotech HPR G, H, I, and J reloadable motors as of February, 2005 as a function of total impulse and peak thrust. The size of the dots is a function of motor diameter (29mm, 38mm, 54mm). The colors of the dots represent Aerotech's three propellant configurations. This chart highlights a few idiosyncrasies in the labeling of some motors; for example, the I357T doesn't produce a higher thrust, nor more impulse, than the I284W. HPR fliers of course know this, and carefully match the thrust curves of their intended motors to their rocket's performance characteristics each and every time they fly. (Right? :-)

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<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 moderate the NARTARC forum!)

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MASA 2005 Badge Design Winner



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