THE 206-43

The Newsletter of NARHAMS, NAR Section #139.
NAR National Champions 2001, 2004

May 28, 1986 - Soyuz T-15 Multiple Space Station Flight
First Ever - Between Mir and Salyut 7
www.astronautix.com

NARHAMS IS MOVING !

By: Jim Filler NAR #27862

Wow ! We're actually going to be moving to a new sport launch location. This July 15th (Rain date of July 22nd) will be the last launch at Middletown Park. This site has been good to us over the years. NARHAMS was flying here before I joined the club back in 1989. Looking back at a lot of memories that I and many other present and past members could share is endless. A couple of points I'll touch on just for old time's sake. The first ECRM I attended at Middletown was in March of 1990 or was it 1991? Well, for starters the weather was very typical for ECRM (subject of a whole other article). Cold and rainy. I can remember chasing a "B" streamer model out towards the shopping center on Rte. 40. Only a few houses were along Coblentz road extending up about a ¼ mile from Rte. 40. Other then those few homes, the only other structures between the launch site and the houses was a farm house and barn near where the sediment pond is on the far side of Coblentz road. Of course the farm had cattle in the pen and the bull was something we warned everyone not to go near. Back to the streamer model. That was the only model that performed well all weekend. As I crossed over the road and back into the field I stepped into ankle deep mud. Never did find the model as I believe it probably landed near Braddock Heights. The other

Photo by Jim Filler

memory I have of that weekend was that I remember Tom Lyon who was the CD, sitting in his truck tabulating flight cards and points by hand! Wow .... No contest manager Thank You Dr, Kidwell for your marvelous program.

In 1993 NARHAMS hosted NARAM-35 right at Middletown Park. We actually flew the meet off the baseball diamond and the sport launch was flown by CMASS on the softball field. I remember altitude day, the line was about 30 deep just to check in for the better part of the day. Even though I was there everyday, I was not one of the main supporters of the meet. Of course the weather washed out on Friday, scale day so none of the carnage of the craftsmanship day would be witnessed. I do know from later conversations that this was one of the best NARAMS held in years and also

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ZOG-43

Volume 28 Number 05

May 2006

ZOG-43 is the official newsletter of NARHAMS the National Association of Rocketry Headquarters Astro Modeling Section # 139

NARHAMS is the oldest model rocket club in the United States!

ZOG- 43 is dedicated to model rocketeers of all ages, abilities, and interest. We are committed to providing the most current, up-to-date information on model and real world rocketry, and to provide educational material as well as entertaining information. ZOG -43 is published monthly and is available to anyone on a subscription basis. Current rates are $10 for meeting pickup or email or $15 for postal mail U.S. Funds for 12 issues a year, payable to NARHAMS Material in ZOG -43 is not copyrighted. Free and unlimited reproduction is granted with the proper credit to the author and/or ZOG-43.

For more information.....

If you have any questions about ZOG-43 or NARHAMS, or if you have any comment(s), correspondence, free merchandise or if you'd like to submit an article, send them to :

ZOG-43, 700 Cliveden Road West,
Batlimore, MD 21208
E-Mail ZOG-43 at:
zog43editor@yahoo.com

ZOG-43 is edited by Roy Lappalainen, and is an eight-time winner of the NAR/LAC "Rockwell" Trophy, recognized as the best NAR section newsletter.

Years won: 1969, 1973, 1975, 1990, 1991, 1992, 2003, 2004 & 2005

Zog-43 staff typist is none other than Jennifer Ash-Poole a.k.a. Secretary to the Stars !

Photographs: by Roy Lappalainen, except where noted.

ZOG-43 is produced on a eMachines D2046 PC with a Pentium 4 processor using Adobe PageMaker. Masters are printed on a HP Laserjet 4L printer.

This Edition: ***20 copies***

NARHAMS ON THE WEB

http://www.narhams.org

Send and receive E-mail with other NARHAMS members through NARHAMS Web page grouplist via yahoo-groups.

Soyuz-T Interior © Mark Wade

NARHAMS serves Baltimore, the state of Md., Washington DC and the surrounding Metropolitan areas. The club is a section of the National Association of Model Rocketry (NAR) and we are the oldest continuously active model rocket club in the United States, first established as a high school club in 1963, changing our name to NARHAMS when chartered as a NAR section in 1965. NARHAMS is the only five time winner of the NAR "Section of the Year" award.

Years won: 1997,1998,1999, 2001, 2004

NARHAMS members regularly fly their model rockets at NASA's Goddard Space Flight Center on Soil Conservation Rd. in Greenbelt Md. The launches are open to the public and are held the first Sunday of every month (weather permitting), starting at 1 PM.

Sport Launches are usually held the second Saturday of every month at Middletown Recreation Park in Middletown Md. Check the web page for updates.

NARHAMS welcomes all prospective new members to our monthly meetings. They are held on the first Saturday of the month from 5:30 to 9:30 PM at the College Park Airport Annex Building. Dues are 10 cents a week, with an initial 50 cents up front (good for 5 weeks) as a sign of good faith.

NEW: Monthly meetings available on-line via chat-room , simply go to the NARHAMS homepage and click on the link.

ZOG ROYAL COURT

(NARHAMS OFFICERS)

ZOG (President)

Jennifer Ash-Poole 410-674-6262

PRINCE ZOG (Vice-President)

Roy Lappalainen 410-653-6087

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Ed Pearson 301-577-7775

KEEPER OF THE HOLY WORDS (Secretary)

Chris Kidwell 571-434-7507

COURT JESTER

(Section Advisor)

Jim Filler 301-524-4447

Directions to College Park Airport:

Follow I-495 to Kenilworth Ave. South. Make a right onto Paint Branch Parkway, then make a right on Cpl. Frank S. Scott Dr. At the airport entrance go straight to the Operations Building, the annex building is adjacent to the "Ops" building.

made a nice profit for the club as well as the NAR.

I do not know what year I started running the ECRM meet for the club, but I am still doing it and still enjoying it. Another memory, and there are lots of them just from the ECRM meets over the years, was watching a modeler that is no longer with us Ducky Klouser, fly his 1/4A Parachute model for over 30 minutes just hanging over the field.

A couple of other events that stick out in my mind are the numerous night launches that we have held over the years. We have had some impressive launches and individual night flights. I remember having an October fest celebration one year that we had many a V-2 flying and past NARHAMS President Don Brown grilling up the bratwurst on the grill right on the field. I am sure that I have only scratched the surface of some of my and many other members memories of this field.

Photo by Jim Filler

Photo by Jim Filler

So where are we moving? Old National Pike Park actually has an address of Mt. Airy Md. The field is located at the back of the park which is Frederick County's newest park. To get to the park, just take Rte 70 east from Frederick to Rte 75 north. Take Rte. 144 east about 2 miles and look for the entrance to the park on the left. If coming from the Baltimore area, just take the Rte 75 exit about 8 miles before you get to Frederick.

When are we moving? The first scheduled launch will be on August 19th with a rain date of August 26th.

Some notes I will share with you to prepare for the new location. The new field is larger in area. The park is only about one half

Photo by Jim Filler

built for fields and such. According to the park service, no projected dates for finishing the park have been decided on. The field we will be flying from is quite a bit larger then the Middletown launch field. The terrain is not quite as flat, some would say a bit hilly but not terrible. For the remainder of the year, we will not be allowed to drive vehicles onto the site. All flyers will have to walk their support equipment out to the set up site, about 100-120 yards from the parking lot. So here is your first tip! If you have a dolly or a wagon of some type, bring it. The park has all of the same conveniences as the Middletown location, parking, shelters, and of course porta-johns. The field is actually only about ¾ mile from Interstate Rte 70, so this could result in problems with a wind blowing due south. If this were to become a problem, common sense range operations may cause flights of higher impulse to be grounded.

I am told that the prevailing wind is from the west, which will eliminate this problem. The other existing rules from Middletown Park will also be in place at Old National Park as well. We will still require a park waiver to be signed by all participants. Currently we have restrictions at Middletown Park that limits motors to "G" impulse. I do not see this changing in the near future. My opinion is we might be able to support "H" motors based on the waiver and the field. I have not filed the paperwork with FAA as of this writing, but will be asking for the same type of LMR waiver for models up to 3.3 lbs that we have had at Middletown.

Well, I am looking forward to seeing many of you at the inaugural sport launch at Old National Pike Park in August.

Random Thoughts From the Zog

May has snuck up on us. I am sure a few graduates and teachers would say the same thing. There is a lot to do and not a lot of time to do it in. We have TARC, several outreaches at the beginning of May, a regional contest over Memorial Day, and everything in between.

The shuttle is getting ready to fly in July, so I am sure they want May to last a while.

The kids are getting antsy for summer, as are the rocketeers who haven't had a chance to launch any new rockets this year. Be sure to plan in some painting and rebuilding time.

One thing that got moved was Jim Barrowman's talk. Jim decided he wanted to come talk in June. So come on out and hear about the history of NARHAMS (and to just hear some tall rocket tales.)

The Section of the Year paperwork will be out soon, so if you did any outreaches, and you don't think we know about them, email them to Chris Kidwell and myself. We'll get them included in the minutes. And if you helped out a TARC team, let us know that as well. We'll include it in the Section of the Year Paperwork.

Bertha Bash Photos

Photographer: Chris Kidwell

Designing & Building Engine Mounts Part 1 of 2

By Tim Van Milligan

On of the most common questions among modelers that are just starting to build their own creations is: "How do I design and build an engine mount." This question is even asked by a lot of TARC-team participants too. So I thought I'd write an article for this club's newsletter that would explain the general design concepts as well as how to assemble the engine mount.

Step 1: Selecting the components

When people start out, they generally have an idea of what size rocket engine they want to use. That is great, because when you design an engine mount, you have to build it around the size of engine casing that will be flown. This in fact leads us to selecting the first component in the design: "The engine mount tube."

The chart below shows the standard sizes of rocket

Common Body Tube Sizes

Engine Name	Diameter	Estes' Tube	Apogee's Part No.	I.D. in/mm	O.D. in/mm
"mini"	13mm	BT-5	10062	0.518" 13.2 mm	0.544" 13.8mm
Regular A,B, & C's	18mm	BT-20	10085	0.710" 18.0mm	0.736" 18.7mm
D size	24mm	BT-50	10099	0.950" 24.1mm	0.976" 24.8mm
F size	29mm		10110	1.140" 28.9mm	1.176" 29.8mm

engines, and the tube size that they will fit into. Most of these tubes are pretty common, and you can find them at dealers such as Totally Tubular, Balsa Machining Service, Aerospace Specialty Products, and my company, Apogee Components. I put the Apogee part numbers in the table to make it easier to get the right one.

The second component you'll need is the "outside" tube. This is the tube that the engine mount assembly is glued inside of. While it isn't technically part of the engine mount, we need to know the size of this tube so we can choose the right components.

More particularly, we need to know the exact inside diameter of the tube. If it is a tube made by one of the manufacturers listed above, you can find the exact diameter of the tube from their web site. It is important to look for the "INSIDE" diameter of the tube, not the outer diameter.

Once we know the inside diameter of the tube, we can now select the proper centering rings. These hold the engine mount tube concentrically inside the outer tube.

I'll tell you right now, for new builders, choosing the right size centering rings is the hardest step in designing an engine mount. Once you get past this step (and it ain't too bad), it is all down hill and easy from here on out.

The rings are chosen based on the size tubes being used. The inside diameter of the ring is sized so that it just slips over the outside diameter of the motor mount tube. The outside diameter of this ring is chosen so that it just slips inside the bigger tube.

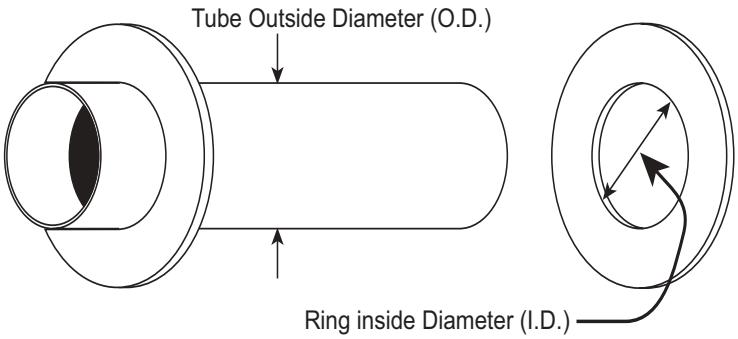
If you are using pre-manufactured tubes, you can buy rings that will easily center them. The hard part though, is choosing the right ones. This is "hard" only because the names used by manufacturers can be really really confusing. It gets even worse if you select tubes and rings from different vendors.

Because of the silly names we manufacturers come up with for each type of part, the way to determine the correct size ring is to look at the "dimensions" themselves.

Let's do an example. Say we have an engine mount tube that has an outside diameter of 0.736 inches. We need a ring to fit over this tube, and also slip easily inside a tube that has an inside diameter of 1.140 inches.

If the ring has an inside diameter of exactly 0.736 inches, it will NOT fit over the tube. The ring needs to have a inner diameter that is just slightly larger, so that it will slip over the tube. How much larger? GREAT QUESTION!

My own rule of thumb is that it needs to be 0.006 inches bigger than the outside diameter of the tube it will fit over. This will be loose enough so that it easily slips over the tube.



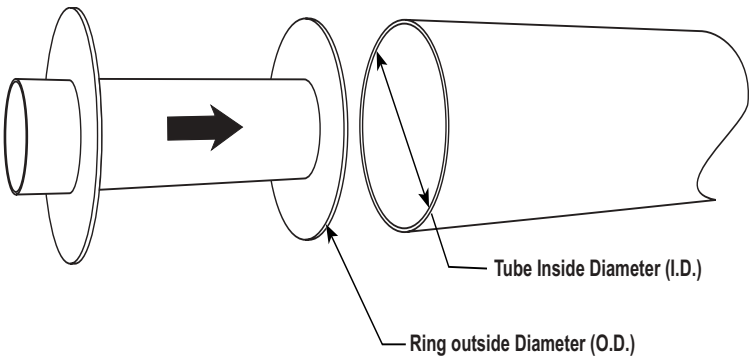
Tim's Rule of Thumb

Ring I.D. = Tube O.D. + 0.006 inches

In our example, we have a tube of 0.736 inches. So we'll add 0.006 inches to this; which makes the inner diameter 0.742 inches.

At this point, we go back to the dimension charts at the manufacturer's web site, and we find a ring whose diameter is close to this number. On the Apogee Components web site, we find a few rings with an inner diameter of 0.740 inches. This is close enough. It will slip over. If it is too tight, we can easily sand the inside with a bit of sandpaper.

Now that the inside diameter is found, we use the same procedure to find the outer diameter. Although this time, we'll subtract 0.006 inches from the inner diameter of the big tube.

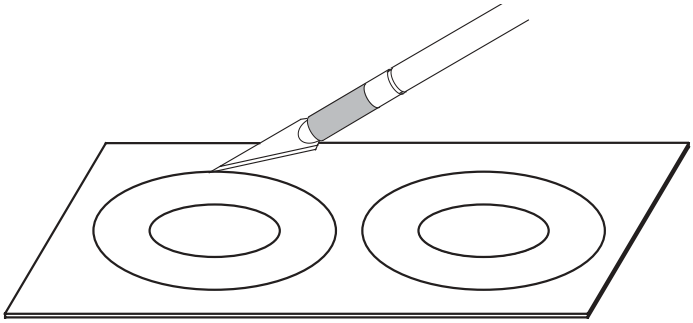


Tim's Rule-of-Thumb

Ring O.D. = Tube I.D. – 0.006 inches

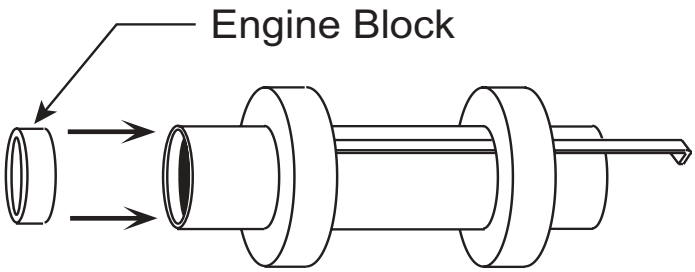
In our example, the big tube has an inner diameter of 1.140 inches. Subtracting 0.006 inches gives us a diameter of 1.134 inches. Knowing this diameter, we'll again go back to the centering ring dimension charts on the manufacturer's web site to pick the exact ring for our engine mount. For this particular example, from the Apogee web site, I'd select the ring P/N 13034, which has these dimensions: I.D.= 0.740 inches, O.D.=1.134 inches.

When ordering rings, make sure to get at least two of them.What happens if the tubes you are using are non-standard? Say you found some paper tubes around your house and you can't find rings in the manufacturer's charts that will be adequate. What then?In this case, you'll have to make your own centering rings. But don't worry. Rings are easy to make. You'll find great instructions in the Apogee Peak-of-Flight newsletter #126. You can download it at: www.ApogeeRockets.com/education/downloads/newsletter126.pdf



If you need cardstock to make rings, you can find it at the Apogee Components web site (Part Number 44001): http://www.apogeerockets.com/body_tubes_and_rings.asp

You'll need one more ring for your engine mount. This is an ordinary ring, but it has a special name: Engine block.



NAR Technical Services

New Products

NARTS has several new items to announce, including the latest in technical offerings, the NARAM-46 CDROM with all 22 R&D reports from NARAM 46 in PDF format on a single CD. These reports range from studies of ignitors, gliders and piston launchers to information on the Rocket League and shroud lines for egglofter rockets.

We are also offering the report by our own "Ole Ed" Pearson on "How Your Club Can Do Better at Contests", with his own take on what a NAR section can do to improve its contest performance and standings within the NAR. If this sounds like a case-study of NARHAMS as we hunt for top points standings, you wouldn't be far off! This 102 page document is also for sale on a single CD in PDF format.

The newest offering, being shipped to NARTS as I write this, is the book "Rockets over Alaska: The Genesis of Poker Flat", a 256 page autobiography by Neil Davis. This book on the rocket program at Poker Flat Research Range, just north of Fairbanks, Alaska is autographed and adds a bookmark of a swatch of parachute fabric that flew into space on one of the Poker Flat rockets. The book also has a 31 page table of all 302 major rocket launches held at Poker Flat.

New Method

Are you itching for a PDF document from our offerings but don't want to pay shipping? NARTS will be rolling out an online delivery method to scratch that itch! Coming soon, the NARTS website will offer online delivery of PDF files via an emailed link that will allow you to download your document for immediate viewing.

Future Products

NARTS is working with vendors and graphics artists to create a new member sticker, a bumper sticker (both sticky and magnetic versions) and NAR logo T-shirts. Keep an eye on the New Products category of the NARTS website, at nar.org/narts for these items and more!

As the name suggests, this ring is glued into the engine mount tube, just ahead of the rocket engine. The thrust of the engine pushes against this ring, and the ring blocks the engine from sliding up into the body of the rocket. That would be bad if it happened. It would cause a terrible mess, not to mention ending the flight with the rocket crashing to the ground.

Again, you'll go back to the charts from your favorite manufacturer and select a ring that will slip inside of the engine mount tube.

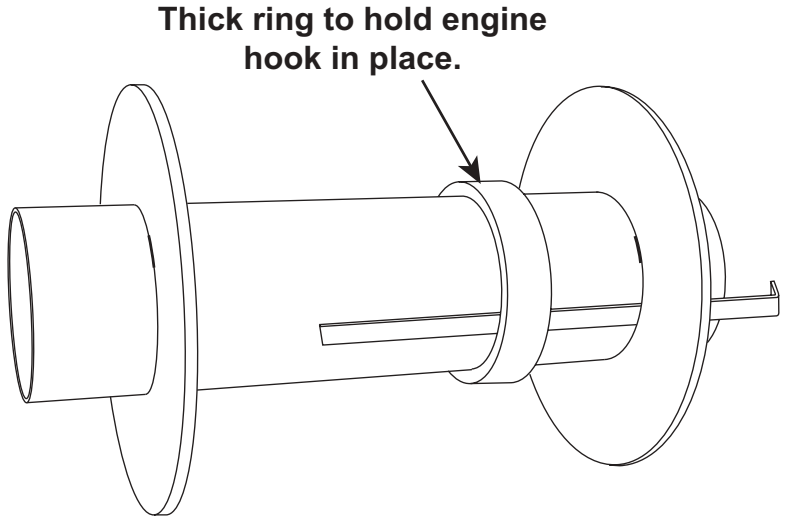
Another option: you can also take a spent engine case (one that has already flown and consumed the propellant inside), and cut a 1/4 inch (6.3mm) length, and use it as an engine block. But remember to clean the ring well to remove any burnt residue. This gunk and residue could prevent it from being glued inside the engine mount tube.

The engine block prevents the engine from sliding forward into the body tube. But what prevents it from falling out the back? This is the job of the "engine hook."

This is a piece of metal that clips over the back of the rocket engine, preventing it from sliding rearward. This is particularly important when the ejection charge in the engine fires. When it does, it gives the engine case a rearward kick. If the engine hook wasn't there, the engine would shoot out of the rocket. Meanwhile, the nose cone wouldn't come off, the parachute would never be deployed, and the rocket would become a lawn-dart as it crashes into the ground.

If you need metal engine hooks, you can get them from Apogee Components, or from another of your favorite dealers.

There is one last component that is needed when you have large disk-type centering rings. It is a ring that slips over the engine mount tube and holds the engine hook in place. If you don't have a ring that



does this, you can use four or five layers of masking tape.

Personally, I like to use a ring, since I know it won't shift around and it will keep the hook firmly in place. The adhesive on masking tape will soften as it gets hot (when the engine is burning), and will shift around a bit. So it isn't as permanent as a paper ring that is glued into place.

Step 2: Sizing the Components

When building engine mounts, there is really only one component that you have to change the size of. That is the engine mount tube. Because they come in long lengths from the manufacturers, you will usually have to cut them shorter.

The length of the engine mount tube will depend on how long the outer tube is. Typically, you cut them so that they are .5 inches longer than the length of the rocket engine itself.

But this length is not very critical. The only critical thing about it is that it needs to be longer than the engine casing itself.

After you cut your engine mount tube to the desired length, you're ready to begin the assembly of your engine mount. That will be covered in the next part of this article.

Photo by Chris Kidwell

Tim Van Milligan (a.k.a. "Mr. Rocket") is a real rocket scientist who looks forward to helping out other rocketeers. Before he started writing articles and books about rocketry, he worked on the Delta II rocket that launched satellites into orbit around the earth. He has a B.S. in Aeronautical Engineering from Embry-Riddle Aeronautical University in Daytona Beach, Florida, and has worked toward a M.S. in Space Technology from the Florida Institute of Technology in Melbourne, Florida.Currently, he is the owner of Apogee Components (http://www.apogeerockets.com) and the curator of the rocketry education web site: http://www.apogeerockets.com/education/. He is also the author of the books: "Model Rocket Design and Construction," "69 Simple Science Fair Projects with Model Rockets: Aeronautics."

Photo by Chris Kidwell

Photo by Chris Kidwell

Calendar of Events for 2006

May 06		Build-and-Blast, Hobbytown USA, Frederick, MD
May 06		Maryland Science Center Space Day, Balt., MD
May 06	05:30 – 10:00 pm	Monthly meeting
May 07	01:00 – 02:00 pm	Goddard public launch
May 13	10:00 – 04:00 pm	Sport launch, Record Trial-2
May 20	06:00 – 06:00 pm	Team America Finals, Great Meadows, VA
May 27-28		RAMTEC
May 27-28		National Sport Launch (NSL), McGreger, TX
Jun 03	05:30 – 10:00 pm	Monthly meeting, club history discussion
Jun 04	01:00 – 02:00 pm	Goddard public launch
Jun 17-18	10:00 – 04:00 pm	ECRM-33
Jul 01	05:30 – 10:00 pm	Monthly meeting, sci-fi discussion
Jul 02	01:00 – 02:00 pm	Goddard public launch
Jul 15	10:00 – 04:00 pm	Sport launch, paratrooper spot landing 2pm
Jul 16		Goddard Contest
Jul 30-Aug 04		NARAM,Rainbow Valley, AZ
Aug 05	05:30 – 10:00 pm	Monthly meeting
Aug 06	01:00 – 02:00 pm	Goddard public launch
Aug 19	10:00 – 04:00 pm	Sport Launch
Sep 02	05:30 – 10:00 pm	Monthly meeting odd-roc, NARAM review
Sep 02-03		RAMTEC
Sep 03	01:00 – 02:00 pm	Goddard public launch
Sep 16	10:00 – 10:00 pm	Sport Launch, night launch, R/C fun fly 2 pm
Sep 19-26		World Space Modeling Championships
Oct 01	01:00 – 02:00 pm	Goddard public launch
Oct 07	05:30 – 10:00 pm	Monthly meeting, "Tactical Turkey" building session
Oct 21	10:00 – 04:00 pm	Sport launch sci-fi 2 pm
Nov 04	12:00 – 05:00 pm	Planning meeting
Nov 04	05:30 – 10:00 pm	Monthly meeting, R/C and glider building session
Nov 05	01:00 – 02:00 pm	Goddard public launch
Nov 18	10:00 – 04:00 pm	OPOSSUM-11, "Tactical Turkey" 2 pm
Dec 02	05:30 – 10:00 pm	Potluck Dinner
Dec 03	01:00 – 02:00 pm	Goddard public launch
Dec 16	10:00 – 04:00 pm	Sport launch

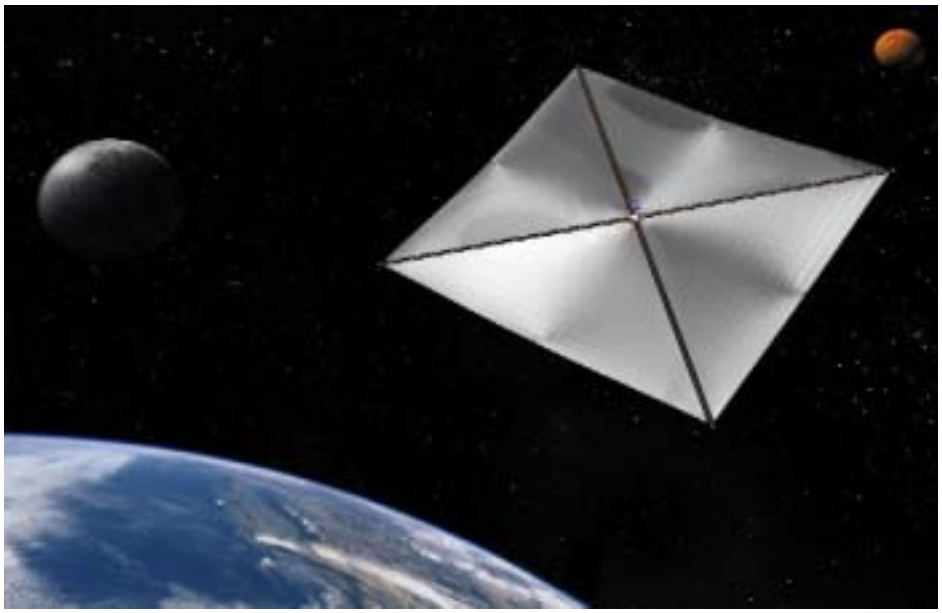
Sport launches are held at Middletown Park from 10am-4pm, waiver up to 3.3 lbs and "G" motors not exceeding 62.5 grams of propellant. All flights "E" power and above are restricted to 5 degrees from vertical and Questions? Call Club President Jennifer Ash-Poole at 410-674-6262 or visit NARHAMS online at http://www.narhams.org

When exploring space, NASA naturally wants to use all the newest and coolest technologies—artificial intelligence, solar sails, onboard supercomputers, exotic materials.

But "new" also means unproven and risky, and that could be a problem. Remember HAL in the movie "2001: A Space Odyssey"? The rebellious computer clearly needed some pre-flight testing.

Testing advanced technologies in space is the mission of the New Millennium Program (NMP), created by NASA's Science Mission Directorate in 1995 and run by JPL. Like the daredevil test pilots of the 1950s who would fly the latest jet technology, NMP flies new technologies in space to see if they're ready for prime time. That way, future missions can use the technologies with much less risk.

Example: In 1999, the program's Deep Space 1 probe tested a system called "AutoNav," short for *Autonomous Navigation*. AutoNav used artificial intelligence to steer the spacecraft without human intervention. It worked so well that elements of AutoNav were installed on a real mission, Deep Impact, which famously blasted a crater in Comet Tempel 1 on July 4, 2005. Without AutoNav, the projectile would have completely missed the comet.



Artist's rendering of a four-quadrant solar sail propulsion system, with payload. NASA is designing and developing such concepts, a sub-scale model of which may be tested on a future NMP mission.

Some NMP technologies "allow us to do things that we literally could not do before," says Jack Stocky, Chief Technologist for NMP. Dozens of innovative technologies tested by NMP will lead to satellites and space probes that are smaller, lighter, more capable and even cheaper than those of today.

Another example: An NMP test mission called Space Technology 9, which is still in the planning phase, may test-fly a solar sail. Solar sails use the slight pressure of sunlight itself, instead of heavy fuels, to propel a spacecraft. Two proposed NASA missions would be possible only with dependable solar sails—L1 Diamond and Solar Polar Imager—both of which would use solar sails to fly spacecraft that would study the Sun.

"The technologies that we validate have future missions that need them," Stocky says. "We try to target [missions] that are about 15 to 20 years out."

A menagerie of other cool NMP technologies include ion thrusters, hyperspectral imagers, and miniaturized electronics for spacecraft navigation and control. NMP focuses on technologies that have been proven in the laboratory but must be tested in the extreme cold, vacuum, and high radiation environment of space, which can't be fully recreated in the lab.

New NMP missions fly every year and one-half to two years, taking tomorrow's space technology for a daredevil test drive!

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

PUBLIC LAUNCH
Goddard Space Flight Center
Visitors Center
1:00PM - 2:00PM

June 4th

SPORT LAUNCH/RECORD TRIAL
Middletwon Park
Noon - 4:00PM

May 13th

PUBLIC LAUNCH
Goddard Space Flight Center
Visitors Center
1:00PM - 2:00PM

May 7th

Launch Schedule

ZOG - FORTY THREE
700 CLIVEDEN ROAD WEST
BALTIMORE, MD 21208