THE LEADING EDGE

Newsletter of the Northern Illinois Rocketry Association, **Volume 21, Number 2**
NAR Section #117, Proud Winner of the 1996 and 1997 Rockwell Newsletter Trophy! **March/April Fools 1998**

Club News

NIRA GOES DIGITAL!

Club President Ric Gaff recently purchased a really cool digital camera for NIRA. The camera stores the photos on a 3 1/2" disk in JPEG format, so that the photos can be instantly loaded onto any PC. Most of the photos in this issue were taken with the new camera, and were not modified in any way (which makes my job a lot easier!).

Enter: The COSMOS

The upcoming April launch will see the first of what is hoped to be a series of competitions especially for NIRA members. This particular event will be called COSMOS. Your friendly Contest Director, Adam Elliott, will be your host. COSMOS is open to all.

This COSMOS will be a Section Meet, which has a contest factor of one. There are three events each with their own weight factors. The entry fee is $1 per person.

The events for the contest are:

Open Spot Landing (weighting factor 4)
1/2A Streamer Duration (weighting factor 8)
A Super-Roc Duration (weighting factor 13)

Open Spot Landing (rule 60.7.3) is the simplest event. All you have to do is use any rocket with any motor and try to make it land as close to the predetermined spot as possible. This distance is measured from the tip (or top) of the model to the landing target. All contestants will be aiming at the same target. Simple, right? Your score is determined by the distance in meters your model lands from the target. Whoever has the smallest score wins!

1/2A Streamer Duration (rule 31) consists of any model that can be safely be lofted by a 1/2A motor and uses a single streamer as the sole recovery device. And, yes, it must all be launched on a 1/2A motor. The streamer must have a length-to-width ratio of five to one (5:1) or greater. This means that for every unit your streamer is wide, it must be at least five times longer than that. A trick some people use is to attach the streamer in the center of the model on the outside. Another thing many people do is fold their streamers accordion style. Both methods are said to increase drag, thus improving duration. The score is the total number of seconds your models remain aloft.

A Super-Roc Duration (rule 33) should be the most interesting. The principle is the same as above, but any recovery device or method may be used as long as the model descends in a manner deemed safe by the RSO. The difference is that a really long rocket is called for. In the case of A Super-Roc your model must be between 75 and 150 centimeters in length. Okay, it can be longer, but you won't gain any points for it. The score is determined by the length of the model (from tip to motor nozzle) in centimeters plus the timed duration. Please do not use any hardwood doweling or solid plastic shafts or any other materials deemed unsafe by the RSO.

A note on duration events:

Your entry will be timed form the instant of first motion until it lands (or drifts out of sight) by at least one person with a stopwatch. You must make at least one qualified flight but can make no more than two. You are allowed to enter two models to accomplish this. One of the flights must be returned to the desk. Every entry must have your name or NAR number on it.

Another note:

All entries must remain in one, connected piece. No motors may be kicked out, and no rocket sections may descend separately.

Standings will be posted for every division in each event. Your overall score for the whole contest will be determined by the NAR's complex scoring process. Rest assured, though, winners will be found. You probably have models and parts lying around that will qualify for any of these events. Why not give it a try? See you in April!

Map to the Greene Valley Forest Preserve Launch Site:

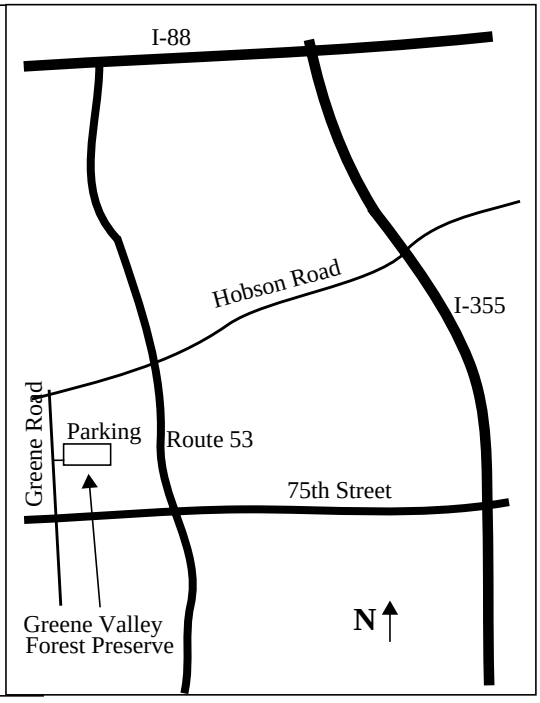
From I-88 exit South on Route 53, then right (west) on 75th Street. Greene Road is the first stoplight west of Rt. 53. Turn right (north), then right into the parking lot.

From I-355 (north or south) exit west on 75th Street. Stay on 75th Street until Greene Road, then turn right (north).

The entrance to the launch site is on Greene Road, between 75th Street and Hobson.

It's a long way from the parking lot to the launch site, so bring a wagon or other carrier. It's also a bit bumpy.

There is a 2 hour window from 12pm to 2pm for you to fly untried designs before the launch opens to the general public.



T MINUS 1 - NIRA'S CALENDAR OF UPCOMING EVENTS

1998 CLUB LAUNCH DATES

Launches are BYOL (bring your own launcher). The location for our 1998 launches is the Greene Valley Forest Preserve. If you have questions prior to any launch, call the NIRA Infoline at (630) 690-6353 and leave a message, I will call you back.

March 15 - 1st launch of 1998! If the weather is bad we'll do something else. Call the Infoline (630-690-6353) to find out what!

April 19 - Regular club launch.

May 24 - Regular club launch (1 week later than normal due to National Sport Launch on the 15-17).

June 20-21 - Midwest Regional Fun Fly, Yorkville, IL.

July 18 - Eat Cheese or Fly, Bong Recreation Area, Burlington, WI.

July 19 - Regular club launch.

August 16 - Regular club launch.

September 20 - Regular club launch.

October 18 - Regular club launch.

October 31 - Nov 1 - RCHTA Show, Rosemont Expo Center

November 8 - RCHTA Launch.

November 15 - Regular club launch

December 13 - Holiday Party at Bundick's

Model of the Month Winners!

February (Top) - Joe Nowak took Adult with his really cute Boyce Mercury-Redstone. John McCallum took Youth (at his first meeting ever!) with his nicely done Estes Sidewinder**.**

March (Bottom) - Tom Pastrick was the hands down winner in Adult with his new and improved Topkat. John McCallum was the back-to-back winner in Youth with his Estes Little Joe II.

Congratulations to all the winners! (digital photos by Rick Gaff)

MONTHLY MEETINGS

All meetings start at 7:30 PM, and include entertainment and a brief business meeting. Don't forget a model for "Model of the Month" voting. We need volunteer speakers to entertain the troops after the business meeting, so call Ric Gaff at (630) 483-2468 if you can help with ideas or can speak yourself. The location is the Glen Ellyn Civic Center, 535 Duane Street (usually on the 3rd floor, but check the board in the lobby).

Currently scheduled meeting dates are: December 5. January 2, February 6, March 6, April 3, May 1, and June 5, **July 10** (Note! This is not the first Friday of July!), August 7, September 4, October 2, November 6, December 4.

There will be a Used Book Sale going on in the gym during the May meeting, so come early to browse and get a parking space.

THE LEADING EDGE, published bimonthly by and for members of the Northern Illinois Rocketry Association, NIRA, NAR Section #117, is dedicated to the idea that Sport Rocketry is FUN! Articles, plans, photos, other newsletters, and news items of interest should be sent to Bob Wiersbe, 1835 Shetland Drive, Wheaton, IL 60187 (or electronically via Internet to wiersbe@lucent.com). Photos will be returned, other material returned if requested. Send membership applications (dues: $3/year, including a six issue subscription to the Leading Edge) and nonmember subscriptions ($5 per six issues) to Ken Hutchinson, 84 Jefferson Lane, Cary, IL 60013. Any item appearing in the Leading Edge may be reprinted by Sport Rocketry with proper credit given; all other uses require written permission of the Northern Illinois Rocketry Association. Before criticizing someone, always walk a mile in their shoes. That way, when you do criticize them, you're a mile away and wearing their shoes.

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Other Items of Interest

Tripoli Wisconsin Launches:

Bong Recreational Area

WHEN	TIME	WHERE
April 18	9a - 7p	Runway
May 23	9a - 7p	Runway
June 13-14	9a - 7p	Runway
July 11	9a - 7p	Parking Lot E
August 8-9	9a - 7p	Parking Lot E
August 29	9a - 7p	Parking Lot E
October 10	9a - 7p	Parking Lot E

High Power launch fee: $10/day for TRA members. (TRA headquarters requests that non-TRA members pay an additional $5 to cover insurance premiums)

Low to Mid-Power rockets (A-G motors & total weight less than 53 oz) 3 or more launches: $10, less than 3: FREE.

Virtual Rocketry
The next best thing to being there!

Looking for a software package for all types of Rocketry? Well, look no further! Virtual Rocketry (TM, R, and Copyright) is the last rocketry related computer program you will ever need!

Just look at these features:

• Complete motor specifications for ALL manufacturers
• Complete database of ALL rockets ever made
• Complete 3D CAD system - design your rocket from scratch
• Flight simulation: subsonic, transonic, supersonic, and warp modes supported
• Flight is viewable from ANY point in space, with ANY weather conditions
• Ability to scan already constructed rockets
• Flight tracking - now you can take Virtual Rocketry to the field

So what can you do with Virtual Rocketry? **ANYTHING!**

Design the Ultimate Rocket!

• Cluster and stage any combination of motors!
• Try out bizarre fin shapes and materials!
• Experiment with new recovery techniques!
• Test before you build!

Attend Virtual Launches!

• Crappy weather outside? No problem! You can organize your own launches, just for yourself, or have others join in via virtual connections!
• No more waiting in line for a pad!
• Design your own field, or choose from a wide selection of existing sites! [Great for playing Rocket Golf (Demo Included)]
• Act as RSO, Check-in Officer, LCO, or skip them altogether!
• Try to get questionable rockets past the RSO from Hell!

New Features!!

• Network with other Virtual Rocketeers for salvo launches, drag races, competition, or just for fun!
• "*Spectator Row*" - A line of virtual spectators are included in the simulation, wherever you specify! See what happens with the "Flying Pyramid of Death" when it tips off the rod in different directions! [Combine with "Launch Pad to Lawsuit Mode for added fun!]
• "*Rocket Cars*" - Watch 100 pound "M" powered Death-Mobiles battle it out on a dragstrip! See guide wires snap, guide lugs break, wheels come off, debris fly!!
• "*Hybrid Mode*" - Experiment with different types of hybrid fuel, all from the safety of your comfy chair. Try that hunk of salami, bagel, even your wifes' meatloaf.
• "*Pinky and the Brain*" - Put a couple of mice into your payload section, complete with instrumentation! Watch their reactions on the screen, or combine it with the WYSIWYF option for the ultimate experience.
• "*Homebrew*" - Make your own motors! Try out different recipes! No need to worry about death and dismemberment (not to be used with the WYSIWYF mode).

All this from the relative comfort of your own home! Virtual Rocketry can do anything you can do in the real world, and then some. Imagine being able to see how your new design will fly, before you even fly it! This is not just an altitude simulation, but a real time, VIRTUAL simulation!

You can watch the flight from any point in space, from inside the nose cone, outside the rocket, underneath, above, from 5 miles away, whatever you want!

And don't forget sound! There are sound files for ALL of the motors in the database! This program handles catos, chuffs, misfires, even sonic booms!

If you can conceive it, VIRTUAL ROCKETRY can do it. Put 7 FSI F-100's and 11 Estes E15's in a rocket, and try to get it past the RSO. If you do, just sit back and watch the fireworks! Catos so real, you'll be ducking the debris!

Build that ultimate bird. You know, the one with everything. Huge honking

motors, really cool payload, nifty ejection systems, on board electronics, radio control equipment, airstarted motors. Virtual Rocketry can handle it!

Want to learn how to use a reload? Virtual Rocketry can do it! You'll assemble the motor part by part, including grease! If you mess it up, you'll find out when you run the Virtual Simulation. Premature ejection, blow-by, chuffs, blown nozzles - we do it all!

What about that rocket you've already built, but haven't been able to fly? With our unique Try-Korder device you can scan your rocket and have it be replicated in Virtual Rocketry! CG and CP points will automatically be calculated, stress points and construction quality will be evaluated, analyzed, and included in the simulation. Didn't use good epoxy? Watch your rocket shred on the screen! Shock cord mount weak? Watch it rip out at ejection! All these things are possible with Virtual Rocketry! Find the failures before you fly! Imagine all the time you'll save! Imagine the money you'll save! You may never go back to a real launch!

Have you ever wondered what it would feel like to actually fly in one of your rockets? Virtual Rocketry can show you! With our patented WYSIWYF (WIZ-E-WHIF or What You See Is What You Feel) interface, you'll not only see what is happening, but feel it! G forces, spinning, deceleration, you'll experience it all! The "Apogee To Impact" (TM) mode has to be experienced to be appreciated!

Take it to the field! Virtual Rocketry isn't just for the home anymore! With our new sensor packages you can bring it along to help with all kinds of things. Ground sensors include airspeed and direction, humidity, pressure, thermal activity, optical tracking, and even seismic activity! The onboard sensors include altitude, GPS, video, and velocity. You can literally fire and forget! For example:

• The "Where'd It Go!?" mode is great for finding those lost rockets, just enter all the parameters at the time of launch and Virtual Rocketry will tell you where to look!
• Virtual Rocketry will even tell you how far down into the ground the rocket has buried itself!
• Virtual Rocketry will tell you what kind of parachute to use, even how much ejection charge to use!
• With the special "Hide and Seek" package your rocket can tell you how to find it using "Hot", "Cold", and "Warm" messages!

Virtual Rocketry runs on an virtually any machine. These packages are available NOW:

Virtual Rocketry Software Package - $999.99 (S&H $5)

Ground Sensor Package - $499.99 (S&H $25)

Flight Sensor Package - $399.99 (S&H $20)

Or, buy the WHOLE package for only $1499.99, shipping included! Please specify what type of machine you will be running it on (IBM-PC, Mac, Sun, VAX, ENIAC, NeXT, Commodore, TRS-80, PDP-11, Atari, Sony Playstation, HP, Cray, or Altair 8080).

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1-800-VIRTUAL

How High Did It Go?
by Richard Wartick

How high did that rocket go? This is probably one of the most-voiced questions by all rocketeers. It's only natural to think about altitude when flying rockets; they are designed and built for the purpose of carrying something upward, even if it's only the vehicle itself. All rocket borne experiments sent aloft by NASA or anyone else, has to be tracked by a ground crew. Accurate tracking involves determining, among other things, the maximum altitude attained during the flight.

How high did my rocket go? In the world of model rocketry, there are three methods that I know of to determine the answer. Optical tracking with theodolites is one way to do it. Direct measurement with an onboard altimeter is another. The third method involves the use of a

"Standard Altitude Marker Streamer."

A Standard Altitude Marker Streamer (or, altitude marker) is nothing more than a streamer. It is cut from polyethylene material 1/1000 inch thick, one inch wide and twelve inches long. A three gram weight is attached to one end of the strip with tape. Like all streamers, a SAM streamer is supposed to flutter as it descends. Constructed correctly, it should drop at a constant speed of eighteen feet per second. This method intrigued me -- it's both self-contained, no external equipment or tracking people needed; and cheap, unlink an altimeter. The only equipment required is the altitude marker and a stopwatch. It's described in the Handbook of Model Rocketry, fifth edition, by G. Harry Stine. Read chapter sixteen entitled, "Altitude Determination," for a detailed discussion of how and why this device works.

With the SAM streamer idea now stuck in my head, I desired to discover for myself how effective this technique works in the "real world." For instance, how would the presence of a cross-wind affect the altitude marker's performance? Prior to flying it, I quickly realized my need to acquire a vehicle that would perform consistently flight after flight; only then could I make a valid judgement on the usefulness of the standard altitude marker.

I began testing various combinations of rockets and motors to find a configuration that would reliably eject a parachute at apogee. I settled on the exclusive use of Estes C6-3 motors, and one "standard" rocket from my collection which would be weighed on a laboratory scale prior to launch. The rocket of choice, named "Courier B", performed satisfactorily when it weighed between 158-161 grams.

Remember, this technique gives a measurement of altitude at parachute ejection. The only way to get a valid (or, actual) time/altitude measurement is to have the ejection charge deploy the chute and altitude marker at apogee. The calculations to determine altitude are easy to do. Time the descent of the marker with the stopwatch, and multiply the number of seconds it takes to reach the ground by eighteen. The result will be the total altitude in feet: Descent Time X 18fps = Altitude in feet.

The test program involved making a series of flights under differing weather conditions, and carefully tracking the results. The streamer must flutter straight down (or almost straight down) in order to give a valid timing. If the streamer drifts on the breeze, a false reading will be evident. Over the period of a year, while attending five NIRA launches and MRFF, I made a total of eleven flights. Weather conditions encountered varied; concerning the wind, it ranged from dead-calm to a very breezy twenty miles-per-hour.

How did the Standard Altitude Marker perform? As I suspected, the streamer would drift considerably in a breeze, even a slight breeze would adversely affect its performance. However, when the air was still, the marker fell straight down. Of the eleven tests, air movement caused the streamer to drift downwind seven times. Four tests produced the desired results, as outlined below.

Flight #	Descent Time (sec)	Altitude (feet)
3	10.98	197
5	10.00	180
6	10.10	181
7	11.91	214

The recorded altitudes are remarkably close, only a thirty-four foot spread separates the lowest and highest values. It's even more amazing considering that the motors used to power the rocket came from different production lots! I bought them as needed, from various hobby shops over the course of a year.

We can now look back to the question asked at the beginning of this article: How high did that rocket go? After running this series of tests with the Standard Altitude Marker Streamer, and recording the results, I have an answer. When additional flights are made with this simple device aboard, I will be able to further refine my altitude estimate for this particular rocket. Yes, wind induced drifting appears to be a problem, but the solution is easy - fly the altitude tests on calm, windless days. For obvious and practical reasons, this is a useful and interesting project. Try it yourself, and let me know your results.

National Air and Space Museum Visit

by Bunny

Since its opening on July 4, 1976, the Smithsonian's National Air and Space Museum has consistently been the most visited museum on this planet. From its treasures in the Hall of Flight to whimsical displays, like the current Star Wars retrospective, the nation's and world's space and aviation treasures attract huge crowds of both the idly curious and avid enthusiasts. My visit there in January was both notable and unremarkable from my previous visits.

My first foray to the NASM was with NAR Secretary George Gassaway. We had decided to attack the NASM library to see what scale data might be dug up. Visits to the library require advanced permission, so I arranged one via email for Friday morning at 10:30. We signed in at the information desk and a librarian came down to take us up to the 3rd floor library. To access materials, you first look thru a massive index of material, then fill out a request form. The librarian accesses the material hidden in the stacks, you sign for it, use it, then return it for a return receipt signature by the library. Any transparencies or other fragile materials require handling with cotton gloves, conveniently supplied by the library.

My attack on about two pages of Atlas index listings was a bit unproductive. I found not a single drawing in the files I pulled, about 40% of the total Atlas file collection. Photographs were a mixed bag. The best AC-27 shots I already had, and the new shots I looked at weren't centered on details I was hoping to get better photos on. I did find a couple of nice Atlas Able photos, but they had no negative number on the back. This meant that the only place I can get copies made would be at the NASM. While the librarian was helpful in giving me an order form to do that, I haven't yet had the heart to look at the pricing. I guess the money goes for a good cause; NASM is working to put its entire 1.7million image collection on laser disk.

Gassaway had better luck digging out photos of the Little Joe I for an English modeler. As we got ready to leave, I noticed a magazine rack, wandered over and found Sport Rocketry. The NARAM issue was close at hand, so I pulled it out to show the reference librarian that we actually did build these things. I showed him the NARAM scale photos, and he replied "Yeah, we looked at that when it came in, and when we saw the X-1, we said "Cool!".

On Sunday, after the Board meeting was over, we hit the main museum for about an hour and a half. The Star Wars exhibit tickets weren't available during the time we were there, so we had to skip that attraction. We voted to split up and regather for the trip back to the airport, so I darted off to the Enola Gay exhibit. You might recall controversy around that exhibit resulted in the firing of the museum director. A fascinating video showed the restoration of the airplane that dropped the first atomic bomb. I then headed off to "Space Race" a good main floor attraction that showed the US vs. USSR manned space race with a combination of US and Soviet artifacts. I spent the remainder of my time in the Hall of Flight, mainly examining the construction details of the Wright Flyer. This is THE original airplane, folks, having undergone only one restoration, mainly of the fabric covering back about 4-5 years ago. I looked at the wood joints quite extensively, noting the various metal reinforcements, and the carefully steamed curved pieces. The Flyer is an exquisite piece of turn of the century workmanship.

All too soon the time came to leave. I regretted having to do that without seeing the Star Wars exhibit, and the newest movie, but so it goes. I'll try to return the Board meeting next year to DC and do the whole thing over again! If you're even in DC, don't miss the treasures of the NASM.

FAA Licenses Third Commercial Spaceport

WASHINGTON -- The Federal Aviation Administration (FAA) has issued a space launch site operator's license to the Virginia Commercial Space Flight Authority to operate a commercial spaceport at NASA's Wallops Flight Facility (WFF) at Wallops Island, Va.

"The approval of this new spaceport demonstrates the dynamic and growing state of the commercial space industry," said FAA Acting Associate Administrator for Commercial Space Transportation Patricia Grace Smith. "The FAA intends to work with these facilities and the entire industry to make sure the U.S. commercial space industry is the safest in the world."

Virginia joins California and Florida as states with commercially or state operated space launch facilities. The FAA previously issued commercial space launch site operator's licenses for spaceports on leased property at Vandenberg Air Force Base, Calif., and Cape Canaveral Air Station, Fla. The Virginia facility will operate under a similar arrangement with NASA.

Like its two predecessors, the Virginia Space Flight Center will focus on small to medium rockets up to the Athena III and Taurus XL class of vehicles used primarily to launch low earth orbit (LEO) communications satellites. LEO satellites orbit at altitudes between 100 miles and a distance required for geostationary orbits of 22,300 miles. Demand for that type of launch is increasing as a number of firms are competing to establish constellations of LEO satellites providing global mobile communications systems.

The facility will consist of two launch pads, one currently operational and the other under construction, a payload processing and integration building and a launch operator office building. The Virginia Commercial Space Flight Authority is anticipating a first launch in the spring of 1999.

Quest Superbird: Mini Kit Review
by Bunny

I got to build the Quest Superbird as my contribution to the Quest kit build up for the East Coast Hobby Show. The bird is a completely straightforward Skill Level 1 model, and it frankly just sort of fell together right out of the bag. The instructions are complete, full of illustrations and spot on. Even the completely rank beginner will have no problem building the model. I changed only one item, and that was to add some extra elastic cord to that supplied in the kit. When done, the kit supplied shock cord only had about 8-10" sticking out the front of the tube. That looked a bit short to me. I used Elmer's Carpenters Glue throughout the construction.

I applied one coat of Elmer's Professional Wood Filler to the fins and tube, and sanded with 240 before hitting the model with some Krylon Ruddy Brown primer. A sanding with 400 grit was followed by Krylon Gloss White, with a Glossy Red payload section. The decals supplied are of the opaque sticky backed variety; they went on with no effort, though I took a Monokote iron to the "Superbird" name decal just to make it stick better.

Your result for about 3 hours work, including finishing, is a 31" tall model that should fly nicely on the recommended B and C motors, perfect for demos and certain to insure you have at least one successful flight at any launch. Hats off to Quest for a nice beginner's effort.

Mini-Building Session Report
from Bob Kaplow

On January 18th NIRA held its first building session and launch of the new year. My basement survived, but it looks like I need an even bigger one to hold the two dozen plus folks who stopped by.

Among the activities: the NAR President was seen building a sound recorder with the help of Ric Gaff. Steve Smith worked on his EZI-65. Pierre Miller worked on an even bigger Atlas for NARAM. Al Rognlie built an Astron Mike glider (and dropped one of for me - thanks Mike), while the rest of the WOOSH gang browsed thru my rocket collections. Rick Kramer and Bill Thiel built NCR kits (they split a LOC tube to replace the stock tube. I don't recall it mentioned, but you have to slightly ream the centering rings to fit this tube). The Guzik's worked on a Launch Pad Nike Ajax and a LOC Aura. Norm Heyen used my drill press and circle cuter to turn a sheet of plywood into swiss cheese. Bob Wiersbe helped his son Chris build an X-ray, Tom Pastrick built yet another Flat Cat, and Jonathan Charbonneau worked on his NCR Bomarc.

We took a break out to the back yard for a mini launch. 6" of snow and single digit wind chills don't stop NIRA. Here's what was flown:

Steve Smith - America, A8-5 (from a blue tube from my collection dated 8/20/69! complete with astron igniter)
Bob Kaplow - Invader, A10-3T
Bill & Ed Thiel - 4fnc ?
Al Rognlie - helicopter that landed on my garage roof (rescued), Intruder?
Chris Wiersbe - X-Ray, 1/2A3-4T

[Thanks for opening up your home to us, Bob! Next issue - a report from the February Building session in the basement of Pete Olivola's home.]

Steve Smith looks over Joe Nowak's shoulder to see Joe's new "Mercury-Redstone in a Cup". (R. Gaff photo)

NIRA's new VP gets in the first flight of 1998, proving once again that NIRA officers can fly rockets. (R. Gaff photo)

Rachel Kaplow with her cookie, Coke, and most importantly, her rocket. (R. Gaff photo)

Bob Kaplow gives Norm Heyen advice on how to keep all of his fingers while working with the drill press. Norm was seen making lots of strange circles. (R. Gaff photo)

An Introduction to Hybrids
by Jonathan Charbonneau

[Editors Note: This is Part 6 of Jonathan's "Confused Stages" series"]

You probably have heard about hybrid engines. What's a hybrid? The hybrid engine is so named because its propellant is part solid and part liquid. Here's a little history of model rocket engines. In the late fifties, all model rocket engines were made with black powder propellant. Black powder consists of sulfur, potassium nitrate and charcoal. In the late 70's/ early 80's composite engines were introduced. Composite propellant is made up of ammonium perchlorate, aluminum powder and a rubber like binding agent. It has more than twice the power of an equal amount of black powder, which is why a composite "D" engine is the same size as a black powder "C" engine. In the mid 90's, the hybrid engine was introduced for High Power Rockets by two different companies, Aerotech and Hypertek. The hybrid engine uses nitrous oxide (also known as "Laughing Gas") for the oxidizer, and either a plastic (Hypertek) or cellulose (Aerotech) fuel pellet.

The hybrid engine is the newest and most advanced of all sport rocket engines. Its advantages include: Efficiency that is comparable to liquid fueled engines; low cost per flight; no LEUP required to purchase, own, or use; and since the fuel and oxidizer aren't mixed until launch, they're virtually non-flammable in storage.

The Hypertek hybrid consists of a nitrous oxide (N_20) flight bottle, an injector bell, interchangeable injector orifices, and a single use fuel grain with a built in nozzle. Assembly of the Hypertek hybrid is fast and easy. An injector orifice is selected and put into the injector bell; the N_20 flight bottle is screwed on; the fuel grain is screwed on. The N_20 isn't loaded until the rocket is on the pad. The other plus is its non-pyrotechnic ignition system. No igniter to fuss with. Turn around time is quick too. Just change the fuel grain, replace the ejection charge on the electronic recovery device and reset.

The Hypertek Hybrid

Hypertek hybrids aren't without drawbacks. For starters, the special ignition system it requires is very expensive to own and not currently available at all HPR launches. Second, a whole supply bottle of N_20 must be carted to the launch site, along with a bottle of oxygen, whether many flights or just one flight is planned. Third, once the N_20 is laded, it's a "use it, or lose it" proposition. If the flight is aborted during countdown, the N_20 is the flight bottle will be lost. It cannot be saved. Also, until the rocket is launched, the valve on the N_20 supply bottle cannot be shut off. Consequently, the amount of N_20 used in one flight is somewhat more than the amount that is actually in the flight bottle at launch. The bottom line is, it's an N_20 guzzler.The Hypertek hybrid can be clustered, but each engine requires its own N_20 supply and oxygen bottle. Because of the additional oxygen supply required for ignition, Hypertek hybrids cannot be airstarted.

The Aerotech RMS Hybrid has a more complex construction and therefore takes longer to prep. First the pyrovalve and associated parts must be assembled into the injector/forward closure.


The Aerotech RMS Hybrid

Then the liner, fuel grain(s), "O" rings and nozzle must be assembled into the casing. The end closures are screwed on; igniter installed; finally, the loaded N_20 flight bottle is screwed on. It is very important to use the right grease in each step. Krytox grease is used in some steps; petrolatum in other steps. They cannot be used as a substitute for each other. Doing so will cause a failure. Don't be scared, however. Just read and follow the instructions carefully and you'll do fine. The hardware for the Aerotech RMS Hybrid is more expensive than the hardware for the Hypertek Hybrid. This sums up the cons of the Aerotech RMS Hybrid.

On to the pros. The N_20 flight bottle is filled before being screwed onto the injector because of the valve system on the bottle. And the Aerotech RMS Hybrid is ignited in the same way as a regular solid engine; same igniter, same ignition system. Result: If doing just one flight, it isn't necessary to lug a whole supply bottle of N_20 to the flying field. If the flight must be aborted, the N_20 in the flight bottle isn't lost. It can be saved for a later launch day. Last, but not least, Aerotech RMS Hybrids can be clustered and airstarted easily.

Which is better? That's up to you to decide. Each brand of hybrid has its attributes. Personally, I prefer the Aerotech RMS Hybrid by a super scale. Someday I'll be flying my 7.6" diameter, 10' tall Standard Arm on a cluster of five hybrids.

RMS/Hybrid Hardware Data

ITEM	PRICE
54mm RMS/Hybrid Upgrade Pack	$199.95
54mm RMS/Hybrid Motor Complete	$294.95
54mm Forward Closure with Injector Plate	$81.95
150 cc Nitrous Flight Cylinder	$110.95
300 cc Nitrous Flight Cylinder	$114.95
440 cc Nitrous Flight Cylinder	$118.95
Flight Cylinder Filling Adapter	$59.95
KRYTOX N2O-Safe Grease	$23.95
Ignitor Spare Parts Kit	$6.95

Reload Kit Designation	Total Impulse (N-s)	Price
J145H	880	$26.50
J170H	790	$26.50
J210H	850	$26.50
J260HW (EFX)	1150	$34.95

Hypertek Hybrid Data

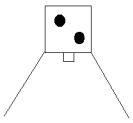
ITEM	PRICE
Complete 54mm Hypertek Hybrid Motor System	$139.95
Complete 54mm Hypertek Hybrid Motor System with 5 Fuel Grains	$269.95
1 - "J" Power Fuel Grain	$28.50
5 - "J" Power Fuel Grains	$135.00
Hammerhead 800cc System	$169.95

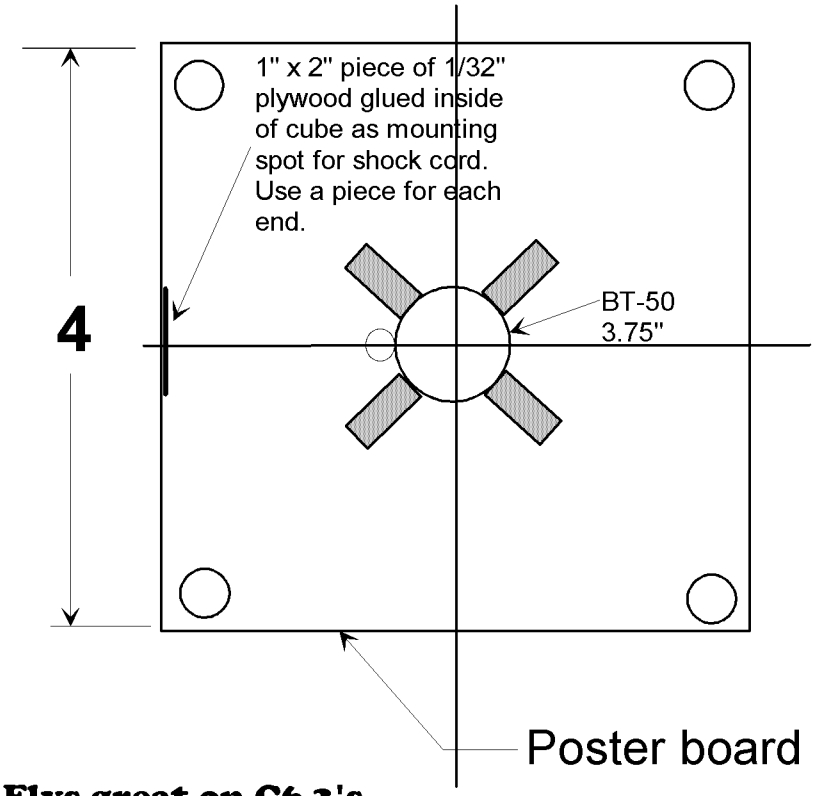
TMT Designation	Orifice	Burn Time	Impulse
J100	.076"	6.7 sec	683 ns
J125	.086"	6.0 sec	743 ns
J145	.098"	5.1 sec	743 ns
J185	.110"	3.6 sec	690 ns
J205	.125"	3.3 sec	684 ns

CUBIX

A SILLY CUBE SHAPED ROCKET FOR ALL SEASONS

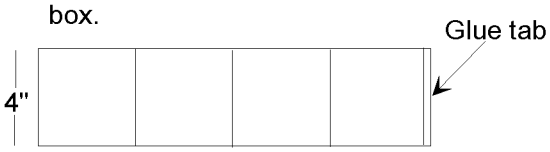
By Richard Gaff
NAR 22906



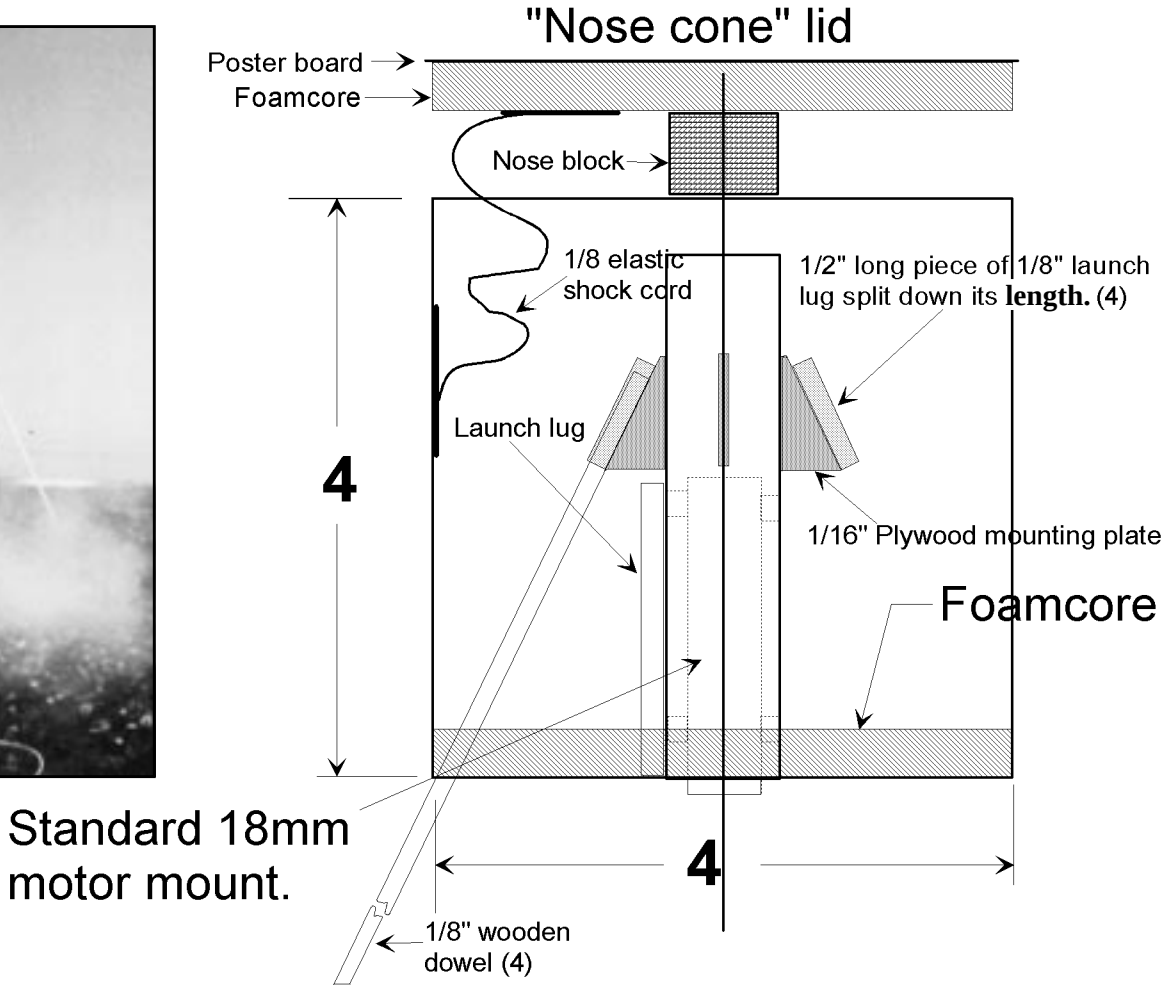


Flys great on C6-3's

Single piece of poster board folded on the lines to form a box.



4"
plus thickness of posterboard



So you think you are ready for High Power?- Part 2

by Norm Heyen

OK, several weeks have passed, and you have already un-boxed your latest toy, err, project. I'm assuming you picked something like a LOC EZI-65. Cardboard body tube and plywood fins, not the PML kit with phenolic tubing and fiberglass fins. What did you see when you opened the kit? A big nose cone, a huge length of body tube, some big fins, a motor mount tube that is as big as the body tube of most of your rockets and some other king-sized parts you kind of recognize. Yeup, you've got a high power kit. I remember wondering why I got two Mosquito body tubes in this kit. Then I figured out these were the launch lugs. And realized the parachute weighed more than most of my other rockets. I was clearly in for something new. Then I looked for the directions. Directions? What directions? The LOC kit had nothing but a few general concepts printed on the back of the package card. Now what?

The nose cone, payload section, and bulkhead for a LOC EZI-65. (R. Wiersbe photo)

After looking at the size of the fins and the spirals in the body tube, its obvious that model rocket techniques just aren't going to cut it. I'm sure that you could fill the fins with balsa sealer, but I think you would like to fly this sometime in the foreseeable future. A stop at the local hardware store is in order. Pick up some Elmer's Fill-n-Finish, comes in a white tub with an orange top. Look in the same aisle as the wood fillers and stuff like that. Pick up some 150 and 200 grit sandpaper. If you have a 1/4 sheet palm sander, your life will be easier. You'll also need a set of measuring spoons from the bakery aisle, a bottle of rubbing alcohol and some bar-b-que skewers. And some auto body filler, the red stuff in the tube. You'll see, just wait.

OK, test fit all the parts and get an idea of just how things are going to fit together. Remember that extra centering ring you ordered with the kit? You did order it didn't you? Is there an 'eye-bolt' and hardware for it? Quick-links? Another trip to the hardware store. You'll get used to it. Test the quick-link with the eye-bolt to make sure they fit with each other. Use fender washers whenever you need to put a bolt through plywood. The third ring is used at the top of the motor mount tube. The other two are going to butt against the fin tabs so that you can get lots of glue and fillet surfaces. So far, nothing is attached yet.

Mix up a bit of epoxy and glue one centering ring to the motor mount tube (MMT), about 1/2" down from the top. If one of the rings has a hole in it, use that one. It is for the eye-bolt. Put a fender washer on the eye-bolt, slip the eye-bolt through the hole, add another fender washer. Apply a dot or two of epoxy under each fender washer. Screw a nut on the shaft and tighten. Screw a second nut, a jam nut, down near the first. Add a dot of epoxy to the threads and tighten the second nut. Apply a fillet of epoxy around the MMT to make sure the centering ring won't be pulled off. Set this aside to cure.

The next step is filling in that big huge spiral in the body tube and the grain in the fins. It is a lot easier to do this before attaching the fins to the body tube. Remember the 'Fill-N-Finish' you picked up? Well, now is the time. This stuff is water soluble and non-toxic, and doesn't even smell. Airfoil the fins first. Start with the 150 grit sandpaper, Round the leading edges, taper the trailing edges and flat sand the rest of the edges. Use a small brush, about 1/4" wide or so. Stir it up well, it has a tendency to separate a little. Add about a teaspoon into an old dish. It is too thick to use right now. I usually mix about an equal amount of water to it and stir well. It should be thin enough to easily brush on. Brush on the stuff along the seam of the tube. Keep it in the spiral, 'cause most of it gets sanded off anyway, and no sense in making more work for yourself than necessary. If this brushed on easily without a bunch of lumps, mix up some more and do the fins. Paint the fins with the filler, do both sides. Don't get any on where the epoxy will be applied, you need the epoxy to get into the wood grain, so leave a clear area about 1/4" wide along where the fin root will sit on the body tube. Set the fins aside to dry, usually a couple of hours, depending on the humidity. After drying, use the 150 grit sandpaper to remove the majority of the filler on both the tube and fins. This should fill in most of the low spots. Then apply another coat, and let it dry. Sand off the humps and use the 220 grit to do final sanding. Take extra care to sand away as much of the filler near the area where the fin fillets will be. The amazing thing about the filler is that it cleans up with water, easily. But the sanding makes a mess of fine powder.

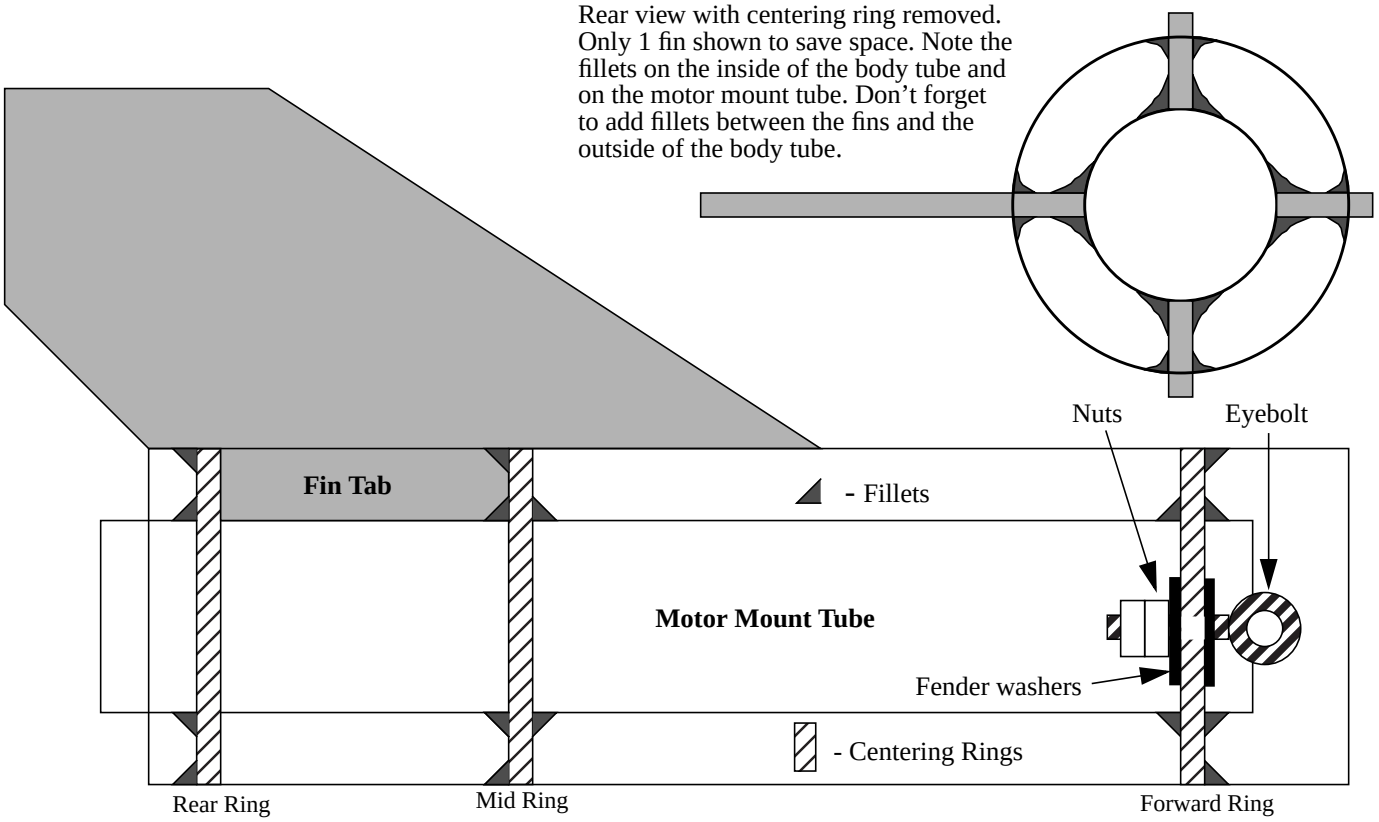
Check the nose cone. Remove any flash and excess plastic. Use the body putty to fill in low spots. This stuff works best if you squeeze it into the spot, then use a flexible piece of plastic, like a piece cut from an ice cream bucket. Use this to spread the body putty fairly smooth. Since you are working with plastic, use 'Wet or Dry' sandpaper, like about 240 or 320 grit. In thin layers, this stuff dries pretty quickly. Use plenty of water to help keep the sandpaper free of clogging. After a couple of applications, the nose should be nice and smooth and any low spots should be filled. Go over the whole thing with some 320 sandpaper to remove the mold release compound and give the surface a 'tooth' for the paint to adhere to.

OK, so far, nothing too tough, but a bit of work and a mess. So, let's get the centering rings mounted in the correct spot and get ready to mount the fins. The idea is to create a forward ring that the fins will mount tightly against. You get lots of fillets and gluing surfaces. Slide the MMT into the body tube. Position the tail end of the MMT flush with the tail of the body tube, unless the manufacturer recommends otherwise. Measure from the tail end of the MMT to the forward edge of the fin slot. This is where the rear edge of the centering ring will be mounted. Mark this on the MMT and epoxy it on. Try to get no epoxy on the MMT below the ring (towards the tail end) as it will get in the way of the fins and you'll have to work around it later. You want the fin tabs to lay flat on the MMT, any epoxy bumps will have to be removed. After this is all set, you are ready to mount the MMT into the body tube. Test fit it first and sand, sand, sand until it smoothly slides together. There is going to be a lot of surface area, so it needs to slide together pretty easily. Slide the MMT into the body tube from the fin end, get the upper centering ring past the fin slots. [Note: make sure you will be able to attach the shock cord to the eye-bolt after the motor mount is in place. If you can't attach it from the open end of the body tube, attach it now and run the shock cord through the body tube as you insert the motor mount]. Spread a good layer of epoxy as deep into the body tube as you can get (try not to get it on the shock cord!). This is where the top centering ring is going to be attached to the body tube. Spread another ring of epoxy just ahead of the fin tab slots. (Remember those bamboo Bar-B-Que skewers? Use one here.) Slide the MMT into place. Stand the tubes up-right and let set. If you are really paranoid, cut about an inch off of a coupler. Put a bead of epoxy ahead of the centering ring and slide this 1" piece of coupler against the centering ring. This will prevent the centering ring from ever pulling out.

While the epoxy is curing, drill a small (1/16" diameter) hole in the section of the body tube between top of the centering ring and the base of the installed nose cone. There are two reasons. First, the rocket gets very airtight and with the motor installed, you will not be able to easily install the nose cone. The trapped air will compress instead of venting. Secondly, if you do get it installed tightly, there is a good chance of the nose cone popping off during flight. As the rocket gains altitude, the ambient air pressure drops off but the captured air stays at ground level pressure. If you get high enough it is likely that the nose cone will pop off at some point. A small vent hole prevents these two problems.

In the remaining centering ring, mount two 'T-nuts'. You may need to lightly hammer them into the centering ring. They should be located as close to the MMT hole as possible. Fill the threaded hole in the 'T-nuts' with Vasoline. Spread a little epoxy around the 'T-nuts' to help secure them. The Vasoline will keep the epoxy from getting into the threads. Set this aside to cure. These will be used to mount the 'Kaplow Clips' engine retainer system. Oh, use 6-32 'T-nuts'. Leave the holes filled.

Now is the time to start mounting the fins. Again, test fit them. They should mount tightly against the MMT and the body tube. Sand until everything fits well. You will apply epoxy along the MMT, the forward centering ring and the inside of the body tube fin slots. And then fillets at



all these joints. These fins are not going anywhere. Everything fit OK? Apply the epoxy and set the fins in place. You might want to refer to the series in *Sport Rocketry* called 'The New Mexico Rocket Workshop' by Norm Taylor. He talks about cutting a piece of cardboard with a hole that slides over the body tube and has slots cut to align and hold the fins in place while the epoxy sets. This will ensure the fins are perfectly aligned. Stand the rocket nose down until the epoxy cures. Apply fillets to the inside of all these surfaces. You might need to lay the rocket horizontally and do just two sets of fillets at a time to keep the epoxy from running. After this is finished, it is time to mount the last, rear centering ring. Apply a bead of epoxy around the body tube, add epoxy to the fin tabs where the ring will fit. Apply a fair amount of epoxy in the fillets along the MMT. You want this to run down and help create a fillet on the inside. Put a bit of masking tape over the 'T-nuts' to keep the epoxy out of where it doesn't belong. Slide the ring into place, the flanges go on the inside, make sure the 'T-nuts' are clear of the fin tabs. Stand the rocket up, fins down and let the epoxy set. Hey! It's beginning to look like a rocket! Just one last thing and we are done with the fins. Apply fillets to the external fin/body tube joints. Do these two at a time. Lay the rocket horizontally and do the two fillets that are 'up', to keep the epoxy from running. Once you are done with all these fillets, they will stay there. (A note about making these fillets smooth. Always were plastic gloves when handling epoxy. Dip your gloved finger in some rubbing alcohol and rub the joint until nice and smooth. Beats sanding. This is also an easy way to get epoxy off surfaces where it doesn't belong.)

Tie a quick link to each end of the shock cord. Attach one end to the eye-bolt and the other to the nose cone. You may have to do this before you epoxy the motor mount in place, depending on the diameter of your kit and the length of your arm. Depending on your kit, the mounting for the nose cone may need to be modified. I just don't feel comfortable with the milk cap or attaching to the little plastic loop molded in. I cut a small opening big enough for a wrench, about 1" wide and 1/2" tall. Put a screw eye into the hole at the base of the nose cone, add washers as possible and a nut to the screw part. This is a little tricky, getting the nut started on the screw portion, Use the wrench to help you out and hold it tight while you screw it in place. This provides a secure way to attach the nose to the rest of the rocket. Attach the parachute and the other end of the shock cord to the screw eye. Pack everything into the body tube and slip the nose into place.

Attach the launch lugs. They should mount along one fin root and about 1/3 the distance down from the top of the main body tube (not on the payload section, if your rocket has one). Just make sure they are lined up and straight, mark the tube and epoxy liberally. A fillet will help make things neat. To toughen up the parts that will get banged up, soak the end of the MMT and body tube with thin CA glue.

All done now except for the 'Kaplow Clips'. Pick up some brass strip stock, about 3/8" wide and 0.060" thick. Mount the motor in the MMT. Cut two pieces of brass about 2" longer than the distance from the centering ring to the end of the motor. Drill a hole in one end of each to fit the 6-32 machine bolt. Put a 90 degree about 3/8" from the end, so that the brass strip will be able to fit along the MMT. Mark where the end of the motor is. Put another 90 degree bend there. Cut the strip about 1/2" longer than the mark. The clip will fit inside the lip of the RMS casing and be bolted to the centering ring, retaining the motor at ejection. Machine or cap screws are recommended because the hex wrench will make it a lot easier to install and remove. Again, refer to the Sport Rocketry article for more details, or just ask someone to show you at a meeting.

This is what the motor mount will look like before you epoxy it in place. Note that this one uses a different style of shock chord mount than described in the text. The centering ring on the left is the rear ring, and is epoxied in place after fillets have been made inside the body tube. (R. Wiersbe photo)

Finish the rocket as you desire. I use automotive paints when I have them, otherwise Krylon works well enough for me. Use whatever you feel comfortable with.

News from Al's Hobby

Aerotech news: In March there will be a small price increase on their products. The increase was mostly on the smaller hobby motors and supplies. Most of the rocket kits went up slightly too. There is no price increase on Restricted Access motors. On to the good news, Aerotech also will be releasing "MONSTER" 4 inch kits this year. They also have NEW Black-Max Econojets in "F" & "G" sizes, to be released.

The really big news from them is the release of the new J390HW Turbo! It's to retail for $49.95.

Specifications:

Hardware requirements: Current Hybrid motor hardware.
Diameter: 54mm(2.125)
Over All Length:27.9"
Hardware Weight: 902 g (1.99lb)
Loaded Motor Weight: 1,740g (3.84lb)
Total Impulse (Max.): 1,280 N-sec
LEUP Requirement: None

PML has also released a price restructuring. Many of their kits prices have changed. Most have gone up a little, BUT a few have come down! They also have released a couple of new kits. The Pterodactyl Jr., a nice 4" kit, reasonably priced at $77.95. The Stratus A.B.R.D. is a minimum diameter 38mm rocket similar to the Cirrus Dart. The main difference of this rocket is the rear deployment of the parachute. This REQUIRES the Adept ALTS25 altimeter. No other altimeter will work.

PML has also released the CPR-2000 retro-fit kits. These, along with the regular CPR kits will also only take the ALTS25. The new KS-KIT-2000, is the new version of the kwik switch, the adapter actually has threads and screws in. I've never had a problem with my older style, however I have heard a few complaints. This does look good though.

NEW From BMS!

In addition to the 12 Estes style cones we have carried for the past few years we have now added over 25 more. Below is just a partial list of the new cones. If you place an order for stock cones alone of any quantity (12 cone assortment included) shipping will be limited to $2.50 per order.

Our standard 4 page catalog is available at:

http://user.mc.net/~bms

Bill & Mary Ann Saindon
Balsa Machining Service
11995 Hillcrest Drive
Lemont, IL 60439

Part#	Description	Fits	Length	Price
BMS50HJ	Honest John	BT50	6.25	$2.75
BMS60V2B	V2 Boat-tail with bored BT20 holes	BT60	3.50	$3.25
BNC20P	Spaceman	BT20	1.30	$1.25
BNC50AD	Honest John - original Estes version	BT50	4.00	$2.50
BNC50X	Sprint	BT50	3.30	$1.77
BNC52G	Thor-Agena B nose cone	1.01	1.35	$2.50
BNC55F	V2 nose cone	BT55	4.20	$2.50
BNC60AB	Gemini Titan - Estes	BT60	2.34	$3.50
MARSLNDR	Mars Lander	BT60		$2.35
TA5260C	Thor-Agena B transition	BT50	3.75	$7.70
BTC55Z	V2 Boat-tail with bored BT20 hole	BT55	3.00	$2.95
BNC60MS	Big Bertha	BT60	2.50	$1.89
BNC55AO	Goblin	BT55	5.00	$2.50
BNC10A	Streak	BT10	0.80	$1.28
BNC30D	Scout, Sprite	BT30	1.45	$1.28
BOMARC	Estes Citation BOMARC	BT55	4.15	$3.50
BMSV2BT1	V2 Boat-tail with bored BT60 hole	BT60	3.65	$3.75
BMS60V2C	V2 cone with 4" deep bored hole	BT60	5.25	$3.50
BMS50V2B	V2 Boat-tail with bored BT5 hole	BT50	2.20	$2.50
BMS50V2C	V2 cone with bored hole	BT50	3.10	$2.25

Other Midwest Area Launches

National Events:			
Date	Location	Event	Contact
Mar. 27-29	Champaign, IL	NARCON-98	Greg Smith, email gd-smith@uiuc.edu
May 15-17	Muncie, IN	NSL-98	Ned Blumenschein, email 102170.3164@compuserve.com or call (219)749-0006
Aug. 8-14	Muncie, IN	NARAM-40	Glenn Feveryear, 717-456-5570 or email Feveryear@cyberia.com
Other:			
May 30-31	Burlington, WI (Bong Rec. Area)	14AL98	Dan Wolf, (414)328-5193 or email 73165.1463@CompuServe.COM
Oct. 10-11	Burlington, WI (Bong Rec. Area)	MWRC 98	Dan Wolf, (414)328-5193 or email 73165.1463@CompuServe.COM Sport Launches:
July 18	Burlington, WI (Bong Rec. Area)	Eat Cheese Or Fly 98	Steve Koszuta, (414)481-6341, email skoszuta@execpc.com or Dan Wolf, (414)328-5193 or email 73165.1463@CompuServe.COM

Heard on the Street (with apologies to the Wall Street Journal)

Welcome to the Club! - Norman Dziedzic, Jr., Yvonne Jagodzinski, Tim Johnson, Matthew D. B. Krueger, Matthew H. Krueger, Sean Lannan, William Leddin, Bill Miller, Steve Miller, Steve Piette, Carl Riley, Brian Roehl, Martin Schroder, Randall Schwebke, and Mike Wisvader have joined NIRA in recent months. Welcome!

Batting 1.000 - Orbital Sciences Corp.'s second Taurus rocket reached orbit on February 10, making two successes on two attempts for Taurus. This Taurus also uses a new, larger, payload fairing for its multiple satellite payload. The main payload was the Geosat Follow-On (GFO), built for the US Navy. The original Geosat was a larger research satellite launched in 1985 on an Atlas, and provided sea surface height information, allowing USN ships to avoid strong head-on currents. The new version is greatly improved, and utilizes GPS to determine and adjust its orbit.

Is It Crowded Up There? - Immediately after Endeavour undocked from the MIR space station, a replacement crew roared aloft out of Baykonur. After Soyuz TM-27 reached orbit and Endeavour undocked, there were 13 humans in space on three separate spacecraft, equalling a previous record for manned presence in space.

And You Think Your Project Is Late - A classified satellite for the National Reconnaissance Office (rumored name CAPRICORN) was put into elliptical 63 degree inclination orbit on January 29 by a Lockheed Martin Atlas IIA Centaur rocket. This rocket, AC-109, was launched way out of production sequence and it seems likely launch of the payload is several years late. Current Atlas-Centaur launch numbers run in the 120-130 range. The satellite may be a follow-on to the SDS communications data relay satellites used to pass on spy satellite imaging data, and may also have either infrared missile warning or signals intelligence secondary payloads aboard.

Ah, So! - Japan's largest launch vehicle, the H-II, suffered its first failure during launch of the Kakehashi satellite. The H-II was meant to deliver COMETS and its attached LAPS transfer engine into geostationary transfer orbit with 35000 km apogee. But orbital tracking data indicate a much lower 250 x 1883 km x 30.0 deg orbit. This was reportedly due to premature shutdown 44s into the H-II second stage's second burn. While the satellite has successfully deployed its solar arrays and checked out its onboard systems, it isn't certain that the apogee kick motor on board is sufficient to deliver the payload to a useful alternate orbit. NASDA have run into a lot of trouble recently, also suffering the failure of ADEOS satellite and problems in their engine development program.

Electronically Connected? - Send an email message to Bob Wiersbe (wiersbe@lucent.com) to be added to the growing NIRA member email list. Also, check out these web sites:

NIRA Home Page - http://ourworld.compuserve.com/homepages/Mark_Bundick/

NAR Home Page - http://www.nar.org/

Rocketry OnLine, the ultimate rocketry related web site - http://www.rocketryonline.com

NAR S&T New Motor Certifications

R44 - The following motors have been certified by NAR Standards & Testing as of July 6, 1997 for general use as model rocket motors. They are certified for contest use effective September 4, 1997.

The following are Aerotech reloadable motors, certified only with the indicated size casings and manufacturer supplied nozzles, end closures, delays, and propellant slugs.

Aerotech: 29mm x 99mm RMS29-60 Casing: F37-6, 10, 14 (50 Newton-seconds total impulse, 28.2 grams propellant mass)

29mm x 124mm RMS29-100 Casing: G54-6, 10, 14 (85 Newton-seconds total impulse, 46.0 grams propellant mass)

R45 - NAR Standards and Testing has certified a new "Fast White Lightning" (FWL) propellant formulation for Aerotech F50 and G80 motors. This certification is in addition to the original, existing certification of these motors using the "Blue Thunder" propellant formulation. Certification values for total impulse and delays remain the same.

These motors have been certified as of December 15, 1997 for general use as model rocket motors. They are certified for contest use effective February 13, 1998.

Jim Cook, Secretary for NAR Standards & Testing <JimCook@AOL.COM>

Jack Kane, Chairman

New NIRA Reprint Series Booklets
by Richard Gaff

Six new booklets have been added to the reprint series this issue bringing the count to 47 available booklets.

Available after the November NIRA meeting:

Thiokol Rocket Basics. File downloaded from the Thiokol Corp. web site present a brief history of rockets and a long description of how a rocket functions. 27 pages

Ancient Rocket plans of Estes Industries from the 60's, 70's & 80's Vol. 4. Orbital Transport Laboratory, 2 versions of the lookdown Astrocam, Gigantiroc 2-A and the Saturnian.

Technical articles from Sport Rocketry, Vol.2 Dynamic Stability, Wind effects on MR flight, 3 articles on delayed staging, and 6 other technical articles.

Available after the December NIRA meeting:

Ancient Rocket plans of Estes Industries from the 60's, 70's & 80's Vol. 5. Tartar, Argus II, Nimbus, Newfoundland Space Tanker, Harpoon, The Lizard B/G.

Phantoms of space - The Secret Dead Russian Cosmonauts by James Oberg. A long article from the internet about the myth of secret dead cosmonauts written by one of the foremost authorities on the Soviet space program.

Frequently asked questions Mini Reprints:

FAQ #6) Model rocket Construction and finishing

FAQ mini reprints are excerpted from the internet newsgroup Rec.Models.Rockets:

NIRA's Scale Data reprint service:

Scale data published in Model Rocketry Magazine and Sport Rocketry magazine is now available from the NIRA reprint service. Data for over 30 rockets is available including the incredible Beach-Gassaway Little Joe II data. Just ask for a scale data reprint request form.

The Reprint editor recommends:

2) Science Fiction Rocket Plans from Sport Rocketry. Artoo-Detoo, X-Wing Fighter, mini Mars Lander and four other plans with a futuristic flavor.

16) Technical articles from American Spacemodeling et. al. Vol.1 Articles about design efficiency, elliptical fins, boat-tailing, CP calculations and 7 others. Most of these articles are concerned with building more efficient rockets.

18) High Power Rocketry - An Introduction. Nine articles from Sport Rocketry on High Power Rocketry. Includes plan for HPR model

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The reprint series is an effort to get interesting useful information out of the collections of "old timers" and into the hands of people who don't have access to the original material.

Sources for the reprint series include back issues of Model Rocketeer, American Sportmodeling, Sport Rocketry, Model Rocketry Mag. main stream magazines, rocket manufacturers and the Internet's Usenet rocket group Rec.Models.Rockets (R.M.R) just to name a few.

Reprint booklets are FREE to members at club functions. If you want them by mail simply send 52 cents in stamps or cash for EACH booklet you order. Or a large 9x12 self addressed stamped envelope (the SASE can be used for several at once, be sure to include the proper postage) to;

Richard Gaff
3175 Norwood Ct.
Streamwood, IL 60107
(630) 483-2468

Email: rickga@ix.netcom.com
or G12091@email.mot.com

A complete up to date list is also available in person, by mail or email.

Aha! I thought so!