THE LEADING EDGE

Newsletter of the Northern Illinois Rocketry Association, NAR Section #117

Volume 24, Number 1 January/February 2001

Club News

NIRA Elections – One of the most important parts of the January meeting (next to 'Model of the Month') is the election of club officers for the new year. Elected by unanimous acclamation, the 2000 officers are:

President – Rick Gaff
Vice President – Pierre Miller
Secretary/Treasurer – Ken Hutchinson
RSO – David Wallis

Rick Gaff and Ken Hutchinson were reelected unanimously in their unopposed races.

Adam Elliot challenged Pierre Miller (the incumbent) for the position of Vice President. There was a second vote because the first vote ended in a tie (with 2 write-in votes cast for Bob Wiersbe). Pierre squeaked by Adam on the second ballot.

David Wallis and Cole Arntzen both ran for the RSO position left open by the retirement of Bob Kaplow after several years of outstanding work in the position. In a close race between two qualified people, David won by a slight margin.

Rick, Pierre, Ken and Bob all deserve much praise for doing an outstanding job as club officers last year (and, in most cases, for several years). Kudos also go to Adam, David and Cole for volunteering to become club officials. Better luck next time Adam and Cole!

New Committees – Two new committees were formed at the January meeting, One is the Launch Site Committee and the other is the Promotions/Membership/Outreach Committee.

The Launch Site Committee is chaired by Steve Piette and will work on finding a new launch site that NIRA can use for MRFF and other High-Power launches. Members who would like to be a part of the committee or who have a possible field location should contact Steve in person at a meeting or launch or through email at steve@simon.chi.il.us.

The Promotions/Membership/Outreach Committee is chaired by David Dornblaser. This committee's goal is to improve the information flow to potential members about NIRA as well as trying to improve the satisfaction of current members.

There have already been some preliminary discussions about this, but anyone who wants to join the committee or has a suggestion should contact David at daviddornblaser@earthlink.net.

Holiday Party – A big thanks to David Dornblaser for hosting NIRA's Holiday Party in December. It was a great event - everyone who attended had a great time.

MRFF 2001 – The Midwest Regional Fun Fly is NIRA's big launch of the year with people attending from several states (including California a couple of times).

Steve Piette will be heading up MRFF again this year after a fantastic job last year. It is tentatively set for June 16th and 17th at Bong State Park in Wisconsin, but better sites are being sought.

Range Store – Martin Maney is now running NIRA's 'Range Store,' freeing up a bit of space in Bob Kaplow's basement. Deliveries can be made to NIRA meetings and launches.

The range store mainly contains an assortment of tubes and components bought when the club made group buys from various manufacturers.

An up-to-date list of the store's stock should be published in the next newsletter, but if you have a need before then (say, for a building session) check with Martin to see if what you want is in stock. His email address is: maney@pobox.com.

Launch Pads – At the February meeting, NIRA voted to buy 2 Quad-Pod launch pads from Jeff Pleimling. Jeff had bought a set of 3 pads through RocketVision's going-out-of-business auction on eBay and offered the two 'extras' to the club. These pads will be used at the large club launchs (MRFF & WTGG) where the club supplies high power pads.

Late Newsletter – I apologize for this newsletter being later then normal – several work and personal issues conspired to take most of my time.

The next newsletter should be out around the March building session.

Winter Building Sessions

These are informal session to build rockets, talk rocket, look at rockets, or just hang out. Bring your favorite snacks or soft drink and a rocket to build.

Both building session will start at 1:00 pm and end about 5:00 pm.

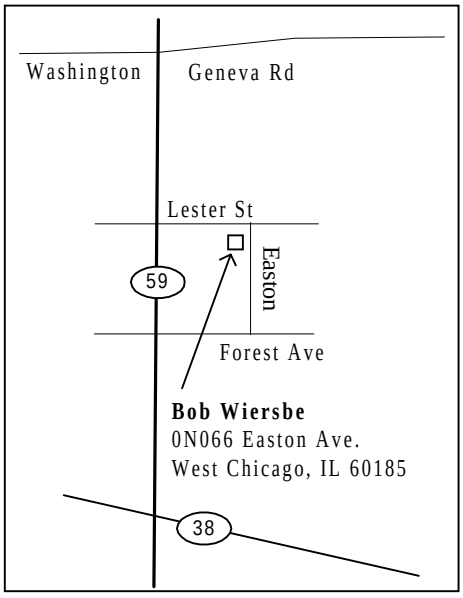
February Building Session
Bob Wiersbe
0N066 Easton Ave.
West Chicago, IL 60185

Bob Wiersbe has volunteered to host a building session at his home in West Chicago on the southwest corner of Lester and Easton.

Please only park along the **west** side of Easton, or along the **south** side of Lester (the sides that border his property).

March Building Session
Norm Dziedzic
125 Prairie Ave
Park Ridge, IL 60565

*(**Building Sessions** continued on page 11)*



Map to February's building session at Bob Wiersbe's house.

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THE LEADING EDGE is published bimonthly by and for members of the Northern Illinois Rocketry Association (NIRA), NAR Section #117, and is dedicated to the idea that Sport Rocketry is FUN!

Articles, plans, photos, other newsletters, and news items of interest should be sent to:
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or emailed to leadingedge@pleimling.org
Photos will be returned, other material returned upon requested.

Send membership applications (dues: $6 per youth, $8 per adult, $12 per family, including a six issue subscription to the Leading Edge), non-member subscriptions ($10 per six issues), and change of address notification to:
Ken Hutchinson
82 Talcott Avenue
Crystal Lake, IL 60014-4541

NIRA's web site is at: http://nira.chicago.il.us/

CLUB MEETING DATES

All meetings start at 7:30 pm. Bring a model for 'Model of the Month.' We always need volunteers for pre-meeting lectures, contact Rick Gaff if you want to schedule a date. The location is the Glen Ellyn Civic Center, 535 Duane Street (usually the 3rd floor, but check the board in the lobby).

March 2

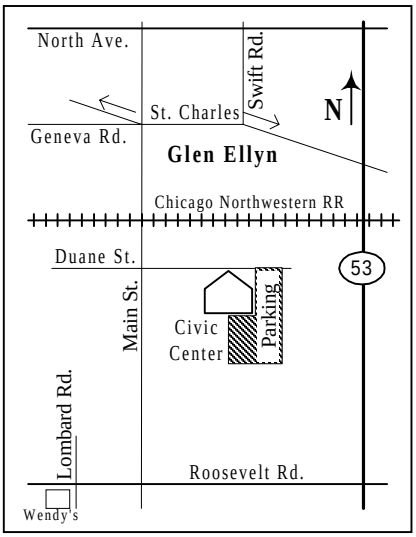
April 6

May 4

June 1

July 6

August 3



CLUB LAUNCH DATES

Launches are BYOL (bring your own launcher). The location for our launches is the Greene Valley Forest Preserve (see map at right). Call the NIRA infoline for pre-launch information: 630-483-2468.

February 18 – Building Session at Bob Wiersbe's (details/map on Page 1)

March 18 – Building Session at Norm Dziedzic's (details/map on Page 1 & 11)

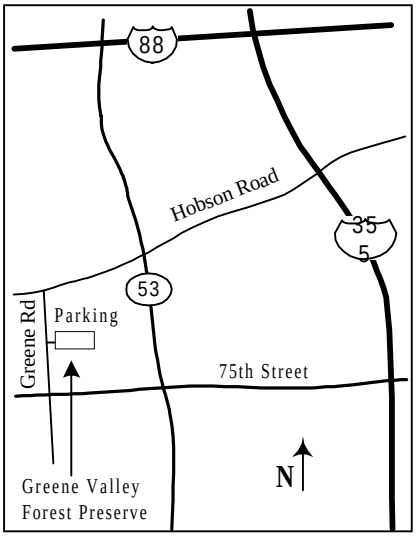
April 15 – Greene Valley Forest Preserve

May 13 – Youth Group Launch at Greene Valley

May 20 – Greene Valley Forest Preserve

June 16-17 – Midwest Regional Fun Fly

July 15 – Greene Valley Forest Preserve



Model of the Month Winners! (Rick Gaff photos)

December – .The youth winner was Veronica Hojek with her Goliath while Joseph Franck was the adult winner with his Purple Haze.

January – .Mark Soppet won the youth division with a rocket built for his physics class. Dave Ketchledge captured the Adult division with his Delta Clipper - a scratch built finless rocket that includes hundreds of hand-cut tiles (unfortunately not visible in the photo)

A High Power Primer - Certifying Level 1 in 2001

by David Dornblaser

High Power Rockets (HPR) are a lot of fun. If you have never flown a high power rocket or would like to see a high power launch, make 2001 the year to do so. There are regular launches that you can attend and/or attempt your first high power launch near Chicago. Tripoli Wisconsin Association (TWA) is an association of several Tripoli prefects and they hold monthly launches at Bong, Wisc. (www.geocities.com/capecanaveral/5280/). TWA welcomes both NAR and Tripoli fliers and model through high power rockets. If you would like to certify Level 1 at a TWA launch, it would be prudent to arrange ahead for NAR members to be there as the majority of fliers are going to be Tripoli members.

In addition to the Tripoli launches there is also NIRA's own MRFF launch on June 16 & 17 at Bong (or another location to be decided later). In addition, NIRA holds the Watch the Grass Grow high power launch, usually sometime in the fall in Harvard, Illinois. Lastly, the Wisconsin NAR group, Woosh (Wisconsin Organization of Spacemodeling Hobbyists) hold their Eat Cheese or Fly (ECOF) launch on the weekend of July 28 – 29th (www.Gamerz.net/woosh/).

If you are interested in trying high power you can take the plunge without purchasing a lot of new equipment or meeting a lot of requirements. You need to be 18 years of age or older and a member of either Tripoli or NAR. You will not need a BATF LEUP for Level 1 flights. Unlike the Greene Valley launches you do not need to bring your own launcher. The launchers are provided at high power launches. The only thing that you will need is a high power rocket and an appropriate motor. There are many high power rockets kits in the $45 - $90 range. Unlike mid power you will not be able to use a single use motor unless you have LEUP permit. If you are unsure of your continuining interest in high power, consider borrowing a motor casing from another flier for your certification attempt. Until you are certified you will not be able to purchase high power reloads. Happily, there is an exemption which allows you to purchase a reload at the launch site for the purpose of certifying and Al's Hobby Shop from Elmhurst sells reloads and rocket goodies at all the local high power launches.

If the altitudes that high power rockets can achieve has you a little nervous, consider this: The rockets and parachutes are larger and much easier to see in the sky than small model rockets are at lower altitudes. The flying fields and recovery areas of high power launches are correspondingly larger. Take along a pair of hiking boots and enjoy the fresh air as you stroll after your high power rocket.

Philosophy

Having a philosophy about High Power Rockets before you take the plunge may save you some time, effort and money. It can be as simple as: I just want to try it once. Unless you want to, you do not have the biggest and most expensive rocket. My philosophy on high power is simple: I fly 29 and 28 mm motors. Most of my rockets achieve an altitude of 1,500 – 3,000 feet. Most of my rockets are 2.56 to 3 inches in diameter and from 48 to 72 inches in length. Typically, I build a high power rocket once every two months. I usually take two rockets to a high power launch and make 1-3 flights.

My philosophy on high rockets evolved with trial and error. Although I have flown rockets well over 3,000 feet I tend to lose them the higher they fly. Flights under 3,000 feet mean that the rocket will never go out of sight. I limit my motors to 29 to 38 mm because I can achieve any altitude that is reasonable with those motors. Limiting the motors that I fly also allows me to be completely stocked with motors, casings and supplies. Once you fly 54 mm motors and above the cost of both the rocket and the reloads goes up dramatically. I like the 2.56 to 3 inch airframe size because I find that size easy to work with and, importantly, the rockets fit in my car. I do recommend 4 inch rockets for big I's or for certifying Level 2 with a J350.

High Power Rocket Selection

High Rocketry is different from large model rockets (LMR) or model rockets (MR). The total installed impulse DOUBLES with each increase in motor size. For example, if you are used to flying a D21T that motor has 20 ns of total impulse. A F72 or a F52T has 80 ns while a G64W or a G40W each have 120 ns of total impulse. Compare this with the Level 1 reloads: H motors have between 160.01 and 320.00 ns total installed impulse while I motors have between 320.01 and 640.00 ns total impulse.

Public Missile's Ariel and D-Region Tomahawk. (Public Missile photos)

The additional power of a high power rocket motor means that the selection and construction of the rocket is different than that of a model rocket. The certification flight is not the time to fly highly modified or scratch built rockets. There is plenty of time to design rockets after you are certified. As a general rule, select only a rocket kit whose manufacturer recommends that rocket for high power use.

The certification flight is not the place to learn about and use dual deployment for the first time. Electronics are great stuff for high power but are not required. It is best to keep the certification flight as simple as possible and stick to a rocket that uses motor ejection.

There are two ways to go about selecting your first high power rocket. The first way is to select a high power rocket that can also see duty as a mid power rocket. This is NOT the same thing as using a mid power rocket as a high power rocket. The second way to go is to select a rocket that is designed only for high power use.

There are a number of good kits that can see duty as both high power and mid power rockets. One kit that I fly frequently is Public Missiles' Callisto. The Callisto is a 2.125 inch diameter, 45 inch long rocket that flies 1,900 feet on a G40W and a relatively high 2,700 feet on an H128W. One of Public Missiles other rockets is the Black Brant that goes up 1,300 on a G and a more manageable 2,050 feet on an H128W. Vaughn Bros' Javelin is a 60 inch long, 2.56 inch diameter rocket that flies 1,360 on a G and 2,100 on an H128W. BSD makes the Sprint that will fly 2,600 on an H128W. The Sprint is also 2.56 in diameter and is 47 inches long. There are other options, but these rockets are examples of high power rockets which can be used as mid power rockets. All of these rockets use 29 mm motors.

The other option is to select a rocket designed specifically for high power. Examples are the Public Missiles' Ariel, which is a 3 inch diameter, 58 inches long rocket that goes 1,640 feet on a H123W, 2,034 feet on a H242T and 3,055 feet on an I161W. The Public Missiles' D-region Tomahawk goes 2,700 on an I161W. Rockets that are designed for high power use only usually have 38 mm motor mounts.

If you would like to keep the altitude very low you may want to consider using a four inch diameter rocket. I do not recommend modifying and using the LOC IV or NCR's Phantom for high power. Yes, those rockets have flown successfully in Level 1 certification flights but I think the flyer is better served to approach high power by getting into the high power mindset and building a rocket designed for high power. Public Missiles makes a four inch diameter

*(**A High Power Primer** continued on page 4)*

*(**A High Power Primer** continued from page 3)*
rocket suitable for Level 1 motors, the Tethys (1,400 feet on an H123W). Unfortunately, the Tethys is a relatively heavy rocket and is not suitable for use on mid power motors. If you goal is to build a large rocket, that is easy to track and does not go very high, the Tethys deserves your consideration.

If I had to choose one rocket to recommend for a Level 1 Certification Flight and as a future backbone of a high power flight it would be Public Missiles' Ariel. Locally, Al's Hobby Shop, 121 Addison, Elmhurst, IL, (630) 832-4908, carries a full line of high power rockets and motors at discounted prices. The Public Missiles website is: www.publicmissiles.com.

High Power Rocket Construction

The most important thing about a certification flight is to get certified. That may seem like a simplification but it is amazing how many fliers make the process overly complicated. To increase your likelihood of success, do not experiment with techniques.

High power rockets are in a lot of ways easier to build than model rockets. With slotted airframes and through the frame mounting of the fins to the motor tube, fin alignment is a snap (make sure any kit that you select has the fins mounted to the motor tube). Smooth airframes like quantum tubes and the larger size makes finishing less tedious than model rockets. The strong materials and construction techniques make high power rockets very durable, with any luck you will fly a rocket many times.

Although your hobby area probably has a lot of CA and wood glue sitting around, pick up some 15 or 30 minute epoxy. Epoxy will make the rocket strong and better able to withstand the rigors of high power flight. Yes, with some of the lower impulse H motors the other adhesives will work; but why take a chance when buidling the rocket the right way for high power requires no additional effort?

Once you have started your rocket do not be frugal with the epoxy. Make internal as well as external filets around the fins. Make sure that the motor tube and centering rings are well attached. In order for the epoxy to get a good grip, make sure that you sand the fins, tubes, etc. before applying the epoxy. Sanding is particularly important if you are using G10 fins or other components.

I do not recommend modifying level 1 certification rocket kits except in two areas: the first is the recovery system. If you kit comes with elastic shock cord replace it with either a Kevlar or Nylon non-elastic shock cord. If you have purchased a PML kit you should be aware that their piston system has a problem and that is that piston has a tendency to bind with their quantum tube airframes. This is particularly true in cold weather as the quantum tube contracts more than does the piston. An easy remedy is not to use the piston system and use a Nomex chute protector instead.

The second area where modification of a kit may be required is in the area of motor retention. Most kits do not come with a motor retainer at all. I use AeroPak retainers and love them (Sorry Bob). Kaplow Klips are a good option for a motor retainer and are far less expensive than AeroPaks (www.nira.chicago.il.us/Leading_Edge/MayJun00.pdf).

You should also consider adding Blacksky rail buttons to your rocket along with or instead of the launch lug provided by the manufacturer. TWA is going to be using 80-90% rails in 2001 and MRFF and ECOF will be rail enabled. Rails are a rapidly replacing launch rods at high power launches in the Chicago area.

A lot of high power rocket kits come with plywood fins. Plywood is certainly a familiar material to frequent fliers of mid power rockets. If you have not tried one yet, try a rocket with G10 fiberglass fins. G10 fins are very strong and durable, particularly, coupled with through the wall mounting to the motor tube. Vaughn Bros.' Javelin and all Public Missile's kits come with G10 fins.

Finally, a word on finishing: high power rockets are heavier than the model rockets that you are probably used to flying. As a result, when a high power rocket lands, gets bumped, or, crashes, it will more than likely get nicked. Spend time on a fabulous finish at your own risk.

High power rocketry is fun and if you haven't tried high power, make 2001 the year to do so. See you at the pads.

Press Release: Rocket Vision Shut-Down

December 21, 2000

From the Rocket Vision CEO....

It is with deep regret that I'm announcing the termination of Rocket Vision operations. I sincerely appreciate the support that our customers and the rocketry community have shown over the past two years.

We're leaving the industry in accordance with one of the clauses of our mission statement: "If we cannot produce quality products at a profit in a market, we will withdraw from that marketplace." We've worked hard to stay true to our credo. According to the overwhelming majority of the feedback we've received, we've done a good job in the area of quality, but we have not been able to become profitable.

Keep your eye out for further updates... We're negotiating with one of the most trusted names in the rocketry industry to keep alive the products you've come to trust and enjoy. I hope you'll give the new owners the same outstanding support you've given us over the years. We've done some good things, and will work hard to be sure your favorite products remain available.

Many of the Rocket Vision team plan to continue attending launches...

We'll see you on the range.

Ad Astra,

William E. Maness

PS. Operational details: All orders received by Rocket Vision will be filled before Dec 30, or a refund will be issued. We apologize for the confusion that our shutdown may cause. This message on the website, rocketvision.com e-mail and our telephone will remain operational through the end of the month. We intend to liquidate our non-rocket assets, many of which will appear on eBay. We believe we will be able to satisfy any of our open creditors from our liquidation proceeds. The wrap-up will be completed by Feb 1, 2001.

COLLECTABLE MOTORS FOR SALE

NOTE: Most are no longer certified, or will lose certification soon. They are believed to be good, but are being sold as collectibles only.

MOTORS CAN NOT BE SHIPPED. You MUST arrange pickup at a NIRA event.

Assorted old Estes motors from about 1970 in blue mailing tubes:
1/4A3-2, A8-5, B3.-7, B4-6, C6-7, and more!

Assorted FSI motors: D18, D20, E5, E60, F7, F100

Assorted MRC motors: A8-3, B4-2, B4-4, C6-3, C6-5

One Rocketflite F50-9 Silver Streak.

Assorted Aerotech motors: D7, D8, E10, E28, E50, F9, G42 and more.

Contact Bob Kaplow at:
kaplow_r@eisner.decus.org

USED CARS FOR SALE - AS IS

Cash from sale of these two vehicles goes to NAR legal fund.

1988 Acura Integra needs water pump and other maintenance

1991 Dodge Caravan needs transmission work

Both cars know their way to NIRA meetings and flying fields!

Best offer for either car.

Contact Bob Kaplow at:
kaplow_r@eisner.decus.org

Internet Rocketry Resources
by Jeff Pleimling

The Internet has changed the world of rocketry just as it has changed most hobbies - by providing a vast network of resources.

This is just a brief description of some resources that are available and that I've found helpful.

NIRA Resources
Yes, NIRA has an internet presence via a web site and an email list. The web site is at: http://nira.chicago.il.us/ and provides information about the club including the by-laws, meeting/launch schedules, and a whole lot more.

Steve Piette is our webmaster and if you have any comments or suggestions you can contact him at steve@simon.chi.il.us.

NIRA also has a (uaually) low-volume email list to keep members informed and to discuss club issues as well as general rocket topics.

The service we use was recently absorbed into Yahoo, although there aren't many noticeable changes to the average subscriber. If you're not on the list, just send an empty email to nira-subscribe@yahoogroups.com.

To help prevent unwanted email (spam) from flooding the list, only subscribers cand send email to the list. Messages to the list should be sent to nira@yahoogroups.com.

If you have any problems with the list, or just questions on how it's run, I'm the list operator and you canreach me at: jeff@pleimling.org.

Other Websites
www.rocketryonline.com has become a valuable resource for the on-line rocketeer. The site was originally started by Darrell Mobley as a hobby and is now owned by the same company that produces *Extreme Rocketry Magazine*.

Rocketry Online includes information and articles useful for model rocketeers to people cetrified level 3. There are also forums, auctions, news and links to just about every other rocketry resource on the Internet. It is well worth checking out.

www.dars.org/jimz/rp00.htm is the address for JimZ's Rocket Plans. This site contains the plans for many (most??) of the Estes and Centuri kits that are no longer being produced. It is an excellent resource when you want to reproduce one of the rockets from your childhood (or a rocket you couldn't afford back then).

The site also contains some Enerjet, Canaroc, MPC and MRC plans.

www.nar.org and **www.tripoli.org** are the web sites for the two national rocketry organizations. Both sites contain valuable information about the hobby, members insurance and information for organization members as well as a list of motors certified by each organization.

The sites also try to keep up to date on the on-going lawsuit against the BATF (as well as providing means to donate money to assist with the lawsuit).

Conclusion
This is just a bare overview on some of the resources available on the Internet. I haven't even attempted to list any of the many manufacturer or vendor sites (as well as every club site). Most of the major launches now even have their own web sites (including www.naram43.com for the next NARAM).

I hope to include more resources in future issues (email lists, web sites, FTP sites, you name it) as well as discussing sites that aren't about rocketry but that are helpful to rocketeers.

If you've found something on the Internet that club members would find helpful, please let me know and I'll be sure to include it.

Annual "Beach Party" Report
by Mark 'Bunny' Bundick

A small group of NIRA-ites broke away early from work and scooted up to Bob and Judy Kaplow's for a quick visit with Tom Beach and Joyce Guzik on December 27. In addition to the expected Beach clan, NIRA members were treated to appearance by two former members and national champions Tim Marcy and Andy Apel. Tim paid some of us a visit at NARAM this year, as he's currently doing post-doc work at the University of Colorado, but we'd sort of lost track of Andy. Some good eats were enjoyed, photo albums pass around and rocket stories exchanges. Some of us took a quick field trip to Bob's driveway to watch a pass of the International Space Station. As it reached its zenith, we also spotted a spent Soviet upper stage in a polar orbit. Neat.

Thanks to the Kaplows for being their usual excellent gracious hosts!

[Editor's Note: for those who don't recognize the name, Tom Beach is the editor of 'Sports Rocketry', the NAR's magazine]

Your hard working Sport Rocketry editor (and party guest of honor), Tom Beach. (Mark Bundick photo)

The crowd chows down; L-R Tom Beach, Tim Marcy, Lizzie Bundick, Ric Gaff. (Mark Bundick photo)

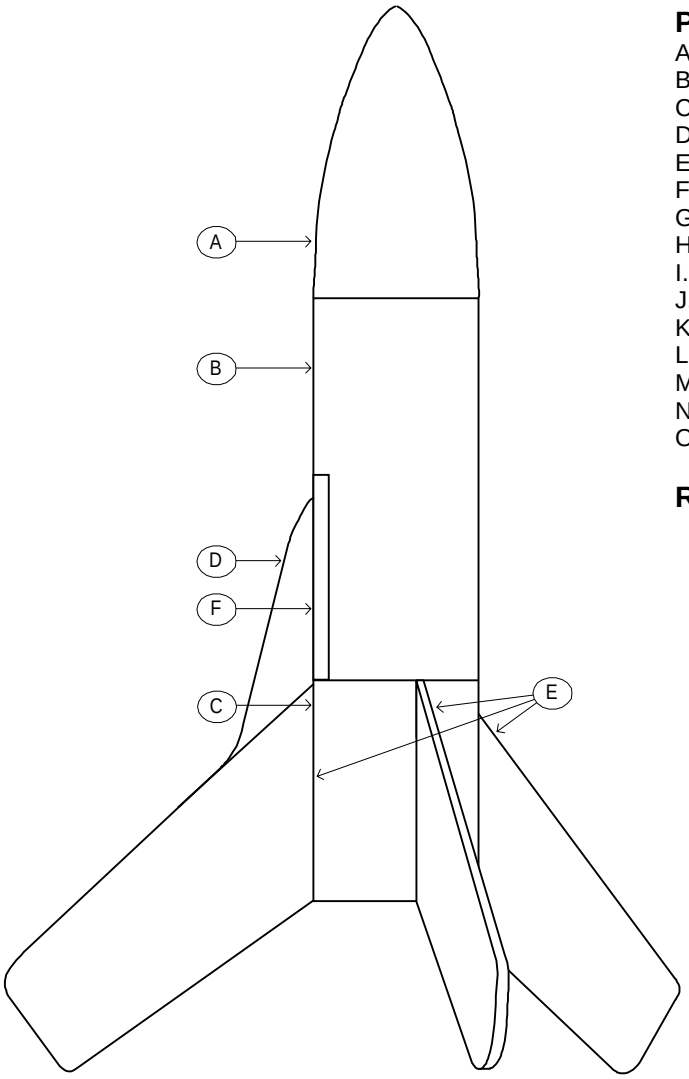
Some of the Beach Party crowd: L-R, Bob Kaplow, Tom Beach, Ric Gaff, Jonathan Charboneau, Adam Elliot. (Mark Bundick photo)

Former National Champ and NIRA member Andy Apel clearly wants an "explosive" 2001. (Mark Bundick photo)

MOONRAKER

An upscaled version of a Centuri Dual-Configuration model

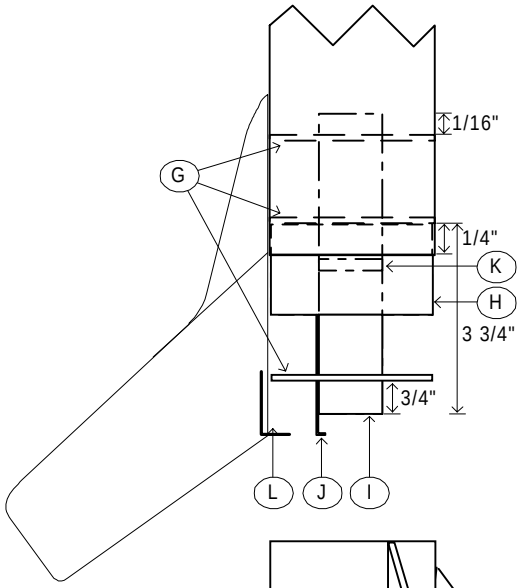
Designed by Mark Kotolski (NAR 35707), Plan #060696

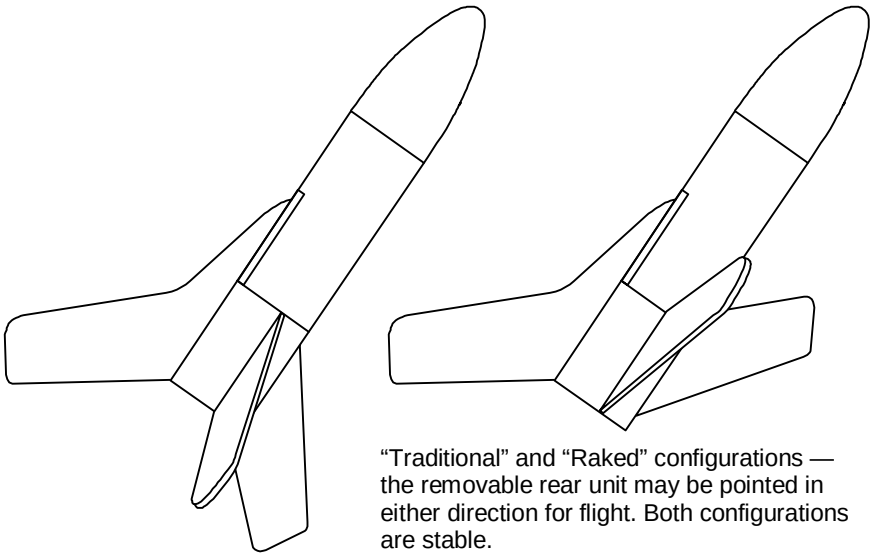


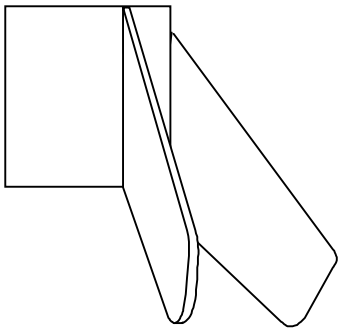
Parts List:

A. Nose cone BNC-70AJ
B. Body tube BT-70 x 6”
C. Body tube BT-70 x 3 5/8”
D. Upper Fin 3/32” balsa
E. Lower Fin 3/32” balsa (3 needed)
F. Launch Lug
G. Centering Rings 1/16” ply or basswood (3 needed)
H. Tube Coupler JT70
I. Motor Tube BT20 x 6”
J. Motor Hook
K. Thrust Ring
L. Small Paperclip or other soft wire
M. 12” Parachute
N. Shock Cord, 1/4” x 24 “
O. Screw eye

Recommended Motors: B4-4, B6-4, C6-3, C5-3







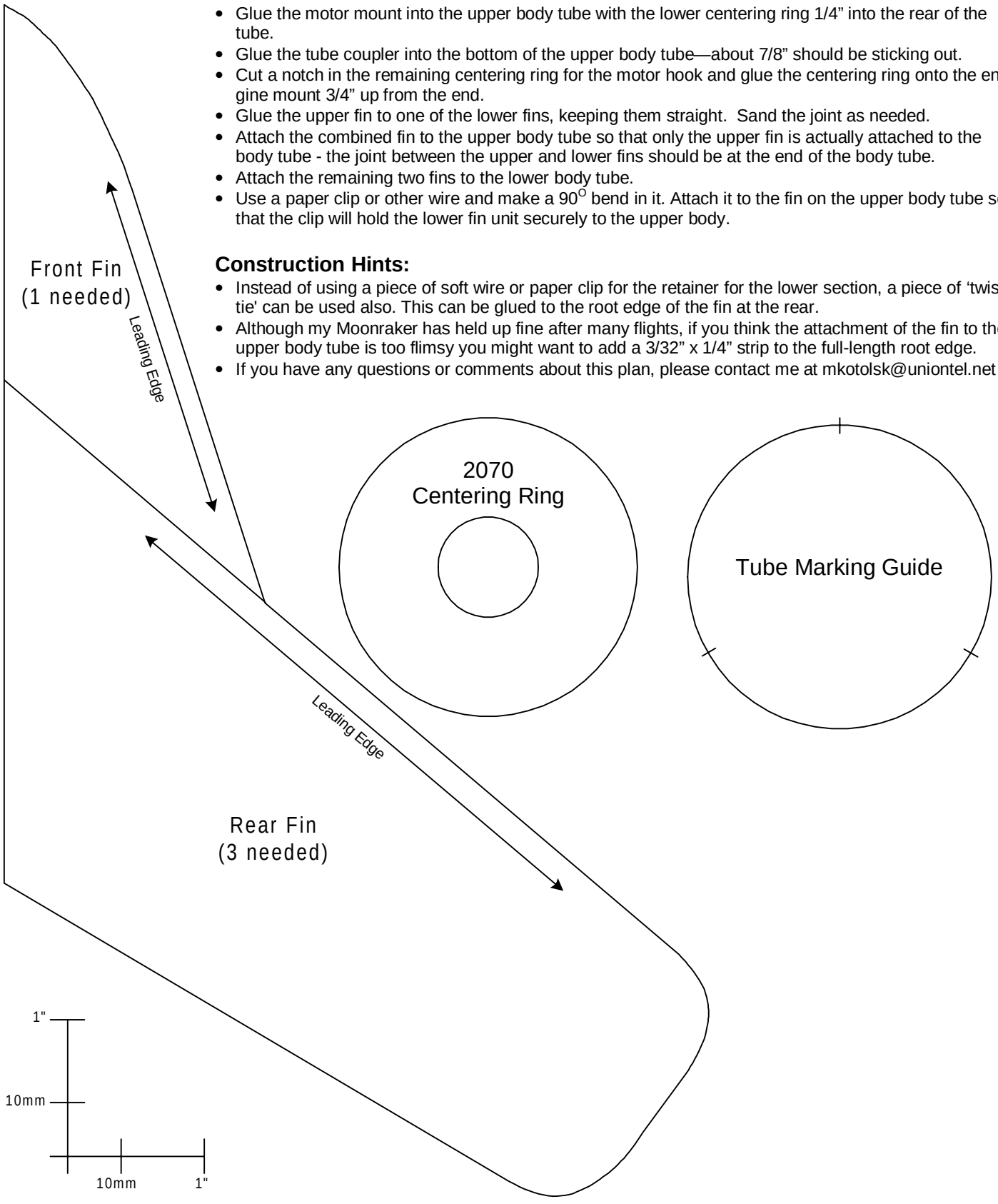
“Traditional” and “Raked” configurations — the removable rear unit may be pointed in either direction for flight. Both configurations are stable.

Construction Steps:

- Glue the thrust ring into the motor mount tube, use a spent engine casing to push it into position (let the engine casing sticking out about 1/4").
- Slit the motor tube just below the thrust block and put the forward part of the engine hook into the slit. Wrap a piece of tape just below the hook to hold it in place.
- Glue the upper 2 centering rings to the motor mount tube so that the first is 1/6" from the top of the motor mount and the other is 3 3/4" from the lower end.
- Glue the motor mount into the upper body tube with the lower centering ring 1/4" into the rear of the tube.
- Glue the tube coupler into the bottom of the upper body tube—about 7/8" should be sticking out.
- Cut a notch in the remaining centering ring for the motor hook and glue the centering ring onto the engine mount 3/4" up from the end.
- Glue the upper fin to one of the lower fins, keeping them straight. Sand the joint as needed.
- Attach the combined fin to the upper body tube so that only the upper fin is actually attached to the body tube - the joint between the upper and lower fins should be at the end of the body tube.
- Attach the remaining two fins to the lower body tube.
- Use a paper clip or other wire and make a 90^{O} bend in it. Attach it to the fin on the upper body tube so that the clip will hold the lower fin unit securely to the upper body.

Construction Hints:

- Instead of using a piece of soft wire or paper clip for the retainer for the lower section, a piece of 'twist-tie' can be used also. This can be glued to the root edge of the fin at the rear.
- Although my Moonraker has held up fine after many flights, if you think the attachment of the fin to the upper body tube is too flimsy you might want to add a 3/32" x 1/4" strip to the full-length root edge.
- If you have any questions or comments about this plan, please contact me at mkotolsk@uniontel.net



Space Launch Report for November-December 2000
by Tim Johnson

Year In Review
There were 81 space launch successes in 85 attempts worldwide during 2000, the most since 1997. Twenty five launch vehicle types flew during the year from 12 sites in six countries and one non-territorial ocean zone.

Krunichev's Proton-K was the busiest launch vehicle, with 14 successful flights, most ever for Russia's biggest rocket. Energia's time-tested Soyuz-U was second with 13 successes. These two accounted for 27 of the 30 space launches from Baikonur Cosmodrome, Kazakhstan, which easily retained its "world's busiest spaceport" title.

During the year, Delta 3 and Atlas 3A "transition generation" launchers scored their first successes. Boeing launched six Delta 2 rockets while Lockheed Martin flew seven Atlas 2A, two Titan 4B, and one Titan 23G boosters. Both companies completed pathfinder versions of their Delta 4 and Atlas 5 EELV designs.

Ariane 5G logged four successful commercial missions and Arianespace extended the successful Ariane 4 launch streak to 59 with eight flights. The company lost money, however, as it faced increased competition from International Launch Services (ILS) and Sea Launch.

NASA performed five STS missions, the most since 1997, as it ramped up construction of the finally-crewed International Space Station (ISS). Shuttle flew for the 100th time during the year.

China carried out five launches, using three CZ-3A rockets, one CZ-3, and one CZ-4B, but the anticipated second test of the Shenzhou crew-rated vehicle slipped into 2001.

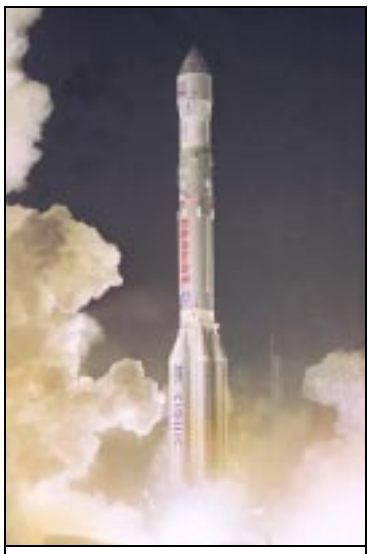
Sea Launch logged three commercial missions with its powerful Ukrainian/Russian Zenit 3SL, but faulty ground sequencing software caused one of the launches to fail in March. Ukraine's NPO Yuzhnoe also supplied two successful Zenit 2 launches for Russia during the year.

Orbital Sciences performed five launches during the year, including two Minotaur, one Taurus, and two Pegasus missions. Minotaur, a new launcher with two Minuteman ICBM stages topped by two Pegasus stages, flew from a new commercial pad at Vandenberg.

Rotary Rocket and Beal Aerospace both shut down during the year, leaving Kistler Aerospace as the only firm still trying to build a commercial launch vehicle without direct government funding. Prospects seemed bleak, however, after the commercial LEO market collapse engulfed Iridium, Orbcomm, and ICO/Teledesic.


Atlas "Great Bear" mission launch
(International Launch Services photo)

November/December
There were 11 launch success in 13 attempts during the year's final two months. Russia and the US each launched one mission to ISS. Arianespace boosted five payloads on three successful launches. ILS orbited two satellites with one Proton and one Atlas. Two November flights ended a slow year for Boeing's Delta 2. The rocket only flew six times during the year, fewest since 1995. China launched a second Beidou navsat. Russia launched an imaging satellite for Israel. One Kosmos 3M and one Tsyklon 3 failed after December launches from Russia's Plestesk Northern Cosmodrome.


Proton carrying the Sirius 3 comsat
(International Launch Services photo)

ISS Missions
Russia launched Progress M1-4 to ISS on November 16 atop a 2.5 stage Soyuz-U from Baikonur's LC 1. The 7,250 kg cargo ship carried 2,000 kg of supplies for the three-man Expedition 1 crew on a mission named ISS-2P. Two days later, the ship's Kurs automatic docking system faltered during final rendezvous, forcing ISS crewman Sergei Krikalev to perform a teleoperator manual mode docking. Zarya's Earth facing (nadir) port was used because Soyuz TM-31 occupied the aft port.

Progress undocked December 1 to provide clearance for shuttle Endeavour, launched the same day from KSC LC39B. Controllers parked Progress in a temporary orbit while Endeavour docked to the Node 1 nadir port on December 2. Commander Brent Jett, Copilot Michael Bloomfield, and Mission Specialists Joseph Tanner, Carlos Noriega, and Marc Garneau, flying the STS-97/ISS- 4A mission, brought the 49 x 16 x 16 ft, 35,000 lb. P6 solar array module. Once attached to the Z1 truss, four P6 solar blankets were unfurled to span 240 x 38 ft, making it the largest object known to have been deployed in space. The $600 million P6 will provide 65 kW of electrical power to ISS.

Two Launch Failures
A two-stage Kosmos 3M failed on November 20 while attempting to orbit 950 kg QuickBird-1 for Colorado's EarthWatch from LC 132 at Plestesk. QuickBird struggled into an unstable 78 x 610 km orbit and reentered over South America about 75 minutes after liftoff. The Kosmos 3M's restartable second stage did not perform its second, apogee burn to circularize the orbit. United Start officials suggested that QuickBird's solar arrays might have deployed early, damaging the stage. The failure ending a string of 59 consecutive successes worldwide, dating back to March 2000. It was the first Kosmos 3M launch failure since October 6, 1995.

The year's 85th and final space launch, of a Ukrainian-built Tsyklon 3 rocket, failed on December 27. The rocket's on-board computer incorrectly commanded the S5M third stage to shut down about 376 seconds after liftoff from Plestesk LC32. The stage and payload, consisting of three Strela-3 and three Gonets D-1 comsats, reentered over the Bering Sea. A successful launch would have used two third stage burns to put the satellites in 1,420 km x 82 deg orbits.

Other Launches
Delta 281, a 3.5 stage 7925 model, orbited GPS 2R-6 from Cape Canaveral's SLC 17A on November 10. Delta 282, a 2.5 stage 7320 variant with three GEM solid motors, boosted NASA's 588 kg Earth- Observing Mission (EO-1), Argentina's 477 kg SAC-C, and Sweden's 6 kg Munin nanosatellite into near polar orbit from Vandenberg AFB SLC 2W on November 21. The complex mission featured four second stage burns and the first flight of a 359 kg Astrium Dual Payload Attach Fitting (DPAF).


Ariane 508 (V138) core stacking
(Arianespace photo)

Ariane 5G (A507/ V135) launched 4,758 kg PAS-1R, 630 kg AmSat-1D, and 110 kg STRV-1C and STRV-1D into GTO on November 16 from Kourou ELA3. Ariane 44L (A4101/ V136) boosted 4,700 kg Anik F1 into GTO for from ELA2 on November 21. Ariane 5G (A508/ V138) orbited 1,414 kg Astra 2D and 2,105 kg GE-8 on December 20 from ELA3.

The 14th Proton launch of the year took place November 30 from Baikonur's LC 81 Pad 23,

*(**Space Launch Report** continued on page 9)*

*(**Space Launch Report** continued from page 8)*

when a Proton-K/DM3 orbited 3,800 kg Sirius 3, the third "CD Radio" comsat. It was the 6th ILS Proton mission of 2000.

Atlas 2AS AC-157 launched a classified satellite for the National Reconnaissance Office (NRO) from Canaveral's LC36A on December 6. The MLV-11 "Great Bear" mission put the satellite into GTO, using a standard two-burn Centaur flight profile. The payload fairing sported a bear logo designed by an elementary school student.

Delta 4 Common Booster Core (CBC) Static Fire Test Unit (Boeing photo)

A CZ-3A launched the second Beidou ("Northern Dipper") navigation satellite into GTO from Xichang LC2 on December 20, completing China's first experimental navsat constellation.

Delta 4 Rollout

During late October, Boeing rolled out its first Delta 4 Common Booster Core (CBC), fitted with a Rocketdyne RS-68 engine, at Decatur, Alabama. This first CBC is the Static Fire Test Unit. It will be shipped to Mississippi's Stennis Center for testing in the historic B-2 test stand once used to qualify Saturn V S-1C first stages.

The 5.2 meter diameter, 38 meter tall CBC consists of a tan upper LOX tank, a white center-body intertank section, a huge tan LH2 tank, and a white aft engine section. A tapered thermal shield will be added to the base of the engine later. The Delta 4 CBC is the first all-new liquid propellant expendable booster assembled in the U.S. since Saturn V some 35 years ago.

Atlas 5 News

Lockheed Martin received four more RD-180 engines from Russia's Energomash on November 23; including the first slated for use on the new Atlas 5 rocket. Engine 9T will be installed on the first Atlas 5 Common Core Booster (CCB), designated AV-001, at the company's Denver site in January 2001. Plans call for AV-001 to be shipped to Cape Canaveral three months later for pathfinder testing at rebuilt Space Launch Complex 41.

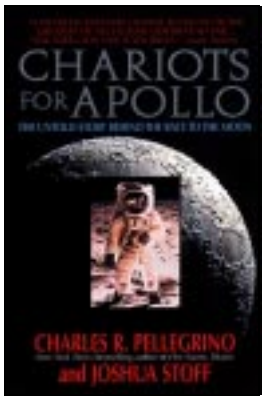
The AV-001 Common Centaur tank was also shipped from San Diego to Denver during November. In Denver, Centaur will be fitted with an RL10A-4-2 engine and avionics before being shipped to the Cape. The maiden Atlas 5 flight of AV-001 is planned for 2002.

Bunny's Book Beat: "Chariots for Apollo: Untold Story Behind the Race to the Moon" by Charles R. Pellegrino and Joshua Stoff

Review by Mark 'Bunny' Bundick

The Cliff Notes Review: Great book, crummy title.

The first spacecraft designed solely to operate in the vacuum of space was Grumman Aviation's Lunar Module. Since nobody had ever built such a machine before, the Grumman engineers were faced with both the exhilaration and bafflement of how to make such a beast. This book tells their story, and it's a good one.



The LM, as it was eventually referred to, needed to combine light weight, efficiency, and zero tolerance for flaws. Weight was an engineering known up front, because every pound delivered to the moon's surface meant an expenditure of roughly 25 pounds of propellant starting on Earth. If you're a space history buff who craves engineering details, you'll find plenty of them in this book starting with the propulsion system. The LM's principal building material was a sheet of aluminum so thin you could see through them. Since the need to have as reliable an ascent engine as possible was paramount, the fuel and oxidizer used were ultra-toxic hypergolics pumped not with a typical liquid engine pump, but with high pressure helium. The combination of thin materials, high pressure and toxic material made for just one of the many engineering challenges faced by the Grumman team.

Chariots for Apollo: Untold Story Behind the Race to the Moon
by Charles R. Pellegrino and Joshua Stoff
Format: Trade Paperback
320 pages
Publication Date: 6/19/1999
ISBN: 0380802619
List Price: $13.50

Now throw in the challenge of Kennedy's deadline of "by the end of the decade", and the story really turns interesting. The human side of LM building is told in equally fascinating details and depth. The Grumman staff was completely dedicated to their mission. Many engineers worked 16 hour days, 7 days a week during LM construction, risking their health, marriages and sanity to build these remarkable machines. The end of the program must have been particularly heartbreaking to these dedicated people, what with a number of LM's left here on earth instead of flying on their intended missions to the moon.

My only complaint comes from the title. First, there's a NASA history series book from the 70's of the same title, which covers in fairly complete, but dust dry, detail all elements of the manned portion of the Apollo stack, i.e. command module, service module and lunar module. When I first saw this book listed on Amazon, I skipped it because I thought it was a NASA reprint. Which leads to Title Complaint #2. Nothing in the title suggests it about the LM itself, yet the book is as complete a history of that spaceship as you're going to find. Not good marketing by the publisher, at least in my opinion.

Bunny's Rating: a 4 out of 4 rockets. An entertaining and informative space history story, full of both detail and color, and definitely worth adding to your collection.

Confused Stages – Stage 17
by Jonathan Charbonneau

White Lightning propellant, Blue Thunder propellant, multi-staging, parallel staging, clustering, spinning, the list goes on...

The above are some examples for ways to spice up a rockets flight. But "something's missing!" Can you find it? Take a few minutes to think about it before reading on.

It should become evident that all of the above are done on the way **up**. There's always been a lot of hype on spicing up a rocket's flight, but usually on the way up. This stage is about ways to spice up a rocket's flight on the way down. "That's right, down." "Why?" you ask. Because a sport rocket spends most of its flight time in its recovery configuration. The upward flight rarely, if ever, lasts into the second minute of flight. The downward flight always lasts longer then the upward flight, except when something's gone wrong.

One way to spice up a rockets flight on decent is with skydivers/paratroopers/parachutists. Another is with whirly birds and the third is parasite gliders.

Parachutists: Parachutists come in several sizes. It is best to use the largest or second largest size that will fit the rocket. Dime store parachutists are fine for BT-55 and BT-60 sized rockets. For rockets 2 inches or more in diameter, Aeromax Parachutists are best. Aeromax parachutists can be bought at hobby shops such as Al's. If your local hobby shop doesn't carry them, you can order them directly from Aeromax. Call Aeromax at (847) 776-2291 for details on ordering. These parachutists cost $9.99 (plus tax) each. $10 may seem steep, but these parachutists are well built and worth every penny. They are also tangle free and come in many color combinations - so get a platoon of them. The more, the merrier.

For high power rockets 5 inches or more in diameter, the G.I. Joe Golden Knight is the ultimate. This 12" paratrooper has a real working parafoil chute. He also comes with both black and yellow jump suits. He is sold exclusively at FAO Schwartz. CPR[1] is strong recommended when flying this guy because, brace yourselves, he costs $140 plus tax. By the way, he's a limited edition too. Good luck finding him.

Whirly Birds: These are make-it-yourself toys. You will need spools, drinking straws, paper, pencil, ruler and tape. See the accompanying illustrations for assembly.

Parasite Gliders: Almost any glider can be used, as long as glider, rocket and engine are properly matched. Be sure glider is neither too big for the rocket nor too flimsy for the engine. Dime store gliders are fine up to C power. One-piece gliders can withstand D power and possibly E. If using E's, don't use Blue Thunder or similar high thrust types. E6's and Black Jacks are best. Some rockets can carry more then one glider. As a rule, if the rocket has three fins, it may carry up to three gliders. Four finned rockets can carry two large gliders or four small gliders. If the rocket is long bodied and very stable (e.g. Mean Machine or Shadow) it may be able to carry up to six gliders. Caution: Be sure to locate all gliders behind the rockets center of gravity. Never place any glider in front of the center of gravity.

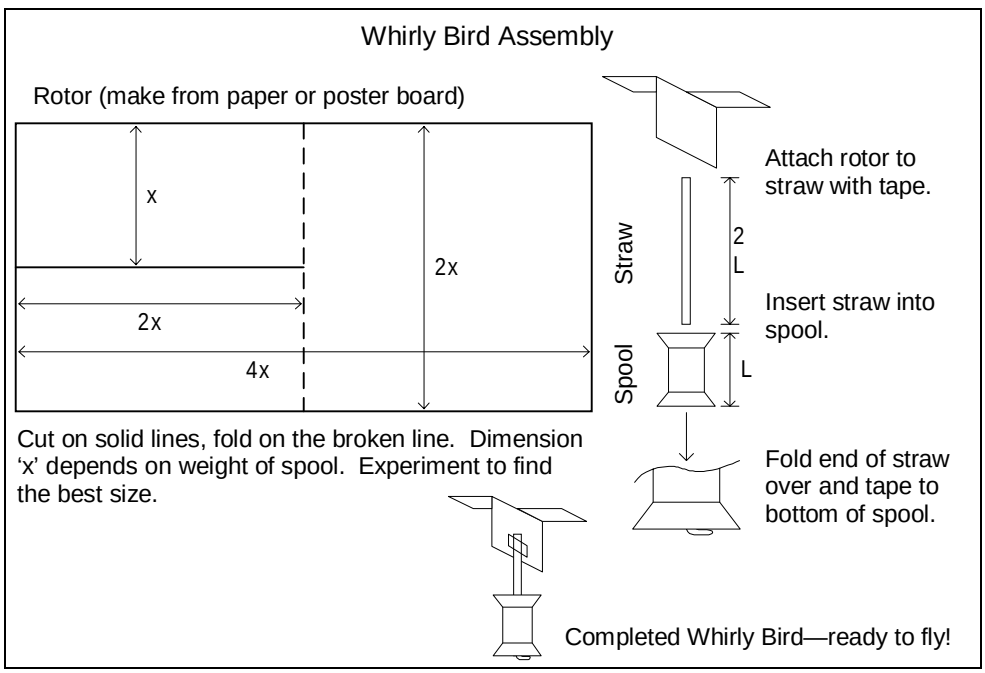
Superman's Recommendations

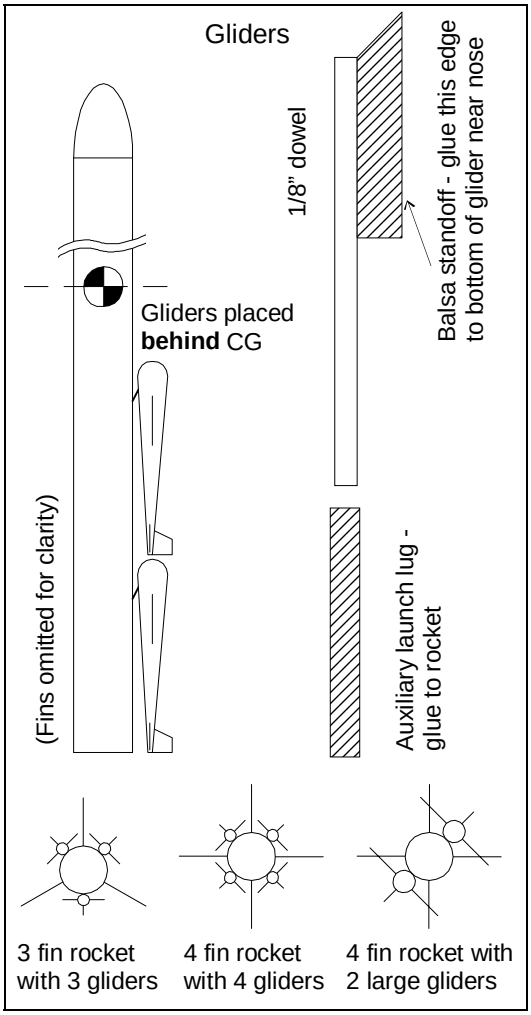
If you're happy and you know it
Do All Three!

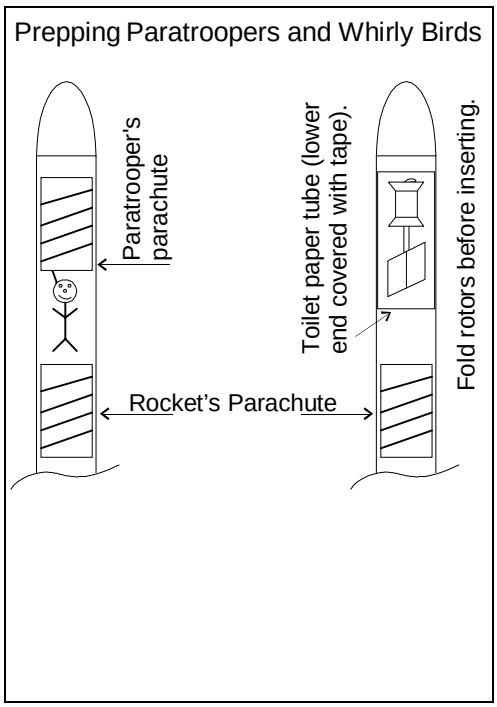
Happy Flying!

Notes:

1. "CPR" stands for *Close Proximity Recovery*, in rocketry. Cardiopulmonary Resuscitation is its more traditional meaning. Superman recommends that everybody learn how to do this. Knowing it will allow you to save a life.







Welcome to the Club!

Brian and Scott Hulina and Beth Tuleja have all joined NIRA in the past few months. Welcome to the club!

(If you've joined recently and I've missed your name, please let me know!)

NARAM-42 Website
John Viggiano, Contest Director

I am pleased to announce that the NARAM-43 website is now up and running. Please point your browser at:

http://www.naram43.com/

We hope to see you at NARAM-43. Have fun & fly 'em high!

Press Release: RockSim 5.0 Now Available

Apogee Components is now announcing that RockSim version 5.0 is now available! The price is $85 for new users, $35 for those upgrading from version 4.0, or $50 for those updating from v3.0 and older.

The new version features awesome 3-D images of your rocket designs; plus advanced simulation techniques like: electronic deployment of recovery devices, tracking the rocket after parachute deployment, and staggered ignition of rocket motors. On the design side, the new features added are: through-the-wall fin tabs on any shape fins, complex motor cluster arrangements, and saving of component sub-assemblies. More information is available from the Apogee web site: http://www.apogeerockets.com/rocksim.asp

The program is available from Apogee Components, or your local brick-and-mortor hobby store. If they don¹t carry it, have them call us. All upgrades must be made directly through Apogee Components.

Version 5.0 will open all your previous designs created in older versions of the program. The 3-D feature works on these older files too!

A FREE demo version of the program will be available from the Apogee Components web site. This demo allows you to try the various features of the program to see if it is right for your needs.

Apogee Components, Inc.
630 Elkton Dr.
Colorado Springs, CO 80907-3514

Tel: 719-535-9335
fax: 719-534-9050

web site: http://www.ApogeeRockets.com
email: tvm@ApogeeRockets.com

NSL 2001 Information
From David Urbanek

The Web Site is: http://public.surfree.com/urbanek/rockets/UROCNSL.htm (all one line).

Yeah, it's long and hairy, but it's free. There are links from the UROC site and the NAR main site. There should be an ad in the next Sport Rocketry. Things are coming along nicely.

Currently the range fees are:
Individual: $25.00
Family : $35.00

It will be $5.00 more at the door (and if we have to put up a door for wise-cracking NAR folks we will). In Utah we are very used to pricing for a whole family since this state is famous for having a propensity to progeny. We interpret family as parents and children. If you want to combine you and your brother in a family membership, please bring along a parent to supervise (big grin).

If you want to get an early start, you can mail the check or money order to:
UROC-NSL
c/o David Urbanek
4715 South 1300 East #31
Salt Lake City, UT 84117

Make sure you include enough information that I know who you are, where to send your registration pack, and how I would get in touch with you if there is a problem with your handwriting, your check, or my brain.

We will have credit card capabilities very soon so you can charge the range fees and pay interest fees to a big, impersonal mega-corporation.

You can call me at (801) 273-0443

The nearest airport is Salt Lake City International (SLC is the code). It's a full service airport with car rental and everything.

There are a lot of local attractions to occupy non-rocketry family. There is a really cool, brand new, Dinosaur museum in nearby Lehi, Utah. You've got the Great Salt Lake a few miles north of the launch site. There might still be skiing, but you never know if there's going to be snow in May. If there is, the ski resorts are within a 1 1/2 hour drive of the launch site. We'll compile a bunch of information on day trips in the registration pack.

We are thinking of having a special contest: if you can hang a rocket in a tree (it has to be more than 8' off the ground) you get a special prize. Hanging a rocket in a very large sage brush doesn't count.

For Sale: Aerotech Mantis Pad with Interlok Launch Controller. New. $60.00 or best offer for the set. This is a great deal – it normally costs $70.00 for more just for the pad alone. See Jonathan Charbonneau at a launch or meeting for more information.

NAR S&T News

R68: NAR S&T ROCKET MOTOR DATA AVAILABLE

NAR Standards and Testing is pleased to announce the availability of RASP.ENG data for NAR-certified rocket motors on the NAR website. A second page of RASP.ENG data has been added to the PDF file for each motor type. Both data points and a plot of data-point locations on the thrust curve are provided.

To view these files, visit http://www.nar.org/SandT/NARenglist.shtml, then click on a motor type to download the PDF file.

Happy New Year from the National Association of Rocketry.

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

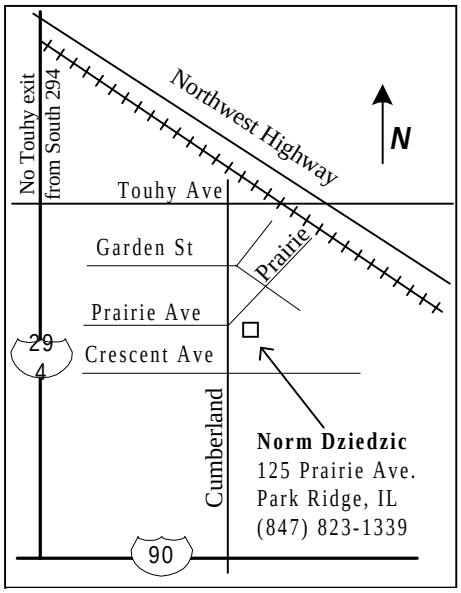
Jack Kane, Chairman

***(Building Sessions** continued from page 1)*

Norm is hosting the March building session. He says in a message to the NIRA mailing list "I don't have a basement but lots of table space, TV's for videos, space to commiserate, computer for sims. If it's warm enough, we can use the scroll saw and table saw in the garage for intricate shaped fins or plywood."

Norm also said that 1 block up the street is Hill's Hobbies which doesn't have a good rocketry selection but does carry balsa and CA glue and all Estes motors—but no tubes or other parts. Train buffs will probably want to drop in there to see the huge array of models they have on display. They are open on Sundays.

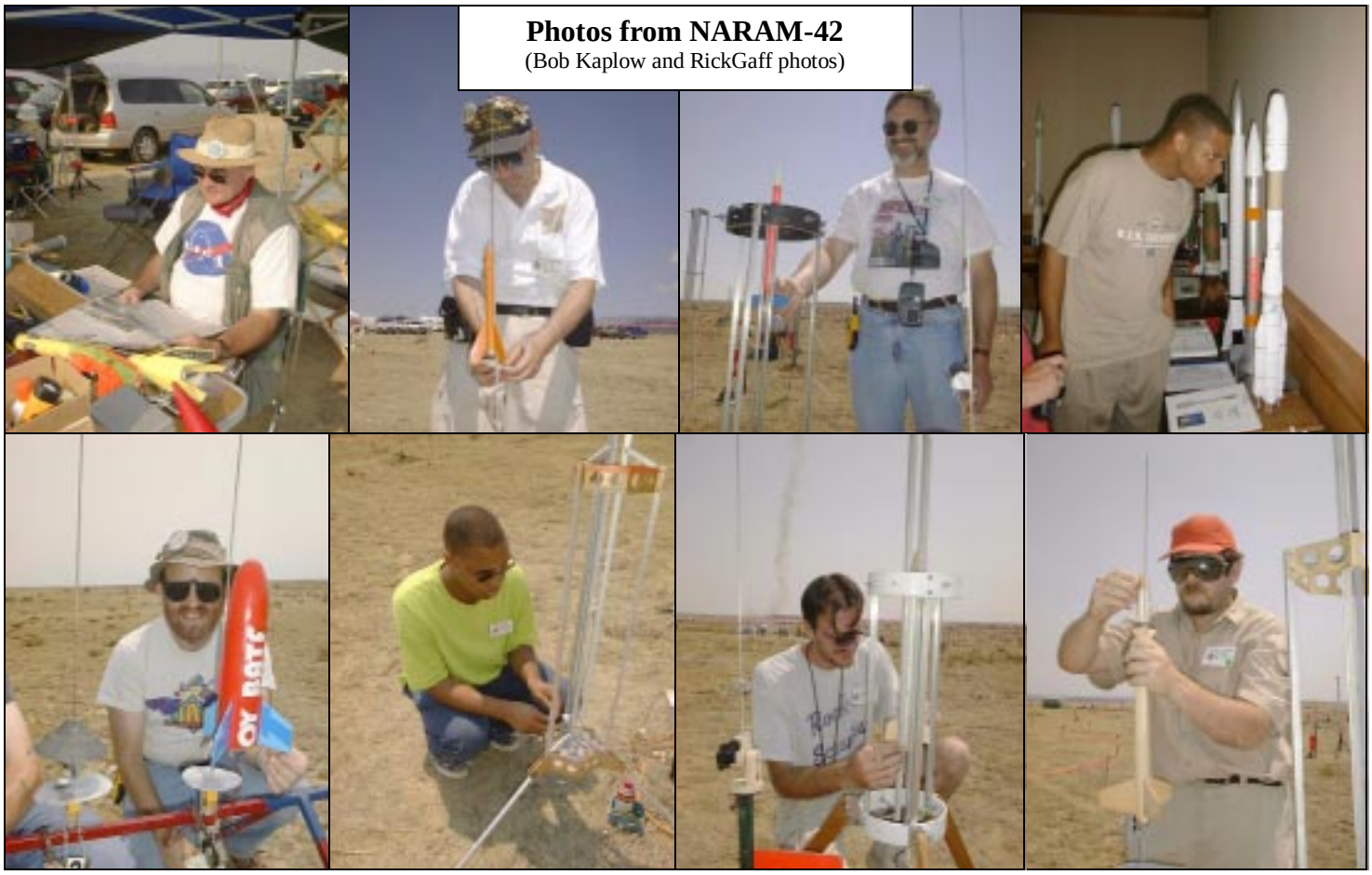
Note: There is no Touhy exit from the southbound Tri-State (294). Go to I-90 East and exit on the Cumberland North exit.



Map to the March building session at Norm Dziedzic's house.

Photos from NARAM-42

(Bob Kaplow and RickGaff photos)



THE LEADING EDGE

Jeff Pleimling, Editor
245 Superior Circle
Bartlett, IL 60103-2029

This may be your last newsletter! Check your label for the expiration date.
If it says Membership Expired or Membership Expiring, this will be your last newsletter!