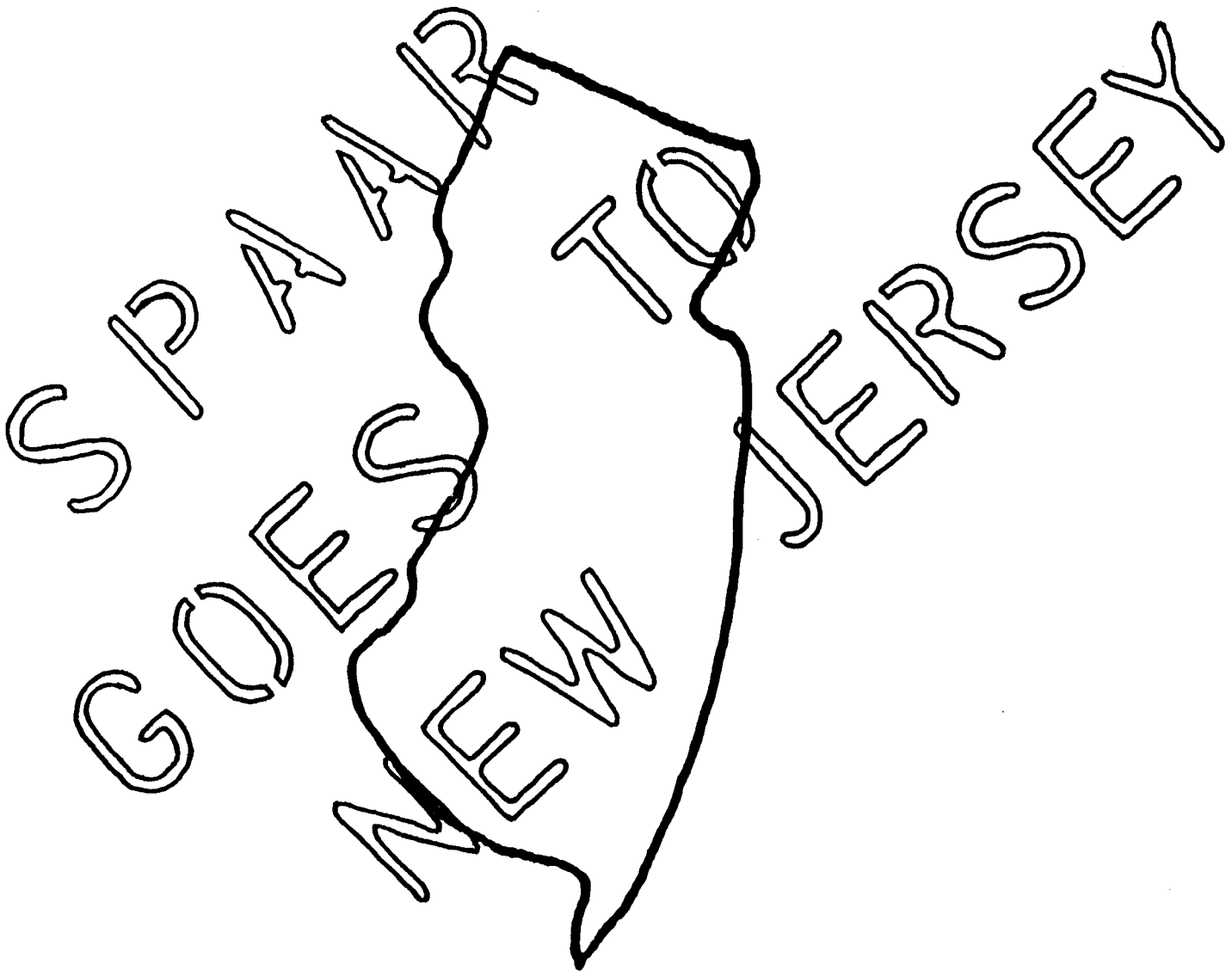
THE SOUTHERN PENNSYLVANIA AREA ASSOCIATION OF ROCKETRY

COUNTDOWN

VOLUME 1 NO 11



APRIL 89

The SPAAR Countdown

Volume 1, Issue 11

April, 1989

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The SPAAR Countdown is the official newsletter of the Southern Pa. Area Assoc. of Rocketry, NAR Section #503, PO Box 127, Reamstown, Pa., 17567, and is intended for the enjoyment of it's members. Those responsible this time: Fast Eddie "I build for speed" Miller, Glenn "Anyone got a spare port-a-pot?" Feveryear, John "I just wanna look one more place for that rocket" Yost, and George "King of Prang" Beever. And a special thanks to Mr. Trip Barber of NOVAAR, if he happens to read this, for the use of his streamer duration plan, which appeared in a mid-seventies issue of "The Model Rocketeer" magazine.

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SPAAR goes to New Jersey
-OR-
"Just who are those guys, anyway?"

On Sunday, March 19, five members of your favorite NAR Section, SPAAR, traveled to Somerville, NJ, to take part in, or observe, GODDARD V, an Open Meet sponsored by the Garden State Spacemodeling Society, GSSS. John Yost, George Beever, Dick and Bill Rhoat took the northern, or Allentown-Bethlehem-Easton route, while Glenn Feveryear and family (or was that a ground support unit?) took the southern route through part of Delaware and up the Jersey turnpike. Both groups arrived about 8:45 - 9:00 AM.

Once there, we met several GSSS members, including Section Advisor Jack Sarhage, and Contest Director Dr. Bob! Kreutz. I must say that they were more hospitable than the NJ weather! If you showed up for the scheduled SPAAR Sport Launch on March 12, March 19 in NJ was a carbon copy! High winds and cold temperatures made things a bit uncomfortable, but the meet went ahead.

The first event was Predicted Duration, in which you can fly just about anything you want, just as long as it's duration exceeds 30 seconds; to win, you must come closer to the duration you predict your model will make than anyone else. John Yost flew an old Estes "Photon Disruptor", but his 17 second flight didn't make the 30 second minimum. The winner, I beleive, was a GSSS member who predicted 37 seconds, and came in at 36.8 or something.

As the day went on, our guys had some problems, but we had our share of success, too. A number of the GSSS members were heard to remark about the use of Apogee Components materials in our streamer duration birds, which despite the high winds, had remarkably straight boosts to high altitude.

Glenn had a bit of a problem with his B Eggloft Duration model, which shredded the shroud lines of it's chute at deployment. George's entry in the ½A B/G event, a "Honeybee", turned in a real nice boost, and an even nicer glide; only problem was, he forgot to attach some clay under the left wingtip, to induce a circling glide, and it just drifted off into downtown Somerville. Smooth. But the most remarkable event of the day, by far, was John Yosts' first ½A SD flight. He flew a Perihelion made at the SPAAR Winter Workshop, with a ½A3-4, and a Micafilm streamer, rumored to be 4"X40"; after a very straight boost to altitude, the red streamer deployed perfectly, easily seen in the sky. At one point, I personally saw the model rising, meaning it caught what little thermal activity there was that day. Finally, it drifted out of sight, and John returned somewhat dejectedly, figuring it was long gone. About 15 minutes later, however, John said, "Ah, what the heck... let's go look for it." So we did, and to my amazement, about 1 3/4 miles away, under a railroad overpass, along a highway, was the rocket. It was brought back for an offical returned flight. At the time of this writing, the official results haven't been received, but that has to be a winner!

Thanks to Jack, Dr. Bob! and the rest of GSSS. We hope to see you this fall!

SECTION MEETING MINUTES

The monthly SPAAR business meeting was held on March 20, 1989, at the Lancaster County Library, N. Duke St., Lancaster, between 7 and 9 PM. Attending were: John Yost, Ed Miller, Dale Greene, David Bender, Glenn Feveryear, Dave Wenrich, and George Beever.

OLD BUSINESS: John Yost asked for ideas and suggestions concerning the demonstration launch to be given on May 20. George Beever had proposed flying an example of each differant type of model rocket, such as streamer recovery, parachute recovery, boost-glider, etc. The major facter in planning this demonstration will be the size of the area to be used, which will dictate what types of models can be flown. John will check into this prior to the next meeting. John also suggested displaying an enlarged version of the NAR/HIAA Model Rocket Safety Code, as well as a display of photographs of model rocket activities. Glenn Feveryear suggested using the Sport Launch scheduled for May 7 as a "dry run" for the demo.

TREASURER'S REPORT: Ed Miller reported a balance in the General Fund of $201.20, and that no new members have joined since the last meeting.

COMPETITION COMMITTEE: Glenn Feveryear reminded those present that during the next Sport Launch, April 16, the first "practice" event will be held in preparation for the Section Meet to be held on July 23. The featured event on the 16th will be "A" Streamer Duration, Multi-Round. (Multi-Round rules are explained elsewhere in this issue.) The types of prizes to be awarded after the Section Meet were discussed, with the end result undecided, however John will check into trophies and Glenn will check on ribbons. Glenn also indicated that official NAR Flight Cards will be used at the meet, and a discussion ensued regarding the use of Flight Cards on a regular basis, even for sport flights, if the member wishes to have his/her flight timed, qualify for a SPAAR club record, or be included in the Flight Log portion of the newsletter. Glenn also pointed out the need for members to volunteer during launches for timing duties. A name for the Section Meet is still needed, send your suggestions to Glenn. A registration fee for the Section Meet was discussed, to help defray the costs of the NAR paperwork and prizes. After some discussion, it was decided to charge C Division members $2 for the Meet, and A and B Division members $1. This would cover the entire days' events. In addition, for the purposes of this meet, A and B Divisions will be combined, which means that those members who fall into those catagories (those 17 and younger) will only compete against each other, and not against those in C Division (18 or older). The need for "creature comforts" at a day long meet such as the one being planned was discussed. Glenn was given the go ahead to purchase whatever NAR paperwork is needed.

ACTIVITIES COMMITTEE: Dale Greene reported that he had sent the club's ad in to the WITF-TV magazine, "Apprise". He also stated he could contact the those who write the "Weekend" section of the Sunday News for a possible article. Dale was then asked to start planning for a SPAAR family picnic, to be held in July or August, as well as a Christmas get together in December.

OPERATIONS COMMITTEE: John Yost reported that the club launch system is operational, with two flights having been launched off of Pad #1 on March 12. He also has developed a countdown/launch proceedure, which eliminates the use of the word "fire", which should only be used in case of an actual fire. Also, John stated that whoever is the Range Safety Officer (RSO) on any given day should designate a deputy or an assistant, to keep things running if the RSO is busy elsewhere. A discussion was then held on purchasing the items needed to build club launch stands, of the type discussed at previous meetings. George Beever made a motion, seconded by Ed Miller, to authorize John to purchase the materiels needed. The motion was passed unanamously.

NEWSLETTER COMMITTEE: George Beever passed around copies of other sections' newsletters that are being received on an exchange basis, such as "The Launch Rack" (GSSS), "Team Pittsburgh" (Pittsburgh Space Command), and the NOVAAR FREE PRESS.

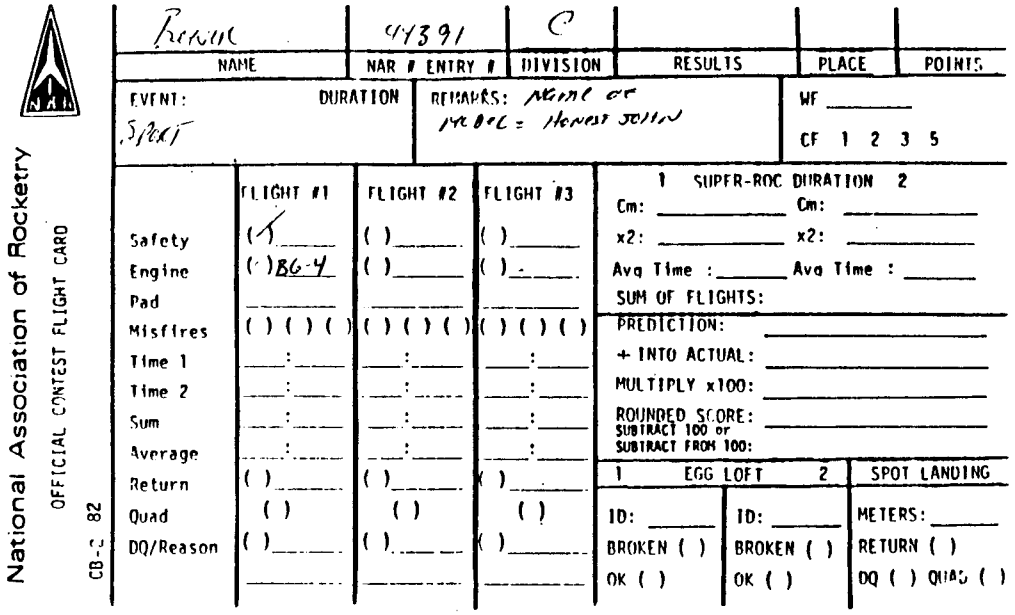
The meeting adjurned at 9 PM, after general discussion.

EDITORIAL

The critter reprinted below is well known to some members of SPAAR, but to some of us it's a real stranger. What is it? Officially, it's known as NAR form #CB-2-82; more commonly as an NAR "Flight Card". At NAR sanctioned events, one of these things must be filled out prior to any competition flight. This is how the records and scores are kept. The side reprinted below concerns itself with duration events; the flip side is for altitude competition. At this point you may be asking, "so what does this have to do with the price of tea in China? Read on, prease.

Since the inception of our club, we've had a newsletter of sorts. It's had various names, (which we won't get into here, thankfully) but one constant thing about it has been a running log of all model rocket flights made at club launches, now known as the "Flight Log". Granted, no one forced me to do this, as it was my own idea. It satisfied my fettish for statistics. So I'm weird, OK? But as time passed, the feedback that I got from you, the members, was that the Flight Log was an interesting and enjoyable portion of the newsletter. Of course, I've been told by some that I'm wasting my time, not to mention driving my wife crazy (how can you change a pre-existing condition?); or, other clubs or sections don't bother, why do you? My answer to that is, why do we have to be like everyone else, anyway? So get to the point, already. OK, here's the scoop: at the Section Meeting on March 20, it was decided that a flight card will have to be filled out prior to any flight in which the member: 1. Wants to make an official contest flight; 2. Wants to have the flight count towards a club record; 3. Wants to have the flight timed; 4. Wants the flight recorded for the Flight Log, even if it's a Sport Flight.

OH NO, NOT THAT! I ALREADY HAVE ENOUGH PAPERWORK AT WORK/SCHOOL TO KEEP ME BUSY UNTIL THE YEAR 2019 AND NOW THIS YUTZ WANTS ME TO DO MORE JUST TO FLY ROCKETS!!! Chill out, Boost/Glider breath; it's not that bad. Consider this: for the good old, everyday sport flight, it takes about 20 to 30 seconds to fill out a Flight Card. How do I know? I timed it, thats how. (boy, did I look stupid. Glad noone was around.) All you have to do is fill in your name (no cheating here), event (Sport, A Streamer Duration, etc.), name of model, if any, in the remarks box, and the engine type in the "Flight #1" column. Thats it. Done. Finito. When you are ready to fly, just hand the card to the RSO or whoever is keeping records that day (guess who?), and go fly. The person recording the info will write in the duration of the flight as it is determined. Pretty simple, huh? A huge supply of these flight cards has been made up, just ask. Since most people know what they are going to fly before a Section Launch, the cards can even be filled out the night before. If you fly, say, 6 rockets, it might take all of 2 or 3 minutes to fill out the cards. That's not too much to ask. After all, the idea behind this is not to DIScourage keeping track of your flights, but to ENcourage streamlining and simplifying the process. Of course, the choice is up to you; just asking for a little help.



National Association of Rocketry
OFFICIAL CONTEST FLIGHT CARD
CB-2-82

NAME	NAR # ENTRY #	DIVISION	RESULTS	PLACE	POINTS
Ronnie	44391	C			

EVENT: Sport — DURATION — REMARKS: Name of model = Honest John — WF ____ CF 1 2 3 5

	FLIGHT #1	FLIGHT #2	FLIGHT #3
Safety	(A)____	( )____	( )____
Engine	( )B6-4	( )____	( )____
Pad	____	____	____
Misfires	( ) ( ) ( )	( ) ( ) ( )	( ) ( ) ( )
Time 1	___:___	___:___	___:___
Time 2	___:___	___:___	___:___
Sum	___:___	___:___	___:___
Average	___:___	___:___	___:___
Return	( )____	( )____	( )____
Quad	( )	( )	( )
DQ/Reason	( )____	( )____	( )____

1 SUPER-ROC DURATION 2
Cm: ____ Cm: ____
x2: ____ x2: ____
Avg Time: ____ Avg Time: ____
SUM OF FLIGHTS:
PREDICTION:
+ INTO ACTUAL:
MULTIPLY x100:
ROUNDED SCORE:
SUBTRACT 100 or SUBTRACT FROM 100:

1 EGG LOFT	2	SPOT LANDING
ID: ____	ID: ____	METERS: ____
BROKEN ( )	BROKEN ( )	RETURN ( )
OK ( )	OK ( )	DQ ( ) QUAD ( )

SPAAR GETS BO'ed

On **March 12**, a good number of SPAAR members showed up at Cocalico Sr. High for what was hoped to be the first Section Launch of 1989. After a winter of building sessions, boredom, and waiting, many SPAAR members awoke on the morning of the 12th to seasonal temperatures, and little or no breeze. This was going to be a great day for flying rockets! A shake-down test of the new club launch system was planned, and many members had new models built over the winter, both competition and sport, that they wanted to try out.

The first hint of trouble came at about 10:30, when Glenn Feveryear called George Beever and asked "Hey, are we still going to fly?". "Why not?" was the answer. "Because it's blowing like crazy down here, at about 25 to 30 mph." A quick check out of the window and to the TV weather station indicated that maybe Glenn had been around the sanding sealer fumes too long. "Nope, no problem here. Winds are at 7 to 13 mph". Famous last words. Within the next hour, the dreaded cold front blew in, dropping temperatures and raising the winds to the howling stage. So much for flying today, boys. Unfortunatly, those who have to travel any distance to get to Denver were already on the road, like Glenn and his neighbors, John Yost, Ed Miller and Dave Bender, and Mark Snyder and family all the way from just outside of Baltimore (no jokes about you bringing the bad weather this time, Mark, but I am starting to wonder, kiddo). Well, all of those people, plus Dick and Bill Rhoat, Rick Hackman, and the Wenrichs showed up, but in the end, we got BO'ed. Thats Blown Out, folks, it has nothing to do with personal hygene, or the lack thereof.

However, all was not lost. The new club launch system built by John Yost over the winter was tested, and it work just fine. Two flights were made, both by Rick Hackman, to make it an official club launch. In addition, Rick showed us some fine examples of "Agrarian Rocketry", which consisted of one rocket made from a corn stalk, and the other was dubbed "The Flying Corn Cob", and it was just that; a rocket made from a corn cob. We're not sure what variety of corn it was, but I understand that Silver Queen flies much better that plain old yellow corn. Tastes better, too. These "corny" rockets didn't fly this time, but will in the future. Heads up. It really took some imagination to think those things up.

The March 12 launch will not be made up, and the next Section Sport Launch will be held on Sunday, April 16, at the same time, 1 PM. Volunteers are needed to come out around 12:30 to help set up the range.

FLIGHT LOG

Flight #	Name	Model	Motor	Time	Dur.	Misc.
1	Rick Hackman	Astron Streak	½A6-2	XX	XX	GF
2	Rick Hackman	Astron Scout	½A6-2	XX	XX	GF

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NEW MEMBER

As of March 29, please add the following new member to your membership rosters: James F. Lytle, 5051 West Heaps Rd., Pylesville, Md., 21132, ph# 301-836-1568, NAR #48748 SR. Jim will be our fourth Maryland member; he has been flying model rockets for 4 years, and is being introduced by Glenn Feveryear. Welcome, Jim, and we're looking forward to meeting you!

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Anyone who is interested in attending the Pearl River Model Rocket Seminar, to be held April 28-30, to be conducted in Pearl River, New York (NE of NYC), contact Section Advisor John Yost. This is a traditional model rocketry event, and it would be worthwhile for a SPAAR member to attend. Registration deadline is April 21.

TECH TIPS by Ed Miller

Balsa Alternative

Did you ever buy a model rocket kit and discover that the balsa fin stock was very soft and spongy? Soft, light balsa might be OK for some uses, it doesn't make a very strong and durable model. Try using bass wood. Most well stocked hobby shops carry it. It comes in the same sizes as balsa, and it is much harder and stronger. It can be cut with a standard X-Acto knife if you give it a few passes of the blade. If you use bass wood, your fins will probobly not get broken every time that you have a rough landing. The only weak point with Bass is that the fins are generally stronger than the fin-to-body joint. To eliminate this problem, try using the through-the-wall method of fin attachment.

Even stronger fins can be made from model aircraft plywood. This material is also stocked in most hobby shops. It comes in thicknesses ranging from 1/64" to 1/4". The 1/16" and thicker stock makes excellent fins. If you make through-the-wall plywood fins, they probably outlast the owner of the rocket!.

NEXT MONTH: EJECTION BAFFLES; NO WADDING NEEDED!!

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STREAMER DURATION COMPETITION

On April 16, during the regularly scheduled Section Sport Launch, we will hold the first of our "practice" events, leading up to our Section Meet scheduled for July 23. The purpose of these "practice" events is to give evryone a chance to become familiar with NAR contest rules, and to gain some experience in this facet of model rocketry. The first event to be flown will be A Streamer Duration. Some of you may remember that A SD was part of UNCLE - 1 back on October 9 of last year. On April 16, we will fly A SD, Multi-round. What is Multi-round, and what are some of the strategys behind Streamer Duration? I hope to shed a little light on both, but believe me, this is all new to me too, so we'll learn together.

There appear to be several basic rules to follow when designing a rocket, or picking out a plan for your streamer duration model:

1. Make it light! The lighter the model, the higher the altitude achieved. The higher the altitude, the longer it will take for the model to fall.

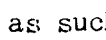
2. Use a minimum diameter body tube!!! For ½A and A Streamer (or parachute, for that matter) Duration models, this means using mini-motors, which means using either Estes BT-5 or Apogee #13 tubes, and for B and C Duration, Estes BT-20 or Apogee #18, etc, etc. Why? For ½A and A, the mini-motors are much lighter than, but put out the same power as, their standard (18mm) size counterparts; if they are heavier, the altitude acheived is less... remember point #1? Don"t worry about not fitting that streamer in that little itty-bitty BT-5. It will go in, beleive me.

Figure out how much body tube you will need. You'll need room for the motor, a little wadding, and your streamer, AND THAT'S IT! Why use 15" of body tube (more weight) when 8 or 9 inches will do?

3. USE THREE FINS!! The fourth fin only adds weight, and, well, we won't go into that again. Any loss of stability (minimal, anyway) will be made up for in increased altitude.

4. USE A 1 : 10 RATIO FOR YOUR STREAMER! Studies have shown that the overall most efficient streamer ratio is 1:10; meaning if your streamer is 2" wide, amke it 20" long; 3" wide, 30" long, and so on. Any less, and your model won't slow down enough, and much more is wasted. In addition, try accordian folding the first ½ to 2/3 of your streamer, then rolling up the rest. Again, studies have shown that this is the best drag-inducing arrangement. Streamers can be made out of almost anything, but tracing paper, mylar (mycafilm) and crepe paper appear to be the most popular. Experament!

5. USE AN EXTERNAL SHOCK CORD MOUNT. Mount your shock line in one of the fin roots, and secure it with epoxy. Put an expended motor casing in the rocket and find the balance point, and secure with tape; this will allow the rocket to fall horizontally, creating more drag. The shock cord is mounted outside of the body tube to allow more room inside for your streamer. The increased drag it may cause is counter-balanced by the additional room created for the larger streamer.

6. MISC. If you have one, fly from a tower. This will eliminate the need for launch lugs, which create drag. If you do use lugs, use 2 small ones, beveled as such: 

Avoid OVERfinishing. If you can avoid using any sort of paint, do so. If possible, use "Magic Marker" type felt tip pens to give the balsa parts some color. A light coat of sanding sealer or clear dope, sanded, will help in streamlining. For a final color, colored dopes, sanded, are good. If you are an NAR member, be sure to put your NAR number somewhere on your model, as required.

If you have time, build two or more copies of the model you are going to enter in any particular event. Duration models, I'm afraid, enjoy sailing off into the sunset, which means you stand a greater chance of losing your ½A PD model than your good old Big Bertha. If you only bring one model for an event and it gets lost or is damaged, you're done. I have found that out the hard way!

When you go out to the launch feild, remember the extras JIC (Just In Case): extra motors, ignitors, recovery wadding, streamers, chutes, etc, etc. Bring along a couple of differant sizes of streamers or chutes to accomodate changing weather conditions.

Know the rules for the event(s) that you are flying. For example, in NAR Streamer Duration competition, the streamer can only be connected by a single line to the model, at it's narrow end. This means that the Estes method of tying the streamer to the middle of the shock cord is a no-no. It would be a shame to have a great flight DQ'd for something like that!

Above all, remember that this is a sport. Even though we are measured against our fellow contestants, we are really competing against ourselves. In A SD, the object is to take a model rocket, a class A motor, and try to keep the thing in the air for as long as possible. It's a challenge, to be sure. If you win, great; if you lose, learn from it, and do better the next time around. If you have learned something, you are always a winner!

NAR RULES CONCERNING A STREAMER DURATION, MULTI-ROUND:

* Each contestant is allowed three flights in a multi-round event.
* A contestant may enter no more than two models to make official flights.
* The maximum time (max) or duration for each official flight in A SD is 120 seconds; The official duration of each flight is calculated as follows: if the duration acheived exceeds the MAX, the entry will be awarded the maximum time limit (120); otherwise the entry will be awarded it's acheived time in seconds.
* Scoring: the durations of the three flights are summed. If there is no tie for first place, the contestant acheiving the highest score is the winner. If there is a tie, additional flights (flyoffs) will be held to determine the winner, with increments of 1 minute being added to the max time.
* Models in multi-round duration events need not be returned.
* If unusual weather conditions are encountered, the CD may lower the max time to a more reasonable value.

The above rules are paraphrased from the US Model Rocket Sporting Code, other wise known as the "Pink Book".

LATE NEWS

Section Advisor John Yost has been advised of the events that are scheduled to be flown at WUBBA, a two day Regional Meet which is held each year outside of Allentown, Pa., over the Father's Day weekend. This would fall on June 17-18 this year.

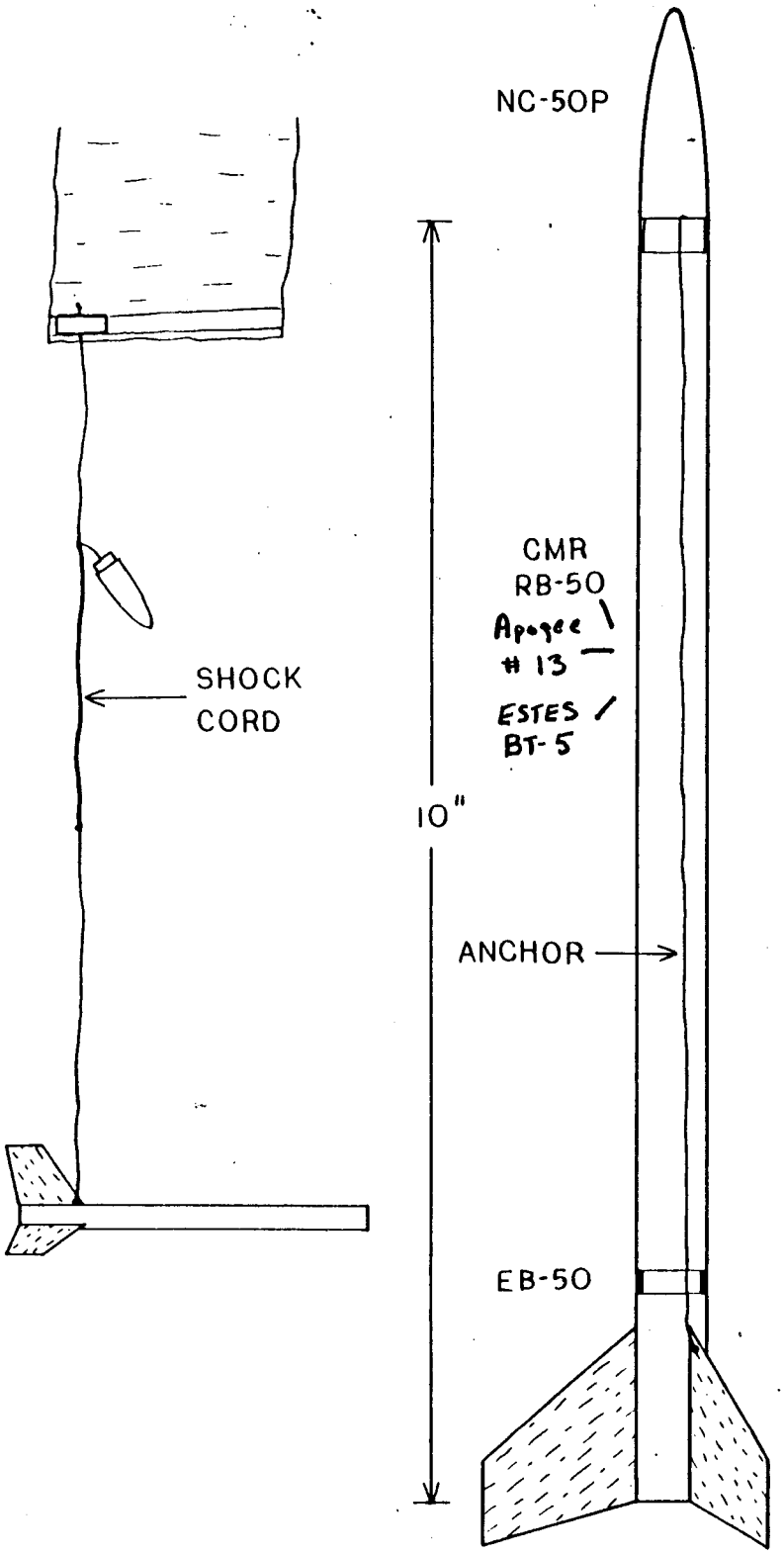
The events are:

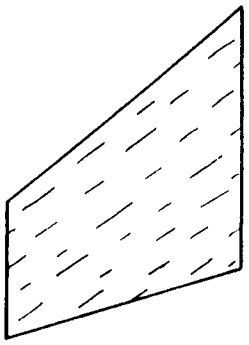
1. "E" Helicopter Duration
2. "½A" Parachute Duration
3. "B" Streamer Duration, Multi-Round
4. "B" Eggloft Duration
5. "C" Boost/Glide
6. "C" SuperRoc Duration
7. "B" Flew-wing Boost/Glide

More information about this meet will be available soon.

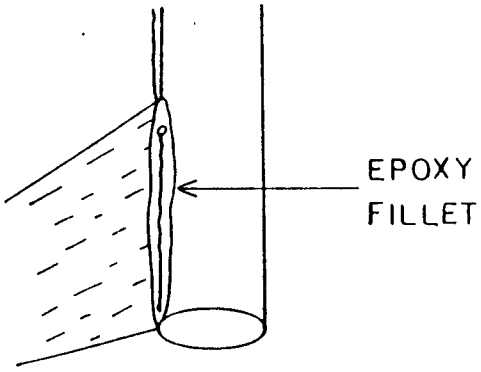
In addition, as this issue is being printed, the results from GODDARD V were recieved. As expected, John Yost placed first in ½A SD with flights of 126 and 76 seconds, good for 1st place and 60 points. Glenn Feveryear took 1st place in R R/G with a total of 103 seconds and 200 points. More details next month.

Below is an example of a Streamer Duration model, making use of the ideas and suggestions listed on pages 4 & 5. Originally built with CMR parts, it is easily adaptable to Apogee Components (see page 7) or Estes parts. Good Luck!





FIN PATTERN
1/64" PLYWOOD



ANCHOR DETAIL

CLASS A SD
by TRIP BARBER

PRODUCT REVIEW

Apogee Components

by Glenn Feveryear

Since the closing of Competition Model Rockets (CMR) a little over a year ago, modelers have had to find new ways of using the current and diminishing line of Estes products to produce competition worthy models. Unlike the products of CMR, these parts are heavier and require somewhat more finishing to achieve an aerodynamically smooth finish on a competition rocket.

Early in the summer of 1988, a new company emerged with a line of products that would again provide modelers with higher quality, lighter weight materials. This company was Apogee Components.

Although they have been in business for about 9 months, their first "official" catalog just arrived in February. This article is intended to be an overview of the Apogee product line as described in this catalog.

Probably the most obvious departure from the standard model rocket material is the "Black Shaft" airframe tubing. These tubes are made of phenolic impregnated "kraft" paper. They are stiffer than standard tubes and less likely to crimp. However, they will crack if excessive pressure is applied, either by forcing in an engine with a tight fit or by fitting a nose cone too tight. These tubes can easily be sandedto provide a very smooth finish without the need for fillers. They come in lengths of 12" to 30", making them great possibilities for SuperRoc. Prices are the same per inch as Estes, and you're getting a better product. One last thing on tubing: Apogee is selling a kraft-paper tubing that they call "Tele-tube". This could be the answer for competition payloads since the Black Shaft tubes will fit inside, with a pretty close fit.

"Nova Cones" are the next item in the catalog. Made of black ABS plastic, these cones need very little finishing, if any, and have a smooth transition joint between the cone and the body tube. One drawback, however, is the very loose fit when inserted into the body tube. If you are using an external shock cord mount, this will tighten the fit. Maybe someone was really thinking here.

Going on, we find a product that will surely replace the old CMR egg capsule: the "Nova Eggcone". This cone, although designed with a slightly differant shape than the CMR version, provides a very good fit for an egg. Again, this cone is made of ABS plastic requiring almost no finish. The $5.95 price may be a little steep, however.

CMR introduced using model aircraft plywood for fin material, and now Apogee introduces a material they call "Waferglass". This material, available in thicknesses down to .015" is greatly differant from balsa or plywood, as it has no real grain. Aside from making a much stronger fin, this material again requires almost no finishing. One other nice feature is that you don't need a knife to cut the thinner stuff; just find the pair of household scissors.

Concerning recovery materials, Apogee is selling a very interesting assortment of High-Tech items which are a real departure from the norm. "Micafilm" streamer material is one. Although I have never used this stuff myself, the description of it is very interesting, and John "I found it by the bridge" Yost did manage a 2 minute+ time using it for streamer duration at GODDARD V. The cost seems a little steep, but it may be worth it if John's time is what can be expected. Kevlar shock- and shroud-line is the second new material. Although very strong, small in diameter and lightweight, this stuff may be an example of "overkill" for model rocketry. The price is high, considering that you can make a 12 shroud-line chute using carpet thread for just pennies. I wonder if the Kevlar will really save that much?

As the catalog continues, we find the standard assortment of engine blocks, couplers, transitions, centering rings and launch lugs. Some of the materials used for these items are differant than what is normally used, and may prove their worth over time.

On the last few pages, Apogee gives very good and comprehensive tips and instructions on using their products. If they are followed, you should have no problems using Apogee products. In summery, I feel that Apogee has begun to fill the void left by CMR's demise. Their products are of high quality and service is fast; the prices are a bit high, but you are paying for higher technology. For a catalog, send $2.00 to: Apogee Components, 11111 Greenbrier Rd., Minnetonka, MN, 55343.

TO:

Southern Pa. Area Assoc. of Rocketry
NAR Section #503
PO Box 127
Reamstown, Pa 17567

The COUNTDOWN - April '89

SOUTHERN PENNSYLVANIA
AREA ASSOCIATION

OF ROCKETRY
SECTION 503

SPAAR #503