



# The Upstate Rocketeer

Official Publication of MARS™, the Monroe Astronautical Rocketry Society,  
Section 136 of the NAR®



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## Special Building-Season Issue

In this issue we have several plans. Two are for cluster birds (one mini-engine, the other high-impulse); another is for a B/G. There are also "how-to" articles for those plan-

ning projects, and an interview with scale maven Peter Alway. We've also got the latest on MARSCON '94, which promises to be a great convention. Enjoy!

## New Year's Day Launch

### Launch Coverage by John Viggiano

MARS's own answer to the Polar Bears Club, our annual New Year's Day launch, was held at the Memorial Park in Henrietta. This was the first launch since losing the Videk field in Farmington in December. It would seem Memorial Park has become our new "interim" field.

Present were Jay King, John Viggiano, and new MARS friends from Honeyoye Falls, Ken Forney and his wife. The windy weather, the late announcement of the site, and the long holiday weekend all conspired to keep the turnout low. Nevertheless, some significant "first flights" were made.

First MARS flight of 1994 was John Viggiano's brand-new Thunderhawk-BT with a boat tail. John painted it white in the middle, fluorescent orange at the bottom, and gold at the top to coordinate with his Firehawk-MP (which is now hanging in a rocket-eating tree in a New Jersey schoolyard after a flight there on Thanksgiving weekend).

Next, Jay christened his classic Estes Goblin with a D12-5. Even with streamer recovery and careful angling of the launch rod, Jay had to hike to the far edge of the park to make his recovery. It was well worth it, though, for that beautiful flight. There's nothing like starting off the new year with lots of "oompf!"

John followed up with the first flight on his "Dampf Bahn," a slender rocket so-named because it was designed



*FIRST FLIGHTS, '94 – John Viggiano (left) and Jay King pose with the rockets they flew for the first time on New Year's Day, a MARS tradition.*

to eventually take the FSI "Steam Engine," the celebrated F7. Except for a short upper section, it was unpainted, and made its maiden flight on a B6-4. Despite an external shock cord mount, a couple of fins suffered damage on landing.

Ken flew his first rocket with our club, a very nice Estes Nova on an A8-3. It turned in a couple of nice flights that day, landing within a few meters of the same spot both times. It would be nice to have Ken fly Spot Landing for us at NYSPACE!

There were some other people flying rockets on the other side of the baseball diamond from us, and we thought they might have been other members of our club. They turned out to be people flying Christmas present rockets, and in spite of Jay's cordial invitation, they did not want to fly with us. It's too bad, as they missed the opportunity to see the maiden flight of Jay's Quest Intruder. When we told Jay how impressive it looked, he remarked that he hadn't yet put all the decals on it.

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## Opinion / Editorial

### Rhymes of the Range

This is John writing, and I'm happy to announce the winner of the "Name the Editorial" contest, Damon Runyon of Manhattan, who assumes no responsibility for the editorial which follows . . .

The *United States Model Rocket Sporting Code*, aka the Pink Book, is the set of rules by which we run sanctioned competition. Unlike the FAA's set of rather arbitrary and stifling rules, every rule in the Pink Book is there for a rational and reasonable purpose. Is the Pink Book perfect? Of course not. But I do believe it is the most perfect set of rules for flying rocket contests ever devised.

Because rules often need interpretation, the Pink Book provides for a National Contest Board and a National Contest Board Director. Currently, this position is held by Mr. Matt Steele. It wasn't too long ago Mr. Steele was carrying on about the conduct of the Contest Board Director at that time, Mr. Mark "Bunny" Bundick. Bunny had made several rulings which were unpopular with Mr. Steele. As I understand it, there were Regional contests, which carry the most points (besides the National meet), held with only two competitors. Our current requirement for ten competitors was a result of one of these rulings. Mr. Steele's attacks degenerated into personal slurs and remarks degrading Mr. Bundick, including editorials in *SNOAR News*, a section newsletter edited by Mr. Steele.

Now that the shoe is on the other foot, Mr. Steele is conducting Contest Board business beyond reproach, *n'est ce pas?* Alas, no. His actions provide some insight into his dissatisfaction (if that's what one could call the cause of those vitriolic tirades) with Bunny's performance. Allow us to examine two incidents.

The first is Mr. Steele's puzzling ruling that the requirement for safe, qualified flights did not somehow not apply to the Sport Scale entries at this past NARAM. Although expressly and explicitly prohibited in the rules, Mr. Steele instructed NARAM-35 CD Tom Lyon to award NAR contest points on the basis of the static scores alone. This action was the subject of a protest filed at NARAM, and is the center of a controversy that persists to this day.

Personally, I was quite disappointed to loose the last day of NARAM to poor weather. However, there is little one can do about it, besides schedule NARAM quite differently. It is not prudent to bend the rules, let alone have at them with a machete, to provide consolation for inclement weather.

The second incident is Mr. Steele's questionable advisory ruling purporting to permit the use of reloadable engines in contest flying. Once again, their use is expressly forbidden because of two rules. Rule 4.9 says that all engines used in competition must have a non-metallic casing, and reloadables have metallic casings. However, this is purely a safety issue, and this rule should be changed to reflect the changes in the Safety Code. Rule 4.10 says that the engine must be factory loaded. While this addresses safety concerns which have changed, it also serves a legitimate competitive purpose. It is infinitely easier to alter the total

impulse of an end user-loaded engine than one loaded at the factory. Neither of these rules have, to my knowledge, been altered or stricken. The proper procedure for doing so is through the Rule Change Proposal process, where it would be voted on by the membership of the Association.

There are other legitimate reasons why the use of reloadable engines in impulse-specific contest events deserves more consideration. For one thing, their purchase, possession, and use is prohibited to persons under the age of 18 years. When competition divisions are combined, this means that some competitors would have the option of using or not using an engine whose use was barred by federal law to others against whom they are directly competing. Without giving the members and competitors the ability to debate these considerations, Mr. Steele has again overstepped his authority and come up with another fiat irrevocable to the rules.

Apparently, Mr. Steele feels the job of the National Contest Board Director includes completely sidestepping the rules, using rubber rulers in order to produce a popular ruling. His dissatisfaction with Bunny's refusal to do so indicates this, particularly in light of his repeated tendency to do so as Director. I, for one, prefer a stable set of rules, even if I don't like some of them, rather than a set of rules which can change according to the whim and fancy of a single individual. It is quite ironic that, just a short time ago, Mr. Steele was gleefully helping himself to the largest serving of hasenpfeffer (as he put it) after lambasting Bunny for a mistake. For Mr. Steele's sake, let us hope that his iniquities are not met with the type of gloves-off slug fest which he so vigorously promoted for Mr. Bundick. For the Association's sake, let us hope we have in either Mr. Steele or some other individual a National Contest Board Director who is willing to uphold the letter and the spirit of the rules.

Until next time, have fun & fly 'em high!

John >

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**Submissions:** Submissions are welcome from any source. We prefer material in electronic form (flat ASCII text), though please submit a hard copy as well. Currently, we accept color and black and white prints, slides, and Photo CD.

#### MARS™ Officers:

President:	John Viggiano
Vice President:	Wayne Foster
Secretary-Treasurer:	Ferenc Gy. Róka
Immediate Past President:	Jay King
President Emeritus:	Daniel Wolf

## MARS Club News

### Meeting Summaries:

At the December meeting, the club by-laws were changed to eliminate the six month "lame duck" period from when new officers are elected and when they take office. This change also effectively eliminated the President Elect, Vice-President Elect, etc. positions. The by-laws now state that the new officers will take office immediately upon election. Also at the meeting, the following officers were elected for the 1994 calendar year:

President - John Viggiano  
Vice President - Wayne Foster  
Secretary-Treasurer - Ferenc Róka

Also at the December meeting, a new club launch site was discussed. This has become the number one priority item for the club. Now that the former Videk site is not available, the club has no regular flying field. With the internal political problems going on at the Warplane Museum, we may not have a field for our large meets and launches either. Thus locating a new field has become the number one priority item for the club. A launch site search committee was formed at the meeting. Committee members are searching for a new field with each member assigned to specifically check out one "quadrant" of Monroe County. The committee consists of:

Dan Wolf - Northwest quadrant  
Ralph Fargnoli - Northeast quadrant  
Jay King - Southeast quadrant  
John Viggiano - Southwest quadrant

Also at the meeting, it was proposed that a committee be formed that would be responsible for maintain the club's launch equipment and other GSE and also be responsible for bringing it to the club launches. This committee consists of:

Ralph F.  
Dan W.  
John V.

At the January meeting, MARSCON '94 was discussed (see related articles in this issue for more info on MARSCON). Also discussed at the meeting was NYSPACE '94. Originally, we had decided to hold NYSPACE in May because experience indicated that June was often a very crowded month (ie. ECRM, Battle Park, and RAMTEC). Since then, we learned that ECRM 21 is being held in April and that Battle Park '94 is being held in May. With several club members making plans to "do" both of these events, it was decided to move NYSPACE to June. This gives us one "big" event each month from April through June (see related article). Events for NYSPACE were also set. They are: 1/2A Boost/Glide, 1/2A Streamer Duration, A Super-Roc Altitude, D Dual Eggloft Altitude, Open Spot Landing, and Scale.

Also at the meeting, the topic of the meeting night was discussed. We have been meeting on Tuesdays now for about 5 months. Even though the attendance has not changed dramatically, it was felt it was too early to change the meeting to a different night. At the same time, it was also noted that Tuesday is not a good night for some members. Therefore, we agreed that for the month of February, we will be meeting on both the second Tuesday and the third Friday. The Friday meeting will be more of a social meeting so bring something along for show and tell.

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## As the Rocketry World Turns...

(news and rumors heard 'round the hobby)

**Manufacturers News...** In a recent post on Modelnet, Ed LaCroix reported that Apogee Components has been working with AeroTech again, this time in the development of 24mm reloadable R/C glider motors. The complete motor case will retail for \$49.95 and three reload kits will initially be offered for it. They are the D7 (3 pack - \$6.95), a 30 ns E6 (3 pack - \$8.50) and a 40 ns E6 (3 pack - \$9.95). Also from Apogee, the long awaited glider kits are reported to be imminent and Ed may bring some along for sale at the NSL. A new catalog is also said to be available "Real Soon Now". Lastly concerning Apogee, the 1/4A3-2T motors will lose contest certification at the end of this contest year. Estes A3-2T,6T motors will loose certification then.

It has been reported that North Coast Rocketry's E & F composite motors are soon to be available. NCR hopes to bring them to the NSL as well at least for demo flights, if not for sale. Several people have reported a high failure rate of the new Estes E motors. On a recent modelnet post, Michael Hellmund of Estes reported that "... the E quality

problems have been fixed in production runs after 12/15/93 (Batch code 15X12). The runs prior to that had a propellant density problem." In other Estes news, the 1994 catalog is now out and although it isn't yellow, the "technical pages" have returned after being absent for many many years. The new technical section was apparently "done" by Tom Beach and Joyce Guzik.

**NAR News...** The NAR Board of Trustees met in November. Here are some highlights (thanks to posts by Bunny on Usenet and Modelnet). First, the NAR Comptroller Stu McNabb was nominated and approved to fill out the remainder of Gary Rosenfield's term. Second, NARTS plans to have "Advanced Topics in Model Rocketry" reprinted. The NAR will pay the authors a 10% royalty and NARTS will have a 5 year exclusivity on sales and distribution. John Sicker is in the process of building a new HPR engine test stand for NAR S&T. Third, the first issue of a "competition newsletter" was sent out to about 300 NAR members, presumably all who flew in at least one sanctioned contest last year.

Last but not least, during the review of the magazine operations, *Sport Rocketry* editor Steve Weaver presented a

proposal to "take the magazine private." At the same time, it was also reported that Mr. Weaver has spent \$20,000 of his own money on the magazine over the past year. This news means that the magazine we've been getting over the past year is costing us quite a bit more than we thought. As a result of these disclosures, Mr. Weaver's duties as editor have been redefined and Mr. McNabb has assumed the financial and contractual controls of the magazine. At the same time, a special committee consisting of Dave Lewicki, Vern Estes, Chris Tavares and Mark Bundick (chairman), was formed to deal with Mr. Weaver's proposal and will prepare a "request for proposal" for magazine production and distribution. The committee will make recommendations to the board at the February meeting. (This is a brief summary of Bunny's posts; see me if you wish to see the full text—ed.) Because of the higher than expected magazine costs, the Trustees have also voted to raise dues. The new dues structure, effective April 15th, is as follows: Juniors - \$20, Leaders - \$20, Seniors - \$35.

**Tripoli News...** This month's Tripoli news concern two popular "East Coast" launches. First, it appears there will not be a spring Danville launch due to the lack of a suitable field. Second, Battle Park 94 will be held in Culpeper, VA on the weekend of May 21-22. The launch system is said to have been extensively upgraded to alleviate problems that have plagued this otherwise great launch in the past. Many vendors plan on attending and it is shaping up to be the biggest and best launch ever. Over 200 flyers are expected with 10 L motor flights and 2 M motor flights already being planned. Make your reservations early. The Comfort Inn is the official hotel and it is sure to fill up fast. Comfort Inn phone (703) 825-4900. For more information contact: Mike Showalter (Tripoli Central Virginia) 1090 Norman Road, Culpeper, VA 22701, Phone (703) 547-2539.

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## Sport Plan: Mini Viper IV

by John Viggiano, based on the full-size version by LOC/Precision

The LOC Vipers are large birds having either three (as with the Viper III) or four (Viper IV) 24mm engine mounts. Here's a half-scale version of the Viper IV, made to fly on either two or four mini engines. (I favored this over the III, which may only be flown on three engines.) In addition to a length of BT-55 and a PNC-55AC (which was designed for the scale model of the Arcas, by the way), you'll need the following:

- 4 pieces of BT-5, 152mm (6 inches) long
- 4- 13mm diameter engine blocks (from Apogee, or cut your own from expended engine casings)
- 2.5mm (3/32") Balsa sheet
- Launch Lug, Shock Cord, Parachute, etc.

Although a length of 360mm is indicated on the plans for the BT-55, feel free to use the entire 18 inches if you don't feel that you absolutely must have a model half the size of the original Viper IV.

Start with the BT-5 tubes. Sand away some of the glassine, which interferes with proper bonding. On each tube, mark a ring 40mm (1.6") from one end. This end with the mark will be the forward end. With all the tubes that will be

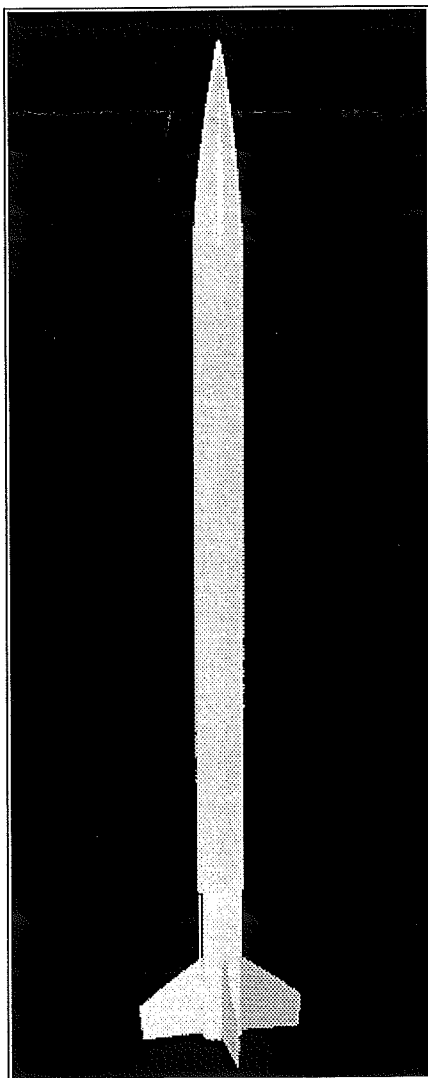
on your workbench before you're done, it will be easy to get a tube "aft-backwards." Having the marks will work in your favor.

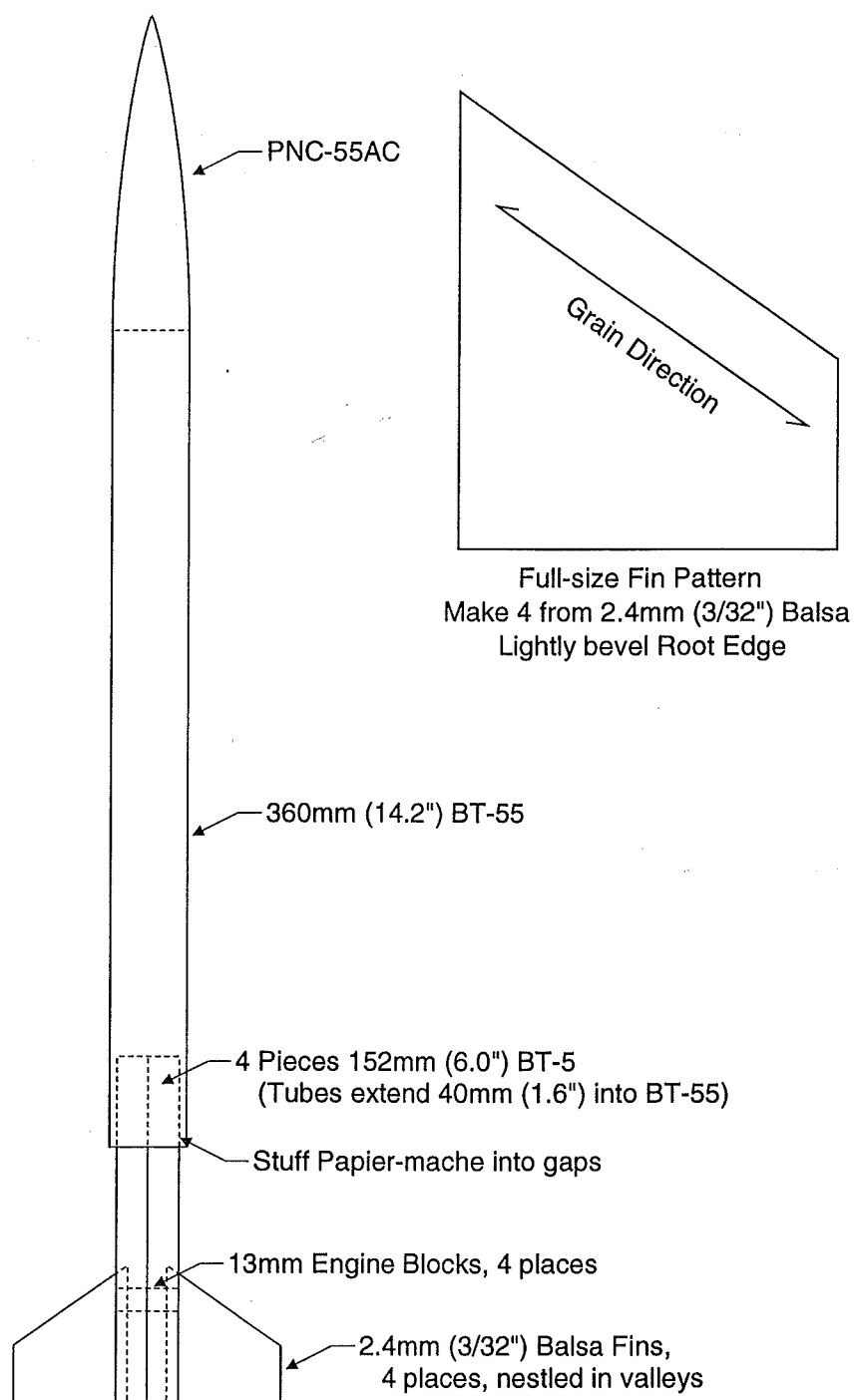
Insert the engine blocks in the aft end of the tubes, away

from the marks. If you choose to use a nylon bolt as an engine retainer (as I did), it is important to have all the engine blocks the same distance from the aft end. Glue the tubes together in pairs for easier alignment, making certain the ringed ends stay together. While they dry, cut out the fins. Remember all those years you had to keep the root edge nice and square, while you profiled the other edges? This time you get to round the root edge too, the better for it to nestle in the valley between the engine tubes. But don't glue those fins in just yet! Fill the balsa grain. I used a coat of Elmer's Fill 'n' Finish on each side, followed by sanding.

Apply some wood glue to each of the BT-5s, and bundle them as squarely as possible, holding them in place with rubber bands. Again, wait for the glue to dry, periodically checking the corners with a square. Put a fin at the aft end of each valley and fillet heavily. (If you do this step before putting the engine tube assembly in the BT-55, it's easier to use a Kuhn fin alignment jig.)

Now comes the tricky part. It takes a little bit of a stretch to get the four BT-5s to snuggle inside the BT-55. Coat the lower 40mm (1.6") of the inside of the BT-55 with wood glue, and coax the engine tube assembly in to the marks you made earlier. It's important to make sure





## Design Decisions and 1/4 A SRD

**By Jay King**

When designing a competition rocket there's always a temptation to build the ultimate model, to use the lightest, high tech. materials, most sophisticated design principals and highest quality of finish. This approach can advance the hobby but it is seldom competitive or personally rewarding. A good design is often referred to as being "efficient" meaning that its application is the best compromise of time, materials and other resources versus performance for the maximum return. For competition model rockets this means balancing the amount of design and construction time against potential gains in performance.

the joint isn't crooked; you can do this by rolling the assembly on a flat surface with the fins hanging over the edge. Watch what happens to the cusp at the center of the engine tubes, and adjust accordingly. When dry, make some papier-mâché from tissue and wood glue and stuff it between the BT-55 / BT-5 joints, and some more between the BT-5s.

You can use a nylon version of those posts used to hold together photo albums instead of engine hooks. With four engines in place, conventional engine hooks can become unwieldy. I epoxied the small sleeve from one of these devices into the area between the BT-5s. The bolt-like part screws into this after the engines are installed.

The remainder of the construction is straightforward, but make sure, when flying, to place wadding above all engines to avoid the dreaded reversed cross-ignition, which is more popular with the spectators than it is with the person who built the rocket: the ejection charges of the correctly ignited engines can ignite the ejection charge of an engine which did not light on the pad. It will burn in reverse, frying the bejeezus out of your rocket from the inside out. If you use only 2 engines, the remaining two tubes may be plugged with expended engines. Also keep in mind that if you use four A10-3Ts, you'll have an average thrust of 40 Newtons, which is quite a kick for a small rocket like this. The prototype flew quite nicely on a pair of A3-4Ts.

Have fun, and fly your Mini Viper IV high!

>

I was planning for NYSPACE 93, deciding what to build for 1/4 A Superroc Duration. I knew that the intense competition called for a highly competitive model but I could not afford to expend all my efforts on this one event and ignore the others. I needed to allocate the optimum amount of my resources.

I decided that I would prepare several designs and compare their potential performances versus the resources required to construct them. The main resource was time, model rocket parts being fairly inexpensive, cost of materials was not an issue. The performance evaluation would be based on altitude. Altitude predictions are straight-forward and a model that delivers its parachute to a higher altitude generally returns a greater

*figures follow; text continued on page 15*

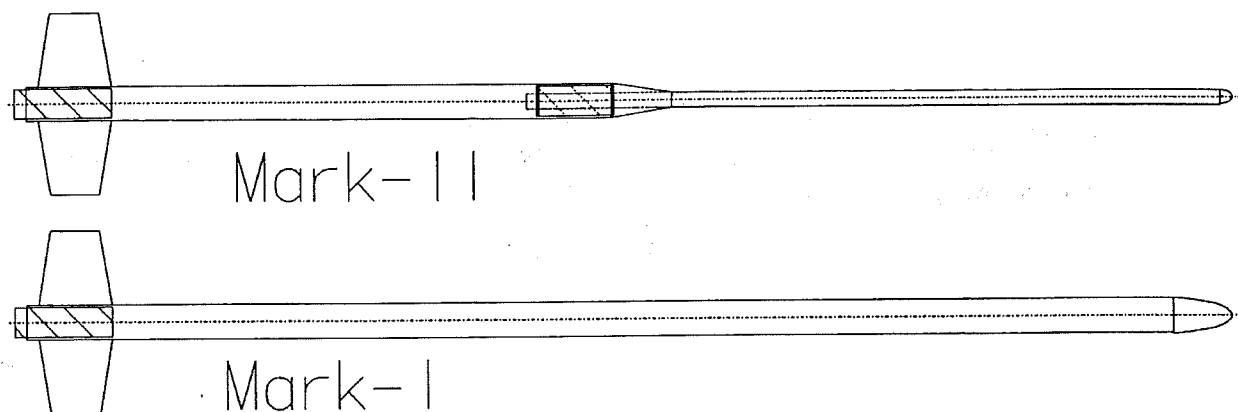


Figure 1.

Model	Mass	unit	M 1 A	M 1 B	M 1 C	M 2 A	M 2 B	M 2 C	M 2 D	M 2 E
BT-5	mm	459	459							
PT-6	mm				265	265	265			
PT-13	mm				250	250	250			
Soda Straw	mm								265	265
Vellum - 13 mm	mm								250	
Fiberglass 13 mm	mm									250
13 mm Balsa NC	#		1	1						
13 mm Plastic NC	#				1					
6 mm Balsa NC	#					1	1	1	1	1
13 to 6 mm Plastic Reducer	#		1							
13 to 6 mm Paper Reducer	#			1	1	1	1			
13 mm Stage Coupler	#		1							
Fins 1/16th Balsa	#		3	3						
Fins 1/32nd Balsa	#				3	3	3			
Fins Waferglass	#		3	3	3					
Engine Block	#		1	1	1	1	1	1		
Mass of Model	gm		6.52	7.52	8.43	7.92	6.94	6.29	3.2	4.07

Figure 2.

Estimated Model Mass.

Model	Cd				
Mass	0.8	0.7	0.6	0.5	0.4
3	69	76	85	95	107
4	68	74	82	91	102
5	66	72	79	87	96
6	63	70	75	82	90
7	60	65	70	76	83
8	57	61	66	71	77
9	53	57	61	65	70

Figure 3.

Estimated Maximum Altitude.

Construction Time Est.	unit	M 1 A	M 1 B	M 1 C	M 2 A	M 2 B	M 2 C	M 2 D	M 2 E
Prepare Main Body	min	5	10	10	5	5	5	60	120
Prepare Upper Body	min				5	5	5	5	5
Assemble Reducer/Coupler	min	1	1	1	10	10	10	10	30
Cut, Shape & Finish Fins	min	10	10	5	5	5	15	15	15
Assemble fins	min	10	10	10	10	10	10	10	10
Construction Time Est.	min	35	41	31	40	40	50	105	185

Figure 4.

Estimated Construction Times.

Summary	Unit	M1A	M1B	M1C	M2A	M2B	M2C	M2D	M2E
Mass of Model	gm	6.52	7.52	8.43	7.92	6.94	6.29	3.2	4.07
Mass of Recov. Sys.	gm	2	2	2	2	2	2	2	2
Mass of Engine	gm	6	6	6	6	6	6	6	6
Total Mass	gm	14.52	15.52	16.43	15.92	14.94	14.29	11.2	12.07
Est. drag coeff		0.8	0.6	0.6	0.4	0.4	0.4	0.4	0.4
Total Construct Time	min	35	41	31	40	40	50	105	185
Engine Prop. Mass	gm	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Engine Thrust Dur.	sec	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Engine Avg. Impulse	n	3.26	3.26	3.26	3.26	3.26	3.26	3.26	3.26
Engine Delay	sec	4	4	4	4	4	4	4	4
Estimated Ejec. Alt.	mtr	55	58	54	65	71	75	95	85
Construct Time Est.	min	35	41	31	40	40	50	105	185
Models per 10 Flts.	#	1	1	1	1	1	1	5	3
Const. Time for 10 Flts	min	35	41	31	40	40	50	525	555
Performance Factor		1.57	1.41	1.74	1.63	1.78	1.5	0.18	0.15

Figure 5.  
Summary and Performance Factor.

## The Fly Boost-Glider

by Philip A. Slaymaker

(Originally appeared in the old MARS newsletter,  
*The Full Blast*, Volume 6, No. 2, Dec. 1975)

### Editors Prelude:

*I'm publishing this plan for two reasons. First, I thought that this style of B/G was always a lot of fun and that some of you may enjoy building one. I remember watching Phil fly this one at some of the first MARS launches I attended back in the 70s and I always enjoyed watching it fly. Second, I have notice some of you having difficulties in B/G with pod separations (either not separating or separating early) and this design will prevent that. Along the same lines, you also might want to check out Al Nienast's Black Gnat fixed pod B/G plan that we ran in 1992 in UR. This one is here mostly for fun, but it does fly well and makes a nice attention getting backup B/G. Perhaps a good one to have when you need a qualified and returned second flight.*

I'm presenting the original plans for the FLY B/G, partly as a matter of historical perspective. It was first designed and flown about 10 years ago (almost 30 now!, ed.) when hand-launched style B/Gs had not yet come into vogue. Among its better-known contemporaries were the Invader, Raven, Flying Jenny and the Space Plane.

The Fly is basically a large-finned rocket, and as such, has good flight characteristics, and achieves a good altitude. The flat plane airfoil and the lack of a separate stabi-

lizing surface causes poor glide stability, however. I've seen them glide upside-down, spiral dive, as well as glide perfectly. Just check the glide between each launch, and balance for a slight stall. This will compensate for build-up of ejection charge residue.

Construction is exceedingly simple. All the balsa parts can be from a single 1/16" sheet of B or C grained balsa. A 4 1/4" piece of body tube, a matching nose cone and a launch lug complete it. The only recommendations are to use an aliphatic resin glue, such as Titebond, to use double-glue joints, and to complete with a light finish, such as a coat of florescent Krylon spray paint.

When balancing, just throw it upside down, balance for a turn and a slight stall, and test fly with a 1/2A6-2. The engine is recovered according to NAR safety rules. Center and glue a 1 1/4" piece of BT-5 (or equivalent) to the ejection charge end of the casing. Then glue a 1" x 24" crepe paper streamer to the tube. The streamer is packed most easily by folding it.

Happy flying!

*Editor's Postlude: I'm not sure if the above procedure for attaching the streamer pod to the engine is still viewed as legal (remember this was published when tandems were still legal). Alternate methods to Phil's procedure might be to tape the BT-5 to the engine or to build with an Apogee PT-18 tubing and matching nose cone. The larger ID tube allows for a thin mylar streamer to be taped to the motor and rolled up around it.*

# THE FLY B/G

Designed by: Phil Slaymaker

Drawn by: Dan Wolf

(based on plan from Dec. 1975 Full Blast)

## Parts List

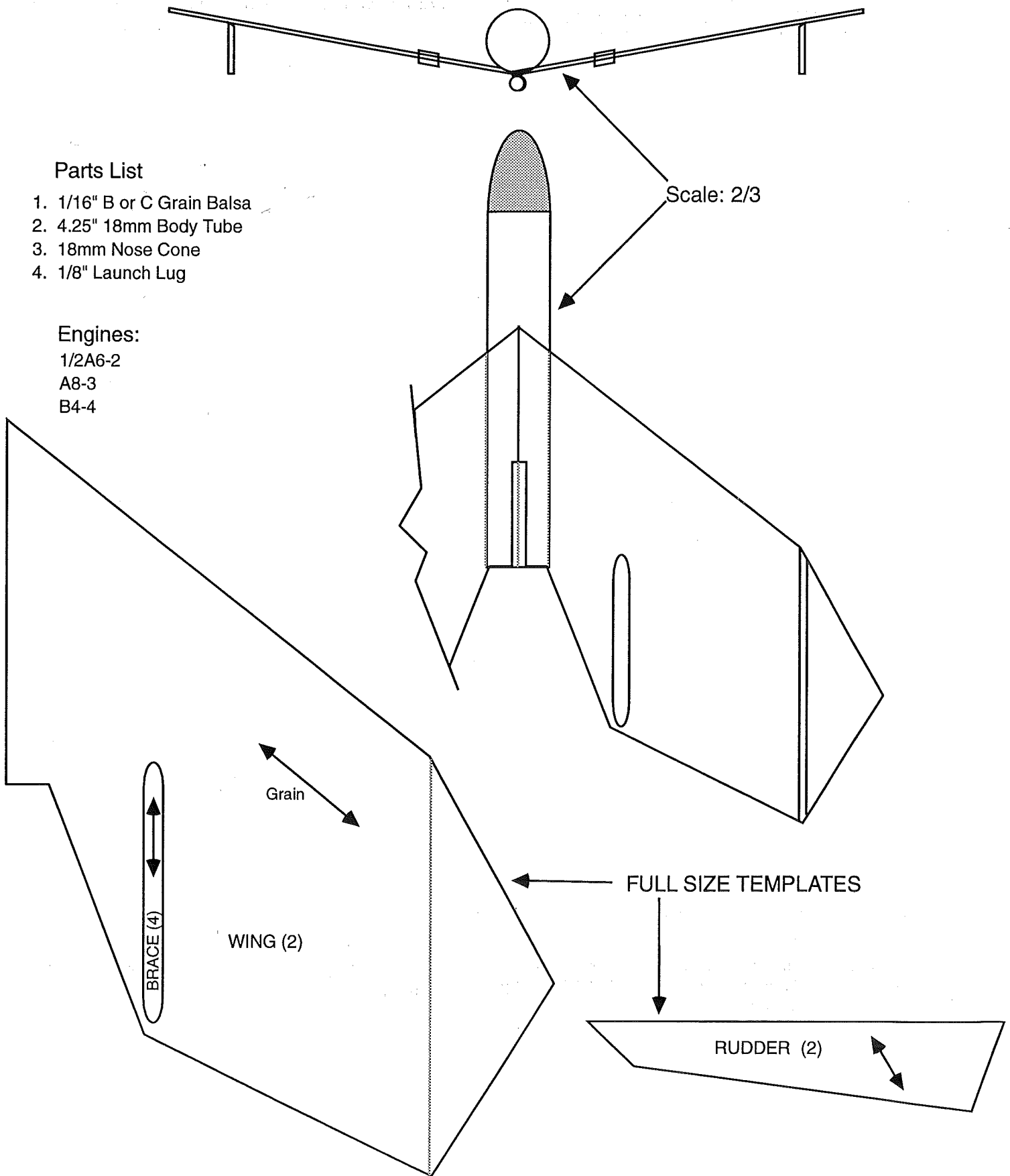
1. 1/16" B or C Grain Balsa
2. 4.25" 18mm Body Tube
3. 18mm Nose Cone
4. 1/8" Launch Lug

## Engines:

1/2A6-2

A8-3

B4-4





## Interview: Peter Alway

Scale rocketry fanatic, scholar, and author Peter Alway had agreed to be interviewed by UR associate editor John Viggiano during NARAM week. Unfortunately, there was not enough time at NARAM to conduct the interview, so Peter allowed us to interview him by electronic mail, instead.

UR: I'd begin with "What got you interested in rocketry," but you came from a family in which rockets were popular, didn't you?

PA: Yeah. My 2nd-oldest brother, Bob, was infected in school, when he found out the Rocket Club wasn't just flying water rockets, but Estes real pyrotechnic rockets. He was astonished that the things were legal. He infected his three younger brothers. I never got over the infection. I don't call myself a "Born-Again Rocketeer" because I have always been too much of a nerd to be distracted by cars and girls like the typical BAR.

UR (wondering if there is such a thing as a "typical" rocketeer, born again or otherwise): Let's begin with something a little different, then: What got you so doggone interested in Scale Rocketry?

PA: Probably the Saturn IB and Saturn V at the back of the Estes catalogs of 1969-1971. I've always done plastic modeling as well. When the Huron Valley Rocket Society (HVARs) started in 1985, I was shocked to find how little scale modeling was done. I had assumed that a third of everyone's collection was scale. These were models, after all. People seemed to like the scale models and plans I did in the early years of the club, so like one of B. F. Skinner's mice, I responded to positive reinforcement with more of the same....

I actually found all those Nike-Tomahawks and IQSY Tomahawks a big turn-off at the time. I couldn't figure out why people didn't do the big stuff like Saturns and Titans and Redstones.

UR: Legend has it that the Alway Brothers scratch-built everything. Was your first scale rocket scratch-built, or was it from a kit?

PA: Gee, good thing I drew a list with little pictures of all my rockets as a kid. I'll have to check... Would you believe I kitbashed my first scale kit (an Estes Semi-scale BT-60 Saturn V) into a goofy sport model?

Here it is! Back in Junior High School, I built a BT-60 Sputnik 2 from G Harry Stine's data in *Model Rocketry* magazine. All sorts of rolled cones in it. I actually found a photo of it lifting off a few years ago, and it's on the cover of the Jan-Feb 1988 *T Minus 5*. I recall it was a very flimsy model, as the cones were not well supported on the inside. Eventually, I converted it into a Vostok. I remember the paper nose cone was so stuffed with plasticene that the oils from the clay started turning the nose to mush.

UR: Describe your workshop. What kind of tools do you have?

PA: My workshop is burried under a couple year's debris, as it's been that long since I've built anything there. (smiles)

The only fancy stuff is a nice, big drill press for turning nose cones and a dremel lathe for smaller parts. Other than that, I use an X-acto knife, Razor saw, Carpenter's wood glue, K-Mart spray paint, scissors, finishing sandpaper, and occasional plastic glue. On rare occasions I use Epoxy or Super glue, but I'm pretty stone-aged for the most part. I'd like to try casting and vacuforming, but I haven't done it yet.

UR: Aside from writing and publishing two excellent and acclaimed books, what hobby-related experience has been most satisfying?

PA: Taking the masking tape (OK, Scotch magic tape) off a scale model after the last coat of paint, and watching one of my few boost-gliders fly well (not necessarily long duration, but putting in a pretty flight). I've really enjoyed the two NARAM's I've attended, as well. I enjoy being in correspondence with people all over, and meeting them at NARAM.

UR: Is there anything about the hobby that really has you steamed?

PA: Well, the rules change that gives too much emphasis on mission points in scale and Sport Scale. It makes a lot of really neat subjects less competitive because the prototypes didn't stage. Of course, this may just be because The 1993 Team Champions keep beating me with staged models that I don't think are as cool as my 1-stage models....

I have proposed that the rules be changed back and that "Space Systems" (which seems to never be flown) be turned into a sort of mission points free-for-all, in which all sorts of mission points are counted more than static points. I'd like to see events for modelers who enjoy "astrobatics" as well as for stodgy farts like me who build their models for accuracy and craftsmanship.

UR: Tell us about your section, HUVARS. How many members do you have? How many are really active?

PA: We have around a hundred newsletter subscribers from Ann Arbor to Hong Kong. About 30 are in Michigan and are considered members. About a half dozen are active. Many of our active members are slowing down, but we've been getting some new folks as well. I think we have some remarkably talented people in our club, thanks in part to the University of Michigan's influence.

UR: How do you fit into your section's scheme of things?

PA: I produce the newsletter, which is now only 4 or 5 months behind schedule.

UR: What type of activities does your section sponsor?

PA: We hold 3-4 NAR sanctioned contests a year, and try to hold sport launches at least once a month. Some of our members teach classes for the Ann Arbor Hands-On Museum and other civic groups. In the past we've held the Mid-American Spacemodeling Conference (MASCON).

UR: Your latest book, *Rockets of the World*, is magnificent. Was it the herculean effort it appears to have been?

PA: It was a lot of fun as well as a lot of hard work. The drawings of a given subject stopped being fun after a couple days. The Space Shuttle and Ariane drawings were herculean efforts! I must admit that illustrating was, for the most part, a compulsive addictive behavior that I really enjoyed. So was researching. Writing the thing was the hard part. I found it difficult to write about the better known manned flights especially. I find myself assuming that everyone knows about Mercury, Gemini, and Apollo, but of course, anyone born in July of 1969 is 24 by now. It's hard to write something fresh about something that you think of as basic knowledge. It was a lot more fun writing about the obscure stuff. It took 2-3 years to produce the book, but as my hobby had transformed into rocket history, it didn't quite seem "herculean."

UR: I understand there's another book coming out soon. Please tell us about it.

PA: *Rockets of the World* was meant to be the second edition of *Scale Model Rocketry*. [This was Peter's first book.] It grew into a grossly enlarged version of the data and history sections of the book. I am working on a grossly enlarged version of the How-to section of *Scale Model Rocketry* now. Most of the expansion will be in the form of model plans. The thing seems to be growing from 64 pages to 96 pages. I hope the high points will be Saturn I and Vostok plans.

UR: What is your favorite scale rocket model that you've built yourself?

PA: Easy. The 1/69 scale Saturn I I built in 1987. The one that took first in static judging at NARAM last summer. Cool picture of it on the cover of the December 1987 *AmSpam*. (Gloat Gloat Gloat)

UR: What is your favorite scale rocket model that someone else built?

PA: I got a good look at Bob Beidron's Ariane 3 at NARAM. Amazing. Roger Wilfong's Saturn I at NARAM 33 was a pretty darned cute peanut scale model. Sadly, I don't get to see as many scale models as I'd like to.

Bob's model is cool, because the more you look, the more you see. The thing has these weld lines you don't

even see until the light is just right. You can't have subtle details like that until you get rid of all the subtle flaws.

UR: What is your favorite non-scale model?

PA: Love that Orbital Transport. Full size, scaled up, or scaled down, it's just plain cool.

UR: As a physicist, what do you think of the term, "High Power Rocketry?" Do you think "High Impulse Rocketry" is more accurate?

PA: Well, yeah, "High Impulse Rocketry" is more accurate, but who cares?

UR: We recently had a discussion of rocket-related myths on usenet. What's your favorite rocket-related myth?

PA: That Saturn V is pronounced "Saturn Vee". That it matters whether you say motor or engine. I guess the old one that rockets won't work in outer space because there's no air for them to push against. The *New York Times* pulled this one up [more than 60 years ago], ridiculing Robert Goddard for not understanding the basic physics taught in our public schools. Who says the schools are getting worse?

UR: What kit would you recommend for a first-time scale effort?

PA: Probably an Estes Black Brant II. Actually, if you can mask a good paint job, why not jump in with a Saturn V? Most people seem to have the most trouble with masking. Other than that, there's no reason a scale kit should be harder than non-scale.

UR: What prototypes would you recommend for a first-time scratch-build?

PA: Something the modeler thinks is just so cool, he or she just has to finish it. I'm not sure a simple sounding rocket is the best place to start, because the prototypes don't have the glory associated with them that can inspire a modeler to carry the project all the way through. A simplified Saturn V (say BT-60 with an Estes clear plastic fin unit) would be more satisfying for anyone not immersed in sounding rocket history.

UR: All modelers seem to have a favorite technique. What is yours?

PA: I just love turning wood. You get such cool parts with so little effort. And the smell of balsa dust is great (between sneezes).

UR: Your books feature sounding rockets and space boosters; missiles like the V-2 are discussed primarily in their role as sounding rockets. Is the lack of military hardware intentional?

PA: Yeah. Working under the delusion that the availability of data just might impact the availability of kits, I figured

that maybe more kits of scientific rockets than weapons of mass destruction might make model rocketry a bit more of the "future scientist" hobby I remember as a kid. I have been accused of writing "left-wing crap" for saying nice things about Scud missiles as research rockets, so maybe I'm just left-wing nerd.

UR: Peter, we don't think you're a left-wing nerd, just some one who likes rockets. Thank you for sharing your thoughts with us.

*Peter Alway will be one of our "Featured Personalities" at MARSCON '94 this March. Plan on attending this exciting event!* ➤

## Who Am I?

My first rocket was an Estes Alpha that I flew for the first time in 1969 in front of my grandparent's house in Geneva, NY.

My second rocket was a Big Bertha that I kit bashed by building it with three fins and decorating it with Boy Scouts of America decals. The Big Bertha is my favorite kit still available.

Shortly therefore, I scrounged up ten whole dollars and placed a mail order to Estes. In that order was an Orbital Transport, my favorite kit of all time.

My favorite engine of all time was the Estes 1/4A S (short series). I used to fly them in Alpha look-a-likes that I built from the blue engine mailing tubes. The models were very heavy and only went up about 75 feet with a "slow, realistic" takeoff. I never lost one, which should come as no surprise.

What I enjoy most about rocketry is developing elegant solutions to design problems using engineering and physics.

My favorite scale model is the Saturn 1B although I've never built one.

My favorite rocket engine available today is the 18mm 1/2A.

My favorite competition event is egglofting.

My least favorite event is scale.

Who Am I? (answer in the next issue)

The first one to correctly identify (via by mail or by phone to the editor) the above MARS member will receive a free package of Quest Tiger Tail igniters and a free package of recovery wadding.

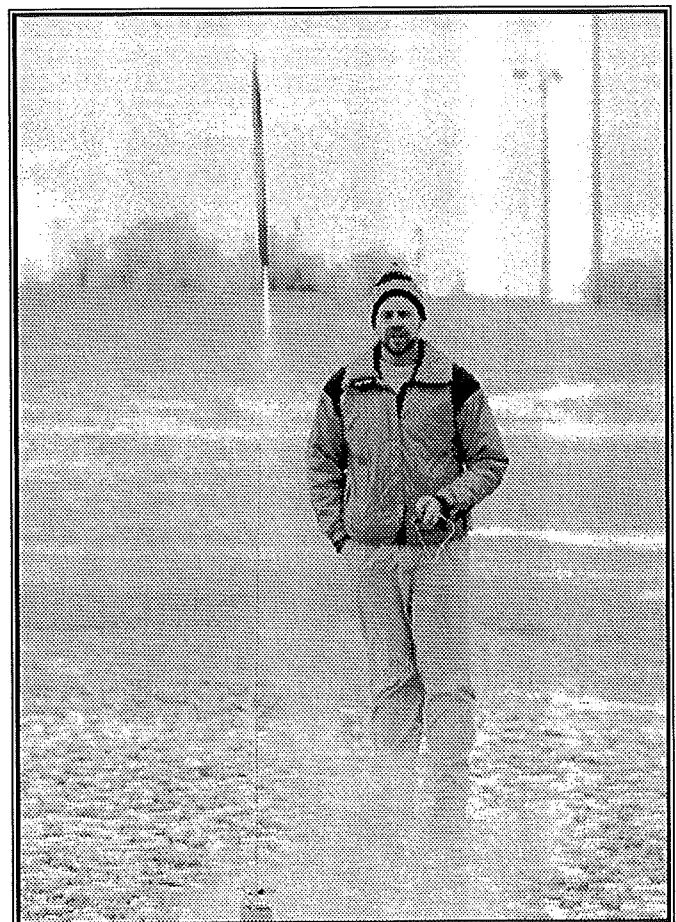
*I'm still waiting to receive more "Who Am I" questionnaires from MARS members. Please send them in so that we can continue this feature in the next issue of UR.* ➤

*continued from Page 1*

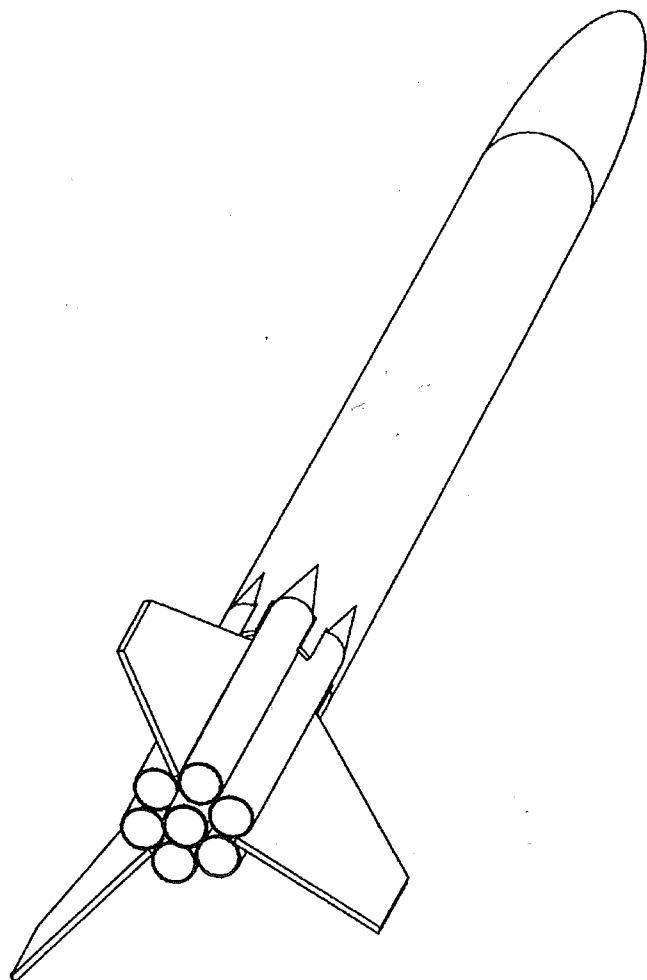
Our launch ended with two flights from John. The first of these was the first test flight of the Mini Viper IV (plans for this rocket appear elsewhere in this issue) on a brace of A3-4Ts. It flew beautifully, but landed on some ice. The final "first flight" of the day was John's new AeroTech IQSY-Tomahawk on a D12-3, which seemed to be less juice than the Tomahawk wanted. With the kit shock cord, the nose and payload section snapped back into the body quite hard, knocking the nose free. Still, there was no significant damage to the rocket on recovery.

These eight flights closed out the first event in what promises to be another big year for our club. Prizes were awarded to each participant; whether they were awards for achievement in rocketry or rewards for toughing it out in the windy Rottenchester weather didn't matter. . . . ➤

*FIRST FLIGHT: At right, Jay King launches the first MARS flight of 1994, John Viggiano's Thunderhawk-BT.* ➤



## Lucky Seven: A High Impulse Cluster Plan



Plan by Rick McBroom

Originally appeared in *Fox Valley Rocketry*, Vol 1, Nr. 6 (May/June 1990)

*Fox Valley Rocketry, the newsletter of Tripoli Chicago, often contained plans for high-impulse rockets. The original Lucky Seven plans called for parts from Dare Rocketry. Dan thought this was a neat plan, and I agree with him. Our version is designed for the slightly smaller diameter (but easier to obtain) tubes from LOC/Precision. I have re-drawn the tube scalloping guide and fairing pattern for use with the LOC tubes. As much of the instructions contained material specific to these components, we present here a modified and condensed version of the text, with some of my own comments on stability.*

==John

### Parts List:

- 1 – LOC BT-3.00 Main Body Tube, 34 inches long
- 1 – LOC MMT-1.14 Main Engine Mount Tube, 18" long
- 6 – LOC MMT-1.14 Secondary Engine Mount Tubes, 11.33" long

- 1 – LOC PNC-3.00 Nose
- 2 – LOC CR-3.00-1.14 Main Engine Tube Centering Rings
- 1 – LOC LL-50 Half-inch Launch Lug, cut in half
- 1/8" or 3/16" Birch Plywood Fin Stock
- Manilla Cardstock for Fairings
- Parachute, Shock Cord, &c.

Cut out the tube scalloping guide and wrap it around the base of the main body tube, lining up the tick marks. The scallops are 2.5 inches deep. See Figure 1. Try to cut at an angle; those secondary tubes need more room at the inside of the main tube than at the outside. You may need to adjust the fit with some sanding.

The six secondary engine tubes are sized so they can be cut from two lengths of LOC MMT-1.14, with no leftovers, so measure carefully.

The two centering rings should be positioned as indicated in Figure 2. The aft ring should be positioned so 12 1/8" of the main engine tube is behind it. The forward one should be not quite flush with the front end of the tube, to allow a heavy fillet. There should be 5.5 inches between the two rings. When installing the main engine tube in the main body tube, the after ring is recessed slightly past the scallops, as shown in Figure 3. The main engine tube is supposed to extend 1/4" past the secondary tubes after they're installed, so use one as a guide. When all the engine tubes have been installed, the results should look like Figure 4.

Note that the outer engine tubes do not butt against the centering ring. This allows the ejection gasses to vent through the tops of these tubes, thence through the gaps between these tubes and the main body tube. Do not seal these gaps unless you plan to only use composite engines whose ejection charges have been removed in these sec-

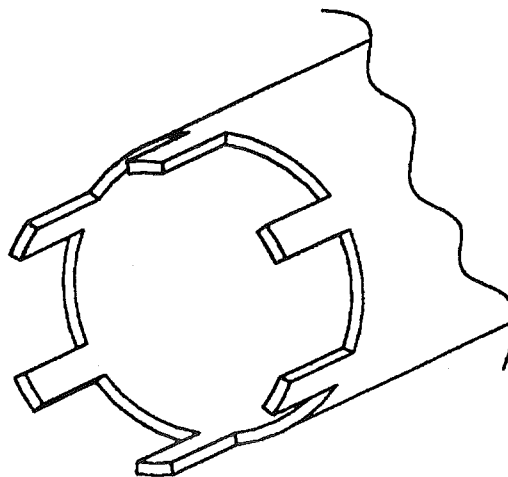
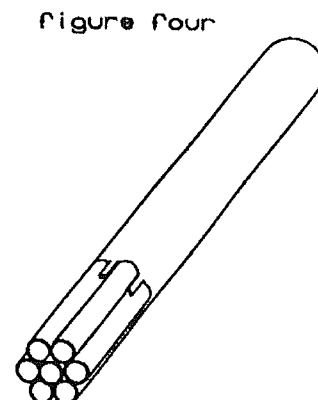
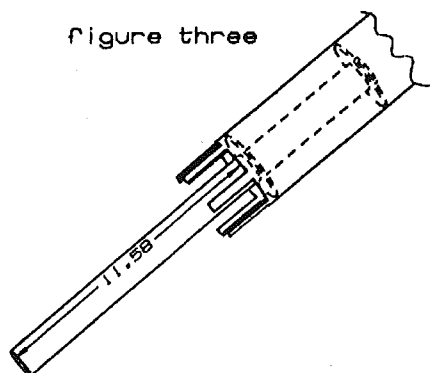
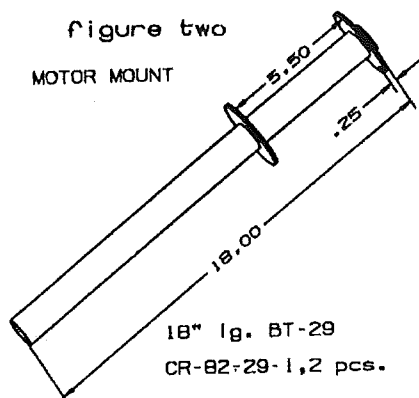


Figure 1. The body tube should look this way after scalloping. The slots may appear deeper than they do here – they should be 2.5" deep.



ondary tubes. In order to prevent the fairings from blowing off, do fill the forward ends of the secondary engine tubes which extend outside the main body with epoxy putty.

The fin plans are same as for the NCR Phantom-4000. A half-size pattern is provided. With lots of mass in the tail, swept fins seem necessary for proper stability. Cut yours from 1/8" or 3/16" thick Birch plywood. I don't think it would be a bad idea to use larger fins.

Approximate Barrowman calculations indicate that the CP is 1" forward of the fin root/leading edge vertex. For

proper stability, then, the fully-loaded rocket should balance well ahead of this point. Lengthening the body will not materially affect the CP, but it can help coax the CG forward a little. A half-length of BT-3.00 and a matching bulkhead assembly can make a nice payload section.

Rick said he planned to fly his prototype with an H125-15 in the core and six F7-4s in the secondary engine tubes. I wish I could have seen that!

(Patterns continued on next page)

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## Upcoming Events Preview

The first half of 1994 is shaping nicely for MARS with one "big" event for each month from March through June. Here is a quick preview of the upcoming activities. First, MARSCON '94 will be held in March. See related article for more information on our second annual rocketry convention.

On the weekend of April 23-24, the club will be traveling back to Middletown, MD to participate in ECRM-21. This meet will be flown at the same field as NARAM-35 and will be hosted by NARHAMS, NAR Section #139. This year's ECRM events are 1/4A Parachute Duration (MR), A Helicopter Duration, C Rocket/Glide (MR), E Dual Eggloft Altitude, and Sport Scale.

After a convention and a contest, what's next? How about some high power rocketry? May 21-22 is the weekend for Battle Park '94, the high power rocket launch sponsored by the Central Virginia Tripoli Prefecture.

Finally, the weekend of June 4-5 MARS will be hosting NYSPACE-94. We're still hopeful to have this one down in Geneseo and it should be a great time for New York state rocketeers to come together for a weekend of fun and competition.

Of course there will still be monthly club meeting and launches along the way. With contests, a convention, and a high power launch plus club launches and meetings, the first half of '94 promises to provide something for everyone.

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## MARSCON '94 – Don't Miss It!

Construction Workshops, contests, how-to sessions, and a sport launch will highlight this year's convention. Peter Alway, author of *Rockets of the World*, will be our featured personality. He'll describe scale modeling and related topics. Mike Hellmund of Estes Industries will also be on hand. Find out what it's like to work for the biggest model rocket company in the world!

Other sessions will feature world-class modeler Jeff Vincent with tips and suggestions for Plastic Model Conversion, past National C-Division Champion Dan Wolf with a glider construction workshop, a discussion on getting started with high-impulse rocketry, tips on first steps with Radio Control, airbrushing, and others. Build and fly your own flying saucer!

The activities will start off with a social get-together and an auction Friday night. Workshops will be held Saturday; bring your own glue and tools for the building projects (kits will be provided). If weather permits, a sport launch will be held on Sunday.

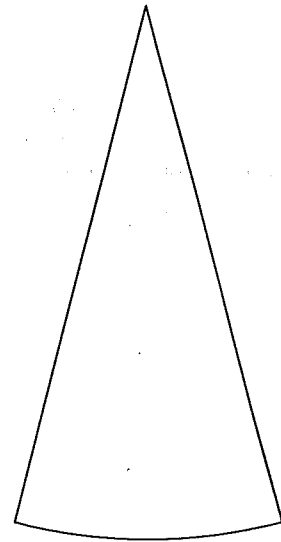
There'll be plenty of door prizes, plus prizes for the best looking rockets (categories for kit, scale, and original design), so bring your favorite!

Registration is \$10 in advance (until 7 March), \$12 at the door, \$7 for 16 years and under, and includes two kits and a Pizza supper on Saturday.

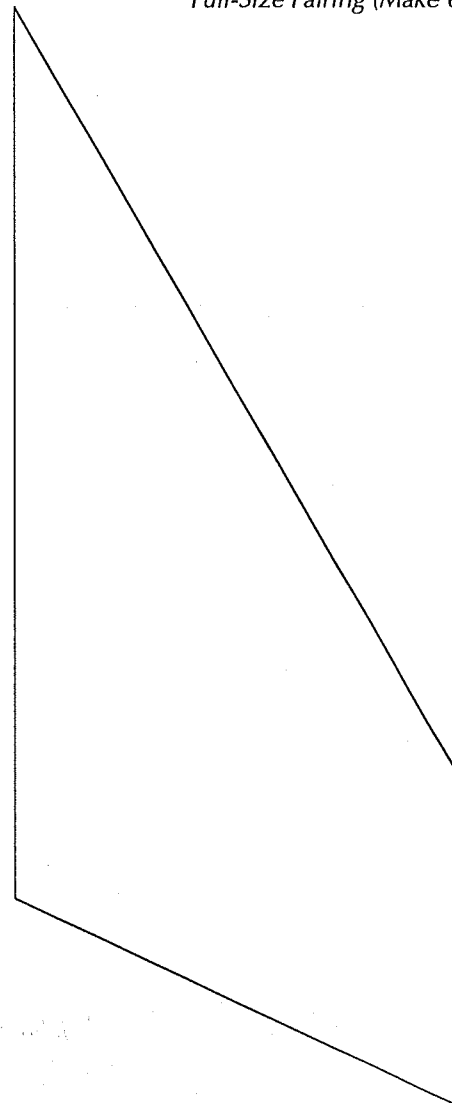
For further information, contact John Viggiano at (716) 359-3869 (voice) or (716) 475-2361 (fax), or Dan Wolf at 458-3848.

Don't miss this great convention!

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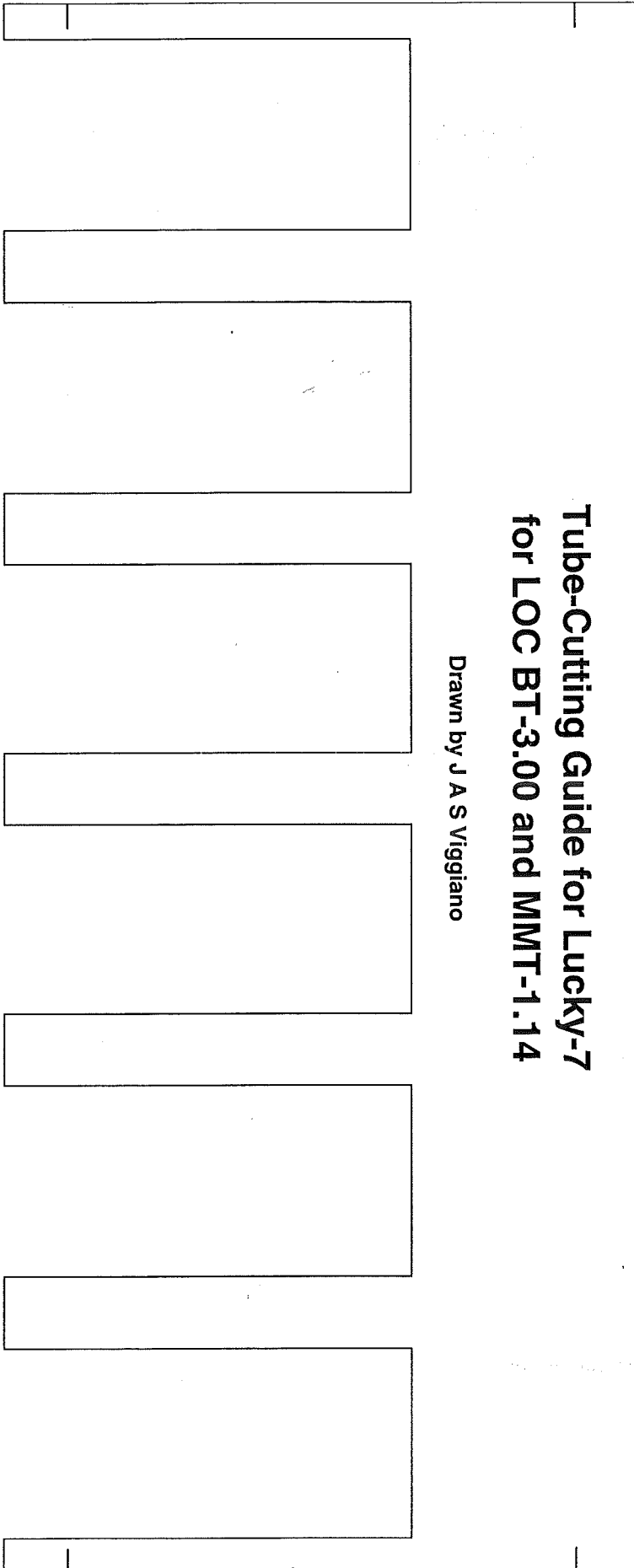
*Full-Size Fairing (Make 6)*



*Half-size Fin Pattern for Lucky Seven*

# **Tube-Cutting Guide for Lucky-7 for LOC BT-3.00 and MMT-1.14**

Drawn by J A S Viggiano



*continued from page 5*

duration.

I began with two basic, maximum length designs, (Fig #1) calling them "Mark I" and "Mark II". I then broke them down into several variants.

M1A is a simple BT-5 tube with balsa nose cone and 1/16th balsa trapezoidal fins.

M1B has a modification to reduce drag, it is broken at the middle to permit a smooth nose cone to body joint and keep flow attached over a greater area of the body.

M1C returns to the single tube design but uses Apogee PT-13, a plastic nose cone and Waferglass trapezoid fins.

M2A uses Apogee parts and further reduces drag by using a reducer and 6mm tube (PT-6) for the front half of the model. The heavy plastic 6-13 adaptor is replaced with paper in M2B.

M2C further reduces mass and drag by using 1/32nd balsa fins.

M2D is the first of the "high tech." designs. The lower body is replaced with vellum and the upper with a soda straw.

M2E uses fiberglass for the lower body.

I prepared a spreadsheet to calculate total mass (Fig #2) for each design which ranged from 8.4 to 3.2 grams. I also estimated CDs for each model ranging from .8 to .4.

With the various designs developed I built a second spread sheet (Fig 3) to estimate the flight performance of each. The range of estimated performance is wide. The low end (.8 CD and 9 gm) is 53 meters and the high end (.4 CD and 3 gm) is 107 meters. These are estimates but they indicate that a wide performance range is possible. Some simple additions to the mass spreadsheet yielded construction time (Fig 4) ranging from a low of 31 minutes for the M1C; (the Apogee parts go together quickly and require little time to finish) to a high of 185 minutes for the fiberglass M2E. Advanced modelers would take less time and beginners more, the important finding from this exercise was to demonstrate that time to build a model is significantly greater for more advanced designs.

Finally, I calculated a "Performance Factor" for each

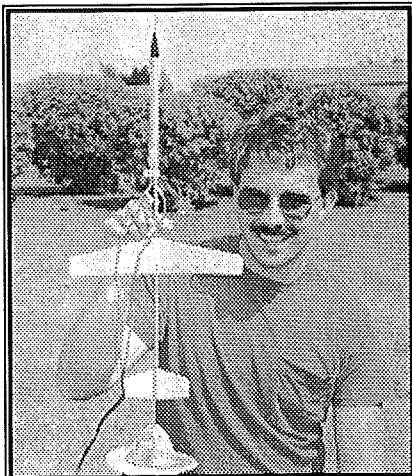
design (Fig 5) based on several factors. The first is that model rockets have a limited useful lifetime. They are either lost, wear out, or are destroyed in a Cato. I assumed that with careful flying that most of the models would last ten flights while the M2D (vellum) would last two and the M2E (fiberglass) three. The performance factor is the estimated altitude divided by the time to build models for 10 flights. The higher the performance factor the more "efficient" the design.

The high tech models come in last because of the large amount of time to build them and their poor durability. The winners are the M1C and the M2B. The M1C owes its success to the use of Apogee parts for low construction time and durability. The M2B, with the paper reducer, takes longer to build but is 1 gm lighter and has a less drag. Its estimated altitude of 71 meters is 17 meters greater than the M1C so that was the design I decided to build.

To summarize the design process:

- 1) Identify factors that need to be controlled; in this case altitude performance and construction time.
- 2) Develop several designs using various approaches, materials or construction techniques.
- 3) "Fly" the designs on paper, or in a computer and evaluate what resources each requires versus performance. In this case, time to build versus altitude.
- 4) Select the design that provides the best return on investment. Here, the minimum time spent in the shop for the greatest achieved altitude and useable lifetime.

Regardless of how good the design and construction techniques, the key to effective competition is practice and consistency. The point of this article was to outline how a designer can make intelligent decisions to optimize his use of time and resources. This kind of analysis can never replace flying experience. An experienced modeler with an M1A will probably beat many of the "better" designs. Make the best possible use of your limited workshop time and fly as much as you can.



*JEFF & FISH & CHIPS: At left, Jeff Ryan poses with his built-wing Fish & Chips B/G, which he modified from an MIT design. It looks great, Jeff!*

*A BOOK BY ITS COVER — John may be wearing a St. Louis Browns jacket, and Dan a Purdue Boilermakers sweat shirt, but both are rooting for the Pennsylvania Crude BT about to be flown. Photo by Jay King.*



## The Lost Art of Silkspanning

### How-To by John Viggiano

Tired of wimpy body tubes? Sick of looking at spiral body tube seams? Angry at fins that keep popping off? Here's a way to turn body tubes that are the moral equivalent of a sow's ear into the proverbial silk purse. Consider silkspanning them.

Silkspan is a long-fibered paper produced on a tissue former; in heavier weights it would today be called a non-woven cloth. In conjunction with dope or epoxy, it is a low-tech (and low cost!) composite construction material that has much going for it. A 2x2.5 foot sheet costs only about a buck. It provides an excellent surface to which fins and launch lugs may easily be bonded, even with cyanoacrylate "super glues." It hides those spiral body tube seams, leaving a surface that's smooth. And, as a low-tech composite, it strengthens the tube, making your rockets more rugged. Why not learn this technique this building season?

#### Tools and Materials:

- Sheet of Medium Silkspan
- Sandpaper
- Dope Brush
- Dope and Thinner
- Spray Bottle and Water

Thinned dope is recommended for some steps because of its great penetrating ability. You may use a product like Sig's Light Coat, which is already thinned. Or you can thin a product like Sig Super Coat, and save some money. Other steps call for an unthinned dope, because penetration is less important with these steps. Sig's Super Coat may be used unthinned in these instances. In neither case should a plasticized dope be used; the plasticizer will limit the dope's ability to shrink and tighten. Good ventilation is needed when working with dopes; it's hard to fly rockets with a bum liver and a cauterized nervous system!

The first step in silkspanning a body tube is to sand away most of the glassine outer wrap, which interferes with bonding. 240-grit paper works well for this; an absolutely smooth surface is not necessary because we'll be covering things up with dope and silkspan. You don't want to sand away all the glassine, however; you'll be left with a larger (and deeper!) spiral gap.

After cleaning the dust off the tube (with a tack cloth, if you prefer), apply a coat of thinned dope and allow the tube to dry. After the dope dries completely, give the tube a light sanding with 320 paper, and apply another coat of thinned dope.

Cut a piece of silkspan so it is slightly longer than the tube, and about 1 or 2 cm wider than the circumference of the tube. Apply a line of unthinned dope to the length of the tube, and push the edge of the silkspan into the dope. Apply a line of dope to the top of this edge, and set things aside to dry thoroughly.

Feather the doped edge of the silkspan gently with some 320 sandpaper. Never sand undoped silkspan; you'll cut it up and make a mess. Apply a mist of water to the silkspan. It doesn't have to be dripping wet, just damp. The moisture causes the silkspan to expand; as it dries it will shrink back to its original size. Blot up any water on the tube and wrap the silkspan around the tube, pausing to push out wrinkles as you wrap. Place a line of unthinned dope underneath the loose edge, and smooth the edge into the dope. Apply more unthinned dope on top of the edge. Allow the tube to dry.

As the water dries, the silkspan attempts to shrink back to its original size. Most small wrinkles should disappear in this shrinking step; if they don't, re-dampen the area and gently push them out. Naturally, wrinkles in the doped edge should be avoided, as they won't come out unless the edge isn't secure.

Apply two coats of thinned dope to the entire surface. These thinned coats should penetrate to the surface of the tube and form a strong bond. When they're dry, apply a coat of unthinned dope, and sand it lightly with 320 sandpaper when dry. Repeat this last step until the silkspan becomes saturated with dope. When it does, the surface will be very smooth and glossy after drying.

If you really want to strengthen a tube, heavy silkspan may be built up in layers. The most layers I have used is four, on my Firehawk-MP. Make sure each layer has become saturated with dope before beginning on the next one. Also, the seams should be offset from each other so no large lumps form. A layer of thin silkspan over the heavy or medium makes a smooth top surface.

Another advanced technique is using epoxy instead of dope. Epoxy has little volatile component; unlike dope, most of it does not evaporate during curing. It can saturate the silkspan in a single coat. I used this technique on the Eos-BT I used to win G-Water Loft at NARFUND '93. The downside is the surface needs lots of sanding, and the weight penalty is greater.

The process of silkspanning consumes time, but most of it is waiting for things to dry. Although three or four days may elapse from start to finish, only a half hour or so is actually devoted to each tube. If you're in a rush, you might not want to consider silkspanning, but during the "cabin fever" months during the winter building season, it's hard to imagine needing a rocket built in a day. If your body tubes need a little bolstering, consider silkspanning them. It's an important technique that should be in your bag of tricks.