

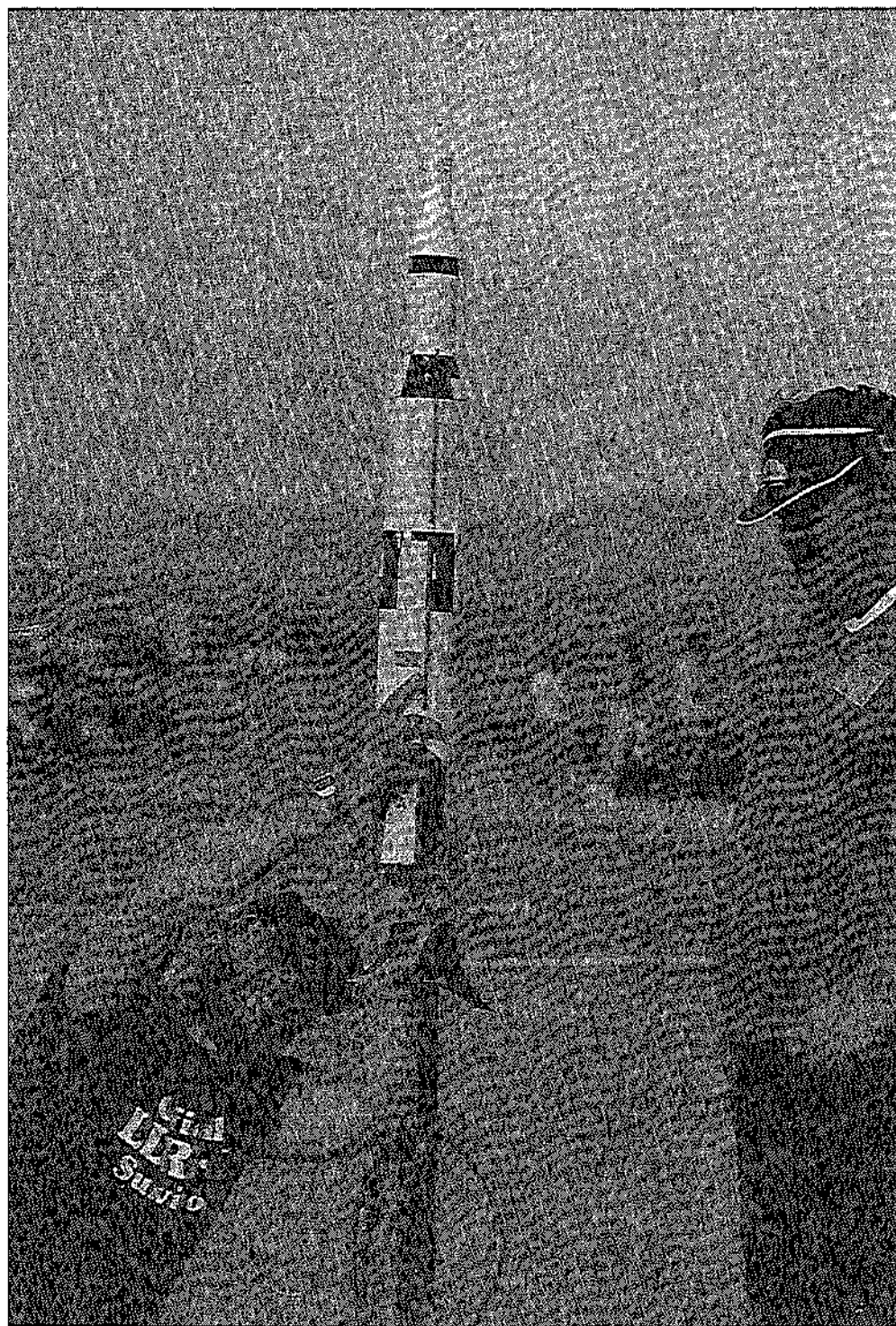
SDA NEWS

April/May, 1988

THE LEADER IN SPACEMODELING

\$2.00

HOW TO FLY SCALE MODELS!



Model Rocketry's Longest Publishing, Most Controversial Newsletter!

April/May 1988

Volume 14, Number 3



"This ain't no disco...
No CBGB's....
This ain't no
fooling around..."

Life During Wartime by the Talking Heads

Hey, what can I say? I promised Matt when I took this job, I'd call them as I saw 'em. The last editorial on the shoddy job the Pink Book committee did brought a good number of responses. The number of positive comments outnumbered the negative ones by a factor of about 2:1, so I figure I picked the right issue. Of course, I got "nasty-grams" from the NAR powers that be...Miller, Bundick, and Kaplow. That much was expected. What I didn't expect was the same misguided, narrow theme (*Continued on page 20*)

Credits and Debts

QUOTABLE

"Since we are a natural resource conservation agency, model rocketry is not permitted!"

The Cleveland Metroparks head nerd, when Chris Johnston tried to get permission to fly in the park.

"Sure, that makes sense - we kill whales from 8:00 AM until 11:00 AM; fly rockets from 11:00 until 3:00 PM; and then strip mine until dark!

Chris Johnston

COVER STORY:

Hmmm... I know the igniter is up here somewhere! Matt Steele and George Gassaway hook up Randy Kelling's F15 powered Centuri Saturn V. The model flew flawlessly, thanks to tips that Randy got from George. George passes on these tips in this issue, with an article that should help every modeler, not just scaler modelers. Photo by Robyn Steele.

CREDITS:

Editor, Producer, and Head Honcho: JD McNeil; Executive Producer and Circulation Therapist: Matt Steele; Executive Producer's Sex Kiffer: Robyn Palmer

Steele; Co-Producers: Chris Pearson, George Gassaway, Mr. Maddog; Writers: Chas Russell, Vince Huegele, Chris Johnston, Dan Kafun, "Backender" Bob Ferrante (that's what happened to his CAR, you out there with the filthy minds!!!); Cameramen: Terry Lee, Randy Kelling, Mary Roberts; Security: Marty Williams, J. Pat Miller, Wayne Hendricks; Gaffers: Ric Gaff, Jack Kobzeff, Wasco Schaffer, Heidi Smakula.

(By the way, most of these people are on strike this month, that's why this issue is late!)

IMPORTANT STUFF

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Subscription price is a mere \$10.00. Make your checks payable to Matt Steele, 13011 Branscomb Road, Huntsville, AL 35803. Any resemblance to any persons in this publication is pure coincidence, unless you think it's you we're talking about, and then we probably are. The opinions and viewpoints expressed within do not represent SNOAR, the NAR, or anyone but the guy who wrote it. So there!

Publishing Funds: Courtesy North Coast Rocketry

LETTERS TO THE EDITORS

Dear Sirs;

I was talking to Howard Galloway the other day, and he's really pissed 'cause he hasn't seen a copy of the Model Rocketeer in a L-O-N-G time. He says that if the NAR HQ doesn't get this straightened out soon, he's going to cancel his lifetime membership.

Just thought you'd like to know...

William S. Roe
Rocketry Heaven

P.S. Where's my Impact?

Dear Sirs:

Come on now, how many of you ever got laid at a NARAM? Huh? Raise your hands. No, Flygare, you don't need to raise both hands. Just checking.... I'd like to get the hotel accommodations right this year!

The NARAM-30 CD
In a King Size Bed
At the Ramada

Dear Sirs:

My friends told me about it, but, hey, I thought they were exaggerating. I mean *NOTHING* could be that good! But I tried it, and it is! Model Rocketry is better than sex!

This could lead to a whole new publishing empire, not to mention lifestyle, for yours truly.

Thanks for the great advice!

Hugh Heffner
Airborne Right Now

Dear Sirs;

Rocket...big, BIG Rocket... Swishhhhh.... POP!

Zziipp... **CRASH!**

Th-Th-Th-That's All Folks!

Your insurance
company

Dear Sirs:

Is it just me, or do most East European contest officials really dress like Hal Gurney?

Jordan Pavlov
Burgas, Bulgaria

Dear Sirs;

It's a fact. The young, attractive blond female translator I had in Poland was really a redhead. When I told the Poles I wanted a blond, I got one. Ha-ha, how about those Poles!!! How did I know she was a redhead, you ask? Ha-ha, how about those Poles!!!

Howard Kuhn
Still in Poland

Dear Slimeball,

What's happened to SNOAR News? It's really gone downhill lately. You need to get that other guy back!

Matt Steele
in the network

Dear Sirs,

I don't build rockets; I just like to watch them!

Jimmy Swaggart
in a hotel room

Dear Sirs,

Did you hear about the Polish rocketeer who won a gold medal at the Internats? He was so proud, he had it bronzed!

Vlaskie Gorzyński
Iron Curtain Country

Dear Sirs,

Or was that Andy Mitchell? Oh, that's right, Andy never won any medals....

Manning Butterworth

Dear Sirs,

This is great! When you write a letter to SNOAR News, you can say anything you want because no one believes you wrote it. Dane Boles is a pompous ass! Lee Piester is a fool! Pat Miller is a wimp! Mary Roberts fools around! I love it!!!!

Bob Cannon
Penrose, CO

Dear Sirs;

No, we don't get our ammonium perchlorate from Pacific Engineering in Nevada.

At least not anymore!

The Composite Guys
Basement Bomber, NV

Dear Sirs,
I'm totally appalled you would name a rocket launcher after a feminine hygiene product. (SNOAR News Volume 8, Number 4, page 7) There is no similarity whatsoever between the two, and I resent your implications. What's the matter, don't you guys out there let your wives read this rag? Or do you even have wives?

Offended Lady
Having PMS today

(SNOAR News regrets the offense and apologizes. Please consider the name "Max-I-Pad" retracted and replace it with "Douche Bidet". Ed.)

Dear Sirs,
Actually we approved the new NAR weight limits a long time ago. But the announcement memo to agency distribution has been sitting on this guy's desk ever since. He's been out on leave (that he had to take) and then his wife got sick. As soon as he gets back, the approval will be expedited to somebody else's desk for their signature and comments. And how was your last near miss???

The FAA
30,000 Feet High
and still climbing!

Dear Sirs,
Look, now that I'm a married man, I won't have to screw other people as often.

Jerry Bovine
Honeymooning

Dear Sirs;
Hey, we're serious! Exciting Model Rocket products are coming your way Real Soon Now!

Enerjet, er, Enertek
AVI City, WI

Dear Sirs;
What's a Manning Butterworth?
About five cents!

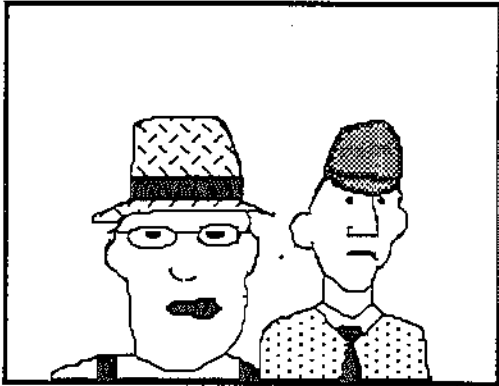
Pat Millertime
Abalone, Texas

Dear Sirs,
It was a big mistake. I'm sorry I ever started it. Just forget the whole damn thing, OK?

Orville Carlisle
Shakopee, MN

NAR TOP COMPETITORS

as of 06/02/88	NAR#	SEC	PTS	W F
A Division				
1 CHRIS WEAVER	41889	203	2,460	9
2 PATRICK BARRETT	43642	205	2,002	6
3 JOEL LEE BURGESS	36016	203	1,996	9
4 MARY K. BURGESS	39998	203	1,872	9
5 WILLIAM MOSER	38831	459	1,744	5
6 ANDREW BURGESS	43073	203	1,734	9
7 MATTHEW SIAS	43745	403	1,712	6
8 KEVIN HINOTE	44026	475	1,474	5
9 DON LINDER	35892	117	1,368	3
10 ANDREW LINDER	43406	117	1,284	3
B Division				
1 MARTY WILLIAMS	35301	403	2,624	6
2 TIM BARKLAGE	44211	475	2,212	5
3 LEE OLYNIEC	35214	403	1,892	6
4 JASON HAYNES	43119	403	722	4
5 KATHY KMETZ	PEND	403	628	2
C Division				
1 DAN DOMINA	50570	205	3,386	8
2 JIM SEXTON	35936	461	3,328	8
3 MIKE KOWALEWSKI	37608	461	2,234	8
4 ALVIN NIENAST	28820	369	2,196	5
5 WAYNE HENDRICKS	17818	403	2,085	6
6 JIM ZINGLER	28818	369	1,873	5
7 TRIP BARBER	4322	205	1,682	7
8 LARRY B. RICE	33323	113	1,634	8
9 JEFF GORHAM	27382	203	1,616	9
10 BOB KREUTZ	35100	439	1,556	5
Teams				
1 LEE-PURCELL	241	203	4,092	11
2 ZUNOFARK	48	403	2,562	6
3 JANOVANDPAVLOV	251	IND	2,464	7
4 HIGHER STRAIGHTS	343	475	2,392	5
5 HONEYMOONERS	811	461	1,350	7
6 IRON BANANA	588	117	1,062	3
7 TNT	439	439	994	4
8 BROWN & BROWN	7	205	939	7
9 CRUNCH BIRDS	471	471	820	2
10 AMSPAM IN THE CAN	601	IND	720	3
Sections				
1 HARA		403	16,418	6
2 VIKINGS		203	14,541	9
3 NOVAAR		205	11,735	7
4 RED STICK ROCKET SOCIETY		475	9,936	7
5 CAROLINA SKYWRITERS		461	7,146	12
6 NIRA		117	6,069	3
7 SMOKEY MOUNTAIN		486	4,754	3
8 HUVARs		463	4,604	4
9 CSAR		113	4,423	8
10 WWAR		369	4,300	5



Ed says...
Here's The Top Ten Things
NOT
To Do At NARAM-30!!!

Ed and I are jus' tickled pink that you're comin' on down to NARAM-30. Here's a list of items that will sure as hell get your ass thrown out of the contest, though. DO NOT:

10. Throw Enerteks in the pool.
9. Walk up to the Saturn V at the Space and Rocket Center and say "Hey, is this thing leaking fuel?"
8. Fly E5 bottle rockets from the from the motel parking lot.
7. Throw Enerjets in the pool (but Lee Piester is OK!).
6. Place a couple of feet of thermalite in the nozzle of a Pershing at the Space and Rocket Center and light it.
5. Fly D12 bottle rockets from INSIDE the motel room.
4. Ask who won the Civil War.
3. Throw Harry Stine in the pool (but Pat Miller is OK!).
2. Slap a "Who Flew the G?" bumper sticker on Mark Bundick's Sport Scale model.

And, the A-Number One Thing Not To Do At NARAM-30 is...

1. Get more intoxicated than the contest director!

And, now a word from our sponsor, Bartles and James Premium Rocket Cooler...

Bartles and James Premium Rocket Cooler



Ed and I would like to thank everyone for the tremendous response to our full page ads in the recent issues of SNOAR NEWS. I must admit that I was skeptical about appearing in such an extreme publication, but our new high power business is booming.



Thanks to the sound financial techniques of our industry advisor, Jerry Bovine, we have managed to take in several thousands of dollars without spending a single red cent. Once again, we thank you for your support...but even more, we thank you for your cash!

How to Make Scale Models Fly!

(Or: Nearly everything you wanted to know about what can go wrong, but were afraid you'd find out firsthand)

by George Gassaway

The scene: The 1987 World Spacemodeling Championships in Belgrade, Yugoslavia during the scale event. An immaculate Polish Saturn-1B takes to the

air, climbs to apogee, and ejects its parachutes. The very thin plastic chutes rip, and the model crashes spectacularly, ruining hundreds of hours of work. A short time later, another Polish Saturn-1B has a similar problems and crashes!

Something seen even at the top levels of scale modeling are models which crash or fly poorly. Far too often the models are victims of carelessness or the most basic of mistakes. Why?

A scale builder spends a lot of time on the scale details of a model. Since he has been flying basic "Alpha" type rockets for years, he may take for granted that anything he spends so much time on is going to fly properly. But, far too often such models suffer from lack of consideration of the basics of model rocketry: mass, propulsion, stability, and recovery system. Failure to adequately prepare for those basics leads to trouble. And for a lot of scale models, they end up being different from what the modeler has had much experience with before. Far too often a model is completed without much advance planning of things such as model mass, engine power, recovery system, or stability. The attitude of "if it's too heavy, I'll just double the power" is not a slogan for success.

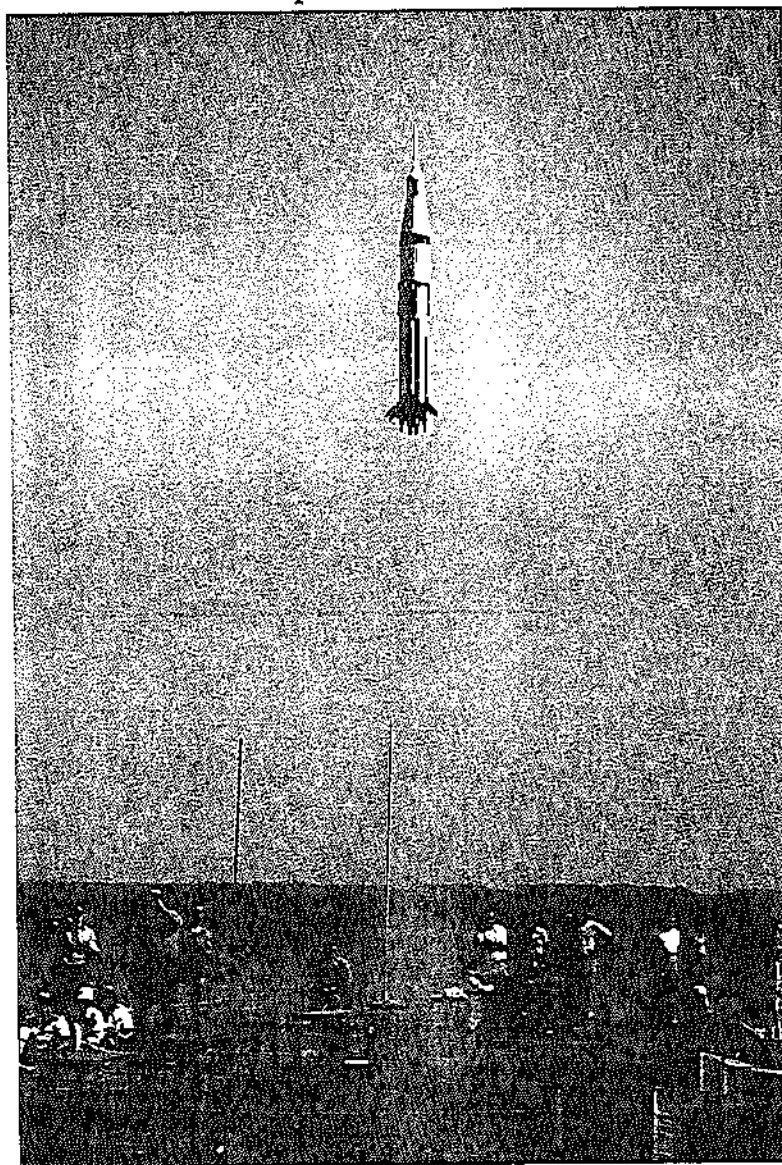
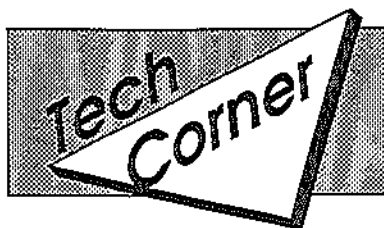
The following are major problem areas to carefully consider and plan for before starting on a scale model. If not all areas can be well accounted for beforehand, it may be far better to forget making such a vehicle and choose a less troublesome prototype to model.

Model Mass

A model's mass is going to be dictated to a large extent by the size of the model, the construction methods, and even the engine or engines selected (should the

model use an abnormally heavy motor such as the FSI F7 or F100). The ultimate limit of mass will be determined either by contest rules (weight limits), Safety Code limit, or the desire for the model to fly higher than the launch rod. There have been many examples in the past of models which were too heavy to fly with the limited engine power the model used. It's no fun to have built a 14 ounce model that needs E or F

Below: A Polish Saturn 1B takes to the air, only to crash when its designer failed to include adequate parachutes. Matt Steele photo.



power to fly decently, but be forced to use D power to stay under the 16 ounce limit. Now we have lighter composite motors and soon we will have higher weight limits, but it will still be possible to get stuck in such a vicious circle.

The model should be planned out for the estimated mass, and efforts made to keep it light enough. Some builders have made test subassemblies in order to accurately gauge how model weight is adding up, as well as evaluate fabrication techniques. Should the model seem likely to come in too close to weight limit regulations or beyond what you had figured to be acceptable, it may be necessary to switch to a smaller scale or develop a significantly lighter construction method.

Model Propulsion

Proper propulsion for a model rocket is a matter of choosing enough engine power to adequately fly the model, with several criteria. Model mass will be most important, a C engine isn't going to do much with a one pound model. Also entering in is the model drag, a function of frontal area and shape. The classic under-power situation has often been a D12 in a model just barely under a pound. Such models lumber up to 100-200 feet, pop out the recovery device, and land, having technically flown. These flights are quite unimpressive, but they are better than crashing. A good scale model needs to have enough engine power to overcome the mass and drag to fly to a decent altitude. Generally, a "decent" altitude, is above the 150-200 foot marginal "popgun" flights. Higher power for flights of 1000 feet or more are obviously impressive. Such high flights run the risk of structural failure if high thrusts are involved, (such as losing fins) as well as increasing the chance of the model drifting away to become lost. Flights of 400 to 600 feet would seem reasonable for most scale models.

Computer altitude predictions can help make decisions based on mass and planned propulsion, but are subject to some error (particularly trying to assign the proper drag coefficient to some of the more unusual vehicles). Also a part of propulsion is selecting the proper time delay for ejection, which may play a part in determining the engine to use.

Model Stability

For purposes of this discussion, stability will encompass any forces which can cause the model not to fly straight. In some cases it can be far more complex than just making sure the CG is far enough ahead of the CP. If you are not fully aware of the importance of the CP/CG relationship, it is suggested that you read a good reference book such as Stine's Handbook of Model Rocketry. Unlike model airplanes, which may

refer to a wing balance point, when the center of gravity (CG) is discussed for rockets, a balance point is not always acceptable. The CG is really the center of mass of the model, the one point about which the model may rotate in any of the three axes (pitch, yaw, and roll). Often the CG is assumed to be at some distance along the center of the body tube. For some designs that will not always be the case, as will be explained shortly.

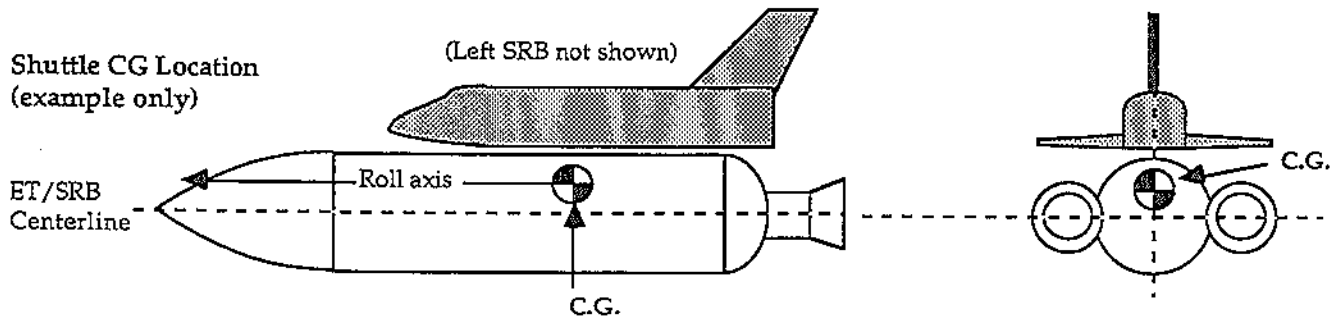
Classic CG/CP Relationship: There really is no excuse for letting a scale model go unstable. If the model is not stable, it is more likely than not headed for a hazardous crash. A lot of sounding rockets are quite stable, but there are a few which are quirky. Obviously, vehicles without fins are going to need some fin area added, usually in the form of clear plastic fins.

Vehicles with tiny fins might possibly be stable, but require special attention to make sure that they can be stable enough. Usually such models require a significant amount of noseweight. The LTV Scout as a scale model is notorious for flying stable one flight and unstable the next, unless it has more noseweight than it seems to need. The Vostok/Soyuz type vehicles can fly without fins if the CG is far enough forward, due to the unusual semi-conical shape of the strap-ons. The Redstone type vehicles (Mercury-Redstone and Jupiter-C/Juno-1) do not present a lot of fin area. Some versions such as the Mercury Redstone can produce enough drag from the nose (capsule and escape tower section) as to bring the CP more forward than expected (when reaching higher angles of attack), so they should also have a more forward CG than might otherwise seem normal.

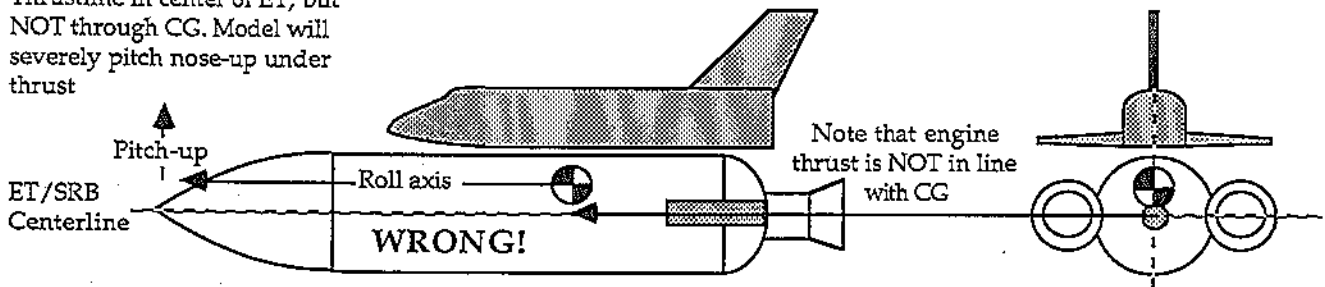
If there is a kit available for the vehicle you plan to model, it may be worth getting the kit just to check out what center of gravity location it uses. However, be sure the kit has enough scale accuracy to make such CG comparisons valid. For example, the Estes Mercury Redstone and Jupiter-C kits have larger fins than scale size, so the kit center of pressure is more rearward than a scale model would be.

Another stability matter to consider is pitch-roll coupling or yaw-roll coupling. Yaw-roll coupling can happen with asymmetrical models. If the model gets into a sideways yaw, it can be forced into a roll due to the restoring forces being unequal (such as a vehicle with a large rudder on top and none on the bottom). Such models can get into a coning motion which, while not exactly unstable, will produce tremendous drag to rob the model of a lot of altitude. This is an unusual occurrence, and is not easy to predict or to solve. A more forward CG may help, but it may require the addition of one or more clear fins on the opposite side. That is one reason why some fighters like the F-16 have ventral fins.

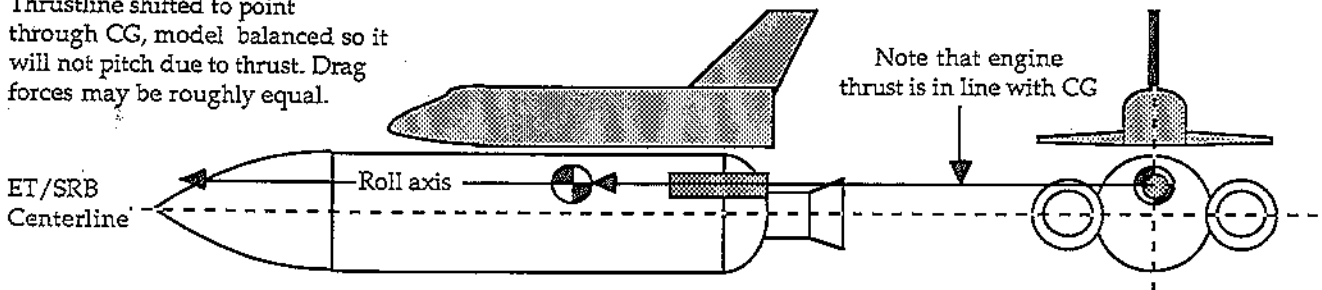
Examples of CG/Thrustline problems and solutions for asymmetrical vehicles such as the Space Shuttle.



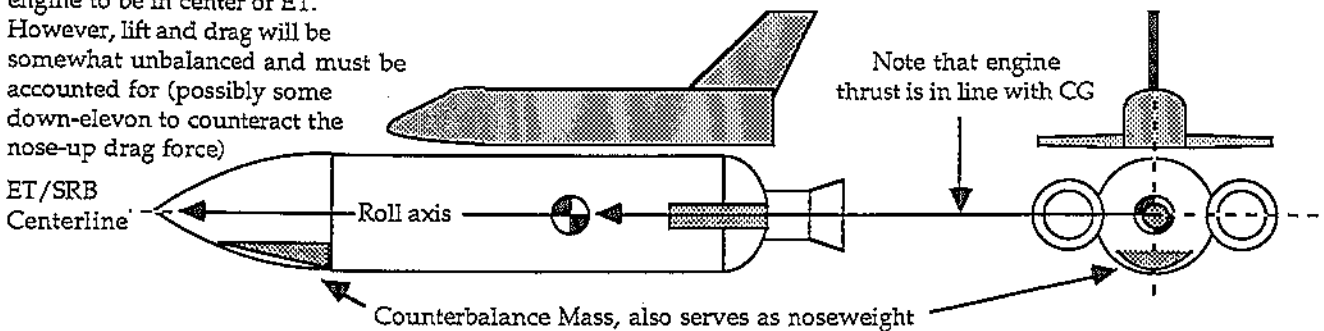
Thrustline in center of ET, but NOT through CG. Model will severely pitch nose-up under thrust



Thrustline shifted to point through CG, model balanced so it will not pitch due to thrust. Drag forces may be roughly equal.



Counterbalance mass used to allow engine to be in center of ET. However, lift and drag will be somewhat unbalanced and must be accounted for (possibly some down-elevon to counteract the nose-up drag force)

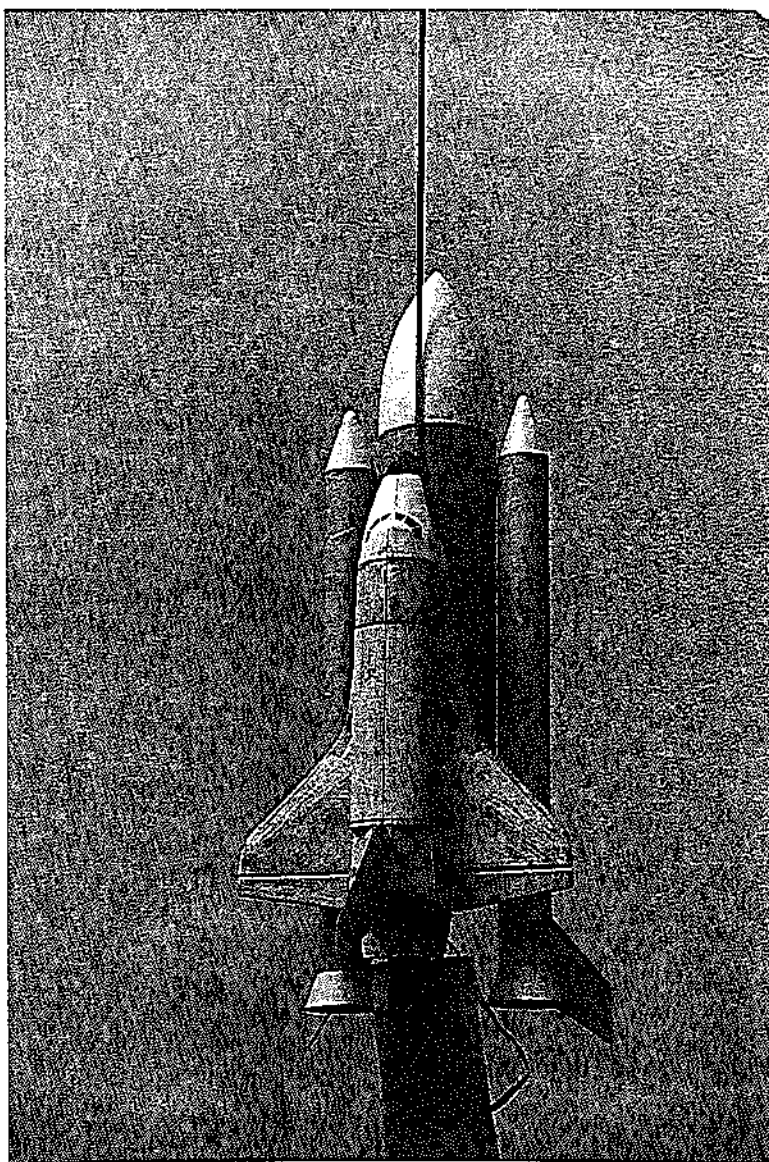


Lift Imbalance: Something not usually associated with most models are unequal lift forces. Aerodynamic pitching can be a problem with scale models of vehicles which have wings or which have some fins ahead of the CG, such as up near the nose. A model of a Chaparral or Sidewinder missile will not fly straight if the nose fins and rear fins are not parallel to the body. The worst case would be to have a couple of opposing nose fins to be a few degrees off in the same direction. Those nose fins will act as canards to push the nose, causing the model to pitch into a loop if not a power crash into the ground. Of course, you can get the same effect with just about any rear-fin model by angling a couple of the fins like elevators. This is why a lot of the Estes Phoenix missile kits fly in strange paths, usually one or more of the eight fins/wings are not built parallel to the main body. The purpose of mentioning this is to reinforce the importance of building such models correctly. If in doubt, either do not build such models or make two or more rear fins crooked by a few degrees (both clockwise, for example) like ailerons to make the model roll going up. The roll will even out any other tendencies to pitch in a particular direction, although the model will probably have a barrel roll or corkscrew flight path. Some models may be downgraded for workmanship if fins are seen crooked, so more creativity may be required. For example, making the rollerons on a Chaparral act as spin tabs would add stability, just like the real thing.

Thrust Induced Pitching: Thrust induced pitching can happen with vehicles which are not symmetrical. The best example of this is the Space Shuttle. If you put an engine in the very center bottom of the external tank, it is going to pitch over onto the orbiter's back and crash. Why? Because the engine thrust will not go through the center of gravity, which is somewhere near the orbiter side of the ET centerline. There will also be some lift and drag imbalance. In other words, the orbiter's mass will pull the shuttle onto its back under thrust. Incredible as it may seem, a top scale modeler did just such a thing. One solution for that would be to put a LOT of counterbalance mass on the opposite side of the ET, just inside the nose, to balance out the orbiter and bring the total model CG through the ET centerline. This has been done with success, but with a smaller and lighter model which could afford the weight of the counterbalance mass. Another way is to move the engine mount location so the thrustline will go directly through the center of gravity location caused by the orbiter. Estes has done their kit this way, and the method works well. It has also worked well with a 1/72 shuttle boilerplate. That method requires either precision advance planning to balance out, or to assemble the whole model except for engine

mount, set the model up on a balance device, and find out exactly where the CG location is, relative to the pitch and yaw axes (allowing for the yet to be added mass of the engine mount). Another possible solution would be to cluster motors in the SRB's and the orbiter, and angle the thrustlines to result in no pitching motion, but this would be quite difficult and very risky (and beyond the scope of this article!). Regardless of the method used to assure the thrustline is in line with the CG, care must be taken with the finished model to assure no shift in the CG away from the fixed engine thrustline. The CG may be moved more forward of course, but in adding such extra noseweight it must be added atop the imaginary thrustline to remain in

Below: George Gassaway's 1/72 Shuttle boilerplate, the result of four years of effort to build a workable flying Space Shuttle model. Matt Steele photo.



proper balance.

Drag imbalance can also produce pitching, if there is more drag force on one side of the thrustline than the other side.

Accounting for pitching created by drag or lift can be tricky to solve, it may require allowing the model to have some lift, drag, and thrust pitching to oppose one or more forces to even everything out. Note that most boost gliders have nose-down thrust pitching and nose-up aerodynamic pitching which tend to cancel out each other (often pitching nose-down at launch and pitching nose-up later in boost as the airspeed increase allows the lift pitch-up forces to take effect). Most scale models with such problems could require a lot of testing to determine the correct way to do it.

One thing which should NOT be attempted is to point the engine thrustline in a direction which is not parallel to the length of the vehicle being modeled (this refers to single-engine models. Clustered models can have the engines canted as long as they are in opposing directions so the average thrustline will still be straight ahead). If the engine thrustline is canted, part of the model flight path will be sideways relative to the model. If the model is stable, such a sideways motion should make it pitch over in the direction of the sideways motion. It is unlikely that such a sideways flight pitching problem can be solved short of putting in some form of active onboard guidance.

Launch angle and wind can cause the model to pitch, in some cases very severely. A model needs to be stable, but too much stability can make it weathercock too much. A slow-moving model will weathercock and gravity-turn more than a faster moving model. On some windy days it may be worth using a higher thrust or short burn time motor if the model is sensitive to weathercocking. This assumes the model can handle higher thrust and velocities.

Boilerplate models are very useful for checking stability and all aspects of flight. A boilerplate is practically mandatory if the vehicle has potential aerodynamic or thrust induced pitching problems.

Model Recovery System

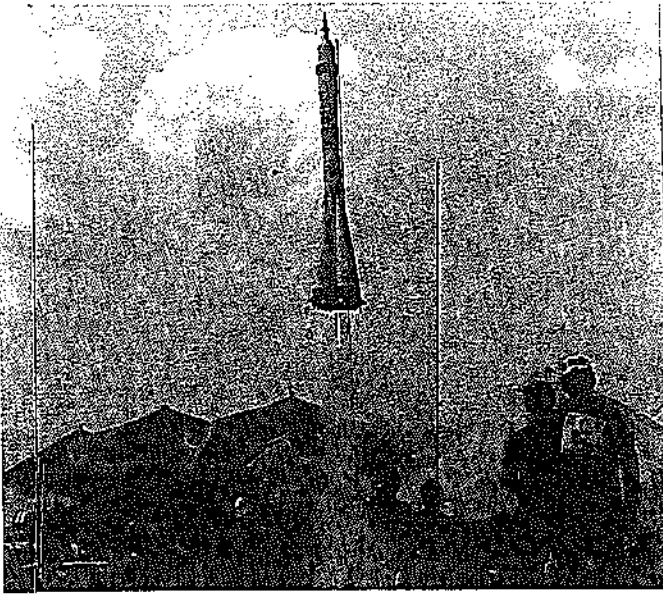
The model recovery system starts with the secure anchoring of the shock cord to the model and ends with the model landing with as little damage as possible. The shock cord should be mounted in such a manner that causes the least internal obstruction inside the body tube, yet will not be burned or broken easily. Too often, the glue-inside-the-tube shock cord mount method causes the parachute to jam against it at ejection. In addition, once the shock cord gets weak from age and ejection damage, it is very difficult to replace the shock cord with a new one. One of the best methods is to use a wire cable shock cord that is glued deep inside the body, such as directly to the centering ring or to a

tube coupler. (*Editor's Note: See the article on page 15 in this issue on how to use wire shock cord mounts.*)

The main shock cord should be elastic. The rubber type shock cords such as Estes uses are poor; they burn, melt, or break easily and only last a few flights. Elastic has been found to be the best. The width of elastic depends on the mass of the model; normal size models under 8 ounces can use 1/8" elastic; 8-16 ounces about 3/16"; models weighing a pound or more should use 1/4" or thicker elastic. Lighter models that are likely to open at high speeds should also use thicker elastic. These are minimums widths, so you can add a margin of safety by going up a size if you feel the need. If thicker elastic is used, be sure there is adequate room for it. Some very large heavy birds may require 1/2" or 3/4" elastic.

The shock cord should be quite long so it can stretch significantly to absorb the shock of the parachute opening. Think in terms of feet or even yards of elastic, not inches. Six to ten feet may be appropriate in the case of a one pound model with a lot of opening shock stress (high speed deployment and/or a large chute). A good rule of thumb is to make the shock cord at least twice as long as the model's overall length. Also allow for proper length between the chute and nose section as well as the chute and main body. If the main body weighs 10 ounces and the nose section weighs 5 ounces, you don't want to tie the chute directly to the nose! In that example the chute should be tied at the 2/3 point of the shock cord, as measured from the bottom (main body) end (4 feet along a 6 foot shock cord). A shock cord should link the main body and upper section together.

Some scale fliers want to avoid having the main body and nose banging into each other after parachute deployment, so they use separate chutes to let the pieces come down separately. Often this has resulted in scenes of the main body crashing to the ground with an non-ejected or tangled chute while the nose section drifts safely down. Or, worse yet, the chutes of both get tangled together to make both crash. That certainly causes more damage than hitting each other in mid-air, and such flights are usually DQ'ed. The Zunofark team had such a problem with at BT-60 size Sandhawk that kept having various recovery systems failures. The eventual solution was to have the nose and main body connected together by a long shock cord and to use two chutes. One chute was the main chute, tied along the shock cord at a point that would allow the nose to remain high above the main body during descent. This eliminated the sections from banging against each other during descent. Main chute ejection was also a problem. The solution to the problem was to use a small strong chute tied to the nose section. The small chute packed in such a manner that if the nose section came off at all, the small chute would be pulled out



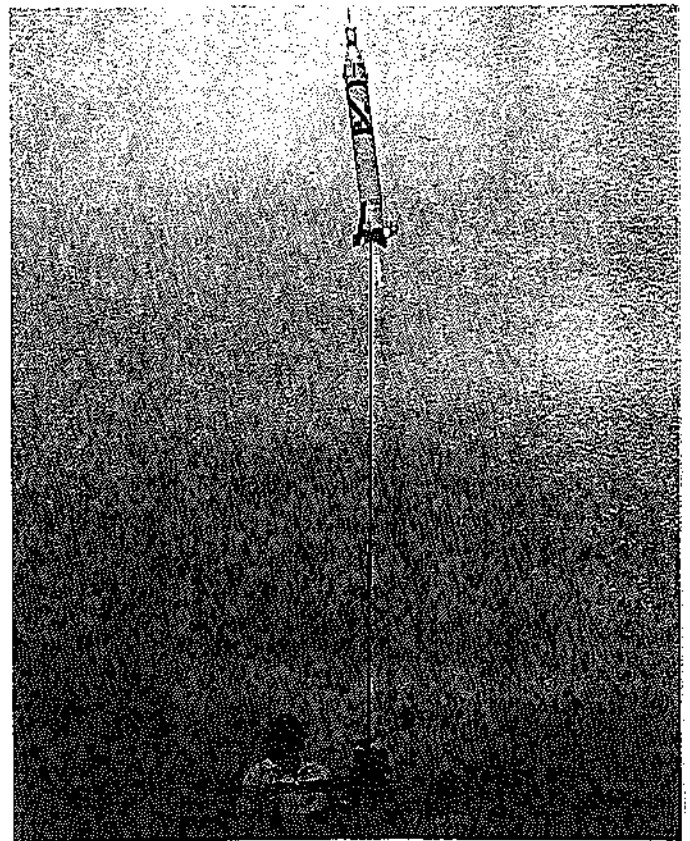
Above: The Soviets flew well tested RC ejection models; their Bulgarian counterparts has reliability problems. Matt Steele photo.

Below: An example of the semi drogue chute method in action. Wayne Hendricks photo.



Above: Matt Steele preps Rob Justis's ill-fated 1/100th shuttle in Poland. Marion Ruki photo.

Below: Pop lugs can cause tip off, as this photo graphically demonstrates. The Zunofark Jupiter C fortunately survived. Robyn Steele photo.



and open up. At worst, this would land the model with less damage and no DQ in case the main chute failed. But, it also could help to pull the main chute out of the body tube. Since we began to use this system, our recovery failures have been dramatically reduced. (*Editor's Note: For more details, see the Semi-Drogue Parachute System article on page 14 of this issue.*)

The heart of the recovery system is the actual device which slows the model down, whether it is a parachute, streamer, or even wings for glide recovery. If you try glide recovery, you either already know more than this article can say, or will be in bigger trouble than this article can help with. Streamer recovery is usually associated with high-flying models, which in scale often are scale altitude models. Most models use parachutes, of course. The parachutes need to be strong enough not to be ripped or damaged from the opening shock. A heavy model with a big chute is going to have a lot of stress on the parachute and shock cord. So will a model which is not particularly heavy, but is flying fairly fast at ejection (due to a non-vertical flight path or improper delay choice).

If the model has enough room for storage, use fabric chutes instead of plastic. There are several commercial fabric chutes available (such as North Coast Rocketry), or if space/time/money is short you can make them in single sheet form from polyester lining (which can fit into a smaller space than multi-panel chutes).

If you must use plastic chutes, at least reinforce them by running the shroud lines over the top of the plastic canopy, with additional tape tabs applied to hold the lines radially across the top (using plastic at least the thickness of commercial chutes such as Estes, not dry cleaner bags). Usually, if such a plastic reinforced chute is damaged due to opening shock, the plastic rips itself radially across a line in a place or two but often holds together well enough to still slow the model. Under much lower stress, normal (non-reinforced) plastic chutes will often either rip a corner off or just let the shroud line slip out from under the shroud tab.

Mylar chutes have only one positive aspect; they are very light. If you have screwed up and made a model on the very edge of the weight limit, mylar chutes are probably necessary to stay under the weight limit. Mylar chutes are risky to use, however. Either they tend not open or they to rip to shreds. They are to be avoided whenever possible.

A final note about parachutes is selecting the proper size for the job. Experience should be a general guide. Each flight can be treated differently however; on a calm day on a decent field a larger chute can be used than during high winds or on small fields. The bigger chute lands more softly but worse than landing damage is loss of the model, so be careful on selection for the

proper conditions. This is even more important for models which fly to fairly high altitudes. Generally, though, the following is a good rule of thumb for parachute sizes are:

- 0-4 oz: 12" diameter parachute
- 4-8 oz: 18" diameter parachute
- 8-12 oz: 24" diameter parachute
- 12-16 oz: 36" diameter parachute
- 16-32 oz: 48" diameter parachute
- 32-48 oz: 2 each 48" diameter chutes

Other Considerations

Staging: If you fly a two or three stage model, be sure the engine combination will boost the model properly. To insure that the staging technique is reliable, test fly a model many times to gain experience with methods that use a fuse, timer, or mercury switch. If the upper stage is ignited electrically, be sure to include a safety arming switch. This is required for contest flying, and a generally good idea for all electronically staged models. Boilerplate flights highly recommended.

Clusters: Only cluster motors in a scale model if you have had great success doing it. Avoid widely displaced cluster motor locations, as the farther apart the motors are the more the model will tip to one side from the slightest uneven ignition of the cluster (i.e., no clustered shuttle SRB's unless you like Russian Roulette). Use at least flashbulb ignition if not something even better, and adequate ignition battery power. Boilerplate testing is a must for clustered models.

Engine Mounts: The engine(s) must be securely mounted! Do not install weak mounts that may let the engine shoot through the model under thrust. The boost thrustline must be as designed. Engines should not be able to move in either the aft or forward directions. Allow access to the engine so that it can be friction fit and/or taped to the engine mount tube. Engine hooks preferred if design allows. Be sure that the hook itself will not rip rearward out of mount tube.

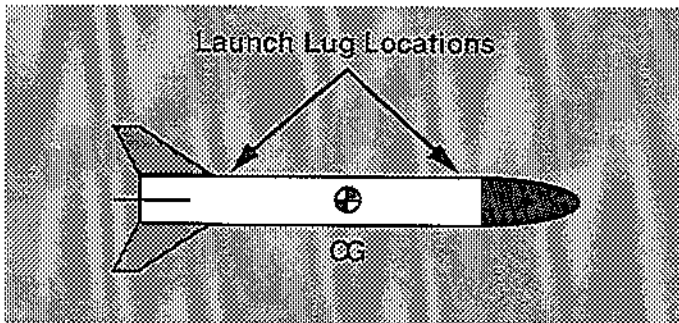
Nose Cone/Nose Section Fit - The nose assembly (portion above the separation point) should fit properly. Too loose a fit may allow the nose section to fall off under thrust or during deceleration just after burn-out. Too tight a fit may result in the nose never coming off. A good fit can be achieved by using a relatively long shoulder, at least as long as the diameter of the body tube, preferably more. Such a long shoulder will prevent wobble while still allowing a wide enough tolerance to avoid having to use an excessively tight fit.

A good way to test for the proper fit is to pack the recovery system inside the model, and then turn it upside down. If the nose section falls off, the fit is too loose, and the nose section shoulder needs shims (usually tape) added. The nose section should fall free if a

little force is applied. If it takes a considerable force to free the nose section, then remove a bit of the shoulder to make the section slide smoothly. The nose section should not wobble from side to side.

The recovery system should come out of the tube if you blow into the motor mount of the model. If it doesn't, repack or replace the recovery system until it deploys cleanly. Don't jam the parachutes into the tube and expect the ejection charge to blow the chute out. That's a good way to blow apart a tube or kick an engine.

Launch Lugs: Launch lugs must not bind. The best method to date is to use two small lugs spaced equidistant from the CG.



If a pop lug is used, it must be adjusted so it will not come off too early or snag the model at the top of the rod when it is supposed to release. Pop lugs need practice; if it doesn't work properly, the whole model may be destroyed when it veers off course. Lugs glued to the model may not look as nice, but they are more reliable.

Launchers: The launcher should be more than capable of holding your model. A Porta-Pad with a 1/100 Saturn-V could be a disaster. Make sure the launcher cannot tip over from wind gusts. If the model is above average in size (more than 12 ounces), a long, stiff launch rod is suggested. Six foot long, 1/4" diameter rods are great for big birds. Some special large models could require even bigger rods or a custom tower. If a C-rail type launcher is used, the rail connections must not bind. With all of the above, try applying side loads to the model on the launcher to simulate possible wind gusts that can make the model bind or wobble.

Test Flying: One of the most important ways to increase chances of success and reliability is to make up a boilerplate model, to the same size as the scale model. The boilerplate model can be quite simple or relatively complex itself depending on how many areas of model construction and flight need to be studied. It does not even need to be painted, indeed should there be a crash it can be easier to repair and modify if left unpainted. The boilerplate should have the same mass and center of gravity as the scale model, and the external shape and significant details identical so the center of pressure, as well as drag and lift, will be realistic. The

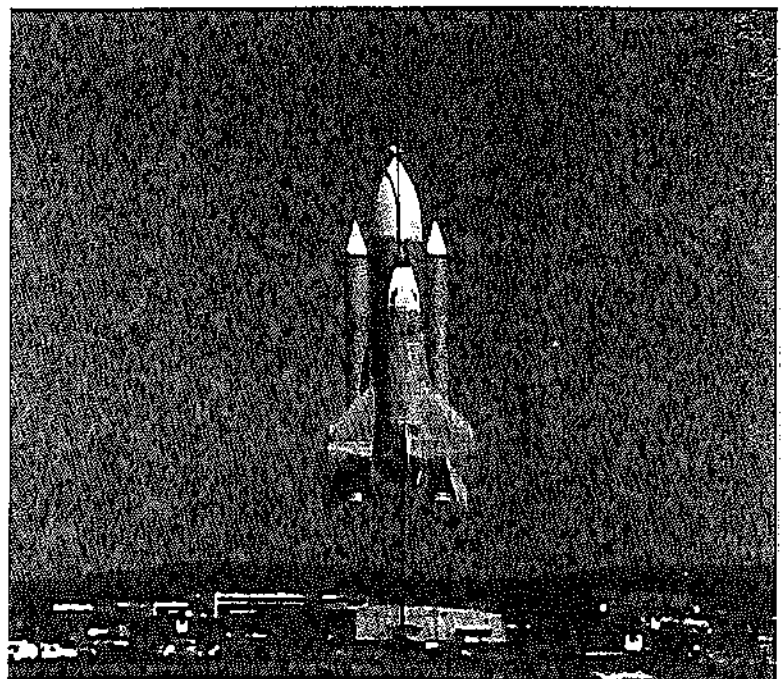
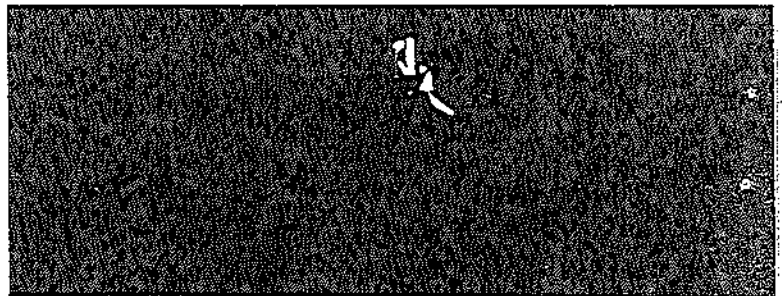
boilerplate should also use the same total recovery system as the scale model will, so that any problems will show up on the boilerplate first.

Brain Use: The most important aspect of all scale model flying! Think about what might go wrong. Think about how to correct so that it won't happen again. And, as a famous rocket engineer once said when asked of his thoughts before an important launch: "What did we forget?".

Conclusion

Originally, this was written for Scale fliers, but everyone who flies rockets should can benefit from the tips in this article. This was written to cut down on the number of screwed-up scale flights, but so much of this applies to such a wide range of models, especially high power.

Below: The more complex the vehicle, the more planning is required to account for all potential problems. This 1/72 R/C Boilerplate Shuttle flies fine in these two views; an attempt two years earlier crashed due to a combination of marginal stability and high wind. Matt Steele photo.



Semi-Drogue Parachute System

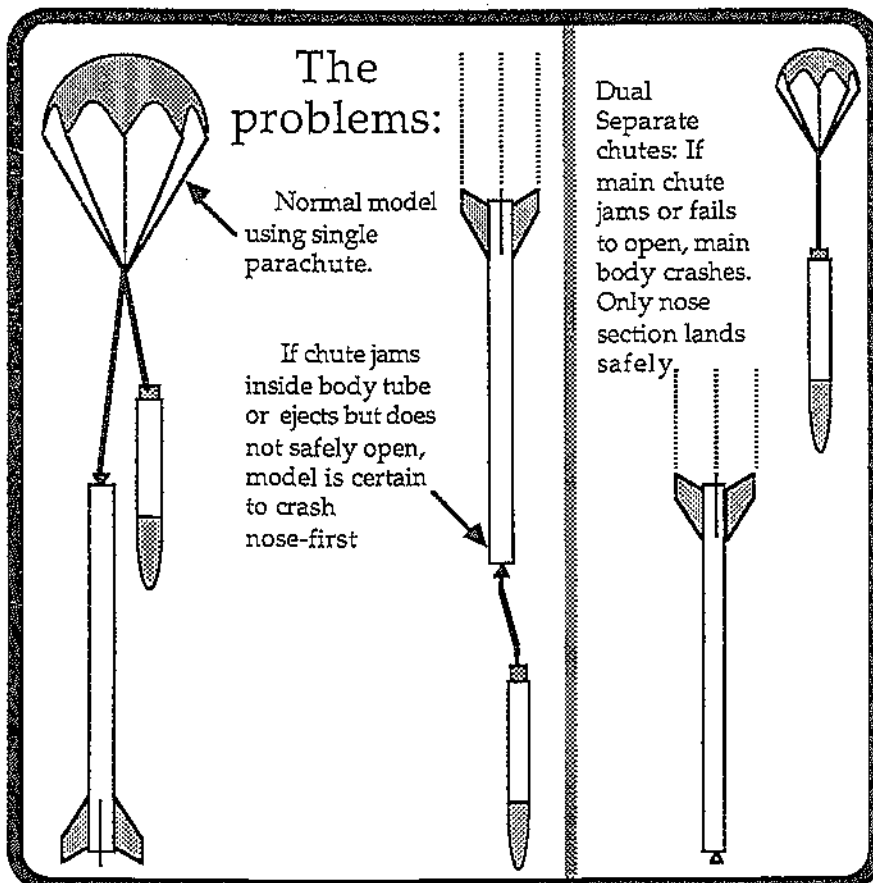
This system was developed after a series of parachute system failures in a BT-60 size Sandhawk model. Out of three flights using a chute on the main body and a chute on the nose section, the main chute didn't open fully once and never ejected at all on another flight, causing serious damage. The nose section always landed safely, having deployed its chute. The separate dual chute method was dropped in favor of letting one chute bring it down, but that flight ended in a crash as the single chute jammed inside the tube and never ejected.

Those problems were puzzling for a "typical" model, but did point out the need for something better. The key to the solution was the frustrating sight of the nose section landing safely when the main body chute failed on dual separate chute flights. If only it had been linked to the main body anyway, the small chute of the nose section would at least have avoided a lot of damage and for contest purposes probably have been ruled a safe flight.

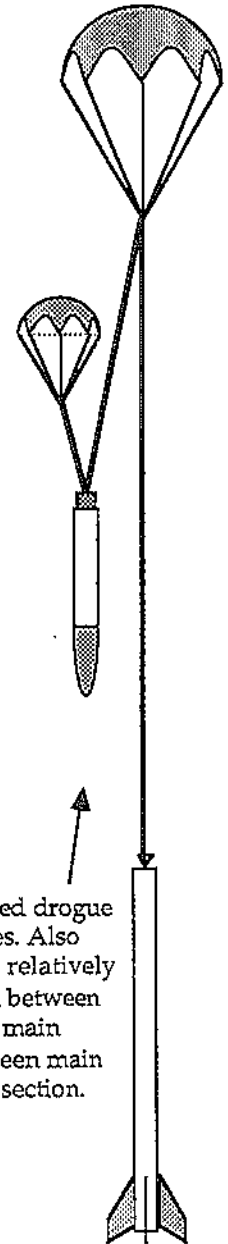
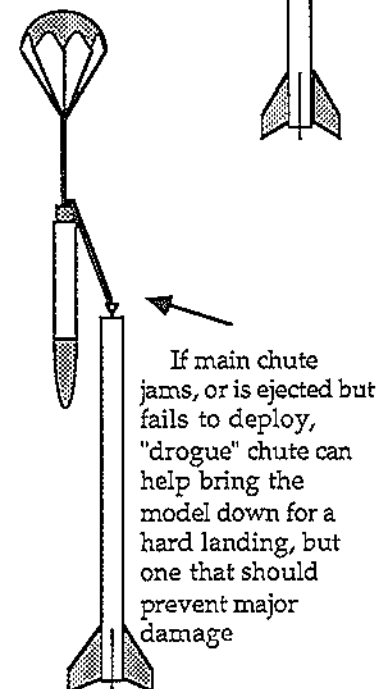
The solution was to indeed keep the model connected together during recovery, with the same shock cord as would be used for a single chute recovery. But, a smaller chute was added to act as a "drogue" chute, this chute connected to the nose section. When packed for a very loose fit inside the body, on top of all other items in the main tube (chute and shock cord), it would be free to come out and open if the nose section came off at all. It is also possible to pack the main chute in such a manner that the smaller chute could pull it out if it failed to eject normally (On some models the ejection pushes the nose off, but not necessarily the chute if the wadding does not provide the proper piston type seal).

Many larger models as well as scale birds have used this method over the past 6 years, with 100% successful deployment. Whether or not this means the "drogue" actually has pulled the main chute out often is not known. It does seem to have pulled out the main chute on at least two flights however, one being a NARAM scale flight

This is called "Semi-Drogue" because the smaller chute does act as a secondary parachute to slow the model in addition to the main chute. Most true drogue chutes only help pull out a larger chute and help little if any during descent.



Fully deployed drogue and main chutes. Also note the use of relatively long shock cord between main body and main chute and between main chute and nose section.



Making Wire Cable Shock Cord Mounts

This method provides a secure means of anchoring an elastic shock cord to the model's main body in a manner that does not obstruct the tube, is difficult to break, and allows easy replacement of the elastic. The concept is not new, many of the old Mini-Max kits came with such a wire cable already installed.

The wire should be stranded steel cable, such as model airplane control cable. The diameter required depends on the diameter and size of the model. .012" diameter cable works fine for models under 8 ounces and down to about BT-20 diameter. Large heavy models, especially ones exceeding 16 ounces, should use cable of about .028" diameter.

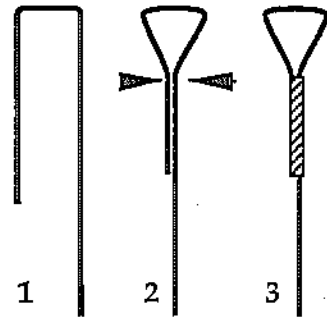
Make a loop into one end of the cable as shown. This will be the top end which the elastic shock cord will be tied to, so make sure the horizontal portion of the loop is a bit wider than the intended elastic shock cord width.

The model construction sequence must be interrupted at the proper point in order to mount the wire shock cord, depending on the mounting method used. This means not gluing in the engine mount until the wire cable has been mounted to it, or not gluing a tube coupler until the wire cable has been attached. It is possible to add a wire cable to a finished model by slipping a tube coupler mounted cable deep down inside body tube, below the parachute and wadding level so as not to interfere with ejection (push into place first, then apply glue).

Do not cut the wire cable to any particular length until measuring out directly with the model. Put a bend into the appropriate location on the wire cable that will still allow about 1/4" of the top loop to extend from the top of the body tube. This will require later on gluing the engine mount or tube coupler at the location intended from the above measurement. The location marked on the cable by the bend represents the bottom "turn-around", allow a few more inches as required for the upward portion of the loop and the parallel length for the thread wrapping.

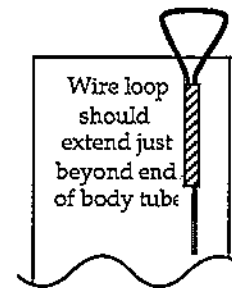
Whatever method of anchoring the wire cable is used, be sure to add plenty of cyanoacrylate glue to the thread wrapping in order to protect it very well from multiple exposures to ejection charges. An extra coating of epoxy is a good idea as well.

Glue engine mount or tube coupler in place, and proceed with normal model construction.

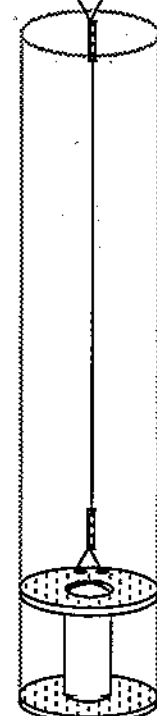


Making the wire loop

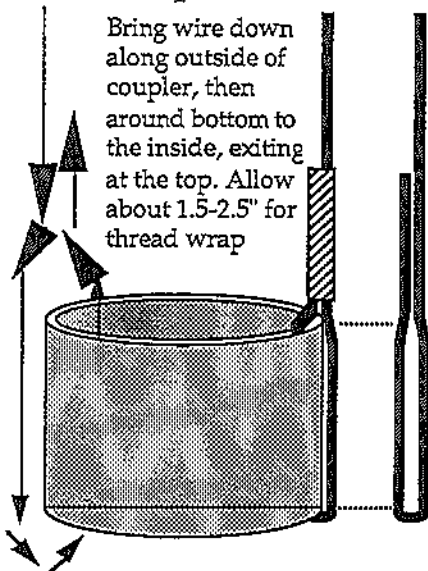
- 1 - Bend wire to a rough "U" shape at the end. Allow enough length for the downward leg to be wrapped with thread later
- 2 - Pinch and bend wire together to form the bottom of the triangular loop
- 3 - Wrap strong thread around parallel portion of the wire to secure the loop. Apply cyanoacrylate to thread after wrapping.



Connect elastic shock cord to wire loop

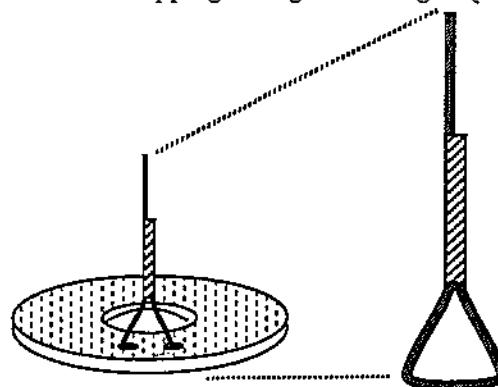


Tube coupler mount



Centering ring mount

Anchoring wire mount to centering ring. Align wire mount holes to apply stress crossgrain, as shown. Add reinforcing if necessary to prevent wire from ripping through centering ring



LUCERNE HAPPENINGS!

Photos by Wasco Schafter

Here's what's going on on the West Coast!

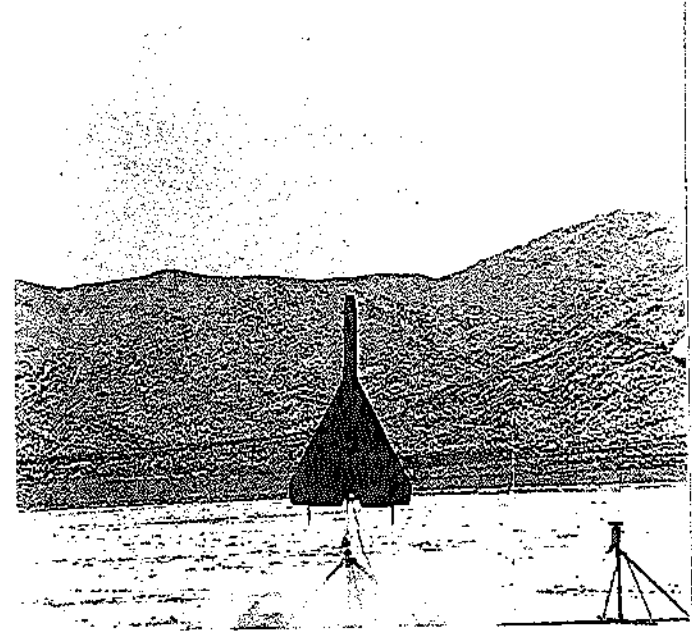
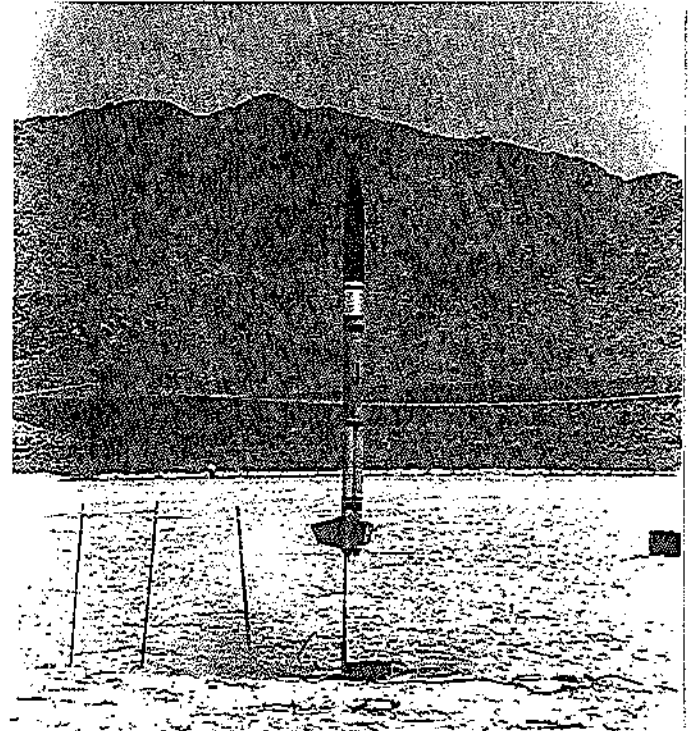
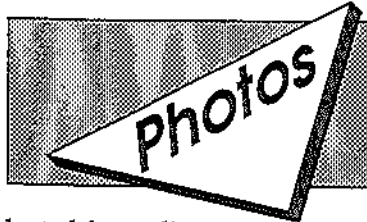
This page, top right: A 4" diameter scaled up Enerjet 2250 lifts off under clustered composite power.

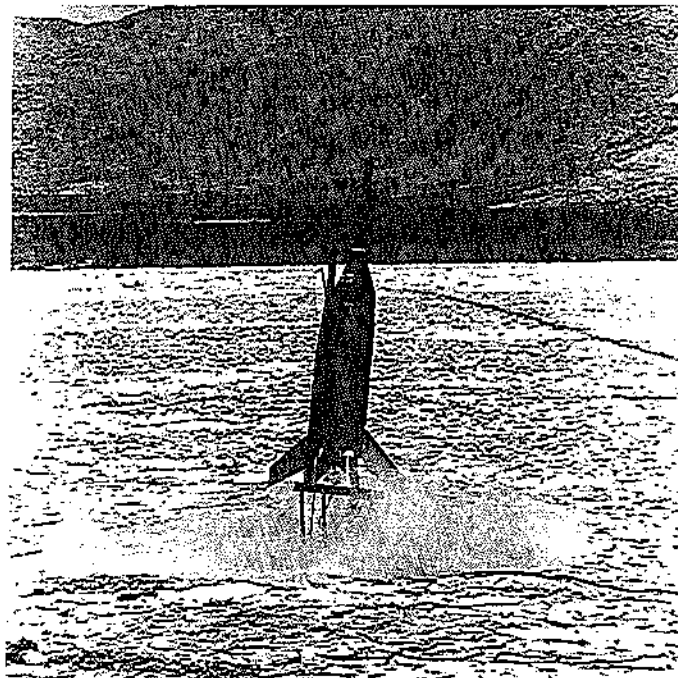
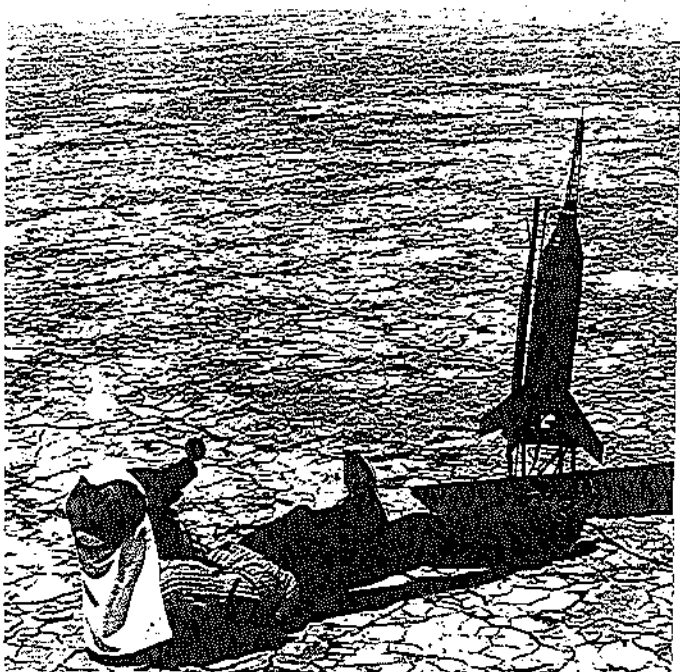
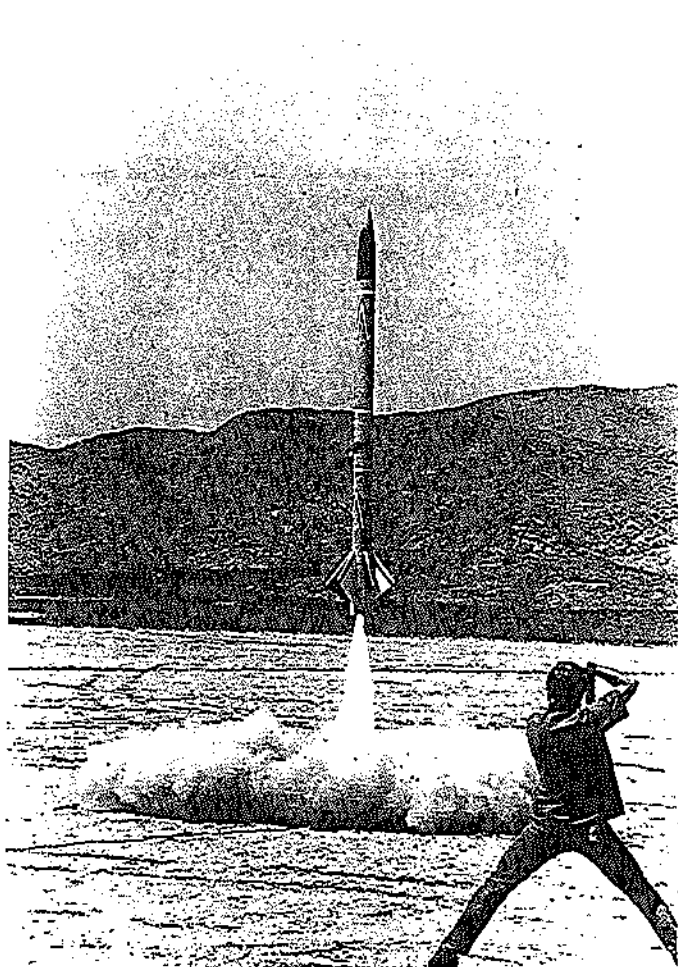
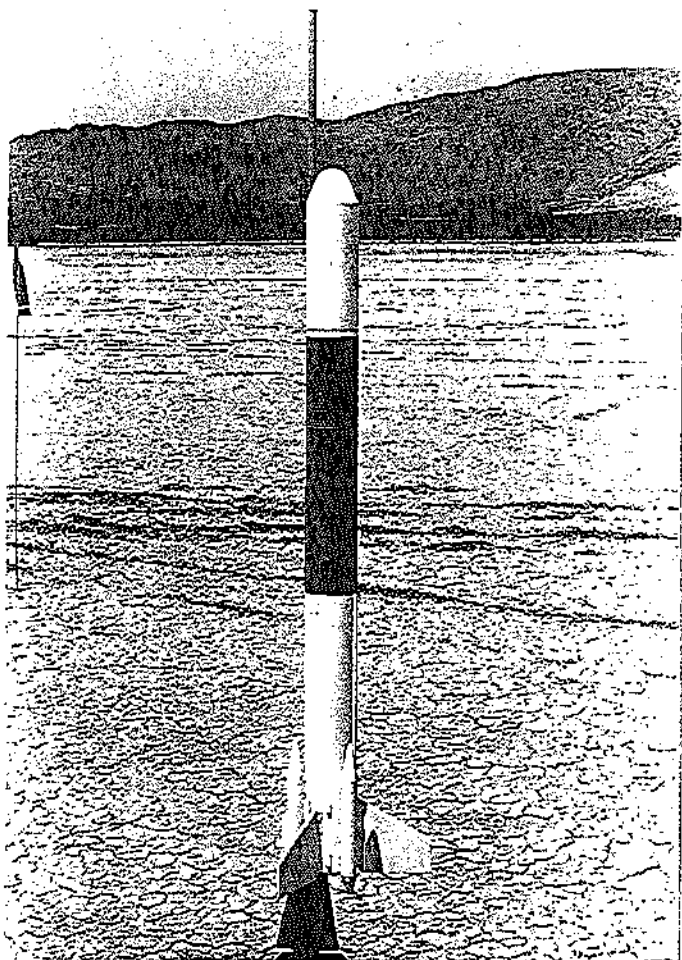
This page, below: A ducted fan radio controlled rocket glider. Unfortunately, it suffered from a lack of control during glide and landed quite hard.

Opposite Page, top left: Another of Moose's Deltas

Opposite Page, top right: A "K" powered bird lifts off spectacularly! Witness said this was quite an impressive flight.

Opposite Page, bottom: Marc McReynolds always has some nice models, and this Little Joe I, complete with launch tower, is no exception. The difficult tower detailing was quite good.

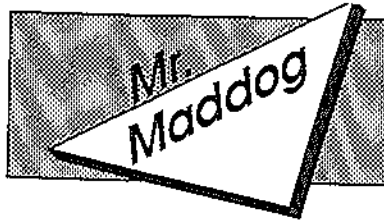




From "Model Rocketry's Greatest Hits, Volume XXIV", let's give a warm welcome to Mr. Maddog as he sings some...

'TUNES

Started out writin' this song for George Gassaway and Terry Lee...ended up writin' 'bout Matt Steele, Carl Warner, and...funky Randy Kelling had a lot to do with it...



My Heroes Were All Contest Junkies

I grew up a'dreamin' of flyin' in contests
And lovin' the rocketeers' ways
Pursuin' the dreams of my high flyin' heroes
I let the best of my youth slip away
I learned all the moves of the modern contestant
Don'tcha fly just one rocket too long
Designs change with the season, for no rhyme or no reason
Like the words to an old Modroc song

(Chorus)
My heroes were all contest junkies...
and they still are, it seems
Last place or first, for better or worse...
winnin's an elusive dream

Competitors are loners, with their own brand of mis'ry
Late nights at Burger King an' Pizza Hut
Grass fires an' misfires, hot shots and sure-shots
And gettin' your car stuck in ruts
But in August, there's NARAM, a week most like heaven
But like all good things it's quickly gone
A trophy or two's all that's in it for you
And the new contest season goes on

(Repeat chorus)

THE COVER OF MODEL ROCKET NEWS

(to the tune of "The Cover of Rolling Stone")

Spoken: Hey, Maddog, tell 'em who we are!

We'll we're Big Time flyers, High Impulse buyers
recognized everywhere we go
Winnin' friends and influencin' people
from NARAM's to big demos
We've got all the Estes...merchandise...
certificates we'll ever use
And we keep flyin' higher, but we can't get our smilers
on THE COVER OF MODEL ROCKET NEWS

(chorus)
Model Rocket News
(Gonna see my picture on the cover)
Model Rocket News
(then I'll be one up on my brother)
Model Rocket News
(Wanna see my smilin' face...)
on THE COVER OF MODEL ROCKET NEWS

I got a freaky ol' lady name o' Cato Katie
who sews parachutes for me
I got a friend who owns half of North Coast
so I get all my motors free
I've got another friend who's in the AMA
and he builds all my gliders, too
And I keep on winnin' but I'm still not grinnin'
on THE COVER OF MODEL ROCKET NEWS

We've got A Divisioners on recovery crew
and they get all our best flights back
We've got B Divisioners who can run the range
so we never have to get bored an' track
Family and friends, well they all pitch in
so our newsletter always comes through
An' we get big subscriptions, but not even a mention
on THE COVER OF MODEL ROCKET NEWS

Spoken: Yeah, I'll be up front...smilin'...
Just like Chris Tavares! Heh, heh...
yeah!

North Coast Rocketry

The Leader in High Power Rocketry!

No one offers the advance rocketeer more!

The most complete line of kits, parts, motors, accessories, adhesives, publications, & electronics.

Fast, personalized service!

New phone or CompuServe ordering!

*Need those motors or parts
in a hurry?*

North Coast Rocketry now
accepts phone-in orders!
or orders taken over
CompuServe!

**Call (205) 883-6020
10 AM to 8 PM CST**

Call in with your order and you will be given current prices and motor availability. Merchandise in stock will be shipped within 48 hours. All orders will be shipped UPS COD. Second or Next Day Air additional.

*Want to talk about a problem?
Have questions?*

Need some more information?

**Try the
NCR Information Line**

By using EasyPlex on CompuServe, you can contact Chris or Matt any time.

CompuServe ID Numbers
Chris Pearson - 71401,2370
Matt Steele - 73270,2745

CompuServe is accessed daily by NCR, and your messages will be given a quick reply by either Chris or Matt!

Coming for Summer '88!

New Technical Reports!
Electronic Delay Ejection Timer!
Audible Rocket Location Finder!
Exciting New Kits!
Electrical Launching System!
Relay Launching System!
Modular Launching Pad!
Rocketry Books!

Payment by Visa or MasterCard!

From Your Sometimes Sober Editors

(Continued from Page 2)



that they expounded. That is: "Don't you dare criticize a NAR Volunteer".

Bull!

Here at SNOAR NEWS, we WILL criticize NAR volunteers, or anyone else who steps out of line. The rocketry community needs it to keep those who are unethical, self centered, or just plan on their butts, out of positions of power. Just because some one is a volunteer, doesn't mean that they they are immune from criticism. Volunteers are expected to do the job right. There have been good NAR volunteers in the past, and there have been ones who have done a great deal of damage to the organization before they were removed.

Past Board of Trustees, and particularly Pat "Armadillo Whiz" Miller, have resisted all attempts to paint a balanced picture of the NAR; the informal policy is "there will be no dirty linen shown in public". The Model Rocketeer (since Don Carlson) and American Spacemodeling have reflected that philosophy over the past years. The Executive Council of the Board (Bundick, Greenlee, and Tavares, in this case) recently reprimanded Pat Miller and John Pursley for having a "public argument". What a pile of crap! Pat Miller has also tried to stiff arm his way into club newsletters to keep editors from publishing controversial material. For the most part, he has succeeded. Only SNOAR NEWS remains as a source for what's really going on in the rocketry world, and Miller has tried throughout the years to keep the clamps on it, too. Past editors have been reprimanded by the Board. Matt has caught more than his share of flack about SNOAR NEWS since his election to the Board of Trustees. And, the NAR awards people saw to it that SNOAR NEWS didn't win the LAC Newsletter Award years back because of it.

That's the price that we've paid, and we'll gladly keep paying it, because the hobby needs it. As we go into our fifteenth year of publication, it becomes obvious that this is one of the reasons we have made it so long.

Now, we've conspired to keep the long arms of the law away from us. I am not an NAR member, and I don't intend to become one. I don't need Pat Miller threatening to take away positions or slap me with a reprimand. He can't touch me, and that allows me total freedom to call the shots as I see them.

Also, for the people who wrote in and wanted their part of the story published: go publish it yourself in

your newsletter. I got letters from Bob Kaplow, Mark Bundick, and Lawrence Bercini discussing the last issue's editorial. They are all from NIRA, who happens to publish a club newsletter. If they want their rebuttal published, I feel that they have the means to do without taking up space in SNOAR NEWS. This is not a federally funded, federally regulated publication; equal time is not required. The operating bucks come out of SNOAR's pockets; we're not in the business of funding other people's opinions. They can do it themselves. If they want it, I'll sell them a copy of the SN mailing list.

Some of these people who complained about the editorial presented the argument that I don't do anything, so I'm not qualified to complain. This is simply not valid when taken in the context of the political atmosphere. I represent a number of people who HAVE done a lot of things (For example, Matt and George were both part of the Pink Book revision committee, but the way that Mark Bundick structured it made it impossible for their votes to have full impact. It certainly wasn't "one man, one vote" like most people would've set things up). If the arm twisting and reprimands weren't so plentiful, these people could come forward themselves. But the past has proven that it's futile to do that, with all the political maneuvering that Bundick and Miller do. So, we're tired of playing that little game, and we've changed the rules.

This rocketry thing isn't Utopia...it isn't a a police state either. But the efforts to present the former sometimes take on the appearances of the latter. That's why SNOAR NEWS still sticks by it's motto: "If we didn't bitch, who would?". This was Chris Pearson's creation in the late 1970's. It seems even more fitting in 1988.

This ain't no foolin' around....

JD McNeil

On a more personal note....

For those of you who want to write me directly, please send your correspondence to:

JD McNeil
Editor, SNOAR NEWS
8146 Oldfield Drive #10
Huntsville, AL 35802

I had been holding off on publishing this address, since I plan on moving soon, but with all the mail coming to Matt, I thought it was best to let the word out. I tend to travel quite a bit, so writing me should be your best bet.

Please keep sending subscription info and checks to Matt, as he is set up better to handle things than I am.

NAR Executive Committee Reprimands Miller, Pursley

by J.D. McNeil

The NAR Executive Committee met on April 25, 1988 to discuss information regarding an argument between Pat Miller and John Pursley on



the field at a recent Dallas contest. The Executive Committee (in this case, Mark Bundick, Claude Greenlee and C.D. Tavares) reprimanded both for arguing in public before the NAR membership. The committee also affirmed the authority of the President to direct the operations of committees between board meetings. And, despite the disclaimer that the Executive Committee was not interested "with the content of the argument", the Committee moved to solicit alternate production sites of American Spacemodeling "to protect the interests of the Association". They did not, however, seek a replacement for the NAR President.

The Executive Committee botched it's first attempt in late March to reprimand Miller and Pursley when it failed to notify the remaining board members within 14 days as directed in the Bylaws. The Committee held a telecon between all parties on April 25 to reinstitute the reprimands. The Committee "expects that such public displays will not occur in the future".

The reaction that we have heard to date has been negative for the most part. Matt Steele indicates that a number of Board members are concerned about the precedent that this action sets. Matt states, "I'd love to comment that I think this action is counter to the professed goals of the organization, but I can't. In this climate, the Executive will issue a reprimand for criticizing them in public. It will be very interesting to see what comes of this when the whole Board meets. I wish, however, we could spend our time more productively than settling petty disputes between Trustees."

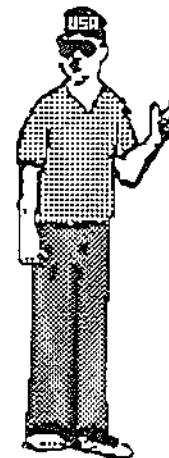
More on this as it develops...

Haven't seen an AmSpam in a while? The NAR HQ recently computerized operations. In the process, some names fell through the cracks. If you think you've been dropped, give Marie a call at NAR HQ ((612) 445-2106), and she'll cheerfully straighten things out.

--An Unpaid Advertisement--

Former United States World Spacemodeling Championships Team Member Tom "Bag of Parts" Hoelle says...

"ALL OF MY
BIG TIME
INTERNATIONAL
MODELS ARE
BUILT WITH
ESTES PARTS...
OR THEY'RE NOT
BUILT AT ALL!!!



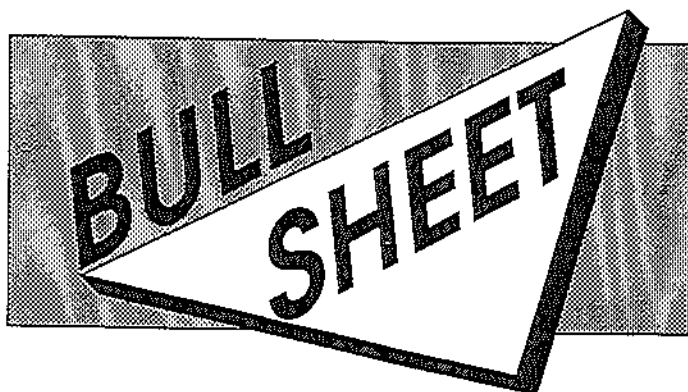
Some folks contend that Mr. Hoelle is America's top scale modeler. Who else could win a NARAM with a mere "boilerplate" model? And who else could get a place on the US World Championships Spacemodeling Team just by saying he would build a new model? (OK, besides John Pursley?) Who else could show up at a World Championships with nose cones to be hollowed out or decals to be applied? We at Estes can't say we're surprised that Tom uses Estes parts; we're just surprised that he uses any parts at all.



"WE DONT CARE
WE DONT CARE
WE DONT CARE
WE'RE THE ROCKET COMPANY!"

Estes Industries

A proud sponsor of the US International Team. What you do with the parts after we send 'em to you is your business!



Vulcan and NCR recently had motors certified by Standards and Testing. The Vulcan/NCR G50 is the hottest G motor to date, rated about 125 n-sec. This efficiency was reached by going to a more efficient propellant than the SMOKY SAM type, so there's no SMOKY SAM G motor at this time. *See the story below for details as to when that might be possible.* The remaining Vulcan/NCR line has been submitted; word is that the motors will be certified in time for NARAM-30. The NARAM range store is expected to have a large number of SMOKY SAM F motors for sale to satisfy all those F Altitude flyers in attendance.

Enertek is not here yet, and there may not be any evidence of them until mid-August, according to the latest reports. Most sources attribute the delays due to problems with kit components and motor cases. The Enertek E15 and E30 were recently certified by S&T, however, Enertek's Bill Stine is planning on attending NARAM, so perhaps he'll be able to answer why Enertek has been unable to match its hype so far.

More motor changes in the works? Gary Rosenfield recently submitted a technical interim amendment (TIA) to NFPA 1122 that would allow composite motors to contain up to 125 grams of propellant. This would mean SMOKY SAM 160 n-sec motors would be a real possibility. The issue will be voted on by the full NFPA in the fall. Estes opposed the move on the basis that the TIA didn't allow black powder motor manufacturers the same weight allowances as the composites. Keep in mind, that if this TIA goes through, the super G motors (those with 62.5 to 125 grams of propellant) would still be DOT Class B motors, so there would be additional shipping costs involved.

The USA/USSR meet has been set for mid October at Wallops Island, Virginia. The dates are still shifting around as the USSR tries to firm up its travel plans. The NAR will field a team to travel to Moscow in September 1990. The Team will be selected in a flyoff competition that was to be held in Virginia at

NARAM-31. This turns out to be too close to the 1989 World Championships, so look for a flyoffs on Memorial Day weekend either in Huntsville or Allentown.

The FAI CIAM has accepted the NAR's proposal to host the 1991 World Championships here in the United States. Westover Air Force Base in Massachusetts is the likely site, and organizers are pushing for a July date. The NAR now begins the process of raising the \$15,000 needed to host the meet.

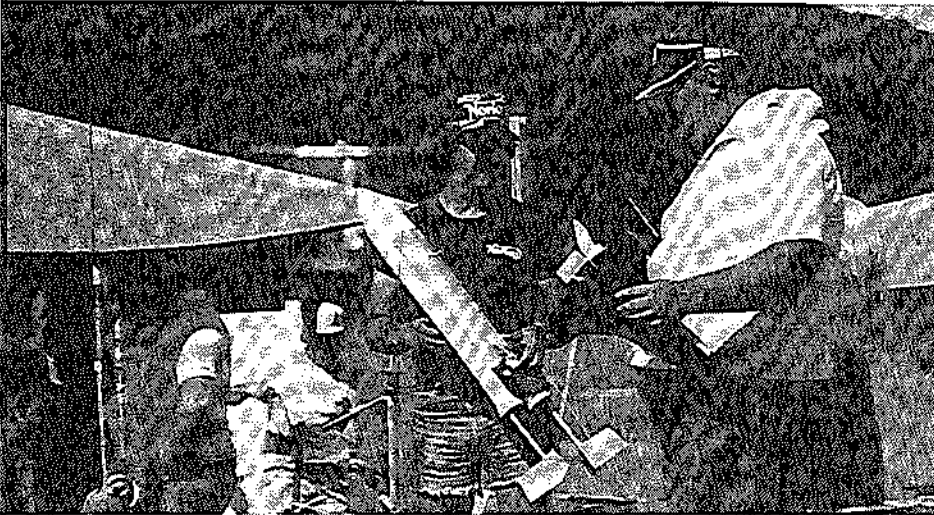
North Coast is expanding their line soon, developing a contest series of kits and parts to fill the void left by CMR. Vac-formed plastic nose cones are the most significant new products, along with both single and dual egg capsules. Lightweight body tubes will also be available. Kits developed by national champions rockteers Matt Steele, Chris Pearson, and George Gassaway should help the beginning modeler get a good start in the competition arena. Kits include two types of boost gliders, the Rotaroc helicopter duration bird, a dual egglofter, and a piston kit. NCR will also offer aluminized mylar parachute material and Micafilm streamer material. Look for the introduction of these products at NARAM-30!

Apogee is another new company on the modroc scene. Edward LaCroix II is the owner; older rocketeers like Jim Backlas will remember him from the late 1960's. Apogee plans on carrying .015" fiberglass fin stock, phenolic body tubes in 13, 18 and 24 mm sizes, and injection molded nose cones. A complete line of glues and epoxies will also be offered. Apogee plans on filling orders for fin stock and tubes now; the nose cones are expected to be widely available by NARAM.

NAR growth has started to slow down. The Association didn't make it to 5000 at the end of 1987 as projected earlier, but it should've surpassed the 5000 mark by now. When the NAR passes 5,502 (the NAR's all time membership high), Pat Miller has promised to throw a big time celebration.

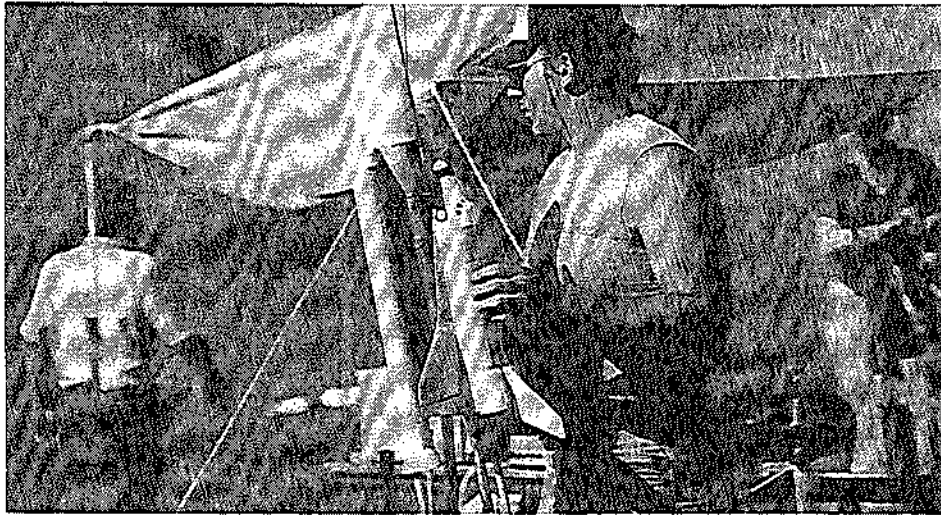
Speaking of disconnected, don't follow the phone numbers in AmSpam if you want to get to NARAM. Through an amazing coincidence, Matt's home phone number, the Ramada Inn's phone number, and the Huntsville Residence Inn's number are only one digit different. The same gremlins that messed up last year's NARAM zip code changed the phone numbers for NARAM this year. Matt's home number is: (205) 883-6020, and the Ramada Inn is (205) 881-6120. If you call the hotel number listed in AmSpam, you'll get the Huntsville Residence Inn, which is a nice place to stay, but a long ways from the flying field.

SHUTTLE FLIGHT ACTION!



George Gassaway's Space Shuttle model provided the inspiration (and the sweat) for the article on scale model flying presented in this issue. We thought you might like to see a photo series of one of the early boilerplate flights.

Left:
Chris Pearson and George Gassaway prepare to mate the Zunoferk Team's 1/72 Shuttle at NARAM-26



Above Right: Matt Steele holds the mated model, waiting for the pad to be prepared.

Right: Matt and George make the final preparations before flight. The flight was successful, on Aerotech F15 power!



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