JOURNAL OF THE EAU CLAIRE HIGH ORBITERS AEROSPACE MODELING CLUB

VOL. two no. two

FEB. '78'

TITEBOND GLUE THROUGHOUT FOR STRENGTH

OFFSET WING .060 LEFT OF CENTER WHEN GLUEING TO FUSELAGE

OUTDOOR FLIGHT PATTERN: 1/2 - 1 TURN RT
FLIP-OUT INTO LEFT GLIDE TURN (40-80 FT.

HIGH POIN

FINISH: TWO OR MORE COATS OF SANL
FOR WEATHERPROOFING FOLLC
COAT OF "GLASWAX". A GOC
WILL AID CLIMB. BRIGHT C
AID VISIBILITY.

STAB

LT. 1/16 SHT

**SWEEPETTE 19**

DESIGNED BY: LEE HINES
DRAWN BY: DON CHANCEY

*AERO MODELING ENTERPRISES*
*2215 So. Air Depot Blvd.*
*Midwest City, Okla. 73110*

FINGER REST - MED 1
(EITHER SIDE, TO SU

USE RAZOR PLANE FOR SHAPING WING

SLIGHT RIDGE

.240 THK AT 1.2"(30%)
FROM LEADING EDGE

CENTER AIRFOIL

FOR INCREASED ALTITUDE, ADD ABOUT 1
UPSWEEP TO BOTTOM FRONT OF WING AIR

TIP AIRFOIL

.204 THK AT 1.02" (30%)
from leading edge

N BALSA'S
SAVER" (NOT
D WITH KIT)

.3 DEGREES POSITIVE INCIDENCE (OPTIONAL)

IF A LIGHTER M
FUSELAGE DEPTH

S DESIRED CAREFULLY REDUCE
CKNESS.

EL TO MATCH DIHEDRAL

FUSELAGE

GLUE SANDPAPER @ 3 FINGER
CONTACT AREAS

DATUM SURFACE (MUST BE ST
ACHIEVE PR

GHT TO
R INCIDENCE SETTING)

ALANCE POINT AT
55% TO 58%

(FUSELAGE
FROM REAR

ACTUAL
9.2

1"x1.9"x1/4"x1/8"

E LINE

x1/16"

AVE E-IN"
HOUT NOT
TO CENTER BRK)
031-.093 DEPENDING ON
T ( LESS IN CALM,

.10

TO
TO

E RECOVERY MOVE WING HI POINT FORWARD
.10").

TAPER AIRFOIL AS SHOWN!

.015)

1.1"

FRONT VIEW

SET C.G. PER PLAN & HAND GLIDE TEST. ALL SWEEPETTES SHOULD USE
THE CONOVER TRIM METHOD" AS FOLLOWS:

A. LEFT RUDDER (CAREFUL NOT TOO MUCH!)

# T - MINUS ZERO !

Even though it is early in the contest season, we are Number One so far ! In addition, we have two members in the top ten in all three age divisions. That's not a bad start for our first full year of competition as an NAR Section, and a rocketry club. Let's keep up the good work guys !

The club patches are in, so those who paid for one can pick them up at 2013 Cameron, or you will receive yours in the mail shortly if you live outside of Eau Claire.

Pete Pathos and I have formed a team so we can compete in more contests this season. For you avid contest buffs this is a good way to broaden your flying experience in a shorter amount of time, and it is also a good way to reciprocate with other clubs who attend our meets. It only costs 50¢ per contest season, so you may want to consider forming a team yourselves.

Mark Bundick's Parksley Eagle Sparrow B/G design appears on pages 8 thru 11 of this issue, and I have a Class 1 S.D. design on page 12. Part 1 of "Getting Started in Contest Rocketry" by Jeff Flygare appears on pages 4 and 5, and the first topic is Drag.

The letter I wrote DOT concerning the new model rocket motor labeling regulation appears in this issue. You all should drop DOT a note expressing your desire for them to exempt shipments of model rocket motors weighing less than 25 lbs. from complying with this requirement. Maybe they won't listen to you, but they won't be able to say you didn't make your feelings known to them.

I have an exclusive report on the Chicago Trustee Meeting held February 4, 1978 on the campus of the University of Chicago. I was fortunate to be able to attend this meeting, and I was very impressed with the amount of important decisions made by the trustees. Manning Butterworth has resigned as President of the NAR (he has accepted a research postion with a university in Wales), and our new President, Pat Miller from California, is a dynamic personality. Pat should add much in energy, enthusiasm and articulation to his new position.

TAC has decided to restrict WIScon-I to one day (February 25, 1978). Final details appear on pages 15 and 16.

This month I have added an ECHO picture-of-the-month feature. It is on the last page. If you have a picture you would like to see in Echoes send it to me.

Let's be National Section Champs this year men !!!

Bruce

# BRHO CLUB CALENDAR & NEWS.

February 8, 1978. DeLong J.H. rm. 168 7 to 9 pm.

Club Meeting. Continuation of glider discussion. Copies of Dr. Gregorek's BB/G report on designing Boost and Rocket Gliders. Club patches passed out to those who ordered one.

February 22, 1978. Parks and Rec. 7 to 9 pm.

Club Meeting. Evaluation of rockets to be entered in WIScon I. Open discussion session.

February 25, 1978. Tomah, Wisconsin.

WIScon I. All those going with me should meet in the K-Mart parking lot by the Pizza Hut. We are leaving at 8:00 am. sharp! If you're not there you'll have to find your own way down.

April 15, 1978. Memorial High School Football Field. 1 to 3 pm.

All manufacturer demonstration. All Eau Claire members should plan to help launch and recover rockets.

April 22, 1978. Craig Rd. launch site. 9 am to finish.

Ground Hog II (section meet). Class 00 P.D., Class 0 P.D., Class 1 S.D., Sparrow B/G, Hawk R/G, Class 1 Helo Dur., Entry fee: 50¢ per person.

May 27 & 28, 1978. Craig Rd. launch site.

Pole Cat II (regional). Class 0 P.D., Class 0 Helo Dur., Class 1 P.D., Class 2 S.D., Hornet B/G, Sparrow R/G, Eagle B/G, Condor R/G, Pee Wee Payload, Robin EL, Dinosaur Superroc. Fees: A- $2.50, B- $3.50, C- $4.50.

June 10 & 11, 1978. Milwaukee area.

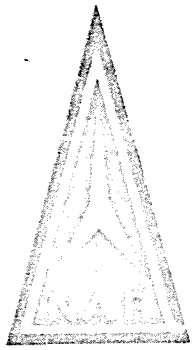
NARBAR-78 (regional). Scale, Pigeon EL, Gemini Dual EL, Class 00 P.D., Class 2 S.D., Sparrow B/G, Condor B/G, Hornet R/G, and Class 2 Helo Dur. Contact: Chris Weege, 7614 N. Bell Rd., Milwaukee, Wi. 53217.

June 17 & 18, 1978. Joliet, Ill.

Daughter of MAR (regional). Sparrow B/G, Hawk R/G, Class 00 S.D., Gnat R/G, Class 1 S.D., Class 1 Flexwing, Class 2 Helo Dur., Class 3 P.D.w/egg, Swift B/G, Hornet R/G. Contact: Jim Murray, 116 N. Chapel, Waukegan, Il. 60085

# NOW is the time to join NAR

ONLY THROUGH NAR CAN YOU . . .



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* Keep Current with the latest events on the model rocketry scene through your own copy of the exciting, all-new MODEL ROCKETEER!
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* Enjoy the Peace of Mind of your $1,000,000 liability protection!
* Avail Yourself of the opportunity to be a part of the international model rocketry fraternity - - the Fédération Aéronautique Internationale (FAI)!
* Learn all about the latest NAR regulations and contest rules in the revised "Pink Book"!

Additionally . . .

* For the first time - - the NAR FAMILY PLAN! one family member joins at the full rate - - any and all other members deduct $2.00 from their membership dues! (Sorry, you're going to have to share your family copy of MODEL ROCKETEER, but you still get all of the other benefits).
* And last but not least - - evidence of your membership in NAR - - the newly, redesigned wallet-size sporting license!

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## NAR MEMBERSHIP APPLICATION

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MEMBERSHIP CATEGORY (Please check one box only)

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☐ Family Plan Membership (Deduct $2.00) ☐ New ☐ Renewal

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If I am accepted in the National Association of Rocketry, I pledge to observe and follow the NAR safety code. I am aware that a reported violation of the NAR safety code may lead to the revocation of my membership right. I also agree to abide by the by-laws and the standards and regulations of the NAR.

Signature _____

Jeff Flygare, now with Centuri Engineering, and once the senior advisor of the NAR Buffalo, N.Y. Section, gave us permission to reprint the series which first appeared in the Satellite (their section newsletter), and later in the Model Rocketeer. We are reprinting it for those who were not members of the NAR when they appeared in MR. We thank Jeff for allowing us to use this material.

Editor

## Getting Started in Contest Rocketry Part I

*by Jeff Flygare*

In this column we are going to take time out from the discussion of the various contest events to talk about a topic which is fundamental to good contest flying. In every event we have discussed so far, we have been talking about obtaining optimum performance by reducing the retarding forces acting on a model rocket, and the most significant and easily controlled of those forces is aerodynamic drag.

I realize that drag has been treated by numerous articles, the most important of those being Estes' technical report TR-11 by Dr. Gregorek. Also, those of you who may have attended the Pittsburgh Conventions, NARAMs, and the like have probably heard Dr. G and others talk about drag. These articles are very good (expecially TR-11), but the major difficulty to the new contest modeler seems to lie in applying the information in these reports to his contest flying. In this column I am going to try to fill the gap between sport flying, where drag is just another force acting on a rocket and is disregarded to a great extent, and contest flying, where the elimination of drag to as large a degree as possible leads to optimum performance and winning. I will touch on some of the basic information in TR-11 and the other reports, but the emphasis in this article will be on the practical applications of the theory. I encourage the reader, however, to read the Estes TR-11 report after this discussion.

We can start off by asking what drag is and why it is important to the hobby of contest model rocketry. Drag is one of many forces which act on a model rocket as it travels through the air. Along with gravity it composes the force which retards the forward motion of the rocket. Drag is caused by a number of things. Friction drag is caused by the molecules of air passing over the surface of the rocket. Pressure drag is caused by an unbalance of pressure around the rocket. Regardless of the type of drag, it acts to slow the model down and keep it from reaching the maximum altitude it can achieve. As I have said all along in this column, we are looking for optimum results. If we can do something about the force drag exerts on the rocket we can improve the character of the rocket's flight and get better results. It turns out that drag is the only major force which we can control (outside of the thrust of the engine, but the total impulse is fixed for any given contest event to a certain extent) for the rocket, so it is therefore most important that we thoroughly understand it and how to control it.

Okay. Regardless of what type of drag we are talking about, it can be described by the following formula:

$$D = 0.5\rho C_d V^2 A$$

Don't get upset because it looks confusing. It isn't really, and we'll thoroughly discuss it below.

First, drag depends on the density of the medium through which the rocket is traveling. This appears in the formula as the Greek letter $\rho$ or rho. In the case of model rockets, the medium is air (unless you are flying underwater rockets). Since the above formula can be used for the computation of the drag on a body traveling through any fluid we must consider the fact that the fluid in question might not be air. We all know that it is much harder to swim than it is to run and that is because we are traveling through a denser medium. This difference in density is therefore brought into the drag equation. It is interesting to note that as we go higher into the atmosphere, the atmosphere becomes less dense; there are fewer air molecules in a cubic centimeter than there are on the surface of the Earth. This is the reason why airplanes must have pressurized cabins. The air is so "thin" at 50,000 feet that it would be difficult to breathe. Also, as temperature increases, air density decreases.

V is the symbol for velocity. It should be pointed out however, that the velocity of a rocket is constantly changing, and therefore it is necessary to calculate the drag of a model rocket in very small increments of time in order to get an idea of the total change of drag with velocity through the flight. In most cases, though, the drag of the rocket is calculated only at certain intervals and points in the flight (such as liftoff, burnout and ejection) and the change in velocity does not affect the drag calculation. The important thing to remembr in relating drag and velocity is that as velocity increases, drag increases. In fact, drag increases as the square of the velocity. In other words, if the drag of a rocket is 4 grams when the rocket is traveling 100 meters/sec., the drag at 200 meters/sec. is 16 grams [(4 grams)$^2$].

A represents the surface area of the model. This is perhaps the easiest factor for us to control as far as reducing the drag involved. The surface area of the model may be changed by using a smaller body tube, smaller fins, or by elimination of a transition piece to a larger tube. Also, putting a better finish on your rocket will cut down on the surface area. In other words, as the surface area increases, drag increases; as the surface area decreases, drag decreases. So if we want to build a model which will go as high as possible with a given engine, we should use the smallest possible amount of surface area with that engine and therefore the smallest body tube. Here we have a good, basic rule to follow for reduction in drag in contest flying: use the smallest possible body diameter and the smallest size fins THAT WILL STILL GIVE YOU ADEQUATE STABILITY! Be careful when cutting back on fin size because you begin cutting back the stability of the model. One thing you may notice about sport model kits is that, besides the fact that they generally have a great deal of surface area (large tubes and extra parts all over the place) they generally have very large fins, which are very draggy but make the model super-stable. In contest flying we try to find the optimum fin size which will give minimum drag and yet sufficient stability. It's the old trade-off story all over again.

In connection with surface area we should talk for a moment about boundary layer. If you've read articles on drag or heard people discussing drag, you've probably heard the term boundary layer being discussed, possibly without knowing what it was. To picture the boundary layer, just envision the surface of the rocket and the air molecules passing over that surface. (See Figure 1A).

When the rocket is passing through air which is laminar (that is, where the air is calm and the air molecules move past the surface of the rocket in smooth, even fashion) drag is much less than if the flow separates from the body tube. What do I mean by separation? Well, in laminar flow, as you can see from the diagram, the boundary layer (the first few layers of molecules closest to the surface) moves over the surface and stays close to the surface. But, if there is some abrupt change in the surface (such as a de-

fect in the finish in the surface or a sudden break in the direction the air travels over the rocket due to a transition piece or fin attachment), the boundary layer does not have enough energy to hold it close to the surface and it breaks away. This separation of the boundary layer causes a great deal of drag, and should be avoided whenever possible.

There is one other interesting aspect of surface area drag which I will mention. It has been exploited by the boost/glider people to a certain extent but to date I haven't seen much use in straightforward rockets. This involves the use of a turbulator. An interesting phenomenon was observed first by the great German aerodynamicist Ludwig Prandtl, following up on some work done by Alexandre Gustave Eiffel (after whom the Eiffel Tower in Paris is named). Eiffel had noticed a rather severe drag reduction in his experiments on the drag reduction on a sphere. Prandtl took the work further by placing a sphere in a wind tunnel, and putting a fine wire ring around the sphere a short distance from the separation point of the boundary layer in laminar flow just in front of the separation point to become turbulent (that is, it did not flow in a smooth, uniform pattern, but tumbled over itself). Now usually anything traveling through a turbulent flow will have a higher drag than an object traveling through a laminar flow simply because air that is flowing along evenly is easier to move through than air which is turbulent. But in this case, the transition from the laminar flow to the turbulent flow just before laminar separation takes advantage of a particular aspect of turbulent flow to an advantage. Turbulent flow, even though it is more difficult to move through, by its very nature has a larger amount of kinetic energy and when passing over the surface of the rocket, if it comes to a sudden change in the surface, it is better able to remain attached to the surface of the model, whereas the boundary layer of laminar flow separates. This, paradoxically, causes *less* drag, even though the flow is turbulent. Therefore, a wire or thread of this kind, placed just before the laminar separation point for the boundary layer causes the transition to turbulent flow, and the boundary layer stays attached to the surface. The wire is known as a turbulator.

We have discussed the factors which influence drag and to a certain extent discussed how to regulate each. Now, let's look at three different types of drag.

PRESSURE DRAG: Pressure drag is caused by an unbalance of air pressure around the model. A model rocket sitting on the ground has an equal amount of air pressure on all sides of it. But when the model is thrust into the air, an unbalance of pressure occurs on the leading edges of all sections of the model. This unbalance of pressure is pressure drag.

FRICTION DRAG: Friction drag is the result of small particles of air traveling over the surface of the model. This is the drag which results when the boundary layer separates from the surface when the surface is improperly finished, as we discussed above.

INDUCED DRAG: Induced drag is drag which occurs from the attitude with which the model attacks the air, or by the presence of objects on the surface of the model which directly cause the production of drag. For example, one factor which can produce induced drag is the angle of attack of the model. The model's angle of attack refers to the angle between the long axis of the model and the direction of travel. (See Figure 2). If the model is not meeting the on-rushing air head-on but instead is flying at a slight angle, it presents more surface area to the air and since, by our formula, drag increases directly with the surface area, drag increases. Angle of attack can become a severe problem in rockets whose stability is poor. It can be remedied by simply improving the stability of the rocket. In less severe cases, it is generally the fin alignment which is responsible for producing large angle of attack.

LAUNCH LUG DRAG: Launch lugs can contribute as much as 30% of the drag on a model rocket. In our effort to reduce drag on contest rockets it becomes necessary to remove the launch lug. But, some sort of guidance method must be used during the first few feet of flight.

One method is the pop-launch lug which was developed by Howard Kuhn. The idea is to use a launch lug which comes off of the rocket after it has traveled the length of the launch rod. This generally consists of a 5 to 6 inch length of launch lug with a wire bar on the front that slips into a small slit in the body tube and two wire hooks on the aft end which fit around the fins. A piece of tape is placed on the top of the launch rod to stop the launch lug and detach it from the model as the rocket goes on its way, free of the launch lug and the extra drag.

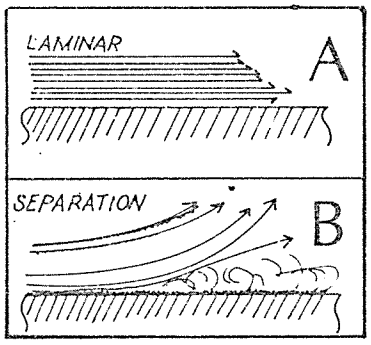



FIGURE 1

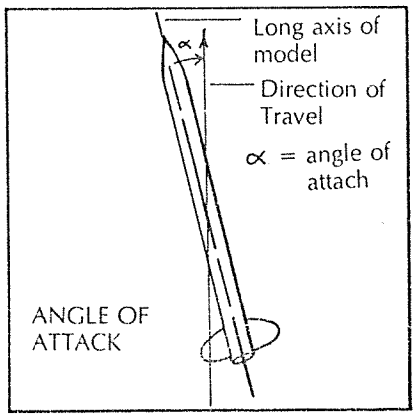



FIGURE 2

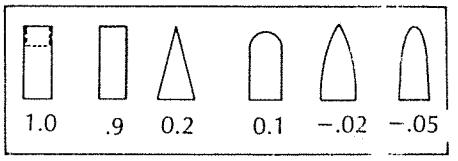



Fig. 3 Drag Coefficients of some Nose Cone Shapes

Another method which eliminates the launch lug is to use either a tower launcher or a piston launcher. I'm not going to take space here to describe these, but you can find information on them in back issues of the *Model Rocketeer* and *Model Rocketry* magazine. Perhaps, if there is enough interest, we'll talk about them in a future column.

Still another method of reducing drag is to use rounded shaped nose cones, tail cones and fins. To demonstrate the difference between the various shapes of model rocket parts we have to go back to our drag equation and talk about the one factor we have not, as yet, discussed — the drag coefficient.

The drag coefficient can describe to us what shapes are best for model rockets. Any body traveling through air has a drag coefficient. And, if any part of the body is considered, it too has a drag coefficient. Thus, model rockets themselves have drag coefficients describing the flow of air around them, and so do nose cones, tail cones and fins. Let's look at some typical pressure drag coefficients for various shapes of nose cones. (Figure 3)

From the figure above you can see that parabolic and ogive shape nose cones are best because they have the lowest drag coefficients and thus the lowest drag. You will find that in model rockets, unlike full scale rocketry, rounded, ogive, and parabolic nose cones have less drag. This is because model rockets travel at sub-sonic speeds and at these speeds a nose cone with smooth and unabrupt changes in direction cuts the air best.

There is a considerable amount of drag due to boundary layer separation at the base of the model. With small rockets there is very little that can be done about this drag. In larger rockets, however, the use of a boat-tail or tail cone can greatly reduce boundary layer separation. You can find more information on this in an article by George Pantalos in the January, 1974 *Model Rocketeer*.

Fins should be shaped to a streamlined "fish outline" (rounded in the front and drawn to a point in the back). Also, the use of fin shapes which are rounded (such as an elliptical shape) will help to reduce the vortices (turbulent air streams) that occur at the tips of the fins.

This has been a very brief discussion of drag. What you should get out of it is a few basic rules to follow when designing, building and flying contest model rockets. Keep in mind that the person whose design has the least amount of drag will have an advantage over the rest of the competition.

# Space History

February 12, 1961. The USSR fired its first Venus probe from orbiting Sputnik 8. The probe missed Venus.

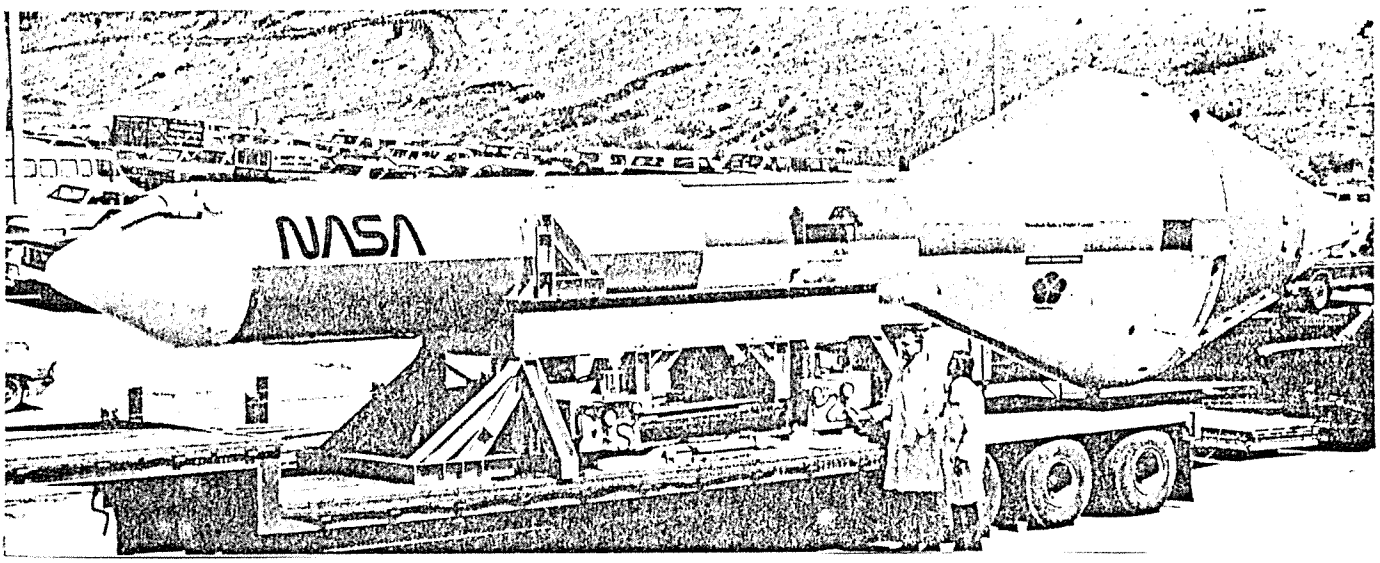
February 20, 1962. John H. Glenn, Jr., orbited the earth three times in a Mercury spacecraft, Friendship 7.

February 4, 1966. The USSR's Luna 9 landed softly on the moon and transmitted the first pictures directly from the surface.

February 26, 1966. The first Apollo spacecraft-the future "moonship"-flew 5,500 miles from Cape Kennedy to the South Atlantic.

**** Roes, Nicholas, and William E. Kennedy, Space-Flight Encyclopedia . Chicago and New York: Follett, 1968.

# & NASA NEWS




Vehicle to check out the recovery parachute system for the space shuttle's solid rocket boosters (SRBs, produced by Thiokol Corp.) began back in mid-June 1977 at the National Parachute Test Range, El Centro, California . The 40,000 lb.

(cont. next pg.)

(NASA NEWS continued from page 6)

Martin Marietta (also manufacturer of the External Tank (ET) for the shuttle) vehicle was to be dropped from a Boeing B-52 bomber to test the recovery system that will be on each 175,000 lb. booster. The system consists of one pilot parachute and a drogue parachute and three 115-ft.-dia. main parachutes. The drogue parachute is 54ft. in diameter and the pilot parachute is 11.5 ft. in diameter. The test vehicle is 50 ft. long with a minimum diameter of 4 ft. and a maximum diameter of 10 ft.[1]

* * * * * * * *

# GALAXY II anyone ?

If you grooved on Star Wars, and feel like you're floating in a black hole in deep space now, waiting for a sequel to hit the silver screen, maybe Galaxy II is for you. It will cost you around $5.00 a month if you decide to enter the race for an empire, but that isn't really too bad these days. It's a lot cheaper than building your own Death Star!

A gentleman named Brett Tondreau designed Galaxy II. It is a computer game which uses two IBM System 370 model 168's to store and compute all happenings. You send in your monthly moves and receive a printout each month that tells you how your stradegy has worked. Your ultimate goal is to build an empire.

If this pastime sounds interesting to you, you can read more about it in the March-April 1978 Elementary Electronics. For more information then this write to: Brett Tondreau, GALAXY II, 20121-5 Leadwell St., Canoga Park, California 91306.

* ** * ** * ** * ** * ** * ** * ** * ** * **

[1]Aviation Week & Space Technology, June 13, 1977, pg. 87.

# the story of the *Parksley Eagle* by: mark 'bunny' bundick. nar 19250

The Parksley Eagle is a modification of Guppy Youngren's NARAM-16 winning Sparrow B/G. It is somewhat more stable than that particular model, thus making it easier to trim. While it employs some of the MIT technology, it is still a good first model for someone wanting to build high performance B/G's.

The first Parksley Eagle was built for NARAM-17 in Orlando. After a 117 sec. test flight the bird turned in a 29 sec. spiral dive at the NARAM. Further experience with trimming eliminated this problem. Originally the model was named Icarus III, but after building one covered with yellow Jap tissue, my teammate suggested the current name. We both graduated from Parksley High School whose mascot was the eagle and school colors were black and gold. After receiving its appropriate name, the model began to perform impressively, thermalling away at PHART-III, and winning two events at VACUUM-I. The model's success led me to choose it as my primary Sparrow bird at the FAI Flyoffs after NARAM-19. The Parksley Eagle responded by winning the Sparrow event and landing me a spot on the team.

To build the bird, begin by collecting all the listed materials paying particular attention to getting light wood for the wing. Transfer the patterns for the wing, stab and rudder to cardboard by placing cardstock under the pattern and pushing a pin through to mark the cardstock. These patterns can be saved for future Parksley Eagle's. Cut out the balsa parts carefully. Sand an airfoil on the wing after you've drawn a high point line at 25% of the cord. The stab can take a symmetric airfoil, but you'll have to be careful when you sand on 1/32" balsa. The wing should be beveled at the root edge and double glued to the dihedral shown.

The boom and pylon can be made out of either hard balsa or spruce. Spruce is stronger, but heavier. If you do use hard balsa, simply round off the edges (except where the wing, stab and pod attach), and tissue cover for extra strength. Cut out a "Piece X" for the pod and immediately double glue it to the pylon. If you don't do this you're liable to lose it. Build the pod like a normal rocket, with the pylon and launch lugs 180° apart as shown. The 30lb. test fish line shouldn't be installed until the pod has been sealed and painted. Note that it

is threaded through the pylon near the "Piece X" and knotted. This helps in that if the initial shock of ejection doesn't strip the pod off, the streamer will be pulling from the rear and may pull the pod off the glider.

With all the parts cut out and the pod assembled, you have a decision to make. You can either assemble your Parksley Eagle as is, or you can tissue cover it. I HIGHLY recommend tissue covering. It adds lots of strength for its weight, it smooths the airflow, and it provides color. If you want to tissue cover it, make up a mix of 50% dope and 50% thinner. Brush on a liberal coat to all balsa surfaces and let dry. Throughly sand with 320 grit and then apply another coat. Sand lightly, just enough to make the wood smooth. Next cut a rectangle of tissue for each wing panel that overhangs all edges about ½". Do the same for the top and bottom of the stab, bottom of the wing halves and the rudder. I like to use bright colors on the stab, rudder, and tops of the wing, and black on the boom and wing bottoms. It helps visibility. Cover only one surface at a time. Begin by applying some of the 50-50 mix to the root of one wing panel. Put the tissue on and smooth it out as you apply. Keep brushing on dope as you work out to the tip of the wing. After the dope is dry, take a FRESH piece of 320 grit snadpaper and sand off the overhang. Then tack down any edges that refuse to stay down with dope. Repeat the process for all the surfaces and then assemble the glider. A word of warning; glue doesn't stick well to doped tissue, so using a sharp razor blade, remove tissue from surfaces to be joined and use double glue joints.

You should add a finger rest to the bottom of the right wing as per standard hand-launched glider practice. Wait for a calm day and give your Parksley Eagle a toss. If it stalls (as they are liable to do), add clay to the nose until a smooth glide is obtained. You can induce a turn by adding clay to the left wing tip, but by adding the 1/8" stab tilt into the model as shown in the dihedral detail you'll have a built in turn. After you have a smooth glide with hand tosses, try a standard hand-launch glider toss to grab about 50' of altitude and observe. If you haven't got a beautiful flat circling glide keep adjusting with clay. Those of you hot-shots out there can employ stab warps, washin and washout to acheive the same thing without adding the clay weight. I usually spend about an hour or so hand launching my birds to get that perfect thermal-seeking trim.

Comes the fateful launch day. Prep an A3-2t motor and tape in snuggly. I don't use engine blocks as a rule, but instead use engine hooks. Ejected engines don't win contests. Pack in the streamer and wadding and GO FLY, MAN!!! Don't

Parksley Eagle continued.

forget to tape the leads to the launch rod so they don't catch any part of your glider. If there are no serious misalignments, your Parksley Eagle will reward you with a perfectly straight boost followed by instant transition and a good glide. Out of the six Parksley Eagle's I've built, two met untimely deaths by being crushed in accidents, and the other four have, alas, thermaled away. One of these was equipped with a dethermalizer.

The Parksley Eagle is a pretty reliable, and at times spectacular performer. It should reward you with good performance if you give it the attention during construction that it deserves. Happy thermal hunting!!!

LIST OF MATERIALS:

1/8 x 3 x 12 contest balsa
1/32 x 2 x 8 C-grain balsa
1/8 x 1/2 x 16 hard balsa or spruce
1/8 x 1/2 x 4½ hard balsa or spruce
5" BT-5 or RB 50
BNC-5E or NC-50S
Two ½" launch lugs
15" of 30 lb. test fish line
12" x 1" streamer
White glue
Modeling knife
220 and 320 grit sandpaper
Clear dope and dope thinner
Jap tissue

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

Mark has submitted a proposal for an FAI B/G Postal Contest to the Board of Trustees, and it has been given their support. The contest will be run under the FAI rules and the event will be the Swift B/G event. The contest will be run through the mail and Mark will monitor all entries. A full group of three flights must be accomplished or the entry must be done over. A entrant may fly as many rounds as he likes between April 15, 1978 and May 14, 1978. He need not fly his rounds during a sanctioned contest. The entry fee will be no more than $1.00. If you are interested let me know and I will get all the information for you.

Bruce

# the parksley eagle: A Sparrow B/G designed by Mark "Bunny" Bundick - NAR # 19250.

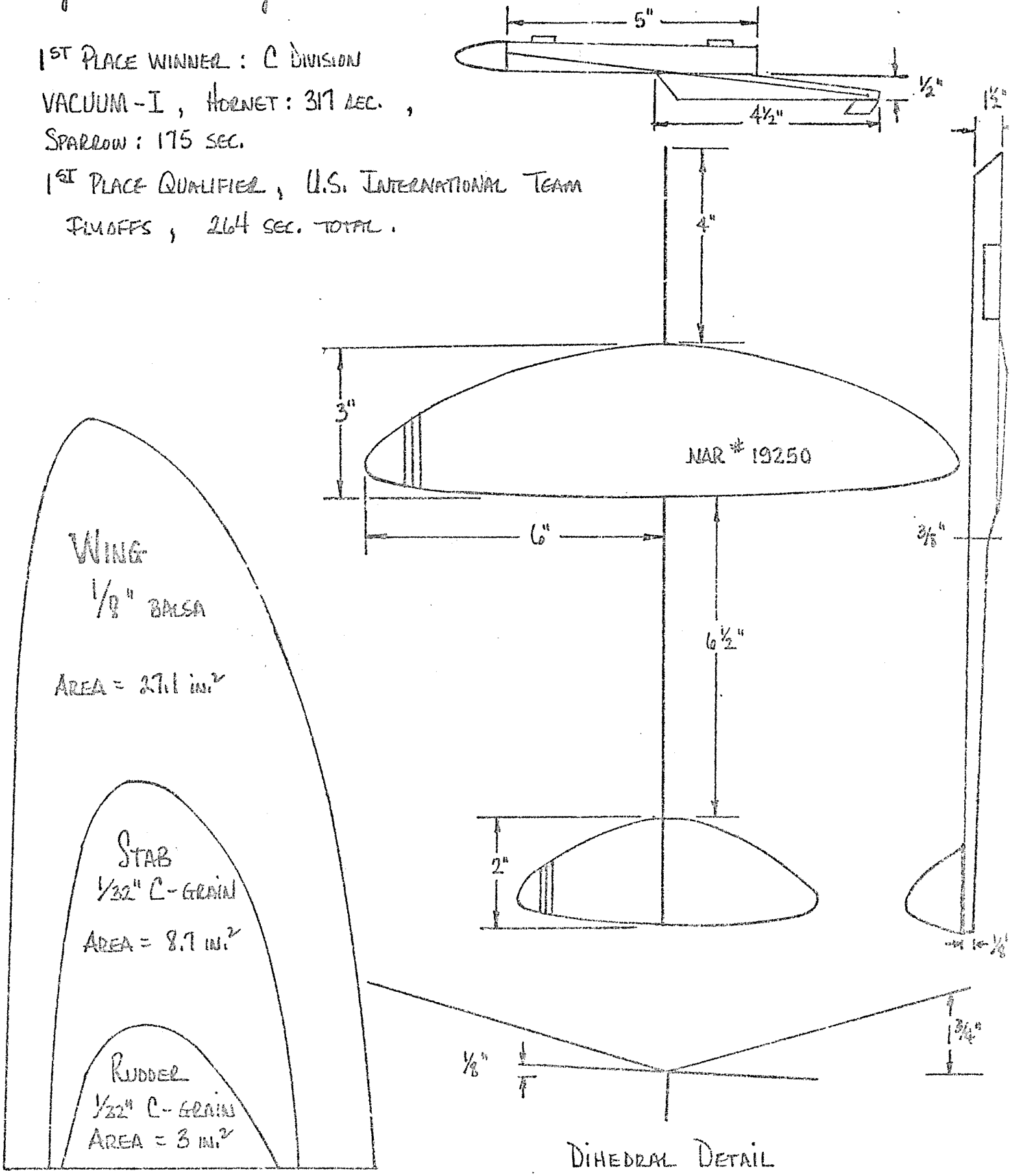
1ST PLACE WINNER : C DIVISION

VACUUM-I , HORNET : 317 SEC. ,

SPARROW : 175 SEC.

1ST PLACE QUALIFIER , U.S. INTERNATIONAL TEAM

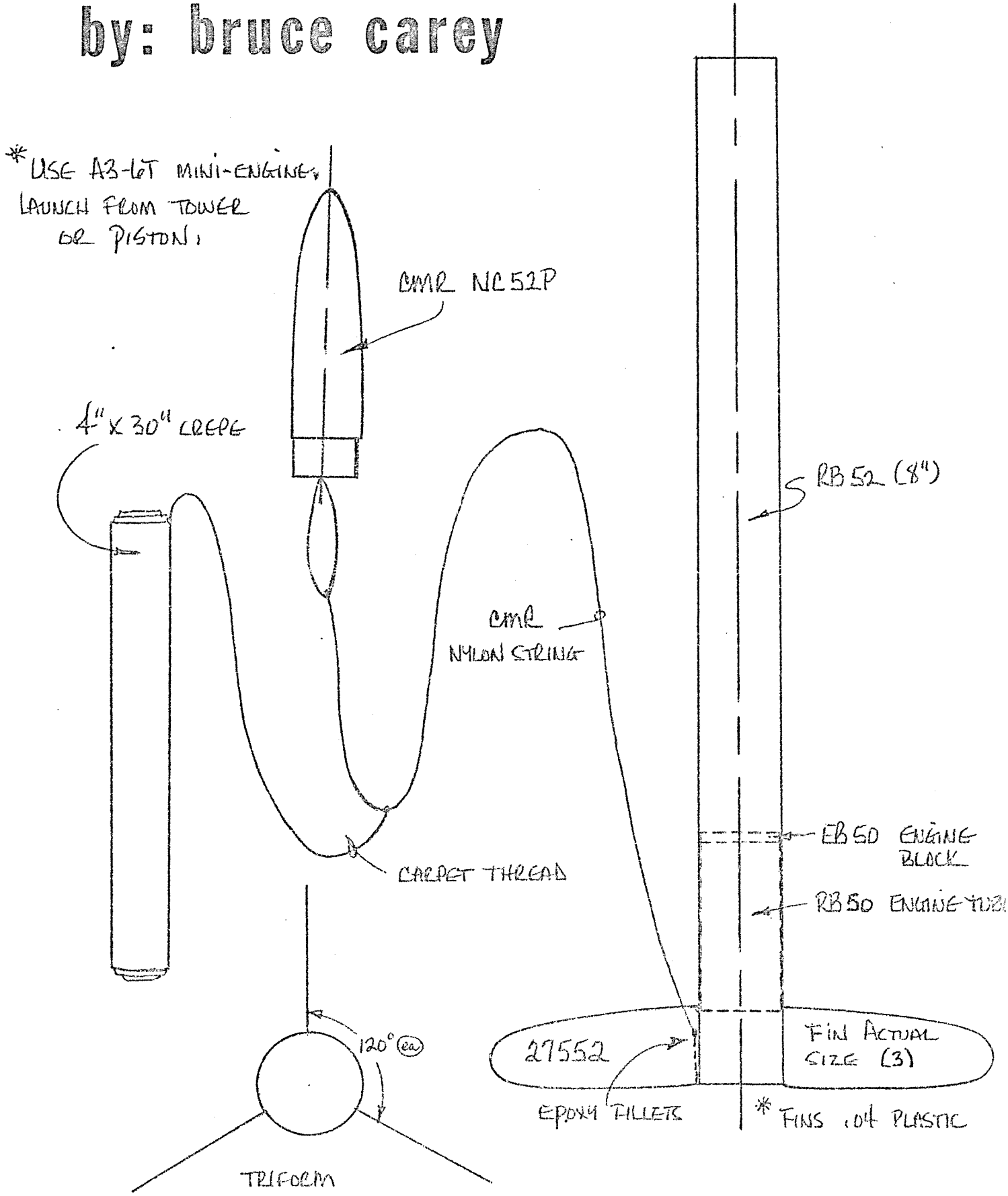
FLYOFFS , 264 SEC. TOTAL .




DIHEDRAL DETAIL

# CLASS 1 S.D.

## by: bruce carey



EAU CLAIRE HIGH ORBITERS
2013 Cameron St., Eau Claire, WI 54701

December 28, 1977

Docket Section
Office of Hazardous Materials Operations
U.S. Department of Transportation
Washington, D.C. 20590

Dear Sirs:

We are writing to make our beliefs known to you with regard to File No. 78-87N. Our group, a model rocketry club affiliated with the National Association of Rocketry, is in favor of the proposed exemption of model rocket motors in quantities of twenty-five pounds or less from conforming with the D.O.T. labeling requirement. This same exemption was granted to model rocket motors by the United States Post Office on December 22, 1970.

As we see it, this labeling requirement, if enforced for the quantities stated above, would only do harm to the popularity of our hobby (with its' obvious educational benefits), create unrealistic concern about the safety of model rocket motors (our safety record is unblemished after 20 years and over a million model rocket launchings), and cost the hobbyist more money while serving no useful purpose.

We therefore request your consideration in the matter of exempting quantities of model rocket motors weighing less than twenty-five pounds from the D.O.T. labeling requirement. Thank you.

Sincerely,

Bruce L. Carey

Bruce L. Carey
President, EAU CLAIRE HIGH ORBITERS

cc: Dane Boles
Jeff Flygare
File

DEPARTMENT OF TRANSPORTATION
OFFICE OF HAZARDOUS MATERIALS OPERATIONS
Washington, D.C. 20590

Official Business
Penalty for private use, $300

POSTAGE AND FEES PAID
DEPARTMENT OF TRANSPORTATION

Mr. Bruce L. Carey, President
EAU Claire High Orbiters
2013 Cameron St.
Eau Claire, Wisconsin 54701

DEPARTMENT OF TRANSPORTATION
OFFICE OF HAZARDOUS MATERIALS OPERATIONS

Date January 12, 1978

This is to acknowledge receipt of your comments on Exemption 7887 in Docket No. HM-_____; Notice No. _____.

Section of Dockets

WISCON I FINAL FINAL UPDATE

Unless otherwise noted on this sheet, everything is the same as on the official information sheet.

WISCON I is being held February 25. You may still pre-register. Send registration forms to: Scott Zingler
324 W. Milwaukee St.
Tomah, WI 54660
Ph. 608-372-5397

Pre-registration gives us an idea of how many are coming, how much space we need for rockets and displays, how many prizes we need, etc.

All contestants register at Tomah Savings & Loan, Superior Ave. Use the front door. There is parking in the rear of the Savings & Loan. After registration, put your rockets in the assigned places, set up any displays you have and proceed to the Tomah Municipal Center Basement (1/2 block north on Superior Ave.) for opening ceremonies.

EVENTS:

Static Scale - A, B & C Divisions
Craftsmanship - A, B & C Divisions
Original Design - A, B & C Divisions
Identical Craftsmanship - A, B & C Divisions (See original info sheet)
Liar's Contest - Open Division
Newsletter Contest (3 entries so far)
Display Contest - Open Division

RESEARCH & DEVELOPEMENT IS CANCELLED! COSTUME CONTEST IS ADDED!

There will be manufacturer's displays.

SCHEDULE:

10:00 a.m. - 10:45 a.m. - Registration, set up displays, nap (FRY ICE) session
- Registration fee - $1.50 for all participants
10:45 - 11:00 - - - - - - TAC President welcome and opening ceremonies
11:00 - 12 noon - - - - - Workshops: (Municipal Center)
- Building Materials & Techniques for Lightweight Strength in Rockets & Rocket-powered Gliders Bruce Carey - ECHO
- Basic Parameters of Glider Design - Bruce Carey - ECHO
- Dynamic Stability - Allen Jones
12 noon - 1:00 p.m. - - - Lunch
1:00 - 2:00 - - - - - - - Workshops: (Municipal Center)
- Glider Selection & Trimming - Jim Benscher - ECHO
- Streamer Duration - Pete Pathos - ECHO
- Tiswaeing Gliders - Al Nienast - TAC
2:00 - 2:45 - - - - - - - Model Rocket Auction (Savings & Loan)
2:45 - 5:00 - - - - - - - Workshops: (Municipal Center)
- NAR Politics - Mark Bendick - Vikings
- Rocketos - Dave Cook - DART
- Tracking - Dave Cook - DART
- Stanford Politics - Eric Bernhardt, Scott Zingler - TAC

(Cont.)

SCHEDULE (cont.)

- Class 4 & 5 Altitude - Dave Cook - DARE
- Advanced Designs for Gliders - Al Hierast - TAC
- Pocket Glide - Hank Hundick - Vikings

5:00 - 6:00 - - - Supper
6:00 - 8:00 - - - Costume Contest
- Movies - Star Wars slip, NASA Films
- Liar's Contest

TAKE NOTE - COSTUME CONTEST
A number of people expressed interest in a costume contest, so we added it to the schedule. Prizes will be awarded for the best costumes. Science Fiction is the theme for the costume contest.

8:00 - 8:30 - - - Awards Presentation

Here is a list of restaurants & motels in Tomah.

Restaurants:

Downtown - Badger
- Tee Pee (fine dining)
- Carlton (fine dining)

Burnstad's - Hwy 12 & 16 East
Kentucky Fried Chicken - Hwy 12 North
Holiday Inn - Hwy 21 North

Motels.

Downtown - Daybreak 608-372-5946 AAA
2 persons - $16
4 persons - $21
- Park 608-372-4653 AAA
2 persons - $14
4 persons - $18
- Tona Courts 608-372-4174
2 persons - $12.50
4 persons - $26

Part of Country 608-372-5981 North Side
2 persons - $14
4 persons - $21

Lynhill 608-372-5569
Hwy 16 West
2 persons - $12
4 persons - $20

Holiday Inn 608-372-3251
Hwy 21 North
2 persons - $26
4 adults - $39
2 adults & 2 under 18 - $26

Best-well 608-372-2471 AAA
Hwy 12 & 16 East
2 persons - $16.64
4 persons - $22.88

See You At WISCOM

Gene Zeigler

# the CHICAGO EIGHT

By: Bruce Carey

February 3, 1978. Sunshine, minus ten, snow flurries, two hours of bumper to bumper on the Kennedy and Dan Ryan, the Midway Plaisance, and finally the International House! Mark Bundick comes down to greet me. We talk on the way to O'Hare were we have to pick up Chris Tavares, Carl Warner and Jon Rains. Back from O'Hare, we sit in on an informal meeting with some of the Trustees, then bull sessions with Tom Hoelle, Jon Rains and Mark. We hit the sack around 3 am.

Mark wakes me at 7:45 saturday morning. We clean up, pick up Jon and Tom on the third floor and go down for breakfast. At 9:00 am. in room 2D at the Center for Continuing Education, across the Plaisance from I-House on the campus of the University of Chicago, Ron Wright (NAR Secretary) brings the meeting to order and things are under way.

As all of you NAR members know, there are a lot of problems that the Association has to cope with, and many of these problems were discussed and acted upon at this, the NAR Trustee Meeting.

The following Trustees are present: Mark Bundick, Tom Hoelle, Pat Miller, Ron Wright, John Worth and Chris Flanagan. Also in attendence are Carl Warner, Chris Tavares, Jon Rains, Jim Murray, Bob Kaplow and myself.

Ron Wright goes over the meeting agenda and the first order of business is the election of a new president to replace Manning Butterworth, who has gone to Wales to do research for one of the universities over there. It is noted that there is a quorum. Chris Flanagan nominates Pat Miller. Second. No other nominations. Vote. Pat Miller is unanimously elected. Pat now takes over the meeting.

The next order of business is the nomination and election of Trustees to replace vacancies left by Elaine Sadowski and Don Stone. Carl Warner and Chris Tavares are nominated and unanimously elected to the positions.

Manning Butterworth has contacted Ron Wright the night before the meeting by phone and made several suggestions and recommendations on various topics to be reviewed by the Board. He suggests the appointment of Carl Warner as Chairman of the By-Laws Revision Committee with Tom Hoelle, Terry Lee and Bruce Carey as Committeemen. This suggestion is voted on and passed. The committee is charged with the task of giving a preliminary report to the Board at NARAM-20, and

the suggestion is made that a full rather than piece meal revision be made.

Pat Miller is requested to contact Dick Nelson to see if he is interested in running the Skill Level Program.

George Flynn is elected Chairman of the Publications Committee. One of this groups tasks is to provide NARTS with material to sell. Chris Flanagan indicates that George has been providing him with materials form time to time for NARTS.

With the discouraging (understated much ?) decision by the CIAM to hold the Internats in Bulgaria in 1978 rather than in the U.S., John Worth asked the question: Who will replace the three members (Matt Steele, Steve Behrends, and Bob Biedron) who were forced to drop out because of the trip cost. Mark Bundick suggested that alternates fill as many positions as possible, and that a special committee be formed to choose any additional team members. The old Internats Com mittee is desolved, and a new committee is formed. Its' chairman is Howard Kuhn and the committee members are Mark Bundick and Chris Flanagan.

Pat Miller notes that there is only one proposal for NARAM-20. The BAYNAR section of California has made it. Pat tells the Board that he will make a decision about the NARAM site within two weeks of the meeting. The only two problems mentioned with regard to the California location were insurance and the possible lack of manpower to run the range. The dates for NARAM-20 will be August 7 to 11, 1978.

The question of revised membership fees and multi-year memberships is given to Chris Flanagan to review and report on at a later date.

Jon Rains, Manufacturer Liaison to the NAR, reports on his study of the Advertising Exposure Program as it involves the manufacturers. No definate action is taken by the Board on this subject. I made the suggestion that someone contact the Public Broadcasting System to find out whether or not they might be able to give the NAR some publicity. Pat Miller says he will look into this.

A group of Model Rocketeer policy changes, suggested by Manning Butterworth, are read to the Board by Ron Wright. Ron suggests that these be evaluated and that a mail ballot be taken at a later date.

The Board desolves the old Executive Council and establishes a new five man group to serve this function. It's members are Ron Wright, Chris Flanagan, Pat Miller, Mark Bundick, and Tom Hoelle. This council can make decisions without a quorum in emergencies, but for these rulings to become permenant the entire Board must ok them.

Dr. Gerald Gregorek has been put in charge of a group that is evaluating

airfoil designs for NASA. This work has taken up most of his time, and the Standards and Testing Committees duties have been too much for the Dr. to keep up with. Chris Flanagan suggested that the MIT people may be willing to take on the taskes of Standards and Testing for an interim period of a year until such time as a permanent person or group can be found. It was also suggested that Trip Barber be assigned as head of this group. Chris said he would contact these people to see if they are interested in the job.

Terry Lee's report was read to the Board, and it indicated that the Contest and Records Committee has been operating at a profit. It also indicated that NARAM-19 lost $600.00. Terry recommended that the Board make Helicopter Duration an official event, and that Flexwing Duration be dropped. The Board voted in compliance with Terry's recommendations.

Mark Bundick then proposed a Postal Contest that he would administer. The Swift B/G event would be used and it would be flown under FAI rules. The Board gave its support to Mark's proposal.

Next, Chris Tavares was called on to give a report on the progress of the Pink Book Revision Committee. Chris said that the group was through the general rules and about to start on the competition events. He said that they were considering members suggested changes as they went, and that they were also trying to close all loop holes. He also mentioned that he had done some research into the printing costs involved, and that $800.00 was one figure he had. Jon Rains mentioned the fact that Estes Industries has its own print shop, and might consider printing the Pink Book in return for advertising consideration. Jon said he would check into this possibility.

Chris Flanagan gave the Treasurer's Report at this point. He said that the association operated at a profit for 1977, and that there would be around $800 left after all outstanding obligations were satisfied. Chris also mentioned that NARTS was doing very well, and that the membership of the NAR was 1698 at the end of 1977.

John Worth, NAR Trustee and Executive Director of the AMA then gave a report on the statis of the NAR's search for insurance coverage. There is presently a proposal in its final stages of nagotiation which would cost an individual NAR member $3.00 per year, and from $5.00 to $15.00 per year for a section. John said this proposal would probably be finalized within two weeks, and that the coverage could be avaliable to NAR members and sections as early as March 1, 1978. We will have insurance again very soon!!!

The Board, after quizzing John on the structure of the coverage, decided to

require members and sections to carry this coverage when avaliable in order to fly in sanctioned contests. Members who's states do not require insurance to fly sport models or who do not fly in sanctioned meets would not be required to carry the coverage. John said he would contact Pat Miller when the coverage is actually secured.

At this point the Board recessed for lunch, and I had to start my trip back to Eau Claire, however most of the more pressing matters had been discussed and acted upon. Mark Bundick is sending me details of the rest of the meeting when he has time, so I will fill you in on the rest of what happened when I have it. I also have copies of all of the reports given at the meeting if anyone wants to read all the details.

I personally feel that if this Board of Trustees continues to perform in the manner they did at the Chicago meeting the NAR can go nowhere but up. Let's all give them plenty of feedback and SUPPORT !!!

***** ***** ***** ***** ***** ***** ***** ***** ***** ***** ***** *****

# My First Scale Model *

By: Pete Pathos NAR # 27916

In order to finish off the rest of the contest year I knew I'd need a scale model. Since this would be my first attempt at building one, I decided to try a D-Region Tomahawk kit that is avaliable from Competition Model Rockets for $4.95. There is also a Scale Pack avaliable from CMR that includes a dementioned drawing and two color photos for $7.00. The kit contains detailed instructions, a scale plastic nose cone, built-up fins, a prototype shroud, and a screw embossing tool.

The instructions are easy to follow. They don't go step by step, but they tell how to build each part separately. The fins are easy to build and look good when finished. To make them, you first cut the cores from balsa and taper the leading edges. Then you cut out the "skins" and glue them to the balsa. This makes them the correct size and thickness, and there is no balsa finishing necessary.

The prototype shroud is made from a folded piece of card stock. When you have folded the piece you glue it to a piece of body tube which fits over the main body tube. The screw head details are made with a small piece of tubing that is filed sharpe and has a rod inside it that is filed to a hexagonal shape. By tap-

ping this tool on the body tube where screws are located you can form the screw details which look like the real thing. This operation is difficult to do because the tube doesn't make much of an impression in the body tube, but if you do it right it makes a super detailed screw head.

The hardest part of the whole model is making the fin reinforcements. They are made out of a strip of balsa that is triangular in shape. They go on either side of each fin.

The payload section is easy to build. It's a piece of body tube that is cut into sections, stamped with the screw detail tool, painted, and then glued back together.

Painting the model isn't real hard because each part is painted separately before it's assembled. There aren't any hard to get colors either.

The D-Region Tomahawk makes an excellent first scale model for the beginning or the expert modeler.

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This months picture shows my son Sean demonstrating the LT method of determining the Drag Coefficient of a model rocket. Sean developed the Lip and Tongue method as a means for younger model rocketeers to determine how much drag their rockets had without the use of Estes' TR-11, which calls for a little more of a math background than little tikes his age usually have had time to acquire. He told me that the Renegade he is shown testing here has a drag coefficient somewhere between .5 and .7.

Anyone who is interested in a more detailed explanation of Sean's LT Method for determining Drag Coefficients should direct their inquries to ECHO HQ.

2013 CAMERON ST.
EAU CLAIRE, WISCONSIN 54701


Chris Tavares
Novaar Free Press
157 Normandy Hill Drive
Alexandria, Va. 22304