ESTES

MODEL ROCKET NEWS

ESTES INDUSTRIES, SUMMER 1992

A NEW BEGINNING

THE PEOPLE

BY: MIKE HELLMUND, ESTES INDUSTRIES

The sleeping giant has stirred. Twenty years and the rocketry world almost accelerated away from it. But the sleep has been cleaned from its eyes - the bones still ache but that soon will pass. Barry Tunick, Estes' new president, has, instead of tickling the giant's toes, given it a swift kick in its rear. A new day has arrived. The muscles still need to be stretched and toned. Estes, in many ways, is a new company. There are many changes that have happened, many more are yet to occur. Some of these changes are apparent in our products (although that is a small indication of things that lie ahead), some changes can be seen in the pages of this new edition of the *Model Rocket News*, some changes will pass undetected.

Other than Barry, there are many new folks here at Estes. Jane Love is our new Director of Marketing (my boss). Mike Riggs has taken up residence as the new Director of Research and Development. The other new R&D department addition is long time rocket modeler, Timothy Van Milligan. The Visual Graphics department (they design everything from the art work on boxes to the *Model Rocket News*) is headed by newcomer Rob Akey. Joining me in the Marketing department is John Carroll. He and I have been involved in the model rocketry hobby for over twenty years.

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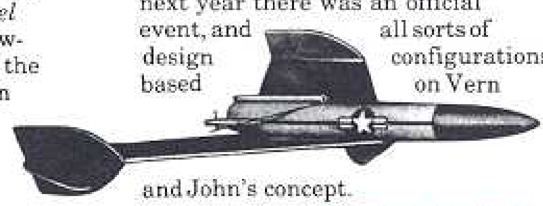
FROM ASTRON™ SPACE PLANE TO THE ASTRO-BLASTER™

A SHORT HISTORY OF ROCKET BOOSTED GLIDERS

By Larry Renger

In the beginning there were model rockets. And they were good. Then the model rocketeers began to think about flying gliders with model rocket engines, and due to the high thrust levels, they shed their wings right and left. Finally, along came Vernon Estes and John Schutz, who designed a swept wing glider and elevons actuated by engine ejection, and it worked just fine! The boost glider was born. They first demonstrated their innovation at the 1961 NARAM. By the next year there was an official event, and all sorts of design configurations based on Vern and John's concept.



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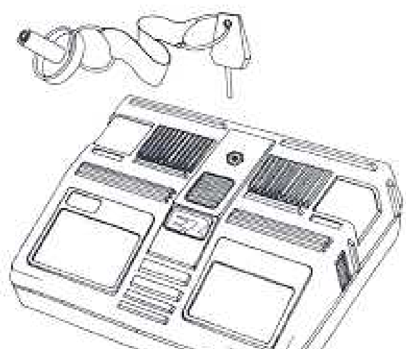
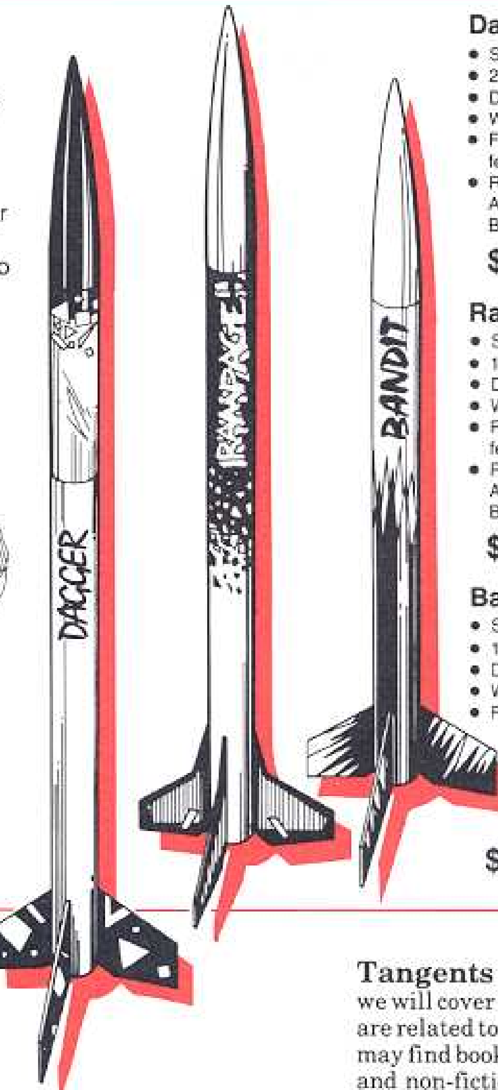




A New Beginning *continued*

We have inhaled a lot of balsa dust and flown so many rockets that we almost have crow's feet from squinting into the sun too many times. My name is Mike Hellmund and for about four times a year, I, with a great deal of help from all the good people here at Estes and hopefully with tons of assistance from you the hobbyist, will put together an informative and enjoyable *Model Rocket News*.

Allow me to introduce you to the newly formatted *Model Rocket News*. In the center you will always find a model rocket plan. It might be one of our golden oldies (send in your requests!), it might be a past entrant of the old "Design of the Month" (like this month's plan) or something from the new

Design of the Quarter.

Each issue will have one or two feature cover articles called The Leading Edge. These will be about anything from products we want to highlight to issues we want to raise. We will also try to include at least one

QuickTech Note

(QT Note). These will be brief reports on various technical aspects of model rocketry. Hopefully these notes will broaden your knowledge of this fantastic hobby.

Contrails

will be a feature that will cover model rocketry events. We will tell you about forthcoming model rocket launches and contests. We will, for instance, keep you abreast of what is happening with Art Nestor's project, "The All American Alpha".

Blast Off

is a section devoted to the various ways which can expand the model rocket experience.

The Idea Box

will be there as always, so keep those ideas coming (we'll send you a fifteen dollar merchandise certificate for each suggestion we publish). In

Tangents

we will cover various subjects that are related to model rocketry. You may find book reviews (both fiction and non-fiction), articles on astronomy or spacecraft, exhibits to see or places to visit. We will hope to include things in which the average rocket modeler would have an interest.

Space exploration history (and maybe some model rocket history) will be found in the section called

Footprints On The Moon.

Our last column will be a resurrection of

Rocketeer Communications.

This will be the "good ole letters to Estes" section. So when you write your letters, address them to:

Estes Industries
Attn: Rocketeer Communications
P.O. Box 227
Penrose, CO 81240

If you have any ideas, questions, or would like to submit an article, then please write! We want all the input possible from you.

New Products

Estes has introduced some radically new and innovative products this year. The first new products I would like to tell you about are our new igniter plugs and the new packaging of our engines. Our engines will now be called Cobra™ engines and will feature new distinctive packaging.

COBRA™
MODEL ROCKET ENGINES

Each pack of Cobra™ engines will have the new igniter plugs along with the igniters. With the plugs it will be simple to prep your engine. Just insert the igniter, push in the plug and you're ready to hook up the micro-clips. The plugs will securely hold the igniter in the nozzle of the engine and will give you consistently reliable and safe ignitions. There is no ignition system that is quicker to prep or more reliable. It is so reliable it can be used for clustering Cobra™ engines.

E2X SERIES

The first three of our new rockets are in the E2X™ series. They are called the Bandit™, the Rampage™ and the Dagger™. These precision build kits can be found at your local retailer. The three E2X™ kits feature plastic fins that mount directly to the engine mount through slots in the body tubes. The slotted body tubes require no painting and come in gloss black (Bandit™), orange (Rampage™), and magenta (Dagger™).

These kits are decaled with hot looking self adhesive decals. The Bandit™, Rampage™ and Dagger™ require no painting, no cutting and can be put together with plastic cement in under an hour (the experienced modeler should put these babies together in about 30 minutes).

Also available is the new Delta Clipper™. This two stage rocket loads up on two "D"s and hits about a half mile in altitude. It features fins that are attached into a slotted, sturdy body tube. The Bail-Out™ joins our Estes fleet as one of our new "fun" rockets. You can put in your own action figure (as long as it's not taller than 3¼ inches), attach one of our parachutes (which includes a special harness) to it and then launch the action figure to new missions.

Our mini-engine powered line gets three new additions: The Mini-Cobra™ (a two mini-engine staged rocket), the Mini-Patriot™ (a semi-scale version of the Desert Storm hero), and the Lumina™, a single-stager with a dynamic decor.

We have also, in honor of the 25th anniversary of Star Trek®, re-released our USS Enterprise™ and the Klingon™ Battle Cruiser. Both of these kits come in special commerative boxes.

Although no longer available through mail order (we're sold out), your local retailer may still have one or two of our limited edition Mars Snooper™ Collector Series rockets (only 2500 were made). The Mars Snooper™ was Estes' first futuristc kit, introduced in 1965.

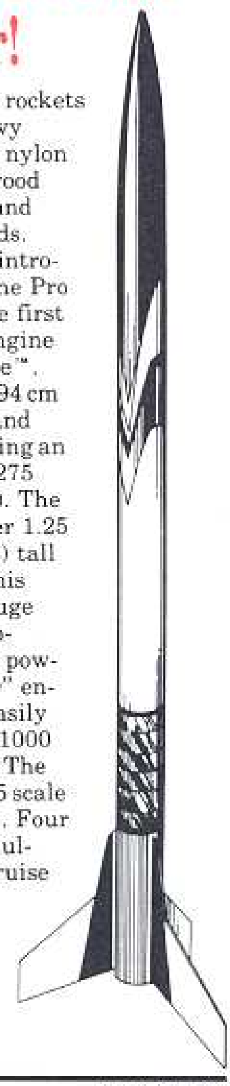
We have two new regular size engine powered rockets that are now available: the Scrambler™ egg lofter (based on the old Eggspress™) and the totally new, futuristic looking Grey Hawk™ Orbital Interceptor.

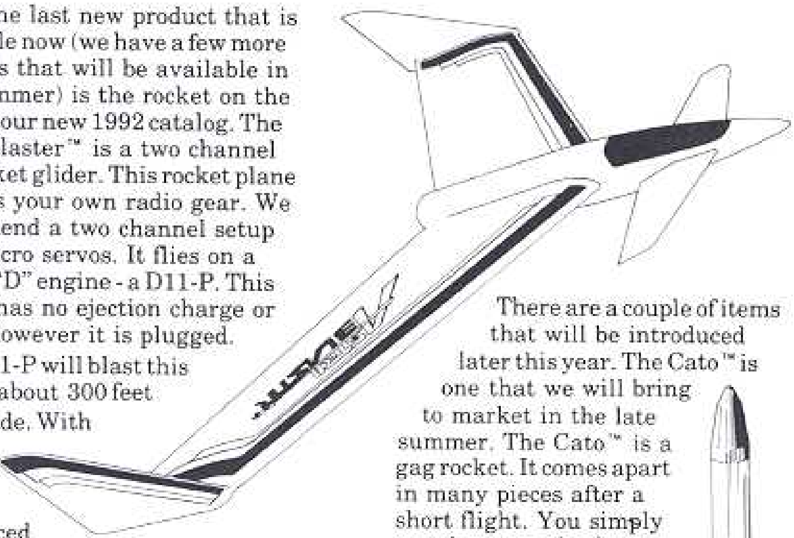
ESTES PRO SERIES™ MODEL ROCKETS

For the serious rocket modeler — those that require a bit more of a challenge — Estes has created the Pro Series™. The Pro Series™ will consist of rockets that are either cluster in nature or will be using composite "E", "F" and "G" engines (a development coming from Estes in the near future). Recommended for those 16 years of age and older.

For the Serious Rocket Modeler!

The Pro Series™ rockets have slotted heavy duty body tubes, nylon parachutes, plywood centering rings and elastic shock cords. There are three introductory kits in the Pro Series™ line. The first is the two "D" engine clustered Impulse™. The Impulse™ is 94 cm (37 inches) tall and capable of achieving an altitude of over 275 meters (900 feet). The second is the over 1.25 meter (50 inches) tall Maxi-Force™. This rocket, with a huge wraparound holographic decal, is powered by three "D" engines and will easily top 307 meters (1000 feet) of altitude. The last rocket is a 1/5 scale Patriot™ missile. Four "D"s ignited simultaneously will cruise this rocket (almost one meter tall) to over 307 meters (1000 feet).





The last new product that is available now (we have a few more products that will be available in late summer) is the rocket on the cover of our new 1992 catalog. The Astro-Blaster™ is a two channel R/C rocket glider. This rocket plane requires your own radio gear. We recommend a two channel setup with micro servos. It flies on a special "D" engine - a D11-P. This engine has no ejection charge or delay, however it is plugged. The D11-P will blast this baby to about 300 feet of altitude. With our soon-to-be-introduced composite engines, the Astro-Blaster™ will rocket up to 1000 feet for even more airspace in which to play. The Astro-Blaster™, with its canard design, sweptback wings and rear engine, provides for an exciting blend of rocket, slope soarer and thermaler. For a more in-depth view of this amazing rocket glider, please see the article on the Astro-Blaster™ in this issue of the MRN.

There are a couple of items that will be introduced later this year. The Cato™ is one that we will bring to market in the late summer. The Cato™ is a gag rocket. It comes apart in many pieces after a short flight. You simply put the pieces back together and launch the rocket again. As you may have noticed in our 1992 catalog, we have a couple of new items for ground support. This includes our E2™ launch controller which features dual launch buttons, audio and visual continuity checks and internal placement for the four "C" batteries and storage of the 17 foot launch cable. The E2™ is available now. The Transroc II™ is our rocket locator. It consists of a transmitter which is placed in the payload section of your favorite rocket and using a hand-held receiver you can home in on your rocket. This item should make its appearance on store shelves by the end of the summer. The last two items are the Power Plex™ launch pad and the Command Controller™ launch controller. Both of these items, scheduled for release in late summer, are the ground support equipment for our Pro Series™ rockets. Watch for many totally new, exciting, never-before-done products (including a brand new, only-available-for-Christmas, starter set) out by this fall. The NEW Estes has left the pad, achieved orbit and will soon take you to new exciting places of the model (and sport) rocketry universe.

So, sit back and enjoy this new edition of the *Model Rocket News*. Then when you're done, go launch a rocket!

MODEL ROCKETRY ESTES SCIENTIFIC SPACE AGE HOBBY

ESTES OF YESTERYEAR 1965/1966

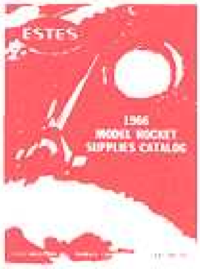
ESTES SPACE PROGRAM

By Art Nestor, NAR #29623

Everyone has them - young and old alike - memories of certain days in which something monumental happened in their life. For instance, do you remember where you were when you heard of the space shuttle tragedy? Or those great days when something good happened in your life? How about your first model rocket flight, taking your first AstroCam™ photo, or when you first met your best rocket buddy? One I treasure was over twenty five years ago, when I discovered model rocketry. The exact dates elude me, but I was waiting for my bus ride home after school in the Junior High gymnasium in Evans City, PA. I had already developed an interest in space when someone brought my attention to the 1966 Estes catalog. Here I could buy an actual flying model rocket! I copied Estes' address and here I am today -- still at it. Let's look at Estes Industries as a rocketeer would have viewed the company through the catalogs and the *Model Rocket News* of 1965 and 1966.

Collectors seeking to complete their set of catalogs will not find one for 1965. The previous year Estes had decided to upgrade their next annual catalog to a more professional appearance with a wider array of products. It was a large task and the problems encountered with suppliers required Estes to push back the publication date of #651. The 1964 catalog was used into 1965 while new products were advertised in *Model Rocket* News. An explanation for the lateness appeared in the March, 1965 (Vol. 5 No. 1) issue of MRN with still no publication date in sight. Eventually it became more economical to change the cover date of the new belated catalog to 1966 and use it for a year and a half. The 1966 catalog is numbered 651. There is no catalog numbered 652, 661 or one with a cover date of 1965.

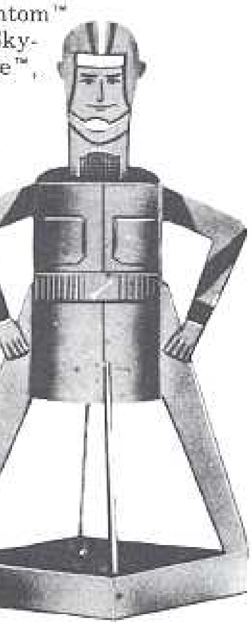
Two versions of the 1966 exist. The front and back covers of both are identical. To determine whether you have the earlier or later version you need to examine the interior. The later version has a 1965 copyright on page one, and more detailed graphics. A definitive example can be found on page 48 (body tubes). There is a picture at the top of the page, a black title strip on the left side and tube headings are in yellow. The earlier version (probably a true 1965) has no picture or black strip and tube headings are in blue. The later version can be found with glossy or flat paper pages. All versions state prices effective August 23, 1965 and the prices do not vary. The following descriptions apply to both.

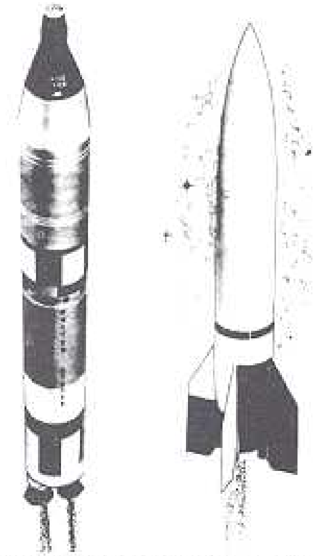


On the front cover, the new Mars Snooper™ is leaving Earth orbit. The cover also displays a new logo used until 1969 (see photo). The back cover features a collection of the entire Estes fleet. This 80 pager measures 5" x 7" making it the smallest dimension-wise of all Estes' annuals. It is most notable for having the first full color covers and introducing the first of a long Estes tradition - the model rocket aerial camera.

The Camroc™ took one black and white photo per flight at ejection. Using a special film disc, the picture was taken through a window in the front tip of the camera. The film and its processing was obtained exclusively through Estes. Camroc™ photos were enlarged to a 3" diameter from the 1½" round negative. Four pages were devoted to the Camroc™, which was flown atop the Delta™, a custom two stage booster with a swept fin design. Although crude, the camera produced amazing photos and was a factor in putting Estes Industries ahead of other model rocket manufacturers.

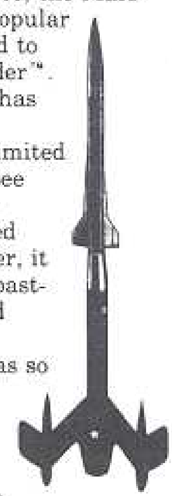
We'll take a brief look at only those other kits appearing in a catalog for the first time. Look to Yesteryear articles of earlier years for missing descriptions. Returning kits were: The Drifter™, Scout™, Mark™, Streak™, Phantom™ Spaceman™, Skyhook™, Farside™, Farside-X™, Apogee II™, Space Plane™, Falcon™, Big Bertha™, Cobra™, Ranger™, Mercury™ Capsule, Alti-Scope™ and Electro Launch™.





Four semi-scale models made their debut. The GT-3 Gemini-Titan™ two engine cluster rocket was described as a "not so easy to assemble" model. This kit required a lot of handwork and detailing on the nose cone, dual engine exteriors, clear plastic fin unit and the paint scheme. It was Estes' largest rocket to date (24½" long, 2.2" diameter) requiring a 24" parachute. It is the most sought after scale kit. The V-2™, Aerobee 300™, and the WAC Corporal™ were small diameter, attractive models advertised as easy to build.

The Mars Snooper™ and the Invader™ were both classic examples of fantasy spacecraft of the early sixties. The Invader™ was a unique boost glider that resembled a flying saucer (8½" diameter, 11¾" long from the tip of the engine pod). An unopened Invader™ kit today is one of the most desirable of collector's items as this was the Invader™'s only catalog appearance. A real show piece, the Mars Snooper™ was very popular and hence not as hard to find now as the Invader™. (Editor's Note: Estes has re-released the Mars Snooper™ in a very limited Collector's Edition - see your 1992 catalog for details.) Recommended for the careful modeler, it was 21½" long and boasted a practical payload section.



The X-Ray™ was so named for its clear plastic payload section. The simple yet attractive design was so well liked, the model stuck around as long as the best of them.

ESTES OF YESTERYEAR 1965/1966 *continued*

And finally, the Sprite™, my first model rocket flown. Another day to remember. It was a small lightweight model featuring tumble recovery. The Sprite™, like quite a number of other Estes kits, was available through the MRN before its first appearance in an Estes catalog. It originally had a 1964 part number. What is notable is that it was the first commercial kit created to use the Series III™ engines. Full diameter but only 1¾" long, these were the early mini engines and designated with an S after the time delay. These engines were available in the 1964 catalog.

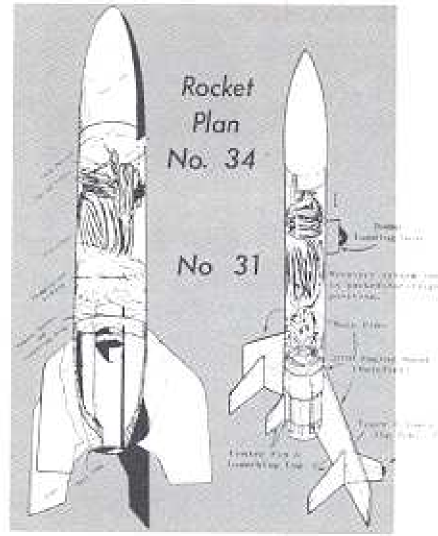
There was an increased selection of parts, modeling tools and supplies, two full pages of decals and fifteen pages covering safety, construction and recovery techniques. There were now 25 engines to choose from, only one above a B (a C engine booster). The most expensive were three for a dollar!

Estes catalog covers have become a great source of science fiction and scale space artwork with an increasing historical value. The loss of the 1965 catalog may have deprived us of possibly a classic cover. Hard core catalog collectors should view the early version of the 1966 as an alternative to not having a 1965 and necessary to a complete set.

Detailed coverage of *Model Rocket News* would require a separate article but a short overview here will help put the time period into perspective. Back in '65 and '66, MRN was an even more important source of information than today because of the newness of the hobby. Vern Estes (founder) took an active part in the creation of each issue. His column, "*Notes from the Boss,*" often addressed rocketeers' questions or gave valuable information on a wide range of related topics and current events. All issues included "*Notes from the Boss,*" and "*The Idea Box.*" Some included a letters section. It is amazing how many ideas we think are new that can be found in these old MRNs. Both the Estes catalogs and MRNs of '65/'66 are now historical papers in the world of model rocketry.

The March, 1965 issue (Vol. 5 No. 1) leads off with a two page article on displaying model rockets. Additional articles were kit plans 31 (The Commuter™) and 32 (Aerobee Hi™), "The Lunar Derby" (on Project Apollo), and announcements on an R & D Contest and an Estes Science Fair Contest.

An interesting glimpse of 1965 is provided by the "Photo Contest Winners" article in the June 1965 (Vol. 5 No. 2) issue. Also featured were kit plans 34 (Whee II™ and 35 (Vertex™) and a "Tech Report on Designing Stable Rockets".



I don't have the Vol. 5 No. 3 issue but it contained articles on launching systems and batteries, the nation's large space boosters and a kit plan (260 - Space Booster).

The April 1966 issue featured kit plans 38 (Gamma™) and 40 (Mitosis™), a Camroc™ photo page, and articles on "*Model Finishing,*" highlights of the first regional Model Rocket Convention (in my backyard of Pittsburgh) and "*Altitude Calculations Made Simple.*"

"*Science Fair Results*" was the lead topic in the December 1966 (Vol. 6 No. 2) issue. Also covered were "*The First International Rocket Meet,*" "*Advanced Drag Calculations*" and the top four kit plans of the Odd Ball Contest Winners.

BLAST-OFF!

By John Carroll, Estes Industries

New to the *Model Rocket News* is our "Blast-Off" section. The information and activities presented here are for those new to the hobby who wish to gain more knowledge and expertise.

Although the topics will vary from one issue to the next, each "Blast-Off" will contain an interesting experiment that you can perform using your Estes rockets. Sometimes the experiments may require you to build a special rocket from a plan that will be included with the article. Other experiments will be designed so that you can use a kit from our catalog.

Along with the experiment, there will be a glossary of new terms and answers to any questions asked in the article. Besides the experiment, other articles may appear that will assist you along the way to becoming a more skilled rocketeer.

The most important element of "Blast-Off" will be you! After you perform the experiment, if you have questions, comments or suggestions (perhaps an experiment of your own) -- please let me know. Your letters will be used to improve future "Blast-Off" features.

The most important element of "Blast-Off" will be YOU!

BACKGROUND ON EXPERIMENTING:

Galileo Galilei, a sixteenth century Italian physicist is one of the men generally thought of as having developed the Scientific Method. This method, which could be thought of as a checklist on how to investigate unknown phenomenon, is primarily responsible for the organized investigation of, and dramatic increases in, the knowledge humanity has experienced since it was first used four hundred years ago. Although not the only method in the process of scientific discovery, the scientific method has proven itself extremely effective in obtaining, categorizing and, most importantly, applying new knowledge that has been discovered. We will use this method as a basis for our knowledge search. The scientific method is essentially:

1. To become aware of a problem or phenomenon that you wish to investigate.
2. To develop an educated guess or hypothesis about the problem. This hypothesis is thought to be true until it can be supported or disproven by experiment.
3. To predict an outcome if the hypothesis is true.
4. To perform actual experiments to test the prediction for truth or falsity.
5. To take the **hypothesis**, **predictions** and **experimental results** and develop a simple rule that puts all three together. This is called formulating a theory about the phenomenon.

Theories incorporate a well-tested hypothesis about natural phenomena. When a hypothesis becomes so well-tested that the results are repeatedly consistent, the hypothesis becomes a **principle** or **law**. This method and extra information may help you develop better organized investigations beginning with our experiment.

MODEL ROCKETS AS EXPERIMENTAL TOOLS

In addition to the fun you already have constructing and flying your rockets, you can use them as tools to investigate an unlimited number of **phenomena** in the world around you. After flying your rockets awhile, you may want to explore how variations in your rocket's design will affect its performance, or even just how high it can fly.

Keeping the five rules of the scientific method as a framework, we first will define the problem we want to investigate.

In this experiment you will fly two rockets that are identical to one another except for one difference.

The investigation problem is: If I change the number of fins on my rocket, will the **apogee** (peak altitude) that my rocket reaches be affected?

This is Step One

The most important step to take now is to set up a notebook. Use this as your journal. Write down your thoughts, procedures, results and anything else you feel are important. The notes you take will help you organize your explorations and provide an ongoing record of the experimental process.

Begin your notebook with a cover page. This page should have your experiment title, your name, the date your began and an estimated date of completion - how long do you think it will take to investigate this phenomenon?

On the next page, state your experimental objective, which is the problem we established earlier. Now, step two should consist of your thoughts and guesses as to how these two rockets will behave. How do you think the number of fins will affect the altitude of your rockets? Don't be cryptic. Write out your complete thoughts, keep your mind open and try to visualize the problem from more than one perspective. Think through the process of flying a three finned versus a four or five finned rocket. Will the performance be affected at all?

By asking yourself (or someone else) these questions, you are **hypothesizing**. You are **guessing** your rockets will behave in some way, but without actually building the rockets or putting your guess to the test.

To transform what we imagine the explanation to be into a more precise interpretation, we develop and perform experiments or tests.

To develop a good or valid experiment, we must keep in mind that we need a control rocket (a rocket that doesn't change) and an experimental or modified rocket. The important thing to remember is the experimental rocket can only differ in one way from the control rocket. In the case of our fin investigation, the number of fins is the differing quality.

Decide how many fins your control rocket will have and how many fins your experimental rocket will have. It doesn't matter which is the control. Your only limiting factor is that the minimum number of fins must be three. If you only attach two, for instance, your rocket will be unstable.

It's good practice to document all of this in your book. It will help you track the decisions you made. Keep your notes up-to-date - always. Your progress is noteworthy and your thoughts are important. You'll need all of this information to review once the tests are over.

After you have written your speculations about the predicted outcomes with different numbers of fins, you will need to collect and list the tools and supplies that are required to run your experiment.

An excellent test rocket to use in this experiment is the Estes Viking™ (item number 1949). To run the experiment properly, you will need two of the Viking™ rockets.

What do you think the results would be if you used two totally different kits?

Establish your control rocket, mark as such and log it in your book. Do the same for the experimental rocket. The number of fins on your control rocket is your decision.

An example selection could be: Choose three fins on your Viking™ #1 control rocket. Choose five fins for your Viking™ #2 experimental rocket. We wish to fly the control rocket first. Fly your experimental rocket the same way and record the altitudes for it as well. Fly these rockets several times each in order to get as accurate an altitude as possible. Fly each four to six times, then average their altitudes.

In this way, we control all of the qualities of the two rockets except for one difference - the number of fins. The qualities of your two rockets are known as **variables**. Variables, as the name implies, can vary or be changed. The variable quality then is the number of fins. All other qualities such size, weight and engine type are kept identical. The Viking™ is a good subject in that there is no sanding or painting to do which might vary the quality of the finish between the two rockets.

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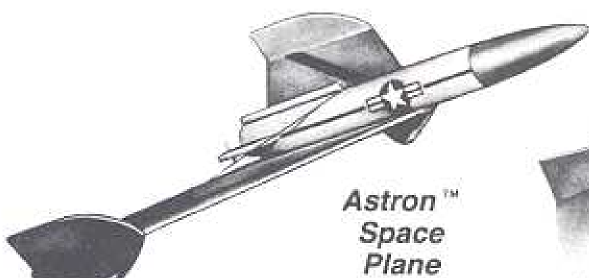


Astron™ Space Plane 1962

Astron™ Invader 1965

Scissor-Wing™ Transport 1974

GLIDERS *continued*

Boost gliders are a real design challenge because they need to utilize two different kinds of stability. First, in the power phase, they need to act like a completely ballistic rocket to gain altitude. At the top of their climb, they must transition to a gliding stability mode. In a general case, these changes are achieved by moving the center of gravity (CG or balance point) toward the rear and also increasing the nose up trim of the glider in some manner. Either method will work, but the most reliable boost gliders use both techniques in combination.

In 1963, in response to an Estes Industries design contest, the forward engine glider based on the hand-launch technique was developed by your author. The aerodynamic advantages of a conventional airframe made the Sky Slash design the dominant contest winner for several years.

> "IN THE BEGINNING THERE WERE MODEL ROCKETS AND THEY WERE GOOD. THEN THE MODEL ROCKETEERS BEGAN TO THINK ABOUT FLYING GLIDERS..."

When the National Association of Rocketry (NAR) changed the rules to require recovery devices for any dropped parts, the innovation cycle began again. Initially, people tied streamers to the engine casings on old designs. Something more sophisticated was needed. Again, the Estes design contest yielded results, with the Activator Tube designed by Ron Burri, and the Pop-Pod by yours truly. Both these designs were techniques for reducing the weight of a glider after the boost phase, while changing the stability from ballistic to glide mode. The Pop-Pod has become the standard for all competition boost gliders.

The next development in the glide recovery field was the new event called Rocket Glider. Here, the requirement was to have no jettisonable parts, and to carry the spent engine at all times. The inventors have gone crazy over this one! The array of different techniques for achieving stability change from ballistic to glider is absolutely mind-boggling. Most designers try to move the center of gravity back and increase the longitudinal stability as a result of some engine ejection charge activation. In English, this means that they slide the engine back or the wing forward, and kick in some up elevator, thus going from ballistic to glide stability.

There have been other interesting developments along the way too. There have been Rogallo-inspired flexible wing gliders, parasite gliders, gliders where canards pop out of the fuselage, gliders with swing wings, and even a scissors wing glider. There have been sport and scale models such as Estes' Sky Dart™, Bomarc™, and, still available, the Space Shuttle™. In addition, you could class the helicopter recovery rockets as gliders, since the rotor blades are wings powered strictly by the descent of the model.

The models mentioned above were all free-flying models. No control was possible. By about 1967, Bernard Biales was experimenting with single channel control of boost gliders, and a model was successfully used in competition by Doug Malewicki to win the spot landing contest at the 1968 NARAM. These models used rudder control only, and the lightest equipment available. Typically, the entire radio weight was less than 1½ ounces. Control was basically only able to direct the landing spot and keep the glider on the field. Sadly, such light equipment is no longer safe to use in the crowded electromagnetic environment of today. But, reliability, range, and performance are far advanced with only a slight weight penalty, and costs are actually reduced.

In response to a request from Vernon Estes, the design team at Estes Industries put together a new concept for boost gliders in 1969. The team of Mike Dorffler, John Simmance, and I designed and built the first multi-channel, digital proportional boost glider, the Sky Dancer™. Powered by staged D-engines, the Sky Dancer™ was a spectacular performer. Six weeks after the request, the glider was successfully demonstrated at NARAM. Sky Dancer™ was aerodynamically and structurally very sophisticated, but a builder's nightmare. It used tapered spruce spars, 1/32" sheeting and ribs, and every trick in the book to achieve light weight. It had to as it weighed 11 ounces ready to boost while carrying 6½ ounces of radio gear. The entire model was covered with Japanese tissue, probably the fastest that material has ever flown. Flight times in excess of two minutes were achieved with Sky Dancer™ at Penrose, Colorado's 5000 feet altitude without thermal help. Control was by aileron and elevator, so the glider even had aerobatic capability.

Last spring, Estes Industries launched an agressive development program to design a versatile and practical R/C rocket or boost glider kit for a reasonable cost to the consumer. The initial product

definition and design were done by Mike Dorffler and myself. Design refinements and kit finalization were by Mike Riggs and Dave Meyers.

The initial requirements dictated that this remarkable kit incorporate average model aircraft construction techniques, while taking advantage of current building materials, standard inexpensive, airborne electronics and efficient aerodynamic principles. This combination allowed simplicity of construction while providing the modeler with a high performing and unique looking rocket glider. Other criteria required that the flight have "hands-off" launch capability, superior performance, and utilize a single standard "D" size engine for cost efficient flying. The glider should also have the necessary structural integrity to withstand the boost loading found in composite engines. In addition, we decided to make it a rocket glider rather than a boost glider to keep it simple. That is, no droppable parts to search for or tricky sliding parts to build.

Today, after less than a year, these strict design requirements have been met. The result is a versatile swept/canard design, this being the optimum configuration for the flight regimes in which this glider is intended to perform.

As mentioned, quick and simple assembly methods are used in this design. The foam core wing construction, diecut fuselage and flying surface parts greatly simplify and shorten the building and alignment operations.

No special tools or elaborate techniques are required. The well-illustrated instruction book and full-scale rolled plans provide excellent detail and clarity for painless building.

The kit contains all necessary materials and hardware. All you need are some simple tools.

There are no unpleasant surprises in the construction phase.

Aerodynamically, the glider incorporates several subtle but efficient concepts. The swept wing allows the engine to be located near the center of gravity to minimize the balance point shift as the propellant burns. This makes the transition between boost and glide as smooth as possible for the pilot. A balsa sheeted foam wing allows the overall flying weight to be reduced considerably when compared to a conventional built-up wing. (This innovation, in itself, provides an incredibly strong, yet shorter span wing with lower drag qualities, ideal for the boost phase.) At the same time this wing provides sufficient lifting area and acceptable wing loadings for the model to perform as a glider.

Twin vertical surfaces located on the wing tips help reduce vortex drag, provide excellent roll stability and allow greater flexibility in engine and radio arrangement.

The canard has been incorporated to provide inherent stability. This configuration is difficult if not impossible to stall accidentally -- a critical quality during the various flight transitions and landing sequence. Although an agile and responsive flier, the positioning of these surfaces permits lower time fliers ample room for learning -- the glider is forgiving in flight.

Also, canard has been utilized over a pure flying wing to avoid the need for some sort of complex mixing control.

In keeping with the precepts of uncomplicated design and use, simple two-channel control is all that is required. One channel for ailerons (roll control) and one for the canards (elevator or pitch control). EZ type connectors allow adjustments to be easily made at the servo end. The clevises at the control surface need not be bothered once they are initially assembled.

The use of micro servos and miniature radio gear keep the glider's all-up flying weight between 12-16 ounces. The glider's size and configuration were determined not only by the weight and size of the radio gear, but by a need to balance the boost altitude performance against glide capabilities to provide a practical performer.

The balance is perfect! This design is able to utilize a "D" engine and obtain optimum thermalling altitude without cumbersome ground support equipment or lengthy pre-flight preparation. As a bonus, it even launches from the compact Porta-Pad II® Launch Pad, using an ordinary Electron Beam™ controller like most other Estes rockets.

The result is the Astro-Blaster™, a model which will either boost hands off or can do aerobatics. In the glider it can ride slopes, or thermals for increased duration, or do exciting loops, rolls, stalls, turns and even fly inverted. Whether the choice is the D11-P or a composite engine, the Astro-Blaster™ is capable of boosting from 300 (on a D11-P) to close to 1000 feet (on our soon-to-be released composites). Primarily an agile slope soarer, the Astro-Blaster™ turns out to be an excellent thermal soarer. All of these qualities enable the Astro-Blaster™ to possess the best qualities in all phases from ease of construction, to boost and glide performance. All this packaged into one very beautiful glider. The Astro-Blaster™, because it combines the best of both worlds will entice rocketeers to easily pursue R/C rocket gliding while at the same time open the world of safe rocket powered aircraft to the traditional aeromodeler.

The Astro-Blaster™ is the result of many hours of design, construction, critique, flight testing, and redesign. The product of this cooperative effort was well worth it. Astro-Blaster™ achieved every one of the requirements set for it, and turned out to be one of the slickest looking rocket models ever. Since there were several expert modelers involved in the design, it benefited from a couple hundred years of model rocket, model aircraft, full size aeronautics, competition, product design and model design experience. Everyone contributed, and the result shows it.

IDEA BOX

Here are some ideas that have been around for a number of years. They were "re-expressed" at NEMROC VII, a NAR sanctioned rocketry convention held last year in Northboro, MA.

There are two spirals on the body tube - one you can see and one you can feel. You want to fill the spiral you can feel by painting with Elmer's Professional Carpenter Wood Grain Filler thinned with water 50% (or more) to be brushable. Sand with 320 grit sandpaper, followed by 400 grit sandpaper.

Sand the entire body tube with 400 grit sandpaper to rough up the surface and remove the glossy coat. The paint will adhere better this way. Try not to sand through the glossy surface to the fuzzy paper below.

Paint the entire rocket with a coat of sandable spray primer. The primer may raise up any fuzz to sand off. It will also show up any dents and dings that you may have missed filling. Fill, sand, and spot spray as appropriate.

Spray paint the rocket with the overall final coat with two light coats, followed by one heavy coat. Note there is a fine line between a heavy coat that gives a glossy finish and running paint. TIP: if you spray too heavily and develop a paint "run," stop spraying and rotate the rocket trying to get the run to run itself out. The run will usually not completely disappear. You have two options at this point: (a) wait for the paint to dry, then sand the run out and repaint; or (b) spray the run with a little spray paint. This may seem the opposite of what you want to do, but remember, spray paint is a lot of solvent with very little paint. Spraying the run will add more solvent than paint, allowing you to run out the run further. You may avoid the need to sand and repaint later using this method. Note that option (c) - wiping the rocket - is not an effective way of dealing with runs.

For every Idea Box suggestion we print, we'll send you a 15 dollar merchandise certificate.

From Mort Binstock of Pittsburgh, PA, a method to help align decals and lettering:

Do you need a straight edge to stick to your rocket to help align decals, lettering, etc.? Are you concerned that masking tape may peel the paint off when removed? Then try yellow post-em note paper. Its temporary glue will not remove your paint. It may be positioned by trial and error until it's just right. The paper is also thick enough to act as a straight edge to help align the decals, etc.

This handy tip comes from Jeff Thomas of North Branford, CT

An easy way to clean your micro clips is to use a 4½ inch emery board. These emery boards can be found in the health and beauty section of any food or drug store. By placing a two inch piece of magnetic tape to one side, you can keep your emery board handy by placing it on the underside of the blast deflector.

Here's an idea from Tyler Vixie of Bothell, WA:

Instead of putting the recovery wadding in your rocket before each flight, put it in when you build the rocket and after each flight. That way, you will always have wadding in your rocket so you will never forget to put it in.

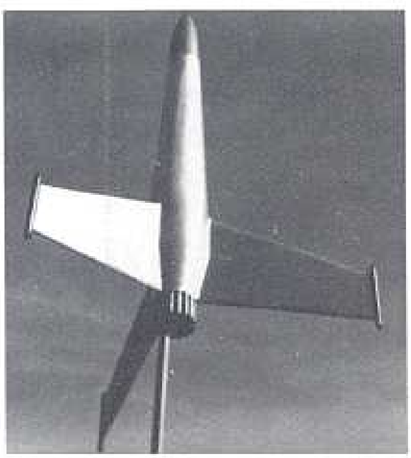
THE ROCKET PLAN

Plan Number 100

EDITOR'S NOTE: *In the center of every MRN you will find the Rocket Plan. This could be a reprint of an old plan or one of the past winners of our Design Contest. This plan can be removed and you will notice that it is not page numbered. Build them - enjoy them.*

1940 Exploratory Planetary Cargo Ferry

BY THOMAS BEACH



Model Features:

- Classic Sci-Fi motif
- Unique body shape due to paper shroud construction
- "Radium power rocket tube" tail assembly
- Large fins with "wing tip landing shocks" for stable boost and three-point landings

Parts List:

BT-50 body tube (9½ inches)
BT-60 body tube (1⅜ inches)
PNC-50KA nose cone
EM-2050 engine mount
JT-60C tube coupler
RA-5060 centering rings (two)
PK-12 parachute kit
BFS-30L 3/32" fin stock (two sheets)
Launch lugs (six: 1/8" dia., 2⅜"
Launch lug (3/16" dia.)
Shock cord (18" long)
Small screw eye
1/8" dowel (6 inches)
Index card stock (8" x 10")

My completed model has a mass of **45 grams.**

The following engines work well:
A8-3 B6-4 C6-5
B4-4 would undoubtably also work. I did not try a B8. I did try a 1/2A6-2 with unimpressive results, so I wouldn't recommend it.

Inspired by the spaceships that graced the covers of the pulp science fiction magazines of the 1930's, this is an all-purpose ship that was used to explore the stifling swamps of Venus, the canal-fed lichen fields of Mars, and the frozen night side of Mercury. Later, these versatile vehicles plied the lucrative interplanetary trade routes linking the many sentient races throughout the solar system.

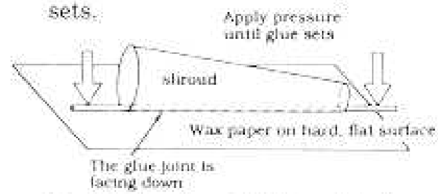
Assembly Notes:

1.

Build the body and engine tube assembly as shown in the construction diagrams.

2.

The most difficult construction step is forming the two shrouds. Make the rear shroud first, then the forward shroud. Trace the shroud pattern onto index card stock and cut it out carefully. Pre-curl the shroud until it holds its final shape. Apply glue to the glue tab and hold the shroud in shape until the glue sets. When gluing the long forward shroud it helps to have a long dowel (or similar object) to hold the glue joint. Place the dowel inside the shroud against the inside of the glue joint and press down on a hard, wax-paper covered surface until the glue sets.



Test fit the shrouds. Notice that the lower shroud overlaps the "rocket jet tubes" a distance of 1/8 inch. If either shroud fits poorly, start over and make another one -- paper is cheap, and properly fitting shrouds are vital for a good looking model. Apply glue to the model on the shoulders and where the narrow ends of the shrouds contact the tubes, then seat the shrouds in place. I suggest aligning the seam of the lower shroud with a fin line (this will allow the fin to cover the seam of the lower shroud) and align the seam of the forward shroud with the launch lug.

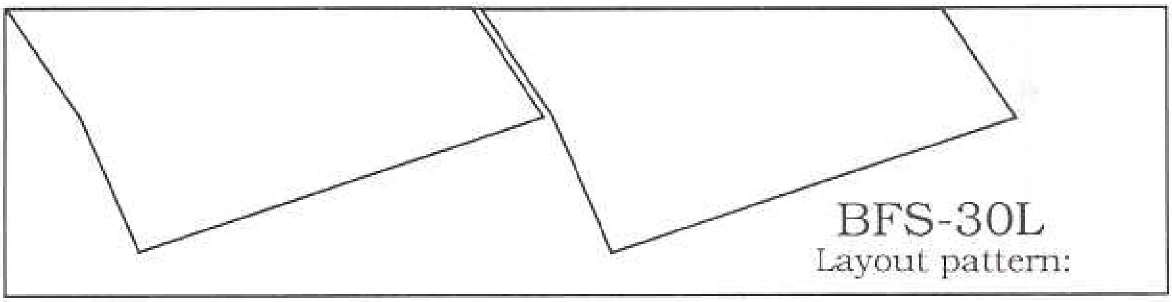
3.

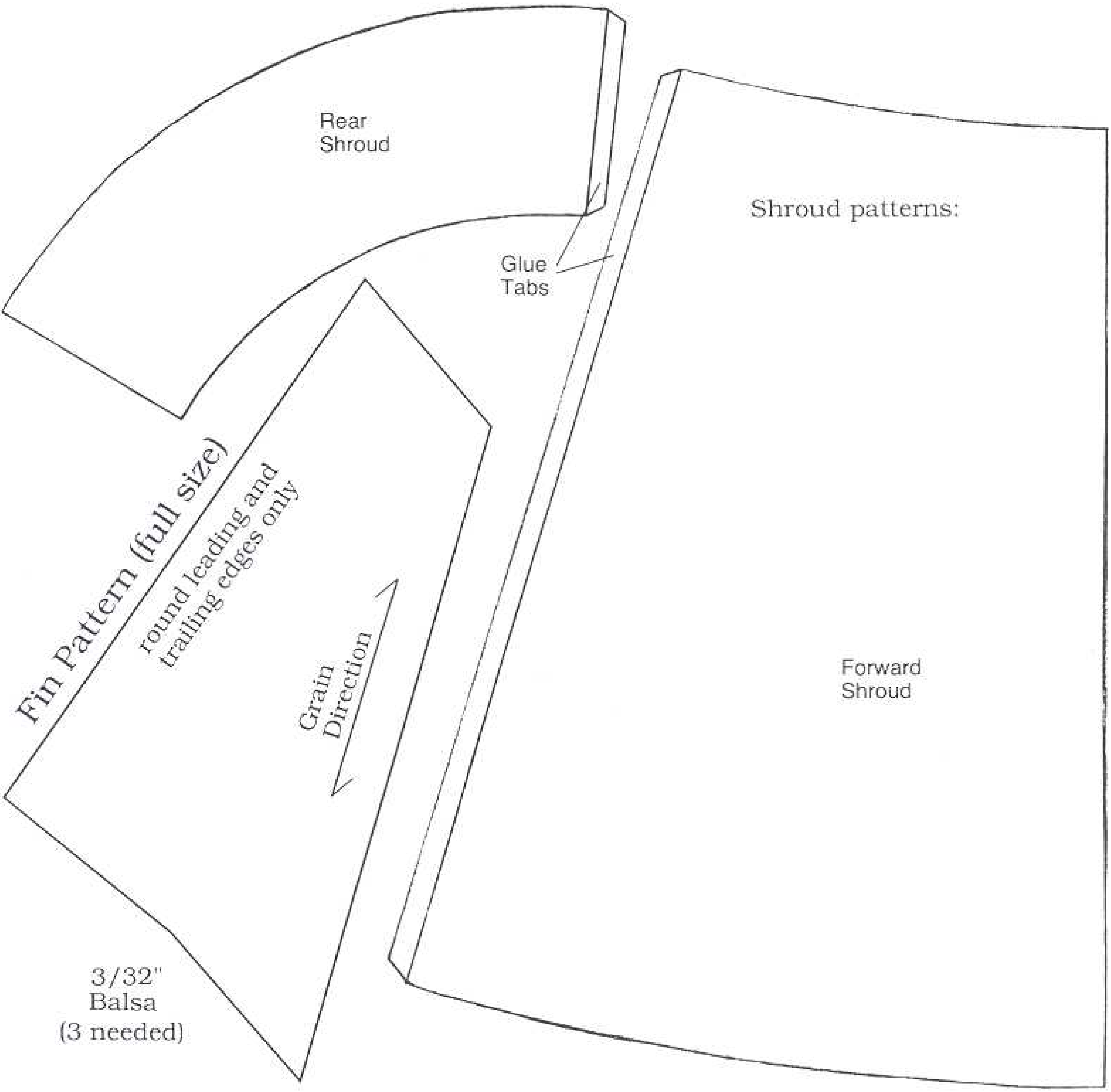
Add the fins and fin-tip dowels as shown in the construction diagrams. Shock cord and parachute are installed in the normal manner.

Finishing the Model:

Apply sanding sealer to the fins *and the shrouds.* Do not use excessive force when sanding the sealer on the shrouds. When the sealing is complete, paint the model. My original model was sprayed with metallic blue. The rocket jet tubes and fin tip dowels were hand-painted red.

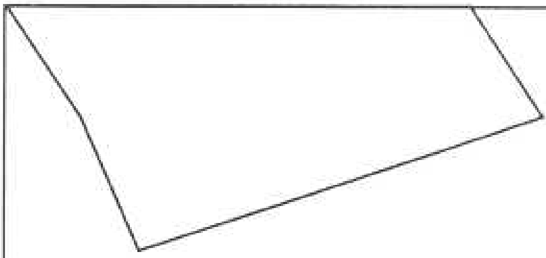
THE ROCKET PLAN
Plan Number 100





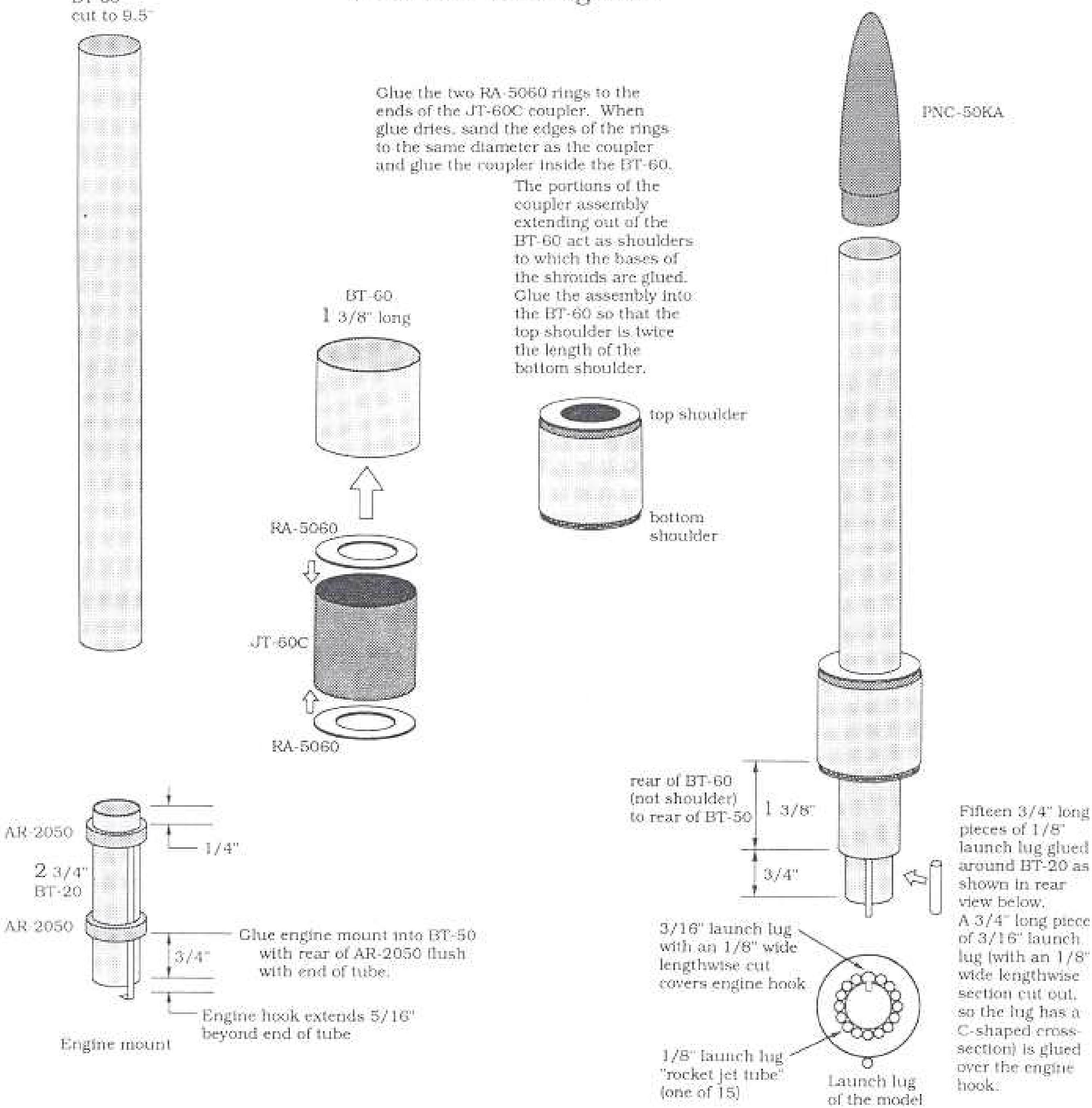
THE ROCKET PLAN

Plan Number 100



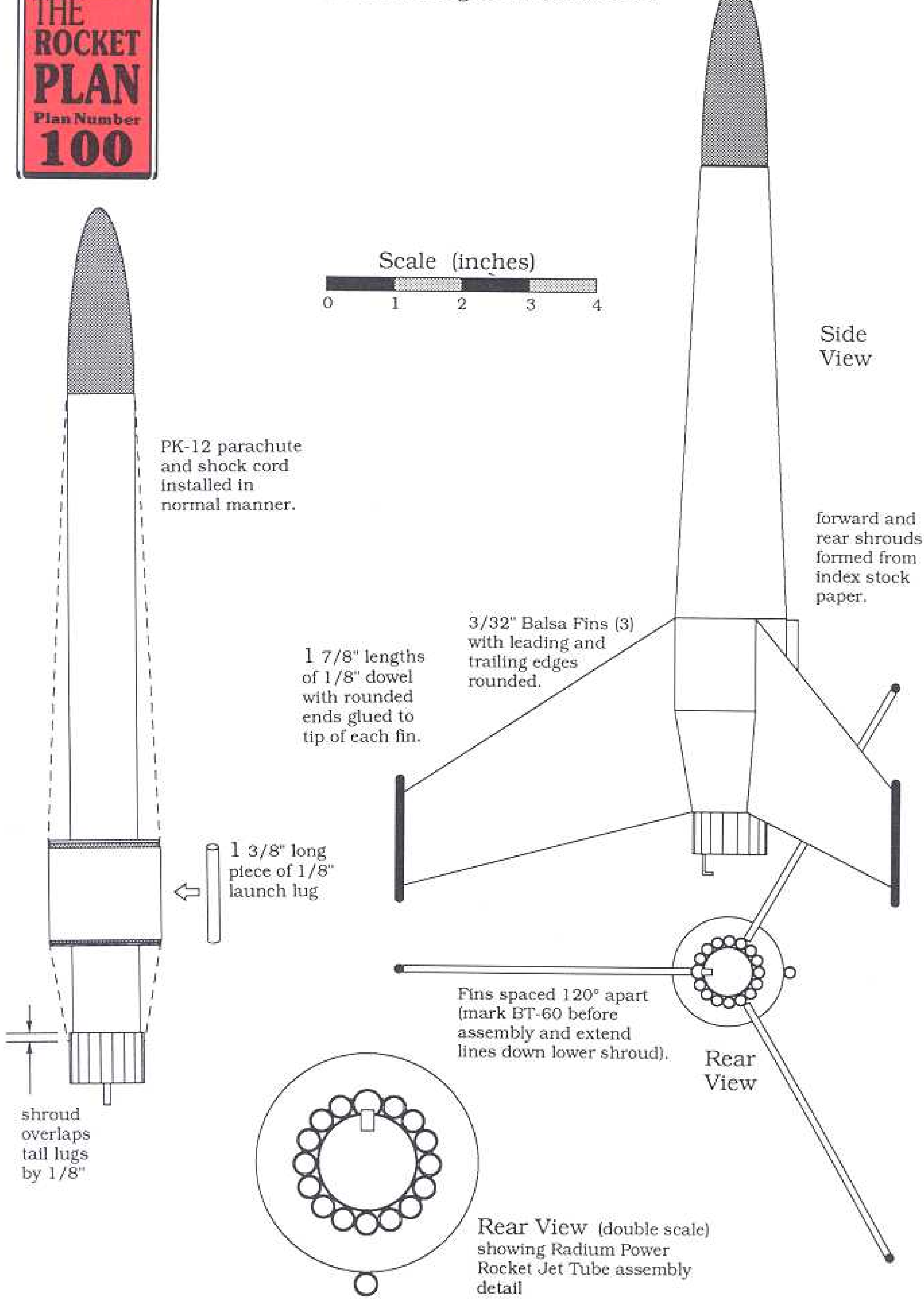
BFS-30 or BFS-30L

Construction Diagrams:



THE ROCKET PLAN
Plan Number 100

Construction Diagrams, continued:



TANGENTS

Tangents will cover subjects that may not have anything to do with model rocektry per se. However, the topics covered may interest the rocket modeler. In this issue, Art Nestor will discuss meteors.

METEOR MAGIC

Editor's Note: Art would like me to let every one know that two major meteor showers will occur on July 29 and August 12, 1992.

By Art Nestor, NAR #29623

I'm sure you have seen the movie in which our hero Indiana Jones is standing on a hilltop late at night, thinking seriously about what actions he should take next. High overhead, slivers of light shoot across the starry sky. These fast moving lights, nicknamed "shooting stars" or "falling stars", are actually meteors burning up in our atmosphere. They add a magical quality to the film. But this special effect is even more magical in real life. If you haven't already, then you ought to make meteor-watching a part of your total model rocket experience. Sometimes you need to turn off the television and experience life for yourself. A couple of hours on a starlit night with family or friends can put life into perspective and stir the imagination.

Meteors, made up of metallic and stony material, can't be seen until they enter the earth's atmosphere and burn up from the heat of friction created by their great speed. Some travel as fast as 26 miles per second. About 65 miles above the earth they first become visible as their heat increases to 4000 degrees F. Most meteors are no larger than a grain of sand. What we see is a glowing cylinder of air around a hot particle of dust. Rarely do they glow brightly for more than a few seconds, but occasionally one leaves a trail of light lasting longer than a minute. Burnout occurs between 30 to 50 miles above the earth. Literally, millions enter the atmosphere each day adding more than 1000 tons to the earth's weight daily. A large and abnormally bright meteor is called a fireball.

Meteors that hit the earth before burnout are called meteorites. Sometimes meteorites explode with a noise that can be heard for several miles when they strike the earth. There are three classifications. Stony meteorites are made up of different minerals and may resemble material that comes from a volcano. Iron meteorites are mainly composed of iron and nickel. The smallest group of meteorites are a combination of the above. Scientists believe a giant meteorite created the Great Meteor Crater of Arizona thousands of years ago. It dug a hole over 4100 feet in diameter and 570 feet deep. The Tunguska Fireball of 1908 exploded in Siberia with a blast felt 50 miles away. It could be seen hundreds of miles away in broad daylight. It scorched a 20 mile area at its point of impact. The largest meteorite found in the U.S. was the Wilamette Meteorite in Wilamette, Oregon in 1902. It weighs about 15½ tons. There are nearly 100 known meteorite impact scars on the earth's surface.

Swarms of meteors circle the sun in a variety of orbits and speeds and are probably produced by comets which leave a trail of particles behind them. When the earth enters one of these streams, the sky seems filled with a shower of sparks. These showers usually occur on a regular annual basis. Because of this regularity we can know the best time of the year to watch and the general location of the sky where they will appear. One of the most brillant showers occurred on November 13, 1833. Some people thought it was the end of the world. Meteor showers are named by astronomers after the constellation from which they appear to come.

Stargazing is not a favorite pastime of mine, but I do enjoy going out about once a year. I'm never disappointed. A couple of years ago a mysterious cloud suddenly appeared on the horizon shortly after I began my meteor watch. It had a very distinct and slowly changing shape. The next day's news broadcast explained the cloud as the explosion of a rocket aborted in flight. Pick the right night and there won't be a shortage of meteors to watch.

First of all, you don't have to be an expert on the stars and constellations to have a fun and rewarding night. I actually know very little. Some research on your part though could make your watch more interesting. Consult your library for encyclopedias or books on space. Usually a chart will list the best times of the year and locations of the sky to watch.

Plan your watch. Here is a list of items to consider taking with you.

1. Lawn chairs, lounges or a blanket to lay on.
2. Flashlights
3. A watch
4. Telescope or binoculars to look at the stars
5. Pencil and paper
6. Snacks
7. Compass
8. A radio

The darker the location for your watch, the more visible the meteors will become. Avoid looking at streetlights, houses or your flashlights. Let someone else know where you will be, when you will be out and what you are doing. At the very least, take the time to figure out the directions of north, south, east and west. After that, try to find the North Star and the Big Dipper.

CONTRAILS

Edited by Mike Hellmund

Contrails is always interested in rocket modelers' input, whereas Rocketeer Communications is for letters and questions. Contrails will be an accumulation of reports covering your model rocket happenings.

Send your reports to: Estes Industries, Attn: MRN, 1295 H Street, Penrose, CO 81240

All American Alpha Update...

If you read our last edition of the *Model Rocket News*, then most of you are familiar with Estes' good friend Art Nestor's project, "The All American Alpha". Well, it's been almost ten months and it would be appropriate to update you on the progress of our Alpha, as it flies its way around the good ole USA. When we left, Art had completed flight number one and had shipped the All American Alpha to Dr. Bob (Dr. Bob Kreutz of New Jersey). I'll let Dr. Bob pick up the story...

All American Alpha Launch #2

Written by Bob Kreutz

Launch #2 occurred on Saturday, July 13, 1991, at the Four Sisters Winery in Belvidere, New Jersey. The Winery hosts many public events for this area of New Jersey and it's always nice to taste some of their "wares" after a full day of flying. The launch was to be the first flight of the day at the Garden State Spacemodeling Section Meet, appropriately called "How Low Can You Go?" because all events were the lowest impulse class possible. This was the first competition in the nation (that we know of) to use the new 1/4A engines, originally manufactured by Estes Industries and the first meet of the new contest year (July 1).

Garden State Spacemodeling Society (photo by Bob Kreutz)

It was a warm, sunny day, but a bit too humid for me. Approximately 20 members of the Garden State Spacemodeling Society were present at the contest. Winds were from the east at three to five miles per hour (we have a range wind meter). I prepped the model as instructed with an A8-3 engine and taped the fin tips to prevent damage on recovery. My 2½ year old daughter, Katie, insisted on helping out and informed me that I had everything properly set and that we should "fwy the wocket" without delay. Our Contest Director, Tom Whymark, announced the imminent launch and gave the countdown. The flight was vertical and flawless, no roll and the chute deployed fully. Recovery was performed by our solo club B divisioner, Charlie Tolliver. I immediately returned the Alpha to its protective case, as the next scheduled launch was two days away in Pewaukee, WI and I had to get the model in overnight mail.

The AA Alpha then proceeded to the following states and to the fine flyers listed:

State	Flyer	Hometown	Date of Flight
3 Wisconsin	John Vitale	Pewaukee, WI	7/17/91
4 Kansas	Tom Poulton	Topeka, KS	7/28/91
5 Illinois	L. Bercini	Chicago, IL	8/6/91
6 Oregon	Greg Holden	Pendleton, OR	8/25/91
7 Indiana	Bill Hale	Brookville, IN	9/6/91
8 Nebraska	Joel Pint	Genoa, NE	9/13/91
9 Utah	Orson Jones	Paradise, UT	9/21/91

After the All American Alpha flew in Utah, the rocket was turned over to Michael Crook. Michael, who lives in Utah, drove across the state line to fly it in Idaho. Michael files this report:

All American Alpha #10 was successful! (Idaho)

Written by Michael Crook

About 5:30pm on Friday, September 27, 1991, I loaded my model rocket equipment into my dad's car for a short journey to Idaho for a rocket flight. This model rocket flight wasn't quite the same as other launches, though. This flight was to be the tenth flight of the All American Alpha.

After we crossed the Utah-Idaho border, we started looking for a good flying site. The field we chose was a big alfalfa field near the Franklin Cemetery, about a mile south of Franklin, Idaho. While I carefully prepared the rocket for flight, my little brother, Jonathan, and my dad set up the launch pad. When the model was ready, I readied my two cameramen and timer.

The weather was perfect for flying. The sun was shining brightly and there was a slight breeze from the west.

"5...4...3...2...1...0...-1...0...Ignition! Alpha, you've cleared the rod, and everything else around for that matter!"

The Estes A8-3 performed flawlessly and at apogee the 'chute deployed as planned and the beautiful bird slowly floated to the ground. In all the flight was spectacular!

In the excitement of things the timer never stopped but liftoff occurred at 6:03pm MST.

After recovery, I repackaged the rocket and helped my brother prep his Yankee™. It made a great flight too! Since the flight he has been telling everyone that his first flight was right after the All American Alpha.

After Idaho, the bird was packed off to fly in Wyoming. Orson Jones did the honors for the Cowboy state. The All American Alpha was then sent to Washington, where Bill Clow resumed Alpha's great American tour:

All American Alpha Flight Report #12
Written by Bill Clow

On an unseasonably warm and sunny October 15th morning, about sixty sixth graders from the math and science classes of Bill Clow gathered on the bleachers of the Chinook Middle School football field to watch the launching of the All American Alpha rocket. The State of Washington was to be the twelfth state in which the rocket has flown.

Bill Clow adjusted the launch rod and prepared the Alpha, which was loaded with a B engine. The students counted down until sixth-grader Joe Razore pushed the launch button and sent the Alpha arcing into the sky. The parachute popped open and the Alpha drifted slowly to the north, near the rocket-eating Douglas fir trees at the edge of the field. The rocket fell out of the wind at the north end of the field and gently settled down into the grass near the running track. The recovery team -- Kristen Bushnell, Andrea Morelli, and Jane Yuan -- picked it up and brought it back.

A photographer and a reporter from the Seattle Times newspaper were present to cover the launching. An article, without any photographs, appeared in the paper on the next day.

The rocket is in amazingly good shape, for all of its travelling and launchings. The fins are slightly chipped on the ends (I sealed the bare wood with some Elmer's glue the day before the launch). We also managed to singe the parachute slightly, it will no doubt have to be replaced before the rocket has flown in all fifty states.

On the day after the flight, Clow packed the rocket in its tackle box and sent it on to a school in Anchorage, Alaska for the next launching.

Scott Batchelder of Anchorage, Alaska launched the Alpha in his fine state and then the rocket was shipped down to sunny California. Sunny????...

All American Alpha Flight Report #14 Flyer-Beaver Sheppard
Written by Frank Daniels

On the morning of November 10, 1991, we awoke to the terrifying sounds of rain coming down like cats and dogs. I couldn't believe my ears. Not since the end of September had we seen the wet stuff in Blythe, CA. We had been calling the National Weather Service every three to four days after our 4-H Leader Vicki Sheppard was notified of our launch date. We were told no rain or high winds in the forecast! However, the rains subsided and we got our historic launch flown.

In attendance were the nine members of the Palos Verde 4-H rocketry club and co-leaders Vicki Sheppard and Frank Daniels. The rocket was damaged upon landing when a boy (not a member of our group) attempted to recover it and stepped on it. Two fins were broken and the body tube slightly crushed. Art Nestor told us to ship it to the next All American Alpha Flier for repairs.

Disaster had struck the All American Alpha. The Alpha was shipped to Tim Dotson for its Nevada flight. Tim and Bob Stanford, who would fly the All American Alpha in Arizona, did some emergency repairs and the Alpha limped through its flights in those two states. The All American Alpha was then sent to Art Nestor for analysis and, if possible, for repairs. The Alpha had lasted through 16 flights. Was this the end of its serviceable life? Oh, what an ignominious end - to be crushed to death under the foot of a spectator. Can Art "Dr. Rocketstein" Nestor resurrect the Alpha? (Don't you love melodrama?). Stay tuned for the next issue and read the possible continuing adventures of the All American Alpha.

Michael Crook and Jonathan Crook Alpha #10...Idaho

MODEL ROCKET FLYING EVENTS

Look for these events to participate in or just to watch!

May 30-31st
Midwest Regional Fun Fly, Chicago, IL

Contact: **Lawrence Bercini, 6033 N. Sheridan Rd. #33J, Chicago, IL 60660, (312) 561-8098**

June 6-7th
Michigan Spacemodeling Championships, Jackson, MI

A regional NAR sanctioned contest hosted by HUVARS. Contact: **Mark O'Brien, (313) 971-6033**

June 6-7th
NYSPACE, Rochester, NY

A regional NAR contest. Contact: **Dan Wolf, 235 Kislingsbury St., Rochester, NY 14613, (716) 458-3848**

June 20-21st
Midwest Model Rocket Regional, Columbus, OH

A regional NAR sanctioned contest. Contact: **Larry Rice, 1416 Aven Dr., Columbus, OH 43227, (614) 235-1339**

August 1-7th
National Sport Launch '92/NARAM 34, Las Vegas, NV

The national NAR championships hosted by SPECTRE. Contact: **Bob Sanford, 5150 East Sahara Ave., #137, Las Vegas, NV 89122, (702) 452-1796**

Please send your events to:
Estes Industries
Attn: MRN
1295 H Street
Penrose, CO 81240

MODEL ROCKET NEWS

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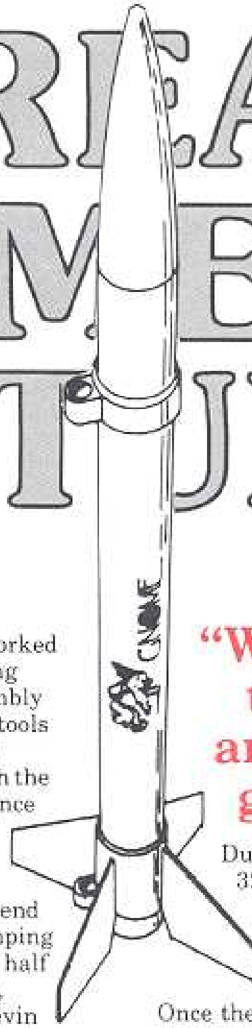
THE GREAT GNOME ADVENTURE



By Lawrence Bercini

Every year, members of the Northern Illinois Rocketry Association (NIRA) man a booth at the Chicago Hobby Show. The show is run by the Radio Control Hobby Trade Association (RCHTA), and representatives of all kinds of model hobbies - including Estes Industries! NIRA runs a booth to tell people about the hobby of model rocketry and how they can get involved in our club. This year RCHTA contacted Estes to have rockets built during ongoing consumer seminars. Estes, in turn, contacted NIRA to staff the seminars. We were told we would be helping hundreds of people build Gnome™ rockets over a two-day period. We jumped at the opportunity to give so many people a chance to try model rocketry hands-on. But how can ten people help hundreds of people build their first rocket?

Mike Jungclas and I worked together to set up the building sessions almost like an assembly line. Each person was given tools and instant glue plus special templates which did away with the need to do any measuring. Once the seminars got started, Mike and I worked more and more of the bugs out of the procedure so that by the end of the first day, we were pumping out 25 to 30 Gnomes™ every half hour! Mike, Ken Hutchinson, Kleve Slouber, Bill Thiel, Kevin McKiou and I tried our hands at leading the sessions while other folks worked as "floaters", giving one-on-one attention. Don and Andy Linder, Sam Mulvey, Ed Thiel, Dave Price, and Bob Wiersbe offered excellent answers for the various questions asked by these first-time modelers: "Is it right?", "Which end is the top?", and "Put the glue here?"

L. Bercini photo

Bob Kaplow helps Elric and Tim Busse ready their models

"Which end is the top?!!" and "Put the glue here."

During the large sessions of 32 people, it was pretty hectic! In spite of that, everybody, including the NIRA folks, were having an excellent time! Once the super glue fumes had settled, we had built 337 Gnomes™!

Between sessions we offered videos which explained the basics of model rocketry and showed a variety of models being launched. It showed how much fun we had at previous NIRA launches. In hopes of getting these new rocketeers to join in the fun, each person received a registration form which entitled them to a free engine if they brought it and their Gnome™ to the NIRA launch scheduled for the next Sunday. Estes graciously donated engines for the event. Everybody involved in the seminar crossed their fingers for decent weather for the upcoming launch.

As one might guess, getting decent flying weather in Chicago during November is not exactly the kind of thing one should place a bet on. That's why Bob Wiersbe dreaded the idea of "trying to find white Gnomes™ in the snow...a new event: Gnome™ Hunt!" In spite of Bob's fears, we got a nice, calm, overcast day with temperatures well above the typical finger-numbing range.

Much to our delight, 20 folks ranging in age from 5 to 75 years, showed up with their Gnomes™, all eager to learn more about model rockets, all eager to show off to their friends/parents/spouses. We brought along one of the NIRA racks for the day just for the purpose of helping our new modelers. Mike Jungclas and yours truly were overwhelmed with the requests for pad assignments! In fact, the entire club was busy helping install igniters, fold streamers, stuff wadding, etc. Special thanks go to the outstanding efforts of Dave Price, Harland Pell, Bob Kaplow, and Mark Bundick (and many others who helped in any number of ways) who sacrificed their own flying time so they could help others.

(L. Bercini photo)

Mike Jungclas gives instruction to Donovan Goble

The newcomers really got caught up in the fun! Our first Gnome™ of the day belonged to young Tom Larson, who, along with his father (also named Tom) stayed until the end of the day, enjoying all of the flights. Brothers Bob and Ryan Lindstrom put up their first flight and **wanted more!** After a while they sent their mother to buy engines and didn't leave until they had fired them all! One of the youngest modelers in attendance, five year old Kelsey Goble, was very shy about doing her first countdown. But after she saw her very own rocket take off, she was ready for a second flight. Although she let Daddy do the countdown, she was whispering right along with him. Lee Lasseigne recently came across rockets in a local hobby shop and became a Born Again Rocketeer. His dad had flown rockets, so he decided it was time to introduce the hobby to his eight year old son. So Lee's son, Anthony Bouldin, had built a Gnome™. At the launch, he became the third generation of rocketeers in the family.

As far as I know, 42 out of 43 of the Gnome™ flights were successful and everybody seemed to be having the time of their lives!

Somehow, the NIRA gang instinctively knew they should bring a variety of models to entertain the eager crowd. Bob Wiersbe demonstrated scale models in the form of a Mercury Redstone™, Titan IIIE™ and Gemini Titan™. Ken Hutchinson complemented Bob's fleet with a gorgeous Saturn V™ flight.

Bob Kaplow and I went the comical route, showing off Happy Meal, Flying Pencil, and Indian Headdress rockets. I also flew some models demonstrating special recovery methods: a helicopter duration model and a large parasite glider strapped to the side of my Optima™. Dave Price really wowed the spectators with a very successful variable geometry rocket glider flight.

Engine configurations were spotlighted by Lee Lasseigne and Ken Hutchinson. Lee had some outstanding, eye-popping two-staged flights, while Ken generated a lot of attention with his five-engine clustered Mega-Cobra. The dark overcast conditions made for some spectacular exhaust effects. Mark Bundick, Bob Wiersbe and Ken Hutchinson demonstrated some very large rockets featuring large motors which gave ROARING good flights! The crowd just loved it!

The big news of the day was Dan Green's TV camera rocket. The camera was small enough to fit into a BT-60 and was set to launch with a D12. The crowd around Dan's ground support equipment looked like opening day of the Christmas shopping season! Unfortunately, an ignition failure left the Marauder rocket sitting on the pad. Dan reported the camera was fine and would return another day...

A whole boatload of thanks go to the whole NIRA gang for hosting a real bang-up building and flying session. Thanks should also be extended to Estes Industries and to the Radio Control Hobby Trade Association for making the "1991 Great Gnome Adventure" a huge success!

Quick Tech

By Tim Van Milligan

Tim Van Milligan is an Estes R & D engineer. Quick Tech will be short articles, written by R & D, Marketing, or even you, giving you brief technical excursions into model rocketry.

ROCKET ENGINE SELECTION

Selecting the proper engine for a model rocket is crucial to achieving a safe and successful flight. It may look like a daunting task when you see all of the different types of engines available, but there are really only three factors that need to be considered for making the proper choice. These are the mass of the model, the amount of aerodynamic drag it will be subjected to, and the intended purpose of the model.

"GO high or GO fast, there is a difference"

The purpose of the model is what it was designed to achieve. The two most common purposes of rockets are to "go high" and/or to "go fast." There is a difference between these two purposes when it comes to engine selection, as I shall attempt to explain. To make the rocket go as fast as it can go requires the most amount of thrust that the engine can produce. When it comes to engine selection, you would want to choose the engine with the highest possible average thrust. This number is printed on the engine as the first number after the engine type letter. For example: with the same "type" of engine — for instance, a "C" engine (which tells you the total power of the engine), you would want to select an engine with the largest number following the "C", which would be a "C6" and not the "C5". Similarly, the "B6" would give a higher speed than a "B4" rocket engine.

Quick Tech *Continued*

But...

When you want to achieve the highest altitude for the same engine power, you would choose the smaller number. Why? Because the force of drag must be considered when trying to achieve the highest altitude. Remember, that the force of drag is defined from the equation:

$$D = \frac{1}{2} \times p \times C_d \times A \times V^2$$

Where "D" is the force of the drag, and "V" is the velocity of the rocket. Since the drag is proportional to the square of the velocity, the higher the velocity for a given rocket, the more drag the rocket must overcome, thus it won't be able to go as far.

This is a very important concept, and is worth repeating. The faster the rocket goes, the more drag it has. The more drag a rocket has, the sooner it will slow down. If it slows down, it will not go as high. So to keep the drag force low, the rocket should travel SLOWER so that it can travel farther!

The second factor to consider when selecting the proper engine is how much aerodynamic drag the model will be subjected to. Remember, drag is a force which is tugging at the rocket trying to slow it down. When the force becomes larger than the forces holding the rocket together (the glue bonds holding the fins onto the rocket), the rocket will come apart in flight. This is something to be avoided. Going back to the drag equation printed above, the drag is also a function of "C_d" which is the coefficient of drag, and "A" which is defined as the frontal area of the rocket. These variables should always be minimized (if possible) to keep the forces acting on the rocket low. This would mean that the engine selected should be a low thrust type, similiar to those for achieving the highest altitude.

An example of this would be rocket-gliders and boost-gliders, which have a large frontal area due to the "long" wings. The forces trying to tear apart the model are very large.

But...

If the model has an extremely large drag force (tending to slow the rocket) but is built "sturdy", the engine selected should be of the higher thrust variety. Why? Because high drag rockets will fly slower, hence the forces acting on the fins to keep the rocket stable will also be smaller. To keep the rocket as stable as possible, you need to keep the velocity high to keep the stability forces acting on the fins large. Remember that the main force keeping the rocket stable is "lift" which is defined as:

$$L = \frac{1}{2} \times p \times C_L \times A \times V^2$$

thus the higher the velocity, the larger the stabilizing lift force.

The last variable that needs to be considered is the "mass" of the rocket. Extra mass in a model acts like adding more drag to the rocket. Why? The force of gravity (which trys to prevent the model from pulling away from the earth) acting on the rocket is a function of mass multiplied by acceleration due to gravity. You have probably seen this in its equation form:

$$W = m \times g$$

If "W" (called weight) is large, it must be overcome by the engine's thrust, which is why extra mass is like extra drag. Selecting an engine for a high mass (heavy) rocket is easy: choose a high "average thrust" engine, so that the flight will be more stable.

There is a special case where adding more mass to the rocket will actually make a rocket go higher; but that is a topic for a future article.

Delay Selection

The next part of selecting the proper motor is choosing the right "delay" time, which is the time in seconds between the end of thrusting and the point when the ejection charge pushes the recovery device out of the model. On a model rocket engine, the delay is designated by the last number on the engine casing. If you have a C6-5 engine, the delay is five seconds, corresponding to the last number. A C6-3 has a three second delay.

Here there are only two factors to consider when choosing the proper delay time; these are weight and drag. These are the same factors affecting the rocket as described above.

A high mass rocket will not travel as high as a lighter rocket because it has a higher gravity force acting on it. Similarly, a high drag rocket will have a higher drag force acting on it and will also tend to slow the rocket down at a faster rate.

What do you do when you don't really know how much drag a model has, or if it weighs too much? The best way is to check the Estes' catalog. If the rocket is in the catalog, the recommended engines are also listed there, and your problem is solved. If the rocket isn't there, the strategy is to find one that looks similar, with similar dimensions (body tube size, mass, and engine mount size). Then your best option is to use the engines that are recommended for that rocket, and the wisest choice would be to use the one that is recommended for the rocket's first flight.

Experience helps. The more you fly rockets, the more you will develop a "feel" for what engine would give the best flight characteristics. Give it a try. Choosing the right engine is a must for a safe and satisfying flight.

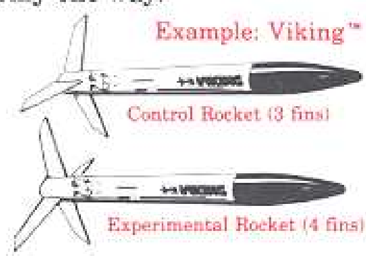
BLAST-OFF *continued*

Can you think of a reason why you wouldn't fly only one rocket with three fins and then glue one or two extra fins on and fly the same rocket again?

List some possible effects of using only one rocket for all of your testing.

Always remember: In order to have a good experiment, the experimental or test rocket should differ from the control rocket in **only one way**.

Example: Viking™



Control Rocket (3 fins)

Experimental Rocket (4 fins)

All other qualities between the two rockets are identical.

Now that you know what you are going to investigate, here's a list of tools/skills to run the investigation:

A. Two Viking™ Rocket Kits (#1949), constructed identically except for the number of fins on each.
NOTE: Do not glue the nose cone pieces together in Step 8 of the Viking™ instruction sheet until both rockets have been weighed. You need both rockets to weigh the same. If one is light, you'll have to add clay to its nose so it will balance the heavier rocket.

B. A balance to make sure the rockets weigh the same.

C. Two (or more) engines with the same impulse rating, i.e. A8-5s. These should come preferably from the same package. You'll also need igniters and wadding for each flight.

D. A launch pad and launch controller

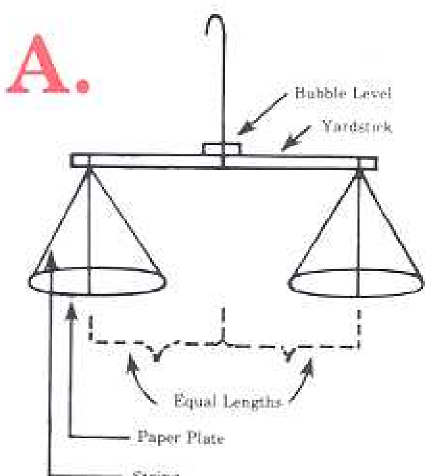
E. An altitude tracking device and a helper to track your rocket and record your data.

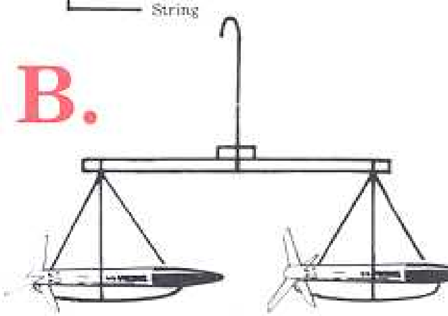
F. Your notebook and flight data sheet (some suggested sheet layouts are shown at the end of this article).

Experiment One: Preparation

A. Read before building your rockets.

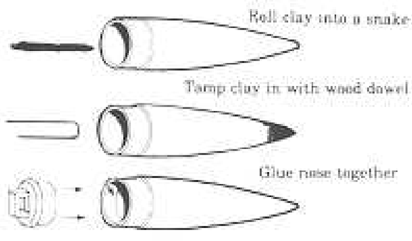
1. Decide which rocket and fin number will be your control rocket, which one will be your experimental rocket.
2. Build one with three fins and the other with four or five fins. Be sure to position fins on both rockets in same orientation.
3. Do not do step 8 on the Viking™ instruction sheet until the rockets have been carefully weighed.
4. Construct your balance from a yardstick, some string and paper plates. Calibrate it with a bubble level before balancing the rockets to make sure both plates are equal.





B. Balance both rockets with engines plus wadding. If one is higher, add a little clay inside its nose cone. Do this until both are balanced and the yardstick is level.

C. Once the rockets are balanced, glue the nose cone and insert together sealing the clay inside the cone as shown in step 8 of your instruction sheet.



Check the weight on a small scale; record it on your specification sheet. Now you have two identical rockets according to size, finish, shape and weight. The only difference is your variable - the number of fins on each rocket.

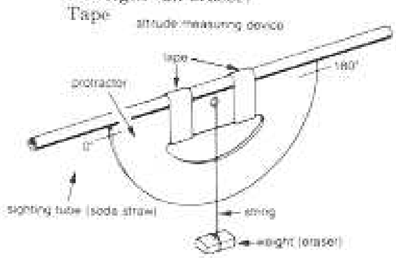
Once you have your rockets finished, you'll need to make an altitude scope to obtain your rockets' altitude performance. If you have an AltiTrak™ (#2232) you can skip this section.

The figure below shows how to make and use an altitude tracker.

Making Your Own Altitude Measuring Device

You will need the following things:

A large soda straw
A 20 cm length of string
A protractor
A weight (an eraser)
Tape



You will be constructing a device that looks like the one in the diagram. Tape the straw across the top of the protractor as shown. The straw will act as a sighting tube. Secure the string to the protractor, by slipping it under the straw and around. Tie it to itself and tape it to the back of the protractor. Tie the eraser at the opposite end of the string, so that it can act as a weight.

The way an altitude tracking device is used is this:

Hold the straw up to your eye. You will focus on the rocket as it is being launched. Move the device up as the rocket ascends. When you see the parachute on your rocket pop out, you will know your rocket has reached apogee. At that instant, hold the string with your finger exactly where it is on the protractor. Read the number on your protractor and record it on a pad of paper. That number will help you determine how high your rocket went.

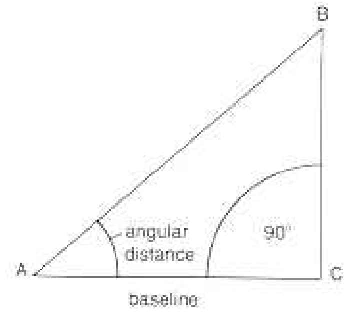


TABLE OF TANGENTS

Angle	Tan	Angle	Tan	Angle	Tan	Angle	Tan
1°	0.02	21	0.38	41	0.87	61	1.80
2	0.03	22	0.40	42	0.90	62	1.88
3	0.05	23	0.42	43	0.93	63	1.96
4	0.07	24	0.45	44	0.97	64	2.05
5	0.09	25	0.47	45	1.00	65	2.14
6	0.11	26	0.49	46	1.04	66	2.25
7	0.12	27	0.51	47	1.07	67	2.36
8	0.14	28	0.53	48	1.11	68	2.48
9	0.16	29	0.55	49	1.15	69	2.61
10	0.18	30	0.58	50	1.19	70	2.75
11	0.19	31	0.60	51	1.23	71	2.90
12	0.21	32	0.62	52	1.28	72	3.08
13	0.23	33	0.65	53	1.33	73	3.27
14	0.25	34	0.67	54	1.38	74	3.49
15	0.27	35	0.70	55	1.43	75	3.73
16	0.29	36	0.73	56	1.48	76	4.01
17	0.31	37	0.75	57	1.54	77	4.33
18	0.32	38	0.78	58	1.60	78	4.70
19	0.34	39	0.81	59	1.66	79	5.14
20	0.36	40	0.84	60	1.73	80	5.67

The rocket is being launched at C. You are standing at A, with your altitude tracking device. You are trying to determine the angle at A by tracking your rocket as it travels from C to B. B is apogee and that is where you need to note where the string is on the protractor. **Remember that you have to subtract the number from 90° in order to get the angular distance.**

The sum of the angles of a triangle is 180°. The angle at C is a right angle and is 90°.

The height calculation goes as follows:

1. 90° – Protractor Angle = Angular Distance
2. Height of Rocket = Tangent of Angular Distance x Baseline

As an example:

You've just tracked your rocket to its highest point. The angle on the protractor reads: 40° (degrees).

Your baseline distance is 500 feet.

Using steps 1 and 2:

1. 90° – 40° = 50° Angular Distance)
2. Height of the rocket = Tangent 50° x 500 feet = 1.19 x 500 = 595 feet

You may want to practice this procedure and make up a chart to transfer the angles measured on the protractor to altitudes in feet. *Remember to subtract your protractor angle from 90° before calculating the tangent of the angular distance.

BLAST-OFF
continued

- With the launch system and tracker in position, you are now ready to fly your experiment and put your hypothesis to the test.
- Prep both rockets according to your instructions, being sure to use similar engines and amounts of wadding.
- Follow the countdown and launch checklists also in your instructions and remove the safety key from the controller after launching.
- Make sure your tracker recorded the correct angles from your altitude scope. These will be used to compute your altitude values.

After your experiment has been flown once and all the data is in for that flight, it is a good idea to fly each rocket another time. Six times would be perfect. The more flights you make, the more accurate your data.

Clean up the launch area and return to your "lab." Now you can look over all of your information. Reread the notes that you made before the experiment. How close were you to predicting the actual outcome? With real data from your experiment, you can support, modify or disregard your earlier hypothesis about how the number of fins affected your rocket's altitude.

Be sure to write your thoughts down based on the new data. You may want to run the experiment again for more information, or you may want to know how fin shapes or orientations affect performances. This is just the beginning! That sounds like material for another "Blast-Off" experiment!

As you proceed in developing new experiments remember to only change one variable between your control and experiment subjects at a time. Let me know how you like this activity and how your own research is going!

Some suggested data sheets for your use:

1. Diagramming Sheet
2. Specification Sheet
3. Flight Data Sheet

FLIGHT SHEET

________ Fins (enter number) ☐ Control or ☐ Experiment Rocket (check one)

Flt. No.	Engine Type	Air Temp.	Date/ Time of Launch	Altitude /Scope Degrees	Flight Comments

FLIGHT SHEET

DIAGRAMMING AND LABELING SHEET

CONTROL ROCKET	EXPERIMENTAL ROCKET
ROCKET #________	ROCKET #________
FINS ________	FINS ________
WEIGHT ________	WEIGHT ________
NOTES:	NOTES:

DRAW A PICTURE OF EACH ROCKET AND ENTER DATA.

ISY

INTERNATIONAL SPACE YEAR 1992

In preparation for the 500th anniversary of Columbus' journey to the New World, the late Senator Spark Matsunaga of Hawaii proposed that 1992 be a year of commemorative events celebrated by global discovery and international cooperation.

Space is the next New World and represents a new age that will draw inspiration and perspective from many peoples of our world and perhaps those of other worlds. Yet the major focus of International Space Year is Planet Earth.

To promote spontaneity, resourcefulness, and public involvement, ISY has been purposely non-structured and decentralized. Its themes are space-related scientific research by both professionals and amateurs and the accumulation and distribution of research data to peoples throughout the world, especially children.

One major objective that is being developed is the monitoring and protecting of Earth's environment. With space related technology and the cooperation of the world's space agencies, this objective can become a reality. Amateur scientists, students and their parents, teachers, and youth group leaders can also be involved via the ISY Student Payload Launching Campaigns.

Some payload launching events have already been scheduled with most occurring from May through September.

However, you may plan your own rocket payload launch. So long as all safety rules are being followed, the idea is for the payload to be part of a meaningful experiment.

Experiments that measure temperature, air pressure, or other atmospheric conditions; or experiments that measure the effects of rocket flight on insects or other payloads can provide the opportunity for individuals from ten years of age through adult to perform environmental aerospace research.

Should you wish to formally schedule your ISY Student Payload Launch or obtain additional information and ideas, you may contact:

RRI ISY Advisory Committee
P.O. Box 7122
Washington, DC 20044

Should you be interested in further information about additional activities and events scheduled during International Space Year, please contact:

U.S. - ISY Association
Danielle Simonelli
Information Director
600 Maryland Avenue SW,
Suite 600
Washington, DC 20024
(202) 863-1734

ROCKETEER COMMUNICATIONS

We will cover people, bits of information and your questions and letters in **Rocketeer Communications.** Our address is: Estes Industries, Attn: Rocketeer Communications, 1295 H Street, Penrose, CO 81240

No More Permits in New Jersey

Rocket modelers in the state of New Jersey should rejoice. Effective July 9th, 1992, the Model Rocketry Permits are no longer required. An individual at least 14 years of age may purchase and use 1/4A through C model rocket engines. Kids as young as 12 can have fun with model rockets by participating in an adult supervised bona fide eductional program.

For their efforts in eliminating this needless permit restriction, our special kudos need to go to Senator Stockman, Cathy Curvy, Aggie Szilagyi, Dr. Bob Kreutz, the hardworking members of the Garden Space Modeling Society, Ken Montanye, James Newquist, Jeff Charney, Ken Davis, Mary Ellen Flynn, and Governor James Florio plus many, many others. Thanks!

Model Rocketry Loses a Friend

On Tuesday, March 24th, 1992, one of model rocketry's best contributors passed way. Bob Cannon was Estes' educational manager and editor of the *Model Rocket News* and *Estes Educator News*. I would venture to say that almost 80 percent of all teachers who use model rocketry in their classrooms got their baptism of fire from Bob. Bob was a tireless person for whom life did not grant enough time to fight cancer. Although Bob Cannon's handiwork may no longer be found among these pages, you can bet that his spirit will always be present.

The following is a tribute to Bob written by Vern Estes, founder and former president of Estes Industries:

TRIBUTE TO BOB CANNON

By Vern Estes

It was my privilege to know Bob Cannon both as a friend and as a fellow worker.

I first met Bob when he came to work for Estes Industries in 1968 as the Manager of Educational Services.

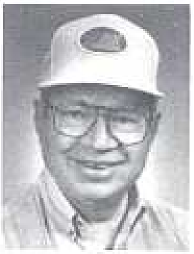
Continued on next page

ROCKETEER COMMUNICATIONS

continued

Using his background and experience as a science teacher, who had built and flown model rockets from the inception of the hobby, and using his own creativity, Bob designed and implemented a world-class educational model rocket program.

Over the years, his influence reached across the country and even around the world.



Bob was thought of by tens of thousands of science teachers as "The Father of Educational Model Rocketry." He was the one they came to when they wanted to start a rocketry program or solve a problem using model rockets as a motivating tool.

It is impossible to know the exact number of young people whose lives were touched by Bob -- but the number reaches into the millions.

Bob took great pride and joy in the way his work was able to give a positive influence to the lives of so many.

Each time Bob authored another issue of the *Educator News* or the *Model Rocket News*, he did it with a purpose -- when he wrote teaching manuals and articles he knew it would have a positive effect on the lives of those who used them.

Even though Bob's office was filled with plaques and awards from prestigious organizations, he felt his most important recognition was in the many letters he received from teachers and rocketeers telling him how he had influenced their lives.

It is impossible to know the exact number of young people whose lives were touched by Bob -- but the number reaches into the millions.

His greatest joy came from receiving letters from people whose lives he had touched as youngsters -- hundreds and hundreds of letters -- describing how their model rocket activities had led to their careers and their successes in life.

In a recent letter to Bob, one of those whose life he had touched told him how his experiences with model rocketry as a youngster led him into a career as a animal psychologist... Then the letter went on to say:

"This afternoon I went into one of the local hobby shops and went down the rocket aisle as I always do. There was a boy loading up his mother's basket. I imagine he was ten or twelve years old. His mom was very patient and I heard the word birthday in their conversation. I wanted to speak to them, but I didn't. I wanted to tell that mom that she was doing something for her boy that might lead him to the moon or Mars. I wanted to tell them that I used to be like that boy and I wanted to say something about my friend Bob Cannon. But I didn't. I think somehow they know -- somehow they know what they are doing."

One of the young men Bob had influenced over the years has proudly claimed that his involvement in model rocketry led him to become an astronaut.

Then, less than a year ago, when this same astronaut, Dr. Jerome Apt, was ready to make his first flight into space he did not forget his good friend, Bob Cannon.

Bob received a special VIP invitation to attend the launch and, as Bob described it later in an article in the *Model Rocket News*, attending the launch was one of the highlights of his life.

Bob was respected and loved by his fellow workers -- always dedicated to accomplishing the task and always willing to put in whatever effort was needed to get the job done.

Even in his final few days, Bob was still thinking about model rocketry and the importance it plays in so many lives.

Bob tried to communicate with his family about the future of the hobby but was too weak to write and most of his words could not be understood.

We now say goodbye to our dear friend, Bob Cannon; but he will always live in our memories and the work he did will continue to affect the lives of millions.

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