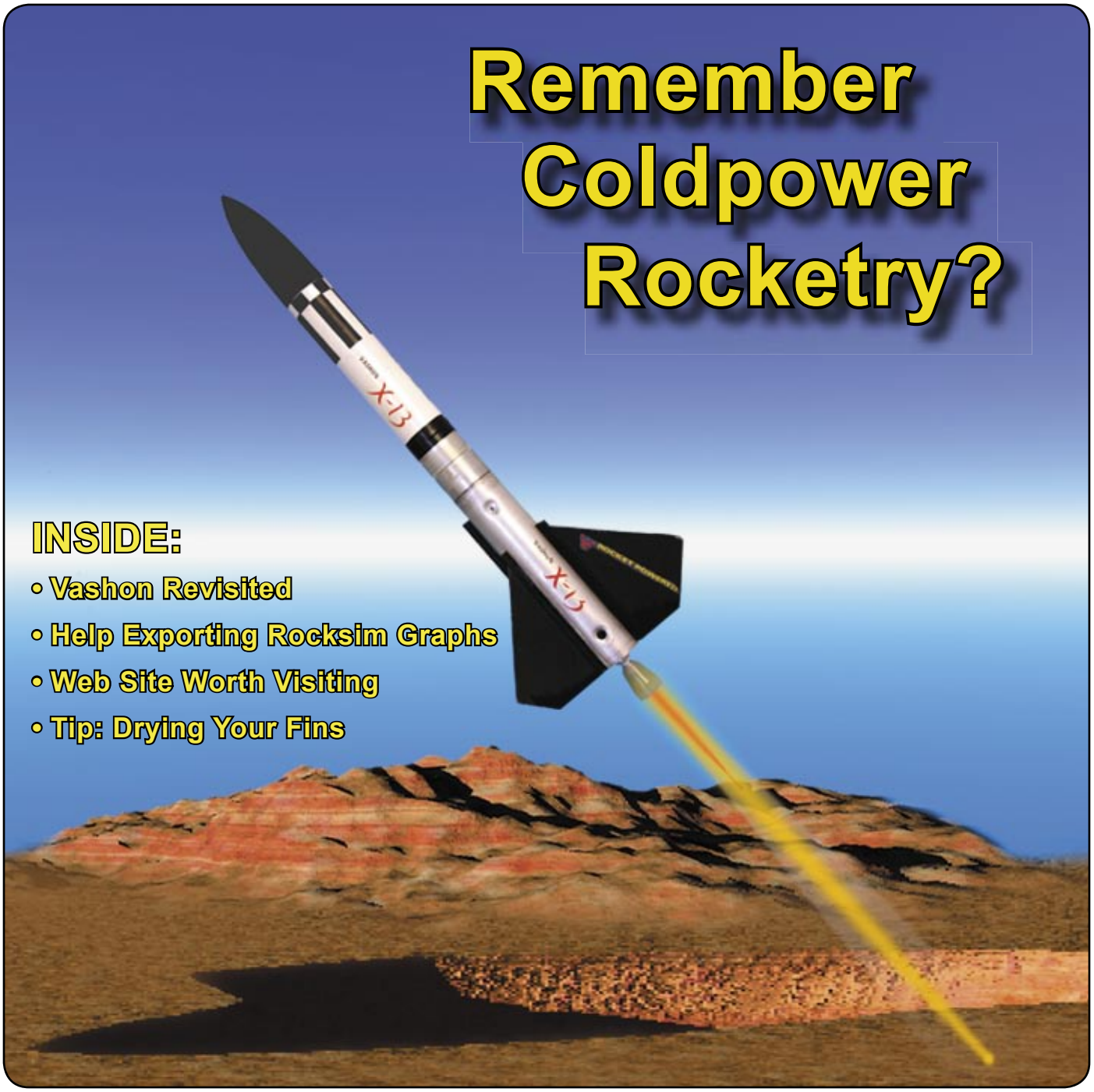
ISSUE 157 - FEBRUARY 22, 2006

APOGEE PEAK OF FLIGHT NEWSLETTER



Remember Coldpower Rocketry?

INSIDE:

- Vashon Revisited
- Help Exporting Rocksim Graphs
- Web Site Worth Visiting
- Tip: Drying Your Fins

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Coldpower Rocketry

by John Manfredo

The majority of this article is taken from information and articles done by Mark Schmitt. He is the Deputy Group Leader (Acting) for High Energy Density Physics and Lasers at the Los Alamos National Laboratory in the Plasma Physics Group, X-1.

Rewind...

In issue 142 of Peak of Flight I explained my background and how I got back into this hobby in 1998. In the article I mentioned being given a Vashon X-13 Rocket Plane for Christmas. I only touched briefly on this subject at the time, but I felt a bit of nostalgia creeping out of me and I decided to revisit this unique flying machine.

Present Day

My model, in particular, was made after Vashon merged with Estes. That would mean that it is from somewhere in the years between 1972-1976. If you look in the picture below, Mark Schmitt's original packaging is in pristine condition due to the obvious care that has been taken with it. Mark is someone who has taken great interest in these models. As you can see in the picture on the right, my original box is fairly worn. That's fine, though, for this worn gift that I received was responsible for "re-igniting" my passion for rocketry!

Mark Schmitt's original package

The Beginning

Alan Forsythe and Chuck Green invented the Valkyrie line of Freon-propelled rockets in the late 60's. The rockets utilized the vaporization of liquid R-12 Freon (diflurodichlorometh-ane) to provide thrust. To market their invention, they started Vashon Industries, Incorporated in 1968. The company was located on Vashon Island, WA, an island in Puget Sound. Both Alan and Chuck had professional backgrounds in rocketry.

John's original X-13 package

From 1959-1962, Alan was employed by JPL where he worked on the Ranger project which sent the first U.S. unmanned spacecraft to the moon. Chuck worked at the U. S. Naval Ordinance Test Station in China Lake, CA from 1959-1964 where he was Head of the Propulsion Technology Branch. While there, he lead an effort to design a Freon-based engine steering system for the Navy's Polaris missile. The two inventors met while working at Rocket Research Corporation (later

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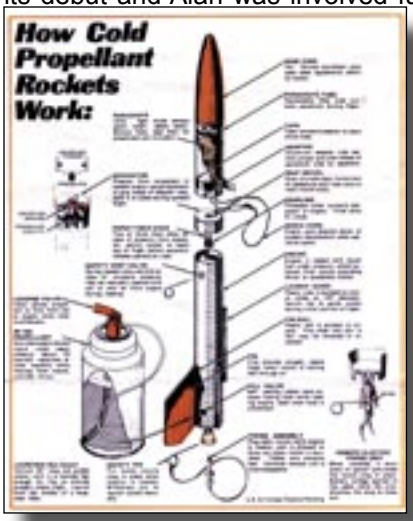
part of Olin Corporation) in Seattle. Between 1965 and 1968 they worked on a low temperature gas generator to inflate the original escape slides for the Boeing 747 (which used R-22 Freon for inflation). In their free time they conspired to develop freon-propelled rockets in Chuck's garage.

By the fall of 1968, Vashon Industries had made its debut and Alan was involved full time in the model rocket business. Within less than a year, Chuck also joined Vashon full time as the company president. Production of the freon-propelled model rockets began with orders for parts to build 1000 rockets.



Original instructions

The Motor

During the Vashon Industries era, all parts for the freon-propellant engines were purchased from outside vendors. Assembly of the parts was performed at the Vashon plant. The engines consisted mainly of polished aluminum tubes and end bells. Four bells were used per rocket. The nozzle and the threaded fittings were crimped or staked into the bells prior to their being inserted into the aluminum tubes. After a thermal epoxy had been placed in the ends of the engine tube, the bells were driven in by machine and the tube ends were rolled over to further ensure that the bell would never pop out.

Coldpwer can

Two of the bells also were required to build the separator which was screwed to the top of the engine. The filler tube in the side of the engine consists of a rubber valve similar to those used in inflatable sports balls (e.g. footballs, soccer balls and basketballs). The vent valve was more complicated, consisting of a small aluminum poppet inserted through a hole in the engine, followed by a rubber washer, a steel washer, a spring and a snap ring inside the rocket chamber to hold it all together. The head of the poppet was exposed, and had

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Photo courtesy of Mark Schmitt

V-1/2, V-1, V-2, and glider motors

a short blind hole also exposed so that the rocketeer could insert a wire and vent the engine during loading by tilting the poppet. This helped assure that the engine was fully loaded with fuel and would provide a good high flight. When it was full it would exhaust a visible cloudy fog very much like the big rockets at Cape Canaveral. The valve also automatically opens when the tank pressure exceeds about 80 psi to protect against over-pressurization.

A nozzle plug kept the engine sealed while fueling. The plug used a standard O-ring (size -002 neoprene) to make the seal. Prior to launch, the plug was held in place by either a metal safety pin, or a thin electrical wire. For manual launches, one merely pulled the pin, which released the plug. For more sophisticated launches, a nozzle plug with electrical leads was used to fire the rocket from a few feet away. The wire leads connected to a thin wire which held the plug in the nozzle. Although the wire resembled nichrome, it was actually pyrofuse. This material is a combination of Platinum and Aluminum in intimate mechanical contact. When heated past a critical temperature, the metals fused exothermically. By connecting the ends of the plug wires to a battery, the pyrofuse would heat up and melt or disintegrated, allowing the plug to be released.

Al designed the separator mechanism which used spring steel to grip the aluminum parachute tube when the engine was pressurized with propellant. Paper discs were used to delay the depressurization of the separator spring (and deployment of the parachute) following depressurization of the engine compartment. The origi-

continued on page 5

Upper parachute section of John's X-13

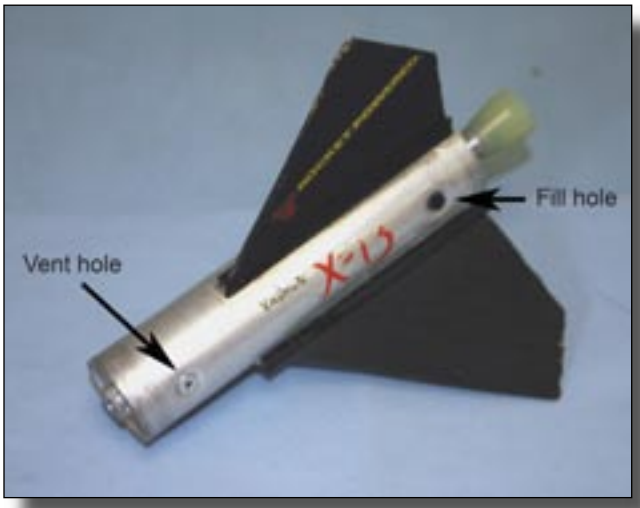
nal Valkyrie rockets used an all-aluminum 3"-long parachute tube. A 4.5" version was available separately to provide more room in the parachute compartment. The short metal tube was the same tube that was used to construct the separator. The rest of the parachute tube was paper which was much cheaper than aluminum.

Using the paper tube also allowed the rocket to be decorated more easily, and provided an impact absorbing section, should the rocket impact before parachute deployment. Vashon produced four types of engines. Most familiar are the 4.5"-long V-1 engine and the 8.5"-long V-2 engine which are both 1" in diameter. The V-2 engine was used only in the Valkyrie-2 kit. A shorter 2.5" V-1/2 engine was also available in the earlier catalogs, but it does not appear in Vashon's last catalog. This engine was sold separately for use in a strap-on clustering arrangement. Two of the 803 engines could be taped onto the booster stage for added thrust at take off. A slimmer 5/8" diameter by 4" long, J-33 engine was introduced around this time for use in the Shrike and XS-1 Styrofoam gliders. This engine was filled through the exhaust nozzle. The vent valve was on the aft end of the engine.

Change of Hands

By the time the company was sold to the Damon Corporation in 1971, production had exceeded 100,000 units. It is interesting to note that on paper, Vashon merged with Estes, under the Vashon Industries name, which was quickly changed from Vashon to Estes. One reason for this name shuffle was so that Estes could exploit Vashon's entries into the marketing arena including chain stores such as Sears and Neaman-Marcus.

Alan and Chuck sold Vashon for stock in the Damon Corporation (which doubled in value shortly after the sale).Alan and Chuck were given a two year contract by Damon to transfer their technology to Estes. In 1972 operations were progressively moved from Vashon, WA to Estes' plant in Penrose, CO. During this time Alan and Chuck developed the Estes Cold-Power engine, which slid into conventional Estes "paper-tube" rockets and used a large spiral spring to eject the parachute. The move of Vashon operations to Penrose was completed in 1973, which coincided with the end of the contract between Damon and the original inventors.



Aft section/V-1 motor of John's model

John's X-13 on stand

Conclusion

If you would like to see the V-2 in action, visit http://www.dph.com/vidroc/Vashon/vashon.html, which has 3 videos as well as some other neat information to look at. I, unfortunately, did not have the fortune of ever having my rocket take off like these. Some parts were either missing or broken and couldn't be fixed. So now my X-13 is a novelty that I can pull out of my collection every so often and reminisce about.

John Manfredo is the education coordinator at Apogee Components. He's Level 1 High-Power Certified, and has been building his own rockets for the last 30 years.

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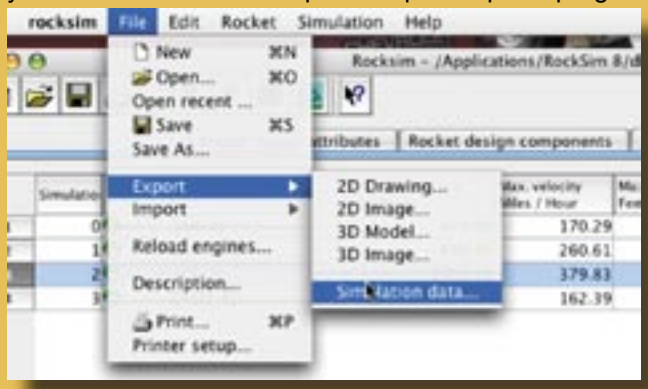
QUESTION AND ANSWER CORNER

How do you insert a RockSim graph into a report?

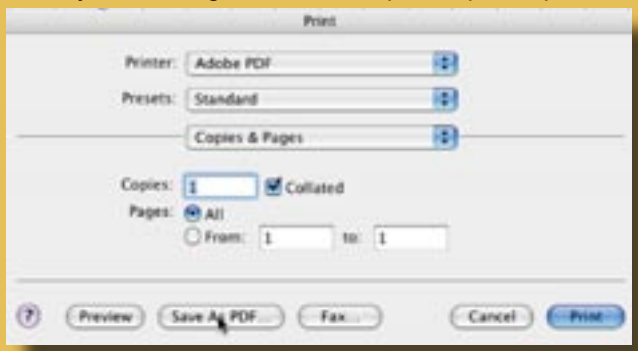
The answer is that there are two ways that should work. The first way is to make a screen-shot of the graph you want. This can be opened up in a paint program



and saved in the appropriate format, such as tiff or jpg.

The other way is to export the flight data to a spreadsheet, and then create the actual graph in excel. This is done from menu: >File >Export >Simulation data. Just select the data you want to see. Otherwise, you'll get tons and tons of stuff that may not make any sense.

If you're using a Mac, that opens up an option that

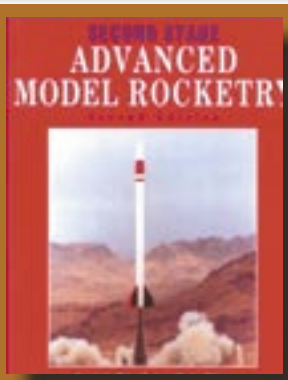


PC users don't have. You can do a print to pdf right from the graph screen. That might be useful too. If you have a question, send it to johnm@apogeerockets.com.

WEB SITES WORTH VISITING

The website for this issue that I would like to take you on a short tour of is that of HobbySpace.com. You may find it at http://www.hobbyspace.com. This website has so much information and so many links on it, it

would be impossible to cover in this small space. Suffice it to say that there are a few items of interest that make me a little biased here. I admit it.....they give Apogee Components some ad-time! If you liked Tim's book *Model Rocket Design and Construction*, then you will be interested to know that the out-of-print *Advanced Model Rocketry* that he helped compile is available out there! There are both new and used versions available.If you've never gotten Tim's design book we have it ready for immediate shipping at http://www.apogeerockets.com/design_book.asp.



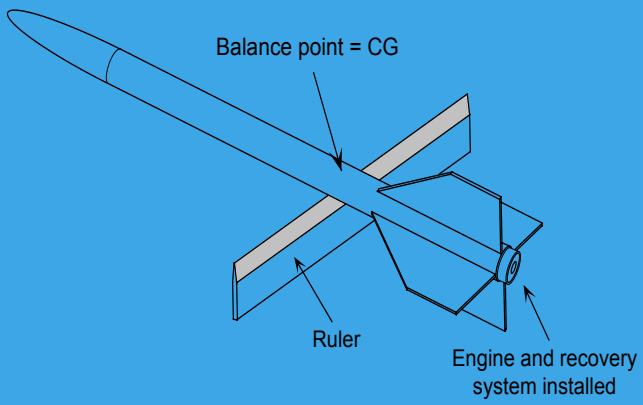
There is a plug for us and many others on the "links" page, which we appreciate! You can find this at http://www.hobbyspace.com/Rocketry/rocketry3.html. On the main page there are many links that will take you anywhere from magazines to education and real space news to games and art! I mean, if you have an interest in anything space-related, then you will have come to the right spot!

Of course, on top of their list for "rocketry design software" is our Rocksim program. If you have trouble finding it, click on http://www.apogeerockets.com/rocksim.asp and try it for yourself!

Enjoy the rest of your tour around this very nice website and see what kind of "space info" you can learn!

DEFINING MOMENTS

The **Center-of-Gravity (CG)** is the point where the rocket will balance. It is also the location about which the model will rotate if unrestrained. To find the CG, simply balance your rocket on the edge of a ruler. When the rocket just balances without falling one way or the other, the edge of the ruler is at the rocket's CG. When you perform this test, balance the rocket in its flight-ready condition - that is, install the parachute, recovery wadding, and an unused engine into the rocket. You don't need to install the igniter, because that will no longer be attached to the rocket after lift-off.If at all possible, check the position of the CG before building the model with Rocksim. You may download the demo of this at http://www.apogeerockets.com/rocksim_demo.asp.



Locating the rocket's center-of-gravity

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TIP OF THE FIN

My tip for this issue of *Peak of Flight* is one that I stumbled upon accidentally when building a model (to tell you the truth, that's how I come across a lot of my tips!).

When finishing fins, mix up a batch of Elmer's Fill n' Finish© until it has the consistency of thin cake frosting. Then paint it on as you usually would making sure that both sides are sealed at the same time. As you can see

Picture 1

in picture 1, I put this on with nice even strokes. The reason to do both sides at once is that if you don't, the fin may become warped as the sealer dries and shrinks down. Now as to what to do with the fin while it dries.

Picture 2

Since we don't want to set it down on either side while it is wet, get a small binder clip and attach it to the root edge that is not sealed as seen in picture 2.

Next, find a small dowel rod and clamp it in a vise. This is shown in picture 3 below. If you don't have a vise....not to worry....you can use anything that will allow you to suspend the dowel rod in such a way as to let you be able to hang the fin on , which you can also see below. This is really nice because you can seal and hang all your fins at once to let them dry.

As I stated at the beginning, I come across these tips all the time while making models in the shop. I

Picture 3

came up with this one the other day while I was working on a new rocket. Ihad just sealed my first fin and said to myself, "What am I going to do with this while it dries?" Well, sure enough, there was the vise sitting right in front of me!

If you ever happen to come up with a handy little tip out of the blue, send it to me. If I use it in the newsletter, your reward will be a Dynastar 58" rip-stop nylon parachute! Send your tips to John Manfredo at: johnm@apogeerockets.com.