MASA PLANET

March - April 2010
Volume 13, Issue 2

The Official Newsletter of the
Minnesota Amateur Spacemodeler Association
Established January 1998
2006 and 2007 NAR Medium Section of the Year
Host of NARCON 2007 and NARCON 2008
2008 and 2009 LAC Newsletter Award Recipient

NAR Section 576

Planet Table of Contents

Want to Try Your Hand at a Rocket Competition?

Second Annual MASA Summer Regional

MASA to Host NAR Regional Event

MASA will host a NAR Regional Contest this summer, and will once again be directed by Mike Erpelding. More details will come as they are finalized, but as of now here is what Mike is planning:

Contest Dates: Sat & Sun June 5 & 6
Rain dates: Sat & Sun June 12 & 13
Location: Nowthen launch site
An HPR sport launch will be held in conjunction with the contest for additional participant/spectator appeal.

Event Weighting Factor:
B Streamer Duration WF 9
1/2 A Parachute Duration WF 7
1/4 A Boost Glide Duration WF 18
D Helicopter Duration WF 23
A Cluster Altitude WF 16
Grand Total: WF = 73 (WF 80 max for a regional contest)

BEGINNERS AND SERIOUS COMPETITORS WELCOME!

Renew Your 2010 MASA Membership NOW!

It Could be Worth a $10 Hub Gift Card

By Carol Marple

If you submit your paid 2010 MASA membership by Thursday, March 4th, your name will be entered into a drawing for a chance to win one of two $10 Hub Hobby Center gift cards.

Two names will be drawn at random at the March 4th MASA meeting. You do not need to be present to win.

This incentive is available to renewing and new members (so let your rocket-flying friends know!). If you've already renewed your membership for 2010, your name will automatically be included in the drawing.

To be eligible, your paid 2010 membership application must be received by our Treasurer, Jason Colt, by Thursday, March 4th.

In the past, renewing memebers were only required to include their name on the application. But for 2010, we would like everyone to submit a completed 2010 MASA Membership Registration form. This will help keep our records up to date, and it is a requirement to be entered into this drawing.

You can mail in your application, sign-up on-line and pay with PayPal, or hand-deliver your application to the March meeting.

To register or for more information, visit the MASA website as www.masa-rocketry.org. Click on the "Join MASA" link in the upper left.

Carol

Renew Now and a $10 Hub Hobby Gift Card Could be Yours!

MASA PLANET

Overview Report on

Synthetic Steampunk Amateur Rocketry (SSAR) Techniques

Todd P. Carpenter
tpcarpent@comcast.net
February 6, 2010

Abstract
This article briefly describes techniques that allow you to safely decorate model rockets with a synthetic Victorian Steampunk theme.

1 Introduction
Imagine a world where electronics and low quality foreign imports did not dominate, and instead, Victorian steam power, clockworks, and individual craftsmanship held sway. This is Steampunk. There is apparently even a Steampunk subculture where people dress up and everything. There are Steampunk computers, mice, cars, and musical instruments. Why not rockets, too?

Since our local safety expert would frown on launching sheet brass and copper rockets, I decided to see what I could do with paint, wood, and tape.

2 Motivation
I was familiar with the genre from watching some B movies. Recent hits (ahem) include Flash Gordon, 20000 Leagues Under the Sea, Wild Wild West, and A League of Extraordinary Gentlemen. Some inspirational Steampunk websites are the following. The craftsmanship in the Wired article is remarkable.

- http://www.wired.com/gadgets/mods/multimedia/2007/06/gallery steampunk
- http://steampunkworkshop.com/
- http://voyagesofdrfabre.blogspot.com/
- http://cmtorrens.wordpress.com/2009/11/04/thursday-thirteen-tribute-to-steampunk/

3 Approach

3.1 Supplies
Ax-Man is a great place to start. I found timers with brass gears, bracelets that look like stainless piping, and gold foil tape. Menards sells backed aluminum tape, and Michael's has little press-on paper dots and faceted studs of different sizes. My old junk drawer had lots of nifty doo-dads from ancient models, rockets, and toys. Scrap balsa and wood dowel were used for piping, brackets, flanges, and headers. Epoxy, CA, and wood glue were all used, as were a variety of metallic and clear-coat spray paints. I also used old Tester paints (some bottles are marked $0.19, which gives you an idea of how old they are).

3.2 Tools
Standard rocketry equipment, including Razor miterbox, tweezers, masking tape, nail set, Xacto, and a Dremel hand-piece with many different bits. One could do much of this without a hand-piece, but it was a huge time saver for customizing components.

3.3 Techniques
My first Steampunk rocket was a new Silver Comet as shown in Figure 1. My second rocket, Figure 2, is a Fat Boy with 30+ flights on it, wounds, and a terrible paint job. Perfect for a remodel. I checked out Hub Hobby in early February for other rockets that would "steam," and found at least 10 of them that would look fantastic.

Figure 1: Steampunk Silver Comet (Steam Comet)

Continued on the Next Page...

Steampunk Continued

Figure 2: Steampunk Fat Boy (Steam Boy)

3.3.1 Rivets

The Steam Comet was all done with the aluminum tape and spray paint. To make the rivets, I first sanded a long strip of backed aluminum tape to put some tooth on it for paint, then I pinned it metalside down on an even-grained pine board. Using my Dremel and diamond burrs, I modified a nail set to look interesting. With a small hammer, I then tapped every 5mm along one edge of the tape to extrude the rivet. I then cut a thin strip off the tape, peeled off the backer, and burnished it to the rocket. This can be done either before or after painting, depending on how you want it finished.

I also made hatches and plates with rectangular pieces of tape, and ran rivets around the outside.

I had very sharp shoulders on the nail set for the Steam Comet, so the paper punched into the extrusion. That was handy if I slipped while burnishing the tape down, since I would still end up with a rivet. On the Steam Boy Figure 2, I used rounded shoulders which allowed me to make taller rivets, but at the risk of mushing them.

As suggested by some MASA members, another rivet approach is to use sticky-back faceted studs. They look terrific when painted, and really stand out. Sticker dots also work, although I am slower with them than the extrusion method, and I have trouble making them even. However, they work on anything, and you don't need the tape. Yet another approach, suggested by another MASA member, is to use a craft roller-wheel.

3.3.2 Leaf

The aluminum tape makes great mock-silver and steel plate. Copper and brass have been trickier to acquire. 3M had a gold mylar tape that is passable for brass (or gold plated portholes). I have some ancient copper tape from stained glass work, but the adhesive hasn't worked. J Ring Glass Studio might be a source for new material. Ax Man had some adhesive backed goldish foil that I want to try next.

I also tried gold and copper leaf. Michael's has copper leaf and fake gold leaf. Steam Boy's copper hatches are covered with the copper leaf, within varying success. The tall rivets were difficult to cover, so I switched to paper rivets on a different panel and had much more success, as shown in the lower panel on Figure 3. Leaf is pretty tricky in general.

3.3.3 Ductwork

The Steam Boy has steam fittings and pipes made from various wood dowels. All the cuts were made with a razor saw in an Xacto miter box. I first tacked the flanges in place with yellow wood glue, and then built up the rest of the pipes. Construction is pretty quick with the yellow wood glue: Lightly coat the joint with glue, wait 30 seconds, add a tiny bit more glue, press together. Sets nearly immediately.

The flexible ductwork is from a bracelet chain. I cut it to length with a Dremel corundum cutoff disk. A wire clipper might work, but would probably mush links. At each mount point, I used a 3/32" carbide ball in my Dremel to make a small receptacle that I filled with CA glue, and then cemented the chain in place. The copper strap on the left of Figure 3 is aluminum tape, rivet extrusions, and covered with copper paint. I then filled under it with CA glue, since this was a duct-to-pipe splice.

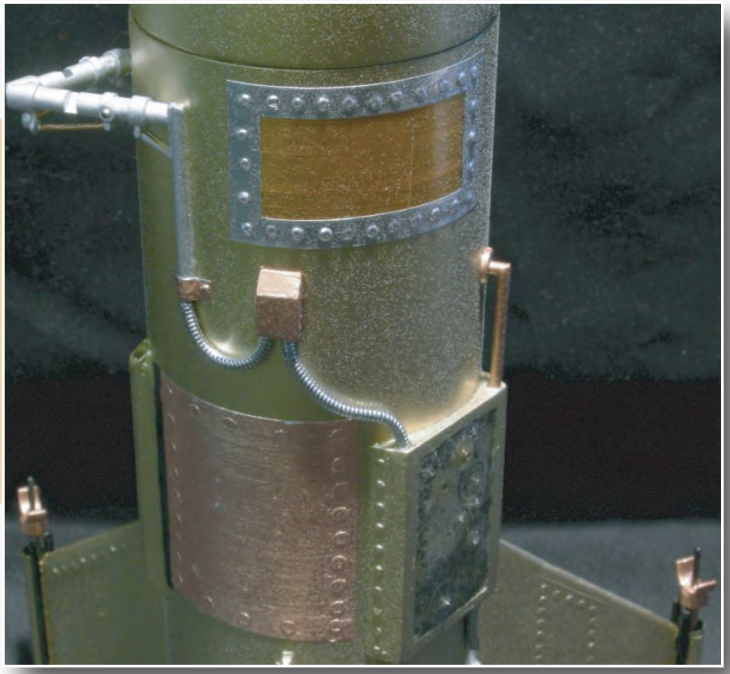


Figure 3: Ductwork, Steam Fittings, and Copper Leaf

3.3.4 Porthole

The porthole in Figure 2 is a green centering ring carved to fit the body tube. Sanding it to shape was slow, so I used a steel barrel bit in the Dremel, and was done in 3 minutes. I ran a ring of self-adhesive rivet studs around the edge, painted the inside black and dropped in a miniature picture. I then filled it with 30 minute epoxy. Even though I thinned the epoxy with a small amount of alcohol, I ended up with bubbles from mixing the epoxy. Next time I'll thin it more (since it isn't structural), warm it, or use a finishing grade epoxy.

Continued on the Next Page...

Steampunk Continued

3.3.5 Clockwork

Clockwork is a significant Steampunk element. I found some old watch parts in my junk drawer and used a corundum cutoff disk in my Dremel to remove most of the shafts. I built a balsa frame and sanded the contour to fit the body tube, as shown in Figure 4. I glued it in place, sealed it and painted the interior black. Once dry, I partially filled it with epoxy and laid in the gears, and topped it off with more epoxy. It was a challenge to complete it before the epoxy gelled.

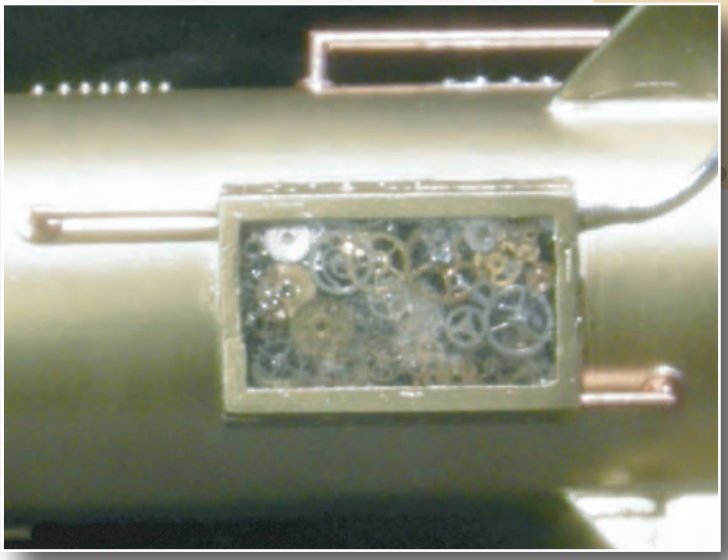


Figure 4: Clockwork

3.3.6 Cockpit

With all the various things added to the rocket, I thought it wise to put some weight in the nose cone. MASA Planet Volume 12, Issue 2, page 3 had the perfect idea for that: Adding a pilot! The old junk drawer came in handy. I built up a cockpit on a cardboard base and cut out viewports with a small disk. I epoxied the cockpit in place, along with a big eye hook, and ran cord out through a pressure bulkhead for the parachute attachment. The wind screen is clear plastic from an epoxy blister package taped in place, as shown in Figure 5. I'm not convinced it will stay put. We'll see. I probably added too much weight, but I'm hoping a C6 or composite D21 will do the trick.

3.3.7 Paint

Once the base decorations were in place, I painted the rocket with layers of metallic paint. Follow recoat directions on the can, and test on scrap. I taped off areas when I wanted to switch between metals. Make sure the undercoat is quite dry when you do that, and use good quality masking tape. I use the blue 3M stuff.

Other materials were painted with small paint brushes and model paint. Metallics and primary colors seemed to all work, and I had no compatibility issues. I did let base coats dry a week beforehand.

Figure 4: Cockpit

Top coat can be clear coat or wax. I did not sand much between coats since that would be really hard on the rivets. I don't think metallic model paint hardens enough to sand. However, I made a huge mistake: I used "reflective" paint, which I assumed would be microspheres in a clear matrix. Nope. It's some magic material with high surface tension, so it forms beads as you spray it on. Looks terrible close up. MASA experts tell us to always test paints on scrap before using. I should have done what they said.

4 Summary

First flight planned in 2010.

Editor's Note: Steam Boy flew perfectly at the Feb 27 launch!

Steam Spitfire Sneak Peak:

This FlisKits ACME Spitfire kit has been outfitted with Steampunk fittings by newsletter editor Jeff Taylor. Colors include Testors Metallic Gold spray on the body with Testors Copper and Brass on some of the details.

MASA Welcomes the Following New Members:

- Alex Brown
- Luke Brown
- Thomas Brown
- Tim Melody
- Lance Murphy
- Mike Murphy
- Scott Murphy
- Audra Rudys

2010 MASA Members

Registrations Received as of February 26

Cheryl Anderson	Alan Estenson	Scott Murphy
Hunter Anderson	David Gensler	Glen Overby
Kevin Anderson	Art Gibbens	Audra Rudys
Levi Anderson	Hannah Gibbens	Cathy Schwartz
Caleb Boe	Philip Gibbens	Joy Schwartz
Daniel Boe	Renee Gibbens	Larry Schwartz
Don Boe	Neal Higgins	Ryan Schwartz
Joshua Boe	Alissa Hoyme	Todd Schweim
Alex Brown	Kirsten Hoyme	Dwayne Shmel
Luke Brown	Ken Hoyme	Elizabeth Shmel
Thomas Brown	Ken Jarosch	Richard Shmel
Allison Carpenter	Paul Jarosch	Susan Shmel
Elliot Carpenter	Abby King	Alyssa Taylor
Laura Carpenter	Eric King	Jeff Taylor
Todd Carpenter	Ray King	McKenna Taylor
Kevin Cochran	Sharon King	Mark Thell
Seth Cochran	Carol Marple	Cheryl Vatsaas
Ted Cochran	Tim Melody	Christian Vatsaas
Jason Colt	Bob Moyle	Ingrid Vatsaas
Ethan Erpelding	Lance Murphy	Rick Vatsaas
Mike Erpelding	Mike Murphy	

62 Members to Date!

MASA Directory

Established January 1998
Founding President: Russ Durkee

2010 President
Carol Marple - masarocketry@rocketmail.com

2010 Vice President
Neal Higgins - nthiggins@gmail.com

2010 Secretary/Treasurer
Jason Colt - artimus772000@yahoo.com

MASA Planet Newsletter Editor
Jeff Taylor - jeff.taylor@mn-rocketry.net

MASA Planet On-Line
www.masa-rocketry.org/planetonline.htm

Club Website
www.masa-rocketry.org

Webmaster
Alan Estenson - estenson@mn-rocketry.net

Club Yahoo Group
http://groups.yahoo.com/group/masarocketry/

2010 Launch Windows

Subject to Change
Check MASA Website or Yahoo Group for updates

All MASA Launches are "Misfire Alley"
(bring your own launch pad and controller)

MASA March Launch
Saturday, March 27 - 10:00 am to 2:00 pm
Location: Elk River VFW*

MASA April Launch
Saturday, April 24 - 10:00 am to 3:00 pm
Location: Nowthen*

MASA May Launch
Saturday, May 22 - 9:00 am to 4:00 pm
Location: Nowthen*

National Sport Launch - www.nsl2010.com
May 29 - May 31 White Sands, New Mexico
NAR National Event

* Locations subject to change depending on field conditions

Final Flight Report of
The "Spirit of America"

Reference "Baffles and More - Part 2"

By Ken Jarosch

Since it was such a great day for rocket flying, I decided to finish up my test flights on the "Spirit of America" rocket. This rocket is the third in the series of Baffled/Zipper-less rockets. See the three articles posted in the MASA Planet under "Baffles and More".

The S.O.A. is a 5 part modular rocket that works up into three configurations. Parts are the Blue Fin Can, White Recovery Tube, White Payload Section, Red Payload Extension and the Red Nose Cone.

The rocket is a zipper-less design with a three chamber concentric labyrinth baffle inside the bulkhead of the fin can.

1) The base configuration is the Blue Fin Can, the White Recovery Tube which holds the 25' shock cord, the chute and the Red Nose Cone. Length is 48" and weight is 46.8 oz. The basic recovery mode uses the LOC 36" chute. While this is small, the upper sections land before the fin can. The chute is attached just 8' in front the fin can, leaving 17' with the upper sections hanging down below the fin can.

On our July 4, 2009 launch I flew the basic configuration with a H128W-S with a PDK-03 for 6 seconds delay. The flight was great to an altitude of about 1097 ft. The small chute brought the rocket down safely with no damage.

2) Today, (August 22, 2009) I added the White 11" Payload Section for a length of 59" and a weight of 57 oz. I flew this second configuration on a H165R-S with a 6 second PDK-02 delay. It was another great flight with that red exhaust plume to an altitude of about 900 ft. I was still using the basic recovery system of 25 ft. of Rol-Ban 1" elastic and the 36" chute. With the added weight the descent was rather rapid probably around 25'/second. No damage but the body alongside one fin shows a 1/2" of paint crack by the rear end of the tube.

3) Later I flew the S.O.A. full up using the added 11" Red Payload Extension for a total length of 70" by 4" diameter and a weight of of 68 oz. with the heavier HPR recovery system. That's 5 oz. more than with the basic recovery system.

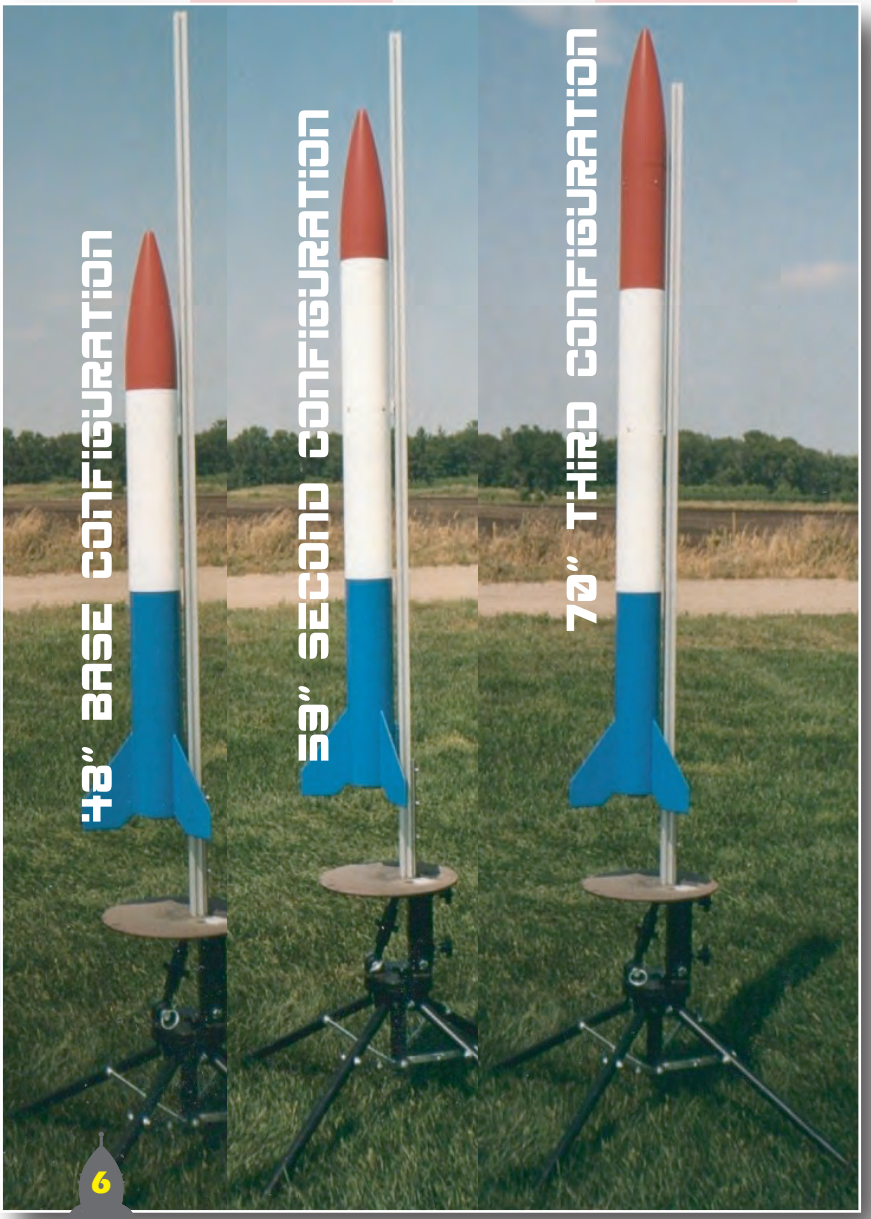
I switched the recovery system to the HPR mode. This uses 25 ft. of 9/16" tubular nylon (1/3L to the chute swivel and 2/3L to upper sections) and the Red, White and Blue Hemisphere Chute from "Chutes by Boe". I don't remember the opening width but the fabric is 48" diameter flat.

In this full up 3rd configuration I used a H180W-S motor with a RDK-03 Delay for 6 seconds. Of course, this was the fastest liftoff to an altitude of about 1186 ft. with the weight of 68 oz. with the HPR recovery system.

Again a real nice flight. With the winds so light and variable, the descent stayed on the same field and floated back and forth. Even though the rocket just slowly drifted down I got another 1/2" paint crack on an adjacent fin. One other problem developed. The upper Quick Link on the shock cord was jammed tight. I took that section apart and used some tools on it. Appears that the threads were not machined well and they jammed.

Looking forward to trying the H210R and a H250G in this rocket next summer.

Ken Jarosch
NAR 56442 Sr
TRA 10290
MASA 148



2010 MASA Vice President's Report

VP Corner

By Neal Higgins

Hello fellow rocketeers and MASA members. As your new Vice President I was asked to write up a short blurb about myself and my rocket experiences so you all can get to know me a little better.

I am married with no kids, but I do have 2 dogs and a cat. My wife's name is Emily and she has only been at 2 launches with me so far. One of these was at the summer solstice launch where Mr. Spudnik was unveiled and flown for the first time.
Like most of you older members I too am a Born Again Rocketeer. I started building and flying Estes and Centuri kits way back in 1966. I can't remember for sure but I think my first kit was the Estes Alpha. I do remember flying a Commanche, Big Bertha, all of the Goony Birds, Orbital Transport, Cherokee D, Interceptor and many other Estes kits. Some of the Centuri kits I flew were the Excalibur, Vulcan, X-24 Bug and the Groove Tube. I also built several from scratch rockets over the course of those early years.

Around 1976 my interests changed and I quit the hobby. Silly things like high school sports, motorcycles and girls got in the way.

In 1996 Emily's nephew decided to try the hobby and so I too got back into it. We only built a handful of rockets and only flew a few times over the next few years. He found he liked music and drumming a little better so he quit but I was hooked again and starting searching the web for more information on what was going on with rocketry and to see if I could find other people to fly with. Luckily I stumbled across the MASA site, saw the launch schedule and decided to drop by and see what was going on. So on an overcast and foggy July 2001 morning I went to my first ever MASA launch. Once I saw a couple of mid power flights I knew I had to join and start building and flying the big boy toys for myself. I hadn't planned on flying that day but I knew I had to so I searched out treasurer paid the membership fee and started what I hope to be many more years of membership in MASA. My first flight as a MASA member was an Estes Phoenix on an E15-8.

I flew many rockets that year at club launches and decided that winter that I was going to get my level 1 certification the next year. I decided on the PML X-Calibre because of the cool 6 fin design. Looking back now I can see it probably was not the best choice but it worked and it has flown many times over the years. It was at the July 2002 launch (my 1 year anniversary with the club) that I went for my level 1 cert. Alan brought the H123 that I flew it on and Ted did the inspection and paperwork for me. The X-Calibre flew beautifully and I now was certified. Emily sometime says I am certifiable but that is different story.

I am planning on my level 2 attempt sometime this coming year using the rocket I flew in the High Power Smack down last fall. I just need to find the time to study for and take the written test. Maybe I can get this done so we I can attempt it the same day as all of you trying for level 1.

Hopefully this wasn't too much info about me for you all to take in. Feel free to drop by at any of the launches to introduce yourselves. I would like to get to know all my fellow members a little better too.

Neal Higgins

DONATE A ROCKET TO A FIRST-TIME FLYER

MASA President Carol Marple is heading up a rocket donation drive for the Fly It/Take It event at NARAM-52 this summer. Consider building a rocket to donate to this worthy cause. The Fly It/Take It event introduces newcomers to rocketry by letting them pick out a new rocket donated from clubs around the country, fly it at NARAM, and take it home to keep for free. Contact Carol for more details.

40 YEARS AGO....

According to the March 1970 issue of Model Rocketry Magazine, Estes introduces a "D" Class motor.

1970 Price for a D-13:
$0.75 each, or 3 for $2.00

"Feeling Groovy"

Cloning a Centuri Classic - Part 1

By Alan Estenson

"Surprise your fellow rocketeers with this unusual model! – The GROOVE TUBE flies straight and true, even though it looks like it shouldn't! Prove to yourself and friends that a rocket doesn't have to look like a rocket!"
– 1972 Centuri catalog

GROOVE TUBE

I make no secret of my affinity for tube-fin rockets. They're easy to build, fly well, and, best of all, have no balsa fins to fill and sand. Over the years, I have constructed dozens of them, both kits and my own original designs, covering the size range from 1/4A through J power. However, there has always been something missing from my collection; I didn't have a Groove Tube!

The "Groove Tube", kit KA-11, was offered by Centuri from 1972 until 1981. To the best of my knowledge, it was the first tube-fin model rocket kit on the market. To be fair, this Centuri classic was probably inspired by the original tube-fin rocket design, the "Infinite Loop" (Model Rocketry Magazine, May, 1969, pages 8-9, see: http://www.ninfinger.org/rockets/ModelRocketry/Model_Rocketry_v01n07_05-69.pdf)

The Groove Tube is a simple rocket to build from plans, and can easily be constructed in about an hour. The major parts consist of the nose cone, 13-inch body tube, six 3-inch tube-fins, and the motor mount assembly. Scans of the original Groove Tube instructions may be found in the JimZ archive: http://www.spacemodeling.org/JimZ/ka-11.htm

One decision that the clone builder must make is the selection of body tube size. The original kit used Centuri ST-8 tubing which has an outer diameter of 0.908 inches. These days, the closest common tube size is BT-50 with an O.D. of 0.976 inches. Do you go for originality or take the easier route? Technically, if built from BT-50, you'd have to scale up the Groove Tube dimensions by 1.075X to keep the proportions correct. Fortunately, Semroc has produced ST-8 tubing and a balsa version of the original plastic nose cone. To make it even simpler, they has a web page where you can order all of the parts necessary to build an accurate Groove Tube clone; you just go down their list and click on the add-to-cart buttons.
http://www.semroc.com/Store/scripts/ClassicParts.asp?ID=492

If you buy everything on their parts list, it'll add up to about $17. Of course, you can save money if you already have things like shock cord, engine blocks & hooks, and parachutes in your stash of parts. To make your clone truly groovy, a reproduction of the original decals is available from Excelsior Rocketry for a mere $4.

I decided to remain true to the original design and build my clone using ST-8. One order from Semroc later, I had all the Groovy parts that I needed. To add to the authenticity, I acquired an original, never used, 12 inch Centuri parachute from MASA member Tim Barr. After gathering together all the parts into a "kit", I assembled the rocket following a printout of the original instructions.

Continued on the Next Page...

Groove Tube Cloning Continued....

GROOVE TUBE

In building this rocket, there were only two things that I did differently from the instructions. First, the centering ring is actually just a tube coupler for ST-8. This meant that it had a very loose fit around the motor mount tube. The instructions just tell you to use a lot of glue and center the coupler carefully. Instead, I split a scrap of body tube, glued it onto the motor mount tube, and then glued the coupler over it. This made for a nice, snug fit. Second, I added a 1/8" launch lug; the original had the launch rod just pass through the gap between any two tube fins.

As expected, it didn't take long to build my very own Groove Tube. In part two of this article, I'll talk about paint, decals, and how going bigger can really put you in the Groove.

Alan

2010 MASA Club Secretary/Treasurer: Jason Colt

Hello everybody, this is Jason Colt your new MASA secretary/treasurer. I have been a club member for three years now and I have enjoyed every minute of it. I plan to serve the club and its members as best I can to make the club more fun and prosperous for everybody.

I have been a rocketeer since 7th grade when I build my first model rocket for a science class. My first rocket was an Estes Super Nova. It was a 2 stage rocket for those of you who remember, because 2 stages were cooler than one for a first rocket. Yes I was THAT KID. It did fly….once. It might still be on the roof of my Junior High School for all I know. Though out the rest of school and college I built kits and launched from time to time when I could afford it. In college I even held a community rocket launch for my dorm. Two people actually showed up. Good times.

A couple of years ago I was looking to get back into rocketry and came across the MASA website. I attended a meeting and I was hooked. I enjoy kitbashing and builds on the cheap using spare parts the most. I like being creative with my designs and trying new ideas. I also like the drama and challenge of flying low and slow. This summer I plan to go for my Level 1. Also am planning to make a larger twin ball rocket based on the one I made last summer, and I'm working on a Illuminated rocket for night launches. I hope see all of you at the fields.

Jason

MASA PLANET

2010 Meeting Schedule

Subject to Change

Check MASA Website or Yahoo Group for updates

MASA March Meeting

Thursday, March 4 - 7:00 pm to 9:00 pm
Location: Science Museum of Minnesota, St. Paul
Topic: L1 and L2 High Power Certification Process by Alan Estenson

MASA April Meeting

Thursday, April 1 - 7:00 pm to 9:00 pm
Location: Science Museum of Minnesota, St. Paul
Topic: On-Board Electronics by Glen Overby

Contributors to this issue of the MASA Planet....

Thank You!

- Todd Carpenter
- Jason Colt
- Alan Estenson
- Neal Higgins
- Ken Jarosch
- Carol Marple
- Todd Schweim
- Jeff Taylor

To contribute pictures, stories, build reviews, or just about anything, email to jeff.taylor@mn-rocketry.net

EMRR's 2009 Spaceship Design Contest

Ray King's Test Flights

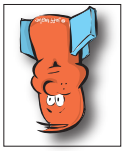
Photos by Todd Schweim

Ray recently competed in the EMRR 2009 Spaceship Design Contest, and his amazing "Love Boat" entry took second place, just barely behind the first place entry.

Congratulations, Ray!

Here are a few test flight photos:

For more details see:
http://www.rocketreviews.com/contests/contest_spaceship_design2009.shtml



MASA PLANET

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