MASA Planet

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How to build your own launch controller

By Steve Robb

8 Pad Launch Controller

About six months ago I started thinking about the possibility of building a new launch controller that the club could use at it's monthly launches. This was partly as a result of a discussion that occurred on the MASA mailing list related to ways to improve the regular launches (optimum number of pads, pad rotations, etc) and also as a result of having access to a large number of surplus components that could be used in the design and construction of a new system. Having a background in electronics I've always been interested in some of the different designs that I've seen in books and on the web so I thought that I would try and take the many ideas that I had come across and try and combine them into a new design.

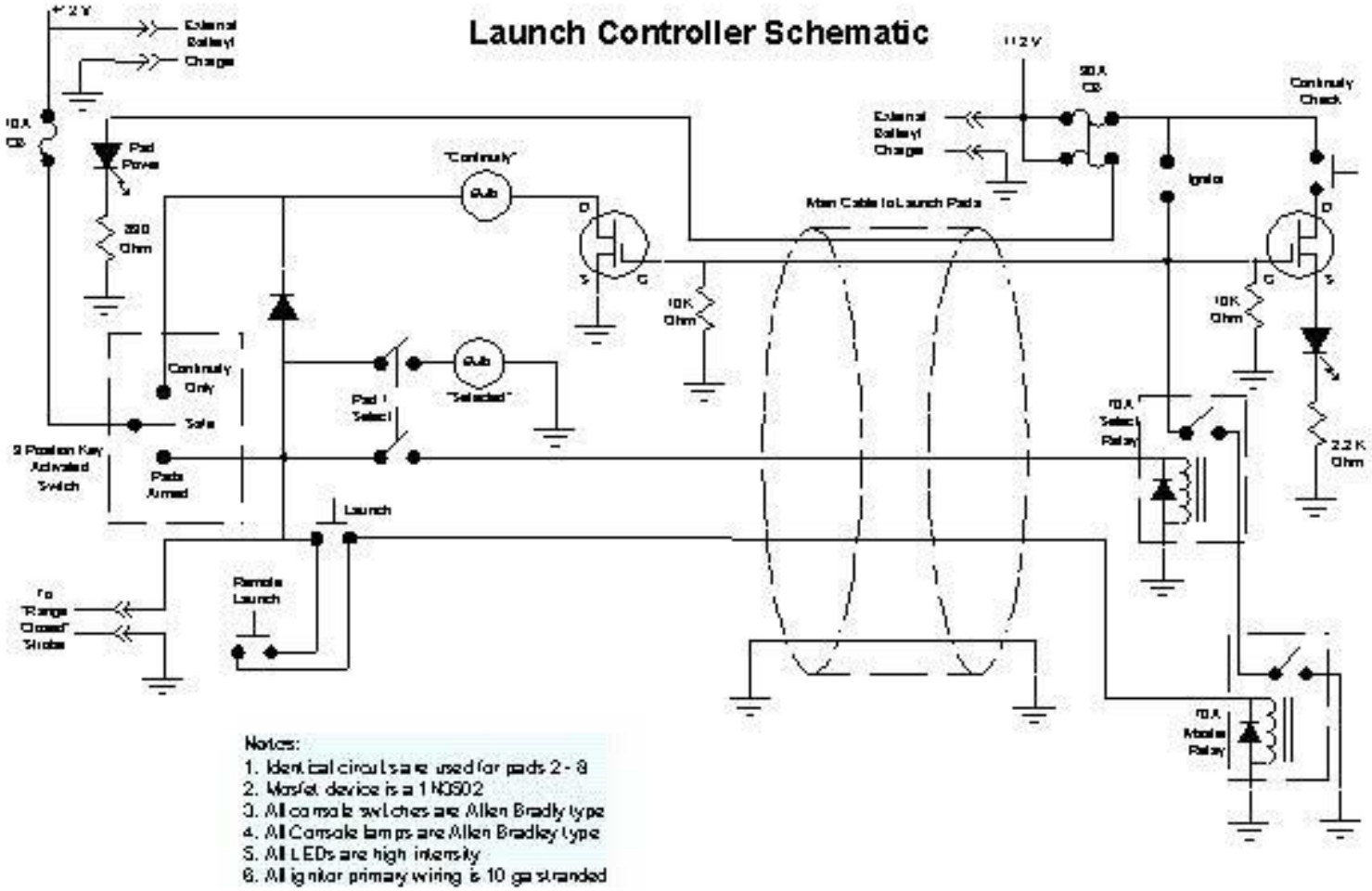
The basic design centered around the following ideas –

- **Control 8 pads**
- **Ability to check igniter continuity at the pad as well as at the console**
- **Maximize safe operation**
- **Robust construction**
- **Self contained – no external batteries**
- **Flexible and expandable**
- **Have maximum power available at the launcher clips**

The overall design went through a number of design changes as I tried one option after another and in the end, the simplest one won out. I had tried to utilize all electronic (no relay) circuitry but creating the high power circuits was too much of a challenge and so I reverted back to a mechanical relay design.

In general, the controller uses a 3 position key switch to select either a "Continuity only", "Safe", or "Pads Armed" circuit. The continuity circuits use MOSFETs to drive the indicator lights (either type 1816 12v bulbs or high intensity LEDs) which limits the current flow through the igniter to a maximum of 3 mA. The pad select switches on the console will energize any combination of pad side relays that are in series with the a master launch relay that controls either pads 1 – 4 or pads 5 – 8. A path to ground for the battery through the igniter is only possible when the master launch button is pressed which picks both master relays.

Here's the controller schematic in it's final form –



Launch Controller continued

The pad side boxes contain two12v, 7Ah gel cell batteries wired in parallel and all internal wiring is 10 ga stranded copper wire. The connections to the pads are 14 ga stranded wiring with typical copper clips soldered to the ends. A 30A circuit breaker protects the pad boxes in the event of an overload condition.

The console is a custom designed, stainless steel cabinet that contains two 12v, 7Ah batteries wired in parallel as well as the continuity circuitry. A remote launch button can be plugged into a ¼" audio type jack on the side so that someone can launch their own rocket without having to reach over by the LCO and press the master switch.

The connection between the console and the pad boxes is 125' of 25 conductor cable. This provides enough individual conductors to provide 8 select signals, 8 continuity signals, 2 launch signals (one for pads 1 – 4, one for pads 5 – 8), 2 ground signals to eliminate grounding issues between the pad side boxes and the console, and 2 pad side power signals to indicate if the circuit breakers at the pads have tripped (quite possible in the event of a short at the clips).

If I were to do it over again, I would eliminate the 12V bulbs that are used for continuity and when the select switches are activated as they are just not bright enough under daylight conditions. On the other hand, the high intensity LEDs that I used (typically 13000mcd) are definitely bright enough even in direct sunlight and could have been used instead of the 12v bulbs.

Overall, it was a fun project to design and build and I'm looking forward to getting lots of use out of it at he upcoming launches.

Upcoming Events:

Launch - Saturday, May 26

NOTE DATE CHANGE TO 4TH SATURDAY!

The two Alphas commemorating the 40th anniversary will be there also!

Location: Blaine
Time: 10 am - ? pm
Theme: Going crazy (but in stages)
Fun Events: Staged rockets
Contests: 1/2A streamer duration
Contest Director: Alan Estenson
FREE MOTORS! Hub Hobby Center will donate FREE Estes 1/2A3-4t motors to those competitors who wish to use them for their contest flights! (Max of two free motors per competitor.)

Meeting - Tuesday, June 5

Location: Science Museum of MN
Time: 7pm to 8:30pm
Notes: We will be in classrooms 5 & 6.

Launch - Saturday, June 23

Location: Blaine
Time: 10 am - ? pm
Theme: Circle your wagons!
Fun Events: Cluster rockets
Contests: A boost glider duration

We're looking for the lost, seen 'em?

Art, for the next newsletter, here are the current list of members from 2000 who have not renewed in 2001 as yet. – Dave Fergus

108 Jeff Hyde
109 Chris Kvidera
112 Carl Persson
116 Jon Hayman
119 John Hart
129 Joe Gonier
131 Larry Booher
132 Jenifer Jirele
140 Peder Thompson
144 Bob Brashear
145 Bob Rusch
152 Kerry Hodges
156 John Knoll
157 Don Kilberg
162 Jeff LaHay
164 Anthony Pray
165 Rob Sieg
166 Todd Chrun (Jr)
169 Colleen Watkins (Jr)
171 Tom Schmidt
172 Tracy McKibben
176 Rand Willock
179 Randy Hoff (Jr)

The MASA PLANET is the official newsletter of the Minnesota Amateur Spacemodeler Association, Section number 576 of the NAR, The National Association of Rocketry. It is published quarterly as a service to its members. Submissions may be made to the editor at: agibbens@usfamily.net. The preferred formats for electronic articles and illustrations are .doc, .txt, .rtf and .jpg.

Our official Web site is found at: http://www.mn-rocketry.net/masa/

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Editor	**Art Gibbens**

Web Site Review: EMRR

Dave Fergus

The following is a review of an outstanding rocketry site. I encourage all of us to participate and thus enhance its' usefulness even more. The site name is Essence's Model Rocketry Reviews or EMRR for short. It can be found at http://www.rocketreviews.com.

The site has the following features:

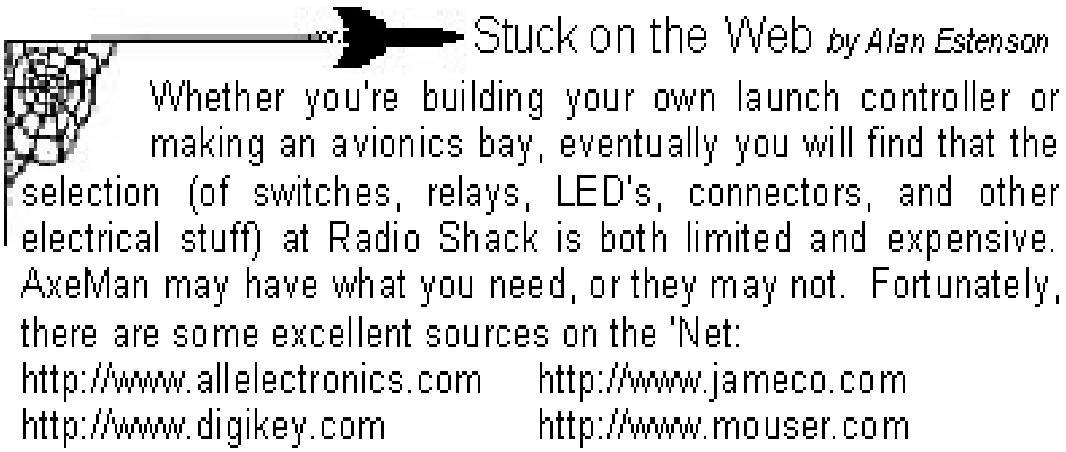
Home Page: with several different navigation methods including a very good internal search engine. There is also a what's new selection that is one of the best I have seen because it strikes a good balance between giving you enough detail to know whether you want to surf there, but not so much that you get mired in detail.

Reviews and Articles: This is the original purpose of the site; to provide comprehensive reviews of kits made by any manufacturer. Nick, the creator of the site has also provided for people to provide reviews of out of production kits, modifications to kits, model rocket plans, and even scratch built designs. A really nice feature is an archive of RMR Descon designs and pictures. I used one of those Rmr DESCON 4 designs (the LEGO 13) to help me figure out how to reliably lock down my BT-70 balsa nose cone on top of the payload section of my Heavy Lifter. This page is also split out into several different navigation methods. You can sort by manufacturer or reviewer or by any one of the other subcategories such as Modifications which have sub-sub categories of conversion, kit-bashing or recycles. You can see that this site has excellent library growth potential. This is also where you would go to submit a review yourself. I should mention that Nick has also gotten excellent prizes for random drawings to be given to reviewers or commenters. Depending on whether you are writing a review of a kit never before reviewed

Surface to Air Missile Demonstration

Jeff Hove

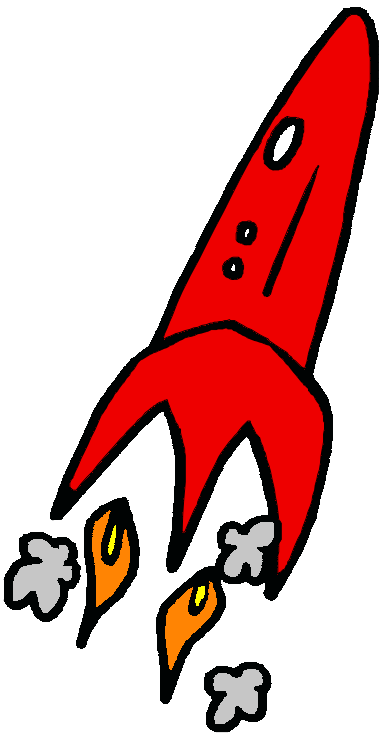
Here's an event that should appeal to most everyone in this group:
There will be an open house at the "Hardwood Range" Air National Guard military live-fire training range. It is Saturday July 14th from 8:30am to 4:00pm, weather permitting. The schedule includes bomb drops from B-1B bombers and F-16s, C-130 cargo drops, strafing by F-16s, and !!!!! SURFACE TO AIR MISSILE DEMONSTRATION !!!!! plus more. See http://www.volkfield.ang.af.mil/doc/hwoodoh.htm for info and for a map; scroll to the bottom of http://www.volkfield.ang.af.mil/doc/location.htm (the range is north of Volk Field, don't accidentally go to Volk). The place is between La Crosse and Madison, WI so it is a several hour drive. I'm sure we'll car pool and leave at dawn to get there early. If anyone wants to travel with my group just let me know.



E M R R R e v i e w C o n t i n u e d

with pictures (5 points) or just writing a brief comment in response to a review (1 point), your points add up to more chances in periodic random drawing for such prizes as a Vaughn Bros. Stretch Blobbo, Public Missiles Small Endeavor, or an Apogee Products Delta III. Once you drill down past reviews by manufacturer (which is a very comprehensive list of rocket kit and products with a note as to whether they make Low, Med. or High Power Scale or Other Products), you get a list of all the kits made by that manufacturer and reviewed on the site. There is also a brief summary of the model specs such as length, diameter, weight and recovery method. If the manufacturer has a web site, there is a link set up here as well. A review follows a format where the reviewer comments on the construction materials, kit instructions including any gotcha's that the kit maker neglected to mention, ease of build, and finishing comments. I have personally learned a lot from reading reviews of any kits before I start building. I have incorporated a lot of what I have learned into all the rockets I make, scratch or kit. Then, the second part of the review is comments on the flying and recovery of the kit. Here, you get a lot of advice on what engines and delays are best and some personal stories of disasters that may keep you from experiencing the same. At the end of the review, by clicking on "What's your opinion?", the site uses your email browser to send your comments about that review or the kit itself. All of the reviews also have at least one picture of the finished rocket and usually pictures of interim steps that need comment with picture. Most reviewers are pretty good about this. On various levels of the reviews, there is a previous and next button to expedite surfing through either the various manufacturers or the kits of that manufacturer.

Specials and Attractions: This is a page that highlights current contests and give-aways. It also provides a link to vendor recognition and featured reviewer details. Under vendor recognition, the vendor answers such questions as their history and mission, favorite kits, and participation in shows and events. The featured reviewer link takes you to a small bio on each of Nick's stable of featured reviewers (those who have submitted enough quality reviews to warrant recognition). By the way, if you win a random drawing, you are expected to eventually submit a review of that product. The donation is usually a new product that the donator wants to promote.



Flight Logs: This feature is for the purpose of providing a database of flight experiences on a particular model to provide you the flyer with information that can help you decide optimum time delays and engine size, as well as whether it is a good wind flyer, etc. The data stored in the flight logs are date, name, engine used, when ejection occurred, wind condition, and any notes provided by the rocketeer. Here you get some pretty interesting flight stories and experiences. The database sorts by either rocket or rocketeer. So, for me for instance, you can see that I have submitted 142 flight experiences on 35 rockets. And it displays a nice graph of engine sizes reported on those 142 flights all the way from micromaxx to M. (So far, I only have 2 E's, 2 F's, and 2 G's.) You can only submit flight logs on kits reviewed in the database, so this is a good way to encourage you to submit reviews and make the total database more complete.

Cp and RockSim files: Recently, to also aid rocketeers, Nick has added databases of Cp's and RockSim files. These are also proving to be very user friendly following the same navigation principles of the other main pages of the site. The RockSim file downloads in zip format to your computer.

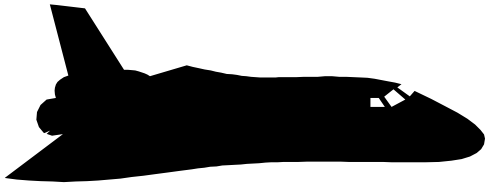
E M R R R e v i e w C o m p l e t e d

Tips, Hints, & Stories: This is pretty self explanatory, and also very useful for modelers of all levels of experience.

Tools and Calculators: The calculators provided are for streamer size, parachute size and descent rate. For streamer size, you can optionally enter streamer width, but after entering rocket weight, it calculates optimum streamer size. For example, a 0.4-oz rocket needs a 21.3-inch long x 0.7-inch wide streamer. There is a tool called thrustcurve.org, which supposedly will give you a thrust curve for an engine you enter. This database appears to be still small and under development.

Sites and Links: On this page are links to manufacturers, contributors, advertisers, and important rocketry sites. Site categories are info, history, stats, commendations, and support. Some Statistics on the site are; 413 products reviewed from 68 different vendors, 2384 flight logs on 357 rockets by 163 rocketeers, and 222 RockSim files.

I highly recommend that all of us in MASA get involved in EMRR. It's quality only increases with more participation. I highly recommend that even if you don't submit anything to the site, that it is an excellent resource for all of rocketeers!



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