



# MASA Planet

Volume 5, Issue 4

Ground Support Edition

September 2002

*Safety First!*

## Rule 11

*Rockets to die for?*

**Ted Cochran**

You may have heard that, in contrast to popular sports such as youth baseball, basketball, and soccer, there has never been a life-threatening injury to someone participating in model rocketry, despite millions of flights over more than 40 years. It's true, as far as we know—provided the safety code has been followed.

But you may be surprised to hear that in the past five years, there have been at least three fatalities involving sport rocketry. Two of them involved model rockets, and all of the people killed were adults. Three tragedies, and all of them resulted from violating Rule 11 of the Safety Code.

Remember Rule 11?

*I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places.*

The three fatalities all involved power lines. Of course, model rockets are not nearly the principal cause of power line fatalities—far from it. Despite continual public

*Safety, concluded on page 2*



Alan Estenson

## Misfire Alley

*How other clubs are sharing the range*

**Ted Cochran**

MASA has for the past five years almost always conducted club launches using a classic rack system, in which rockets are first loaded, then launched. As demand for pads increased, we have expanded the ground support equipment (GSE) to try to keep up. We started with Russ Durkee's launch system, which controls 8 pads. A year or two later, as lines became lengthy, we added my system, which originally controlled 6 pads. Then Steve Robb built an 8-pad controller, which we used with Russ' system for a year to control 16 pads. Now we use my system, expanded to 12 pads this year, in conjunction with Russ' system, to offer up to 20 pads to members during large launches.

However, we've reached the point of diminishing returns. The GSE available now does not, for the most part, permit pads to be separated to the extent that the safety code requires for individual use. This means we still have to load a rack of rockets at a time. Since it always takes less time to launch a rack than to load a rack, the LCO isn't able to launch rockets as rapidly as might otherwise be possible, which means that, even with 20 pads, waits of a half hour or more are again being experienced. The only way to solve this problem is to be able to support more banks of pads. LDRS'99, for example, supported 6 banks of pads and several away cells, so the LCO was always able to launch rockets.

But the other major problem is the sheer volume of equipment that someone needs to transport to every launch. The July launch used two launch controllers, 20 pads, two PA systems with speakers, six batteries, 200 feet of speaker cord, 1,400 feet of

*Misfire Alley, continued on page 2*

### ALSO IN THIS ISSUE

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*Safety, continued from page 1*

education campaigns, power line accidents kill about 150 people in the United States every year. It is hard to overstate the danger.

Don't assume you can safely use insulated tools. One of the people killed trying to retrieve a child's model rocket was apparently using a fiberglass pole. It wasn't enough of an insulator.

Don't assume that the voltages in residential areas are safe--they're at 7.2 kV! In 1984, while I was a firefighter, I watched a 7.2 kV power line melt a ten-foot section of sidewalk, complete with gutter and curb, into green glass. I still have a piece of it in my office. The power line at Fricke's is 230 kV!

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*"I will not attempt to recover my rocket from power lines"*

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Don't assume that a wire is a guy wire, ground wire, or is otherwise "safe" to touch. The person in the photos below made that mistake, and 7.2 kV turned him into a flashbulb. Luckily, he lived to tell about it.



If your rocket ends up in a power line, or even in a tree with a power line through it, no matter how harmless it looks or how easily reached it seems to be, leave it alone. No model rocket is worth spending months in a burn ward for, let alone dying for.

If it looks like it will be tempting to others, call the responsible power company and let them know about it. It would be hard to live with the weight of knowing that someone got hurt trying to get your rocket down.

Alan Estenson, through absolutely no fault of his own, once had a very nice EZI-65 land in the 500 kV power line at North Branch. He did exactly the right thing— he walked away. If it ever happens to you, please do the same. We want to see you at the next launch!

*Misfire alley, continued from page 1*

extension cord, trash cans, a wind sock and tripod, a wadding bucket, safety markers, water buckets, two tables, RSO vests, clipboards and card holder, a scale, three tubes of launch rods, and other paraphernalia too extensive to list. I get tired just thinking about it!

MASA has grown in membership and launch participation to approach some of the largest clubs in NAR (certainly during our prime summer launch season), so it makes sense to see if those clubs have found better ways of operating. And they have.

The Arizona-based Superstition Space Modeling Society (<http://www.sssrocketry.org>), a club that is both a NAR section and a TRA prefecture, has been working to perfect the *misfire alley* approach to launch operations that NIRA, LUNAR, and SMASH, among others, have adopted. They used it to good effect at NSL this year.

In essence, this approach requires that everyone brings his or her own GSE (pad and controller), and sets it up on a grid laid out at the beginning of the day. There are still flight cards, an LCO, and an RSO. The main difference is that the LCO directs the launch of rockets by their owners instead of launching them at a central console. The pads are more spread out than we are used to, which increases safety through distance but which also requires more alertness from launch participants.

To fly a rocket, you prepare it as usual, fill out a flight card, and then present both of these to the RSO, who will initial the flight card. You then put the rocket on your own launch pad, bring your card to the LCO, who will put it into the queue while you return to your pad. When the LCO announces your name, you signal you are ready, and then launch the rocket after the LCO's countdown. If there is a misfire, you retrieve your flight card, correct the problem, and then give the card back to the LCO for re-queuing.

This system solves both of the problems of large rack-based ranges: It ensures that LCOs are able to launch rockets as soon as they are ready, and it spreads the burden of maintaining and hauling GSE among the folks that make use of it.

This year, MASA has tried out misfire alley on some small or informal launches. A more formal system

*Misfire Alley, concluded on page 9*

## MEETING SCHEDULE

### TUESDAY, SEPTEMBER 3

Location: [Science Museum of Minnesota, St. Paul](#)

Time: 7pm to 8:30pm

Topic: Computer software for rocket design and flight simulation.

### TUESDAY, OCTOBER 1

Location: [Science Museum of Minnesota, St. Paul](#)

Time: 7pm to 8:30pm

Topic: Build Junkyard rockets!

### NOVEMBER [TO BE DETERMINED]

**[WILD GAME AND ELECTION DAY WILL CAUSE CHANGE]**

Location: [Science Museum of Minnesota, St. Paul](#)

Time: 7pm to 8:30pm

Topic: 2003 MASA Officer Nominations

### DECEMBER

Time and Place TBD

MASA Holiday Party!

## LAUNCH SCHEDULE

### SATURDAY, SEPTEMBER 28

Location: [Blaine](#)

Time: 9 am - 3 pm

Fun Events: Alpha Drag Race

NARTREK: Finish up!

### SATURDAY, OCTOBER 26: CLUSTERS!

Location: [Blaine](#)

Time: 10 am - 2 pm

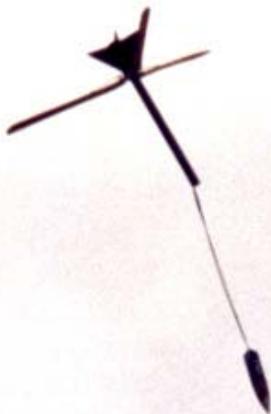
Fun Events: SAM Drag Race

### SATURDAY, NOVEMBER 23

Location: [Elk River / Otsego](#)

Time: 10 am - 2 pm

### Snapshot



Ted Cochran



### Not a 3FNC

Dave Leininger's huge J570-powered Skywinder prepares to enter brush-cutting mode at LDRS in 1999. This was a successful Level 2 certification flight. [Inset] Dave flew it again at LDRS '02; see the video at <http://www.employees.org/~fty/apogee/video/helicopter.mov>

### President's Corner

## Ruminations

### Alan Estenson

NAR members should have received their August issue of The Model Rocketeer newsletter by now. In it, NAR President Mark Bundick has an encouraging update on the status of the lawsuit against the ATF. I encourage all MASA members, whether you hold a current high power certification or hope to achieve one in the future, to make a (tax-deductible) contribution to the legal fund. There is a form in The Model Rocketeer that you can mail in along with your check, or you can go to [www.nar.org](http://www.nar.org) and make an online donation using a credit card. We need to support this effort to ensure that the motors for medium and large rockets aren't regulated out of practical existence. To lead by example, I mailed in a check for \$100 today to join the \$100 that I had donated previously. *[Editors Note: So did I :-)]*

Some rumors have circulated about the sod farm flying site in Blaine being sold. I have spoken with the sod farm owners, and they tell me that their land has not been sold. Sale and development of land is always a possibility, and that possibility will just become more likely in the future. I've certainly noticed how the "urban sprawl" has crept northward over the past few years. For an example, just look at that big new retail grouping at Lexington and 35W. Just two years ago, it was empty fields! The VFW in Otsego has also been pressured in recent years to sell their land to developers. However, as a non-profit entity, they view their community service as more important than any money earned from selling their soccer fields.

I've said it before, and I'll say it again. You should always be on the lookout for possible new rocket launching locations. If you happen across something promising, pass me as many details as you can.

We still have some summer weather left to enjoy. I hope to see many of you at the launches.

Hot jets!

Alan Estenson, MASA President

*Full Scale Models*

# **Two New Prototypes**

*Atlas V launches, Delta IV to follow*

Two new launch vehicles are expected to debut within weeks of this other this Fall. The maiden launch of the Atlas V was August 21, 2002 from KSC, with TV and web viewers treated to a rocket's-eye view of launch to orbit. The Delta IV is scheduled to follow in mid-October. The vehicles are the first of a new class of expendable launch vehicles developed under the Air Force EELV program, and are expected to replace earlier generation Atlas, Delta, and Titan rockets. The Atlas will ultimately be able to add five strap-on SRBs and a second Centaur motor; the Delta will be capable of adding four SRBs or, in its largest configuration, strapping three of the core vehicles together.



Spaceflightnow.com

ILS

### **Atlas V 401 (above)**

Length: 191.3 ft.  
Diameter: 12.5 ft.  
Fairing diameter: 13.2 ft.  
Link: <http://www.ilslaunch.com/atlas/atlasv/>

### **Delta IV Medium+ (4,2)**

Length: 210 ft.  
Diameter: 16.8 ft.  
Fairing diameter: 13.2 ft.  
Link: [www.boeing.com/defense-space/space/delta/delta4/delta4.htm](http://www.boeing.com/defense-space/space/delta/delta4/delta4.htm)



Spaceflightnow.com

# MASA Returns to NARAM!

## NAR's 44<sup>th</sup> Annual Meet

### Mike Erpelding & Glen Overby

NARAM 44 was a lot of fun! You could sum up NARAM with six words: hot weather, great people, and awesome rockets!

As some of you know, over the past few months Glen



The road to NARAM 44

Mike Erpelding

has been searching for a new rocket building facility. He finally settled on one a few weeks ago and decided it was time for a vacation. His planning for NARAM started just a week before he left and luckily he was just barely able to squeeze everything into his Honda Civic. Mike took the plane.

This year's NARAM was held on a field just outside of McGregor, Texas. The site used to be a rocket motor design, test and manufacturing facility. The field was owned by the city of McGregor who got it from the Army after the rocket manufacturing was shut down. There was a hazardous waste disposal area to the south, referred to as "Area S". We never had any rockets go that far, but we were there was a very serious fence around it.

It was hot every day—the high temperature ranged from the mid-90s to the mid-100s with 45% to 80% humidity. We put on plenty of sunscreen and drank lots of fluids, and it wasn't too bad. On most days there was a light breeze in the morning, and a few thermals to be found in the afternoon. The only day it rained was Saturday, after NARAM ended. Fortunately, the

weather cleared up for Mike's evening flight back to Minnesota.

There were lots of interesting people to meet. Glen learned that one of the NAR Trustees, Mark Johnson, works for LSI Logic making disk arrays that Glen's employer, SGI, OEMs from them.

Bob Kaplow, as usual, brought all sorts of weird stuff. His round laundry hamper had fins (Bob facetiously referred to it as his "level 3 project"). On Saturday the sport range LCO jokingly complained that Bob was flying a rocket with *only* four fins and a nose cone.

Peter Alway was hawking his books (ROTW 3<sup>rd</sup> Edition has achieved saturation levels with NARAM attendees) and now has two kits: an Arcas and Astrobee 1500, both manufactured by Balsa Machining Services. Glen had looked at the Astrobee in ROTW several times but it was always a bit more than he wanted to tackle. He resisted the \$30 price until late in the week when he found an ATM. *[Looking forward to seeing it fly, Glen!]*

When we got our registration packets with our nametags, we got assigned to our teams for our duty shifts on the contest range. Mike was assigned as a timer for the green team. Each shift had 8 timers for flight duration events. Two timers would time each launch, both for accuracy and to provide redundancy in case a timer malfunctioned. Mike timed one glider duration flight that caught a thermal for over 5 ½ minutes. He also timed a ½ A parachute duration that caught a thermal for over 7 minutes! Talk about sore eyes! There were several new records set this year, in many events.



Mike Erpelding

Mike's Yankee prepares to fly B altitude off of pad 2. The contest range is a circle of pads, with the RSO in the middle.

*NARAM 44, continued from page 5*

Mike entered the B altitude event with his Yankee rocket. His first launch was tracked at 173 meters, and his second attempt was tracked at 180 meters. He also entered the 1/2 A duration event as an afterthought, using his "Golly" tube fin rocket that he happened to have with him. Mike had purchased an 8" nylon parachute from Recovery Technologies, one of the on-site vendors. On his first attempt the parachute never deployed and Golly nosed into the ground for a DQ. For the second attempt he made a parachute out of a plastic shopping bag and some shroud lines from a 12 parachute. This time he got a very short qualified flight because the chute opened only 12 feet off the ground. *[Mike received 98 contest points, and finished 40<sup>th</sup> overall, for these flights! ]*

The sport range was open every day from 8 A.M. to 4 P.M., just like the contest range. Glen was expecting there to be a large community prep tent, like NARAM 2000 at Estesland had. There was, but that tent was in



The Sport Range

Mike Erpelding

the contest range prep area and was a considerable distance from the sport range. Just in case, Glen had brought his own canopy which he used the whole week. Soon after setting up the canopy on Saturday, Glen says he saw the shadow of a HUGE spider through the east-side tarp. He asked a native Texan and was reassured that, while all spiders are somewhat poisonous, this one was not a threat to humans. The grasshoppers are also huge. Everything is bigger in Texas. There were officially 777 flights on the sport range during the week, using MicroMaxx through K impulse motors.

Mike brought along his Mach 12 and AGM 57X Heat Seeker models for fun and to use up his motors before his flight home. Glen burnt two Gs, two Hs and one I

and made three electronic deployment flights during the week.

Due to the launch site's somewhat close proximity to President Bush's ranch, there was some concern that after Monday NAR might not be permitted to activate the FAA

waiver for the high power range. On Tuesday, they got a visit from the county sheriff and a very nice and professional secret service agent. Mark Bundick did a great job showing him around. He got to see a few egg loafers scramble eggs and some boost gliders "red baron". Since fliers were allowed to fly the rest of the week, apparently the authorities realized that fliers were only a threat to themselves.

In the middle of the week, an engineer who worked at the old rocket motor plant came by to see what was flying. Glen showed him some composite motors and casings. He spent 30 years designing motors at the plant; the AAMRAM was the last motor

designed there before the plant was shut down in favor of a plant in Virginia that had newer equipment. He



Prep tent

Mike Erpelding



Mike Erpelding

Glen Overby prepares to fly on the sport range

said he was one of the inventors of the segmented solid fuel motor.

Saturday and Sunday were very busy days on the sport range. There were over 200 flights on both days, or about as busy as the busiest MASA launches.



Mike Erpelding

Unlike MASA, though, there were plenty of J and K launches.

The most unique rocket was CO2 powered with its own special launch pad. Recovery was also intriguing: it used a mechanical (wind-up) timer used by free flight model airplanes. It used a couple of rubber bands for ejection and a rubber band wound around the timer to hold it in place.

Chris Taylor attempted four times to make a level 1 certification flight with a huge foam glider called the "Grrr" that was designed to fly on clusters of H motors. Unfortunately, he needed a couple of flights to discover and fix design issues, and he was unable to light both motors on either of the later flights. (Link: [www.naramlive.com](http://www.naramlive.com)).

Tuesday night there was a manufacturer's forum at the 12 Oaks hotel (NARAM 44 HQ) in Waco, Texas. Some of the companies represented were Balsa Machining Service, Recovery Technologies, Aerospace Specialty Products, Apogee Components, Mike Dorffler Replicas, Saturn Press, and Nano Rocketry.

Following the forum there was a charity auction to raise money for a fund to be used for educators who



Mike Erpelding

NARAM attendees ooh and ah during scale model viewing

use model rocketry in their classrooms.

Wednesday was the Texas barbecue social at Amsler Park in McGregor. The food was excellent! Afterward, participants had full use of the park.



Mike Erpelding

Thursday night was the viewing of all of the sport scale models. There were lots of really nice models there. You could tell that a lot of time and effort was spent on each one.

Some of the many beautifully detailed scale models. Alas, several of these were to meet their demise during flights on Friday.

Friday was the awards banquet. This was held at the McGregor High School. Lots of trophies and door prizes were given out.

The McGregor Volunteer Fire Department was on the launch site every day. They were selling food and beverages as well as being stationed there in case of a fire. On Friday some of the firefighters were asking if anyone would like to donate a rocket to make a display at the fire hall to commemorate NARAM 44. Mike donated his Yankee rocket to them.



Mike Erpelding

Mike and Glen had a really great time at NARAM 44! They met a lot of nice friendly people there. They would recommend that if anyone would get a chance to go to a NARAM that they take it! [Link: [www.naram2002.org](http://www.naram2002.org)]

*[Rumor has it that NARAM 45 may be hosted in Evansville, IN, with Chad Ring as CD. Let's rent a bus! -Ed.]*



# KISS<sup>1</sup> Launch Pad

*Collapsible mid-power pad for \$10.*

## Ted Cochran

This is the first of a number of plans in this issue of the *MASA Planet* focused on ground support equipment. We'll start with the launch pad.

MASA members use a variety of interesting home brew launch pads: the PVC pads that we built in a club meeting a few years ago, my converted TV antenna tripod, and the Lenz' fancy metal creations, among others. But, if you're looking for inexpensive, highly portable, and easy to build, it's hard to beat the collapsible pads we use on the low to mid power range. Those are made of 1" PVC. The parts below are for a slightly stiffer pad made of 1-1/4" PVC.

You can build one of these for \$10 (\$8 for the smaller version), in 15 minutes.

### Parts List (Prices at Home Depot):

- A. 1 ten foot length of 1-1/4" PVC pipe (\$2.98)
- B. 3 1-1/4" PVC tees (3@.65)
- C. 1 1-1/4" PVC to 1/2" flush bushing (.72)
- D. 1 1/2" by 2" iron pipe nipple (.57)
- E. 1 1-1/4" slip coupler (.34)
- F. 1 1/2" straight threaded gate valve (\$2.76)

You may also need a small can of PVC cement if you don't have any around.

### Assembly Instructions

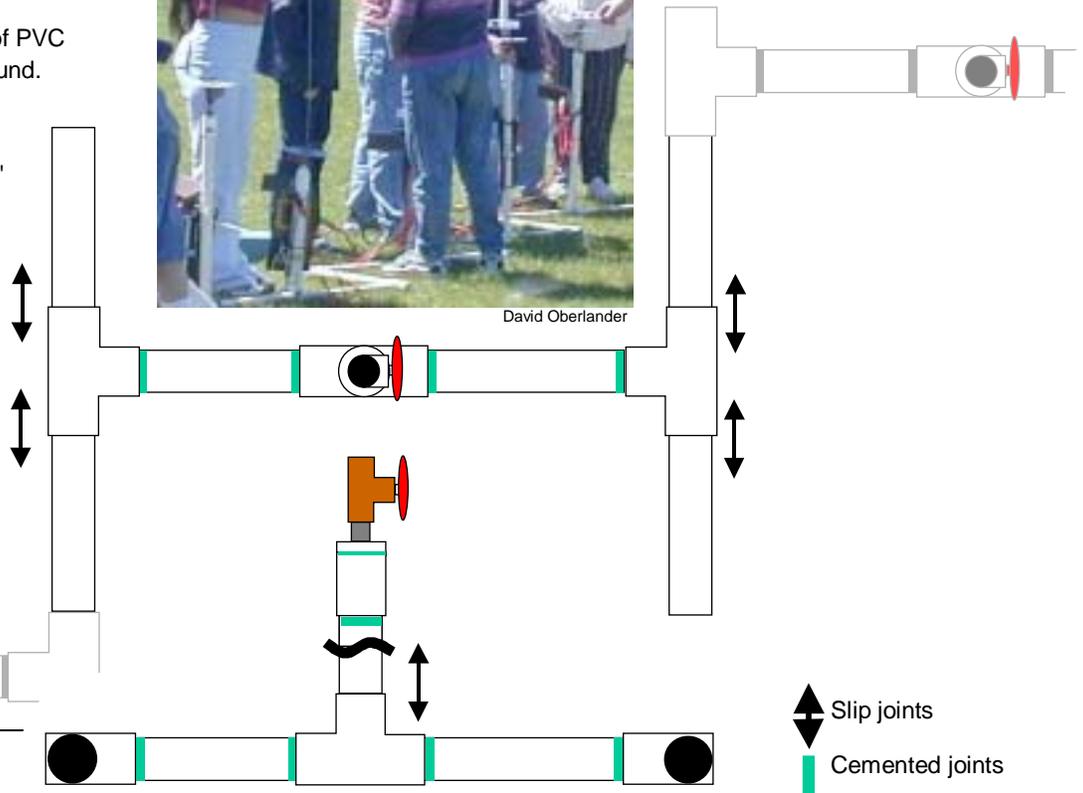
1. Cut the PVC pipe into one 24" length and six 16" lengths.
2. Cement the coupler onto one end of the 24" length of PVC, and the bushing into that, to make a center post.
3. Thread the iron pipe nipple into the bushing, and screw the gate valve onto that. The will serve as a clamp for your launch rod— it can be tilted slightly in one axis, and the center post can be rotated as needed in

<sup>1</sup> Keep It Simple, Stupid

the other. [Thanks to Russ Durkee for the valve-as-clamp idea!]

4. Cement the center socket of each of two of the tees to each of two 16" lengths of PVC.
5. Insert the center post into the center socket of the remaining tee, but do not cement it! Similarly, insert the remaining 16" lengths of PVC into the side sockets of the tees that have already been cemented.
6. Now it's time to make the final two glue joints. These are the only two that are critical, because they need to be square and PVC cement sets up very quickly! Put cement around one end of a 16" length of PVC that is already cemented to a tee, and insert it into the center tee, rotating it quickly so that the center post is vertical. Repeat for the other side.

To disassemble the pad, simply remove the four outrigger feet and the center post. For added convenience, multiple pads may be interconnected so that one outrigger from each pad is connected to the cross bar for the next, as shown in gray in the figure below.



**Tech Tips**

# The Ultimate Igniter Kit for Black Powder Motors

**Rick Vatsaas**

Here is an excellent way to organize your Estes igniters and igniter plugs, preventing damage to the igniters, keeping the right plugs on hand, and keeping your range box neat. You'll also be able to recycle your misfires faster with this handy arrangement.

The first step is to go to Wal-Mart and get yourself an EZ-Dose Vitamin Box from Apothecary Products for less than \$2.00.



The box has seven compartments (it is designed to manage daily vitamin doses). Use two for your Estes igniters (trim the tape on each about less than 1/2 inch for a clearance fit, and the igniters will stack nicely) Use the remaining compartments to organize your igniter plugs as shown. Since the case is see-through, you know your inventory without opening the box.

To keep the igniters from tangling, cut paper separators to fit the compartment, and place between every three igniters.

The vitamin box has many other uses at the range and your hobby bench. Use one to store spare parachutes, streamers and swivels. It's also useful for storing fasteners and electronics parts. Considering what you pay for igniters, and other small widgets, paying two dollars for this case is a good investment.



Can't find this box at Wal-Mart? There are many other choices available, though few met my requirements as well as the EZY Dose. Try small Plano organizers found in the fishing section at most discount stores, or try Michael's crafts store, which sells a variety of similar organizers.

**Misfire alley, continued from page 2**

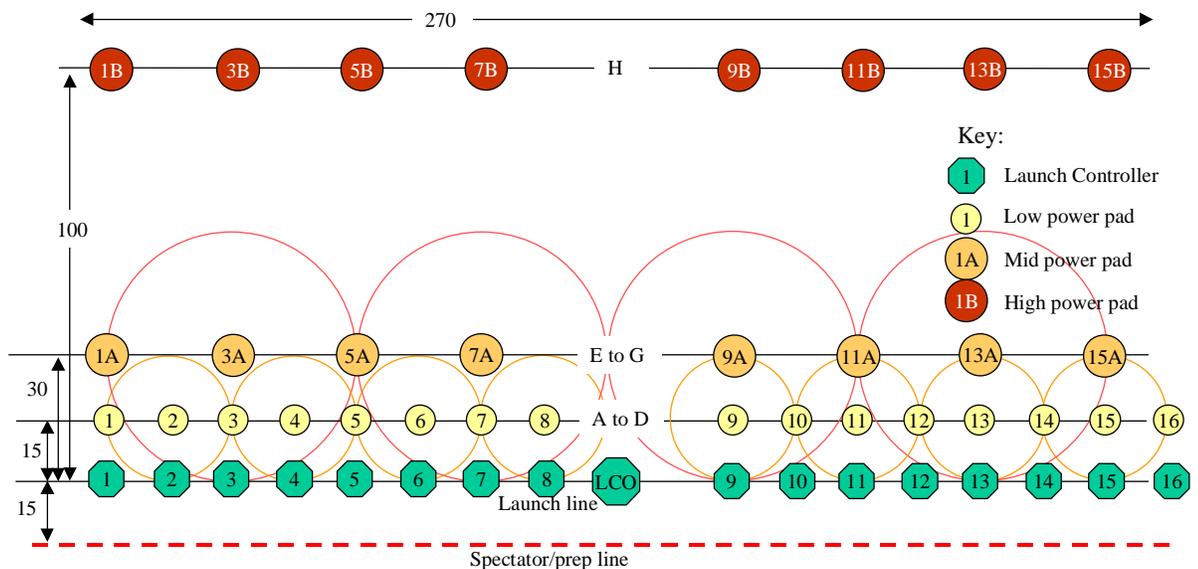
could mix a central console with individual pads, using the layout shown below. The goal would be to ease the transition from the system we currently use. Notice that this layout will support 32 pads—12 more than we currently support— in approximately the same space we currently use. In the next couple of months, let's talk this over, and decide if it is an approach we want to try!

**Misfire Alley layout.** Model rockets on low power pads can be launched at any time. Rockets on the E to G pads require that the nearest three low power pads be cleared. High power rockets require their side of the field to be cleared.

Even numbered pads are for low power model rockets through D impulse. They are 15' apart and 15' from the launch line.

Pads ending in "A" are for mid power model rockets through "G" impulse. They are 30' apart and 30' from the launch line.

Pads ending in "B" are for high power rockets. They are 100' from the launch line.



# KISS<sup>2</sup> Controller

## Two-Pad Ground Support Equipment

Alan Estenson, NAR 69539 SR

This isn't meant to be a detailed plan, but rather, a source of inspiration. A good launch controller doesn't need to be expensive or electronically stupefying.

When flying rockets with my niece, we'll often prep four rockets, launch them all, recover them, and then start all over with another four rockets. I'll usually set up two launch pads and two controllers – my old "bulletproof" homebrew controller and a good ol' Estes Electron Beam. More often than not, however, the Estes controller wouldn't cooperate well, and I would end up moving one set of leads back and forth between the two pads.

After tossing around the idea for a year or two, I finally sat down one evening with a cardboard box of collected parts. My goal was to build a simple, robust, simple, inexpensive, compact and, um, simple two-pad launch controller. Here's a list of the major parts along with their source:

- G. 1 small project box (Radio Shack)
- H. 1 small piezo buzzer (Radio Shack)
- I. 1 standard phono jack (Radio Shack)
- J. 1 standard phono plug (Radio Shack)
- K. 2 on-off toggle switches (Menards)
- L. 1 momentary NO pushbutton switch (Menards)
- M. 1 25' outdoor grounded extension cord (Menards)
- N. 1 6-outlet power strip (Menards)
- O. 1 small 2-prong standard electrical outlet (Ax-Man)
- P. 1 small 3-prong standard electrical outlet (Ax-Man)
- Q. 3 two conductor power cords (Ax-Man)
- R. Misc. 14-gauge wire, connectors, and alligator clips.

At the bottom end of the box is the 2-prong outlet, where power enters the system. You can use a 7.2 volt NiCd battery pack or a 12 volt battery. You can make up adapter cords to connect to any DC power source. The negative side of this outlet connects directly to the ground pin of the 3-prong outlet on the other end of the box. The positive side goes to the phono jack, then to the pushbutton, then to both toggle switches. Each toggle switch then connects to its own pin on the 3-prong outlet. The piezo buzzer is wired across the pushbutton contacts to provide a continuity / pad armed warning tone. A shorted phono plug acts as the

<sup>2</sup> Keep It Simple, Stupid



Alan Estenson

launch key. The wiring is very simple, so I haven't bothered to draw you a schematic. The most challenging bit is packaging it all within the small project box. To allow for easy component replacement, I used crimp connectors wherever possible instead of soldering. The switches needed to be both durable and short enough to fit in the box. The launch control box weighs in at a bantam 6 ounces.

A standard outdoor extension cord plugs into the 3-prong outlet and runs out to a modified power strip.



Alan Estenson

You'll need to open up the power strip and do some cutting, jumpering, and soldering. I rewired my power strip so that the first two outlets are wired normally (for power pass-thru to additional pad banks, should I wish to add some); the next two are wired so that a 2-prong plug will connect to pad 1 and ground, and the last two are wired to pad 2 and ground. This way I can have extra leads plugged into each pad circuit if I choose to do so. When you rewire your power strip, make sure to check all the circuits with your

multimeter. From the power strip, a standard 2-wire power cord runs to each pad. I use banana plugs on the end of these wires with alligator clips that slide onto the banana plugs. This makes alligator clip replacement quick and easy.

To arm the system, insert the phono plug into its jack. Since there is only one continuity buzzer, you need to arm each pad individually to check continuity. You can

*Launch Controller, continued on page 11*

*Launch Controller, continued from page 10*

now arm and fire one pad or both at once. You might be able to fit a little continuity LED for each pad into the box, but I think that the large toggle switches are a good enough indicator of which pad is armed. Label pads 1 and 2 and pads left and right.

This system has been tested at recent launches, with excellent results. Using a 7.2 volt NiCad battery and 25



foot cord, it had no problems igniting Estes and Quest igniters. If you'll be launching motors bigger than "E", I recommend using a 50 foot extension cord and a 12 volt battery. If you need lots of power at the pad for lighting clusters or high-current igniters, you'll want to add a padside relay box with a 12 volt battery.

I hope that this article inspires you to build your own multi-pad launch controller. Good luck!

**Planet's Plans**

# Thumper

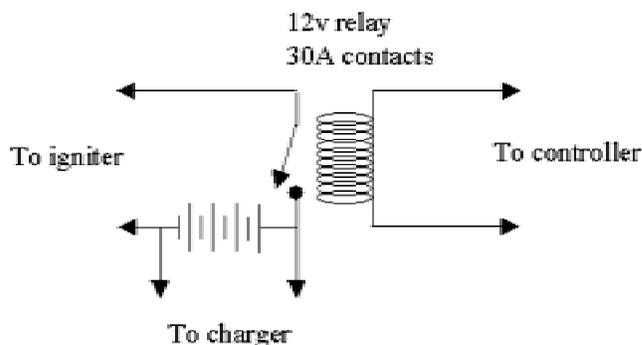
## Pad-side ignition augmentation

**Ted Cochran, NAR 69921**

Thumper was designed to light clusters of black powder or AP motors. It is capable of sourcing over 60 amps, and has lit clusters of up to seven AP motors. It is also good as a pad-side relay box for single motors. It isn't quite so good for single Estes igniters— they sometimes vaporize too quickly for the motor to light!

Parts required:

- A. 1 plastic storage box with handle
- B. 1 or more 12 v batteries (I use three 4Ah gel cells)
- C. 1 12v relay rated 30 amps or better
- D. 10 gauge or larger wire
- E. Assorted screw terminals and connectors



The relay and the batteries are the key ingredients. I was fortunate to find a 60 Amp contactor from a commercial appliance at a surplus store, but you can also use automotive relays. AxMan sells 30A Bosch relays that would be adequate for most applications.

Interconnections should all be made using very large wire, to reduce resistive losses. You may wish to add a piezo buzzer across the igniter leads to alert you if the relay is stuck closed, and/or a continuity indicator. Finally, be aware that digital devices may need to be protected from relay coil inductance—Ask Steve Robb what Thumper did to his MOSFETs!



Ted Cochran

The *MASA Planet* is the official newsletter of the Minnesota Amateur Spacemodeler Association, Section 576 of the National Association of Rocketry. It is published bimonthly as a service to its members.

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The *Planet* is available in color on MASA's web site:

<http://www.mn-rocketry.net/masa/>

**MASA's 2002 OFFICERS:**

**President & Webmaster**      **Alan Estenson**

**Vice President &  
MASA Planet Editor**      **Ted Cochran**  
**Secretary/Treasurer**      **Dave Fergus**

**President Emeritus**      **Russ Durkee**

Submissions may be made to the editor at: [masa.planet@mn-rocketry.net](mailto:masa.planet@mn-rocketry.net). (Volunteer quickly, lest you be asked to write about the legality of field modification of defective 38mm propellant grains for J350 motors.)

**If your email address changes**, please send notice of your change to [masa@mn-rocketry.net](mailto:masa@mn-rocketry.net). Include your name, old email address, and new address. We depend on email for communicating important information. When an email address starts "bouncing", we lose contact with you.

We also appreciate being notified about address and phone number changes!

**Welcome New MASA Members!**

Chris Roehl      Martin Dietl

**New Certifications**

Leland Cheng      Level 2, July 13  
Neal Higgins      Level 1, July 27  
Dave Fergus      Level 1, August 10

**New NARTREK Awards**

Mike Erpelding      Bronze, July 25  
Ted Cochran      Silver, August 11  
Joe Schneider      Bronze (pending)

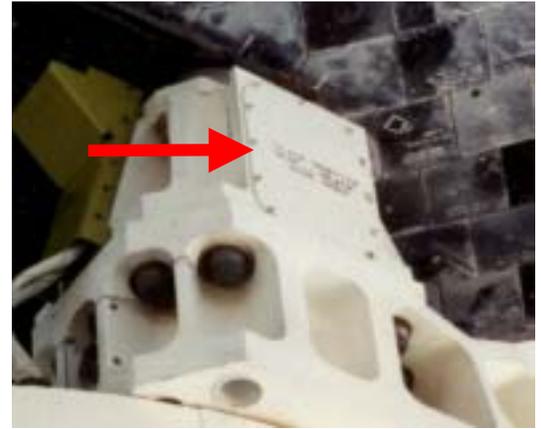
At least 13 other members have at least one of the four Bronze flights completed! Please let us know as you finish your flights! 🚀

**Parting shot**

This inscription, on the mounting pedestal on NASA's 747 shuttle transportation aircraft, reads:

"PLACE ORBITER  
HERE...BLACK  
SIDE DOWN."

Those NASA guys are such comedians! 🚀



**MASA Planet**  
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