

NOTICE: Special model rocket regulations are in effect in California, New Jersey, Oregon and Wash-

S-3

MODEL ROCKET



# OFFICIAL CUB SCOUT ACTIVITY KIT

# MODEL ROCKET DERBY SINGLE KIT

CONTAINS ALL PARTS AND INSTRUCTIONS TO ASSEMBLE ONE OFFICIAL "AKELA-1" FLYING MODEL ROCKET

PLUS INSTRUCTIONS FOR A BUILD-IT-YOURSELF LAUNCHER



LAUNCHER, ENGINES AND TOOLS NOT INCLUDED

ADULT SUPERVISION REQUIRED FOR LAUNCHING ROCKETS

**BOY SCOUTS OF AMERICA**

NORTH BRUNSWICK, N.J. 08902  
MELROSE PARK, ILL. 60160  
SUNNYVALE, CA. 94086

**SUPPLY DIVISION**

Catalog No.  
**1654**

Mfg. by **Centuri** Engineering Company, Phoenix, Arizona

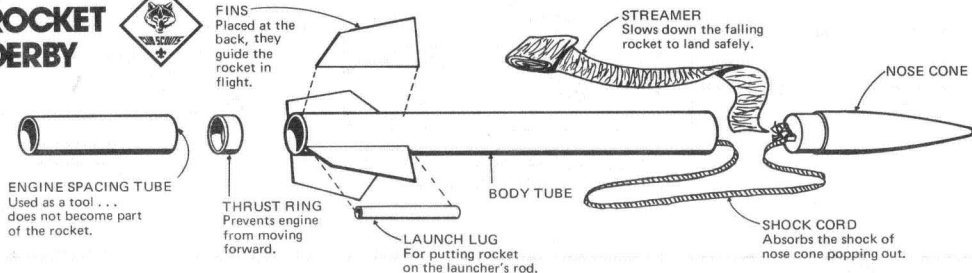
# MODEL ROCKET DERBY



# ASSEMBLY INSTRUCTIONS

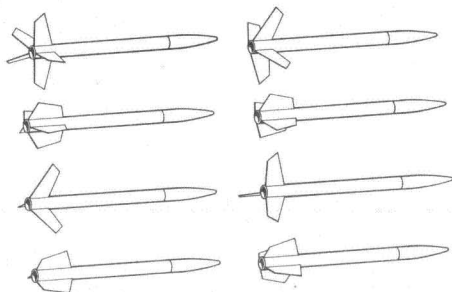
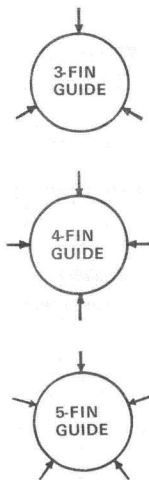
ADULT SUPERVISION REQUIRED FOR LAUNCHING MODEL ROCKETS!

**TOOLS REQUIRED:**  
White glue  
pencil & tape  
modeling knife.

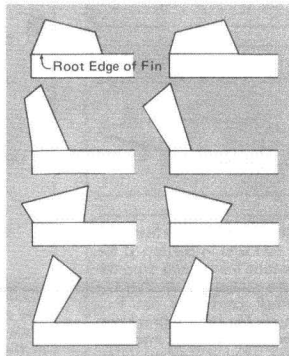


## INTRODUCTION:

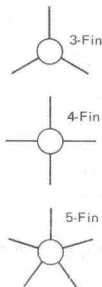
There are many different ways to glue on your fins . . . You can use 3, 4, or all 5, as long as they are evenly spaced. You can use any fin edge as the base, (or "root edge") to glue onto the rocket. Here are 8 of the 24 possible designs.



## SIDE VIEWS



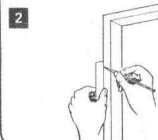
## FRONT VIEWS



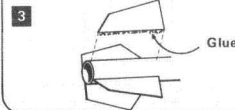
Decide on the number of fins you want to use. Stand body upright on fin guide and mark all positions.



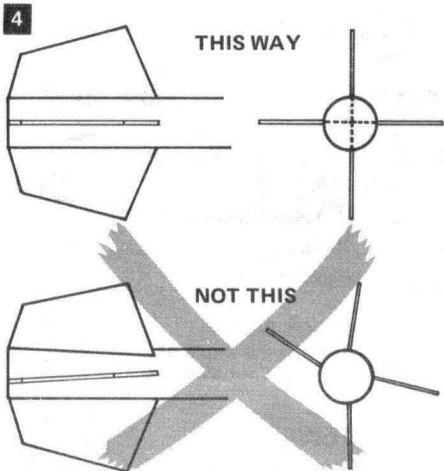
Use a door jamb as a guide line for drawing the lines about 2 inches up the tube.



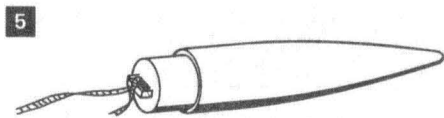
Put a **SMALL** line of white glue along the fin edge. Place fin on the tube, **REMOVE**, allow glue 15 seconds to become tacky. Add a bit more glue, stick fin back on.



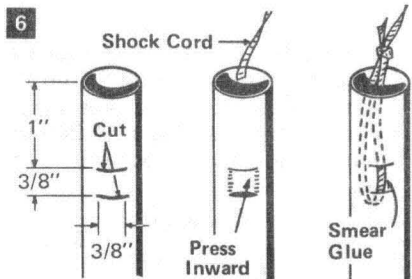
Make sure your fins are on as straight as possible. If they are too crooked, remove them and try again.



Tie one end of the shock cord thru the nose cone eyelet with a double knot.

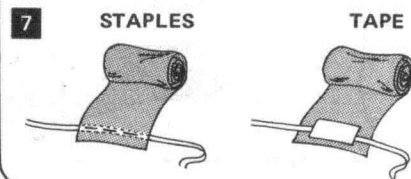


Use a sharp knife or safety-razor blade for this step. Cut two slits in the top of the body. Press the tube inward and drop the shock cord down thru the slot. Pull the end of the shock cord back out thru the top of the tube and tie in a firm knot. Press the depressed portion back into place and smear a film of glue over the joint.



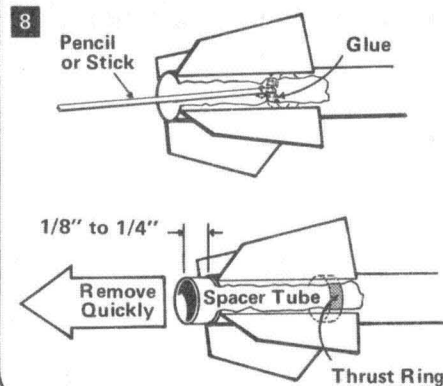
ALL MEASUREMENTS ARE APPROXIMATE

Attach the recovery streamer to the middle of the shock cord. Use either method, but be sure you have a firm bond.

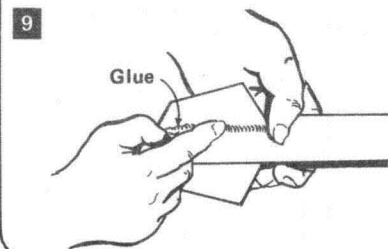


**READ THIS STEP BEFORE DOING IT.**

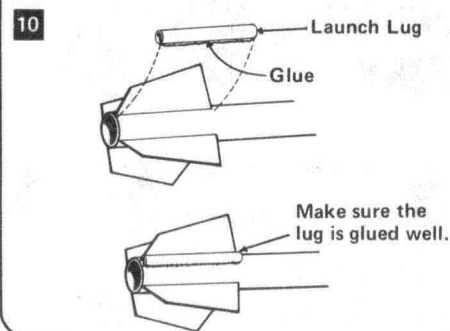
Use a pencil or stick to put a bead of glue around the inside of the body, about 2" from the bottom end. Insert the thrust ring into the end of the tube. Using the engine spacer, push the thrust ring into the tube until the engine spacer sticks out only about 1/8" to 1/4". Remove the spacer quickly before the glue sets.



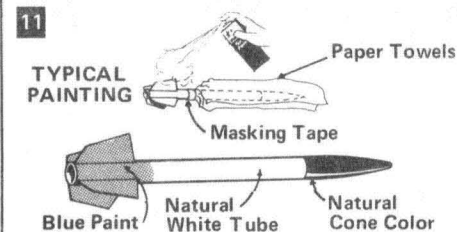
The glue joints of your fins must now be made stronger, so the fins won't fall off in flight. Run a small line of glue along both sides of each fin-body joint. Smooth out the glue with your fingertips, wiping away any extra glue.



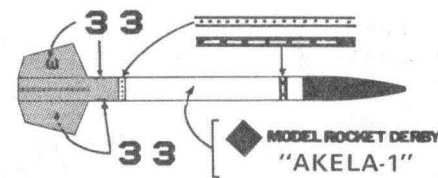
Run a line of glue along one side of the launch lug, and place lug against any one of the fin-body joints.



Your rocket is almost complete. You may want to spray paint all or part of it. Spray enamel works best. If you paint the nose cone, DO NOT use "dope" or lacquer because it attacks the plastic.



When the paint is dry, your rocket is ready for decals. Follow the instructions printed on the back of the decal sheet. If you apply decals on an un-painted tube, be sure to moisten that part of the body tube.



Complete flying instructions are included in the Official Cub Scout ENGINE-PAK 24. The ENGINE-PAK 24 includes engines and other materials for 4 Cub Scout Dens to have a Model Rocket Derby flying contest. Also, instructions are included with all brands of model rocket engines.



OFFICIAL CUB SCOUT ACTIVITY KIT  
**MODEL  
 ROCKET  
 DERBY**

# GENERAL INFORMATION

ADULT SUPERVISION REQUIRED FOR LAUNCHING MODEL ROCKETS!

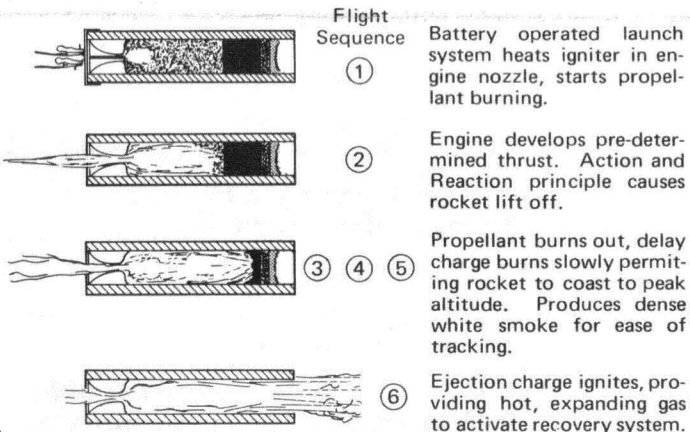
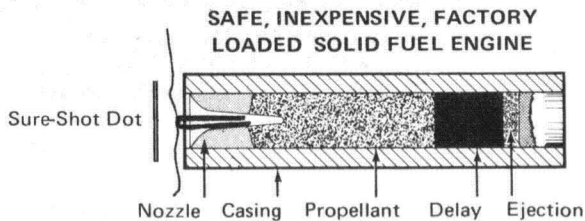
The Cub Scout Model Rocket Derby is a dynamic program that teaches valuable building skills basic scientific principles and builds character thru competition, while having fun.

Building the rockets (under the supervision of an adult who has read this general information sheet) is only the first of several rewarding projects! Cub Scouts can go on to build their own launch system using the instructions on page 4. Finally, Dens and whole Packs can have actual flying contests. The ENGINE PAK 24 is an accessory product which contains a CONTEST GUIDE and enough engines and igniters for up to 8 Cub Scouts in three separate contests.

After the fun of assembly and contests are over, many Cub Scouts will want to take their rockets home for more fun on their own.

Further model rocketry information and supplies maybe found in hobby departments of most stores. All national brands of model rocket products contain complete instructions for proper use.

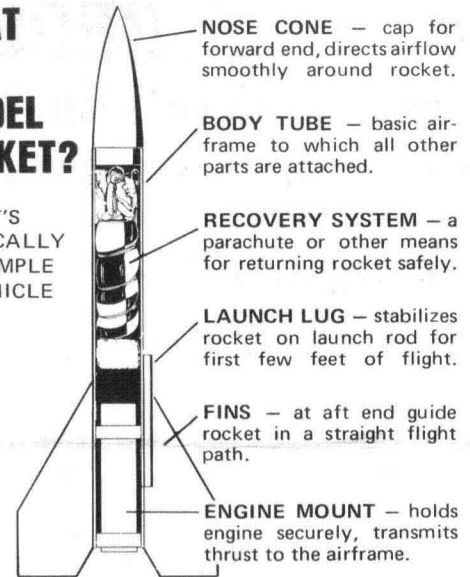
## HOW DO ENGINES WORK?



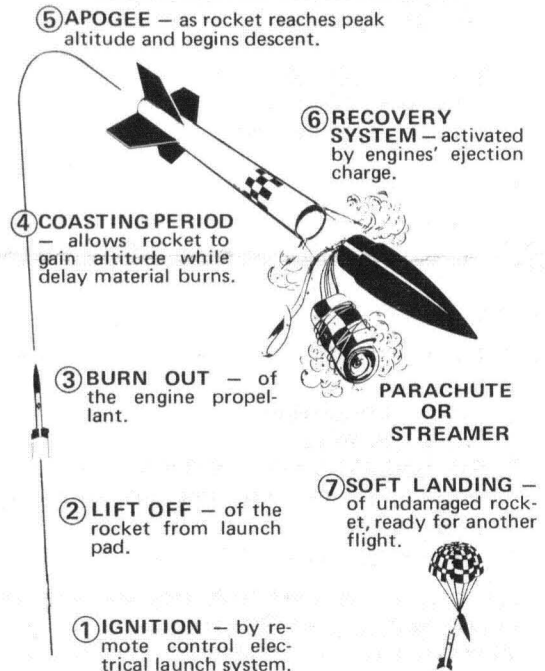
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## WHAT IS A MODEL ROCKET?

IT'S BASICALLY A SIMPLE VEHICLE



## HOW DOES IT WORK?



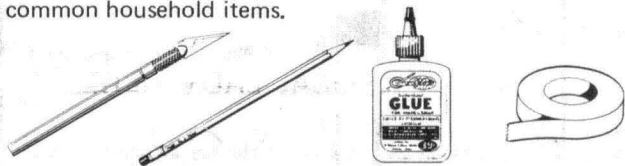


# GROUP ASSEMBLY GUIDE

Here is information for adult supervision of group building sessions.

## WHAT PREPARATION IS NEEDED?

1. Read this General Information folder, the assembly instruction sheet and the package graphics to get a good "feel" of what the project is like.
2. Plan ahead to have the necessary tools before hand. These tools are usually on hand in most Dens, or are common household items.



- 1 **MODELING KNIFE:** One knife can be shared, as it is only used in one minor assembly step. Perhaps you will pick the most careful modeler to do that step for all the others.
- 8 **PENCILS:** For drawing the fin guidelines on the body tube.
- 8 **BOTTLES OF GLUE:** We recommend using only ordinary white glue . . . in small individual plastic squeeze bottles.
- 1 **ROLL OF MASKING TAPE:** Comes in handy for attaching the streamer to shock cord, masking areas for spray-painting and friction-fitting engines in place.

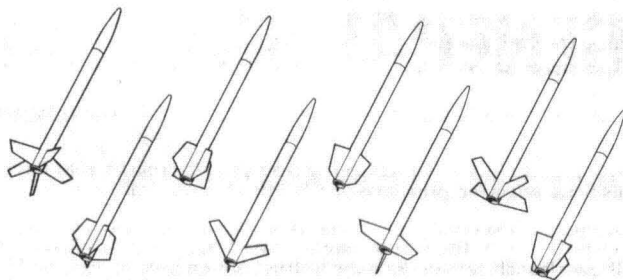
## YOU WILL ALSO NEED:

A few dishes of water for applying decals, rags or paper towels for wiping glue off fingers and 1 or 2 cans of bright colored spray-enamel if your group paints its rockets.

## HOW DO I START?

1. Distribute the main parts. Each Cub Scout receives:
  - 1 *Body Tube*
  - 1 *Sheet of pre-cut fins*
  - 1 *Instruction Sheet*
  - 1 *Bag containing small parts (thrust ring, spacer tube, shock cord, nose cone, launch lug)*
  - 1 *Set of Decals*
  - 1 *Recovery Streamer*
2. Let the group become familiar with the parts while you explain their purpose. This is a good opportunity to introduce the basic principles of Model Rocketry, using the illustrations on the front of this folder.

3. Use a fin and body tube to clearly show the group the variety of fin designs.



## HOW DOES THE CONTEST WORK?

Your Den may want to join with other Dens and go on to actually hold a flying competition.

An accessory product called the ENGINE PAK 24 is available. It includes enough launching supplies for a Den (8 Cub Scouts) to hold 3 different contests:

- **STREAMER DURATION.** . . . rocket which stays up longest is the best altitude "bird".
- **SPOT LANDING.** . . . see whose rocket can recover nearest a pre-marked location.
- **LE MANS START.** . . . a fast-paced contest of launching and recovery skill.

## THE ENGINE PAK 24 CONTAINS:

### 24 "A" POWER MODEL ROCKET ENGINES

These will produce altitudes over 400 feet! This is the most practical altitude for these contests.

### 8 ENGINE INSTRUCTIONS:

With clear illustrated steps for flight preparation.

### 8 SURE-SHOT IGNITER SETS:

For reliable electrical ignition.

### 3 EXTRA IGNITERS

### 1 CONTEST GUIDE with specific information on running the flight contests.

### PLUS FLAME PROOF RECOVERY WADDING

for protecting the recovery system from the engine's ejection charge.

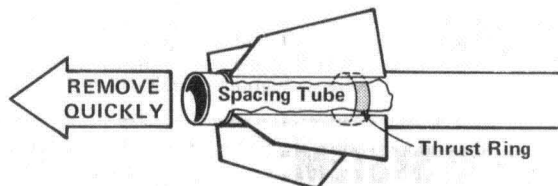
# QUESTIONS & ANSWERS

## CAN THE FINS GO UP FRONT?

Definitely not! The fins must be glued on at the very back of the rocket for it to fly straight. It's just like putting an archery arrow's feathers up near the arrow-head... it causes the arrow to flip-flop while it travels.

## WHAT HOLDS THE ENGINE IN PLACE ?

The thrust ring prevents the engine from moving forward. Instruction sheets that come with engines show how to wrap masking tape around the engine for a tight "friction-fit." Incidentally, the "spacer tube" is the same size, shape and material as the casing of a typical model rocket engine.

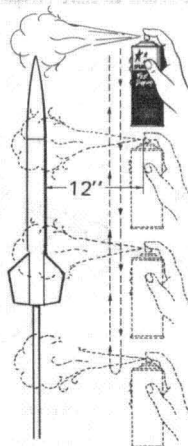


## SHOULD THE ROCKET BE PAINTED?

Painting is optional, as all parts are pre-colored. However, painting will further improve the rocket's appearance and allow for more individuality. Painting also increases the rocket's "life span" by protecting the rocket surface from handling and damp weather. One or two cans of spray enamel and a careful use of masking tape can produce a handsome rocket.

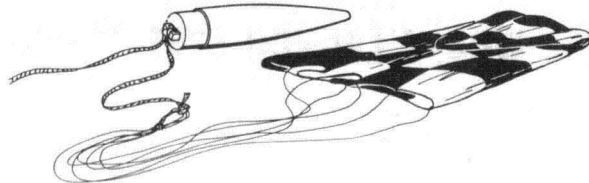
## HOW IS THE ROCKET PAINTED?

Spray painting your finished model with a fastdrying enamel will produce the best results. . . IF IT IS DONE PROPERLY!!! Most important is the number of coats of paint. DO NOT try to paint your model with one heavy coat! Instead, give it a couple of quick, light coats first, THEN a finish coat. Let each dry before applying the next.



## CAN THE ROCKET USE A PARACHUTE?

Its certainly can! A streamer recovery system is used in the Model Rocket Derby because it is more practical for the official contests. However, a 12 inch diameter plastic parachute may be purchased separately at most hobby-shops which carry model rockets. A parachute can simply be tied onto the shock cord.



## WHY USE AN ELECTRICAL LAUNCHER?

Here are the two main reasons:

- The rocket must be guided in its first few feet of flight to be stable and safe in the air.
- Remote-control electric power and special igniters are the only practical way to start the engines burning. Model rocket engines are specially designed so they can not be lit with an ordinary match.

## WHAT ABOUT USED-UP ENGINES?

Throw them away! These safe factory loaded engines are designed for one-time use only. The expended engine casing would not be able to withstand a second firing. This is done on purpose to discourage people from dangerous experiments.

## HOW HIGH WILL THEY GO?

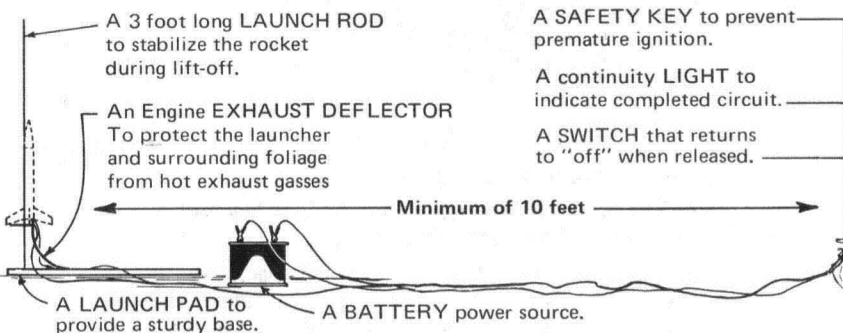
Altitudes of model rockets will vary greatly, depending on the model's length, weight, drag, shape, and many other factors. Knowing how high your rocket will fly helps you pick a large enough launch area. "B" & "C" type engines will of course make the rockets fly higher, but the "A" engines included in the ENGINE PAK 24 are the most suitable for the official Derby.

RECOMMENDED ENGINE	APPROXIMATE ALTITUDE
$\frac{1}{2}$ A6-4	100 - 200 feet
or: A5-4 A8-5	CONTEST ENGINES 350 - 650 feet
B4-6 B6-6	800 - 1200 feet
C6-7	1400 - 2200 feet

# MODEL ROCKET DERBY LAUNCH SYSTEM

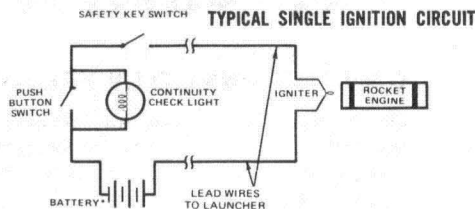
Model rockets are launched only by remote-control electrical means. Inexpensive commercial launchers are readily available, and include all the necessary design features. However, you may wish to build your own. Here are some tips on building a safe, reliable launcher.

## WHAT A LAUNCH SYSTEM CONSISTS OF:



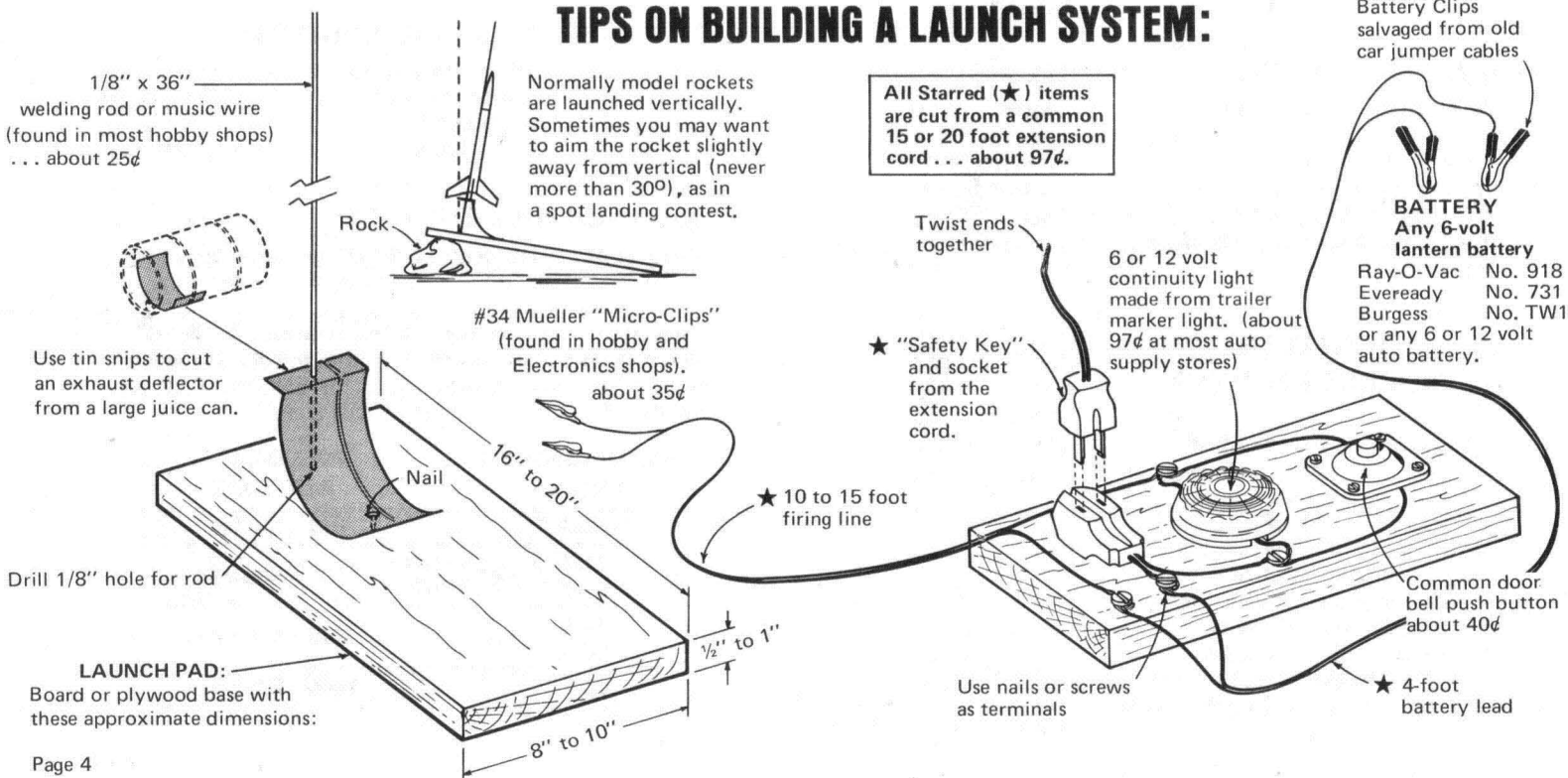
## HOW A LAUNCHER WORKS:

Model Rocket engines are specially designed so they can not be lit with a match, for obvious safety reasons. Electrical ignition works great, and is more realistic.



When the micro clips are hooked up to the engine igniter wires and the safety key switch turned "ON", the continuity light should be lit, thus informing you that the firing circuit is properly hooked up and ready to go. By pushing the button, the electric current passes through the switch instead of being "used up" by the light bulb. The full current is then routed to the igniter wire which in turn glows red hot and ignites the model rocket engine. If the engine does not ignite, read the trouble-shooting remarks that are on the instruction sheet you receive with your engines.

## TIPS ON BUILDING A LAUNCH SYSTEM:



## IMPORTANT NOTICE

### RESIDENTS OF CALIFORNIA, NEW JERSEY, OREGON, WASHINGTON STATE, PLEASE NOTE:

*While Model Rocketry has been safety approved by The Boy Scouts of America and other youth groups, and endorsed by NASA, The Civil Air Patrol, The United States Air Force and The National Fire Protection Association, the above four states still have regulatory legislation for model rocket use. If you live in one of these states, please read the information provided for your state.*

#### CALIFORNIA:

The State of California has recently relaxed its previously restrictive regulations on model rocketry. A license to purchase and fly model rockets is no longer required. You must, however, be over 14 years old to purchase model rocket engines. (You can buy kits at any age.) Parents or Cub Scout Leaders must purchase the "ENGINE PAK-24" for the group.

Before you launch, you still must have your launch site cleared by your local fire official. Protect your right to fly. Go see your local fire official and check up on the new regulations.

#### NEW JERSEY:

Your state requires that model rocket engines be sold only to holders of a valid permit. To obtain a permit to purchase "ENGINE PAK-24's", you must obtain an application form. This application can only be obtained by an adult (over 21 years of age) who accepts full responsibility for safe use of the engines. If you are under 21, your parent, Cub Scout Leaders, or Guardian can write for the application. The only source of the application is:

BUREAU OF ENGINEERING & SAFETY  
MINE SAFETY SECTION  
Room 419  
1100 Raymond Blvd.  
Newark, New Jersey 07102

Upon receipt of your request, the Mine Safety Section will send you the application and Safety Regulation Booklet (NJAC 12:194) Number 24 governing rocket experimentation by amateurs. You return the application forms and a fee of \$2.00 to the Mine Safety Section and a permit will be forwarded immediately. The holder of the permit should bring it along when visiting the Cub Scout Supply store to buy model rocket engines.

#### OREGON:

You or one of your Cub Scout Leaders must obtain a free permit to fly model rockets. Your local Cub Scout Supplier will have blank forms for your convenience. You simply indicate where you plan to fly and visit your local fire department. Your fire marshal will put his "OK" on the form and you then mail it to this address:

OFFICE STATE FIRE MARSHAL  
688 Church Street, N.E.  
Salem, Oregon 97300

Your license will be returned in a day or two. With the license you can purchase "ENGINE PAK-24" and fly at your approved launch site anytime you like.

#### WASHINGTON STATE:

The State Fire Marshal's office is currently studying the revision of its model rocket code in light of the proven safety of model rocketry and of the many endorsements it has received. At this writing the State Fire Marshal has expressed his willingness to allow the Model Rocket Derby program to proceed even while the code is being revised. This consideration is deeply appreciated.

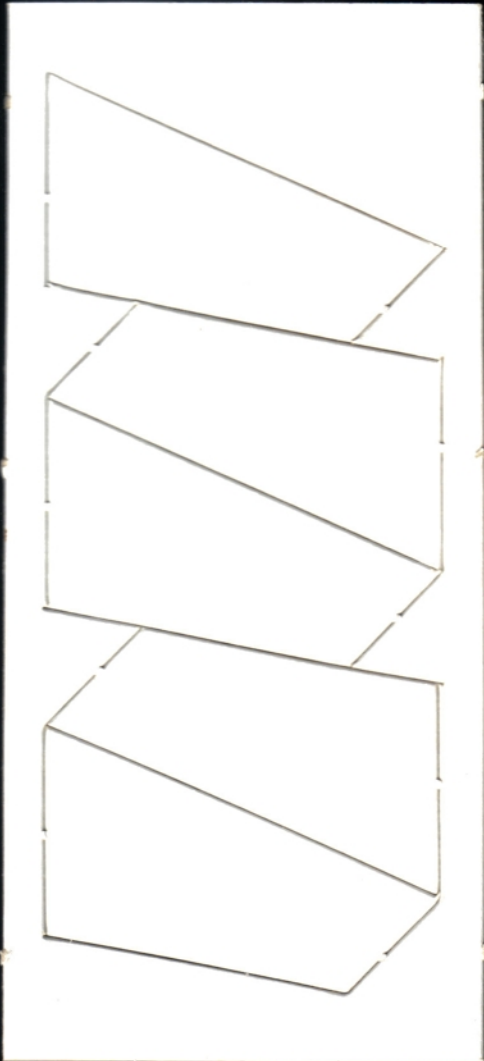
The present understanding is that Adult Cub Scout leaders and parents may purchase engines from authorized Cub Scout Dealers and may run the Model Rocket Derby with adult supervision at all times as specified in the program. For further information, contact the office of the State Fire Marshall. Attention Chief Rex Jordan.

INSURANCE BUILDING  
Olympia, Washington 98504  
Phone 206-753-3605

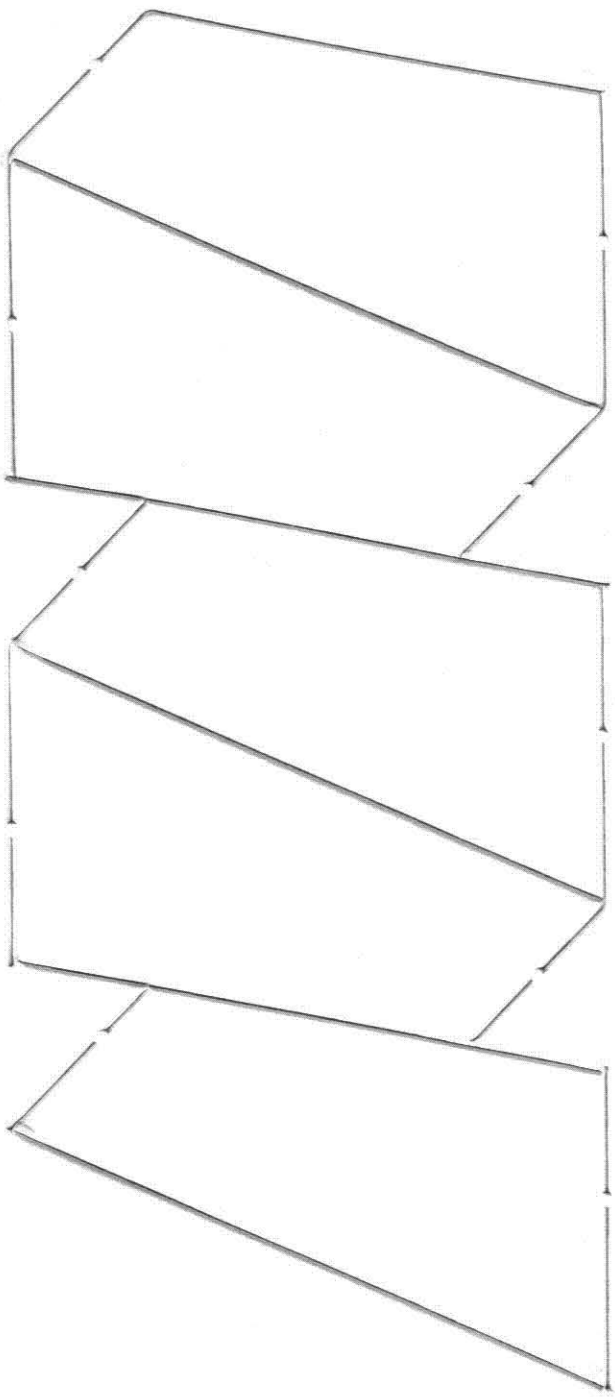
*We regret the inconvenience to residents of the states listed above. These are the last to modernize their model rocket legislation, however, thousands of young people launch model rockets in these states, abiding by their laws. We urge you to obey the laws. The procedures have been carefully worked out and are not difficult to comply with. By following them, we hasten the time when these states join the other 46 that actively support model rocketry.*

All reasonable care is used in the manufacture of these products. While model rockets occasionally fail to perform as expected, this is usually the result of the rocketeer's improper assembly or preparation. For those instances where the product itself seems to be defective, return the rocket and engine directly to the factory for replacement or repair. Please include return postage and an explanatory note.





1 INCH  
SQUARE





MODEL ROCKET DERBY  
MODEL ROCKET DERBY



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"AKELA-1" — — — — —



MODEL ROCKET DERBY  
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MODEL ROCKET DERBY  
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## Centuri Cub Scout Rocket Derby AKELA-1 parts list

Description	Centuri #	Semroc#
Body Tube: 9" x .759"	ST-79	ST-790
Engine thrust ring: .385" x .715"	TR-7	TB-7
Nose Cone: 3" cone, .6" shoulder	PNC-76	BC-70 (balsa)
Shock Chord: 1/8" x 24" elastic	SC-18A	EC-124
Streamer: 1.5" x 32" orange crepe paper	unk.	na
Launch Lug: 1/8" x 2.25"	LL-2	LL-122