



MODEL PRODUCTS  
OF GENERAL MILLS FUN GROUP INC.  
126 GROESBECK HIGHWAY  
MOUNT CLEMENS, MICH. 48043

# ASTROBEE-D

**READ AND FOLLOW ALL INSTRUCTIONS.  
AN ADULT SHOULD SUPERVISE EACH FLYING  
MODEL ROCKET LAUNCHING.**

A flying model rocket is a scientifically-designed educational model . . . NOT A TOY! It is capable of attaining speeds up to 400 miles per hour. If mis-used, it could be dangerous. It should be treated with care and respect. It should be used only as instructed.

Build this kit only according to instructions. Do not alter the design in any way because changes could make it unsafe in flight. This model rocket kit was designed to fly straight and high if built according to instructions.

Solid propellant model rocket engines are specifically designed for the sole purpose of propelling model rocket vehicles. They are scientifically designed, produced on computer-controlled automatic machinery, and subjected to rigid statistical quality control tests. It is very important that caution be exercised in their use. All instructions must be read thoroughly first and followed completely. Model rocket engines are not toys and are designed and intended for propelling model rockets. Their mis-use must be completely avoided.

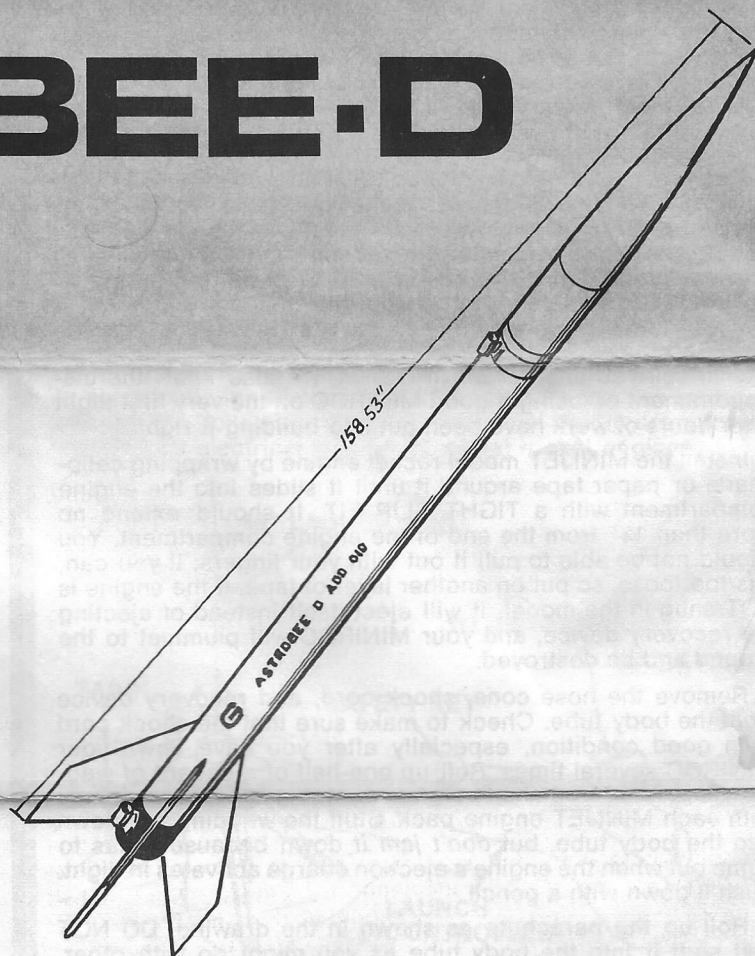
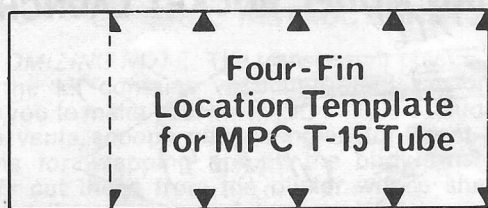
Model rocketry has grown into a full-scale national and international activity and has proven itself to be as safe as other hobbies when common sense safety codes such as the NAR-HIAA Safety Code are followed. Model rocketry will continue to grow every time you fly your model rocket safely.

**NOTE:** The kit was designed to use ONLY the new MPC MINIJET model rocket engines that are smaller and lighter than other makes of model rocket engines of similar power. Other model rocket engines will not fit your MPC MINIROC. Use only those MPC MINIJET model rocket engine types recommended for this model rocket.

## **IF AT FIRST YOU DON'T SUCCEED: TRY READING THE INSTRUCTIONS!**

Before you begin building, **READ THE INSTRUCTIONS!** Even if you think you are an experienced model builder, you may have trouble correctly assembling this new MINIROC kit if you don't follow instructions. We've checked these instructions with both novice and expert model rocketeers, and the assembly sequence has been designed for the most rapid assembly possible.

CUT OUT THIS TEMPLATE AND USE IN STEP 7.



## **About the Real Rocket:**

The Astrobee D is a small, solid-propellant sounding rocket designed to carry a payload of 7.5 to 50 pounds up to an altitude of 90 miles to measure the various phenomena of the earth's upper atmosphere. It was designed and developed by the Space General Corporation, a Division of Aerojet-General Corporation. It is a small rocket, only 6.0" in diameter and 158" long. It weighs 227.5 lb. at launch carrying a 33.5-lb. payload of scientific instruments. Its solid propellant rocket motor produces a thrust of 5200 lbs. to boost it into the air, then a thrust of 2000 lbs. to accelerate it as a sustainer. The motor burns for 15.5 seconds, boosting the Astrobee D to a speed of 5050 feet per second.

## **About Your Model:**

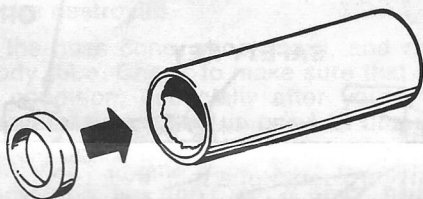
The MPC MINIROC Astrobee D scale model is an accurate scale model of the second Astrobee D flown at White Sands Missile Range, New Mexico on June 8, 1970. The model has been designed to a scale of 1 to 10.152, inches, which means that every inch on the model is equal to 10.152 inches on the real Astrobee D. The scale of the model was determined by dividing the diameter of the real rocket, 6.00" by the diameter of the model, 0.595". All dimensions of the real Astrobee D were then divided by this number to obtain the scale dimensions of the model.

## RECOMMENDED TOOLS FOR BUILDING MINIROCS.

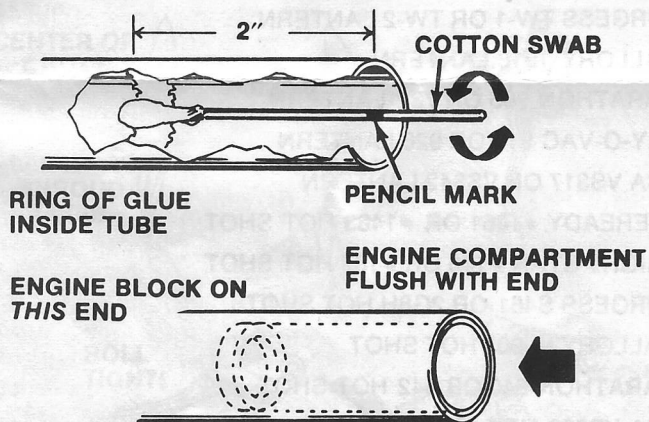
1. Sharp modeling knife. (Watch your fingers!)
2. Glue (Such as White glue, Tite-Bond glue, or Ambroid model airplane glue are the three types that work best. Other types don't seem to hold well at rocket flight speeds.)
3. Sharp pencil.
4. No. 220 or No. 320 fine-grit sandpaper
5. Cotton applicators (Q-tips or equivalent)
6. Paint in desired colors (Such as Krylon spray paint, Palmer Rocket-Glare, or Floquil Poly-S)
7. Balsa filler coat and sanding sealer (Such as Pactra brand. Available at your hobby shop.)
8. Small ruler.
9. Paper Clip

### NOW BEGIN ASSEMBLY:

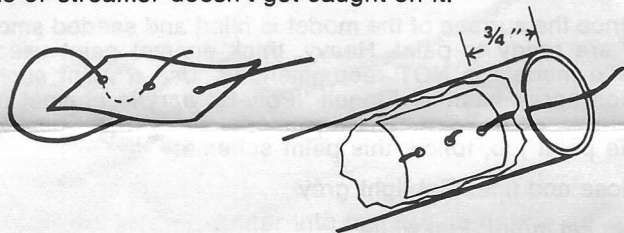
- 1 Put a thin ring of glue around one end of the engine compartment. Insert the O-shaped engine block so that it is *flush* with the end of the engine compartment.



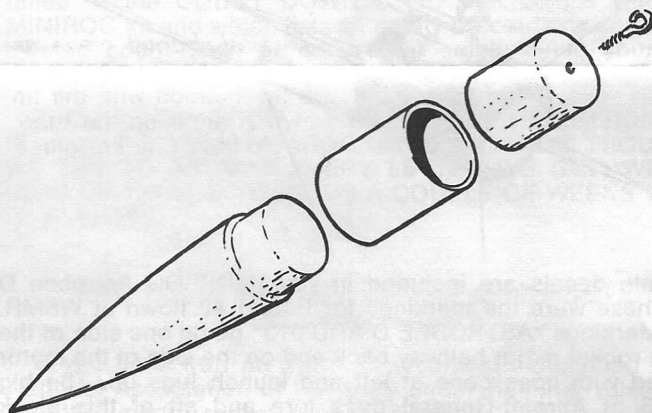
- 2 With the pencil, make a mark on a cotton applicator (Q-tip) 2 inches from the end. Place glue on the cotton. Insert Q-tip into one end of the body tube up to the pencil mark and apply the glue around the *inside* of the body tube 2 inches from the end. Remove Q-tip. Insert engine tube into body tube with the engine block going in first. Push the engine compartment into the body tube until the end is *flush* with the end of the body tube.



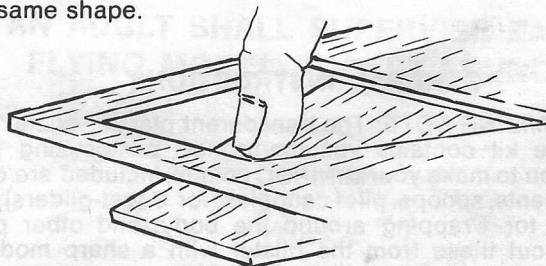
- 3 Lace the shock cord through the paper shock mount as shown in the drawing. Place glue on one side of the shock mount. Insert shock mount into end of body tube opposite from the end with the engine compartment installed. Push shock mount into tube until it is at least  $\frac{3}{4}$ " from the end of the tube. Press down against inside surface of tube. Hold in place with paper clip until glue dries. (If you don't install the shock mount far enough into the body tube, it will interfere with putting on the nose cone when you get ready to launch.) Make sure that it is flush against the tube so that the parachute or streamer doesn't get caught on it.



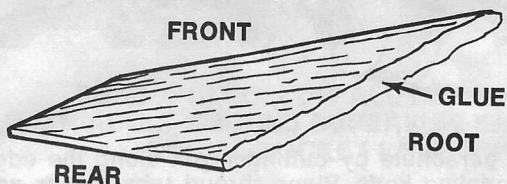
- 4 Assemble the payload nose section by gluing the balsa plug into the small payload compartment so that  $\frac{1}{2}$ " of it sticks out. The nose cone is inserted into the front end of the payload section. DO NOT glue the nose cone to the payload section if you wish to put things into the payload section later. Screw the screw eye into the center of the base of the balsa plug. Then remove the screw eye and squirt the hole full of glue. Re-insert the screw eye into the hole. It is now glued in place and cannot easily be pulled out.



- 5 Remove the die-cut fins from the balsa sheet. Do this carefully. If necessary, complete the cutting with your modeling knife. Do not try to punch the fins out of the sheet if they don't come easily. Line them up and sand them so that they are all the same shape.

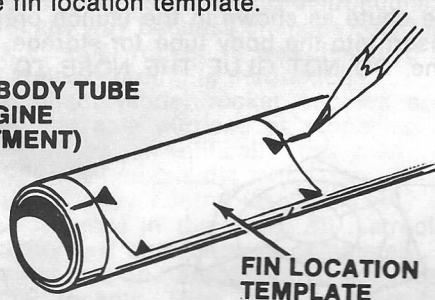


6 Put a layer of glue on the root of each fin where it will be joined to the body tube. Do not glue to the body tube at this time. Set each fin aside to dry. You are making a "double glue" joint that will later be very strong. This is the first step in making a double glue joint.

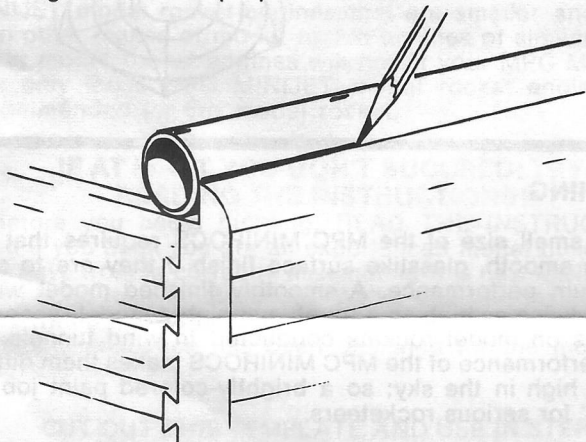


7 Wrap the fin location template around the end of the body tube in which you have installed the engine compartment. Mark the location of the fins on the body tube with the pencil. Remove the fin location template.

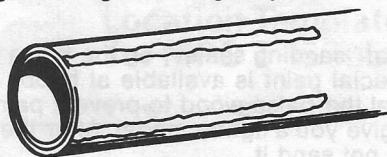
REAR OF BODY TUBE  
(WITH ENGINE  
COMPARTMENT)



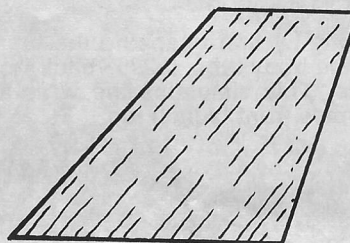
8 Using the edge of a drawer or other V-shaped piece as shown in the drawing, draw a line with the pencil up the tube from each place you have marked a fin location with the fin template. These lines should be drawn straight up the tube. You will use them later to make sure that the fins are glued on straight and in the proper location.



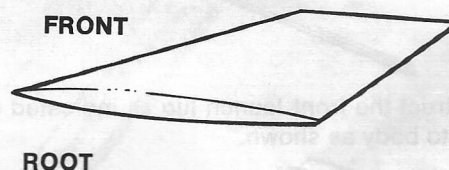
9 Put a thin layer of glue on the body tube where you will later glue the fins. Let this layer of glue dry. This is the second step in making a strong double glue joint.



10 Sand the fins to a tapered cross-section as shown in the drawing.

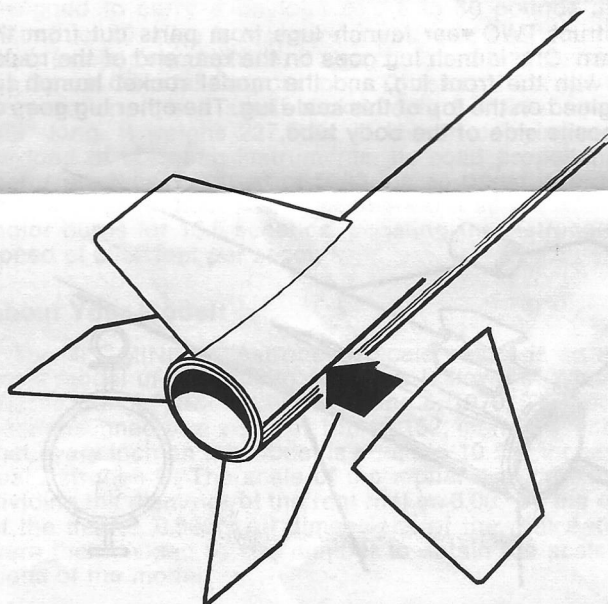


FRONT  
VIEW



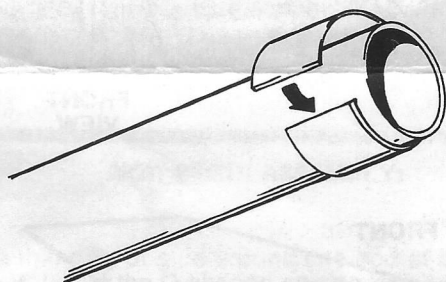
11 Glue each fin to the body, one at a time, letting each one dry before going to the next. Put a thin layer of glue on the body where the fin will be glued. Put a thin layer of glue on the fin root where it will be glued to the body. *Carefully* affix the fin to the body *making sure* that it is aligned with the body tube; if it is not, your model will spin in flight. Make sure that it is sticking straight out from the body tube. **LET IT DRY** before trying to glue on the next fin!

If you do a sloppy job here, your model will fly in a sloppy manner. If you don't do it carefully, your model will not fly well.

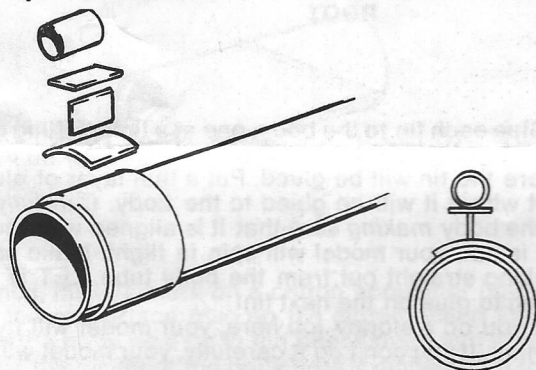


If you do not wish to install scale launch lugs on your Astrobee D model, affix a launch lug on the side of the body tube as you would normally do for a non-scale model rocket. For scale launch lugs, first cut out the launch lug parts from the tag board card.

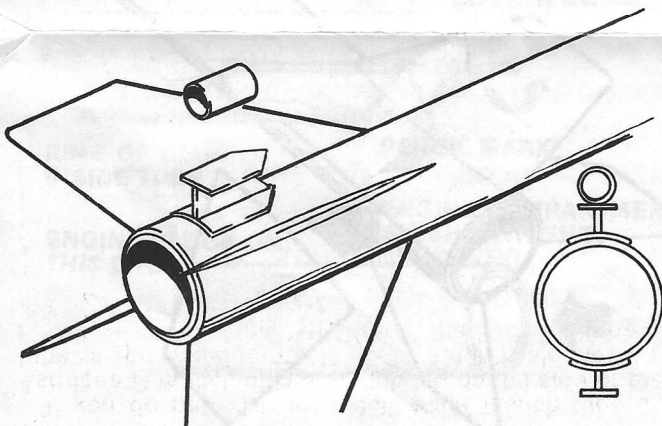
- 12** Form the front launch lug by first wrapping the tag board band around the front of the body tube, 0.295" back from the front edge. Glue in place. This simulates the wrap-around metal band of the prototype's front launch lug.



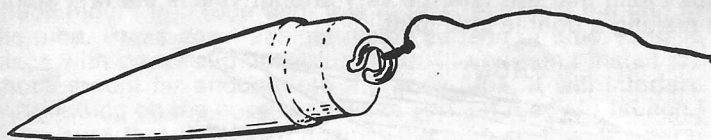
- 13** Construct the front launch lug as indicated on the drawing. Glue to body as shown.



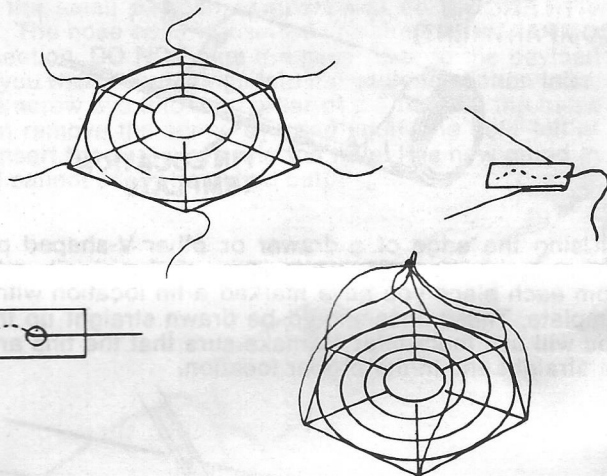
- 14** Construct TWO rear launch lugs from parts cut from the tag board. One launch lug goes on the rear end of the rocket in line with the front lug, and the model rocket launch lug ring is glued on the top of this scale lug. The other lug goes on the opposite side of the body tube.



- 15** Tie the free end of the shock cord to the screw eye in the base of the nose. Use two or three knots. Make them tight.



- 16** Assemble the parachute by cutting it out along the edge lines with the modeling knife. Place shroud tabs on one end of each shroud line, and attach shroud lines to the corners of the chute with the adhesive-backed shroud tabs. Carefully bring the free ends of the shroud lines together evenly, and tie them together with a single overhand knot. Tie the resulting shroud line end to the screw eye at the base of the nose. Roll the chute as shown in the launch preparation instructions, insert into the body tube for storage, and put on the nose cone. **DO NOT GLUE THE NOSE TO THE BODY TUBE!**



## FINISHING

The small size of the MPC MINIROCS requires that they have a smooth, glasslike surface finish if they are to attain maximum performance. A smoothly finished model will fly almost twice as high as a rough, unpainted model, according to tests on model rockets conducted in wind tunnels. The high performance of the MPC MINIROCS makes them difficult to see high in the sky; so a brightly-colored paint job is a "must" for serious rocketeers.

- 1** First, gently sand all balsa surfaces of your model to remove rough spots. This will make it easier for you to fill and paint it.

- 2** Put a coat of "sanding sealer" on the balsa parts and body tube. This special paint is available at hobby shops. Its purpose is to seal the balsa wood to prevent paint from soaking into it. It will give you a lighter model. After the sanding sealer has dried, do not sand it.

3 The wood grain of the balsa wood should be filled to give a smooth surface for maximum flight performance. "Balsa fillercoat" is available at most hobby stores. If you can't find it, make your own by adding a couple of teaspoons of talcum powder to a bottle of clear model airplane dope. Apply filler coat to all balsa parts and let it dry. Then sand it down smooth. Apply at least three coats of fillercoat, sanding smooth between each coat. The filler coat will fill up the cracks of the balsa wood grain and give you a smooth finish for the paint job.

4 Once the surface of the model is filled and sanded smooth, you are ready to paint. Heavy, thick enamel paint used on plastic models is NOT recommended. Use a paint such as Krylon spray paint of Floquil "Poly-S" acrylic enamel for a thin, even coat. Paint the entire model white first. Then, for a scale paint job, follow this paint scheme:

Nose and fins: Flat light grey

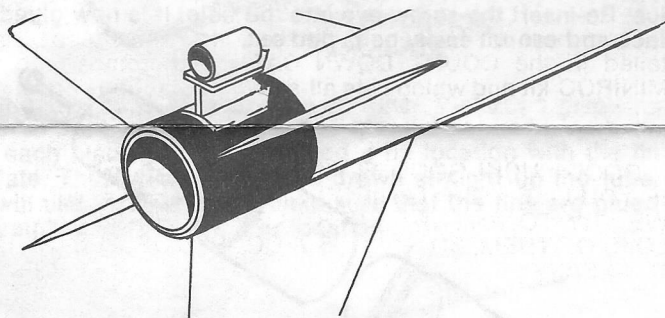
Rocket motor: Flat white

Payload cylindrical section: Flat dark gray

Tail shroud (body tube from rear end to 0.764" from rear end): flat black.

Forward launch lug and band: silver

Aft launch lugs: gold



5 Scale decals are included in your MINIROC Astrobee D kit. These were the markings for Round #2 flown at WSMR. The Markings "ASTROBEE D ADD 010" go on one side of the white rocket motor halfway back and on the side of the motor viewed with nose cone at left and launch lugs up. The big red G of Aerojet-General goes fore and aft of this black lettering. The S/G insignia goes on the opposite side of the rocket motor between the fins. The other decals on the sheet are intended for use on non-scale models that you may wish to build from the Astrobee D kit parts; these additional marking did not appear on the real rocket.

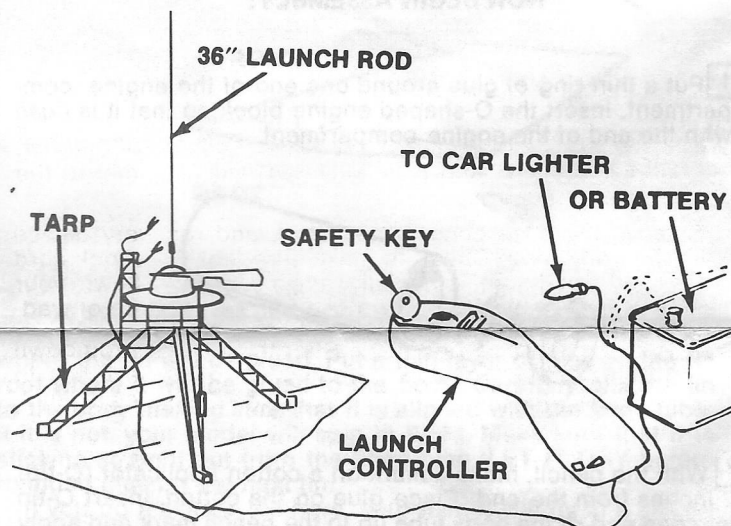
## GENERAL INSTRUCTIONS

**CUSTOMIZING NOTE:** The transparent plastic "blister" that covers the kit contains vacuum-formed customizing parts to allow you to make your MINIROC unique. Included are cable shrouds, vents, scoops, pilot canopies (for Boost-gliders), corrugations for wrapping around the body, and other parts. *Carefully* cut these from the blister with a sharp modeling knife. Glue them to the model using plastic cement or rubber cement. Paint *only* with enamel.

## FLIGHT INSTRUCTIONS:

All MPC MINIROC model rockets are designed to be launched from regular model rocket launch pads such as the MPC Lunar-Lectric or similar launching system. **IMPORTANT:** All MINIROCS must be launched from a  $\frac{1}{8}$ " diameter *straight* launch rod at least 36 inches long!

All MPC MINIROC model rockets must be launched with electrical ignition. Fuses of any sort are highly dangerous, can cause engine malfunction, create a fire hazard around the launch pad after launch, and are illegal to use in most states and localities. They don't use fuses at Cape Kennedy, do they? Your hobby store has an approved electrical ignition system with the proper safety interlocks such as the MPC LUNAR-ELECTRIC handcontroller with its safety key and ready light. You plug the MPC LUNAR-ELECTRIC into the cigarette lighter outlet of your father's automobile to get the current you need to electrically ignite your MINIJET engine. You can also get one of the following portable batteries which are recommended for electrical ignition of model rocket engines.



## RECOMMENDED PORTABLE BATTERIES FOR MODEL ROCKET IGNITION

EVEREADY #731 OR #732 LANTERN

BRIGHT STAR #158 LANTERN

BURGESS TW-1 OR TW-2 LANTERN

MALLORY 1918 LANTERN

MARATHON 986 OR 732 LANTERN

RAY-O-VAC 918 OR 926 LANTERN

RCA VS317 OR VS342 LANTERN

EVEREADY #1461 OR #1463 HOT SHOT

BRIGHT STAR #146 OR #187 HOT SHOT

BURGESS S461 OR 2G8H HOT SHOT

MALLORY M-907 HOT SHOT

MARATHON 640 OR 642 HOT SHOT

RCA VS039 HOT SHOT

WARD 7MW OR 2335 HOT SHOT

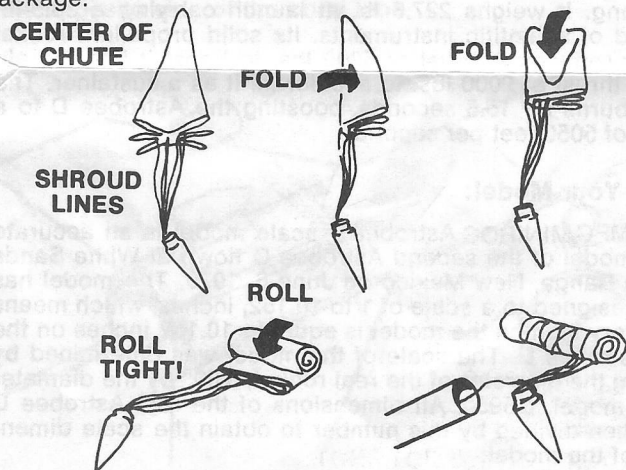
Choose a clear level area at least 500 feet on a side for your launch area. Clear the area under the launch pad of dry grass or other inflammable materials. If possible, set your launch pad on a tarpaulin or piece of canvas (it will also keep the knees of your pants clean!). Your launch site should be clear of trees, power lines, and high buildings. It should be away from airports, highways, and freeways.

For your first flights with your MINIROC, use the 1/2A3-3m or 1/2A3-5m MINIJET model rocket engine. After you *know* that your MINIROC flies well with these low-power engines, double the power by using the A3-4m or A3-6m MINIJETS. The powerful B3-5m and B3-7m MINIJETS will put nearly all MINIROCS completely out of sight into the sky overhead; if you use these powerful engines on your first flight, you will probably lose your MINIROC model. Although MPC would like to sell you another MINIROC kit, we also know the disappointment of losing a good MINIROC on the very first flight after hours of work have been put into building it right.

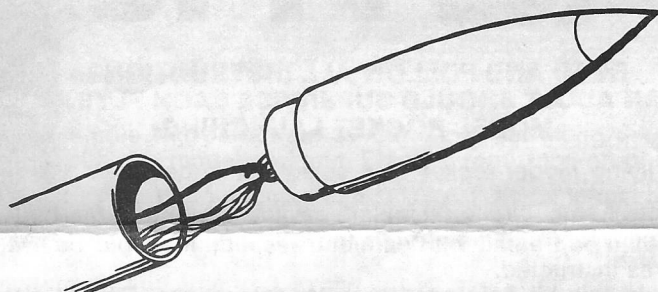
Install the MINIJET model rocket engine by wrapping cellophane or paper tape around it until it slides into the engine compartment with a TIGHT SLIP FIT. It should extend no more than 1/4" from the end of the engine compartment. You should not be able to pull it out with your fingers; if you can, it is too loose, so put on another layer of tape. If the engine is NOT snug in the model, it will eject itself instead of ejecting the recovery device, and your MINIROC will plummet to the ground and be destroyed.

Remove the nose cone, shock cord, and recovery device from the body tube. Check to make sure that the shock cord is in good condition, especially after you have flown your MINIROC several times. Roll up one-half of a square of wadding separated from the fiberglass wadding supply that comes with each MINIJET engine pack. Stuff the wadding roll down into the body tube, but *don't jam* it down because it has to come out when the engine's ejection charge activates in flight. Push it down with a pencil.

Roll up the parachute as shown in the drawing. DO NOT just stuff it into the body tube as you might do with other, larger model rockets! It must be rolled tightly into a cylinder in order to slide easily into the smaller MINIROC body tube. For extra-sure protection of the chute against melting by the ejection charge, wrap it tightly in a small piece of flameproof tissue. Make sure that the wrapped parachute cylinder slides EASILY into the body tube and does not catch on the shock mount. Stuff the extra shock cord in on top of the parachute package.



Install the nose cone on the front of the body tube. If it is too tight, sand it down until it slides on and off easily. If it is too loose, build up the shoulder with one or two layers of tape. Make sure that shroud lines, shock cord, etc. are not jammed between the nose cone shoulder and the front of the body tube.



Install the electric igniter into the engine nozzle according to the instructions that come with each MINIJET engine pack. Most ignition failures occur because the modeller does not install the igniter AS FAR AS IT WILL GO into the nozzle and because he does not press the tape down onto the nozzle AS TIGHTLY AS POSSIBLE. Experienced model rocketeers always check these little points and rarely suffer from mis-fires.

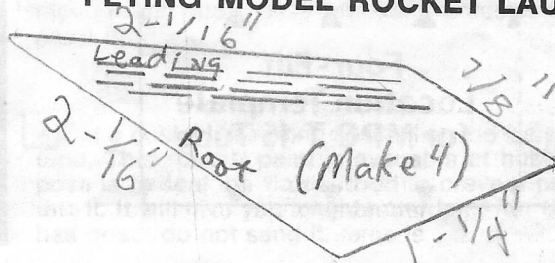
From here on to launch, please follow the procedure detailed in the COUNT DOWN CARD that comes with your MINIROC kit and which lists all safety precautions and a step-by-step count-down procedure for safely flying your MPC MINIROC.

GOOD LUCK! GOOD FLYING! LET US HEAR FROM YOU IF YOU LIKE YOUR MINIROC OR IF YOU HAVE TROUBLES. WE TRY TO ANSWER EVERY LETTER WE GET. WE GET LOTS OF THEM, SO GIVE US A COUPLE OF WEEKS TO DO IT, PLEASE!

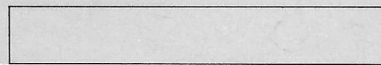
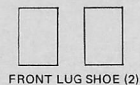
### ARE YOU A MEMBER OF THE MPC ROSTER OF CHAMPIONS?

If you have won an event in a contest sanctioned by the National Association of Rocketry under national rules using an MPC model rocket propelled by an MPC model rocket engine, you may be eligible for this exclusive association of winners. Write us for full details and application form.

### AN ADULT SHALL SUPERVISE EACH FLYING MODEL ROCKET LAUNCH



MINIROC  
ASTROBEE-D  
TAG BOARD PARTS



REAR LUG  
BASE (2)

0  
10



20

0

1

2

3

4

5

6

7

8

9

10

11

12

**DIGGERS**  **HOTLINE**

MILW. AREA  
TOLL FREE  
TDD  
WEBSITE:

259-1181  
1-800-242-8511  
1-800-542-2289  
[www.DiggersHotline.com](http://www.DiggersHotline.com)