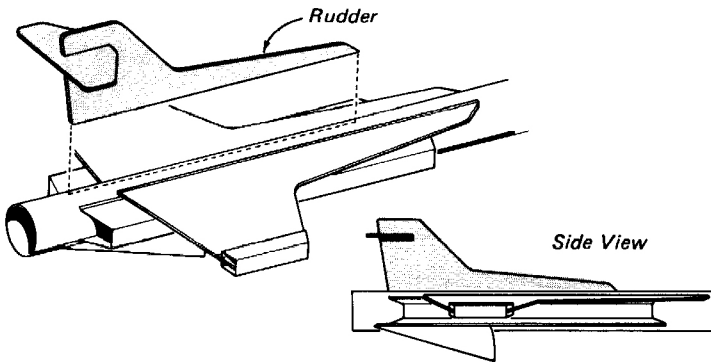




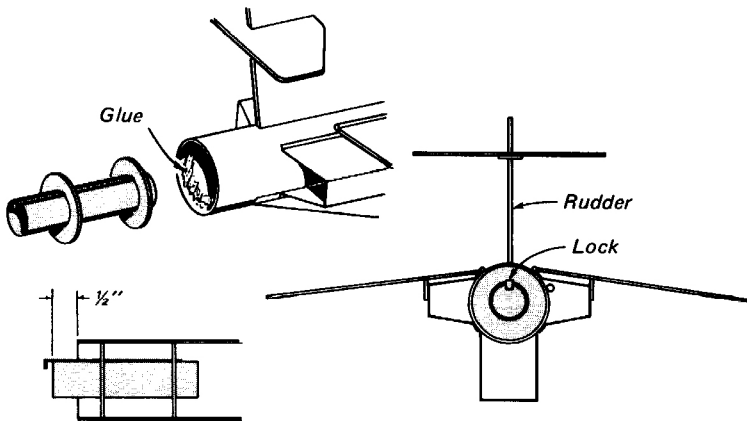
28 Follow this standard procedure for gluing the rudder to the tube:

- Apply a SMALL line of glue to edge of rudder.
- Join the rudder to the tube.
- Separate the parts and allow several seconds for glue to become tacky.
- Apply another SMALL line of glue
- Re-join the parts neatly and allow to dry.

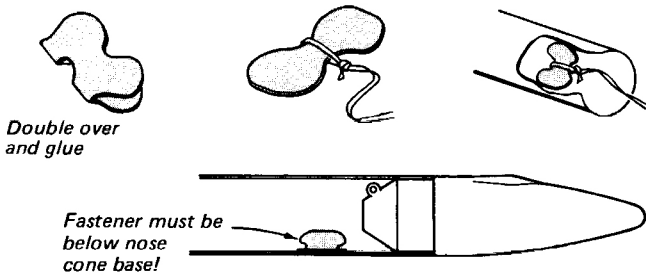
29 Glue the rudder to that it is approximately the same distance up the tube as the main ducts.



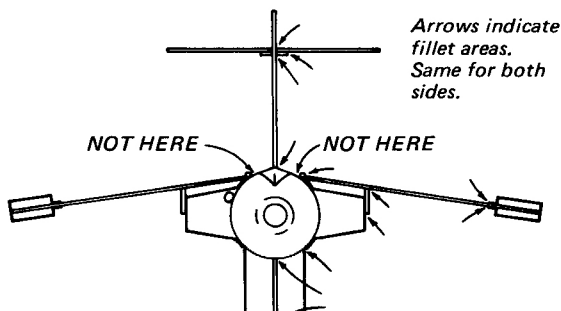
30 Install the engine mount making sure that the engine lock is towards the top of the ship. About 1/2" of the engine tube should stick out the back.



31 Tie one end of the shock cord around its fastener as shown, with a double knot. Glue fastener far enough down into body tube to allow full insertion of the nose cone later. Hold fastener until glue sets.



32 VERY IMPORTANT: Apply glue fillets to every exposed joint except where noted. Set rocket aside to dry, but check it to be sure glue does not run and parts do not sag!

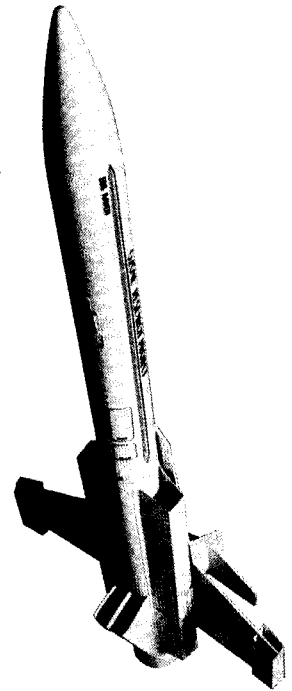


Centuri #5312

SUPER KIT T.M.

E.S.S. RAVEN T.M.

The E.S.S. Raven is the proud flagship of the Earth Science Service (E.S.S.). The Service was founded in 1981 when leading scientists united in a world federation that cuts across national boundaries and politics. The E.S.S. has pushed the frontiers of science ever outward with the recently announced, Faster-Than-Light Drive, and the rumors of time-travel. The Raven is part of the E.S.S. Ozone Research Project which tests the upper stratosphere. Based somewhere in the Sierra Mountains, the Raven can fly to the very limits of the atmosphere. The huge lower scoop gathers air samples to be analyzed by the vast ship-board computer buried within the huge vessel.



MODEL ROCKETEER'S SAFETY CODE

CONSTRUCTION

My model rockets will be made of only lightweight materials such as paper, wood, plastic, and thin metallic foils, with the exception of payloads and engine holders made of wirelike material.

ENGINES

I will use only pre-loaded factory made model rocket engines in the manner recommended by the manufacturer. I will not change in any way nor attempt to reload these engines.

RECOVERY

I will always use a recovery system in my model rockets that will return them safely to the ground so that they may be flown again.

WEIGHT LIMITS

My model rocket will weigh no more than 453 grams (16 oz.) at liftoff, and the engines will contain no more than 113 (4 oz.) of propellant, as prescribed by Federal Regulations.

STABILITY

I will check the stability of my model rockets before their first flight except when launching models of already proven stability.

LAUNCHING SYSTEM

The system I use to launch my rockets will be remotely controlled and electrically operated, and will contain a switch that will return to "off" when released. I will remain at least 10 feet away from any rocket that is being launched.

LAUNCH SAFETY

I will not let anyone approach a model rocket on a launcher until I have made sure that either the safety interlock key has been removed or the battery has been disconnected from my launcher.

LAUNCH AREA

My model rockets will always be launched from a cleared area, free of any easy-to-burn materials, and I will only use non-flammable recovery wadding in my rockets.

BLAST DEFLECTOR

My launcher will have a blast deflector device to prevent the engine exhaust from hitting the ground directly.

LAUNCH ROD

To prevent accidental eye injury I will always place the launcher so the end of the rod is above eye level or cap the end of the rod with my hand when approaching it. I will never place my head or body over the launching rod. When my launcher is not in use I will always store it so that the launch rod is not in an upright position.

POWER LINES

I will never attempt to recover my rocket from a power line or other dangerous places.

LAUNCH TARGETS AND ANGLE

I will not launch rockets so their flight path will carry them against targets on the ground, and will never use an explosive warhead nor a payload that is intended to be flammable. My launching device will always be pointed within 30 degrees of vertical.

PRE-LAUNCH TEST

When conducting research activities with unproven designs or methods, I will, when possible, determine their reliability through pre-launch tests. I will conduct launchings of unproven designs in complete isolation from persons not participating in the actual launching.

FLYING CONDITIONS

I will not launch my model rocket in high winds, near buildings, power lines, tall trees, low flying aircraft or under any conditions which might be dangerous to people or property.

CENTURI Engineering Co., Inc., Phoenix, AZ 85001

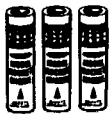
Printed in U.S.A. 081579

HOW IT WORKS

Your E.S.S. Raven model rocket is designed to fly in the same manner as most model rocket kits. The electrically ignited motor blasts the Raven off the launch pad, guiding it into proper flight by the launch rod. The rocket continues coasting to peak altitude while the motor's delay-charge burns. Then the ejection charge ignites, pushing out the nose cone and parachute system. Your Raven drifts to earth ready to be prepared for another flight.

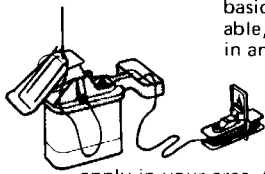
WHAT IT TAKES TO FLY

You will need engines, igniters, an electrical launch system and parachute wadding to fly your rocket. These supplies are NOT included in individual rocket kits, but are available separately and ARE included in every Centuri Starter Set or Rocket Outfit.



We recommend using Centuri engines; each package includes the famous "Sure-Shot" igniters, acclaimed as the world's most reliable model rocket igniter.

The popular Centuri "Powr-Pad" is an ideal basic launch system; compact, highly portable, reliable, and offering features not found in any other launch system.



Always use standard remote-control electrical ignition and follow the engine recommendations. Be sure to comply with any laws that may apply in your area, for the good of Model Rocketry and your own enjoyment.

RIGHT MATERIALS FOR THE JOB

Different model rocket kits are made out of a wide variety of materials, depending on the needs of each kit. The chart below explains why this particular kit is designed using certain materials.

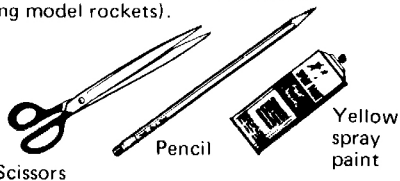
PART	REQUIREMENTS	MATERIAL
Fins	No tools required Precision edges	Pre-cut Fibreboard
Nose Cone	No tools required Durability	Molded Styrene

TOOLS YOU WILL NEED

In addition to the parts supplied you will need the following tools to assemble and finish this kit (DO NOT use model airplane glue for building model rockets).



White glue, or "Wihold" type glue, or Centuri Superbond

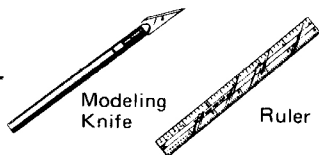


Scissors

Pencil

Yellow spray paint

Optional tools, to help you build an even better model, are:



Modeling Knife

Ruler

Sandpaper, Brush & Filler

BEFORE YOU START

In case you are new to model rocketry, here are some general tips to get you off to a good start.

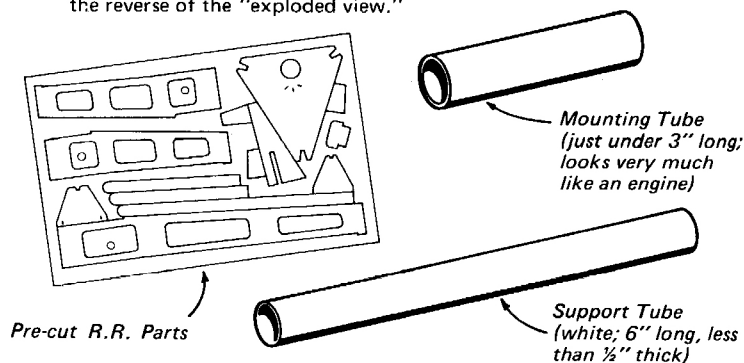
- Choose a practical assembly area: well lighted, big enough to work in, and out of the way of relatives or pets who might accidentally mess up your work.
- Cover your worktable with plywood or heavy cardboard to protect the table from glue, paint, cuts, etc.
- Remove the entire contents of your kit package carefully to avoid losing or damaging small parts. Lay them out neatly and identify each by referring to the "exploded view" drawing on this instruction.
- NOTE: Sometimes certain parts are packed INSIDE of other parts, such as tape discs inside parachutes, decals or couplers inside body tubes, etc.

ASSEMBLY INSTRUCTIONS

BEFORE YOU START:

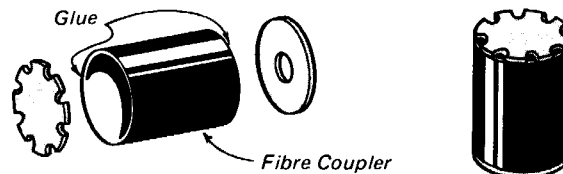
Remove the large "Exploded-View" plan sheet, and place it where you can refer to it while following these assembly instructions.

Identify these parts below for the "Rocket-Rack" display stand and set them aside for assembly later. "Rocket-Rack" instructions are on the reverse of the "exploded view."

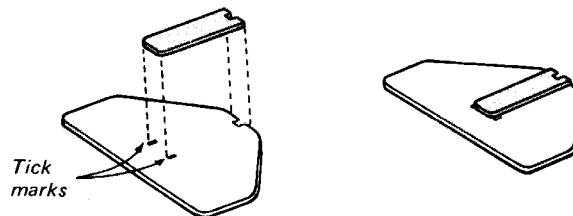


Locate the different parts (using the exploded view) on the four pre-cut fibre sheets included. Carefully push them out as needed, to avoid tearing.

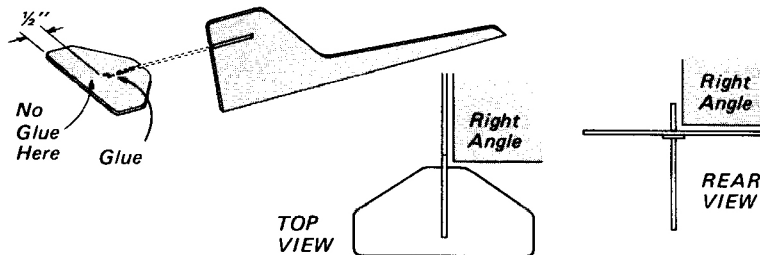
- 1 Assemble the ejection baffle unit. Set aside to dry.



- 2 Glue the stabilize brace onto the center of the stabilizer using the tick marks and notches as a guide.

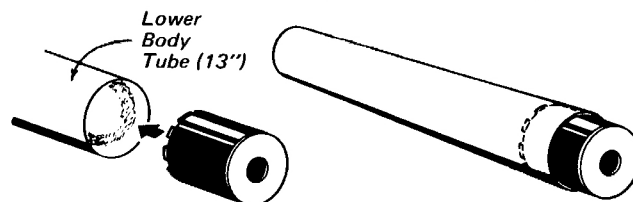


- 3 Glue the stabilizer into the slot of the rudder, with brace on the bottom. Set aside to dry.



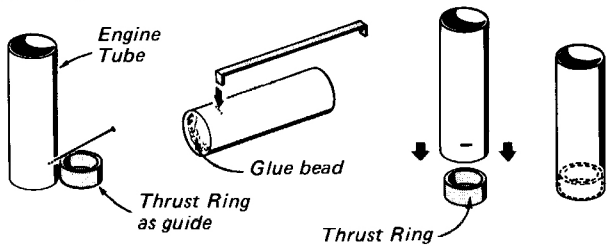
- 4 Take the lower body tube (the longest one) and pencil right on it the word "Lower" to avoid confusion later.

- 5 Test fit the baffle unit into the lower body tube . . . shave or sand to fit, if necessary. Glue baffle unit approximately halfway into tube, with the "donut" end of baffle exposed. Set aside to dry.

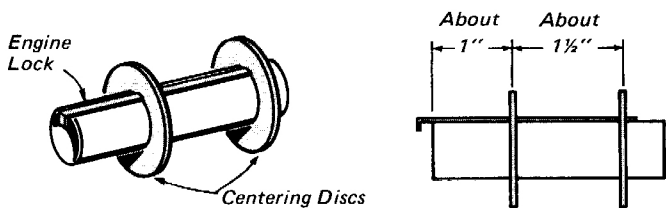


- 6** Make an engine-lock slit in the engine tube by poking holes with a pin or needle (or cutting with a modeling knife if you have one). Push engine lock into tube to finish the slit.

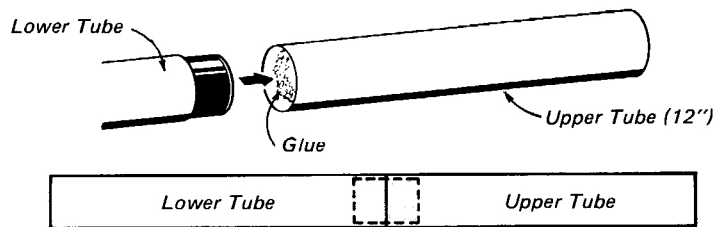
Run glue bead around inside of the slit end of tube. Insert thrust ring by pushing tube down over it.



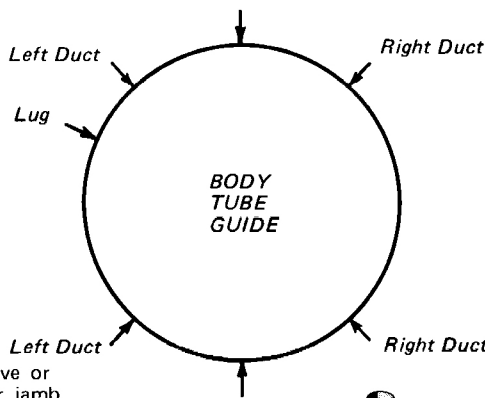
- 7** Re-insert the engine lock into the engine tube and position the centering discs as shown. Glue them in place and set aside to dry.



- 8** Glue the upper body tube into the lower tube unit. Roll completed assembly on perfectly flat surface to be sure tubes are lined up straight.

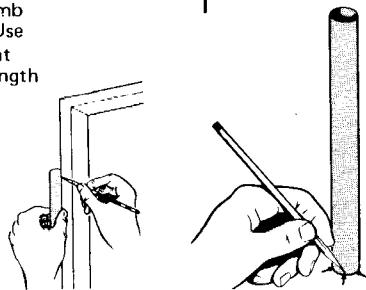


- 9** Stand the body assembly upon its guide below and mark all line positions on the tube.

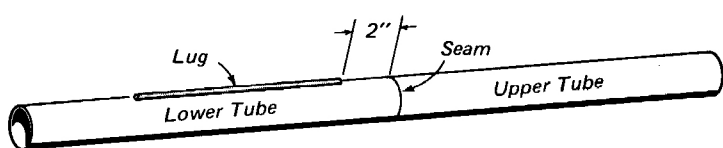


- 10** Identify the lug line by penciling the letter "L" right on the body tube on the line marked for the lug.

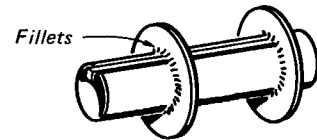
- 11** Find a convenient groove or channel, such as a door jamb or partially open drawer. Use it as a guide and draw light pencil lines down entire length of the tube.



- 12** Glue the 8" launch lug on the LOWER tube about 2" below the seam between the upper and lower tubes on the LUG line.



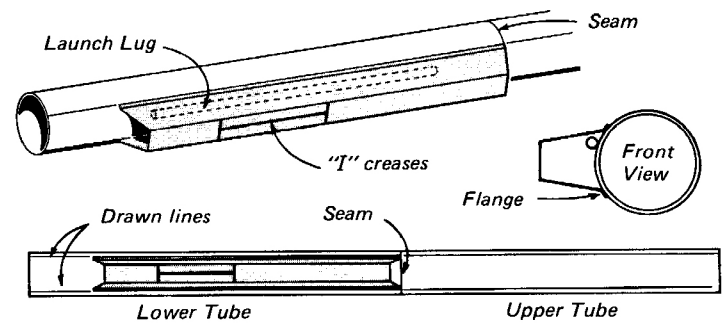
- 13** Through the rest of this instruction you will be asked to "fillet" certain glue joints. "Fillet" means to squirt a fine line of glue along a joint, then smooth it out with your finger. This gives greater strength and durability to a model rocket. Keep a rag handy to clean your fingers. Start by applying fillets to the centering discs of the engine mount. Set aside to dry.



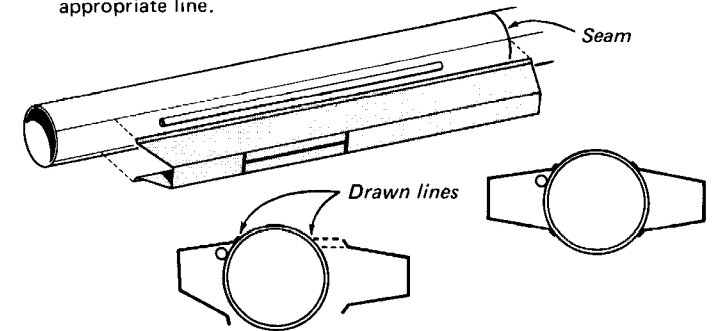
- 14** Follow this procedure when assembling all parts taken from the thinner fibre-board sheet:

- Carefully push the parts out, avoiding tears or wrinkles.
- Fold the parts only along the creased lines mentioned.
- Pre-fit (without glue!) all parts to make sure they are on the correct guideline and facing the right direction.
- Apply a small line of glue to one "flange" at a time.
- Place it immediately in the correct position and run your finger up and down the flange until the glue sets.

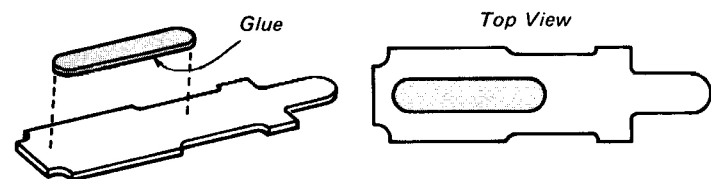
- 15** Fold the main duct as shown, using a straight edge if you prefer. Notice how the main duct will look when assembled. Pay close attention to "I" shaped crease which faces toward the REAR of the rocket. The launch lug will be hidden inside.



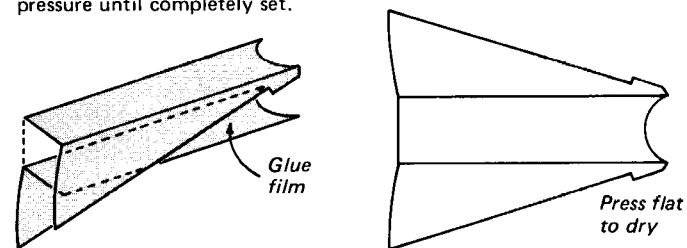
- 16** Glue the flange which is closest to the launch lug on the correct drawn line. Make sure that the forward edge butts against the seam and the side butts against the drawn line. Repeat this procedure for the other side. When these joints are dry, glue the other two flanges against their appropriate line.



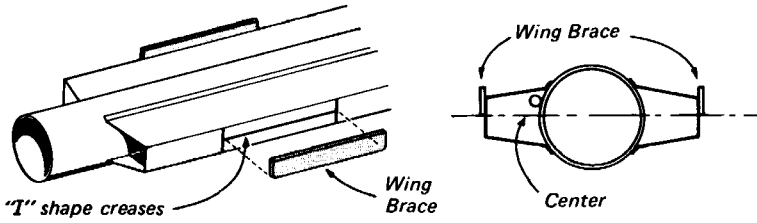
- 17** Glue the fibre sensor into the sensor mount in about the middle of the widest part.



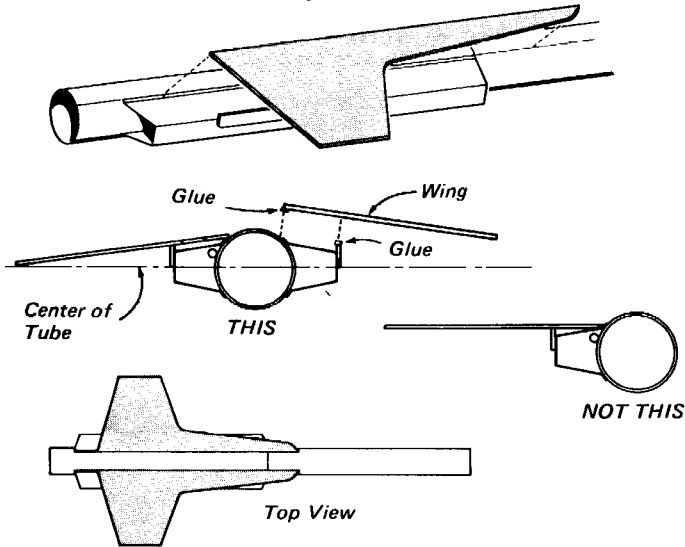
- 18** The scoop is made of two identical pieces - only one is flipped over. Fold, and glue the pieces together with a thin film of glue. Apply pressure until completely set.



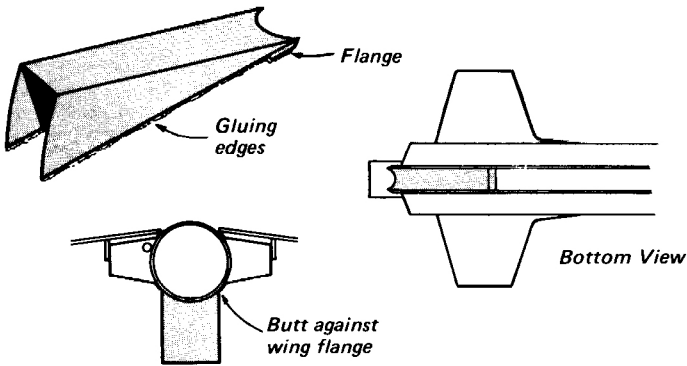
- 19 Glue the wing braces to each side of the main ducts lining them up with the "T" shaped creases. Make sure they both point up!



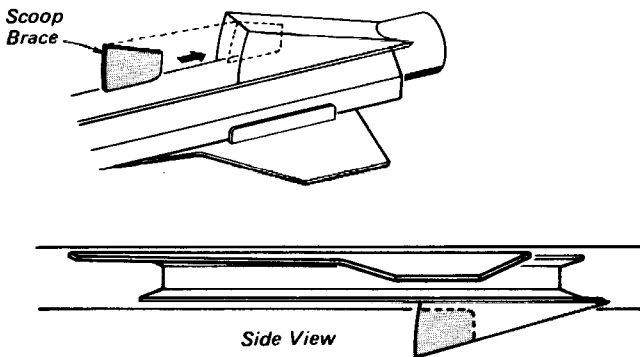
- 20 Locate a "tick" mark in the main duct flange about 1 1/2" from its bottom. The bottom edge of the wing will end here. Apply a generous line of glue down the root edge of the wing and along the top of the wing brace. Attach the wing so that the root edge touches the body tube AND flange while the wing brace glues to the bottom. Hold until set. Repeat for the other wing.



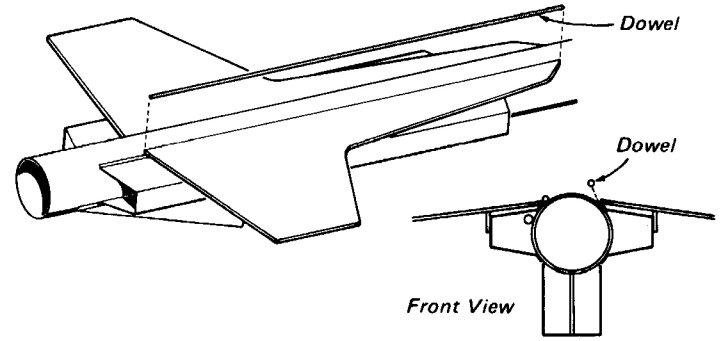
- 21 Fold the scoop as in the drawing below. Apply glue to its flanges and along the edge that will be attached to the tube and press it to the bottom of the ship butting all edges against the main duct.



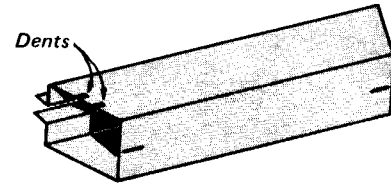
- 22 Apply a generous line of glue to the top and bottom of the scoop brace. Push it into the scoop along the drawn line.



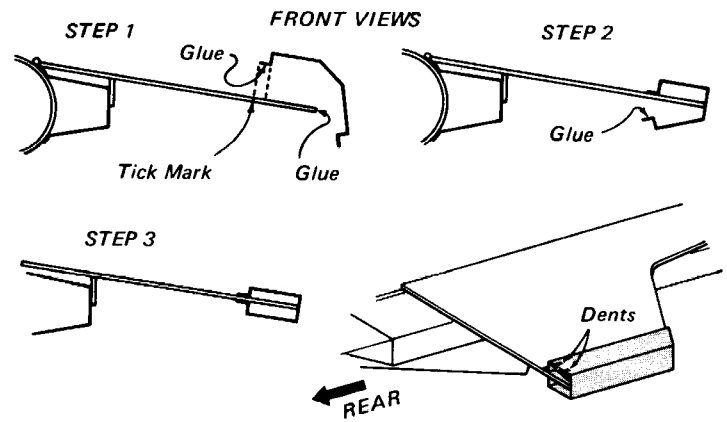
- 23 Run a bead of glue down the wing and body tube joint. Press the 1/2" dowel into the glue. Wipe away any excess with finger. Repeat with other dowel.



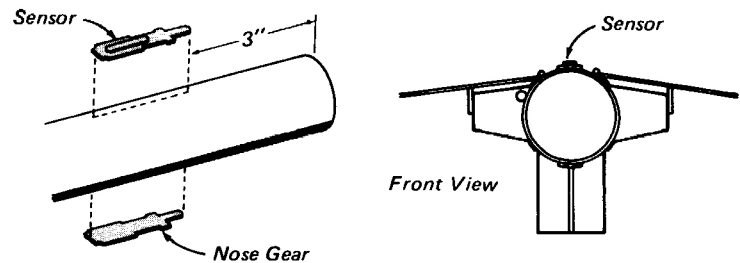
- 24 Fold the wing ducts like the drawing below. Notice the small dents in the top and bottom of the ducts. These will face the REAR of the rocket.



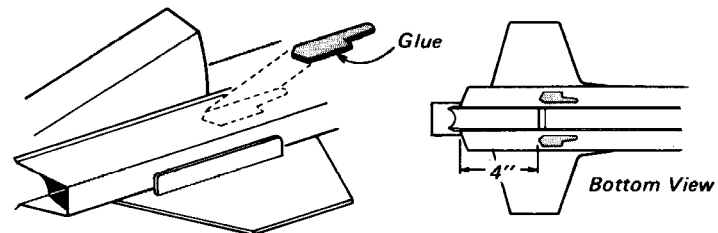
- 25 Glue the corners of one flange against marks in the wing. Next, glue the end of the duct against the wing edge. Lastly, glue the other flange down along its tick mark.



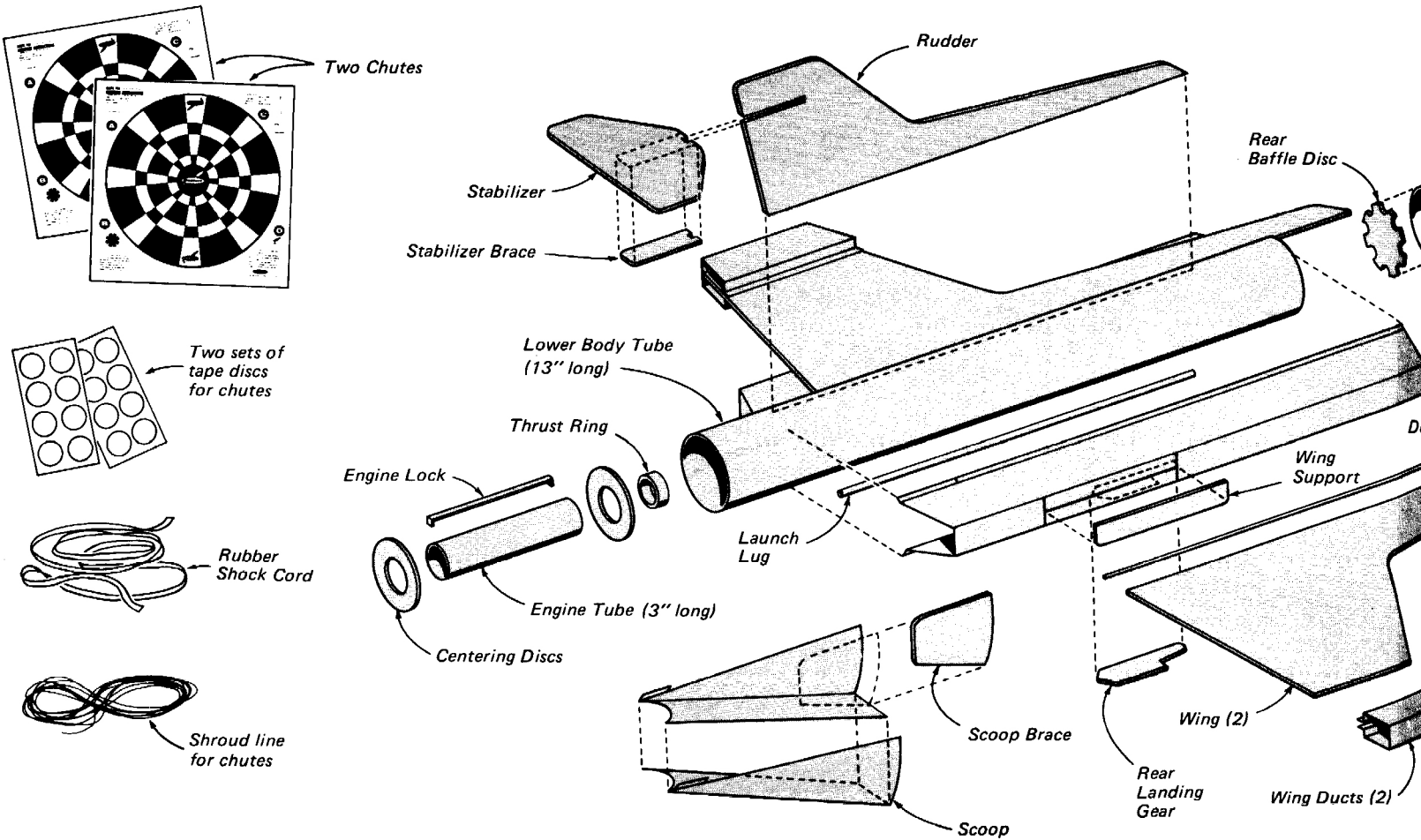
- 26 Glue the sensor (with mount) to the top of the ship approximately 3" from the front edge of the tube. Glue the nose gear on the opposite side of the tube.



- 27 Glue the rear landing gear (right and left) on the bottom of the main duct approximately 4" from the bottom of the duct.

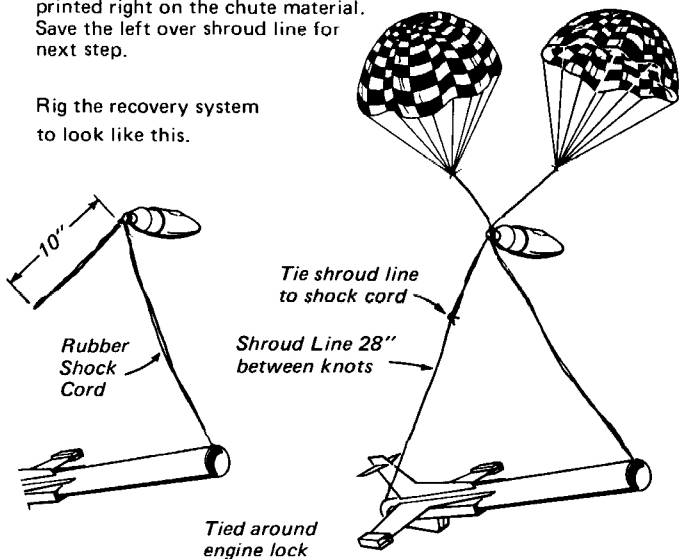


Exploded View



Assemble the two parachute kits enclosed, following the instructions printed right on the chute material. Save the left over shroud line for next step.

Rig the recovery system to look like this.



Apply a final set of fillets to all glue joints and allow to dry thoroughly before further handling.

FINISHING TIPS

For best paint results, spray first with enamel primer to seal the fibre-board edges. Or rub a thin film of glue on or use filler coat and a brush. You may then want to smooth the edges with very fine sandpaper.

When painting plastic parts, never use dope or lacquer! Use enamel only! Dope or lacquer will melt the plastic.

RECOMMENDED COLOR: YELLOW
MAY SUBSTITUTE WHITE

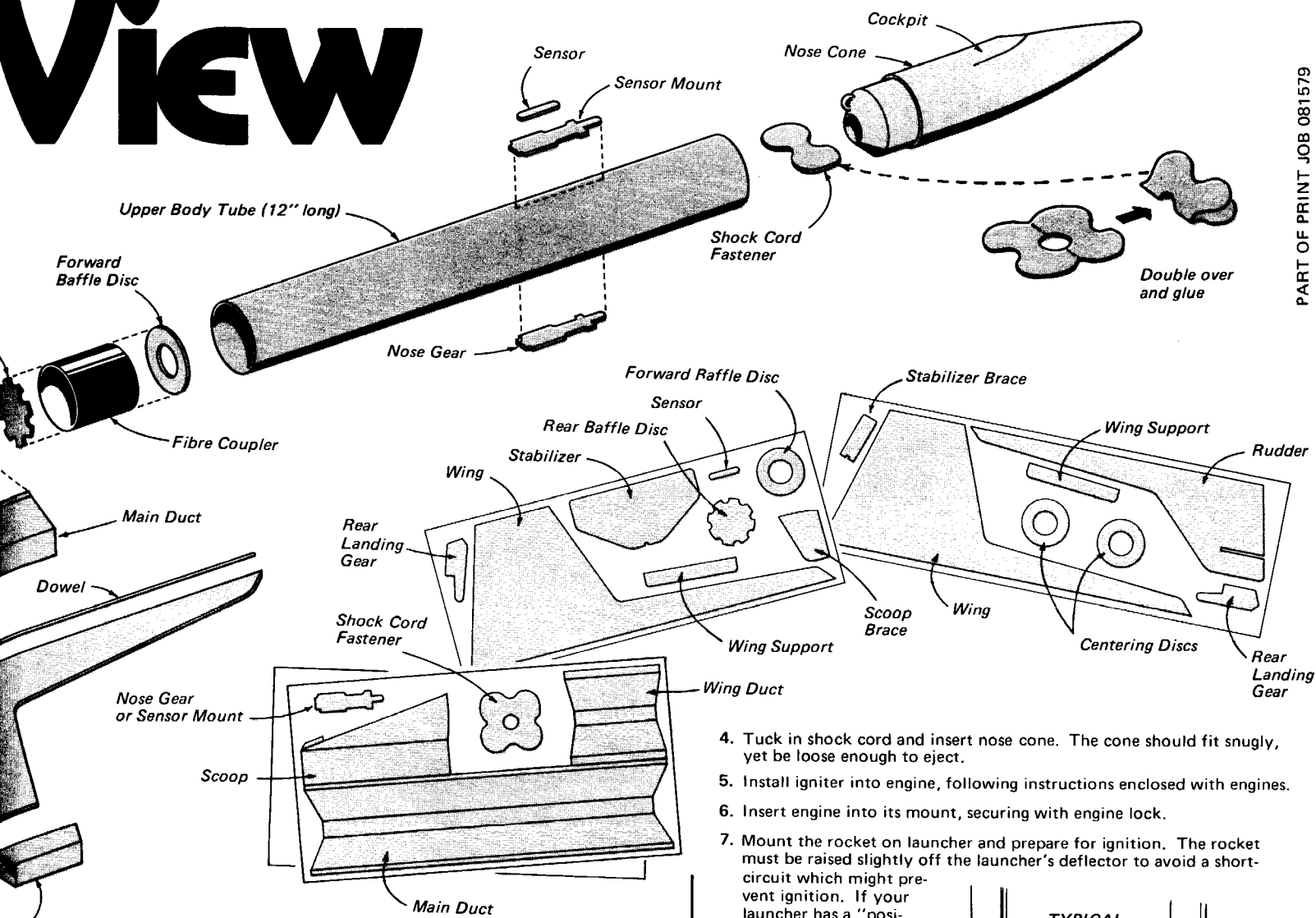
Spray painting your finished model with a fast-drying enamel will produce the best results . . . IF IT IS DONE PROPERLY!! Most important is the number of coats of paint. **DO NOT** try to paint your model with one heavy coat! Instead, give it a couple of quick, light coats first and then a finish coat.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

Applying decals is the last assembly step. Be sure paint is thoroughly dry . . . overnight is best. Read the general instructions. Round up your tools: scissors, rag or paper towel, bowl of water..

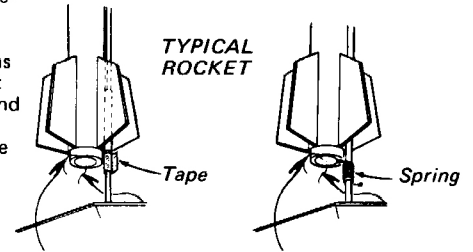
Identify the different parts of decal. Notice how each design is covered with a clear shiny shape which holds the design together.

Complete detailed instructions for decals are on the back of the "Exploded View."

View



4. Tuck in shock cord and insert nose cone. The cone should fit snugly, yet be loose enough to eject.
5. Install igniter into engine, following instructions enclosed with engines.
6. Insert engine into its mount, securing with engine lock.
7. Mount the rocket on launcher and prepare for ignition. The rocket must be raised slightly off the launcher's deflector to avoid a short-circuit which might prevent ignition. If your launcher has a "positioning spring" use it as shown. Otherwise just wrap a little tape around the launch rod to support the rocket and the launch lug.



FLYING INSTRUCTIONS

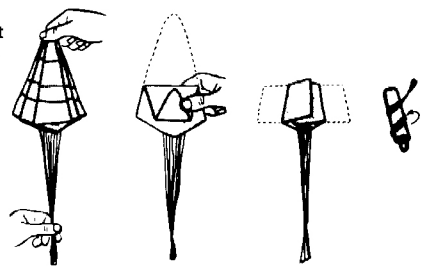
Igniters and complete engine installation instructions are included in "Engine Operating Instructions" which accompany all Centuri engines.

RECOMMENDED ENGINE: C6-3

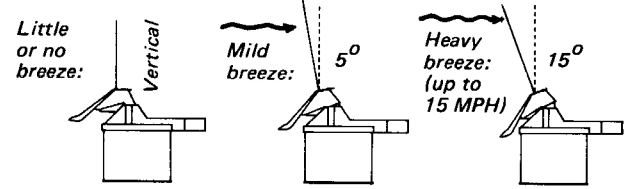
FLIGHT PREPPING

1. Inspect entire recovery system for good condition before each flight. If the recovery system is tangled from the last flight, cut it apart to untangle it.
2. Your Super Kit has an Ejection Baffle which virtually eliminates the need for chute wadding. BUT, we strongly recommend that you still use 2 or 3 sheets of our crepe-type wadding (#5846/SPW-19) in case your engine has an extra strength ejection charge.

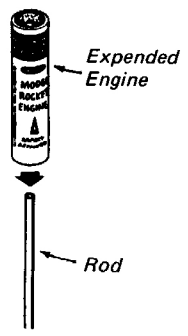
3. Fold parachutes as shown and tuck neatly into rocket . . . trying to avoid tangles. Chutes should be packed just before flight to avoid them possibly sticking together.



8. If your launcher has a rod-tilting feature, use it only for launching in breezes . . . normally model rockets are launched straight up. For reliable, impressive flights, never tilt the rod more than 15 degrees when flying your Super Kit . . . do not tilt the rod to its maximum angle.



Avoid eye injury by capping the exposed tip of the launch rod when not actually launching. Follow the instructions and the Safety Code, and have many happy hours with model Rocketry.



DECAL INSTRUCTIONS

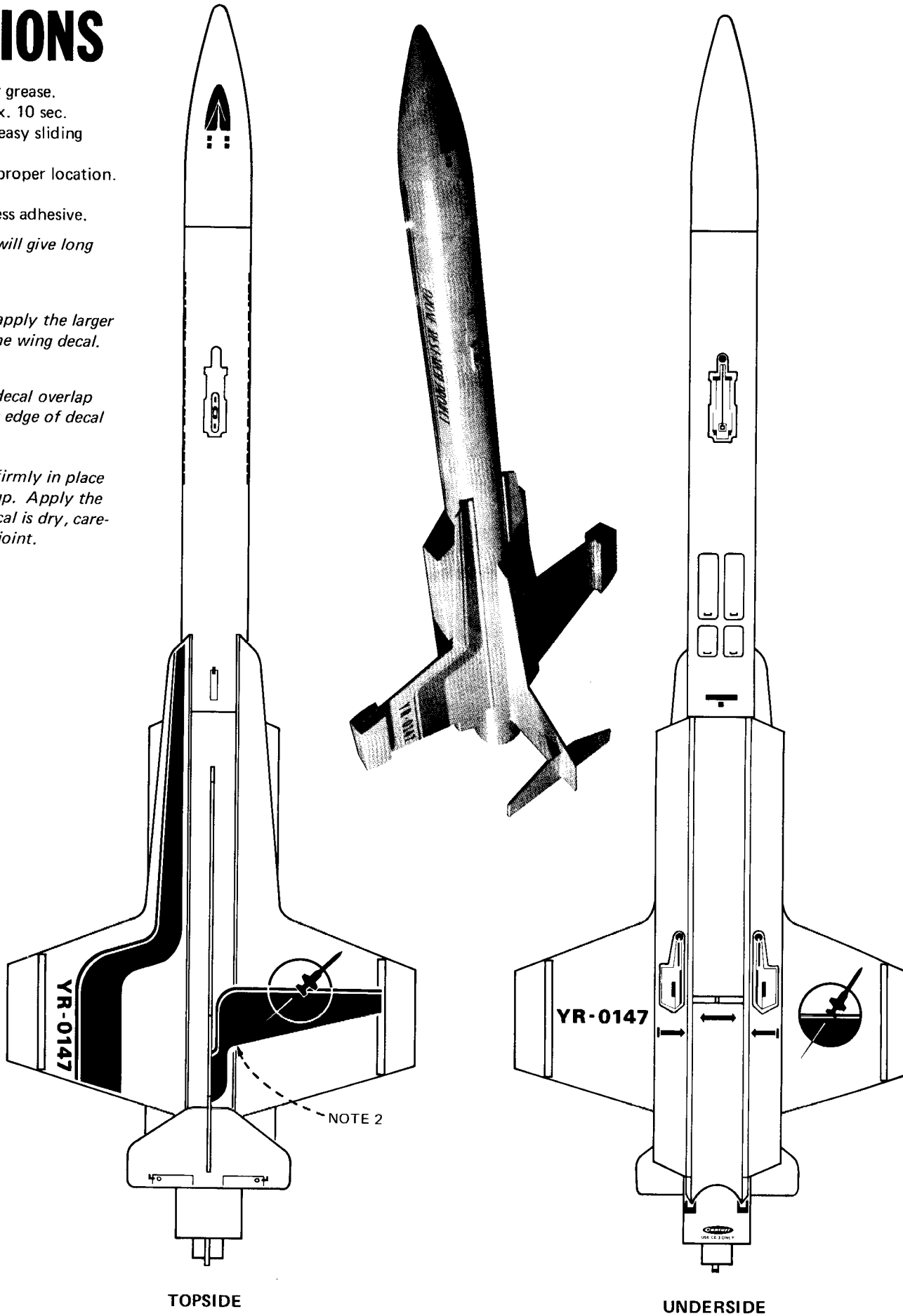
1. Clean surface free of oil or grease.
2. Dip decal in water, Approx. 10 sec.
3. Have surface very wet for easy sliding into position.
4. Slide decal from paper to proper location.
5. Remove all air bubbles.
6. Wash decal to remove excess adhesive.

Properly applied your decal will give long lasting service.

NOTE 1: On starboard side apply the larger tail decal first. Then apply the wing decal. (see NOTE 2)

NOTE 2: The wing and tail decal overlap along the dowel. The leading edge of decal is at right angles to body.

NOTE 3: Make sure cone is firmly in place and orientated with cockpit up. Apply the long striped decals. When decal is dry, carefully slice decal at nose cone joint.



PORTSIDE
(LEFT)

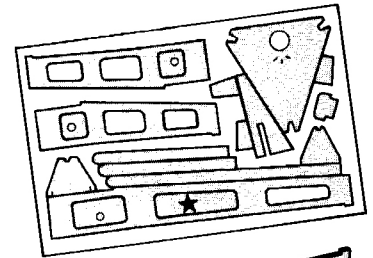
TOPSIDE

UNDERSIDE

ROCKET RACK™ MODEL ROCKET DISPLAY STAND

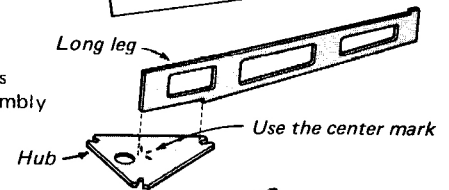
IMPORTANT: The Rocket Rack is a Skill Level 2 . . . this means it is more challenging to build than some rocket kits. Follow instructions carefully for satisfactory results. Assembles in about one-half hour. Follow the standard procedure for gluing all the flat parts.

- A. Use white glue.
- B. Apply a **SMALL** line of glue to edge of piece.
- C. Join the appropriate pieces.
- D. Separate the parts and allow several seconds for glue to become tacky.
- E. Apply another **SMALL** line of glue.
- F. Re-join the parts neatly and allow to dry.

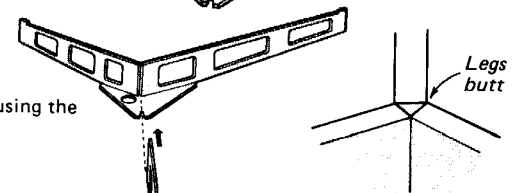


- 1** Remove parts very carefully to avoid bending pieces.

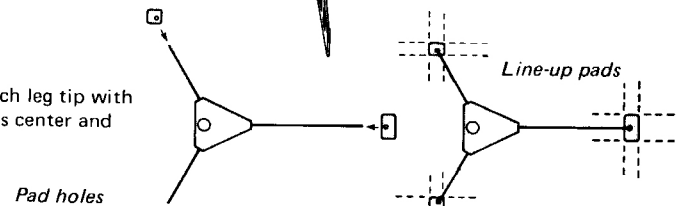
- 2** Glue the longest leg onto the hub . . . fit notches together, line up onto mark, and make sure assembly is squared-up.



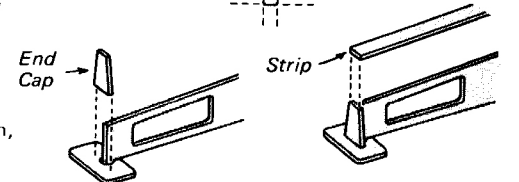
- 3** Glue the two shorter legs in place again using the notches. Legs butt together as shown.



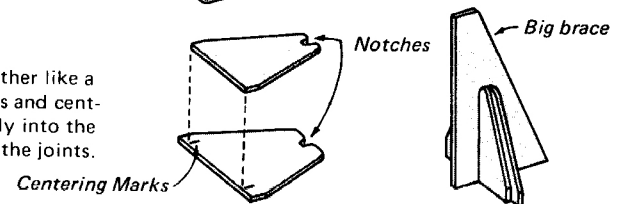
- 4** Place each pad onto each leg tip with holes close to the rack's center and glue to hold in place.



- 5** Glue each end cap in place, centering neatly on the leg. Now glue each strip on, again centering neatly.



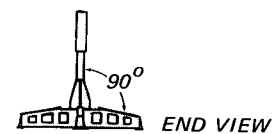
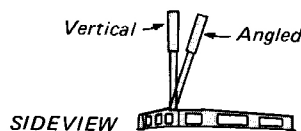
- 6** Glue the two small braces together like a sandwich, lining up the notches and centering marks. Slide this assembly into the big brace and apply glue along the joints.



- 7** Glue the support tube an inch or so into the mount tube. Glue the T-plate into the end of the mount tube. **NOTE:** For mini-motor kits, leave off the mount tube.



- 8** Decide whether you want vertical or angled display . . . insert the support tube just barely thru the hole in the hub and position it. Test fit the brace assembly to check its fit, then glue it in place. **MAKE SURE YOU HAVE A RIGHT ANGLE WHEN VIEWED FROM THE FRONT, OR YOUR ROCKET MAY TIP OVER.**



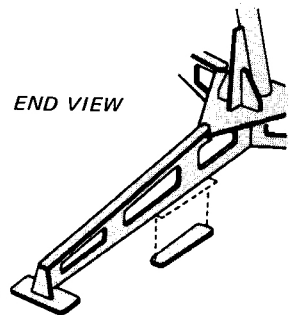
SIDEVIEW

END VIEW

- 9** **IMPORTANT:** Apply a glue fillet to **EVERY** exposed joint, and smooth excess glue away with your finger tip.

- 10** Here are some optional assembly tips . . .

- A: Glue the scrap (marked with a star in Step 1) under the long leg for extra strength.
- B: Smooth any rough edges with fine sandpaper, and spray paint the Rocket-Rack a color such as white, red or silver.



NOTE 3

ESS RAVEN

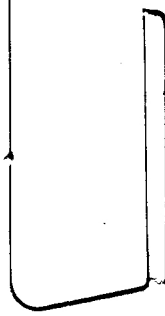
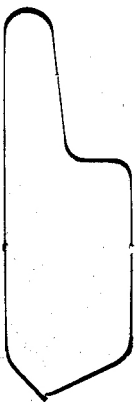
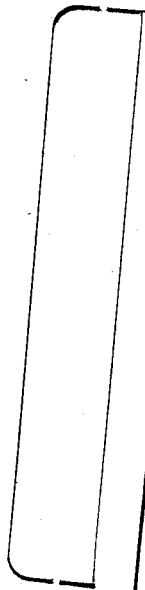
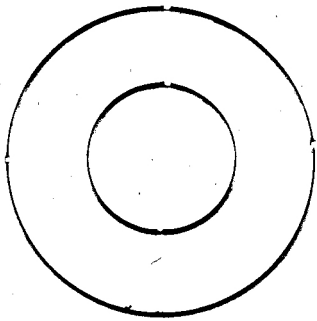
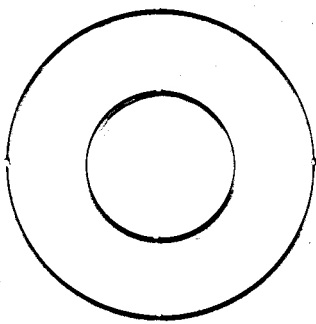
OZONE RESEARCH PROJECT

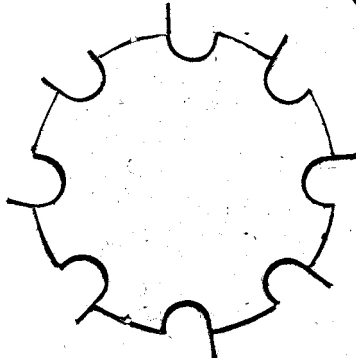
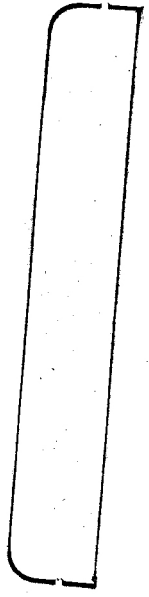
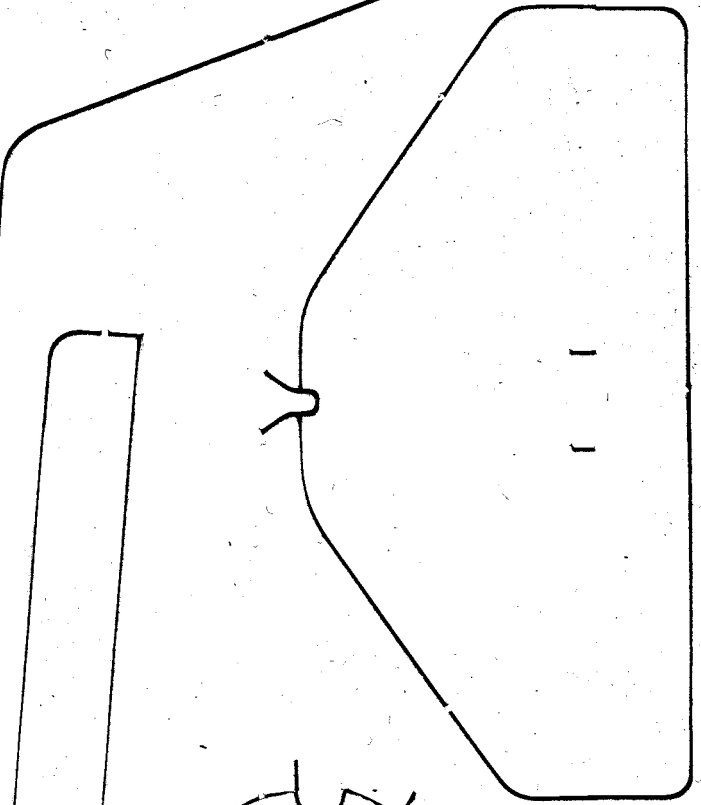
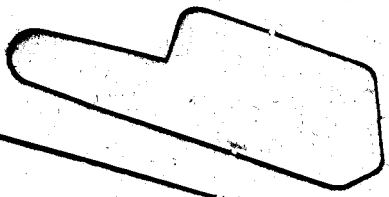
NOTE 1

STARBOARD SIDE
(RIGHT)

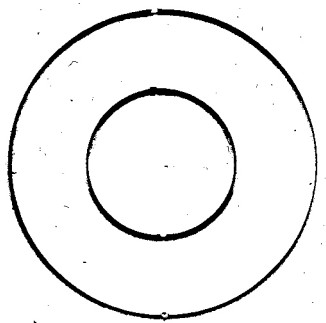
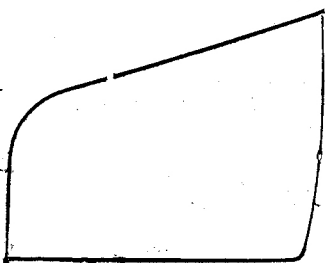


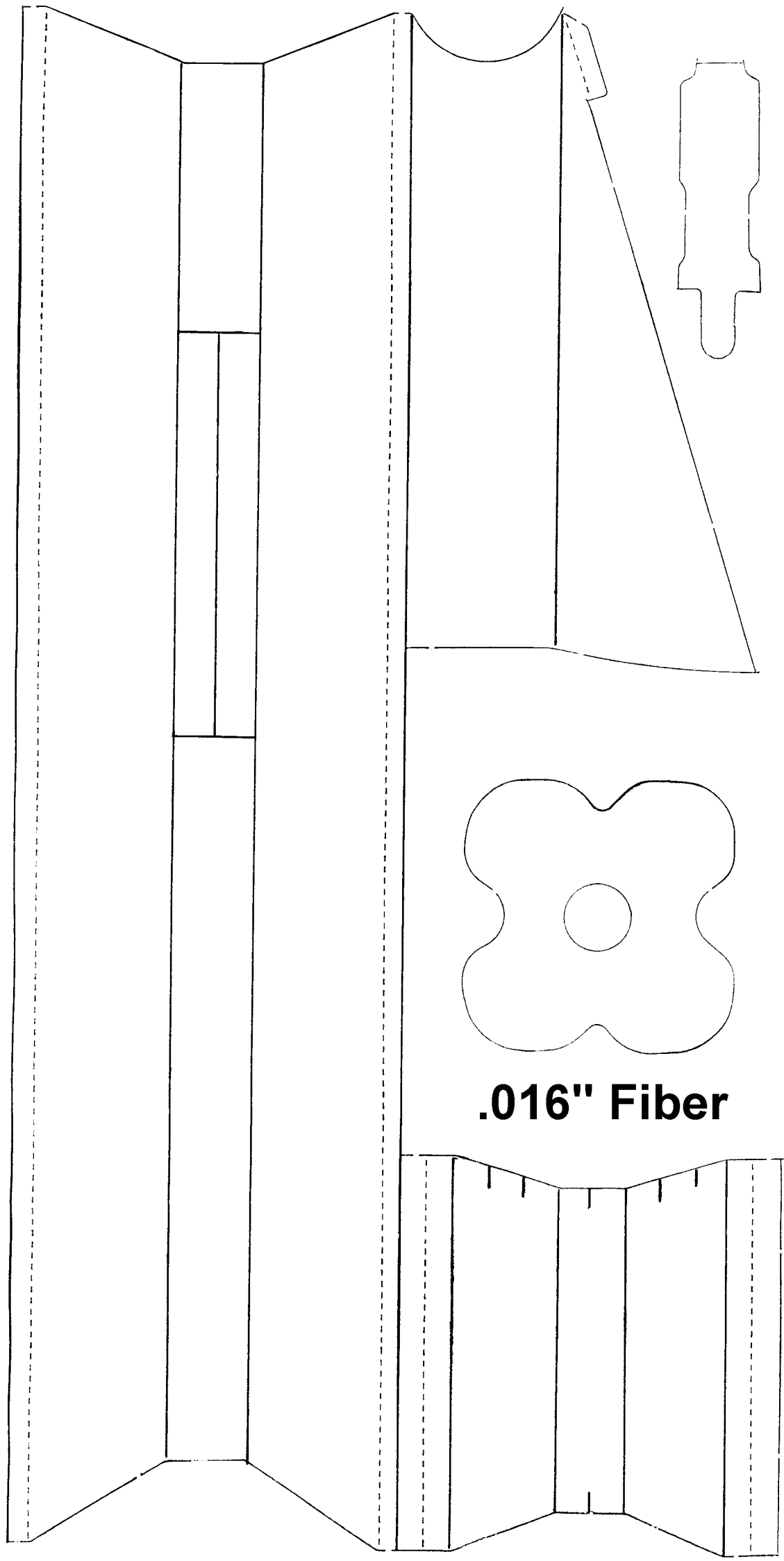
.055" Fiber



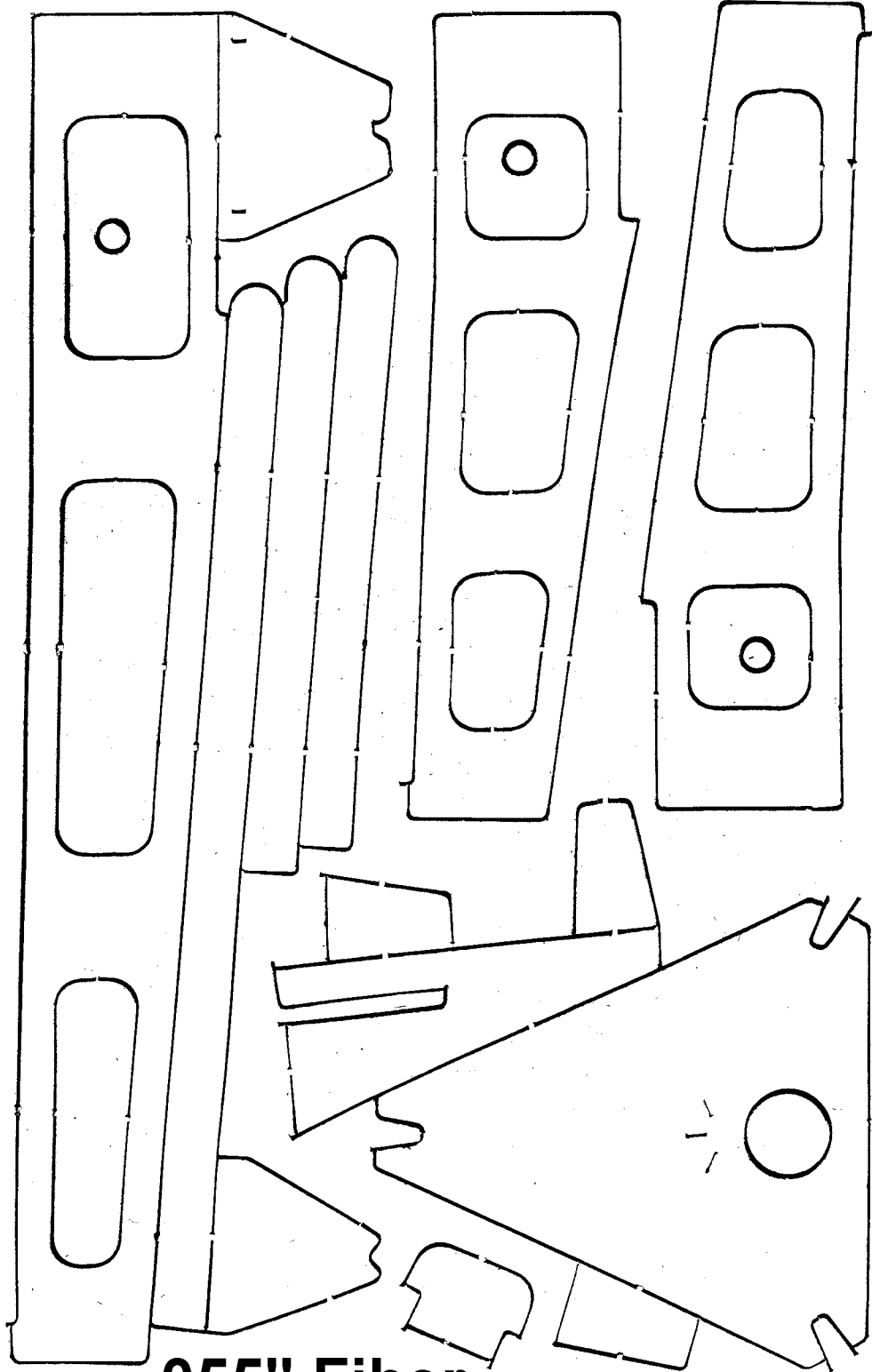


.055" Fiber





.016" Fiber



.055" Fiber



OZONE RESEARCH PROJECT

ESS RAVEN

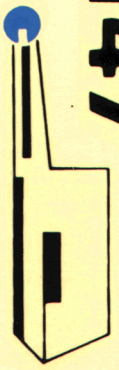
OZONE RESEARCH PROJECT



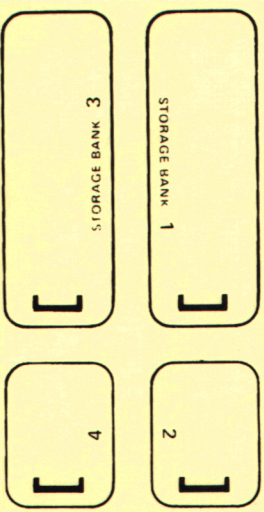
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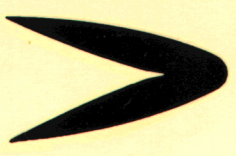
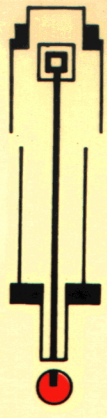
YR-0147



Centuri
USE C6-3 ONLY



YR-0147



Q	Desc	Stk	Num	Size	Other
1	Plastic Nose Cone	N/C		5.5"L	W/Cockpit
1	Upper Body Tube	ST-16		12"L	Estes BT-60
1	Lower Body Tube	ST-16		13"L	Estes BT-60
1	Launch Lug			7/32"Dia x 8"L	
2	Wood Dowel			.088"Dia x 12"L	1/12" Very Close
1	Engine Tube	ST-7		3"L	Estes BT-20
1	Thrust Ring				
1	Engine Lock				
1	Coupler		1	23/32"L	Estes JT-60C
1	Fiber Diecut Sheet			5"W 12.5"L .055"T	Wing & Stuff
1	Fiber Diecut Sheet			5"W 15"L .055"T	Wing & Rudder
2	Fiber Diecut Sheet			6"W 12"L .016"T	Ducts & Scoops
1	Fiber Diecut Display Base			.055"T	Sheet Styrene works
1	Display stand tube	N/C		6"L 1/16"T wall	1/2" Dowel works
1	Engine Casing				Used Engine
1	Shock Cord			1/8"W x 38"L	
2	Chute Pack	CP-20			
	Parachute			20" Red/Wht	
	Shroud Line			128"	
	Tape Disk(8)			1/2"	
1	Decal			6" x 12.5"	Red/Blu/Blk/Grn

REQUIREMENTS
 AGE 14+
 RUN TIME 10-15 MIN
 MAX. VOLTAGE 6V
 MOTOR TYPE 1/8" DC
 WEIGHT 100g



FSS RAVEN
 FLYING MODEL ROCKET

SUPER KIT

INCLUDES EVERYTHING YOU NEED TO GET STARTED! ALL PARTS AND TOOLS ARE INCLUDED!



F.S.S. RAVEN™
 FLYING LABORATORY

FLYING MODEL ROCKET



F.S.S. RAVEN SUPER KIT

This is a flying model rocket that can be used as a flying laboratory. It is a great way to learn about aerodynamics and rocketry. The kit includes everything you need to get started, including the motor, battery, and fins.

SUPER KIT

1/8" DC MOTOR
 6V BATTERY
 1/8" DC MOTOR



CLASSIC SUPER KIT
 FLYING MODEL ROCKET

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