



CRUSADER SWING-WING GLIDER



A DAMON COMPANY
ESTES INDUSTRIES
PENROSE, CO 81240 USA

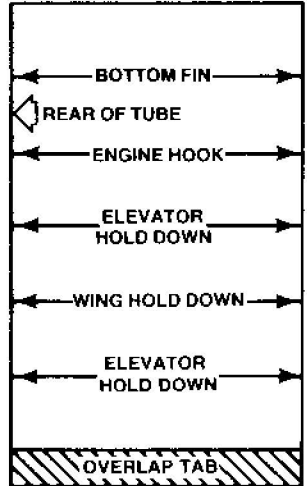
WING HOLD DOWN
REINFORCEMENT STRIP

#1961



ASSEMBLY TIP

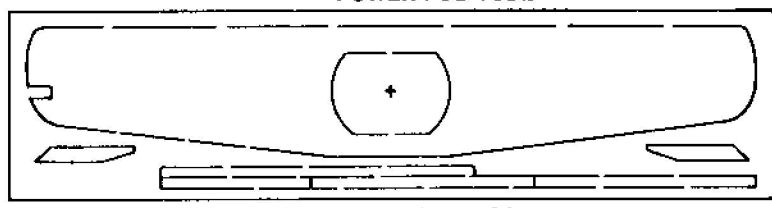
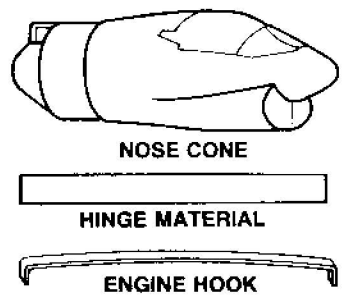
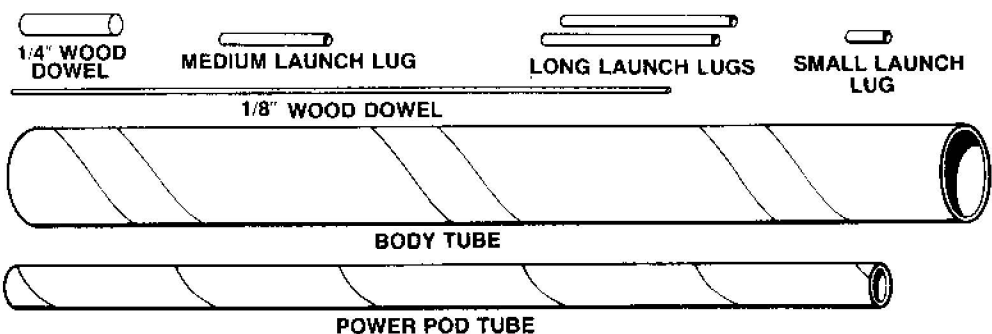
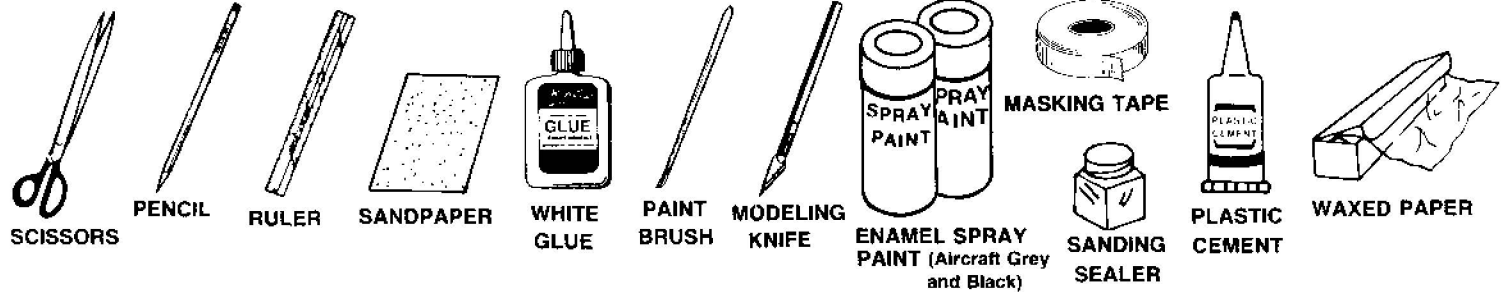
Read all instructions before beginning work on your model. Make sure you have all parts and supplies. Test-fit all parts together before applying any glue. If any parts don't fit properly, sand as required for precision assembly.



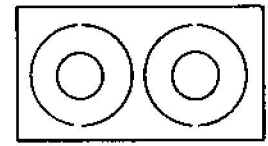
POWER POD
MARKING GUIDE

PARTS AND SUPPLIES

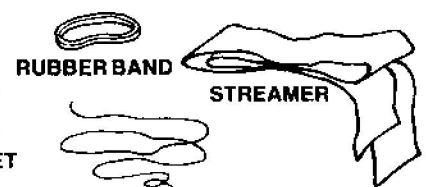
Locate the parts shown below and lay them out on the table in front of you. In addition to the parts included in the kit you will also need:



DIE-CUT WING, Balsa



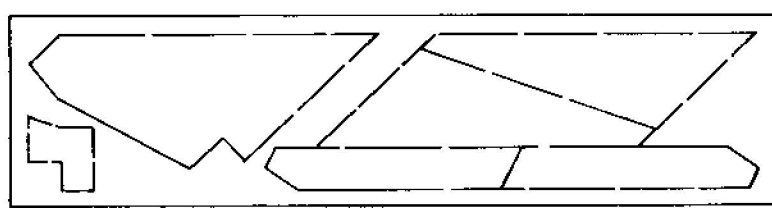
CENTERING RINGS SHEET



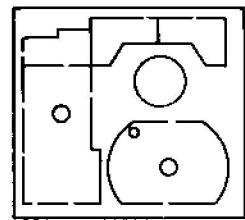
RUBBER BAND

STREAMER

ELASTIC STRING



DIE-CUT ELEVATOR STABILIZER, Balsa



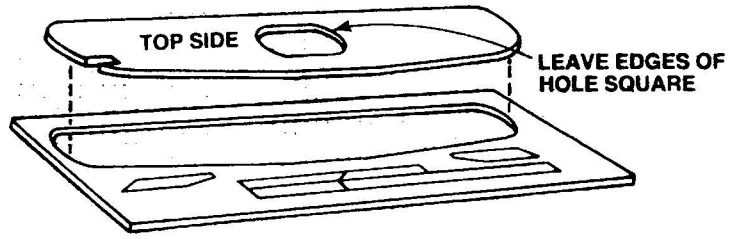
DIE-CUT PIVOT ASSEMBLY, PLYWOOD



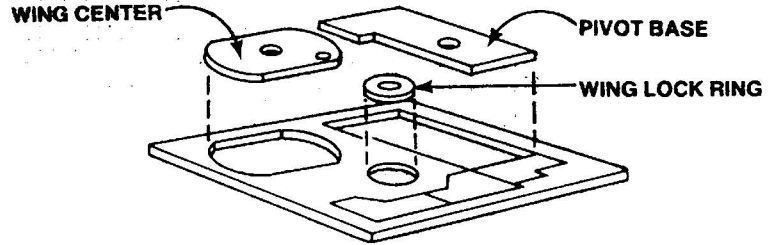
DECAL

WING AND PIVOT BASE ASSEMBLY

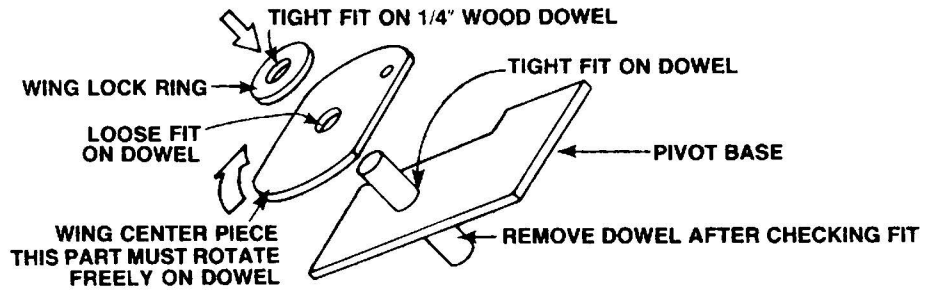
1. Remove die-cut wing from balsa sheet. Remove half circle from center of wing. Lightly sand edges of wing and round edges slightly. Do not round edges of center hole or slot at end of wing.



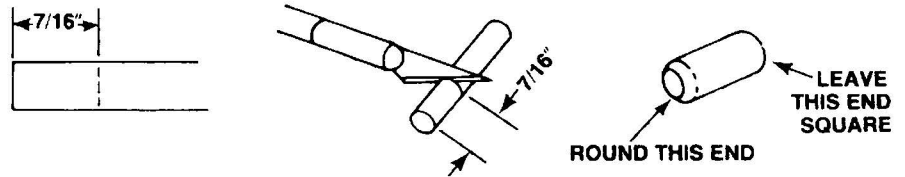
2. Remove the die-cut pieces shown from the plywood sheet only. Sand lightly to smooth surfaces and edges but do not round them.



3. Check fit of 1/4 inch dowel in large holes of plywood pieces. It should be a smooth fit in pivot base and wing lock ring, and a relatively loose fit in wing center piece. Sand as necessary for proper fit of parts. Wing center piece must rotate freely around 1/4 inch dowel for proper wing operation.



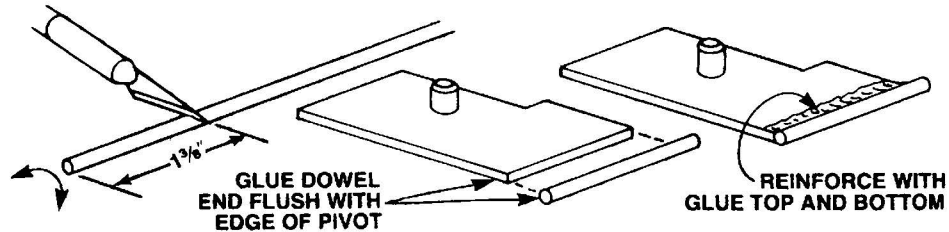
4. Cut 1/4 inch dowel to 7/16 inch length as shown. Sand upper 1/16 inch of one end to a rounded shape as shown.



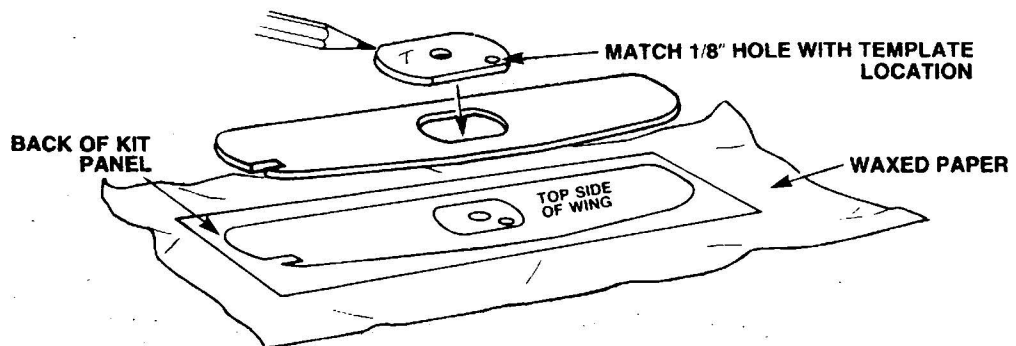
5. White glue 1/4 inch dowel from Step 4 into the pivot base as shown. Make sure assembly looks like the illustration shown. Square end of dowel should be flush with bottom of pivot base.



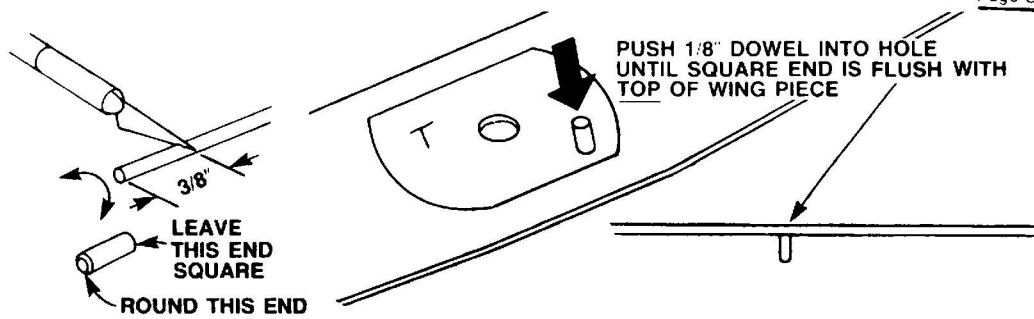
6. Cut a 1 3/8 inch length of 1/8 inch dowel. Save remaining dowel for later use. Leave ends smooth and square. Glue dowel to pivot base as shown. When assembly is dry, reinforce dowel with white glue.



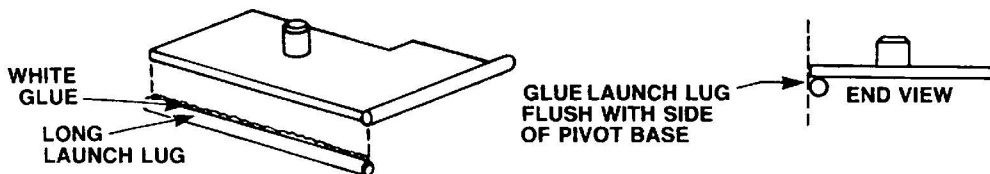
7. Check fit of wing center piece and wing. This should be a snug, even fit. Lay a piece of waxed paper over wing assembly template on back of kit panel. Match location of 1/8 inch hole in center piece and template. Assemble and glue center piece and wing together. Before removing wing from template, mark center piece with a "T" for top of wing.



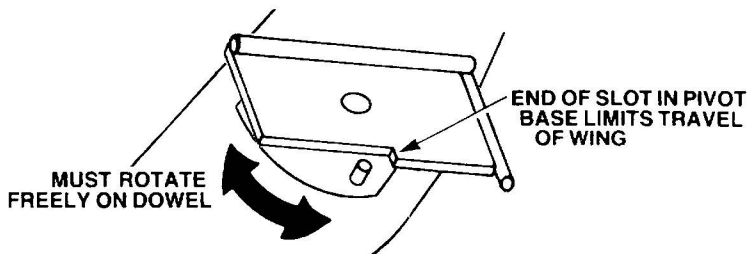
8. Cut a 3/8 inch length of 1/8 inch dowel as shown. Slightly round one end of dowel. Apply a small amount of glue to the hole. Place 3/8 inch dowel in hole on top side of wing and press through until end of dowel is even with top side of wing center piece. Apply a small white glue reinforcement to dowel and wing center piece.



9. Glue one of the long launch lugs to the bottom of the pivot base as shown, so side of the launch lug is even with side of pivot base.



10. Place wing on pivot base and check for free pivoting action. The 1/8 inch dowel in wing will limit wing travel by striking end of slot in pivot base. Remove pivot base from wing and set aside for later assembly.

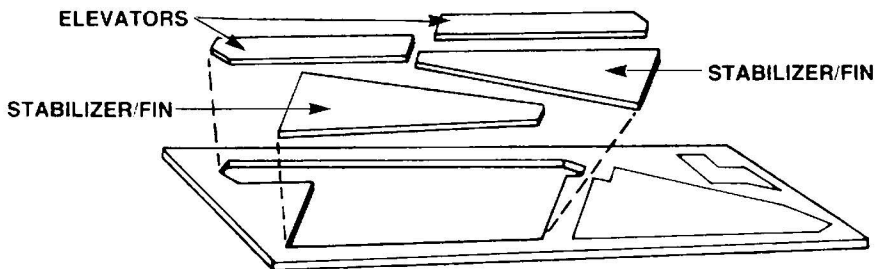


11. Glue shortest length of launch lug into slot at end of wing as shown.

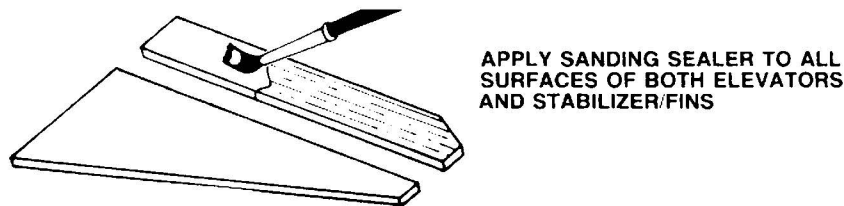


STABILIZER/FIN ASSEMBLY

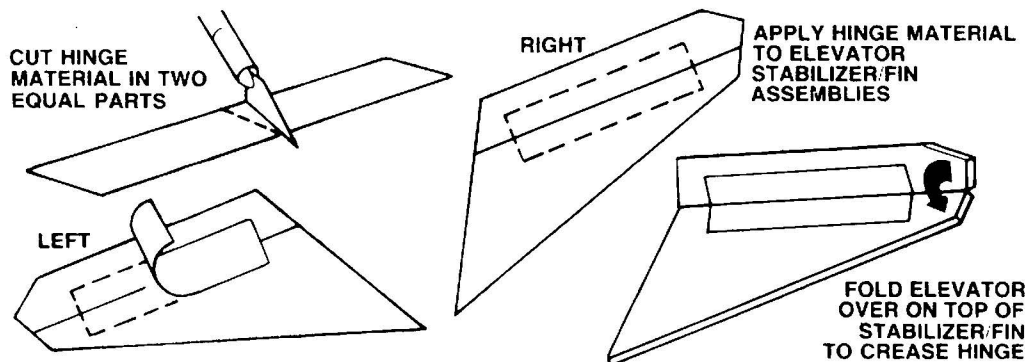
12. Remove stabilizer/fin parts from die-cut balsa sheet and sand LIGHTLY to round edges.



13. Apply sanding sealer to all surfaces of stabilizer/fins and elevators with a small brush. When sealer is dry, lightly sand all sealed surfaces. Repeat sealing and sanding until balsa grain is filled and smooth. Lay out parts as shown.

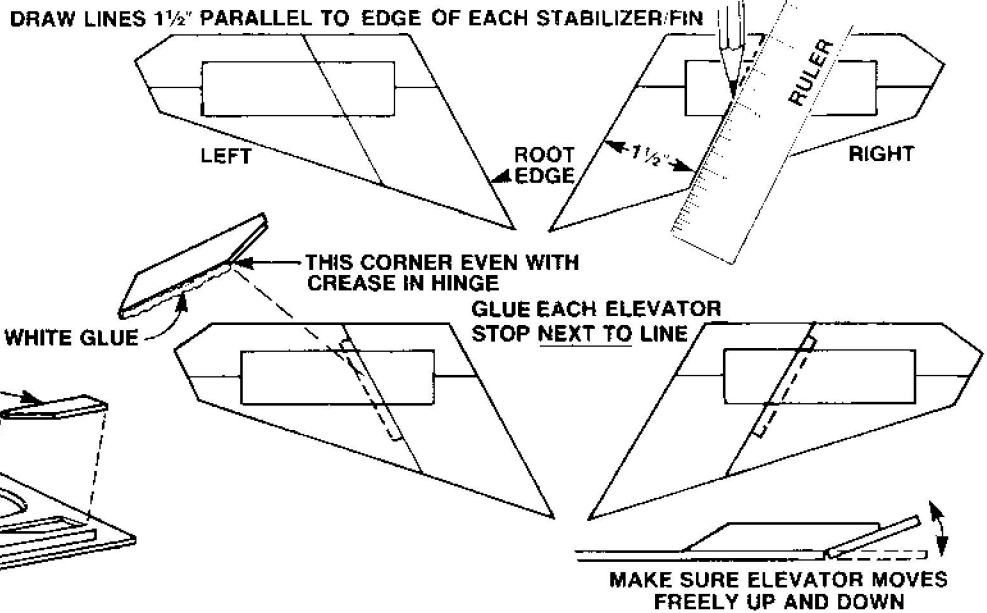
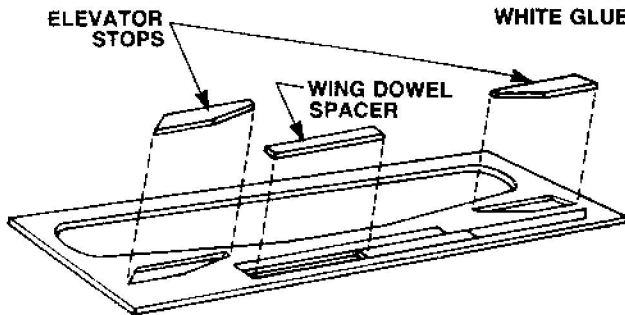


14. Cut the self-adhesive hinge material in half. Position elevators as shown and remove backing paper from hinge material and apply to elevator stabilizer/fin assembly as shown. Fold elevator up and down several times to crease hinge and to insure proper operation.



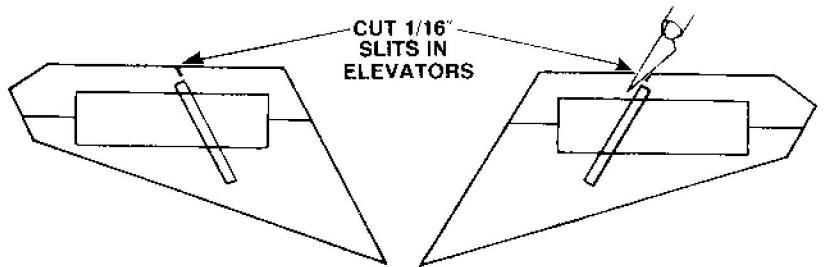
15.

Measure 1½ inch from root edge of each stabilizer/fin assembly and draw a line on each as shown. Remove elevator stops from wing die-cut balsa sheet. LIGHTLY sand to smooth surfaces and edges but be careful not to change angle of stops. Apply glue to each stop and position on line as shown.



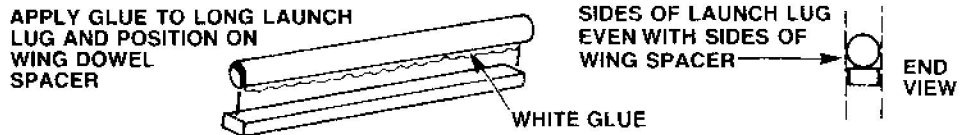
16.

Cut a 1/16 inch long slit in each elevator on the line drawn in Step 15.



17.

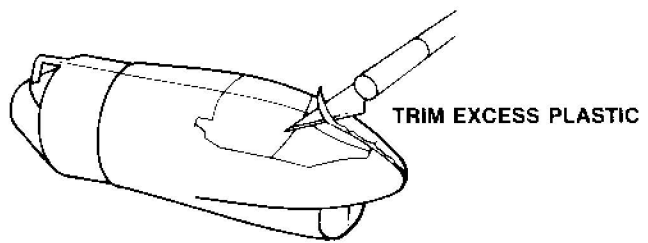
Remove the wing dowel spacer from the wing die-cut balsa sheet as shown in Step 15. Apply glue to the remaining long launch lug and glue to top of wing dowel spacer as shown.



MAIN ASSEMBLY OF GLIDER BODY

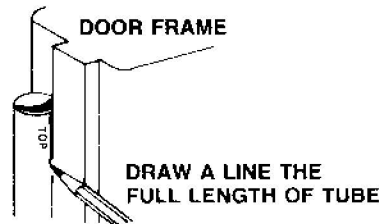
18.

Trim excess plastic from around sides of nose cone with sharp knife. Wipe nose cone with damp cloth to remove oil and dirt.



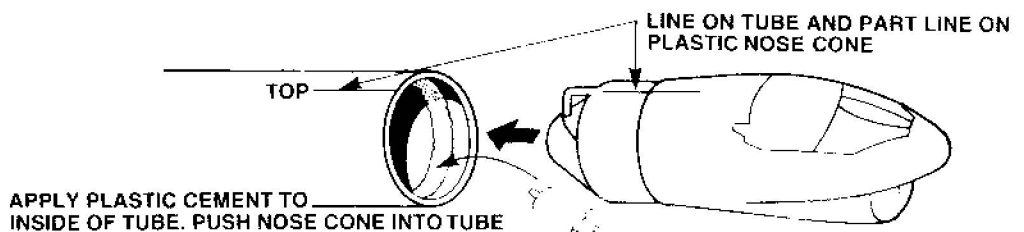
19.

Mark the large body tube with a line its full length. A door frame makes an excellent guide to insure a straight line. Label this line "TOP" with a pencil.



20.

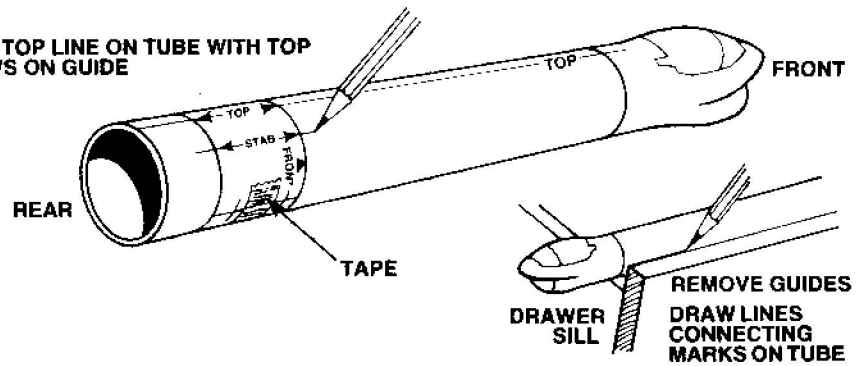
Apply plastic cement around the inside of one end of the tube. Slide nose cone into place and center part line of nose cone with "TOP" line on body tube as shown.



21.

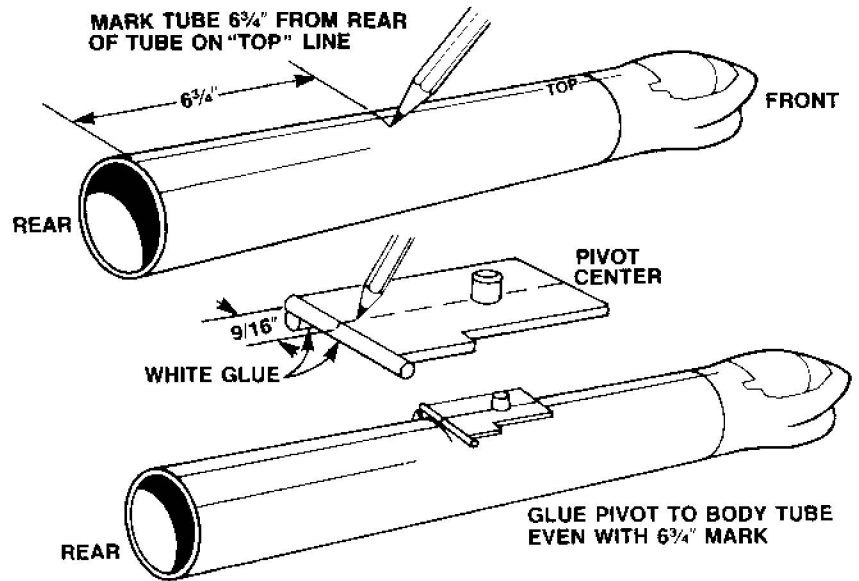
Cut out the main body tube marking guide from back of kit panel and wrap guide around the tube with arrow labeled front pointing toward the nose cone end of glider body. Match up the top arrows on marking guide with top line on body tube and tape. Mark tube at arrows. Remove guide. Draw straight lines connecting each pair of marks. A drawer sill makes an excellent guide to insure a straight line.

MATCH TOP LINE ON TUBE WITH TOP ARROWS ON GUIDE

**22.**

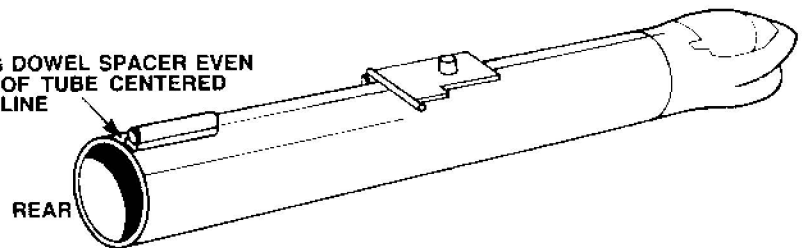
Mark the "top" line on the body tube $6\frac{3}{4}$ inch from the rear of the tube as shown. Mark the pivot base $9/16$ inch from side of base as shown. Apply a line of glue to bottom side of launch lug and down center of pivot. Glue pivot to "top" line matching the mark on pivot with "top" line and rear of pivot even with $6\frac{3}{4}$ inch mark.

MARK TUBE $6\frac{3}{4}$ " FROM REAR OF TUBE ON "TOP" LINE

**23.**

Position and glue wing dowel spacer to "top" line with rear of spacer and rear of tube even.

GLUE WING DOWEL SPACER EVEN WITH END OF TUBE CENTERED ON "TOP" LINE

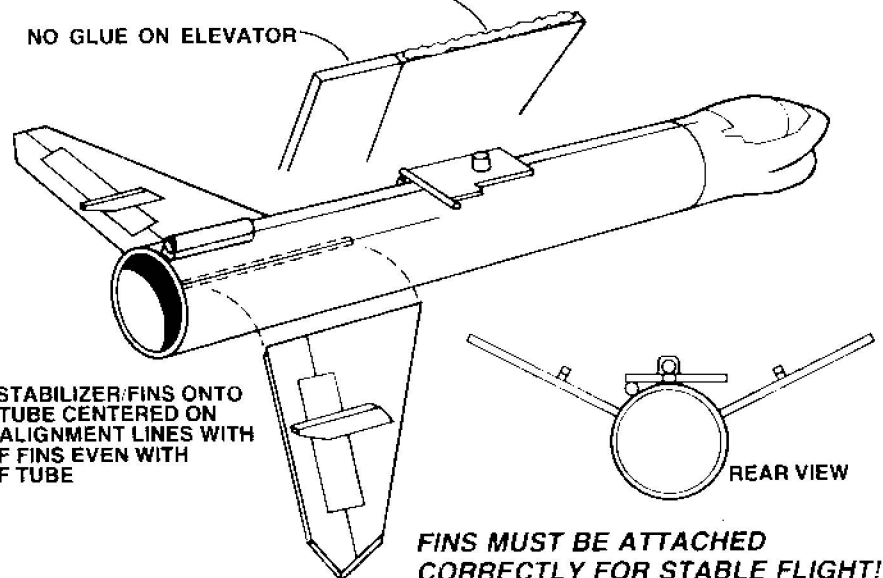
**24.**

Position and white glue stabilizer/fin assemblies on their alignment lines one at a time. Let each dry several minutes before applying the next one. Adjust fins to project straight out from tube.

APPLY WHITE GLUE HERE ONLY

NO GLUE ON ELEVATOR

GLUE STABILIZER/FINS ONTO BODY TUBE CENTERED ON THEIR ALIGNMENT LINES WITH END OF FINS EVEN WITH END OF TUBE

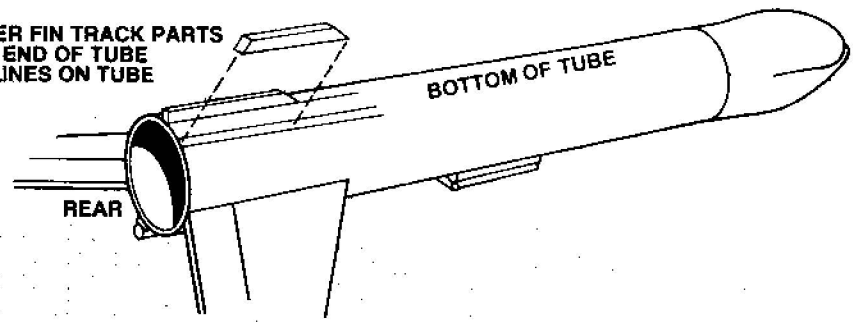


FINS MUST BE ATTACHED CORRECTLY FOR STABLE FLIGHT!

25.

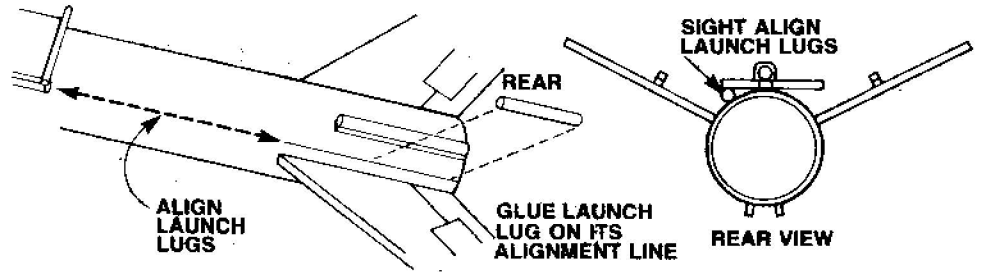
Remove lower fin track parts from wing die-cut sheet. LIGHTLY sand smooth surfaces and edges. Position and glue each fin track between lines as shown, with rear of track part even with rear of tube.

GLUE LOWER FIN TRACK PARTS EVEN WITH END OF TUBE BETWEEN LINES ON TUBE



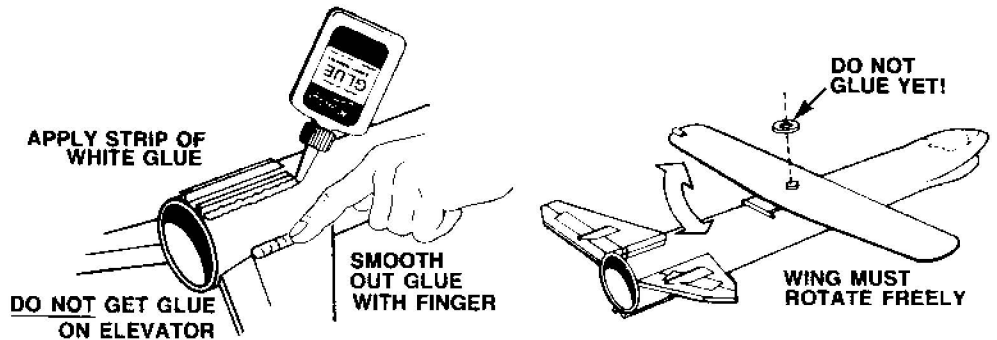
26.

Glue medium launch on its alignment line so rear of lug is even with rear of body tube. Sight through launch lug to be sure it lines up with lug on pivot assembly.



27.

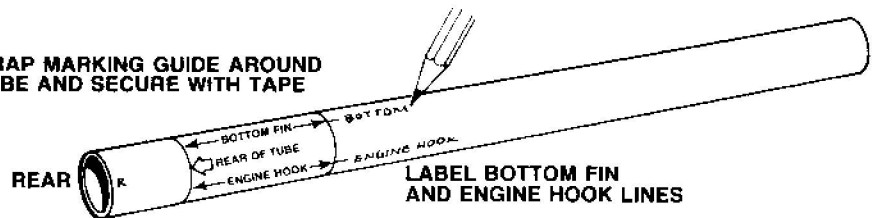
Apply glue reinforcements to the fin tracks, dowel spacer, launch lugs, and to each stabilizer/fin assembly. DO NOT apply glue to the elevators. After glue has dried, place wing on pivot and press wing lock ring over 1/4 inch dowel in pivot. DO NOT glue yet. Be sure wing pivots freely.



28.

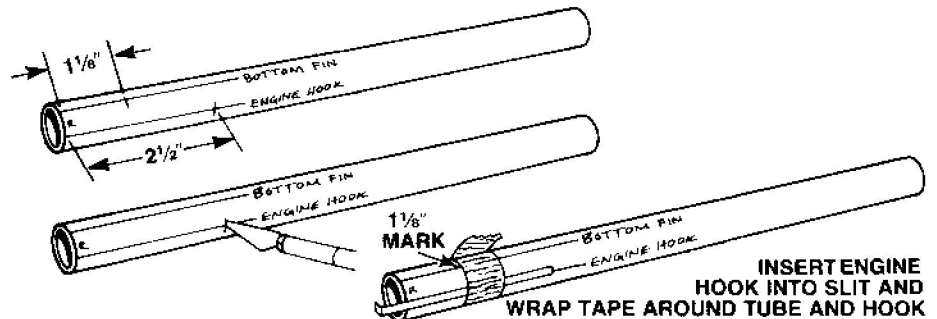
Cut out power pod marking guide from front of instructions. Wrap guide around tube with rear arrow pointing to rear end of tube and tape. Mark tube at each arrow point. Label bottom fin line, engine hook line, and rear of tube with a pencil. Remove guide. Draw straight lines connecting each pair of marks.

WRAP MARKING GUIDE AROUND TUBE AND SECURE WITH TAPE



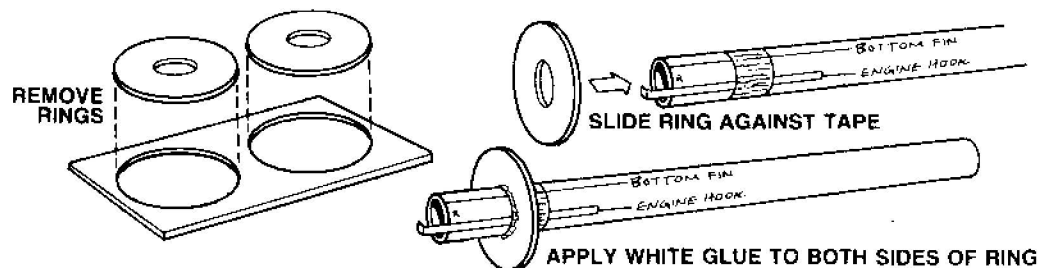
29.

Mark power pod tube 1 1/8 inch and 2 1/2 inches from rear of tube on engine hook line. Cut 1/8 inch slit at 2 1/2 inch mark. Insert one end of engine hook into slit. Wrap a 5 inch length of masking tape around tube at 1 1/8 inch mark to hold engine hook in place.



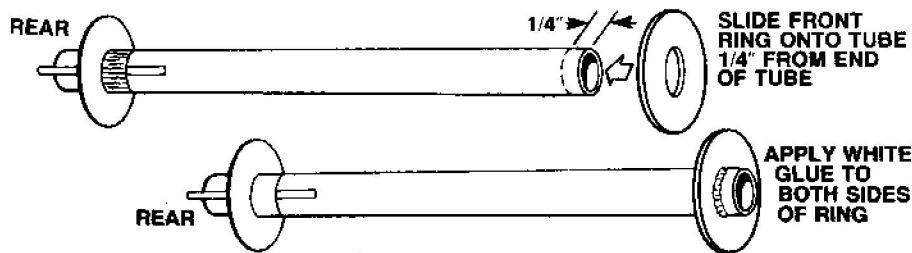
30.

Remove the centering rings from their sheet. Sand outside edge of rings round and smooth. Slide one ring onto rear of tube up to masking tape and glue both sides of ring/tube joint.



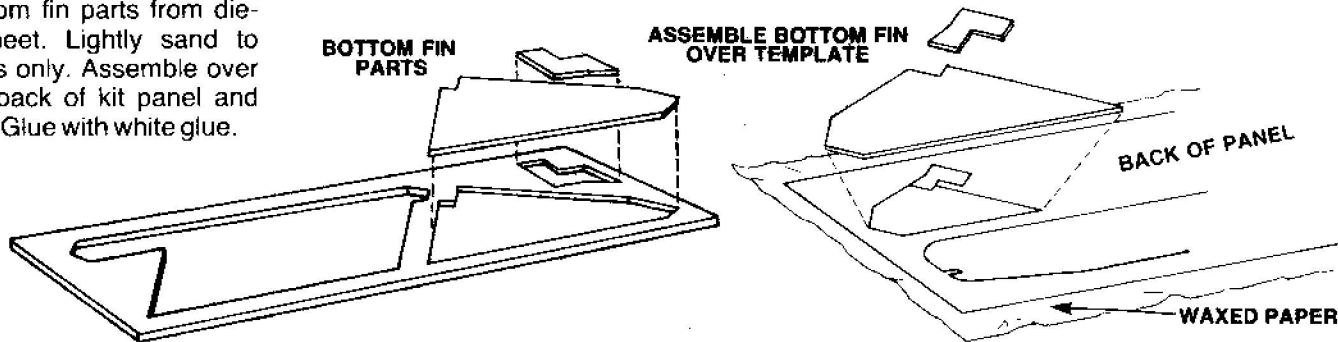
31.

Slide remaining ring onto front of tube 1/4 inch from end of tube. Glue both sides of ring/tube joint.



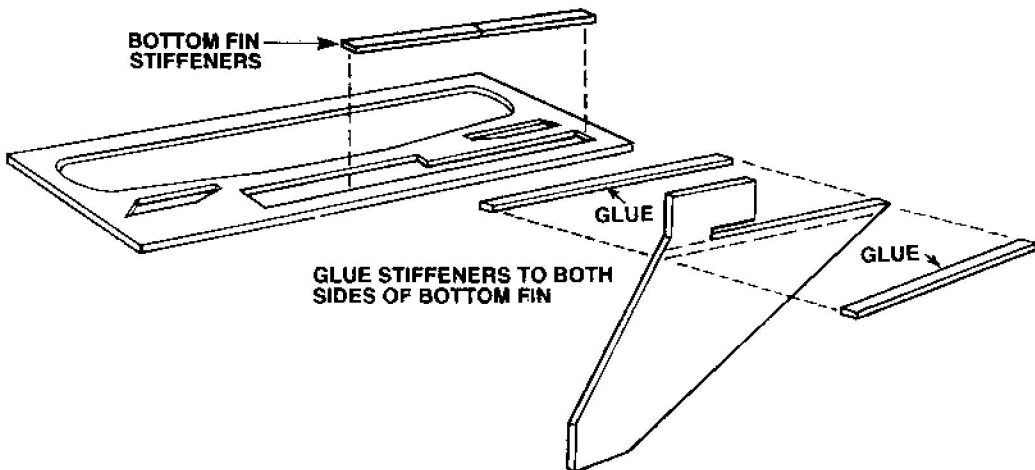
32.

Remove bottom fin parts from die-cut balsa sheet. Lightly sand to smooth edges only. Assemble over template on back of kit panel and waxed paper. Glue with white glue.



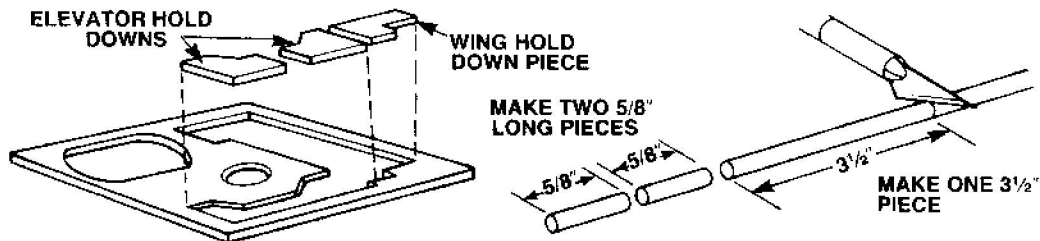
33.

Remove bottom fin stiffener strips from wing balsa sheet. Lightly sand to smooth edges. Remove bottom fin assembly from template when dry. Apply glue to edges of stiffener strips and glue to sides of fin assembly as shown.



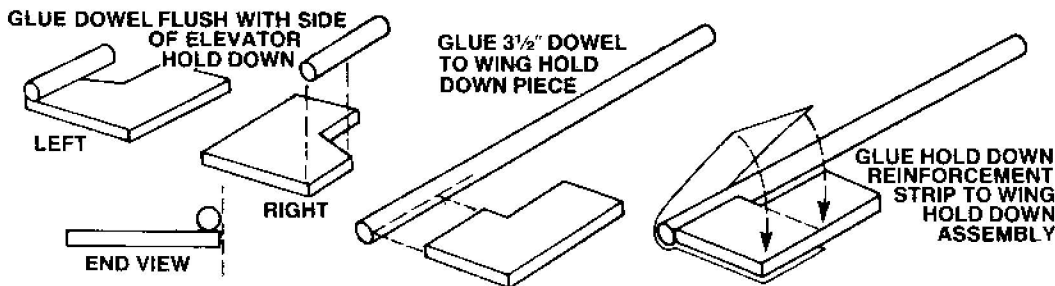
34.

Remove the three parts left in plywood die-cut sheet. Lightly sand to smooth edges. Cut two 5/8 inch long pieces and a 3 1/2 inch long piece from 1/8 inch wood dowel.



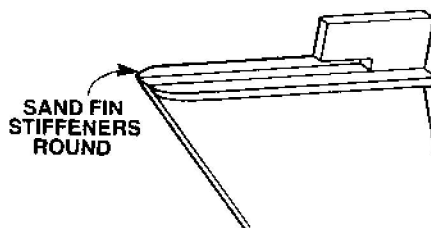
35.

Glue 5/8 inch long dowel to each elevator hold down piece and the 3 1/2 inch long dowel to the wing hold down piece. Cut out the wing hold down strip from front of instructions. Smear glue over hold down strip and glue it around wing hold down assembly for reinforcement.



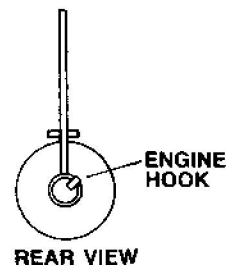
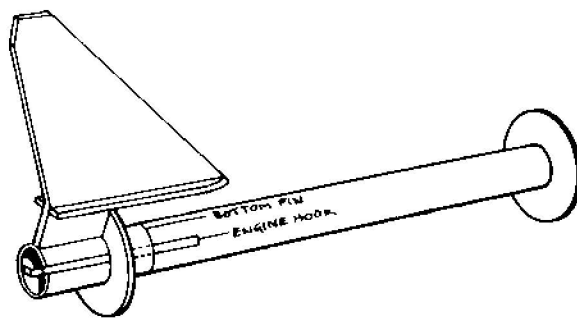
36.

Sand front of fin stiffeners round as shown.



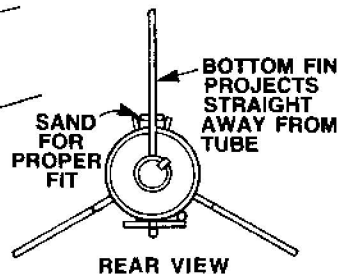
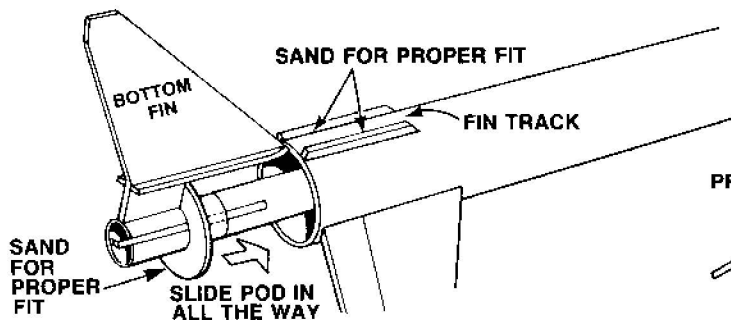
37.

Glue bottom fin to pod on its alignment line. Adjust fin to project straight out from tube. Make sure fin is parallel with center of tube.



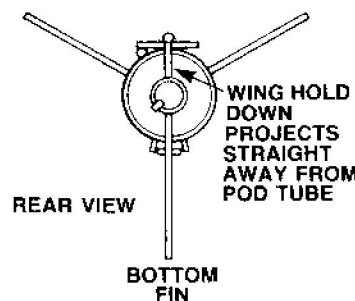
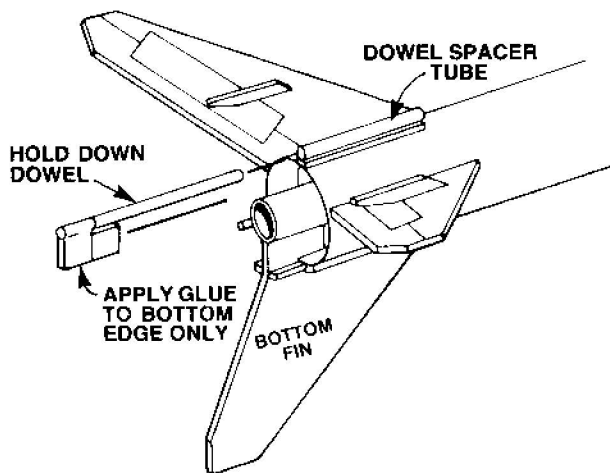
38.

When power pod and bottom fin are dry, slip power pod into rear of glider body tube. Bottom fin should slide into fin track on glider body freely. If necessary, sand centering rings and fin stiffeners for a loose sliding fit in body tube.



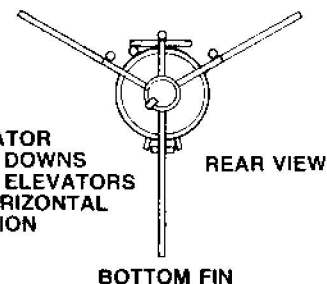
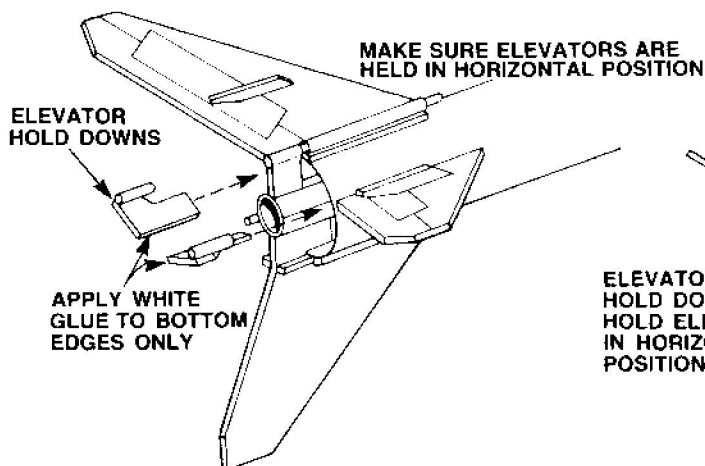
39.

Insert wing hold-down dowel into dowel spacer tube. The rear of hold-down mount should be even with rear of power pod. When you are sure that the part fits properly, remove wing hold-down and apply glue to bottom edge of hold-down and slip back into place. Adjust so it projects straight out from tube. Remove power pod assembly as soon as glue sets.



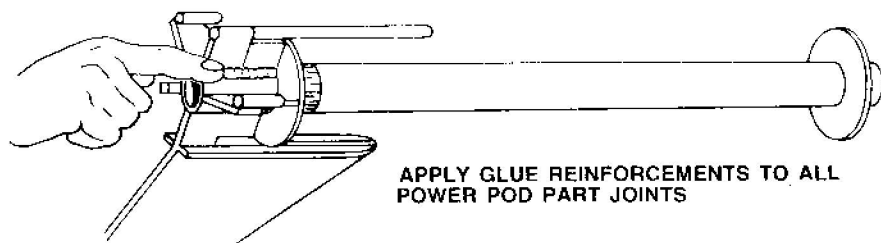
40.

After glue has dried on hold down, slide power pod assembly back into glider body, engaging the dowel spacer tube and lower fin track. Position the elevator hold downs into tube so dowels extend over elevators, holding them in a horizontal position. When you are sure of a proper fit, remove and apply glue to bottom edges of hold downs and slip back into place. Remove power pod assembly as soon as white glue sets.



41.

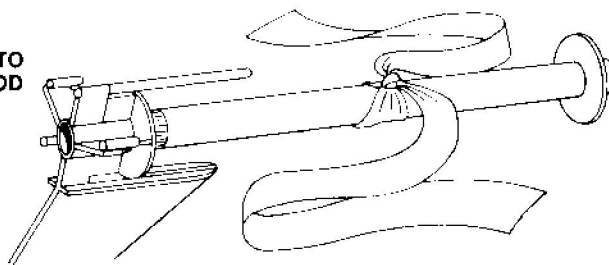
Apply a glue reinforcement to all power pod part joints.



42.

Tie the center of the streamer tightly around power pod.

TIE STREAMER TO POWER POD



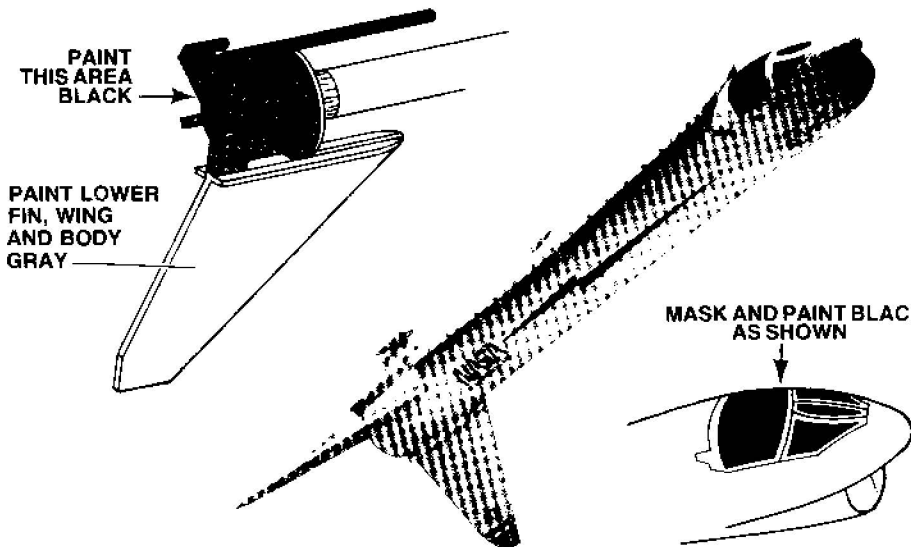
PAINING AND FINISHING

Apply sanding sealer to wood parts with small brush. When sealer is dry, lightly sand all sealed surfaces. Repeat sealing and sanding until balsa grain is filled and smooth. When sanding sealer and glue are completely dry, paint fuselage and wing aircraft grey. **For optimum performance, paint rocket with as little paint as possible to keep weight to a minimum.** Paint wing and fuselage separately. Paint back part of power pod black and lower fin grey. Follow instructions on spray can for best results. Let dry over night before assembling wing and fuselage. mask canopy and air scoop on nose cone and paint black. To apply decals, cut each out, dip in lukewarm water for 20 seconds, and hold until it uncurls. Refer to photograph on front page and on front of panel for decal locations. Slip decal off backing sheet and onto model. Blot away excess water. For best results, let decals dry over night and apply a light coat of clear spray paint to protect decals.

PAINT THIS AREA BLACK

PAINT LOWER FIN, WING AND BODY GRAY

MASK AND PAINT BLACK AS SHOWN



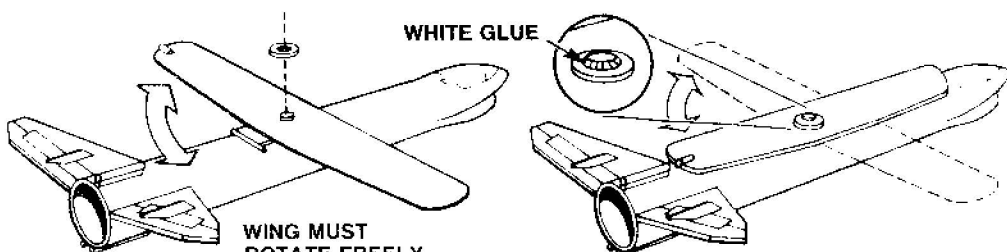
43.

Place wing on pivot and press wing lock ring over 1/4 inch dowel in pivot. Be sure wing pivots freely. Run a bead of glue around 1/4 inch dowel as shown. Allow to dry thoroughly. Check pivot again, wing must pivot freely.

WHITE GLUE

WING MUST ROTATE FREELY

APPLY GLUE AROUND 1/4" DOWEL AND ON WING LOCK RING
CHECK ROTATION OF WING



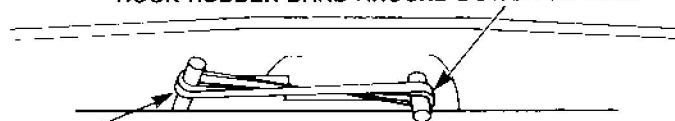
INSTALLING RUBBER BAND AND ELASTIC THREAD

44.

Hook one end of rubber band over 1/8 inch dowel extending down from wing. Pull rubber band back and extend loop over dowel at back of pivot.

HOOK RUBBER BAND AROUND DOWEL ON WING

PULL RUBBER BAND BACK (LOOP OVER DOWEL ON PIVOT)



45.

Tie two knots in elastic thread 3 1/8 inches apart with thread not stretched. Stretch thread through notches in elevators and around wing dowel spacer. Be sure elevators move up against elevator stops. Cut excess thread away and save for possible repairs.

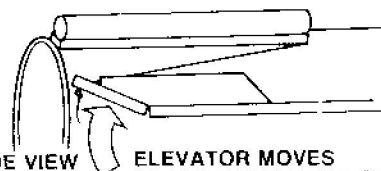
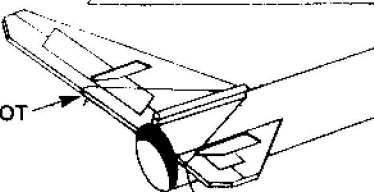
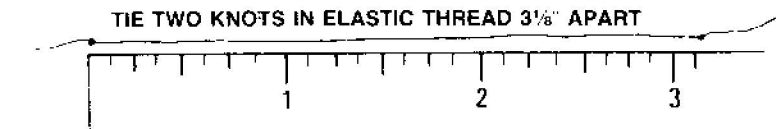
TIE TWO KNOTS IN ELASTIC THREAD 3 1/8" APART

KNOT IN SLOT

CUT OFF EXCESS THREAD

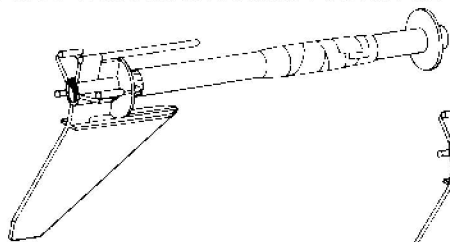
SIDE VIEW

ELEVATOR MOVES AGAINST ELEVATOR STOP

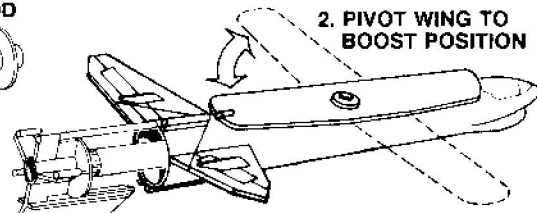


ROCKET PREFLIGHT

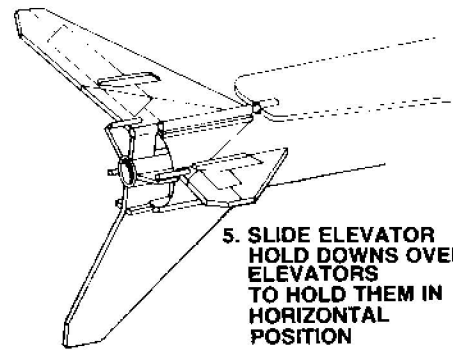
1. WRAP STREAMER AROUND POWER POD



2. PIVOT WING TO BOOST POSITION



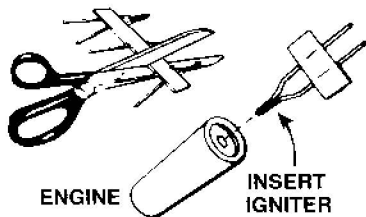
3. SLIDE POWERPOD INTO CRUSADER BODY
4. SLIP WING HOLD DOWN DOWEL INTO LAUNCH LUG ON WING TIP



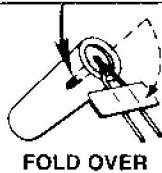
5. SLIDE ELEVATOR HOLD DOWNS OVER ELEVATORS TO HOLD THEM IN HORIZONTAL POSITION

PREPARE ENGINE

SEPARATE THE IGNITERS



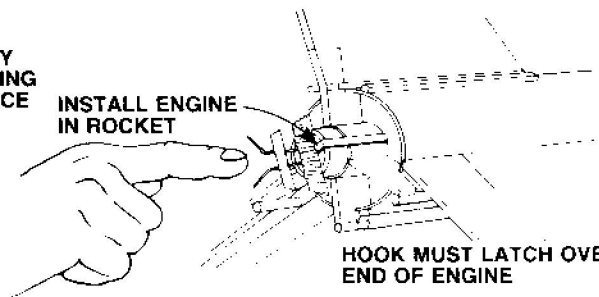
IGNITER TIP MUST TOUCH PROPELLANT DEEP INSIDE NOZZLE OPENING



APPLY AND FIRMLY PRESS MASKING TAPE IN PLACE



INSTALL ENGINE IN ROCKET



HOOK MUST LATCH OVER END OF ENGINE

LAUNCH SUPPLIES

To launch your Crusader you will need the following items:
—An Estes model rocket launching system
—Recommended Engines: B4-2, B6-2, C6-3
Use B4-2 engine for your first flight to become familiar with your Crusader's flight pattern.

FLYING YOUR CRUSADER

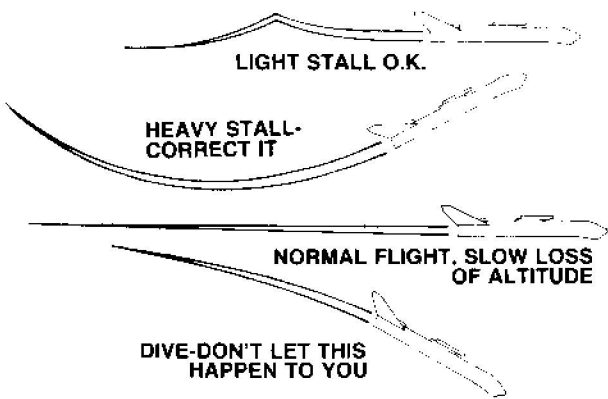
Choose a large field away from power lines, tall trees, and low flying aircraft. Try to find a field at least 250 feet square. The larger the launch area, the better your chance of recovering your glider. Football fields and playgrounds are great.

Launch area must be free of dry weeds and brown grass.

Launch only during calm weather with little or no wind and good visibility.

Observe glide carefully. If Crusader dives slightly, lightly sand elevator stops to increase elevator movement. If Crusader stalls, add shims on elevator stops for less elevator movement. To make Crusader turn, add shim under one elevator stop only.

1. Be sure wing is at right angle to fuselage when in glide configuration.
2. Check for warps.
3. Make sure wing snaps into glide position when pod releases. If wing pivot binds or does not snap open, replace rubber band, or use a silicone spray lubricant to lubricate pivot.



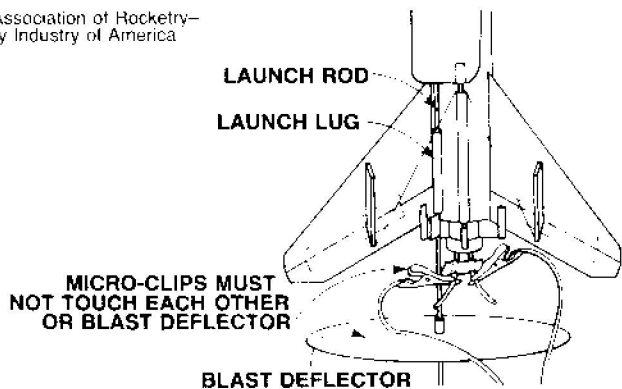
MISFIRES

Failure of the rocket engine to function properly is nearly always caused by a failure to install the igniter correctly. This failure permits the igniter to heat and burn into two pieces without igniting the engine.

FOR YOUR SAFETY AND ENJOYMENT

Always follow the NAR-HIA* MODEL ROCKETRY SAFETY CODE while participating in any model rocketry activities.

*National Association of Rocketry—The Hobby Industry of America

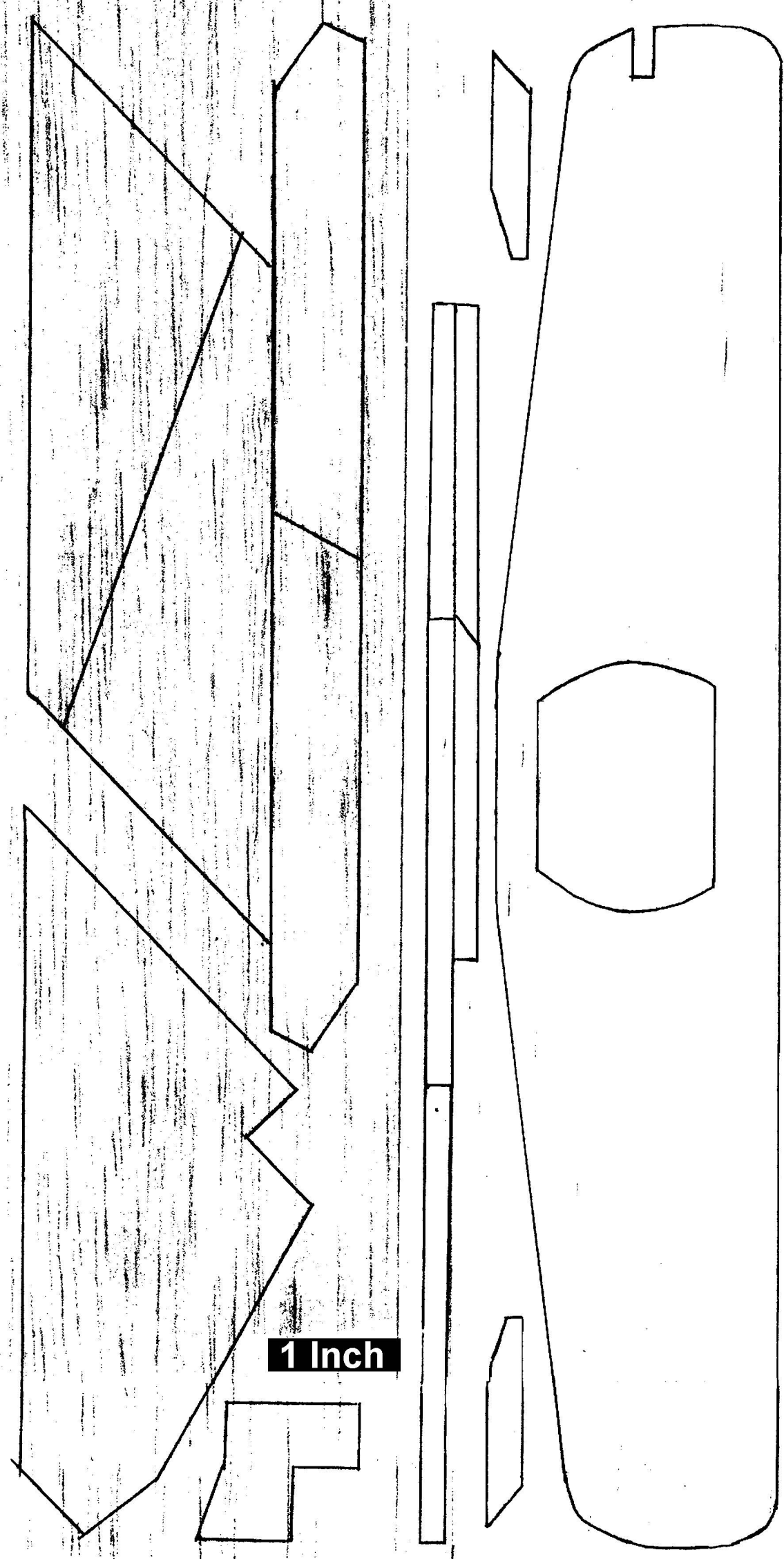


COUNTDOWN AND LAUNCH

- 5 REMOVE SAFETY KEY to disarm the launch controller.
- 4 Remove safety cap and slide launch lugs over launch rod to place rocket on launch pad. Make sure the rocket slides freely on the launch rod.
- 3 Attach micro-clips to the igniter wires. Arrange the clips so they do not touch each other or the metal blast deflector. Attach clips as close to protective tape on igniter as possible.
- 2 Move back from your rocket as far as launch wire will permit, (at least 15 feet).
- 1 INSERT SAFETY KEY to arm the launch controller.

LAUNCH!!!

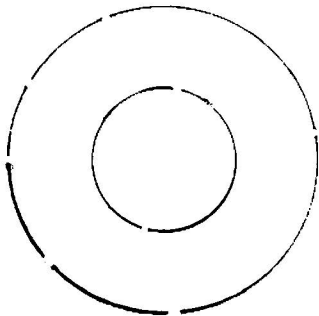
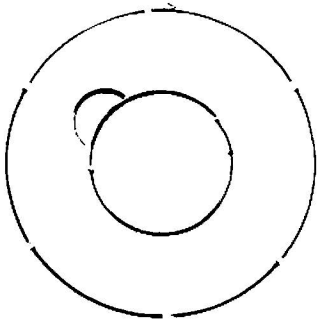
PUSH AND HOLD LAUNCH BUTTON UNTIL ENGINE IGNITES
Remove safety key—Replace cap on rod.

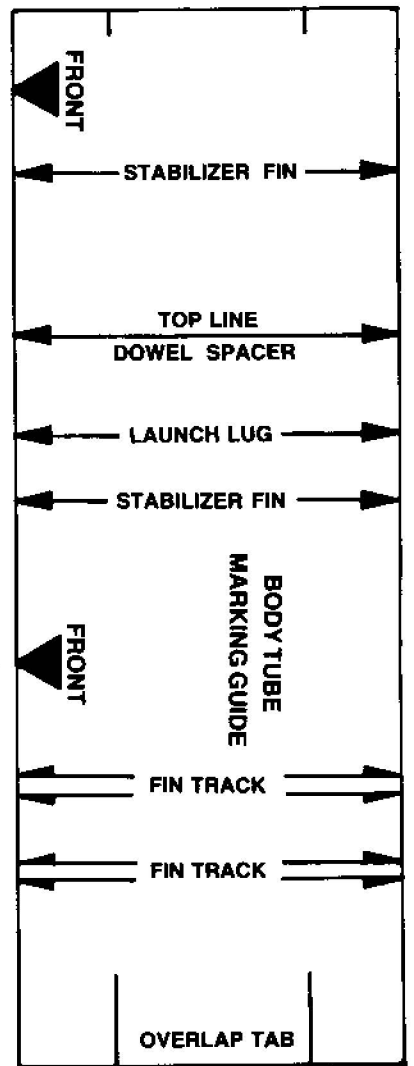
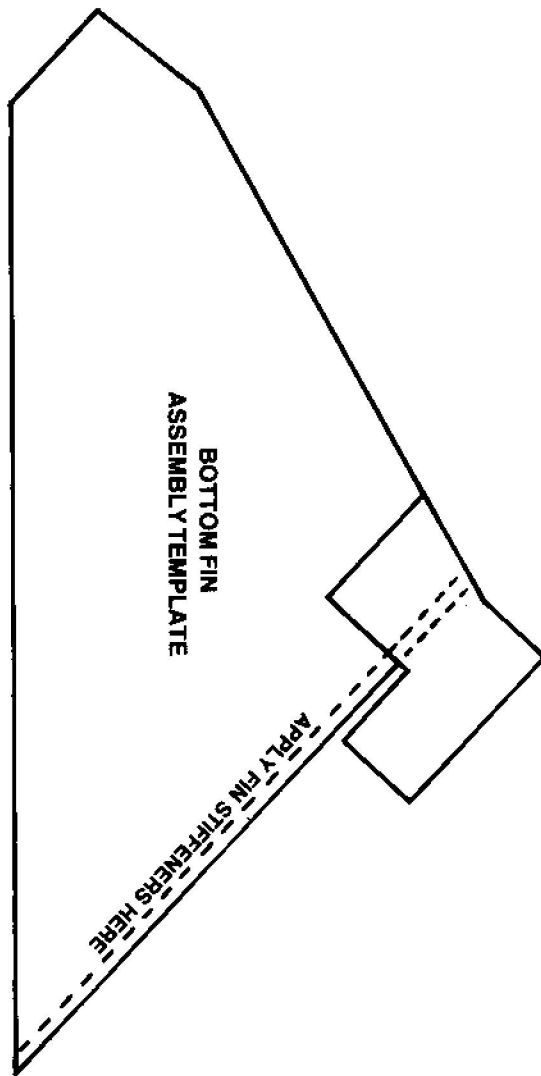
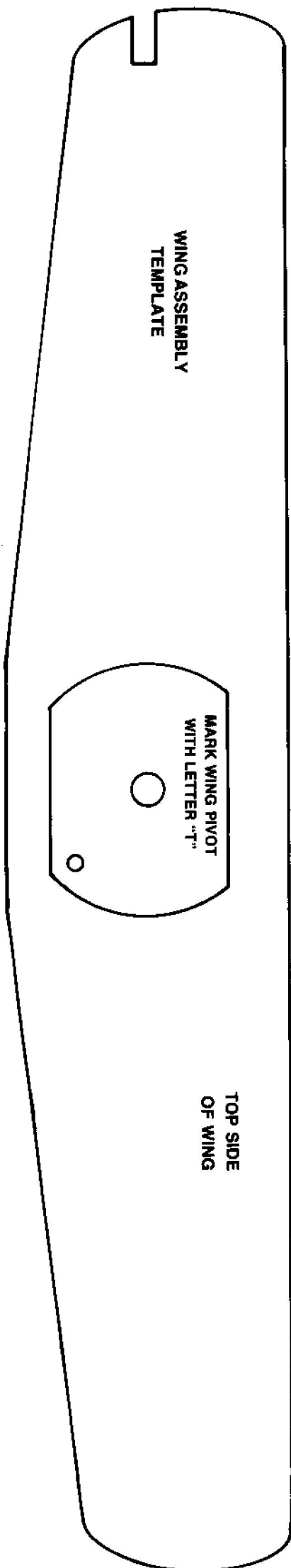




The image shows a technical drawing of a mechanical part on a textured background. The part consists of several interconnected sections. At the top is a rectangular section with a circular hole. Below it is a central section with a complex profile, including a central vertical slot and a wider base. At the bottom left is a section with a semi-circular bottom edge and two circular holes. At the bottom right is a circular section with a central hole. A scale bar labeled "1 Inch" is positioned to the left of the central section.

1 Inch





NAR/HIA Model Rocketry Safety Code

(Eff. 1-1-87)

- 1. Construction**—My model rockets will be made of lightweight materials such as paper, wood, rubber, and plastic, without any metal as structural parts.
- 2. Engines**—I will use only pre-loaded factory-made NAR Certified model rocket engines in the manner recommended by the manufacturer. I will not alter or dismantle model rocket engines or their ingredients in any way or attempt to reload these engines.
- 3. Recovery**—I will always use a recovery system in my rockets that will return them safely to the ground so that they may be flown again. I will use only flame-resistant recovery wadding in my rockets.
- 4. Weight Limits**—My model rocket will weigh no more than 1500 grams (53 oz.) at lift-off, and the engines will contain a total of no more than 125 grams (4.4 oz.) of propellant. My model rockets will weigh no more than the engine manufacturer's recommended maximum lift-off weight for the engines used or will use the engines recommended by the manufacturer for my rocket.
- 5. Stability**—I will check the stability of my model rockets before their first flight, except when launching models of already proven stability.
- 6. Payloads**—My model rockets will never carry live animals or payloads that are intended to be flammable or explosive.
- 7. Launch Area**—I will launch my model rockets outdoors in a cleared area, free of tall trees, power lines, and buildings. I will ensure that people in the vicinity are aware of the pending rocket launch and are in a position to see the rocket's lift-off before I begin my audible 5-second countdown.
- 8. Launcher**—I will launch my model rockets from a rod or other device which provides rigid guidance until the rocket has reached a speed adequate to ensure a safe flight path. To prevent accidental eye injury, I will always place the launcher so that the end of the rod is above eye-level or will cap the end of the launch rod when approaching it. I will cap or disassemble my launch rod when not in use and will never store it in an upright position. The launch device will have a jet deflector to prevent the engine exhaust from hitting the ground directly. I will always clear the area around my launch device of brown grass, dry weeds, and other easy-to-burn materials.
- 9. Ignition System**—The system I use to launch my model rockets will be remotely controlled and electrically operated and will contain a launching switch that will return to "off" when released. The system will contain a removable safety interlock in series with this firing switch. When launching, all persons will remain at least 15 feet away from any model rocket when igniting engines totaling 30 N-sec of total impulse or less and at least 30 feet when igniting engines totaling more than 30 N-sec total impulse. I will use only electrical igniters which will ignite my rocket engine within one second of actuation of the launching switch.
- 10. Launch Safety**—I will not let anyone approach a model rocket on a launcher until I have made sure that the safety interlock has been removed or the battery has been disconnected from the launcher. In the event of a misfire, I will wait one minute before allowing anyone to approach the launcher.
- 11. Flying Conditions**—I will launch my model rocket only when the wind is less than 20 miles per hour, and under conditions where the model will not fly into clouds, fly near aircraft in flight, or be hazardous to people or property.

- 12. 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.
- 13. Launch Angle**—I will not launch rockets so their flight path will carry them against targets. My launch device will be pointed within 30 degrees of vertical. I will never use model rocket engines to propel any device horizontally.
- 14. Recovery Hazards**—If a model rocket becomes entangled in a power line or other dangerous place, I will not attempt to retrieve it.

As a member of the Estes Model Rocketry Program, I promise to faithfully follow all rules of safe conduct as established in the above code.

Signature _____

This Model Rocketry Safety Code is Approved by the National Association of Rocketry and the Hobby Industry of America.

IMPORTANT!

PLEASE READ AND BECOME FAMILIAR WITH THE MODEL ROCKETRY SAFETY CODE ON THIS CARD. PLEASE SIGN WHERE INDICATED AND KEEP THIS CODE WITH YOU DURING ALL YOUR MODEL ROCKET ACTIVITIES.

FULL ONE YEAR WARRANTY

Your Estes product is warranted against defects in materials or workmanship for one year from the date of the original purchase. Any Estes product, except computer software, which, because of a manufacturing mistake, malfunctions or proves to be defective within the one-year warranty period will be repaired or replaced, at Estes' option and at no charge to you, provided it is returned to Estes with proof of purchase.

This warranty does not cover incidental or consequential damage to persons or property caused by the use, abuse, misuse, failure to comply with operating instructions or improper storage of the warranted product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state. For repair or replacement under this warranty, please return the defective part of your Estes product with proof of purchase to: Estes Industries, Customer Service Department, Petros, Colorado 81240.

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NASA

NASA

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EXPERIMENTAL A-7S

VSVM
EXPERIMENTAL A-7S

ESTES PN37286



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Estes Crusader Swing-Wing #1961

Q	Desc	Stk Num	Size	Other
1	Plastic Nose Cone		Custom	
1	Body Tube	BT-60	12.5"L	
1	Body Tube	BT-20	12"L	
1	Wood Dowel		.25"Dia x 1"L	
1	Wood Dowel		1/8"Dia x 9"L	
1	Launch Lug		1.25"L	
1	Launch Lug		3/16"L	
2	Launch Lug		2 3/8"L	
1	Balsa Sheet (Wing)		3"W x 12"L x 1/8"T	
1	Balsa Sheet (Elev/Stab)		3"W x 12"L x 1/8"T	
1	Plywood Sheet		3.5"W x 4.5"L x 1/8"T	
2	Centering Rings	RA-2060		
1	Streamer		29"L	
1	Engine Hook	EH-2		
1	Elastic Thread		6-1/2"L	
2	Rubber Bands		1"L	
1	Hinge Material		5/8"W x 5"L	

CRUSADER

SWING-WING GLIDER

**FLYING
MODEL
ROCKET**

SKILL LEVEL 4

- NASA Advanced Fighter Concept
- Internal Ejection Power Pod
- Two-Color Decal
- Die-Cut Parts

**800
FOOT
FLIGHTS!
45 SECOND
GLIDE TIMES!**

Length: 18 1/2" (46.7 cm)
Wingspan: 12 1/2" (31.8 cm)
Weight: 12.5 oz (354 g)
Motor: Estes E10
Motor Mount: 1/2" (12.7 mm)
Estes Part No. CR-100

For more information visit
the website www.estes.com
or call 1-800-ESTES-1000



ESTES INDUSTRIES
CORPORATION, 100 BROADWAY, USA



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