

# COUNTDOWN AND LAUNCH

## ESTES LAUNCH SUPPLIES

- (Sold Separately)
- Porta Pad® II Launch Pad (Requires 3/16" [5 mm] Maxi™ Rod - sold separately).
  - Electron Beam® Launch Controller
  - Recovery Wadding
  - Igniters (with Engines)
  - Igniter Plugs (with Engines)
  - Recommended Engines: D12-3



www.estesrockets.com

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Penrose, CO 81240

PRINTED IN CHINA

# LONE STAR SPACE ACCESS #2190 COSMOS MARINER



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**FLYING MODEL  
ROCKET KIT  
INSTRUCTIONS**  
KEEP FOR FUTURE  
REFERENCE



**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.

**KEY ALWAYS OUT UNTIL FINAL COUNTDOWN!**

2...

3...

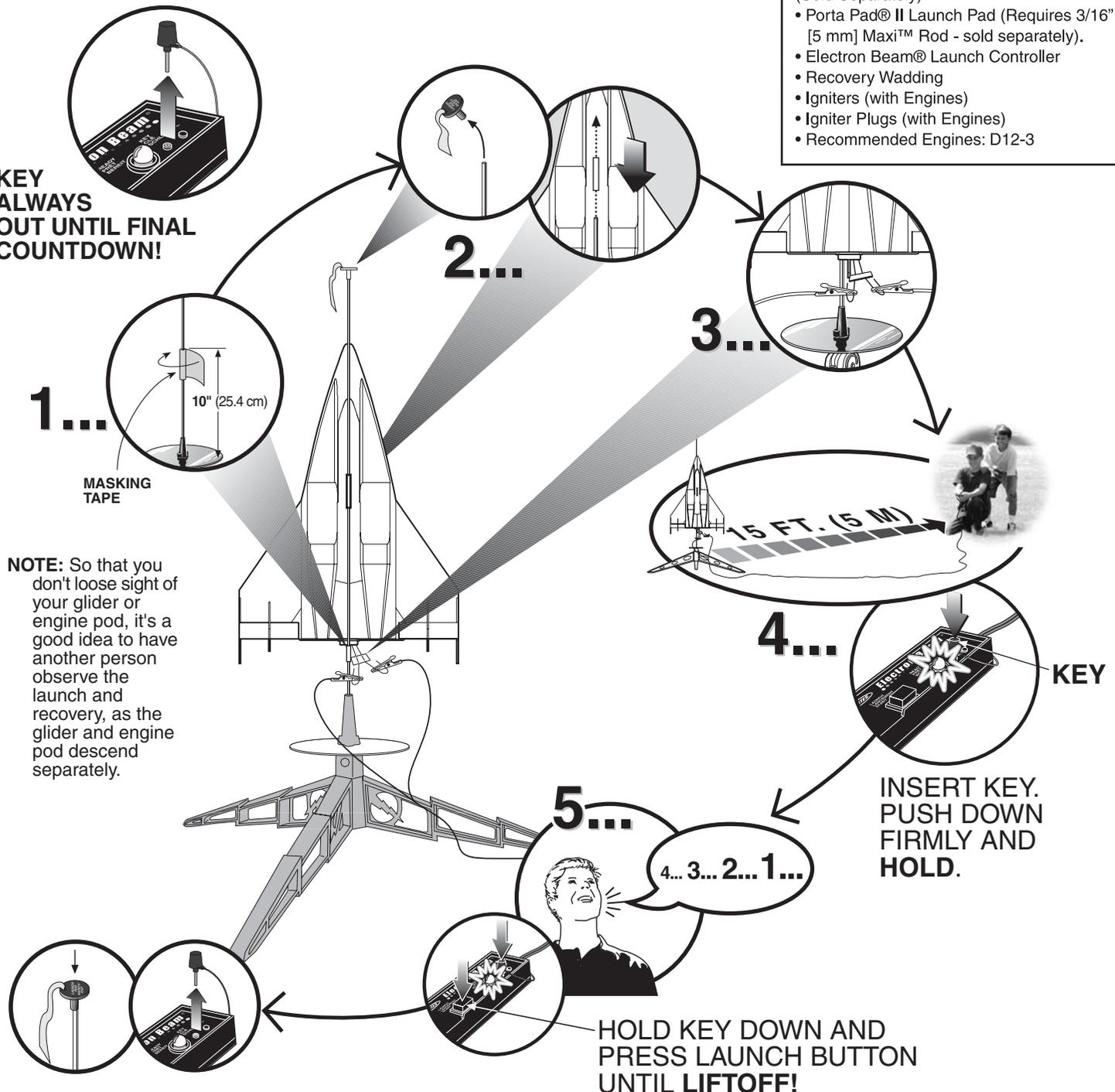
4...

5...

4... 3... 2... 1...

1...

**NOTE:** So that you don't lose sight of your glider or engine pod, it's a good idea to have another person observe the launch and recovery, as the glider and engine pod descend separately.



## PRECAUTIONS



## FLYING YOUR ROCKET

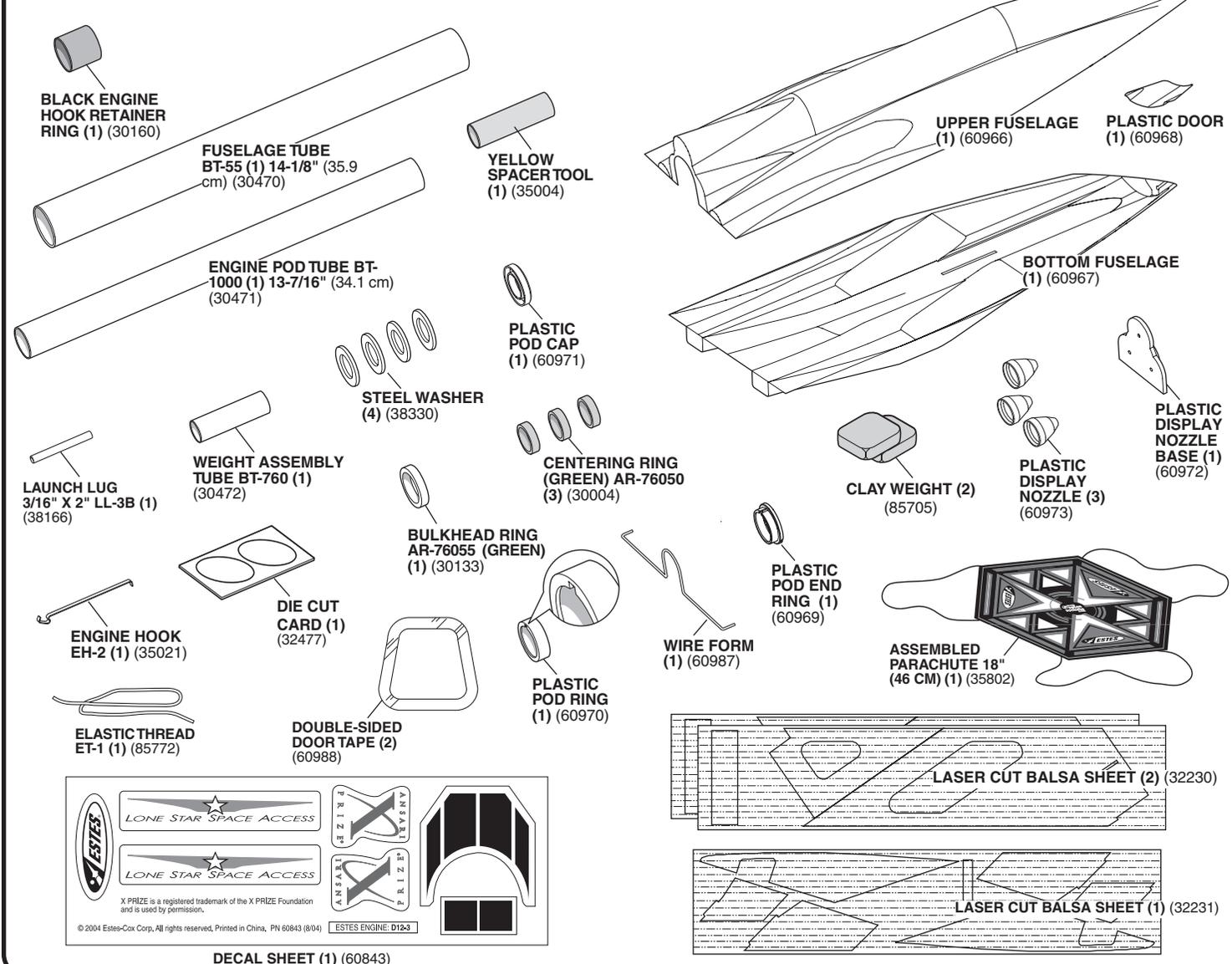
Choose a large field (500 ft. [152 m] square) free of dry weeds and brown grass. The larger the launch area, the better your chance of recovering your rocket. Football fields and playgrounds are great. Launch only with little or no wind and good visibility. Always follow the National Association of Rocketry (NAR) SAFETY CODE.

## MISFIRES

TAKE THE KEY OUT OF THE CONTROLLER. WAIT ONE MINUTE BEFORE GOING NEAR THE ROCKET! Disconnect the igniter clips and remove engine. Take the plug and igniter out of the engine. If the igniter has burned, it worked but did not ignite the engine because it was not touching the propellant inside the engine. Put a new igniter all the way inside the engine without bending it. Push the plug in place. Repeat the steps under Countdown and Launch.

## PARTS

Locate the parts shown below and lay them out on the table in front of you. DO NOT USE THIS DRAWING TO ASSEMBLE YOUR ROCKET.



## SUPPLIES

In addition to the parts included in the kit you will also need:



# 1. ASSEMBLE ENGINE POD WEIGHT ASSEMBLY

**WEIGHT ASSEMBLY TUBE**

**A.** Mark tube 7/8" (22 mm) from front.

**B.** Apply glue around tube in front of 7/8" (22 mm) mark. Slide centering ring onto tube up to mark.

**C.** Apply glue around rear end of tube. Slide centering ring onto tube, flush with the end. Let dry.

**D.** Slide four steel washers onto tube.

**E.** Apply plastic cement around end of tube. Slide pod cap onto tube, tight against washers. Let dry.

**COMPLETED ASSEMBLY**

# 2. ASSEMBLE ENGINE POD ASSEMBLY

**A.** Measure and mark engine pod tube 3/4" (19 mm) and 2-1/4" (5.7 cm) from end.

**B.** Cut a 1/8" (3 mm) slit at the 2-1/4" (5.7 cm) mark.

**C.** Mark yellow spacer tool 1/2" (13 mm) from end.

**D.** Use scrap balsa to smear glue 2" (5 cm) inside engine pod tube.

**E.** Using yellow spacer tool, push remaining green centering ring into tube up to 1/2" (13 mm) mark. **Remove yellow spacer tool immediately.** Let dry.

**F.** Position and insert engine hook into slit as shown. Temporarily hold hook into place with masking tape at 3/4" (19 mm) mark.

**G.** Apply a bead of plastic cement around end of tube. Align plastic pod end ring with notch over engine hook. Slide into place, flush with end of tube. Check that engine hook is straight with body tube. Let dry.

**H.** Remove masking tape.

# 15. PREPARE FOR FLIGHT

Note position of engine pod tube.

**A.** Spike parachute and roll shroud lines and parachute around power pod.

**B.** Insert pod tube into fuselage tube using a twisting motion. Fit should not be too tight. If tight, remove pod and roll parachute around pod tube tighter. Reinsert pod into glider.

**C.** Slip wire form ends over left elevator and right wing.

# PREPARE ENGINE

**WARNING: FLAMMABLE**

To avoid serious injury, read instructions & NAR Safety Code included with engines. **PREPARE YOUR ENGINE ONLY WHEN YOU ARE OUTSIDE AT THE LAUNCH SITE PREPARING TO LAUNCH!** If you do not use your prepared engine, remove the igniter before storing your engine.

**A.** Separate igniter and plug.

**B.** Insert igniter.

**C.** Insert plug.

**D.** Push down.

**E.** Gently bend wires to form leads as shown.

**F.** Insert engine into rocket.



## TEAM OVERVIEW

### LONE STAR SPACE ACCESS TEAM

Lone Star Space Access Corporation is a research and development company dedicated to developing the technologies necessary for a space faring civilization. The goal of the company is to develop the enabling technologies for affordable and routine access to space for the purpose of exploration and utilization. The company is composed of a team of professionals working in a concurrent development environment on a variety of technologies. Their goal is to create the technology and capability necessary to allow mankind to reap the full benefits of the utilization of space and to spin off these technologies for commercial development in other non-aerospace applications.

### TEAM SPECIFICATIONS

Name: Lone Star Space Access Team  
 Web Site: [www.lonestarspace.com](http://www.lonestarspace.com)  
 Country of Origin: Houston, Texas, USA

### VEHICLE SPECIFICATIONS

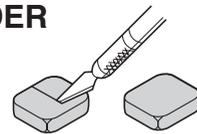
Name: .....Cosmos Mariner  
 Length: .....100 feet (31 m)  
 Wingspan: .....73 feet (22 m)  
 GTOW: .....136,000 Lbs  
 DRY WT: .....30,000 Lbs  
 Engines: .....Three staged-combustion  
 Total Thrust: .....90,000-lbs  
 Payload Capacity: .....3 crew members.  
 Crew Environment: .....Short-sleeved, pressurized cabin.

### MISSION SPECIFICATIONS

Launch Method: .....Horizontal takeoff from ground  
 Max. Acceleration Force: .....3-4 Gs  
 Max. Speed: .....Mach 7  
 Max. Altitude: .....75 miles (120 km)  
 Time in Weightless Conditions: .....10 minutes  
 Landing Method: .....Conventional runway  
 Total Flight Duration: .....2 hours (including flight back to launch point)

# 13. BALANCE GLIDER

CUT ONE CLAY WEIGHT IN HALF



A. Insert 1-1/2 squares of clay into cavity located on bottom front of fuselage.

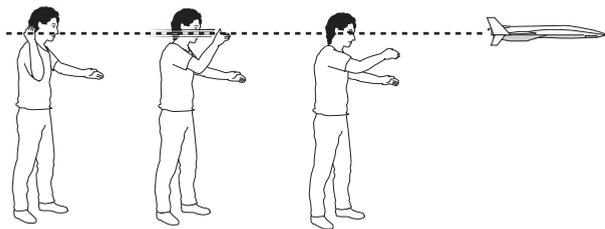
B. Add or subtract clay weight until glider balances between 7-1/8" to 7-3/8" (18.1 to 18.7 cm) from rear of glider. Hold clay in place temporarily with masking tape.

7-1/8" to 7-3/8"  
(18.1 to 18.7 cm)

HOLD CLAY TEMPORARILY WITH MASKING TAPE

# 14. GLIDE TEST

NOTE: Test the glider only on soft, grassy surfaces like a sports field or lawn so that you don't damage your model.



A. With engine pod removed from glider, aim for a spot about 50 feet (15 m) away and toss glider straight out at eye level.

B. Observe glide carefully. Make adjustments a little at a time until you are satisfied with the glide.

CORRECT FLIGHT-  
SLOW LOSS OF  
ALTITUDE

LIGHT STALL-OK

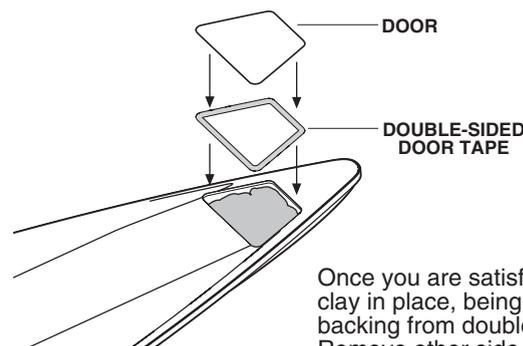
HEAVY STALL-  
CORRECT IT

DIVE-DON'T LET THIS  
HAPPEN TO YOU

## GLIDER ADJUSTMENTS:

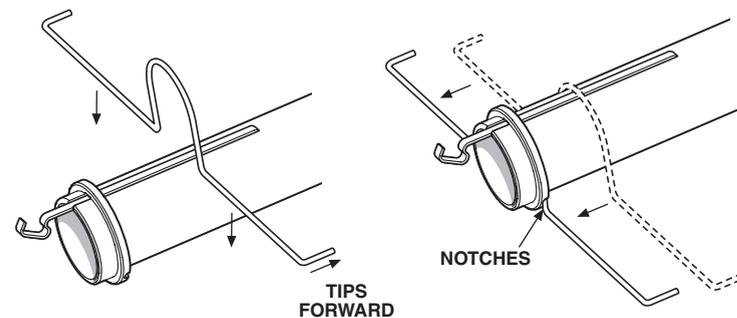
If glider dives, remove clay weight from cavity.  
If glider stalls, add clay weight to cavity.  
If glider turns too sharply, make sure it is balanced span wise (from side to side). If it is not, add weight, in small amounts, to the light wing tip until nearly balanced.

The glider should perform a large, gliding circle during descent.

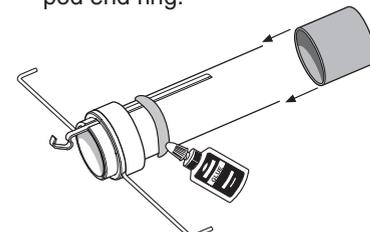


Once you are satisfied with the glide, remove the tape that holds the clay in place, being careful not to dislodge any of the clay. Remove backing from double-sided door tape and apply tape to plastic door. Remove other side of backing and attach door to fuselage, pressing door firmly onto fuselage and securing clay weight in place.

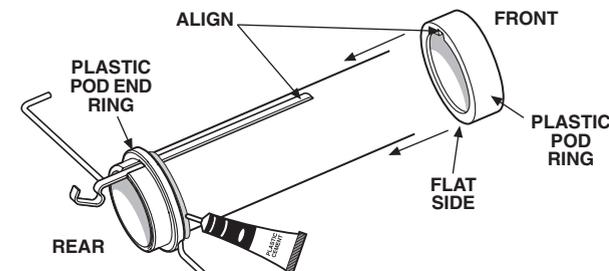
# 2. ASSEMBLE ENGINE POD ASSEMBLY (continued)



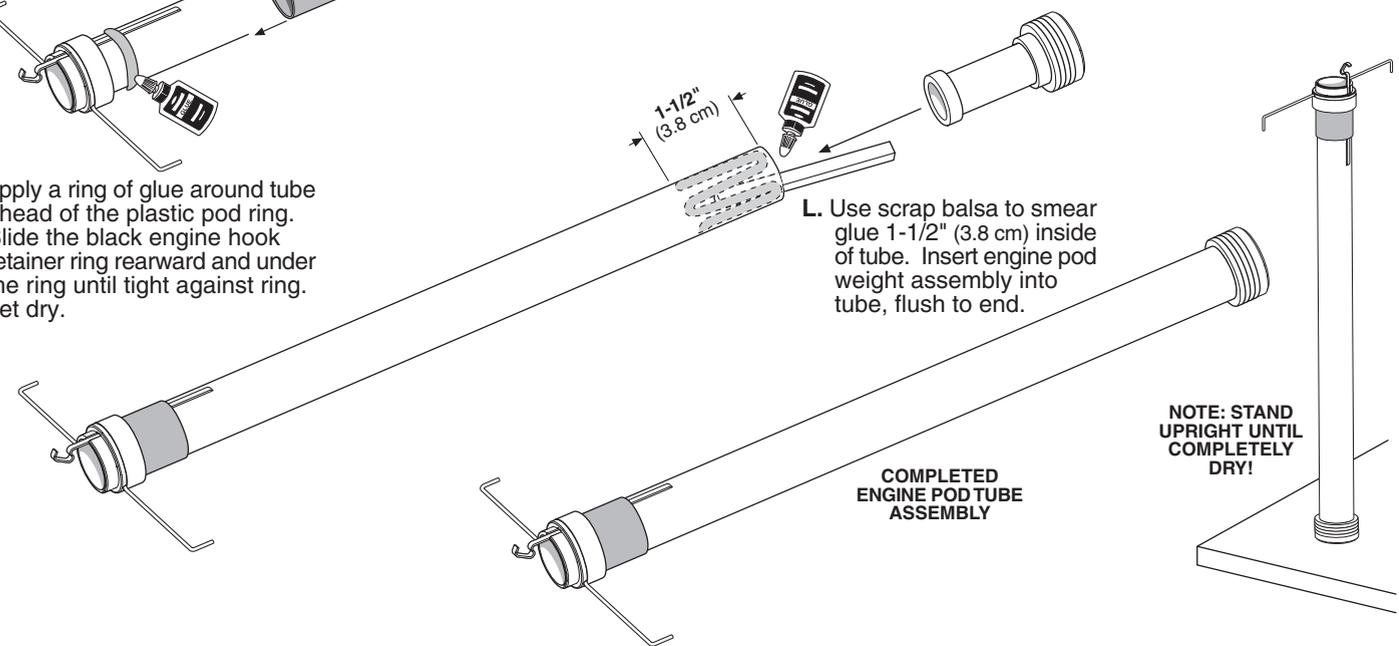
I. Align wire form as shown, tips forward. Loop goes over tube. Press wire form rearward until it fits into notches in the plastic pod end ring.



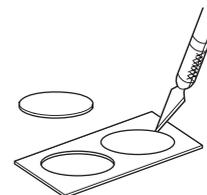
K. Apply a ring of glue around tube ahead of the plastic pod ring. Slide the black engine hook retainer ring rearward and under the ring until tight against ring. Let dry.



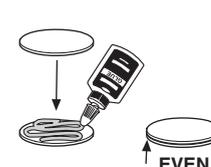
J. Align notch in plastic pod ring with engine hook. Apply plastic cement around front edge of the plastic pod end ring. Slide plastic pod ring down tube, making sure the wire form is trapped between the two rings. Let dry. Note: Wipe off any excess cement.



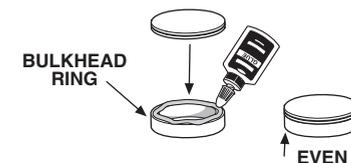
# 3. ASSEMBLE FUSELAGE TUBE



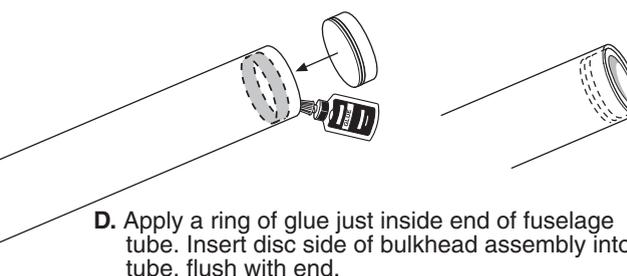
A. Carefully remove discs from card using a modeling knife. Sand edges smooth to remove any nibs.



B. Apply glue to top of one disc. Press both discs together, align evenly. Let dry.



C. Apply glue to bulkhead ring and attach discs. Wipe off any excess glue. Let dry.



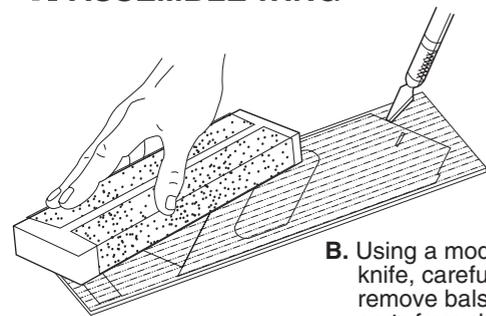
D. Apply a ring of glue just inside end of fuselage tube. Insert disc side of bulkhead assembly into tube, flush with end.

E. Stand upright on bulkhead end until completely dry. Do not lay on its side.

BULKHEAD END

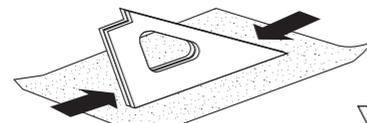
COMPLETED FUSELAGE ASSEMBLY

## 4. ASSEMBLE WING



A. Sand balsa sheets smooth, both sides.

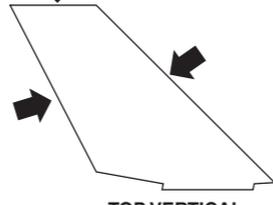
B. Using a modeling knife, carefully remove balsa parts from sheets.



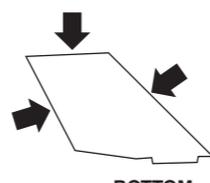
C. Sand edges smooth to remove any nibs. Keep edges square and do not round.

CAUTION: Do not sand off the tabs on top and bottom stabilizers!

NOTE: On these parts, sand only the edges indicated with arrows.

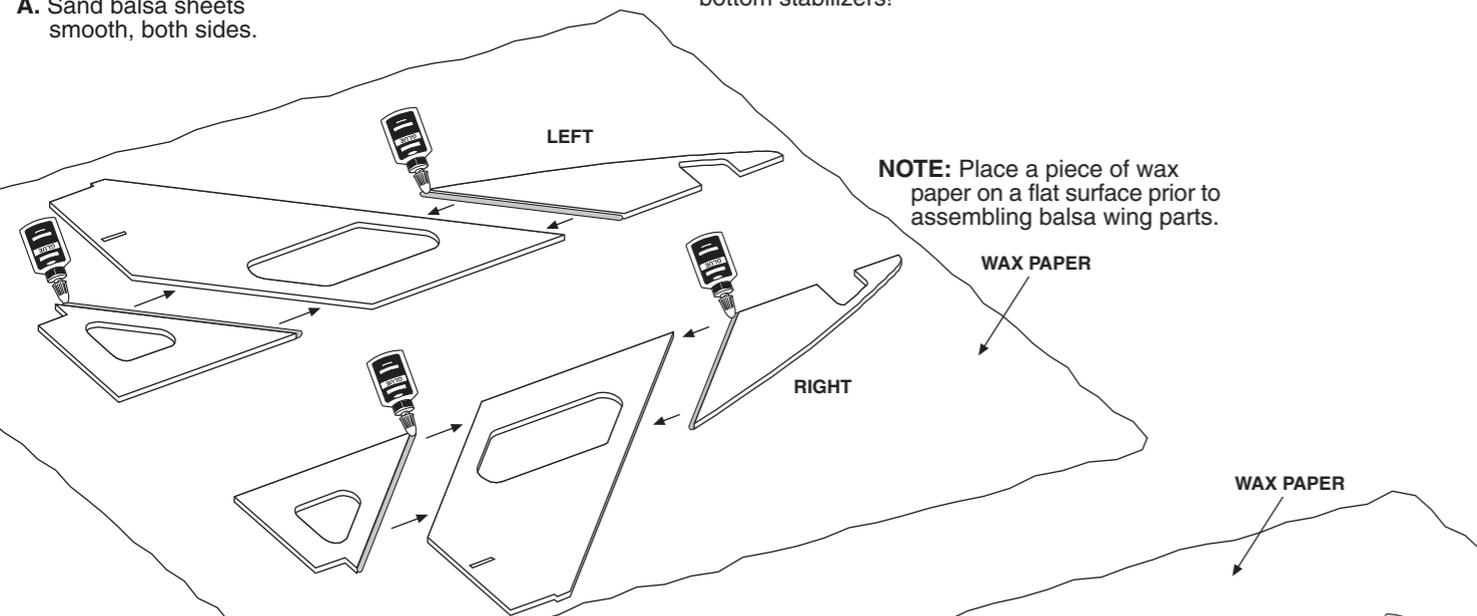


TOP VERTICAL STABILIZER



BOTTOM STABILIZER

NOTE: Place a piece of wax paper on a flat surface prior to assembling balsa wing parts.

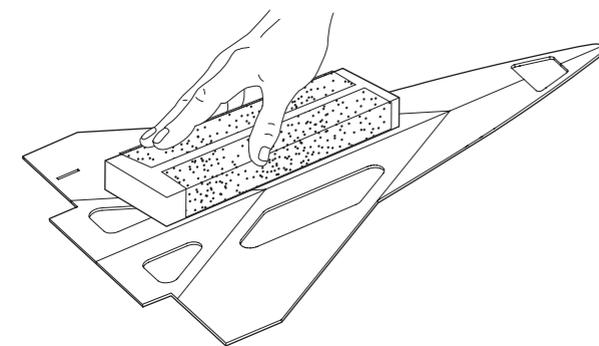


D. Place a piece of wax paper on a flat surface. Line up balsa wing pieces as shown. Glue left and right wings together as shown.

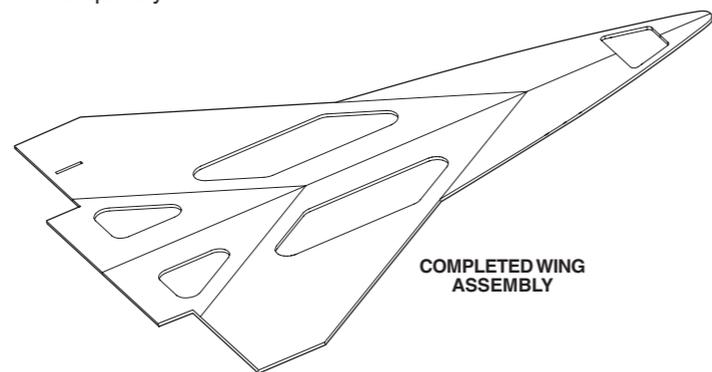
NOTE: Accurate alignment is critical for fuselage fit.

E. After alignment, place another piece of wax paper on top of wings. Place a book on top and let dry completely.

F. After wings are completely dry, align and glue together as shown. Place a piece of wax paper on top of wing, place a book on top and let dry completely.

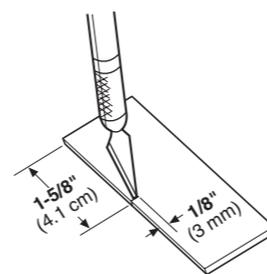


G. Sand both sides smooth.

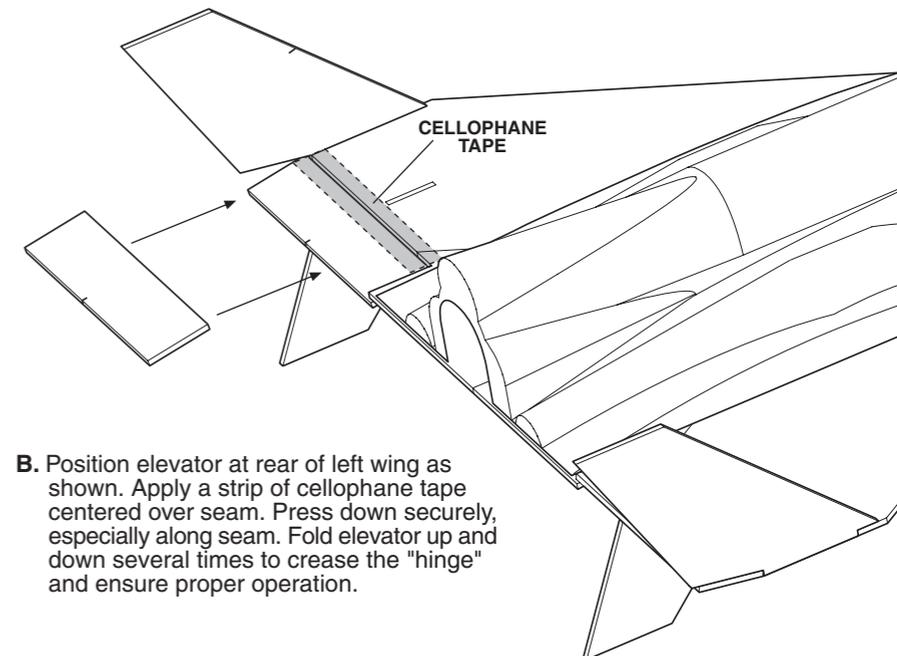


COMPLETED WING ASSEMBLY

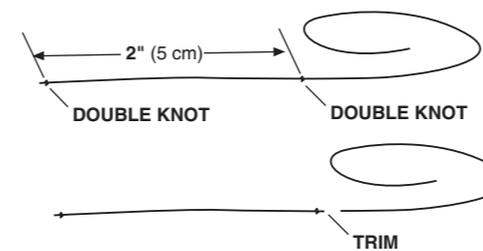
## 12. ATTACH LEFT ELEVATOR AND ELASTIC THREAD



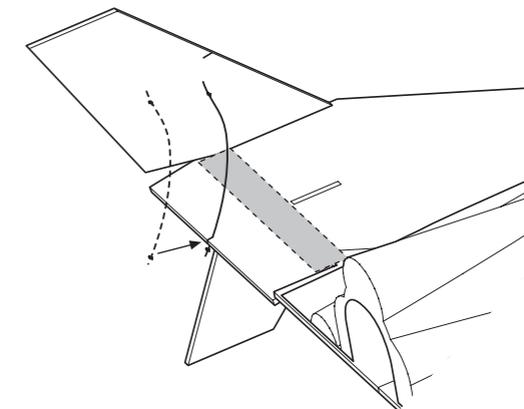
A. Using a modeling knife, cut a 1/8" (3 mm) slit, 1-5/8" (4.1 cm) from left of elevator as shown.



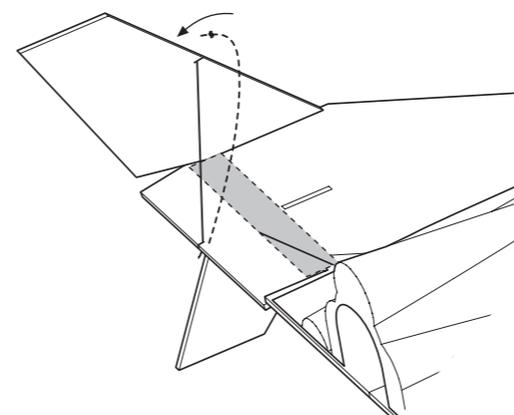
B. Position elevator at rear of left wing as shown. Apply a strip of cellophane tape centered over seam. Press down securely, especially along seam. Fold elevator up and down several times to create the "hinge" and ensure proper operation.



C. Tie a double knot near one end of elastic cord, and another 2" (5 cm) from first knot. Trim as shown.

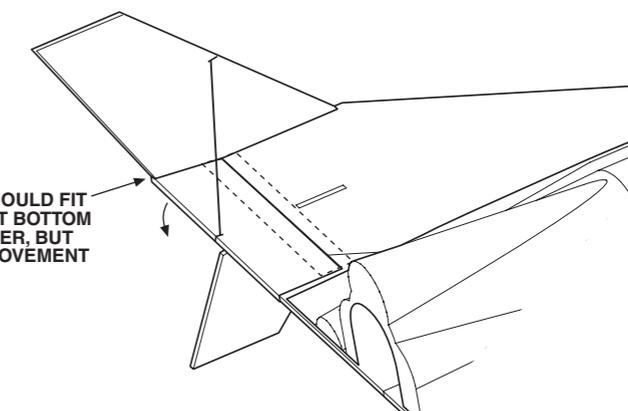


D. Insert thread into slit on elevator as shown.



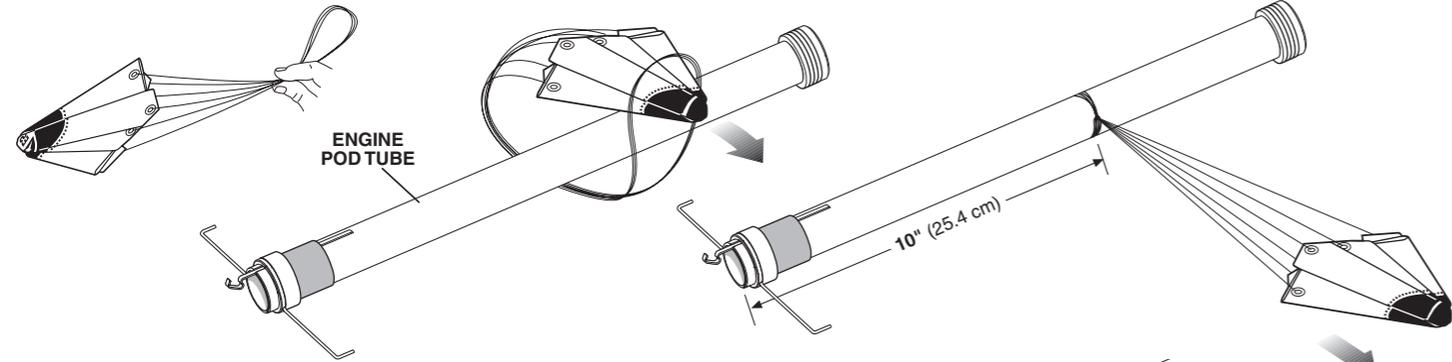
E. Wrap elastic thread around vertical stabilizer and insert into slit with knot on the outboard side of stabilizer.

ELEVATOR SHOULD FIT SNUG AGAINST BOTTOM OF STABILIZER, BUT STILL HAVE MOVEMENT



COMPLETED ASSEMBLY

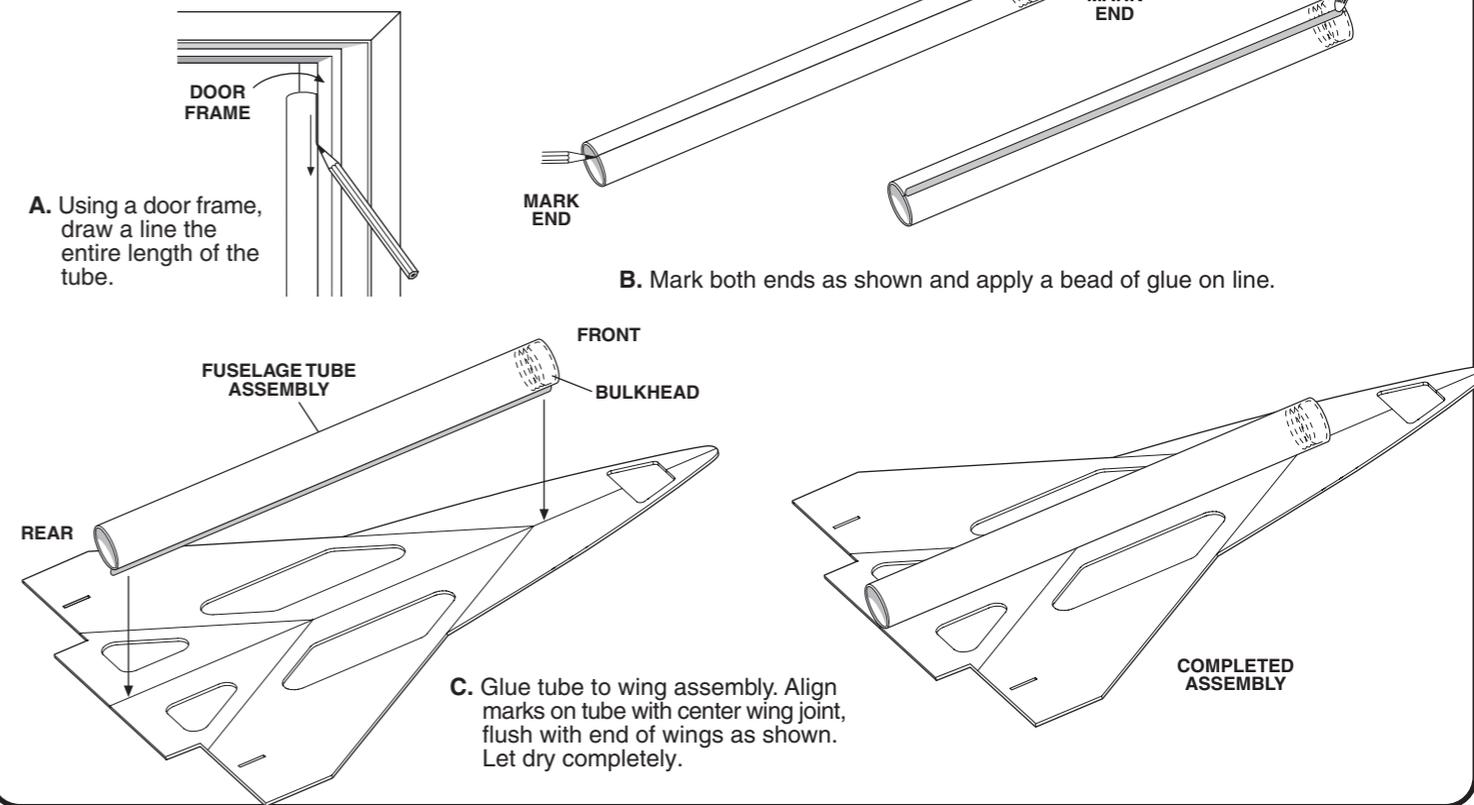
## 9. ATTACH PARACHUTE



**A.** Form a loop in the shroud lines, wrap around engine pod tube, pass 'chute through loop. Position at 10" (25.4 cm) from rear and pull tight.

**B.** Secure to engine pod tube with a band of masking tape.

## 5. ATTACH FUSELAGE TUBE TO WINGS



**A.** Using a door frame, draw a line the entire length of the tube.

**B.** Mark both ends as shown and apply a bead of glue on line.

**C.** Glue tube to wing assembly. Align marks on tube with center wing joint, flush with end of wings as shown. Let dry completely.

## 10. ASSEMBLY DISPLAY BASE

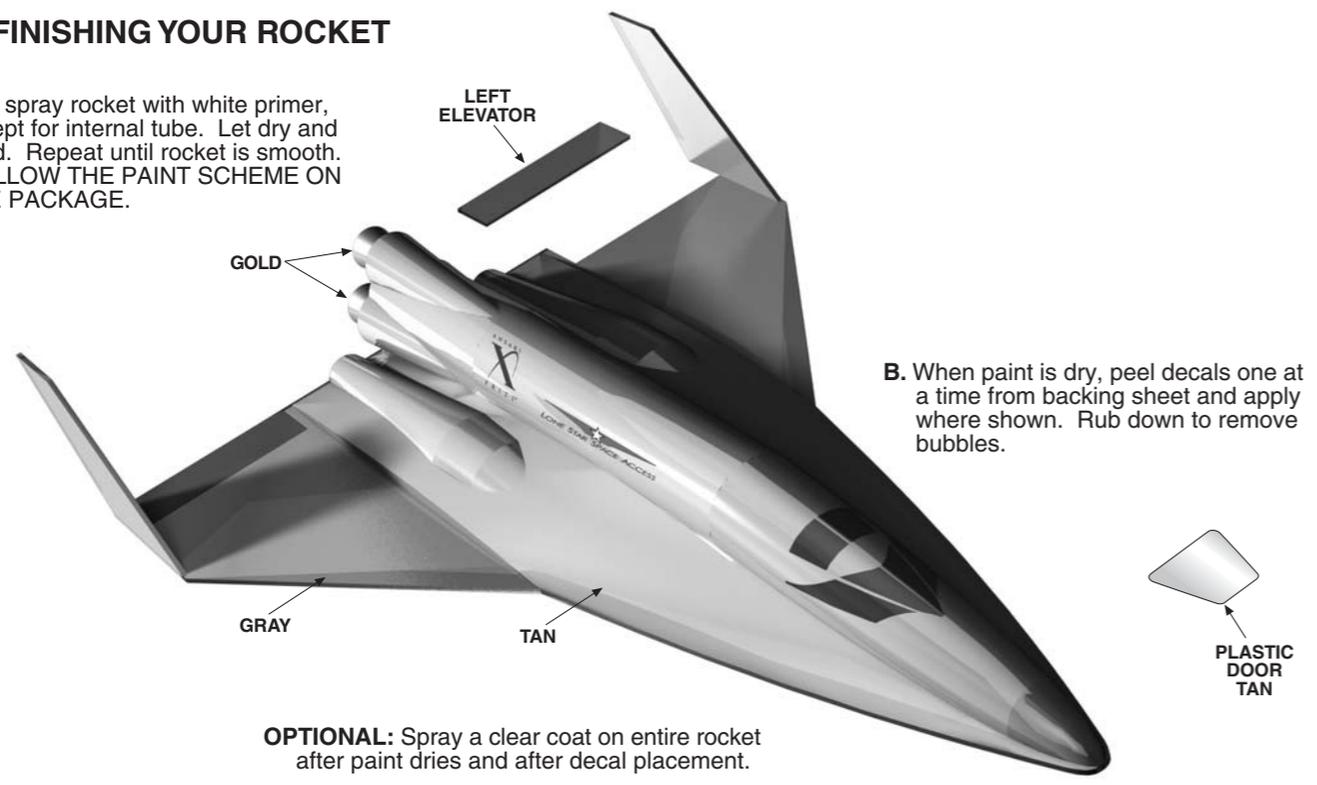


**A.** Apply plastic cement into the three holes in display base. Insert "pins" on nozzles into holes in base. Let dry.

**CAUTION:** For display purposes only. Do not glue to end of glider.

## 11. FINISHING YOUR ROCKET

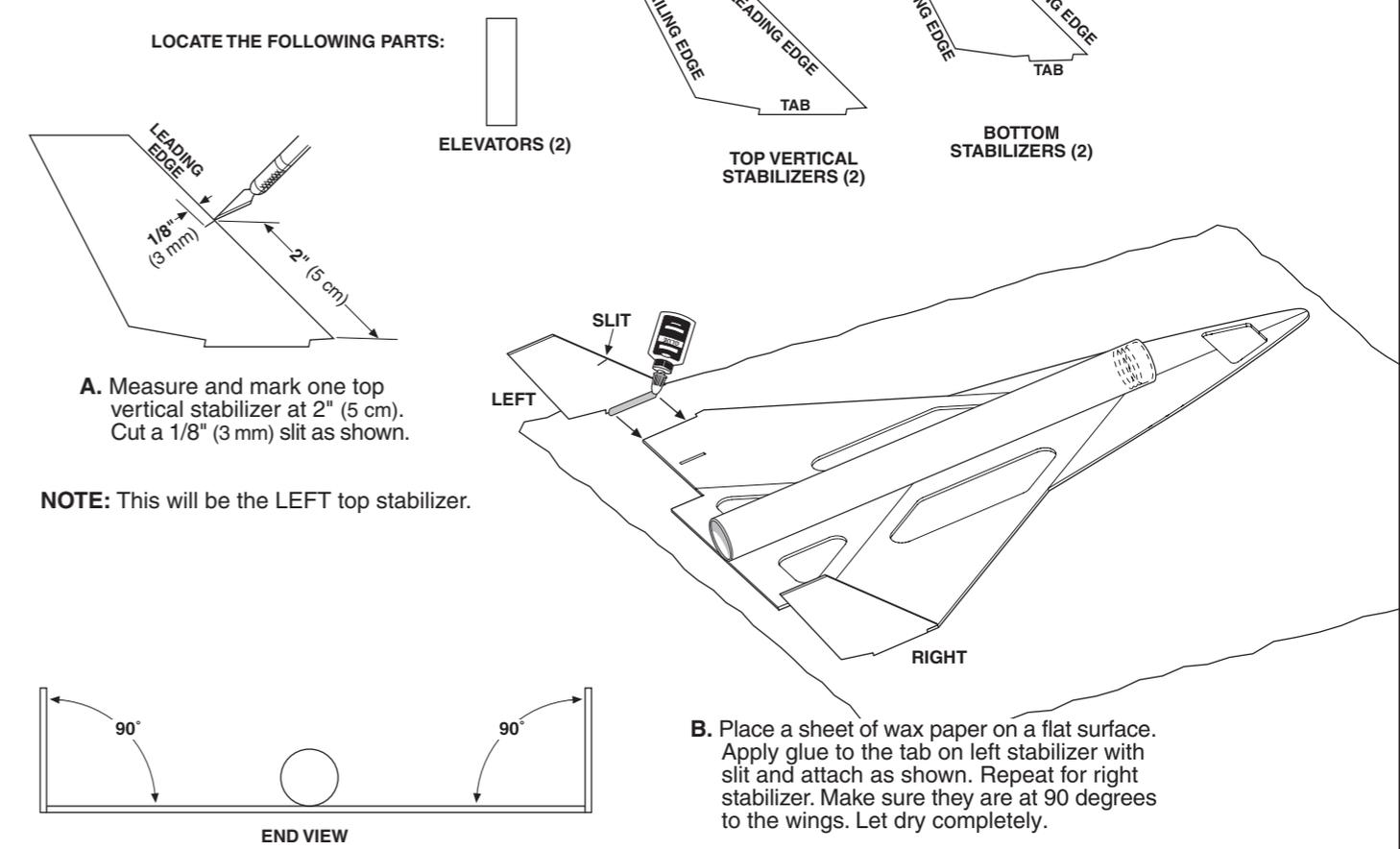
**A.** First spray rocket with white primer, except for internal tube. Let dry and sand. Repeat until rocket is smooth. FOLLOW THE PAINT SCHEME ON THE PACKAGE.



**B.** When paint is dry, peel decals one at a time from backing sheet and apply where shown. Rub down to remove bubbles.

**OPTIONAL:** Spray a clear coat on entire rocket after paint dries and after decal placement.

## 6. ATTACH VERTICAL STABILIZERS



LOCATE THE FOLLOWING PARTS:

ELEVATORS (2)

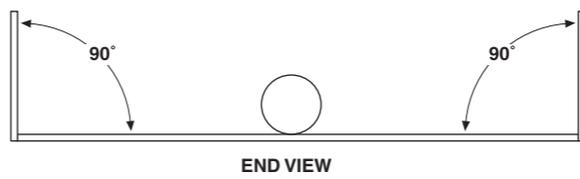
TOP VERTICAL STABILIZERS (2)

BOTTOM STABILIZERS (2)

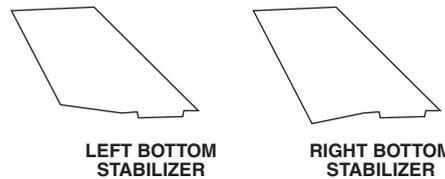
**A.** Measure and mark one top vertical stabilizer at 2" (5 cm). Cut a 1/8" (3 mm) slit as shown.

**NOTE:** This will be the LEFT top stabilizer.

**B.** Place a sheet of wax paper on a flat surface. Apply glue to the tab on left stabilizer with slit and attach as shown. Repeat for right stabilizer. Make sure they are at 90 degrees to the wings. Let dry completely.



## 6. ATTACH VERTICAL STABILIZERS (continued)



LEFT BOTTOM STABILIZER

RIGHT BOTTOM STABILIZER

Note difference between left and right bottom stabilizers.

**C.** Apply glue to bottom left stabilizer. Align tab on stabilizer with slot in wing and attach stabilizer to wing. Repeat for right bottom stabilizer.

LEFT BOTTOM STABILIZER

NO GLUE

RIGHT BOTTOM STABILIZER

NO GLUE

**D.** Apply glue to one of the elevators as shown. Attach to the right wing. Hold in place with tape. Let dry.

END VIEW

90°

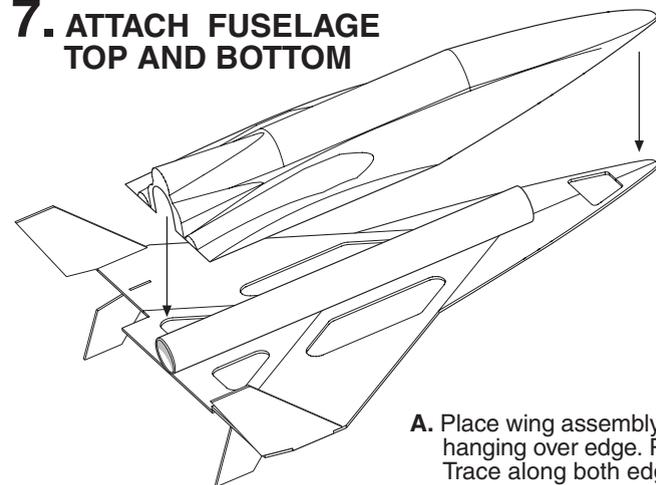
90°

**NOTE:** Top and bottom stabilizers must be attached correctly for stable flight.

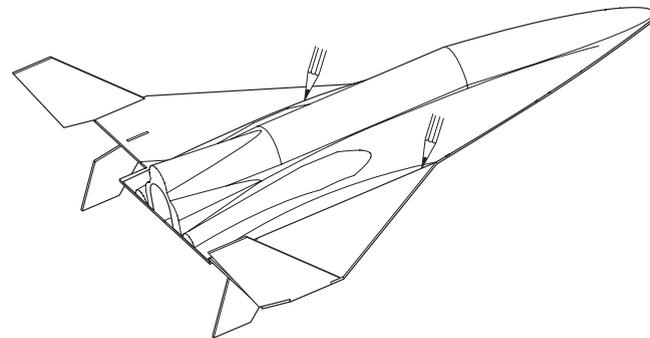
**E.** Apply glue fillets top and bottom of joints. Smooth glue with finger. Let dry completely.

END VIEW

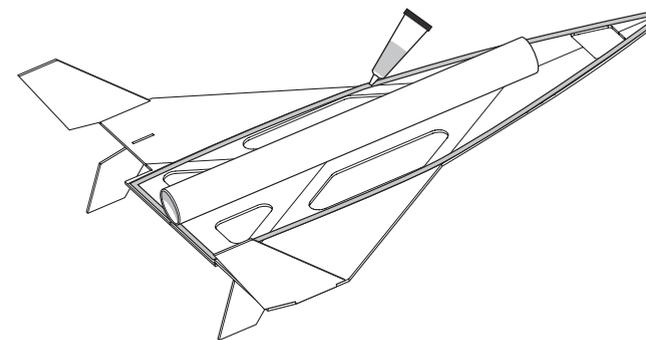
## 7. ATTACH FUSELAGE TOP AND BOTTOM



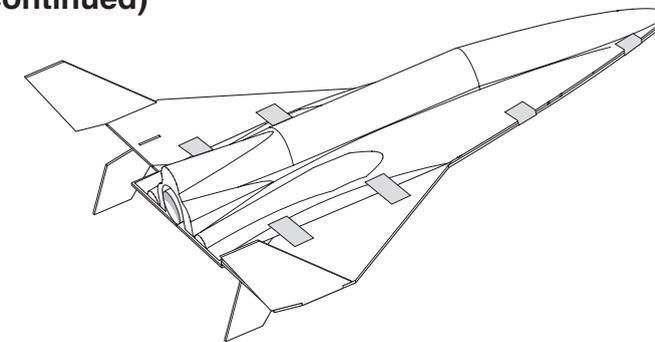
**A.** Place wing assembly on flat surface with bottom stabilizers hanging over edge. Place fuselage top on wings as shown. Trace along both edges. Remove fuselage.



## 7. ATTACH FUSELAGE TOP AND BOTTOM (continued)

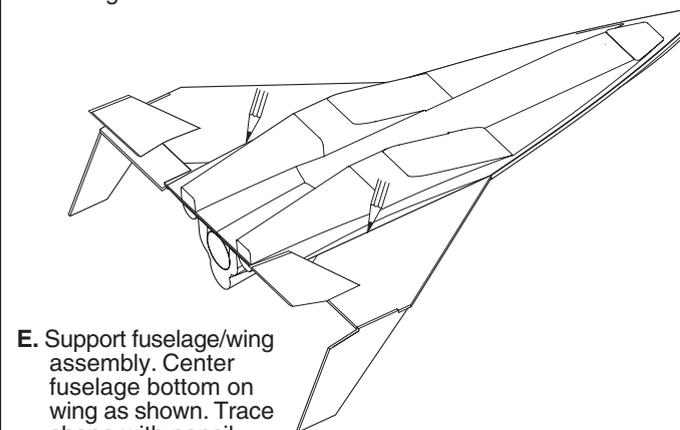


**B.** Apply a 1/8" (3 mm) bead of silicone adhesive just inside pencil lines and just inside wing edge as indicated.

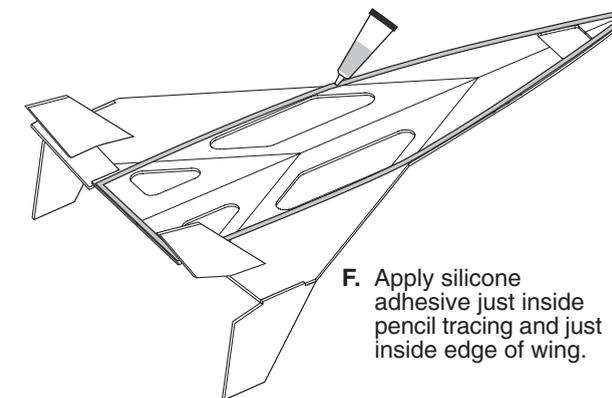


**C.** Attach fuselage top to wing and secure in place with masking tape. Let dry overnight.

**D.** After it is completely dry, carefully trim/sand excess plastic of fuselage top to match with shape of wing.



**E.** Support fuselage/wing assembly. Center fuselage bottom on wing as shown. Trace shape with pencil. Remove fuselage.



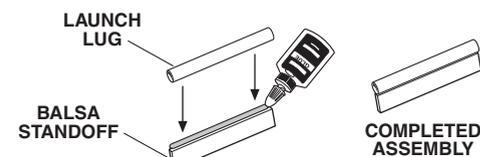
**F.** Apply silicone adhesive just inside pencil tracing and just inside edge of wing.

**G.** Attach fuselage bottom and hold in place with tape. Let dry overnight.

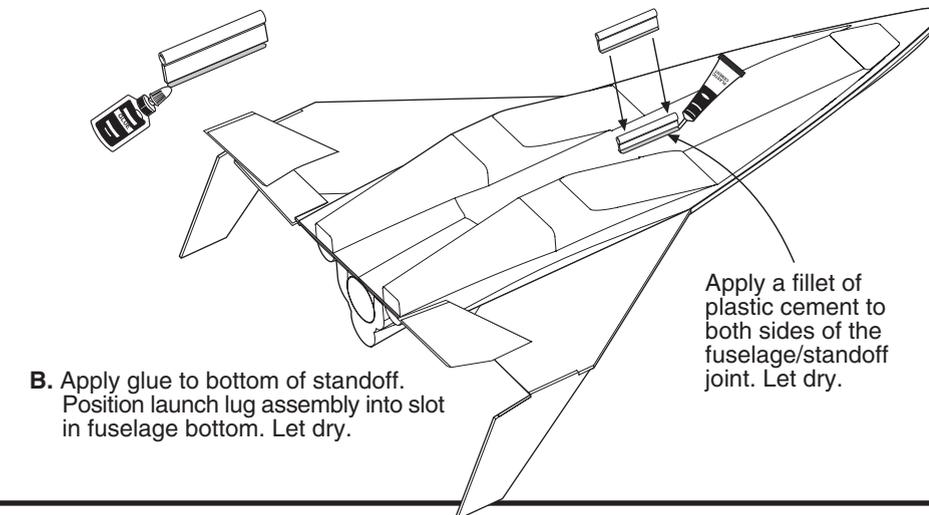
**H.** Carefully trim/sand excess plastic of fuselage bottom to match with shape of wing.

COMPLETED ASSEMBLY

## 8. ATTACH LAUNCH LUG



**A.** Apply glue to standoff and center launch lug. Let dry.



**B.** Apply glue to bottom of standoff. Position launch lug assembly into slot in fuselage bottom. Let dry.

Apply a fillet of plastic cement to both sides of the fuselage/standoff joint. Let dry.