

BOMARC

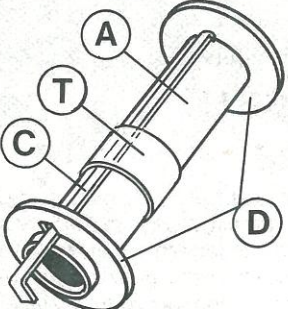
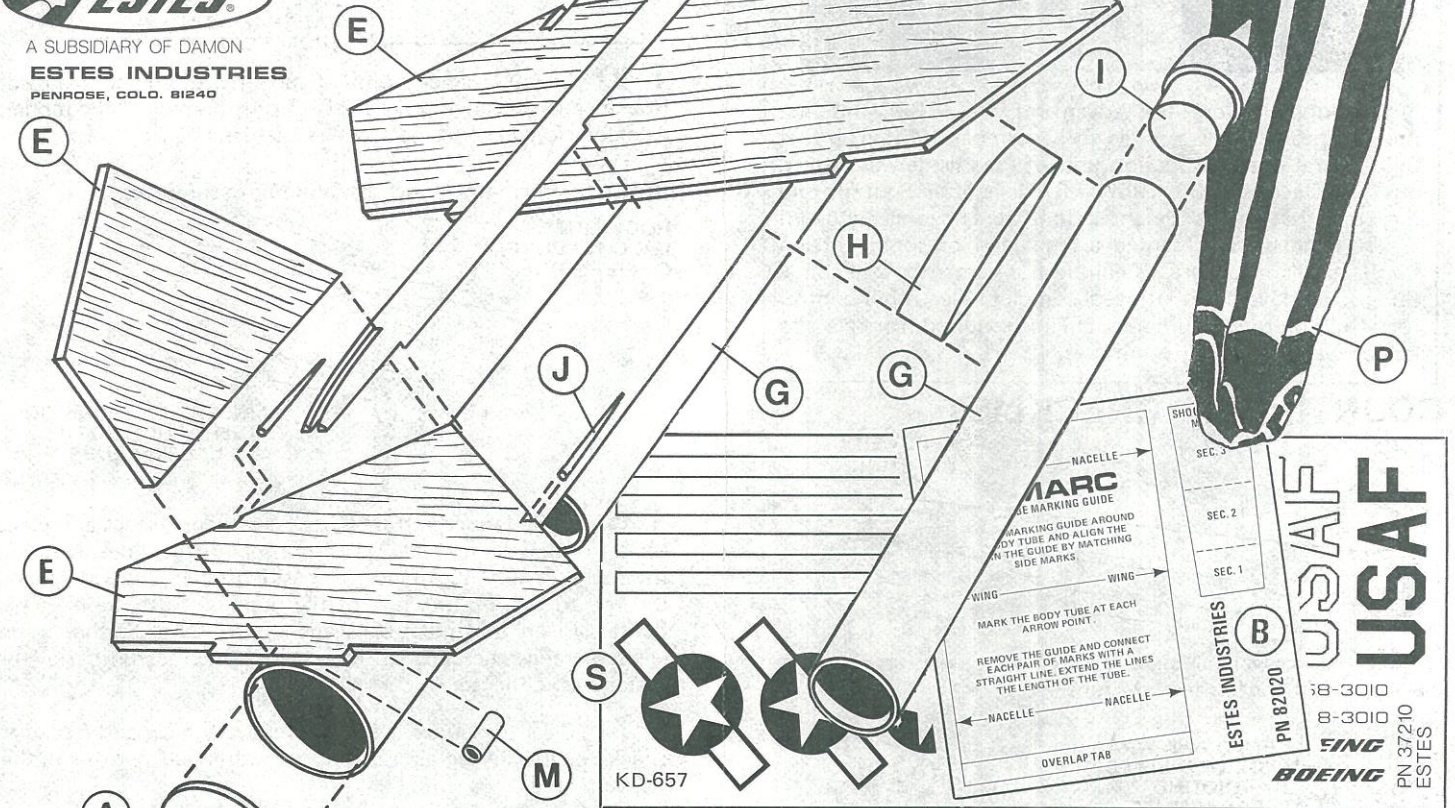
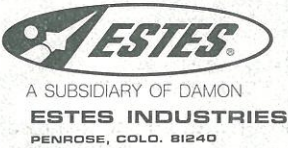
Skill Level 3

This kit recommended for craftsman skill level rocketeers.

PARTS LIST

KIT NO. 0657

A) 1	Engine Mount Tube (type BT-20J)	30326
B) 1	Pattern Sheet (type SP-657)	82020
C) 1	Engine Hook (type EH-2)	35025
D) 1	Die-cut Card (type AR-2055)	30126
E) 1	Die-cut Balsa Sheet (type BF-657)	32247
F) 1	Main Body Tube (type BT-55) 18" long	30382
G) 2	Nacelle Body Tubes (type BT-50FE) 6.5" long	30359
H) 2	Nacelle Pylons (type BPM-S)	70510
I) 2	Balsa Nacelle Cones (type BNC-50BA)	70257
J) 4	Toothpicks (type AT-1)	32064
K) 1	Shock Cord (type SC-3) 36" long	85744
L) 1	Formed Plastic Raceway (type VR-MB55)	71026
M) 2	Launch Lugs (type LL-2AM) 3/8" long	38176
N) 1	Clay Balance Weight (type CB-23)	85262
O) 1	Plastic Nose Cone (type PNC-55AO)	71075
P) 1	Parachute (type PK-18A)	85566
Q) 1	Shroud Line Cord (type SLT-108) 108" long	38239
R) 1	Strip of 6 Tape Discs (type TD-3F)	38406
S) 1	Decal (type KD-657)	37210
T) 1	Retainer Ring (type HR-20)	30168



IN ADDITION:

You will need a few tools and supplies, so collect them before you start. Here's the list:

- A. White Glue: Estes Rocket Glue, Elmer's, or similar.
- B. Plastic Model Cement: The type which comes in a tube.
- C. Knife: A sharp model knife or single edge razor blade.

- D. Scissors: Almost anything which will cut paper is fine.
- E. Pencil: A pencil's best; marker and ball point ink can show through the paint.
- F. Ruler: Measure distances--don't guess.
- G. Sandpaper: Fine and extra-fine for a smooth finish.
- H. Sanding Sealer: Fills the holes in the balsa.
- I. Paint: White, copper or brown, silver and black enamel spray.

ABOUT THE MODEL:

The BOMARC missile was developed by the United States Air Force as a ground to air defense against manned bombers. Boosted vertically at launch by a 30,000 pound thrust liquid fuel rocket engine, it was sustained in flight by two ramjet engines in the nacelles. These ramjets developed over 50,000 horsepower. With a launch weight of 15,000 pounds, the Bomarc was able to exceed Mach 2 at up to 60,000 feet of altitude.

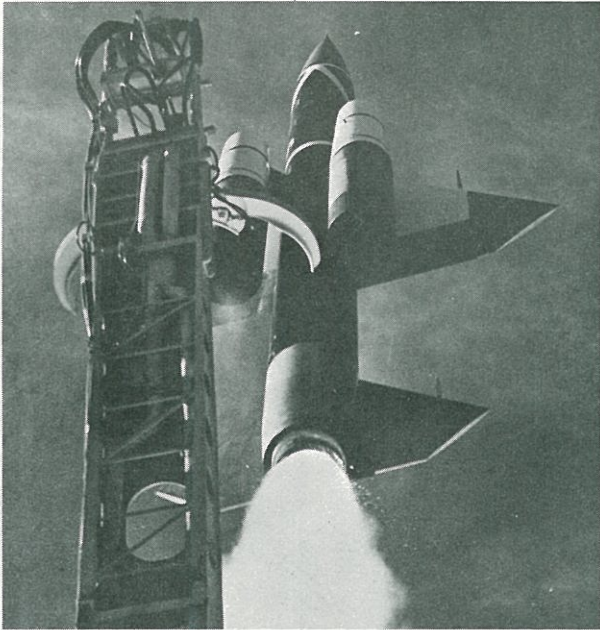


PHOTO COURTESY THE BOEING COMPANY

Developed before the advent of the ICBM, the first Bomarc prototype was fired in September 1952. The first fully operational production unit of the missile was "rolled out" on December 30, 1957 — 87 days after Sputnik told the world that bomber defenses alone were no longer enough!

The Bomarc represented a high level of sophistication for its time. In an era when the transistor was still something of a novelty, it utilized complete electronic control for a fully automatic intercept. Time required from alert to launch was less than two minutes.

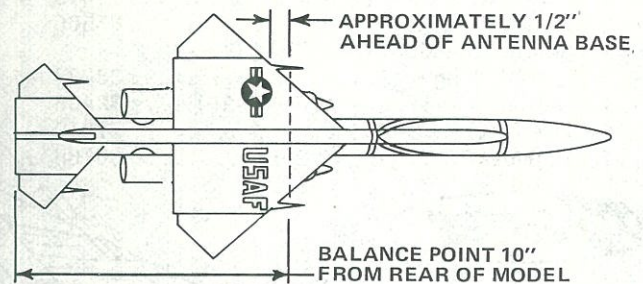
NOTE: DO NOT pack parachute until you are actually ready to launch. For maximum parachute reliability, lightly dust the 'chute with ordinary talcum powder before each flight, especially in cold weather.

T-13 Pack parachute, shroud lines, and shock cord neatly into the body tube. Slide nose cone into place. Nose cone should separate easily from rocket body tube, but should not be extremely loose. If it is too tight, sand the inside end of the body tube and the nose cone shoulder with extra fine sandpaper. If the nose cone is too loose, add a wrapping to transparent tape or masking tape to the shoulder of the nose cone.

T-12 Select an engine and install an igniter as directed in the engine instructions. The engines recommended for use with this rocket are the B4-2, B6-2, C6-3, and C6-5 made by Estes.

Use a B6-2 engine for your first flight.

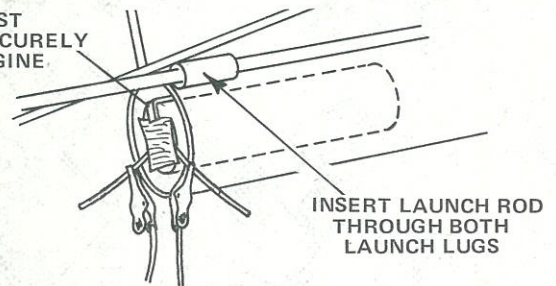
T-11 Insert engine into rocket engine mount. Engine hook must latch securely over end of engine.



T-10 Check balance point of model with engine installed. Rocket must balance at least 10" from the rear of the model. Add additional clay to nose cone if necessary.

T-9 Disarm the launch panel—remove safety key.

HOOK MUST LATCH SECURELY OVER ENGINE



T-8 Slide launch rod through rocket launch lugs and place rocket on launching pad. Make sure the rocket slides freely on the launch rod. Use a piece of masking tape wrapped around the rod to support the rear of the model 1" off the blast deflector. Clean the micro-clips and attach them to the igniter leads. Arrange the clips so they do not touch each other or the metal blast deflector.

T-7 Clear the launch area, alert recovery crew and trackers. Check for low flying aircraft and unauthorized persons in the recovery area.

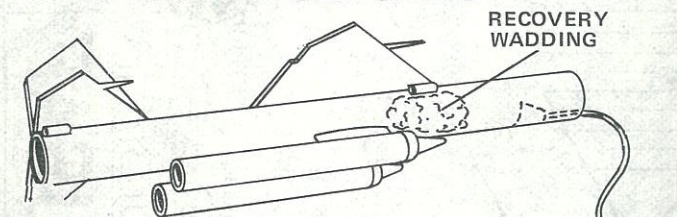
T-6 Arm the launch panel—insert safety key.

-5-4-3-2-1-LAUNCH!!

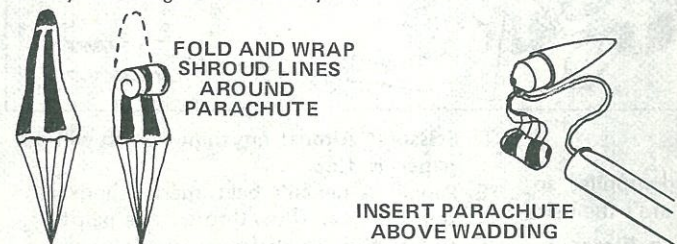
MISFIRE PROCEDURE

Occasionally the igniter will heat and burn into two pieces without igniting the engine. This is almost always caused by a failure to install it correctly. Disarm the launch panel, remove the model, clean the igniter residue from the nozzle, and install a new igniter. Follow the launching procedure again.

COUNTDOWN CHECKLIST



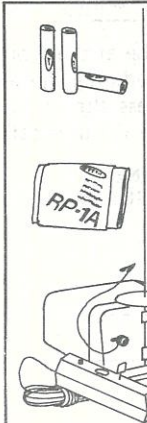
T-15 Pack seven or eight squares of loosely crumpled recovery wadding into the body tube.



T-14 Fold the parachute into a triangular shape. Roll the 'chute tightly as shown and wrap the shroud lines around it. If 'chute is too large, unroll it and repack until it slides easily into rocket. A fit that is too tight may prevent the parachute from ejecting properly.

BOMARC

ASSEMBLY INSTRUCTIONS



To launch your rocket you will need the following items:

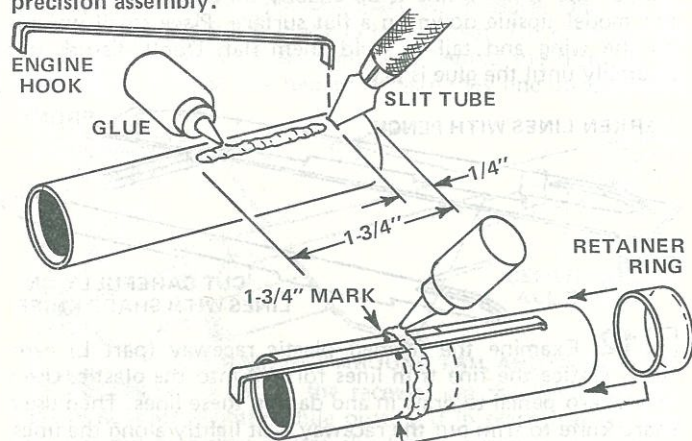
- An Estes model rocket launching system.
- Flameproof recovery wadding (Estes Cat. No. 2274).
- Estes B4-2, B6-2, C6-3, or C6-5 model rocket engines. Use a B6-2 engine for the first flight.

Be sure to follow the HIAA-NAR* Model Rocketry Safety Code when carrying out your model rocketry activities.

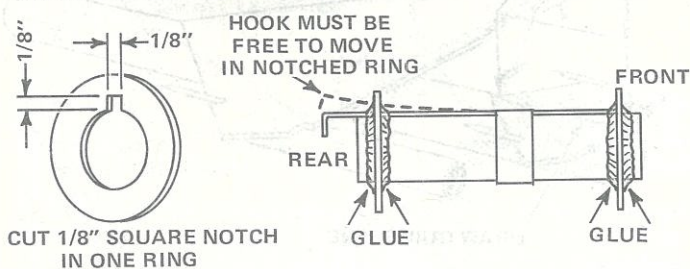
*HIAA-NAR - Hobby Industry Association of America
National Association of Rocketry

BEFORE YOU START:

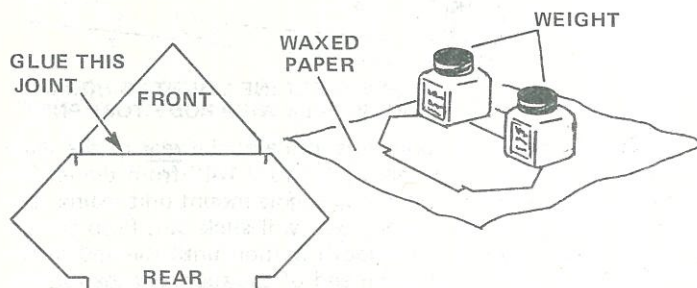
Read all instructions before beginning work on your model. Make sure you have all parts and materials. When you are thoroughly familiar with the assembly procedure, begin construction. Check off each step as you complete it. In each step, test-fit the parts together before applying any glue. If some part doesn't fit properly, sand lightly or build up as needed for precision assembly.



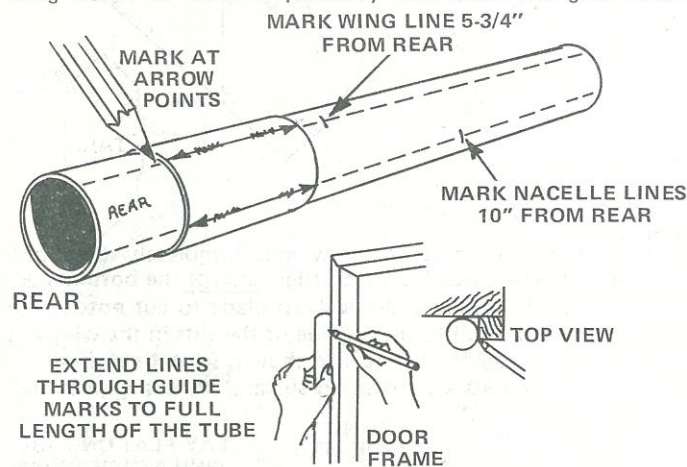
- 1** Mark the engine mount tube (part A) at $1/4''$ and $1-3/4''$ from one end. Cut a $1/8''$ slit in the tube at the $1/4''$ mark. Apply a line of white glue between the marks as shown. Push one end of the engine hook (part C) into the slit and press the main part of the hook into the glue. Apply a line of glue around the tube just ahead of the $1-3/4''$ mark. Slide the retainer ring (part T) onto the tube, centering it over the glue and next to the $1-3/4''$ mark.



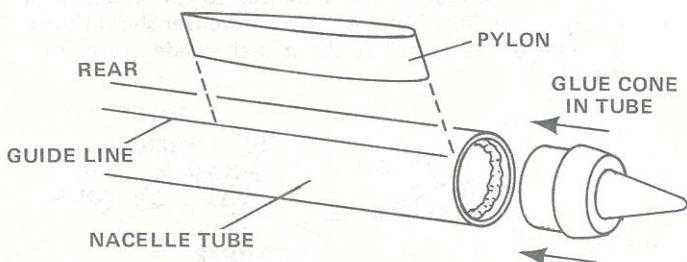
- 2** Separate the adapter rings from the die-cut card (part D). Cut a $1/8''$ square notch in one ring as shown. Slide the notched ring onto the end of the engine mount tube where the hook sticks out. Slide the other ring onto the other end of the tube. Apply a line of glue at the ring/tube joint on both sides of each ring--but don't get glue in the notch. Let this assembly dry.



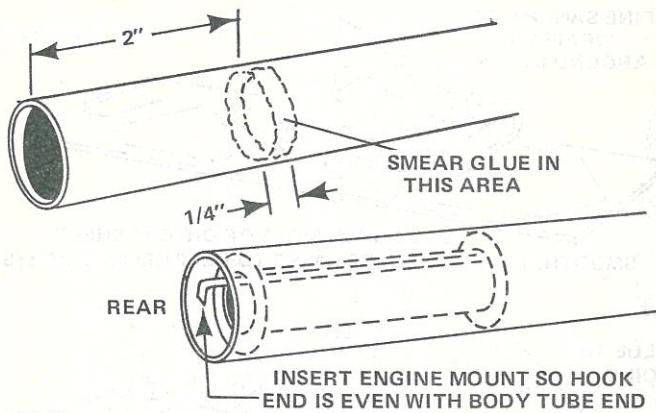
- 3** Sand both sides of the die-cut balsa sheet (part E) until smooth. Carefully remove the pieces, using a sharp knife to free the edges of the parts. Glue the front and rear sections of the wing together. Lay the wing on a sheet of waxed paper (or the plastic from your kit bag) on a flat surface. Weight the wing down to hold it perfectly flat while the glue dries.



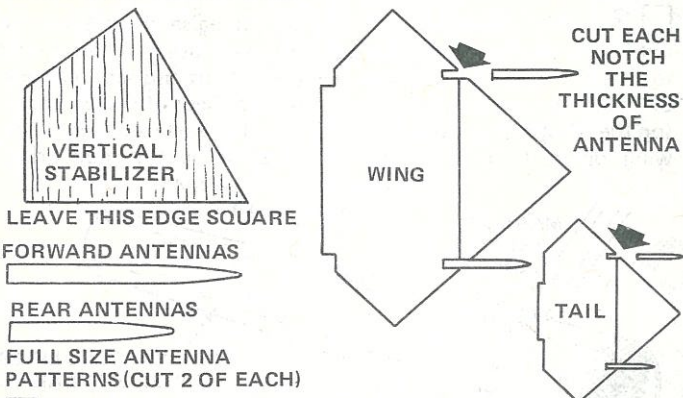
- 4** Cut out the marking guide from the pattern sheet. Wrap it around the main body tube (part F). Mark the tube at each arrow point, front and rear. Draw a straight pencil line through each pair of marks, extending the line the length of the tube. (Use a door frame as a guide when drawing lines.) Write "rear" on one end of the tube. Measure and mark the wing line at $5-3/4''$ from the tube's rear end. Measure and mark the nacelle lines at $10''$ from the rear.



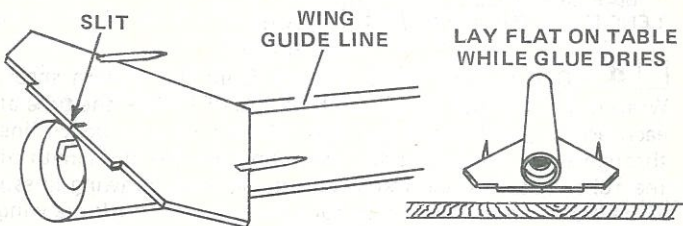
- 5** Use a door frame as a guide to draw a straight line the length of each nacelle tube (part G). Sand the sides of each pylon piece (part H) smooth. Glue each pylon to a nacelle tube on the line so the front of the pylon is even with the front of the tube. Glue a nacelle cone (part I) into the front of each nacelle assembly.



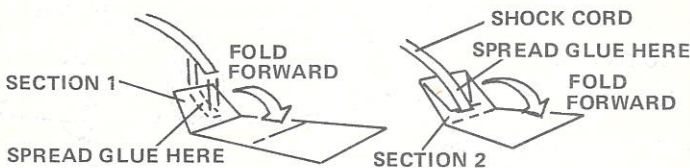
6 Smear glue around the inside of the rear of the main body to cover an area about 2" to 2-1/4" from the end of the tube. Immediately insert the engine mount unit, being careful to turn it so the engine hook will stick out. Push the engine mount in with one smooth motion until the end of the engine hook is even with the end of the tube. Set the tube on its rear while the glue dries.



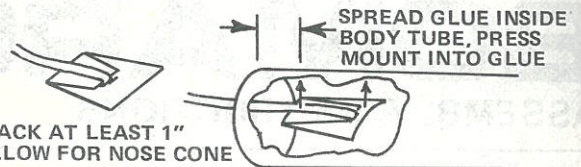
7 When the glue on the wing is completely dry, finish sanding the balsa parts. Round all edges except the bottom edge of the vertical stabilizer. Use a sharp blade to cut notches for the antennas (part J) to the outside of the slits in the wing and tail. Cut the antennas to the size shown. Glue them in place. Set the parts on a flat, protected surface while the glue dries.



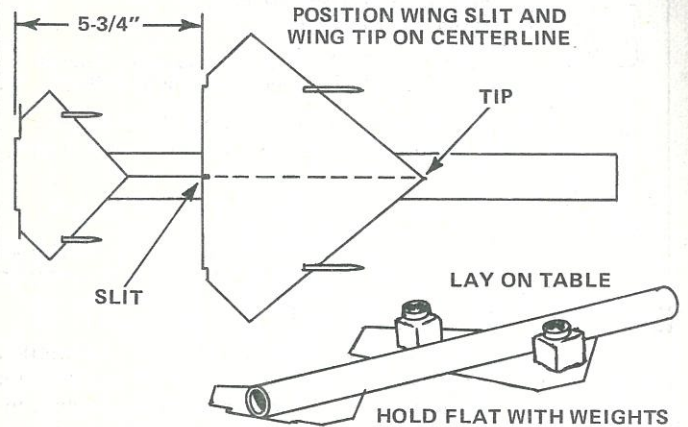
8 Glue the horizontal tail to the rear of the body tube. Use the slit in the rear of the stabilizer to line it up exactly on the wing center line. The rear of the stabilizer should be even with the rear of the tube. Lay the model upside down on the table to dry.



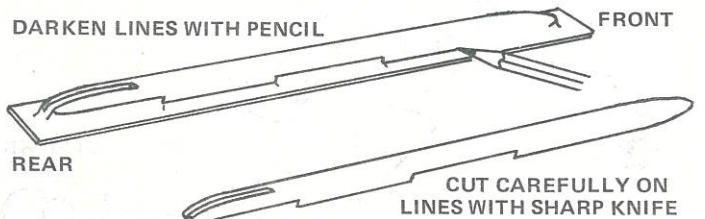
9 Cut out the shock cord mount from the pattern sheet. Crease it on the dotted lines by folding. Spread glue on the first section (1) and lay the end of the shock cord (part K) into the glue. Fold over and apply glue to the back of the first section and the exposed part of section 2. Lay the shock cord as shown and fold over again. Clamp the unit together with your fingers until the glue sets.



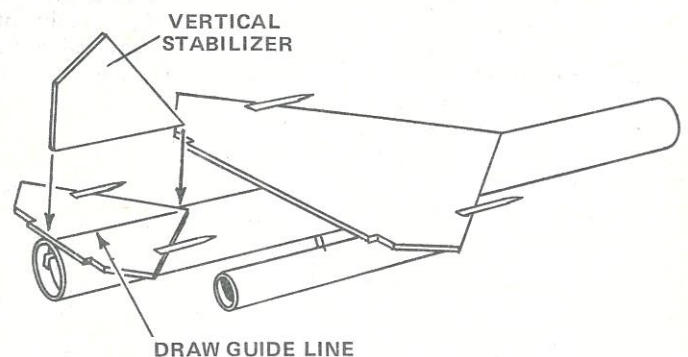
10 Apply glue to the inside of the body tube at the front over an area about 1" to 2" from the end. The glued area should be the same size as the shock cord mount. Press the mount into the glue as shown and hold it in place until the glue sets.



11 Glue the wing to the body so the rear of the wing is on the mark, 5-3/4" from the rear of the tube. Use the slit in the rear of the wing to line it up exactly on the center line. Lay the model upside down on a flat surface. Place small weights on the wing and tail to hold them flat. Don't disturb this assembly until the glue is dry.

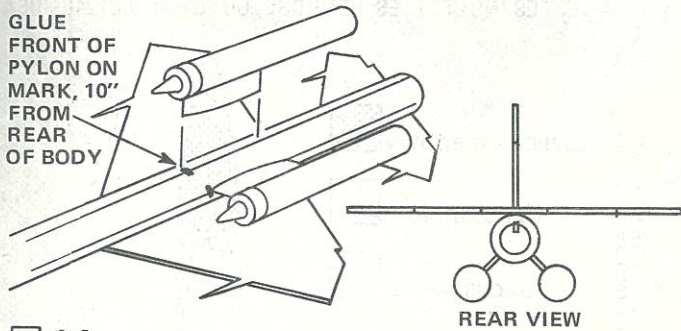


12 Examine the formed plastic raceway (part L) carefully. Notice the fine trim lines formed into the plastic. Use a very sharp pencil to draw in and darken these lines. Then use a sharp knife to trim out the raceway. Cut lightly along the lines, using a straight edge to guide the blade. Make several passes with the blade, cutting part way through on each pass. When the raceway is trimmed, smooth any rough edges with extra-fine sandpaper.



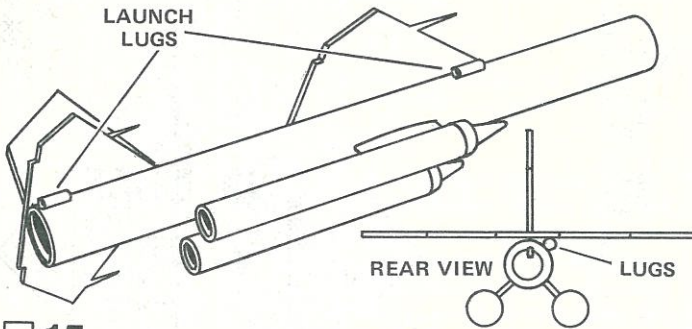
13 When the wing glue is dry, glue the vertical stabilizer on top of the horizontal tail. Draw a straight line from the forward tip of the horizontal tail through the center slit in its rear. Center the vertical stabilizer on this line, with its rear even with the rear of the horizontal tail. Make sure the vertical stabilizer sticks straight up, then set the model on end while the glue dries.

GLUE FRONT OF PYLON ON MARK, 10" FROM REAR OF BODY



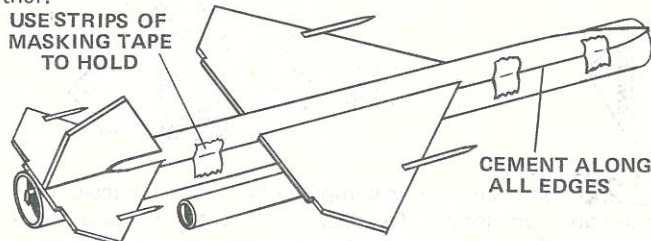
REAR VIEW

14 Glue the nacelle assemblies to the body on their guide lines. The front of each pylon should be on the mark, 10" from the rear of the body. It's best to glue one nacelle on, let the glue dry, then add the other nacelle. Both must stick straight out from the body with their tubes parallel to the body.



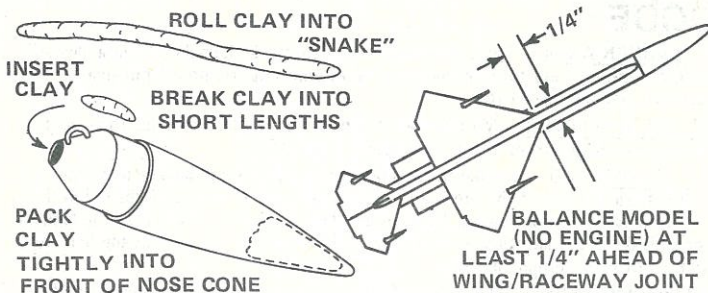
REAR VIEW LUGS

15 Glue the launch lugs (part M) in place. One fits between the tube and horizontal tail at the rear. The other should be glued between tube and wing just behind the front of the wing. Sight through the lugs to be sure they line up with each other.



FIT RACEWAY AROUND TAIL AND OVER WING

16 Check the fit of the raceway on the wing and tail. Spread its sides slightly while putting it in place. Do not trim any additional plastic unless absolutely necessary to make it fit. Remove the raceway. Use "tube-type" plastic model cement to glue it to the wing, tail and body. Hold it in place with small bits of masking tape until the cement dries.

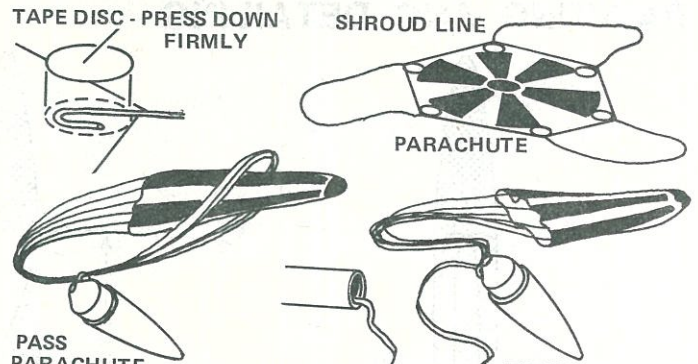


BALANCE MODEL (NO ENGINE) AT LEAST 1/4" AHEAD OF WING/RACEWAY JOINT

17 Cut the clay balance weight (part N) in half. Roll one half between your hands to make a "snake" about 1/4" diameter. Break off sections of the clay about 1" long. Poke them through the hole in the rear of the nose cone (part O). Use a flat-ended pencil or dowel to push the clay forward in the cone until it is packed tightly in the front of the cone. Place the nose cone in the front of the body and check the model's balance point. Without an engine, it should balance at least 1/4" ahead of the front of the wing. If necessary, add more clay until the model balances correctly.

TAPE DISC - PRESS DOWN FIRMLY

SHROUD LINE



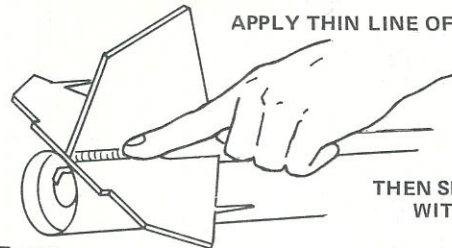
PARACHUTE

PASS PARACHUTE THROUGH LOOP AND PULL TIGHT

TIE SHOCK CORD TO NOSE CONE

18 Cut out the parachute (part P) on its edge lines. Cut three 36" lengths of shroud line (part Q). Attach line ends to the top of the parachute with tape discs (part R) as shown. Pass the shroud line loops through the ring on the nose cone. Pass the parachute through the loop ends and draw the lines tight against the ring. Set the knot with a drop of glue. Tie the free end of the shock cord to the nose cone.

APPLY THIN LINE OF GLUE TO JOINT



THEN SMOOTH OUT WITH FINGER

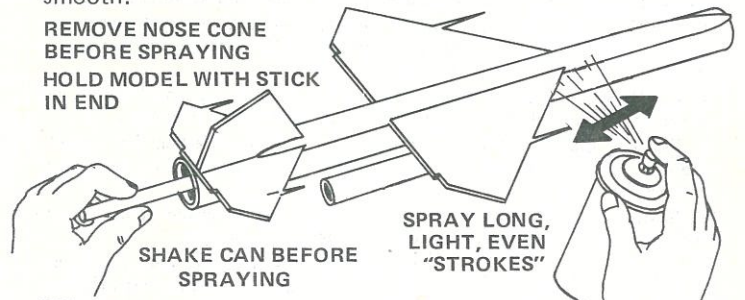
19 Reinforce the nacelle pylon and vertical stabilizer joints with glue. Holding the model level, apply a narrow line of glue to both sides of each exposed joint. Smooth out the glue with your finger. Keep the model level until the glue dries.



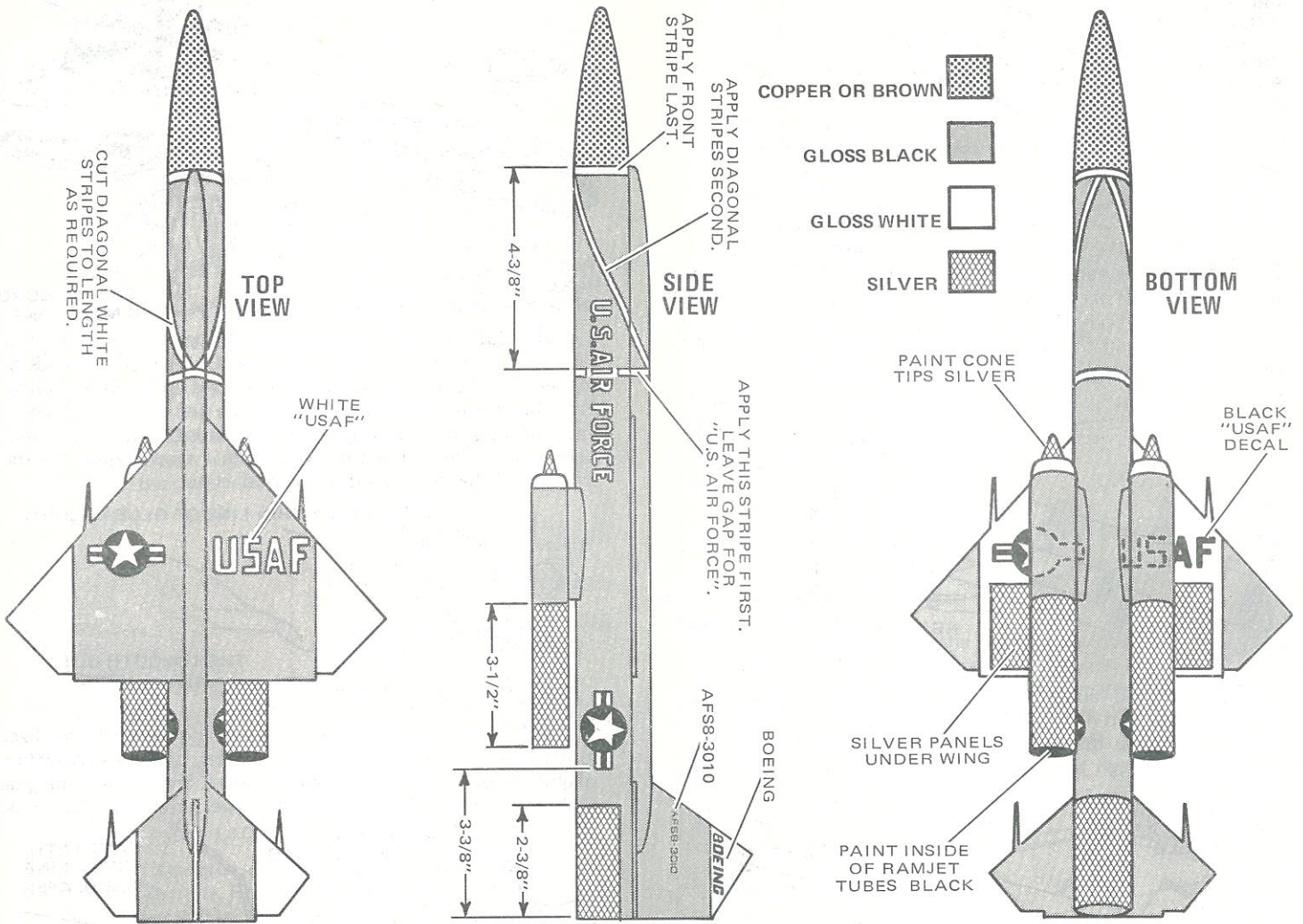
BRUSH ON SEALER AND LET DRY

20 When all glue on the outside of the model is dry, prepare the rocket for painting. Use plastic model body putty to fill any gaps where the raceway joins the model. Apply at least two coats of sanding sealer to all balsa surfaces. Let the sealer dry and sand lightly between coats. Do this until the tiny holes in the wood are filled and everything looks and feels smooth.

REMOVE NOSE CONE BEFORE SPRAYING
HOLD MODEL WITH STICK IN END



21 After the sanding sealer is dry, paint the model. Remove and wash the nose cone to clean any grease remaining from the clay. Give the entire model a light base coat of white spray enamel. Follow with a second light coat, let dry, and sand very lightly. Give the entire model except the nose cone a coat of gloss white paint. Paint the nose cone copper or brown. Let the model dry overnight.



22 Cover the portions on the rocket body which are to remain white with masking tape and heavy paper. Apply silver paint to the areas shown in the drawing. Remove the masking tape as soon as the paint is dry on the surface. Let the paint continue drying overnight. Cover everything that isn't to be painted black, then apply the final coat of black.

23 When all paint is completely dry, apply decals (part S) in the positions shown. To apply decals, cut out a decal section, dip it in luke-warm water for approximately 20 seconds, and hold it until it starts to uncurl. Use a brush to "wet" the area where decal will be applied. This will allow easy positioning. Slip decal off the backing paper and onto your model. Blot excess water away. Apply white stripe decals last. For best results, let the model dry overnight and apply a coat of clear spray to protect the decals.

SAFETY CODE

- 1. CONSTRUCTION** – My model rockets will be made of lightweight materials such as paper, wood, plastic and rubber, without any metal as structural parts.
- 2. 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.
- 3. 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.
- 4. WEIGHT LIMITS** – My model rocket will weigh no more than 453 grams (16 ozs.) at lift-off, and the engines will contain no more than 113 grams (4 ozs.) of propellant.
- 5. STABILITY** – I will check the stability of my model rockets before their first flight, except when launching models of already proven stability.
- 6. LAUNCHING SYSTEM** – The system I use to launch my model rockets must 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.
- 7. LAUNCH SAFETY** – I will not let anyone approach a model rocket on a launcher until I have made sure that either the safety inter-lock key has been removed or the battery has been disconnected from my launcher.
- 8. 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.

- 9. 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.
- 10. JET DEFLECTOR** – My launcher will have a jet deflector device to prevent the engine exhaust from hitting the ground directly.
- 11. 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.
- 12. POWER LINES** – I will never attempt to recover my rocket from power lines or other dangerous places.
- 13. LAUNCH TARGETS & 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.
- 14. 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.

This Solid Propellant Model Rocketry Safety Code Is Approved by The National Association of Rocketry and the Hobby Industry Association of America.