

NIKE 'SMOKE'

1/10 SCALE MODEL KIT

**BIG . . . IMPRESSIVE . . .
ALMOST 2 FEET TALL**
with—EXACT SCALE DECALS
SCALE DATA SHEET
PARACHUTE RECOVERY

This big impressive "bird" is an exact 1/10th true-scale model of a single-stage, solid propellant rocketsonde used by NASA to measure wind velocities at altitudes up to 75,000 feet. The real NIKE-SMOKE emits a dense white smoke trail during upward flight. Cameras, using time-lapse photography and triangulation, show wind dispersion of smoke trail at high altitude.

with
NEW
"Quick-Change"
ENGINE LOCK

\$350

Catalog No. KS-15

Engines Not Included.

SPECIFICATIONS

Body Diameter.....1.64"
Length.....23.65"
Net Weight.....2.0oz.

RECOMMENDED ENGINES

B4-2
C6-5

IP-213

Centuri

FLYING MODEL ROCKET KIT

Mfg. by Centuri Engineering Co. Phoenix, Arizona

Centuri

NIKE 'SMOKE'

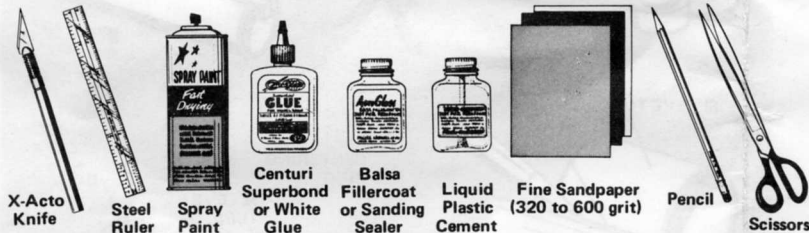
1/10 SCALE MODEL KIT

ASSEMBLY INSTRUCTIONS

Centuri's Nike-Smoke is an exact scale model, 1/10 the size of the real rocket. Requiring only one engine, it is economical to fly yet has the advantage of being large and pretentious on the launch stand. The long tapered nose cone and short trapezoidal fins lend a very sleek and streamlined appearance to the "SMOKE". It is not a difficult kit to build and the engine lock plus large chute compartment make it extremely simple and foolproof, yet very exciting to fly!!

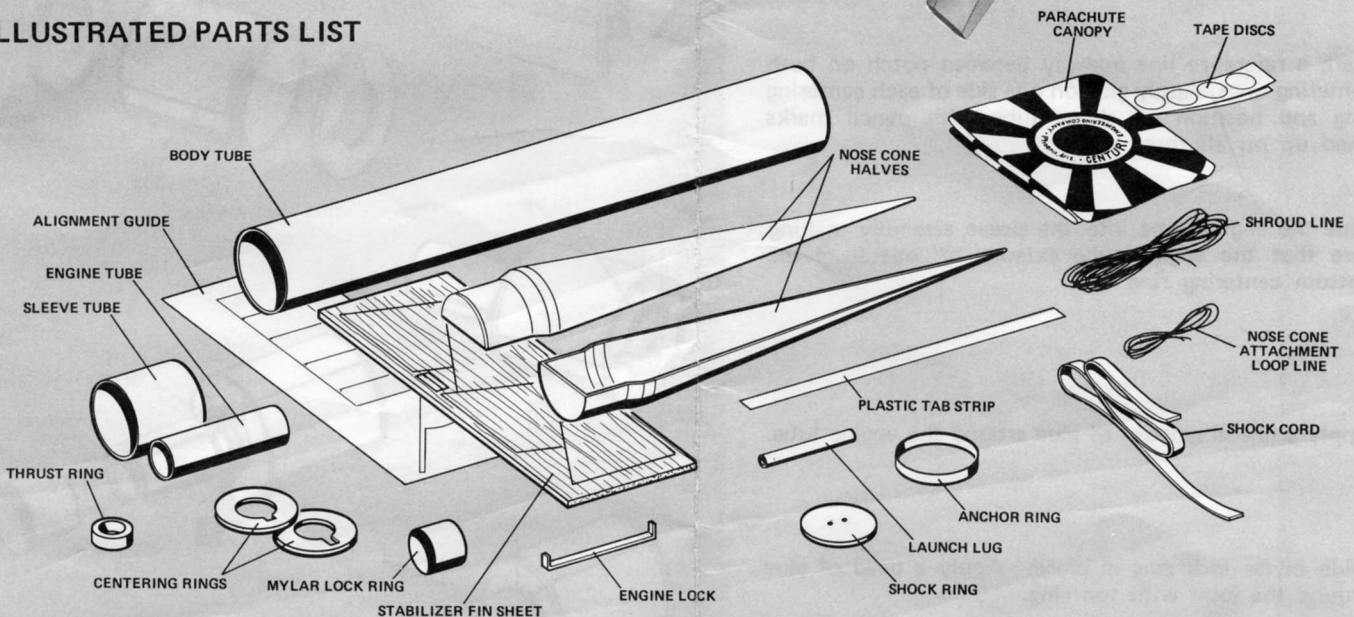
Simplified steps for building the Nike-Smoke are illustrated in this instruction sheet. While, building the kit, keep one thought in mind . . . **DON'T HURRY!!** Take your time and do a neat job of assembling and finishing your Nike-Smoke. If you do, you'll end up with an impressive, good-looking, top performing model which you'll be proud to display and fly for your friends. The Nike-Smoke can be the beginning of an exciting adventure for you into the fascinating and educational world of Model Rocketry.

TOOLS - In addition to the parts supplied, you will need the following materials to assemble and finish this kit. **DO NOT** use model airplane glue for building flying model rockets.

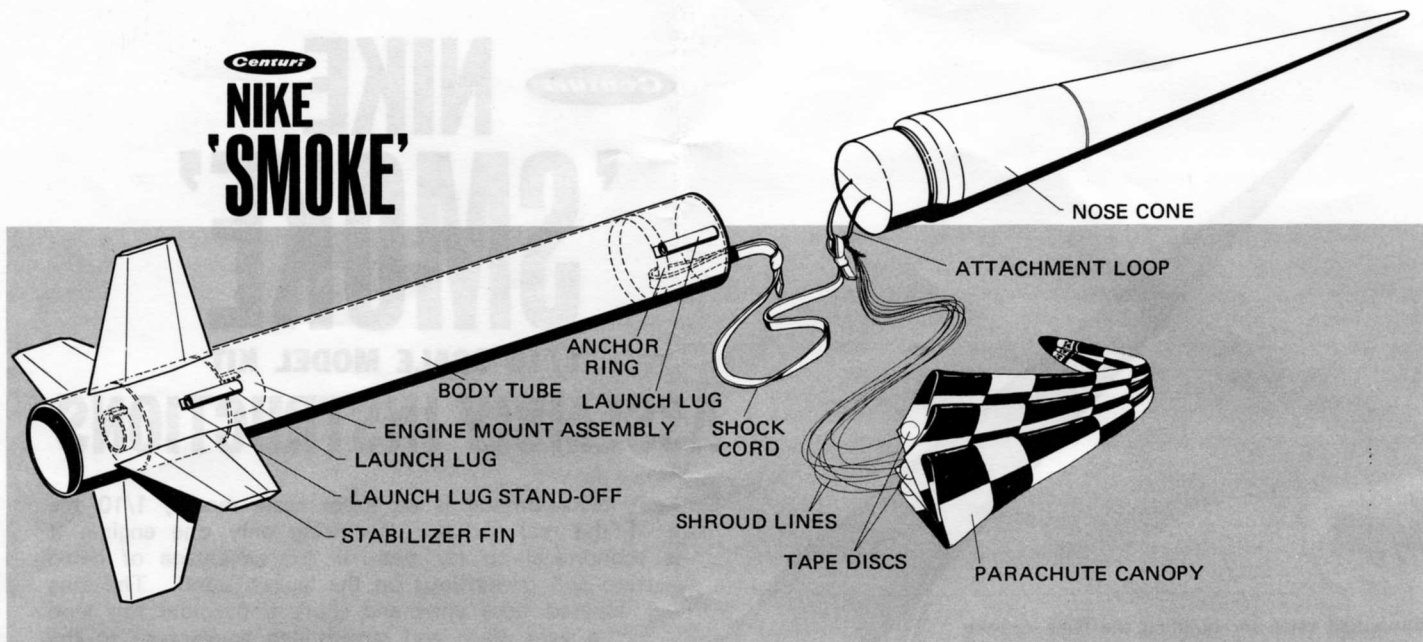


Catalog No. KS-15

ILLUSTRATED PARTS LIST



Centuri
**NIKE
'SMOKE'**

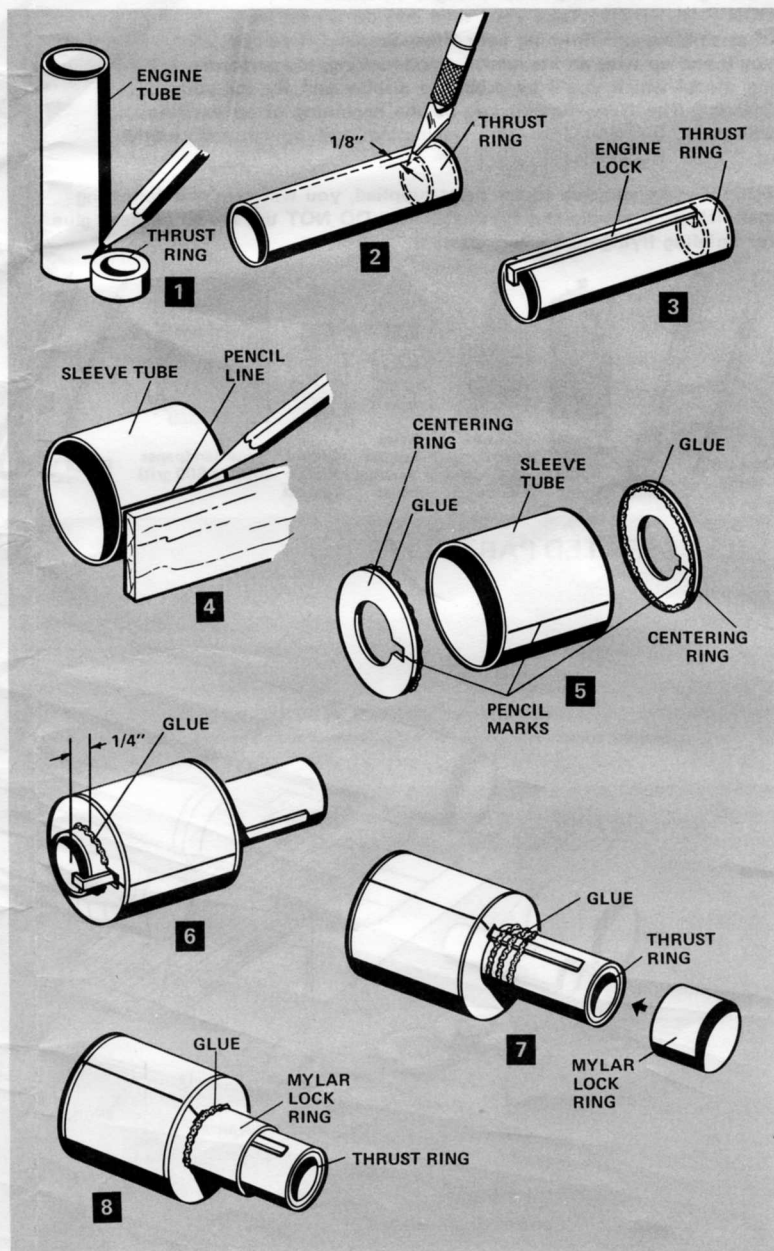


ASSEMBLY INSTRUCTIONS

FOR BEST RESULTS... FOLLOW DIRECTIONS CAREFULLY!

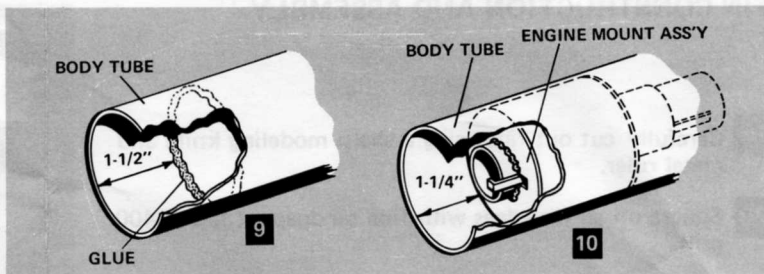
ENGINE MOUNT ASSEMBLY

- 1 Place thrust ring against engine tube. Draw line on engine tube at top of thrust ring.
- 2 Glue thrust ring into engine tube with ends flush. Cut 1/8" slit in engine tube on mark.
- 3 Insert one end of engine lock into slit.
- 4 Draw reference line on sleeve tube.
- 5 Mark a reference line midway between notch on both centering rings. Apply glue on one side of each centering ring and position on sleeve tube with pencil marks lined up on all three parts.
- 6 Glue the engine tube into the sleeve assembly making sure that the engine tube extends 1/4" out from the bottom centering ring.
- 7 Apply a liberal amount of glue around the engine tube.
- 8 Slide mylar lock ring in place. Apply a bead of glue around the joint with top ring.



9 Apply a bead of glue around the inside of body tube.

10 Push engine mount into body tube, positioning bottom ring $1\frac{1}{4}$ " inside body tube. Be careful that you do not cement engine mount in place upside down.



NOSE CONE ASSEMBLY

By following the instructions carefully, it is possible to assemble this nose cone so that no seam line will show. Liquid type plastic cement will be necessary to do a really adequate job.

11 Double the short piece of shroud line, loop thru the die cut shock ring and tie in a tight triple knot.

12 Cut two small notches in the base of one nose half for clearance of the shroud line.

13 Cement the shock ring into the nose half base. This glue joint need not be permanent since the extended shroud line will prevent the ring from falling up into the interior of the nose.

14 Cut the thin plastic tab strip into $\frac{3}{4}$ " long segments. Cement these tabs into the nose half positioned as shown.

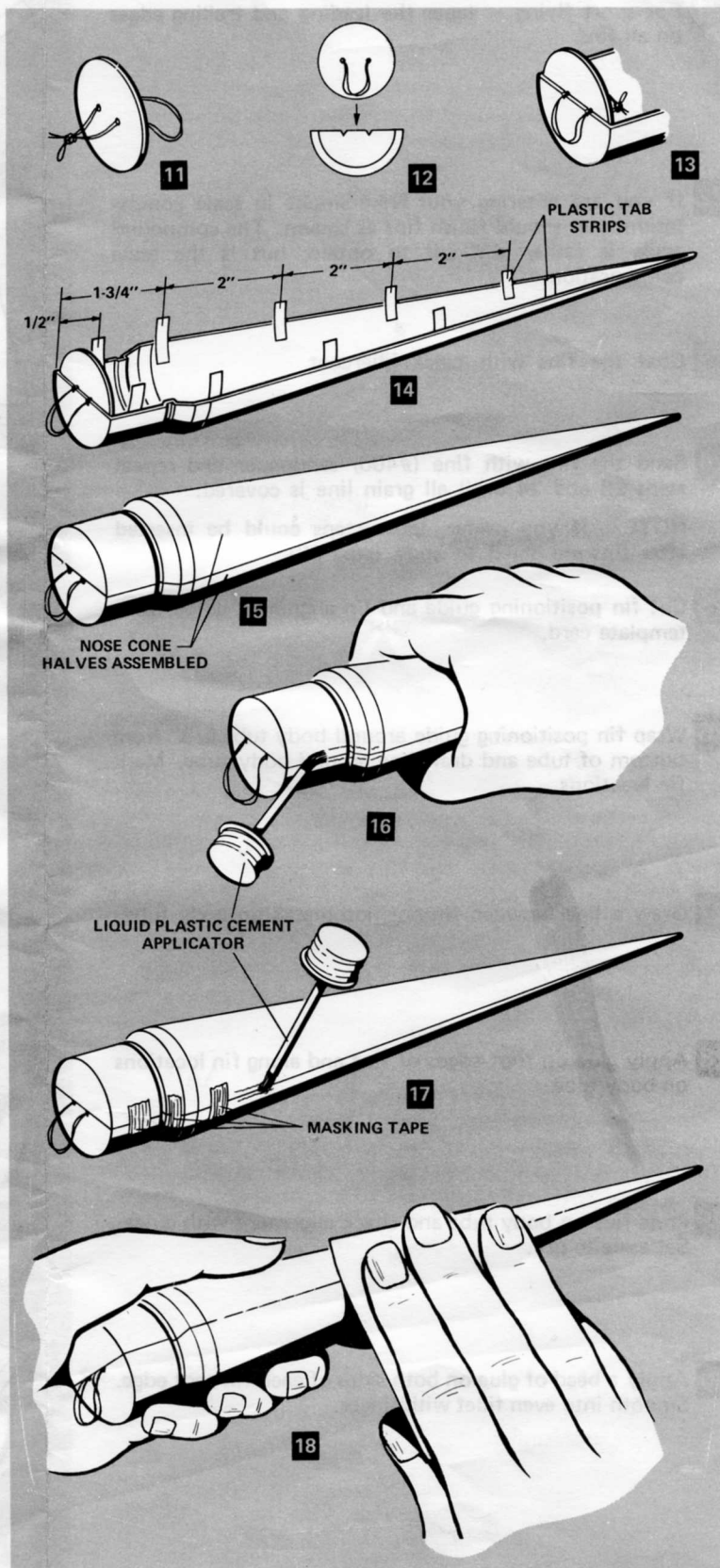
15 Place the other half of the nose on the prepared half and position it exactly.

16 The gluing operation is done in steps. Begin at the base by flowing a small amount of plastic cement along the seam around the bottom 2 " of the cone. Capillary action will pull the liquid cement into the seam and along the tabs. Hold the cone with the nose halves butt joined, not overlapping. When the cement begins to set you may place small pieces of masking tape on the seams to hold them until the joint is firmly cemented.

17 Advance up the nose cone, cementing both sides in 2 " segments and applying masking tape. When the cone is finished, set aside to dry for one hour.

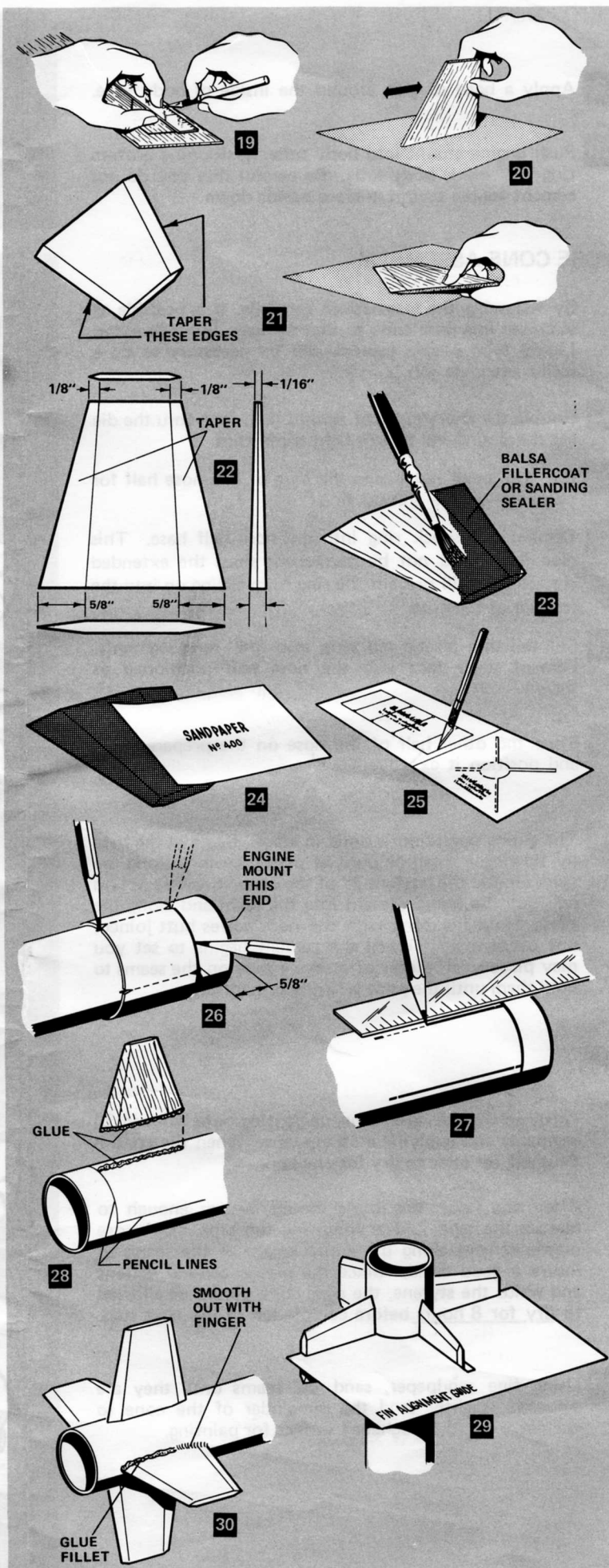
After one hour, the joints should be dry enough to remove the tape. After removing the tape, flow more plastic cement along the entire length of the seams to insure a good bond. Since the plastic cement softens and welds the styrene, the nose cone should be allowed to dry for 8 hours before completion of the next step.

18 Using fine sandpaper, sand the seams until they are smooth. Lightly sand the remainder of the cone to provide a slightly roughened surface for painting.



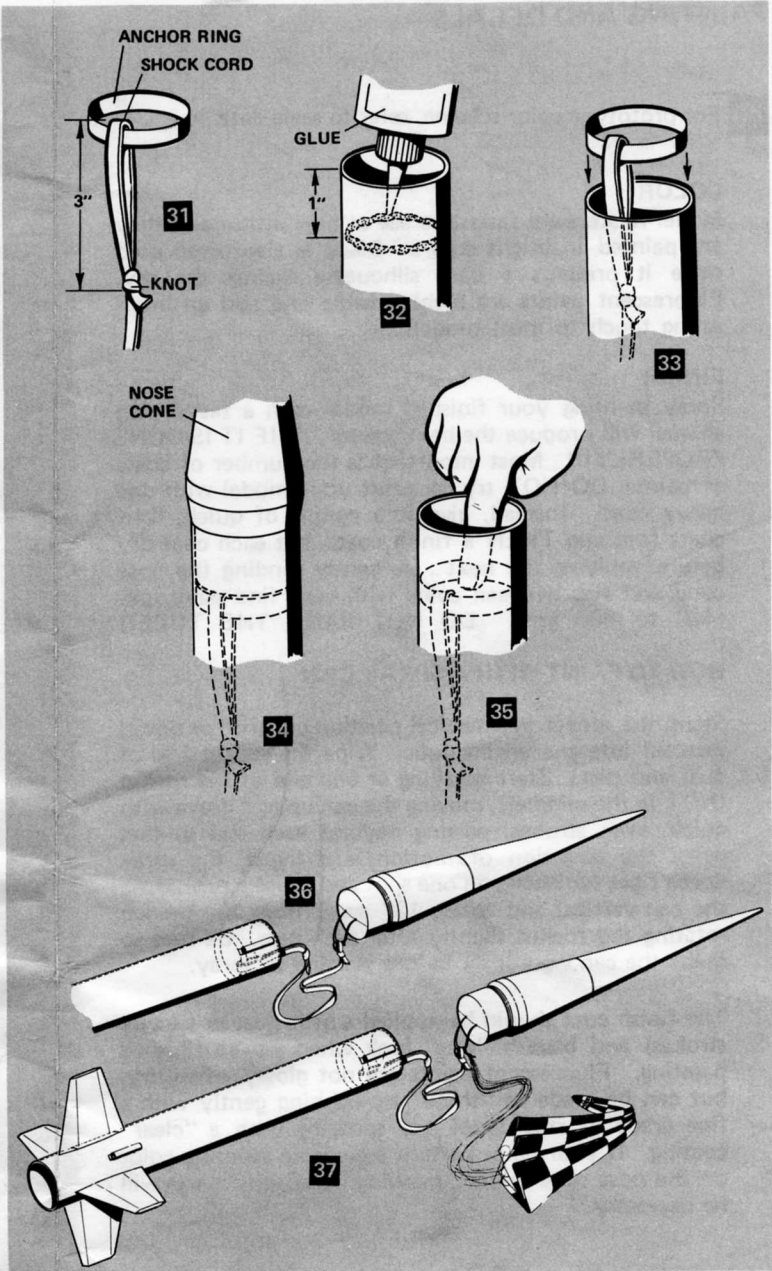
FIN CONSTRUCTION AND ASSEMBLY

- 19** Carefully cut out fins using a sharp modeling knife and metal ruler.
 - 20** Square up all fin edges with fine sandpaper (320 to 400 grit).
 - 21** For sport flying — taper the leading and trailing edges on all fins.
 - 22** If you are entering your Nike-Smoke in scale competition, you should finish fins as shown. The compound angle is rather difficult to obtain, but is the scale configuration.
 - 23** Coat the fins with balsa fillercoat.
 - 24** Sand the fins with fine (#400) sandpaper and repeat steps 23 and 24 until all grain line is covered.
- NOTE:** If you prefer, these steps could be inserted after fins are glued to body (step 29).
- 25** Cut fin positioning guide and fin alignment guide from template card.
 - 26** Wrap fin positioning guide around body tube 5/8" from bottom of tube and draw line around body tube. Mark fin locations.
 - 27** Draw a line between fin position marks on body tube.
 - 28** Apply glue on root edges of fins and along fin locations on body tube.
 - 29** Press fins on body tube and check alignment with guide. Set aside to dry.
 - 30** Apply a bead of glue on both sides of each fin root edge. Smooth into even fillet with finger.



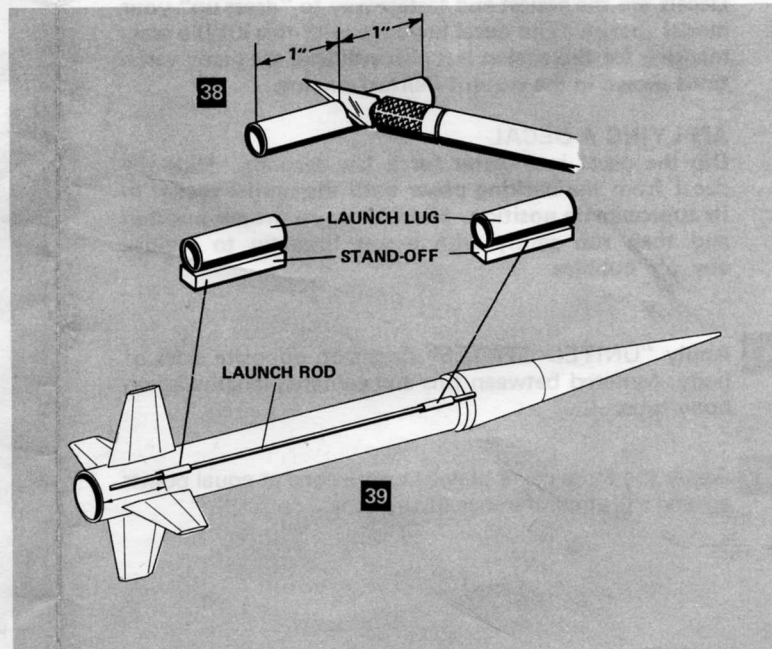
SHOCK CORD ASSEMBLY

- 31** Tie one end of shock cord around anchor ring.
- 32** Run bead of glue around inside of body tube and smooth out with fingertip.
- 33** Drop shock cord into tube and insert anchor ring into end of tube.
- 34** Push the anchor ring into body with nose cone. This must be done quickly since the thin film of glue dries very fast. Remove the nose cone immediately so that it doesn't stick in the body tube.
- 35** Apply a layer of glue over anchor ring.
- 36** Tie loose end of shock cord securely to nose cone attachment loop.
- 37** Assemble chute according to directions printed on plastic chute material. Tie shroud line to nose cone attachment loop.



LAUNCH LUG ASSEMBLY

- 38** Cut the 2" launch lug in half.
- 39** Cut the balsa stand-offs from the fin sheet. Apply fillercoat and sand. Cement launch lug to stand-offs. Using a launching rod to align launch lugs, glue them to body. (If you don't have your launcher yet, you can sight align the launch lugs.)



40 For prototype color scheme, refer to scale data.

COLOR

Model rockets are easiest to see at high altitudes if they are painted in bright colors. Black is also often used since it presents a dark silhouette against the sky. Fluorescent paints are highly visible and add an interesting touch to most models.

FINISH

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 coat dry before applying the next . . . gently sanding the nose cone and fins between coats with very fine sandpaper (400 to 600 grit). DO NOT SAND THE TUBE!!

HOW TO PAINT WITH A SPRAY CAN

Stand the rocket in a vertical position on a rod or dowel inserted into the engine tube. Wipe the rocket free of dust and dirt. Start spraying at one end of the rocket (NOT in the middle!), moving the can up and down with quick, even strokes, passing beyond each end so that when the direction of motion is changed, the spray doesn't get too heavy on one spot and cause a run. Hold the can vertical and about 12" away from the model, rotating the rocket slightly after each pass. Be sure to shake the can vigorously before starting to spray.

The finish coat should be applied a little heavier (slower strokes) and have a "wet" look when you're finished painting. Fluorescent paints are not glossy when dry, but can be made to "shine" by rubbing gently with a fine grade of steel wool and spraying with a "clear" coating. If your paint pattern includes a separate color on the nose cone or fins, masking of selected parts will be necessary.

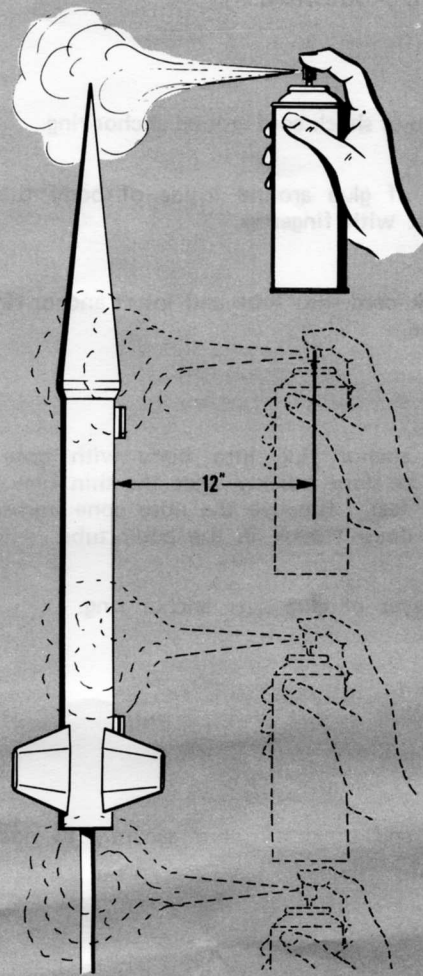
Decals are the easiest and fastest way to "dress up" your model rocket. The decal included with this kit is a scale marking for this rocket but also available are many variations shown in the current Centuri catalog.

APPLYING A DECAL

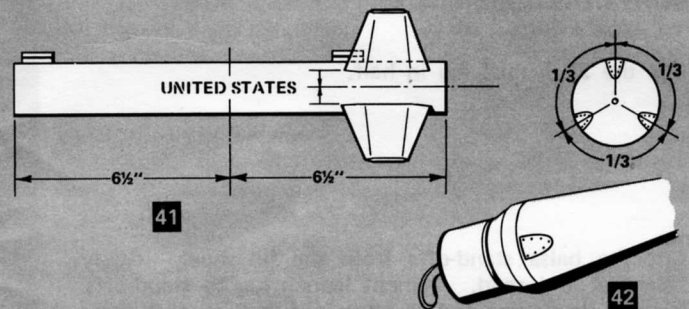
Dip the decal into water for a few seconds. Slide the decal from the backing paper onto the model rocket in its approximate position. Slide it into its proper position and then rub gently with a wet fingertip to remove any air bubbles.

41 Apply "UNITED STATES" decals on opposite sides of body, centered between fins and centered lengthwise on body tube.

42 Apply the three cover plates to nose cone at equal points around the circumference of the cone.



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LAUNCHING THE NIKE "SMOKE"

The approximate altitudes shown in the chart below can vary depending on the finish of the rocket (smoothness) and its weight (heavily painted vs. lightly painted). When a limited amount of launching area is being used, lower altitude flights are recommended. As a rule of thumb, a launching area should have its shortest side no less than one-fourth ($\frac{1}{4}$) the expected maximum altitude of the rocket you're flying. EXAMPLE — If your rocket is going to fly 800 feet high, the shortest side of the launching area should be at least 200 feet long. However in no event should a rocket be launched in an area less than 100 ft. x 100 ft.

The Nike-Smoke may be launched with any of the following engines:

CENTURI ENGINE NO.	APPROX. EXPECTED ALTITUDE	LAUNCH AREA SHOULD BE AT LEAST
B4-2	450 to 500 ft.	125' x 125'
C6-5	900 to 1000 ft.	250' x 250'

The launching field should be in a cleared area away from buildings, power lines, busy highways, tall trees, and dry grass or other dense brush.

Launch the Nike-Smoke from any standard model rocket launcher having a 1/8" dia. x 36" long steel launch rod such as Centuri's LIA-50 or LIA-77 Launcher Assemblies.

Prepare the rocket for flight as follows:

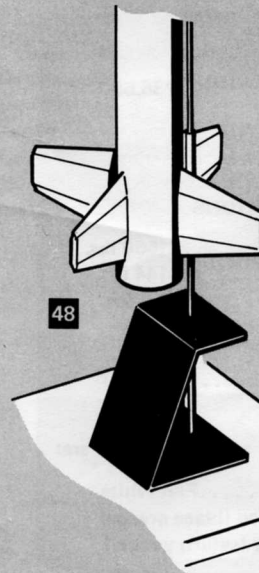
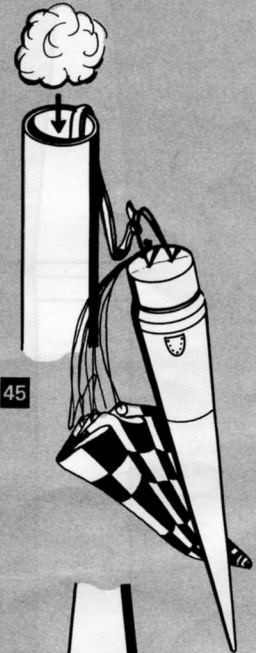
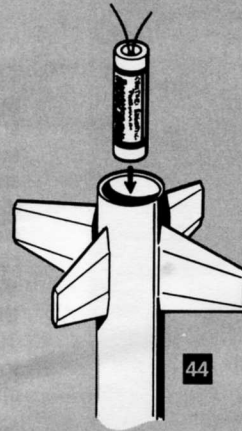
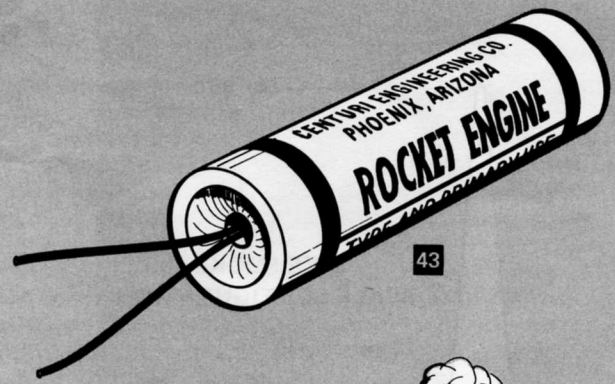
- 43** Install igniter in engine.
- NOTE** — Complete igniter installation directions are included in Centuri's Engine Operating Instructions.
- 44** Insert engine into rocket.
- 45** Insert flameproof wadding.
- 46** Fold and insert parachute.
- 47** Place nose cone in position.
- 48** Line up the launch lugs and slip onto the launch rod. Be sure that the engine is positioned directly over the slanted side of the metal exhaust deflector.

Hook up the engine igniter wires according to instructions included with the engine. Attach battery and firing panel wires as shown on the launcher and firing panel instructions.

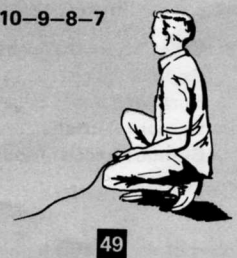
- 49** Give a short countdown before launching to alert spectators.

Model rockets are not toys and should be handled with caution and respect.

For more information concerning CENTURI Model Rocketry Products, see your local Hobby Dealer. If he cannot help you, write direct to CENTURI ENGINEERING CO., P. O. Box 1988, Phoenix, Arizona 85001.

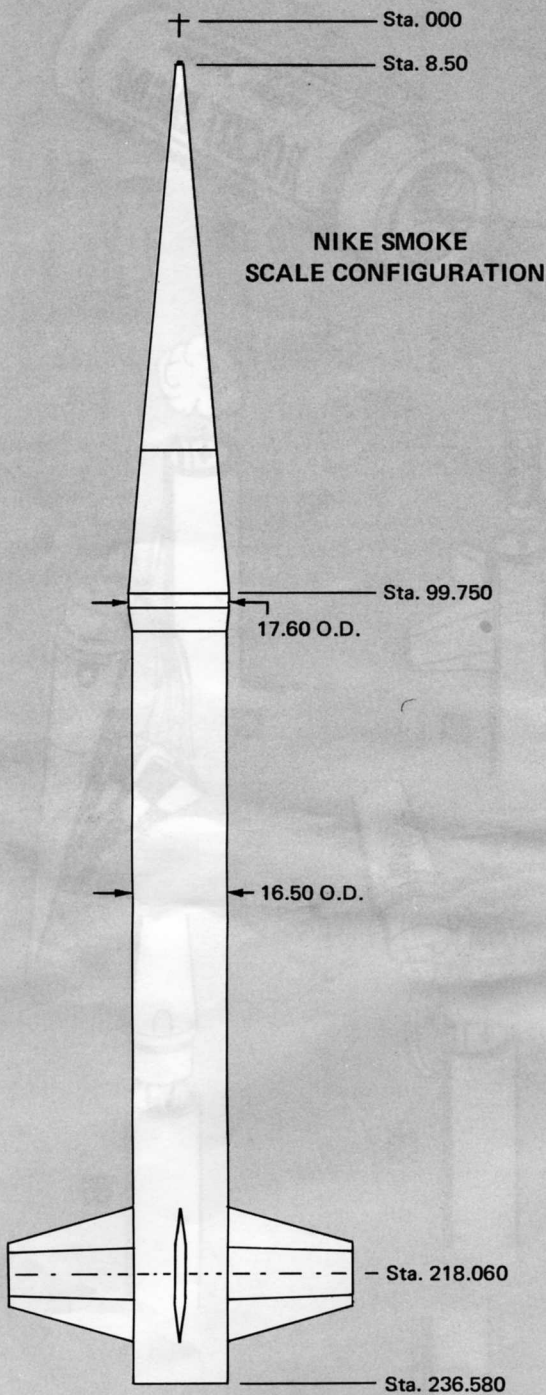


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SCALE DATA

NIKE 'SMOKE'



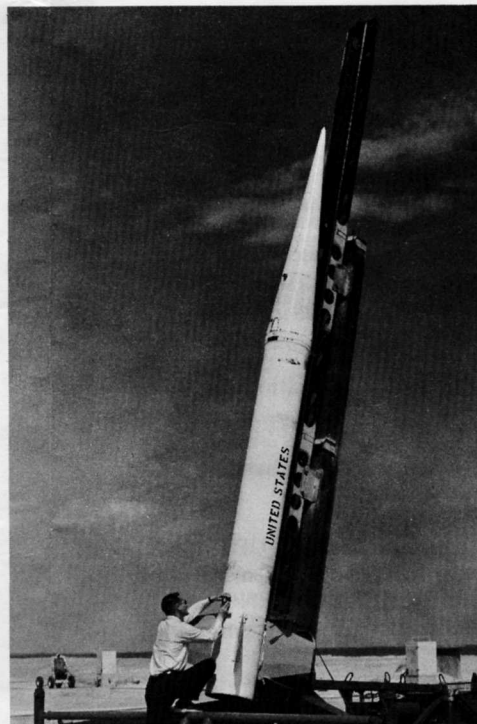
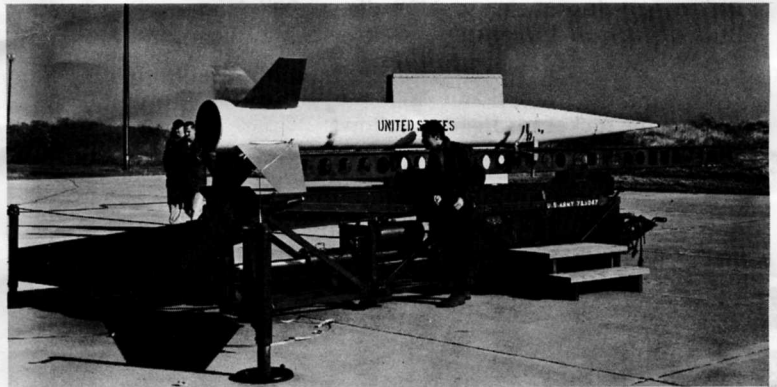
PRIMARY SPECIFICATIONS

Gross Take-off Weight	1560 lbs.
Payload Weight	144 lbs.
Burnout Time	3.5 sec.
Burnout Altitude	6294'
Burnout Acceleration	47.2g
Apogee	75,200'

Colors of the rockets being launched at Wallops Island are:

Body and Nose Cone	Flat White
3 Fins	Fluorescent Red (blaze orange)
1 Fin	Fluorescent Yellow (saturn yellow)
Lettering and Nose Tip	Black

The Nike-SMOKE is a sleek-slimlined bird used to measure upper atmosphere movements. The "Nike" portion of this "rocketsonde" is a standard M-5 Nike solid propellant booster. The "Smoke" is a stainless steel nose cone that contains a payload of 10 gallons of $TiCl_4$. A standard 1" pipe in the nose tip pressurizes the payload compartment during thrust. The canister for the $TiCl_4$ is so designed that when the coasting phase of flight begins, the chemical is forced out at a steady rate into the atmosphere. When the $TiCl_4$ combines with the water in the atmosphere, it forms a dense white "smoke" (hydrochloric acid) that is photographed by time lapse cameras situated on a 90° azimuth, 10 miles from the launch site. The resultant photographs give scientists information on velocity and directional movements of wind up to altitudes of 75,000 feet.



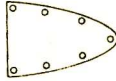
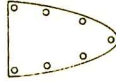
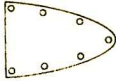
Many Nike-SMOKE rockets were launched at Cape Kennedy and still more at Wallops Island, Virginia. To date, well over 100 have been flown.

UNITED STATES

UNITED STATES

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UNITED STATES



Engineering Co

1/10 SCALE

NIKE-SMOKE DECALS

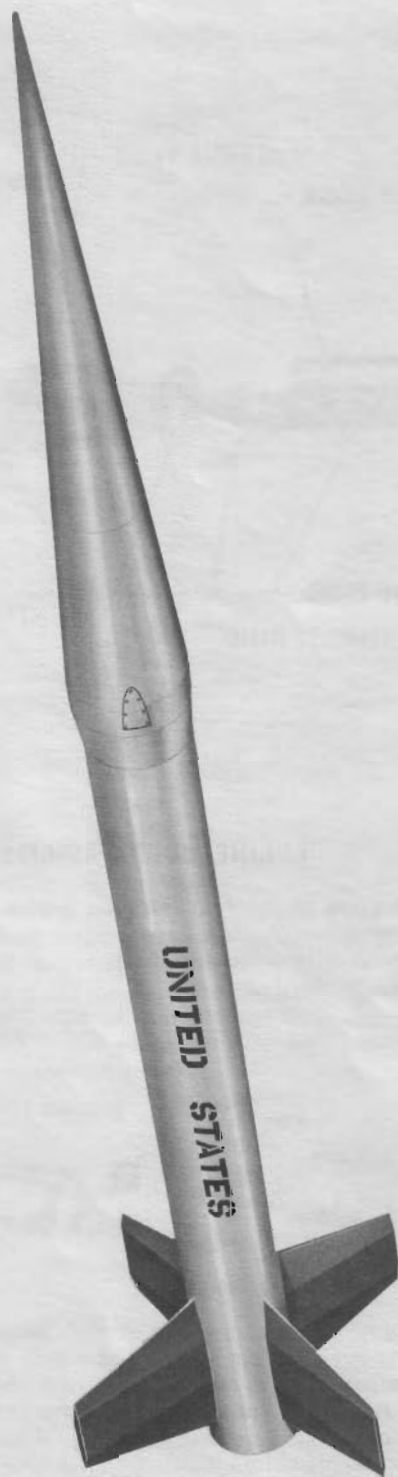
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NIKE 'SMOKE'

The Nike Smoke is a sleek, slimlined bird used to measure upper atmosphere movements. The "Nike" portion of this "rocketsonde" is a standard M-5 Nike solid propellant booster. The "Smoke" is a stainless steel nose cone that contains a payload of 10 gallons of $TiCl_4$. A 1" pipe in the nose tip allows the intruding air to pressurize the payload compartment during thrust. The canister for the $TiCl_4$ is so designed that when the coasting phase of flight begins, the chemical is forced out at a steady rate into the atmosphere. When the $TiCl_4$ combines with the water in the atmosphere, it forms a dense white "smoke" (hydrochloric acid) that is photographed by time lapse cameras situated on a 90° azimuth, 10 miles from the launch site. The resultant photographs give scientists information on velocity and directional movements of wind up to altitudes of 75,000 feet.



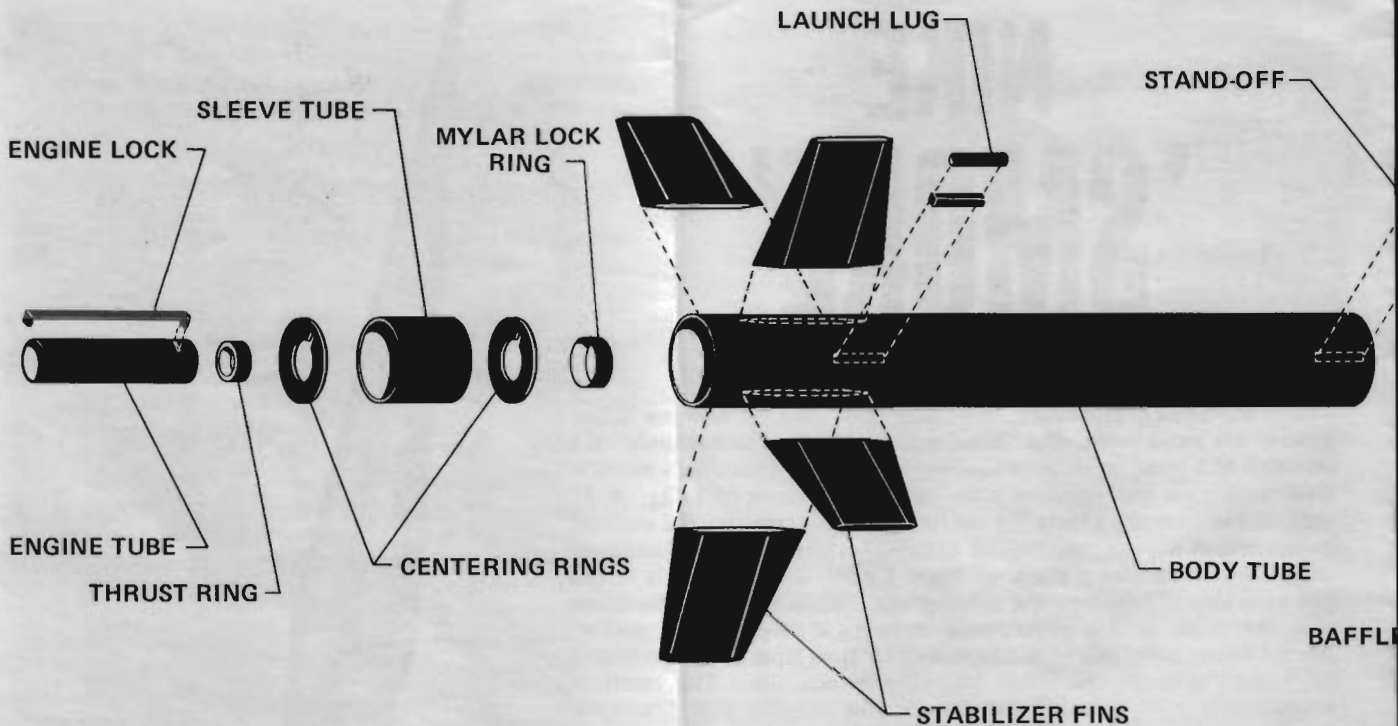
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Centuri

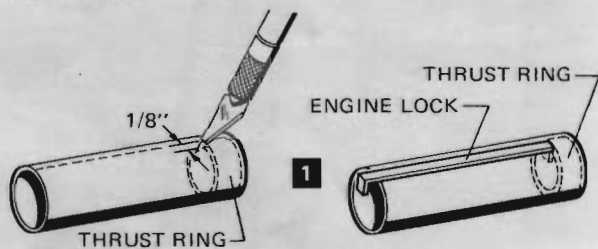
1/10 SCALE MODEL KIT

Centuri's Nike Smoke is an exact scale model, 1/10 the size of the real rocket. Requiring only one engine, it is economical to fly, yet has the advantage of being large and pretentious on the launch stand. The long tapered nose cone and short trapezoidal fins lend a very sleek and streamlined appearance to the "SMOKE". It is not a difficult kit to build and the engine lock, large chute compartment, and ejection baffle make it extremely simple and foolproof, yet very exciting to fly!!

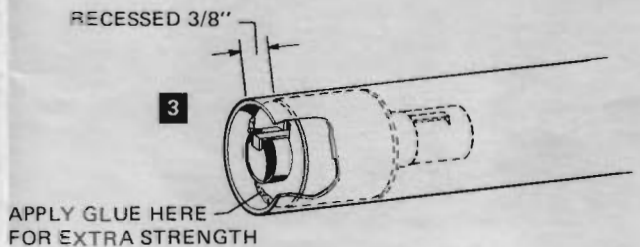


ENGINE MOUNT ASSEMBLY

- 1** Glue the thrust ring into the engine tube flush at one end. Cut a slit just forward of the thrust ring (about $3/16''$) and insert one end of the engine lock into the slit.

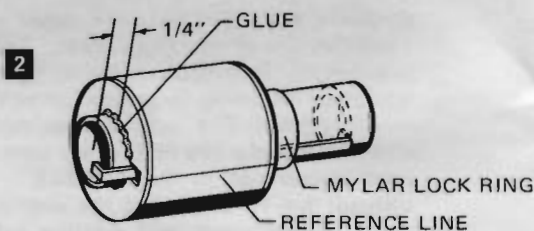


- 3** Glue the assembled engine mount into one end of the body tube with the bottom centering ring recessed $3/8''$.



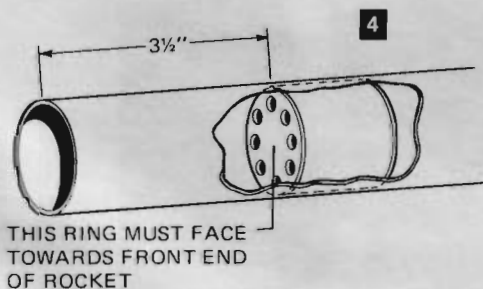
- 2** Apply glue on one side of each centering ring and position on sleeve tube. Make sure the notches on these rings are aligned with each other. NOTE: A reference line drawn across the sleeve tube, will help in aligning these notches. Allow glue to dry thoroughly before inserting engine tube.

Glue the engine tube into the sleeve assembly making sure that the engine tube extends $1/4''$ out from the bottom centering ring. Slide the mylar lock ring over the thrust ring end of the engine tube and glue into place flush against the centering ring.

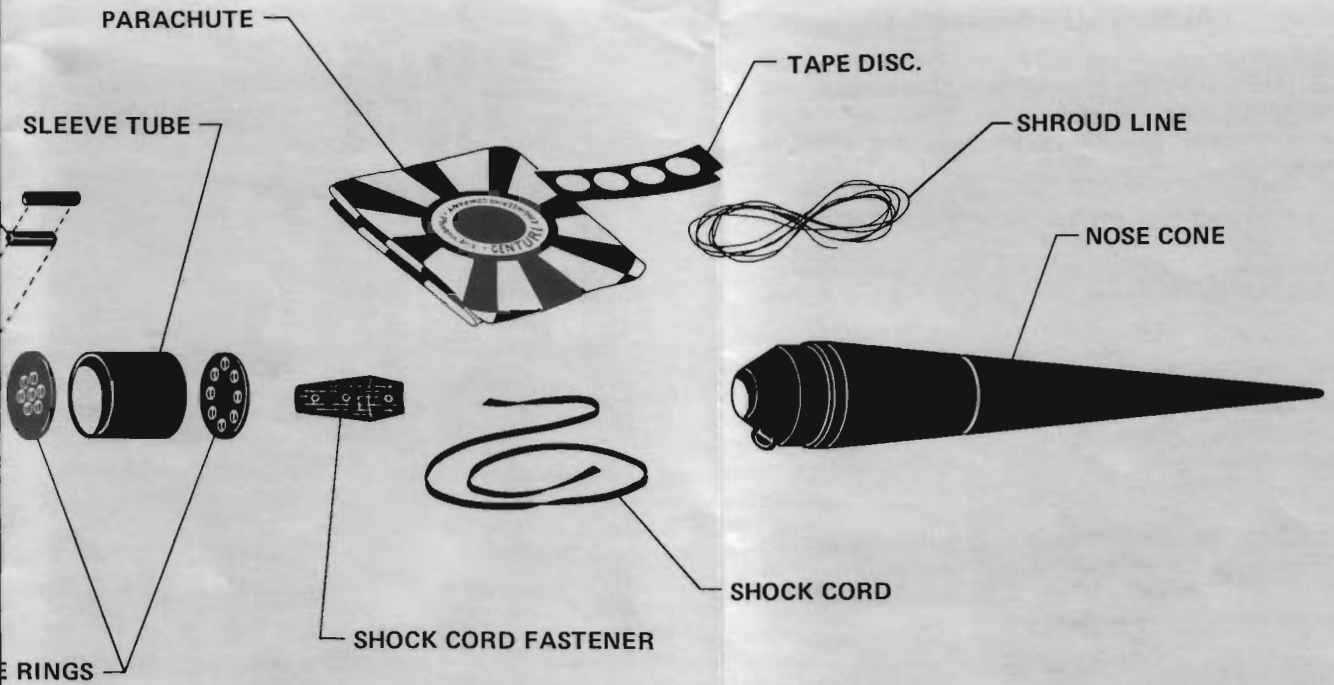


BAFFLE ASSEMBLY *

- 4** Apply glue to one side of each baffle ring and position on the remaining sleeve tube. Allow to dry. Apply glue inside the body tube about $3-1/2''$ from the top end. Push the baffle assembly into place so that the top baffle ring is $3-1/2''$ from the top.

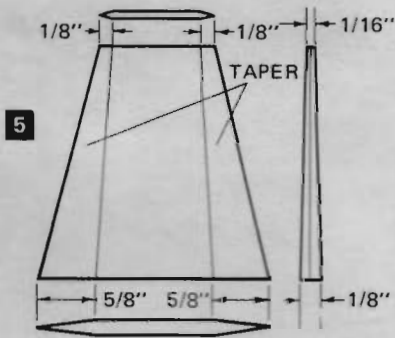


* PATENT PENDING

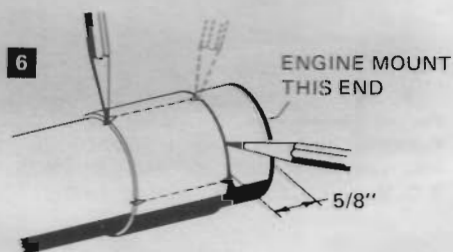


FIN ASSEMBLY

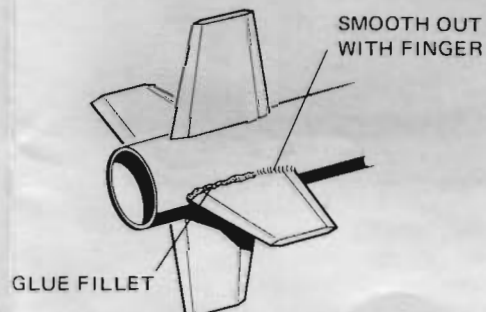
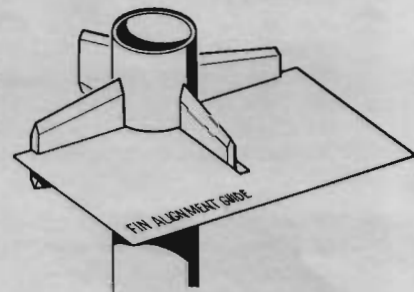
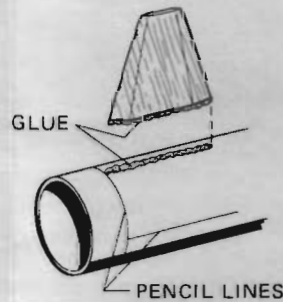
5 Carefully remove the die-cut fins from the balsa sheet. Sand and shape the fins according to the configuration shown in the illustrations. Coat the fins with balsa fillercoat and sand with fine (#400) sandpaper. Repeat this step until all grain line is filled. NOTE: If you prefer, this step can be done after the fins are glued to the body tube.



6 Cut out and wrap the fin positioning guide around the body tube 5/8" from the engine mount end of the tube. Draw a line around the tube and mark the fin locations as shown in the illustration. Draw lines connecting the fin location marks.



7 Apply glue on the root edges of the fins and along fin location lines on the body tube. Press fins into place and check their angle with the fin alignment guide before the glue sets. Apply a bead of glue on both sides of each fin-body tube edge and smooth into even fillets with your finger. Lay the tube horizontally and allow glue to dry thoroughly.



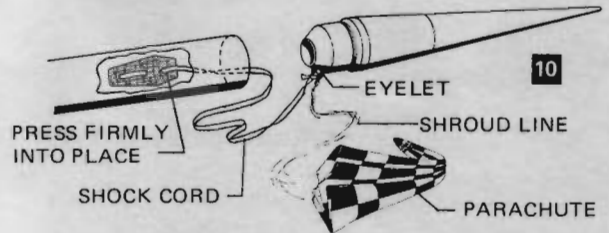
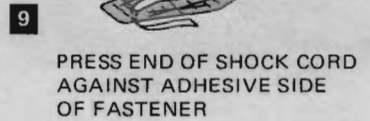
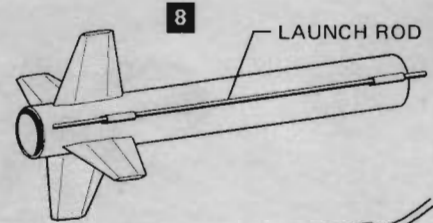
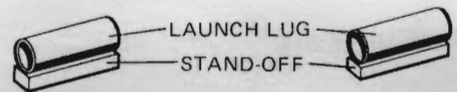
LAUNCH LUG ASSEMBLY

- 8** Cut the 2" launch lug in half and remove the balsa stand-offs from the balsa sheet. After sanding and filling the stand-offs, glue on the launch lugs. Using a launch rod to align launch lugs, glue them to body tube.

FASTENER & PARACHUTE ASSEMBLY

- 9** Peel backing from self-adhesive shock cord fastener. Thread one end of shock cord through holes as shown.
- 10** Slip fastener far enough into the body tube to allow clearance for the nose cone base. When positioned, press firmly into place, starting at the bottom and working to the top.

Assemble the parachute according to directions printed on the chute material. Tie the shroud lines along with the loose end of the shock cord to the eyelet molded into the nose cone base.



FINISHING THE NIKE SMOKE

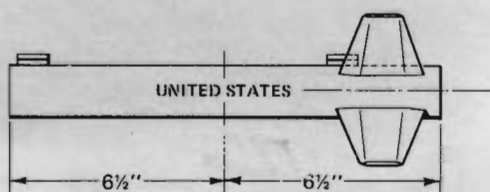
The one piece, sculptured nose cone of the NIKE SMOKE ROCKET is a true scale white color. It is molded of a flexible type plastic as a safety feature. Do not paint this nose cone as the special type plastic will not respond to normal painting techniques.

Spray painting your finished model with a fast-drying enamel will produce the best results. Paint your Nike Smoke as follows:

Body Flat White
3 Fins Fluorescent Red (blaze orange)
1 Fin Fluorescent Yellow (saturn yellow)

Stand the rocket in a vertical position and start spraying at one end of the rocket (not in the middle), moving the can up and down with quick, even strokes. Pass beyond each end so that when the direction of motion is changed, the spray doesn't get too heavy on one spot and cause a run. Hold the can vertical and about 12" away from the model, rotating the rocket slightly after each pass.

Apply "UNITED STATES" decals on opposite sides of body, centered between fins and centered lengthwise on the body tube.



LAUNCHING THE NIKE SMOKE

The approximate altitudes shown in the chart below can vary depending on the finish of the rocket (smoothness) and its weight (heavily painted vs. lightly painted). When a limited amount of launching area is being used, lower altitude flights are recommended. As a rule of thumb, a launching area should have its shortest side no less than one-fourth (1/4) the expected maximum altitude of the rocket you're flying.

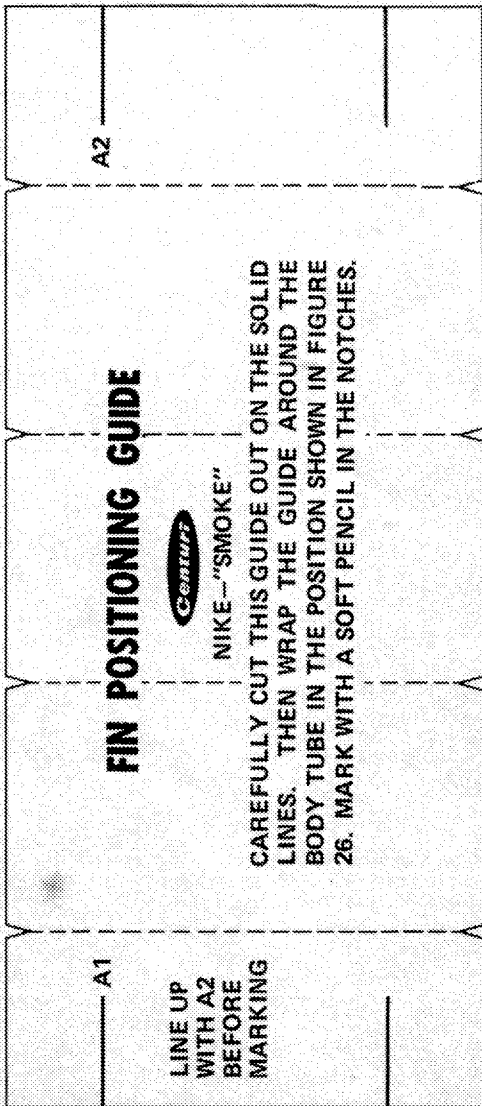
The NIKE SMOKE may be launched with any of the following engines:

CENTURI ENGINE NO.	APPROX. EXPECTED ALTITUDE	LAUNCH AREA SHOULD BE AT LEAST
B4-2	300 to 400 ft.	125' x 125'
C6-5	600 to 700 ft.	250' x 250'

The launching field should be in a cleared area away from buildings, power lines, busy highways, tall trees, and dry grass or other dense brush.

Launch the NIKE SMOKE from any standard model rocket launcher having a 1/8" dia. x 36" long steel launch rod such as Centuri's LIA-65 or LIA-77 Launcher Assemblies.

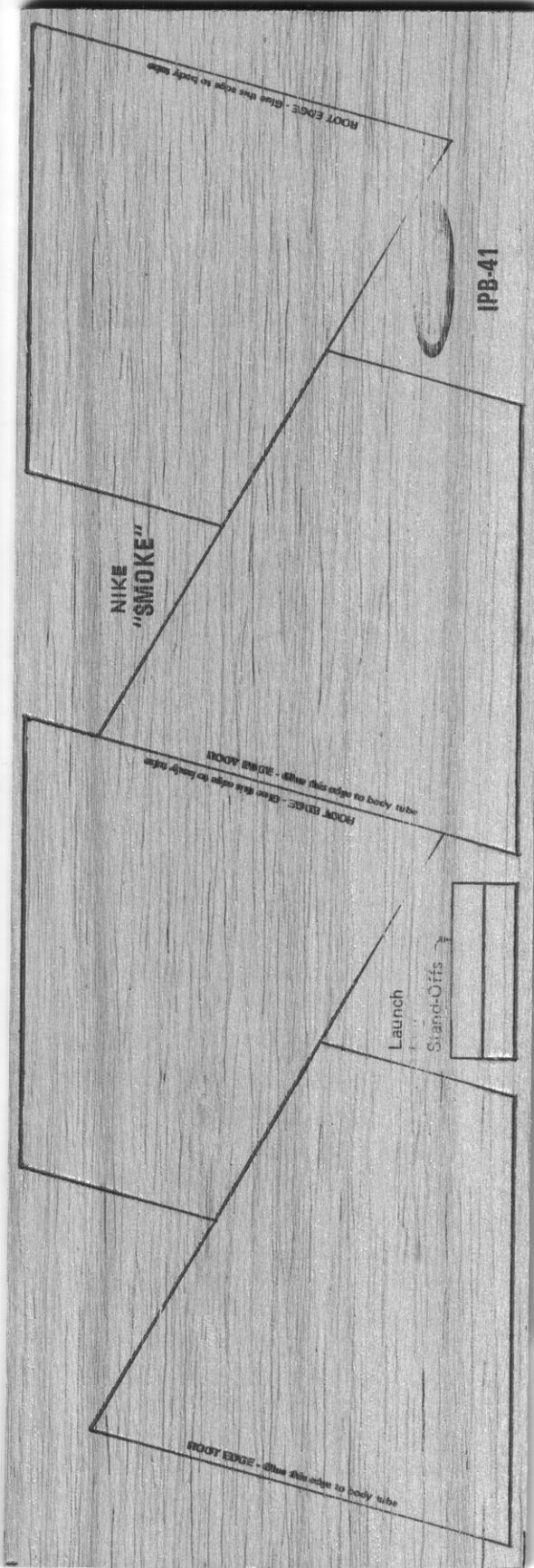
For more information concerning CENTURI Model Rocketry Products, see your local Hobby Dealer. If he cannot help you, write direct to CENTURI ENGINEERING CO., P. O. Box 1988, Phoenix, Arizona 85001.



NIKE--"SMOKE"

FIN ALIGNMENT GUIDE

CAREFULLY CUT OUT THE GUIDE ON THE SOLID LINES & SLIP ONTO FINS AS SHOWN IN FIGURE 29 OF THE INSTRUCTION SHEET.



IPB-41



MAGNOLIA
METAL CORPORATION



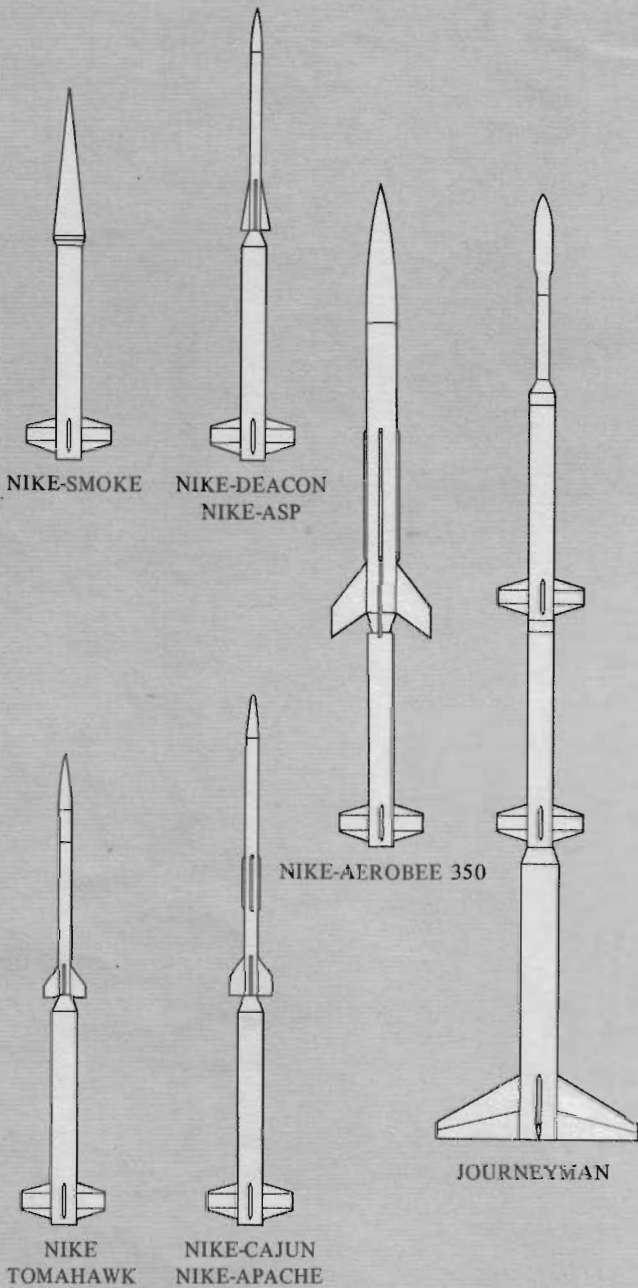
100 Years of the Best in Bearing Metals
 SALES OFFICE - OMAHA, NEBR. 800-228-4043
 MAIN PLANT - AUBURN, NEBR. 402-274-3152

METRIC 1

NIKE BOOSTER CONFIGURATIONS



NIKE 'SMOKE' SCALE DATA

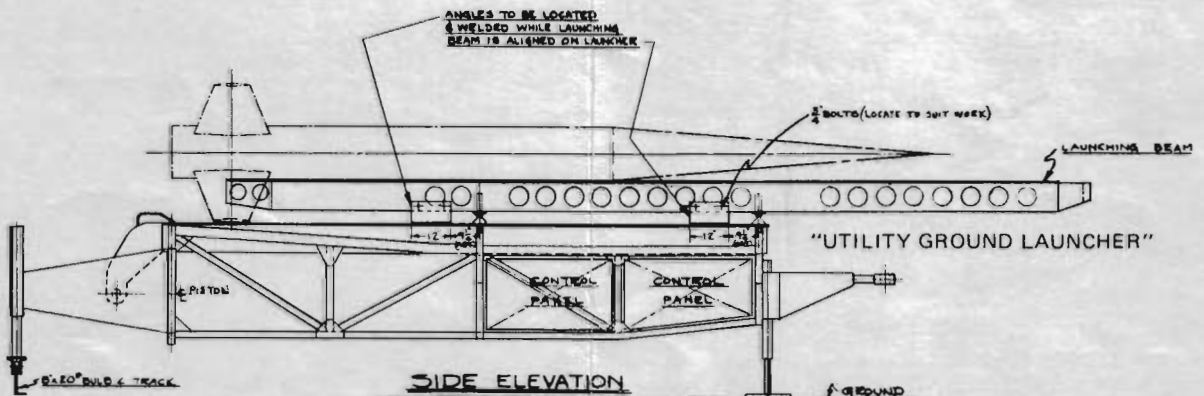


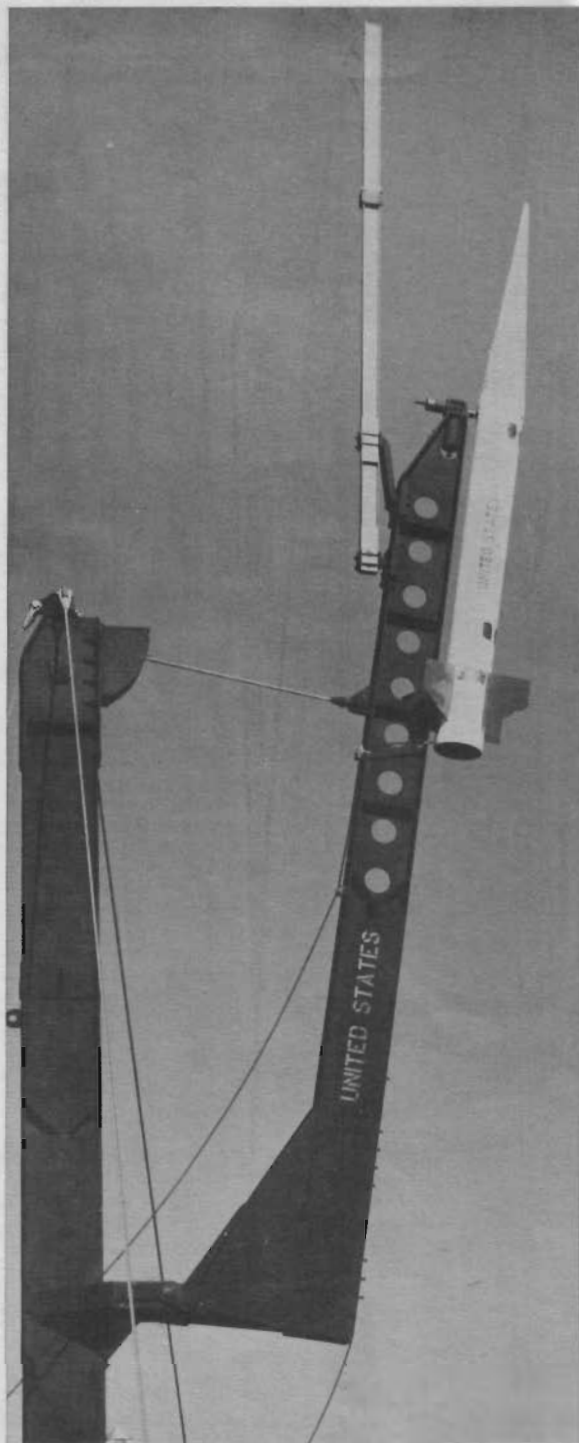
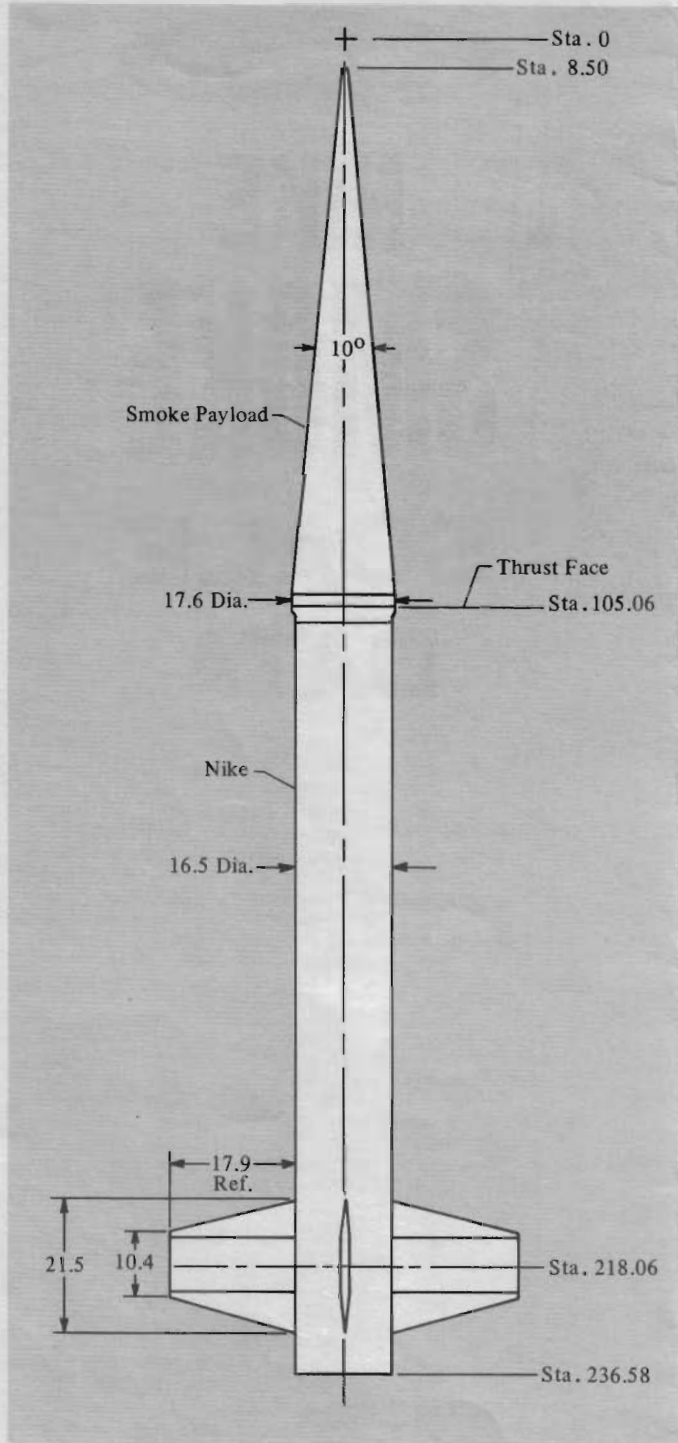
Drawings are for size comparison only.

Sounding Rockets are rockets launched to collect and transmit data about the Earth's environment at high altitudes. The public is generally unaware of the existence of sounding rockets despite the fact that many hundreds are launched every year to help predict the weather, measure air pollution, radiation, and research such varied phenomena as temperature inversions, solar flares, lightning and the Jet Stream. As you read this a sounding rocket may be blasting off right now from White Sands, Florida, Canada, the Phillipines or a ship hundreds of miles at sea.

The Nike Smoke is a member of a whole family of sounding rockets based on the now obsolete Nike Ajax anti-aircraft rocket. As the Nike Ajax was replaced by newer weapons, thousands of booster rockets became available for peaceful use. The Nike Smoke is the only single stage version in use. The "Smoke" is fired prior to Apollo launches to measure winds in the upper atmosphere that might affect the huge Saturn V.

By adding different upper stages, NASA has created the Nike Deacon, Nike Cajun, Nike Apache and the Nike Tomahawk. The Nike also serves as the booster for the much larger Aerobee-350. Occasionally, the Nike itself is boosted by a still larger rocket, usually the Honest John. It then takes the form of the Journeyman: an Honest John booster, a Nike second stage, a Nike third stage, and a smaller spin stabilized fourth stage. By assembling space probes from this "off the shelf" hardware NASA can accomplish a great deal of vital research quickly and very economically. Despite the usefulness of satellites, less expensive sounding rockets can measure conditions from the Earth's surface on up to over 1,000 miles and will probably always be playing a major role in our space program.





WEIGHTS

Gross (takeoff)	1560.7 lbs.
Propellant	764.0 lbs.
Burnout	796.7 lbs.
Payload	144.0 lbs.
Empty	652.7 lbs.
M-5 Nike booster	431.0 lbs.
Fins	69.2 lbs.
Nose assembly	152.5 lbs.

PERFORMANCE

(80-deg. launch angle)	
Burnout time	3.5 sec.
Burnout altitude	6294.0 ft.
Burnout acceleration	47.2 g
Apogee	75,200.0 ft.
Apogee time	65.0 sec.
Splash time	147.0 sec.
Splash range	56,500.0 ft.

PROPULSION

Hercules Corp. Nike booster M-5

Thrust	48,700.0 lbs.
Duration	3.5 sec.
Propellant	solid

COLOR DATA

(Wallops flights): Flat white overall. Three fins fluorescent red, one fin fluorescent yellow. UNITED STATES in letters 8" high, stenciled in black on both sides of vehicle in horizontal position inter-digitated between fins and centered along booster body.

REFERENCES

ROCKETS, MISSILES, AND MEN IN SPACE
by Willy Ley The New American Library

THE MCGRAW-HILL ENCYCLOPEDIA OF SPACE
The McGraw-Hill Book Company

ABOVE AND BEYOND
(Encyclopedia) New Horizons Publishers

THIOKOL CHEMICAL CORP.
(Nike M-5 booster and fins)

HISTORIAN
White Sands Missile Range

HISTORIAN
Goddard Space Flight Center (NASA)

PHOTOGRAPH COURTESY OF THE NATIONAL
AERONAUTICS AND SPACE ADMINISTRATION.

Centuri
Nike Smoke KS-15

Body Tube Info

Main Body

ST-16 --- 13.0 inches long

Engine Tube

ST-7 --- 2.75 inches long

Coupler Tubes --- 1.5 inches long

Balsa sheet

3 inch x 9 inch x 1/8 inch