

Recommended for ages 10 to adult.  
Adult supervision recommended  
for those under 12 years of age  
when flying model rockets.

1 MODEL KIT - Paint and glue  
not included.  
1 MODELE REDUIT - Peinture et  
colle non comprises.

**QUEST**<sup>TM</sup>  
Shaping the future of model rocketry



# Nike Smoke Flying Model Rocket

- Authentic scale model of famous sounding rocket featuring detailed scale data sheet.
- Features a plastic nose cone, one-piece molded fin unit and self-adhesive decals for fast, easy assembly.
- Includes Quest's advanced design features: Kevlar® Shock Cord System, Easy-Lock Motor Mount and Grippers™ recovery system (see back panel).
- Dependable Tuff-Chute™ parachute gently returns your rocket for one exciting flight after another!

Estimated Maximum Altitude:  
1,200 ft (365.9 m)  
Recommended Rocket Motors:  
A6-4 (First Flight),  
A8-3, B6-4, C6-5  
Length: 19.5 in (49.5 cm)  
Body Diameter: 1.378 in (35 mm)  
Weight: 2.2 oz (62 g)

**This model kit  
requires assembly.**  
White glue, plastic cement,  
finishing supplies, launch  
system and rocket motors  
for launching not included.



12" Recovery  
Parachute



#### SKILL LEVEL



Recommended for the  
Experienced Modeler

PROOF OF PURCHASE

Nike Smoke #2007



**QUEST**  
#2007

# NIKE-SMOKE ASSEMBLY INSTRUCTIONS

## Things You'll Need To Assemble this Kit:

Hobby Knife and Pencil



Sandpaper (220 or 320 Grit)



White Glue

Aliphatic Resin glues work best such as TITEBOND or ELMER'S CARPENTER'S WOOD GLUE - ELMER'S WHITE SCHOOL GLUE also works but dries slower.



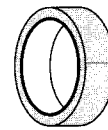
Plastic Cement

Use TESTORS TUBE Plastic Cement, PACTRA LIQUID CEMENT or other comparable brands. DO NOT use cyanoacrylate glue.



Tape

Scotch Magic Tape or Paper Masking Tape



Prod. No. 3502

Skill Level Three

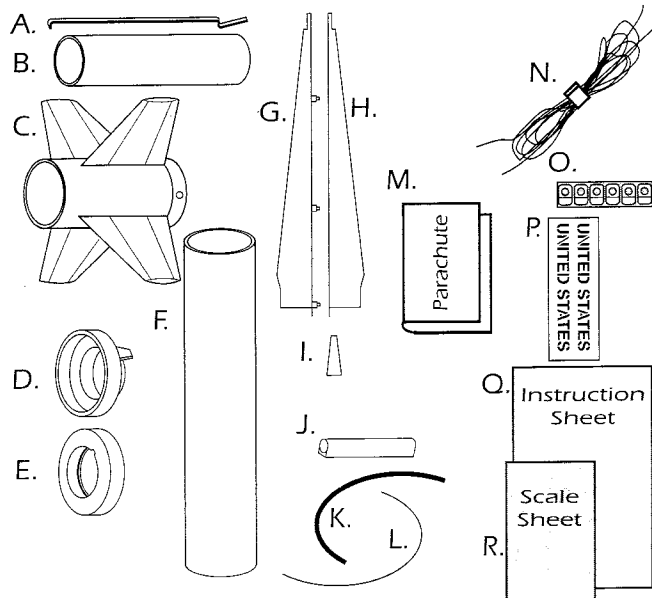


**BEFORE STARTING ASSEMBLY READ THROUGH THESE INSTRUCTIONS. IT IS BEST TO TEST FIT ALL PARTS BEFORE APPLYING ANY GLUE. READ AND FOLLOW THE NAR MODEL ROCKET SAFETY CODE.**

## PARTS LIST

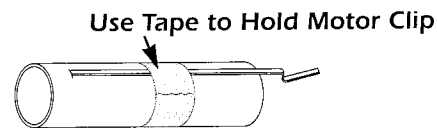
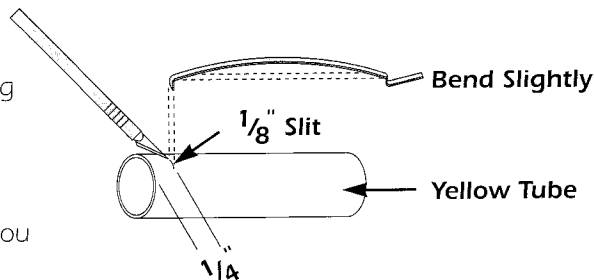
- A. 49000 Motor Clip
- B. 10303 Yellow Motor Mount Tube
- C. 21553 Plastic fin Unit
- D. 21554 Forward Ring
- E. 21555 Aft Ring (Rear)
- F. 11500 8.5 inch Body Tube
- G. 20201 Plastic Nose Cone Male
- H. 20202 Plastic Nose Cone Female
- I. 20203 Nose Cone Tip
- J. 27001 Plastic Launch Lug
- K. 50051 18 inch Yellow Kevlar\* Shock Cord
- L. 50012 24 inch White Elastic Shock cord
- M. 28102 12 inch Parachute
- N. 50100 Pack of 3-26 inch Shroud Lines
- O. 28001 Strip of 6 Gripper Tabs
- P. 91507 Decal
- Q. 96007 Instruction Sheet
- R. 96107 Scale Sheet

\* Kevlar is a registered trademark of Dupont



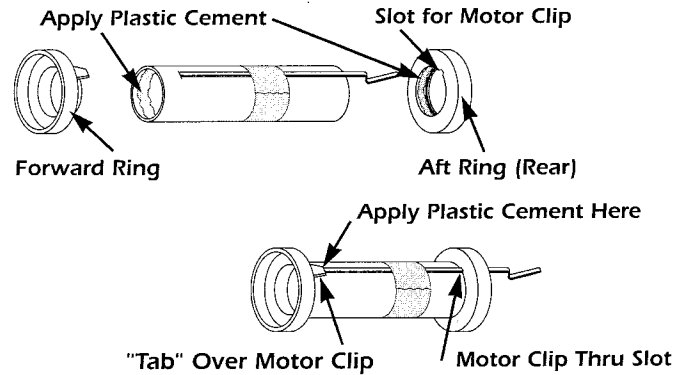
## STEP 1

- A. Use a hobby knife to make a 1/8 inch long slit 1/4 inch from one end of the Yellow motor mount tube.
- B. Make a slight bend in the motor clip as shown. Insert the motor clip into the slit you made in the Yellow motor mount tube.
- C. Wrap a piece of tape all the way around the Yellow motor mount tube to hold the motor clip in place.



## STEP 2

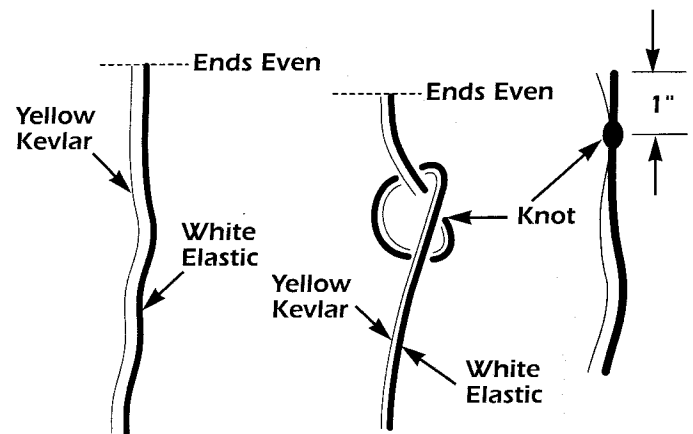
- Apply plastic cement around inside edge of Yellow motor mount tube as shown.
- Insert the forward molded centering ring into the Yellow motor mount tube and position it so the molded "tab" is over the motor clip.
- Apply plastic cement around inside edge of the aft molded centering ring.
- The aft molded centering ring has a slot for the motor clip. Be sure to slide the ring onto the Yellow motor mount tube so that the slot fits over the motor clip.
- Apply additional plastic cement to the forward ring/motor/clip/ yellow motor mount tube joint as shown.



## STEP 3

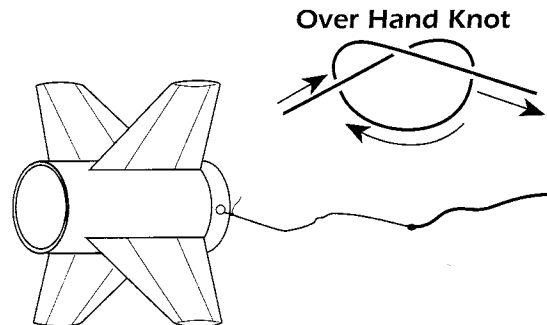
- Hold the Yellow Kevlar Shock Cord and the White Elastic Shock Cord side by side. Pull one end of each cord so that they are even with each other. While holding the two cords together, tie a single parallel overhand knot approximately one inch in from the even ends as shown.
- Gently pull on both cords to set the knot and prevent it from slipping.
- Apply a small amount of white glue on the ends of both cords to prevent them from fraying.

**NOTE: THIS IS A VERY IMPORTANT STEP. IF YOU TIE A DIFFERENT TYPE OF KNOT THE SHOCK CORDS MAY SEPARATE DURING FLIGHT.**



## STEP 4

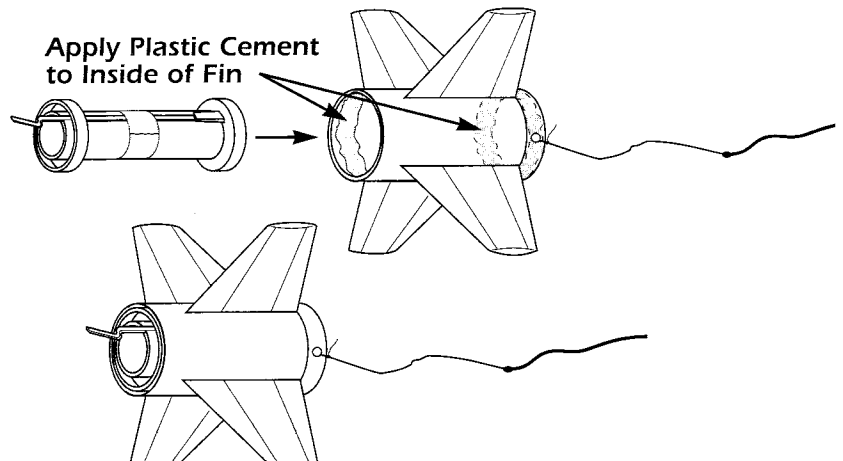
- Use two overhand knots to tie the Kevlar shock cord onto the molded plastic fin unit as shown.
- Trim any plastic "flash" from the fin unit with a sharp hobby knife.



## STEP 5

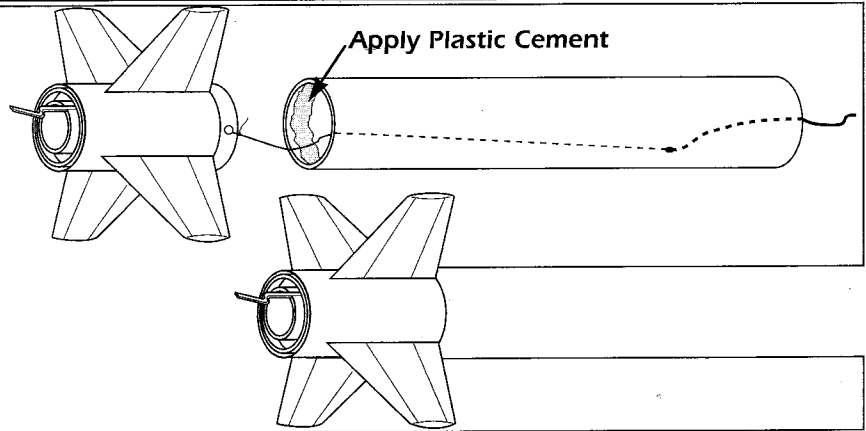
- Apply plastic cement around inside edge of both ends of the molded plastic fin unit.
- With motor clip facing the rear, slide the motor mount assembly into the molded plastic fin unit as shown. Wipe away any excess glue.

**NOTE:** Be sure motor mount assembly is oriented with the motor clip facing the rear as shown.



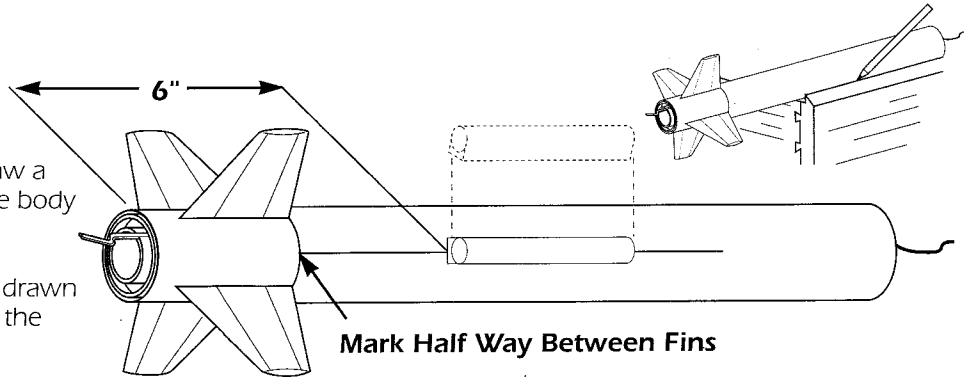
## STEP 6

- A. "Feed" the shock cord into the White body tube until the cord comes out the other end.
- B. Apply plastic cement around the inside of the White body tube.
- C. Insert the molded plastic fin unit/motor mount assembly into the White body tube. Pull shock cord all the way through the body tube. Wipe away any excess glue.



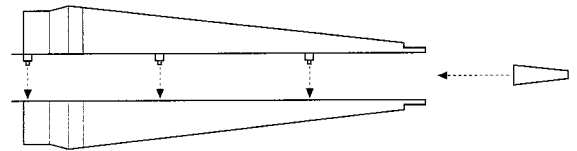
## STEP 7

- A. Make a pencil mark on the body tube half-way between two fins.
  - B. Use a drawer edge as a guide and draw a light pencil line down the length of the body tube.
  - C. Make a pencil mark on the line you've drawn on the white body tube 6 inches from the aft end of the rocket as shown.
  - D. Apply plastic glue to the launch lug and place the launch lug along the pencil line with one end even with the mark 6 inches from the aft end of the rocket as shown.
- NOTE: Be sure launch lug is lined up straight along the white body tube.



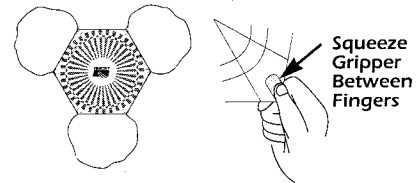
## STEP 8

- A. Trim all plastic "flash" from the molded nose cone parts. Apply plastic model cement around the inside edge of one of the nose cone halves.
- B. Glue the two nose cone halves together and hold together with tape until glue dries.
- C. Apply plastic cement to the inside of the nose cone tip and glue it onto tip of nose cone.



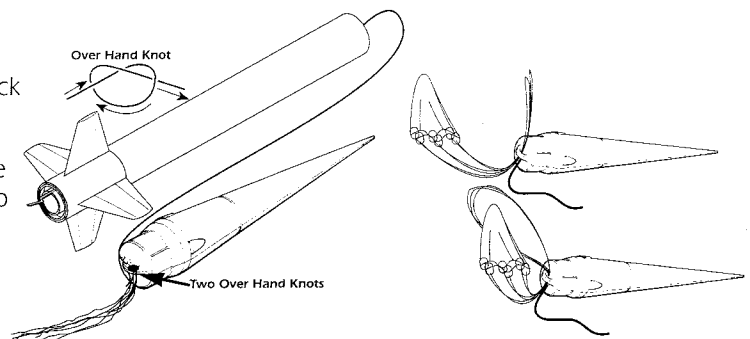
## STEP 9

- A. Assemble the parachute according to the instructions printed on it.
- B. Firmly squeeze each gripper tab and parachute between your fingers.



## STEP 10

- A. Use two overhand knots to tie the loose end of the shock cord onto the eyelet in the reducer.
- B. Pass the shroud line loops of the parachute through the eyelet on the reducer. Pass the parachute through the loop ends and pull lines tightly against the eyelet.



**STEP 11** Use this picture and the scale data sheet as your guide for painting and decal placement.

- A. Spray paint the entire rocket flat white. Mask off and paint the fins as shown.
- B. Use your hobby knife to cut out the decals. Make a smooth continuous cut all the way through the backing sheet. Cut out names and words as a block. Small knicks can cause the decal to tear as you peel it off the backing sheet
- C. Carefully peel off each decal (hold small decals with a pair of tweezers). Dip decals into a bowl of warm water containing a drop of dish wash detergent. Position the decal on the rocket. Use a tissue to gently press air bubbles out from under the decal. After all decals are positioned and have dried, spray the entire rocket with a coat of clear gloss.



## FLYING YOUR NIKE-SMOKE ROCKET

### WHAT ELSE YOU WILL NEED:

To successfully fly your rocket you will need the following items:

- QUEST Launch Pad (No. 7600)
- QUEST Launch Controller (No. 7500)
- QUEST Parachute Recovery Wadding (No. 7020)
- QUEST Rocket Motors, Type B6-4 C6-5
- Use a B6-4 Motor for your first flights.

### ESTIMATED ALTITUDES

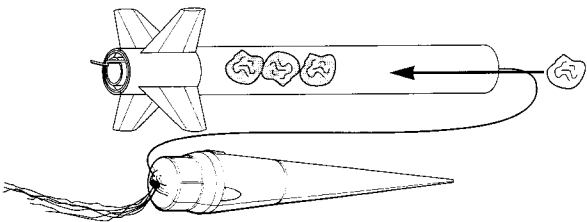
The following is a guide to assist you in determining which motor to use based on the wind conditions and size of flying field available.

MOTOR	ESTIMATED ALTITUDE
B6-4	250 FEET
C6-5	650 FEET

### PREPPING YOUR ROCKET FOR FLIGHT

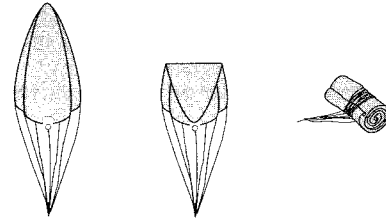
#### STEP 1

Pull the shock cord all the way out of the body tube. Crumple four sheets of recovery wadding and insert one by one into the body tube making sure that the Knot between the Kevlar and white elastic shock cord is on the nose cone side of the wadding. Wadding should fit loosely in the tube but tight enough to form a good seal against the wall of the body tube.



#### STEP 2

- A. Grab the parachute at its center and allow the rocket to hang from it. The weight of the rocket will pull the parachute into several triangular shapes.
- B. Gather the triangles together into one flat triangle.
- C. Fold the top of the parachute down over itself once.
- D. Now continue to roll the parachute over itself and roll the shroud lines around it.



#### STEP 3

- A. Pack the parachute into the body tube. **THE PARACHUTE MUST SLIDE EASILY INTO THE TUBE.** If it is a tight fit, remove and re-fold the parachute.  
**TIP:** LIGHTLY DUST YOUR PARACHUTE WITH TALCUM OR BABY POWDER TO KEEP IT FROM DEVELOPING A SET SHAPE. THIS TECHNIQUE IS ESPECIALLY EFFECTIVE IF THE WEATHER IS HOT AND HUMID OR VERY COLD.
- B. Push the shock cord into the tube and re-fit the nose cone onto the rocket. **BE CAREFUL NOT TO CATCH ANY OF THE SHOCK CORD BETWEEN THE SHOULDER OF THE NOSE CONE AND THE BODY TUBE.**

**READ AND FOLLOW THE ENCLOSED LAUNCHING PROCEDURES SHEET**

**READ AND FOLLOW THE N.A.R. SAFETY CODE DURING ALL YOUR MODEL ROCKETRY ACTIVITIES.**



#### IRONCLAD GUARANTEE

If for any reason, you are not totally satisfied with our product, QUEST will provide whatever you think is fair, from refund to replacement.



Manufactured by:  
QUEST AEROSPACE  
EDUCATION, INC.  
P.O. Box 42390  
Phoenix, AZ 85080-2390

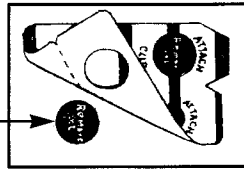
## LAUNCHING PROCEDURES

This sheet covers basic Launching Procedures for single stage model rockets with parachute or streamer recovery systems. Review your kit instructions for additional information about your model rocket. Specific details for launching multi-stage models, glider recovery vehicles or other different types of model rockets are featured in the instructions of specific kits.

### STEP 1

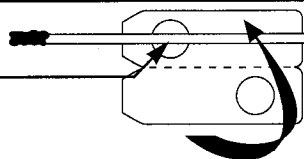
Remove TigerTail II sticker from backing sheet.

Leave "dots" behind on sheet.



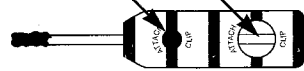
### STEP 2

Center the copper igniter wire over the hole.



Fold TigerTail II sticker over the igniter wire.

Be sure igniter wire is centered and visible through both holes.

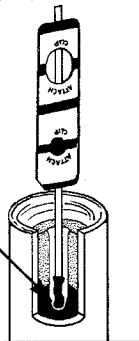


### STEP 3

Place black coated end of the igniter wire into motor nozzle as far as it will go.

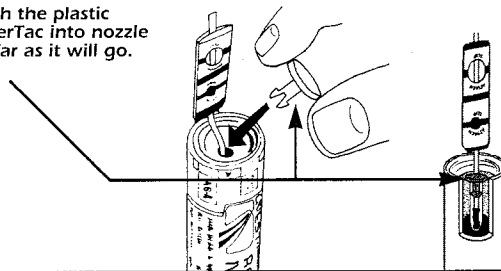
Black igniter tip **MUST TOUCH** the bottom of the nozzle or motor will not ignite.

("Disregard" any message on the motor label stating "Attach TigerTail Here", as this was for an earlier version of the TigerTail igniter.)



### STEP 4

Push the plastic TigerTac into nozzle as far as it will go.



### STEP 5

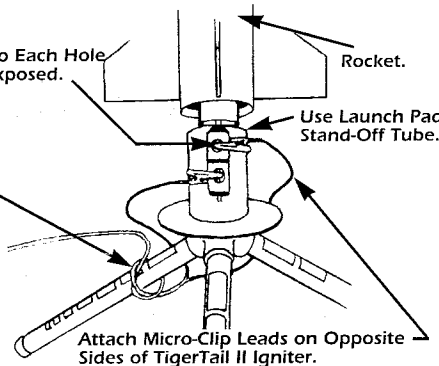
Attach One Micro-Clip Lead to Each Hole Where The Copper Wire is Exposed.

Tie Micro-Clip Leads to Launch Pad Leg.

Rocket.

Use Launch Pad Stand-Off Tube.

Attach Micro-Clip Leads on Opposite Sides of TigerTail II Igniter.



**IMPORTANT:** To Avoid a Potential Short Circuit and /or Misfire **DO NOT** Clamp Micro-Clips too Tightly to the TigerTail II Igniter

**NOTE:** If you are using a different brand rocket motor and the TigerTac does not fit into the nozzle, substitute the TigerTac with a 1" x 1" square of recovery wadding crumpled into a small ball and pushed into the motor nozzle with a pen or pencil tip to hold igniter wire in place.

**LAUNCH SITE SELECTION:** Select a large area away from tall trees, power lines and low flying aircraft. Parks, playgrounds, soccer and football fields make great launch sites. **DO NOT LAUNCH ROCKETS IN AREAS WITH BROWN GRASS, DRY WEEDS, OBSTRUCTIONS OR ANY HIGHLY FLAMMABLE MATERIALS.** The larger the launch site the easier it will be to recover your rocket. See the N.A.R. Safety Code for additional information.

**NOTE:** (For circular area, site dimension is the diameter in feet, for a rectangular area, it is the shortest side in feet.)

Motor Type	Installed Total Impulse (Newton-Seconds)	Minimum Site Dimensions (feet)
A	1.26 - 2.50	100
B	2.51 - 5.00	200
C	5.01 - 10.00	400

**LAUNCH PREPARATIONS:** (1) Parachute Recovery Wadding should be positioned between the rocket motor and the recovery system to prevent scorching of the parachute or streamer. The wadding should loosely fill the body tube for a depth of approximately two body tube diameters. Crumble the wadding loosely to get maximum bulk and a good seal against the wall of the body tube. See Recovery Wadding instructions for more information.

(2) Recheck the recovery system of your model to be sure it has been prepped and packed per its instructions. Your parachute or streamer should fit loosely inside the rocket's body tube so it can deploy easily. Lightly dust your parachute with baby or talcum powder to keep it from developing a set shape inside your rocket body tube. This technique is especially effective if the weather is hot and humid or is very cold.

(3) Check the nose cone fit to be sure it's snug, but not too tight. If it's too loose add a small piece of tape to the shoulder of the nose cone. If it's too tight lightly sand the shoulder of the nose cone and/or stretch the end of the body tube slightly by inserting the pointed end of the nose cone into the body tube and gently twist it back and forth a few times.

(4) To select the correct rocket motor consult the current Quest Catalog, product packaging or instruction sheet for recommended rocket motors to use in your model. Follow all igniter and rocket motor installation procedures.

(5) Install the TigerTail II Igniter into the rocket motor per the TigerTail II Igniter instructions.

(6) When placing the rocket motor into the easy-lock motor mount be sure the motor mount clip is securely positioned over the end of the rocket motor.

(7) Unwind the wire leads from your Launch Controller and place the controller the full length of the wire leads away from the launch pad (at least 15 feet). Be sure the launch controller is disarmed and is in good working condition. Micro-clips must be clean. **ATTACH THE CONTROLLER'S MICRO-CLIP LEADS TO THE LAUNCH PAD BY TYING THEM TO ONE OF THE LAUNCH PAD LEGS WITH A SINGLE OVER HAND KNOT.** Micro-clip lead wire should be pulled apart so each individual micro-clip lead is 6 inches to 8 inches long.

(8) **ALWAYS USE CAUTION WHEN BENDING OVER YOUR LAUNCH PAD TO AVOID EYE INJURY.** Remove the launch rod safety cap and lower the rocket onto the launch pad positioning it on the Launch Rod Stand-Off several inches above the blast deflector. The launch lug on the rocket's body tube should glide easily over the launch rod. Check to be sure there are no rough surfaces or obstructions on the launch rod which could hinder the lift-off of the model. For eye safety keep the tip of the launch rod covered with the Launch Rod Safety Cap until you are just ready to begin the countdown.

(9) Be sure the Safety Key is with you before hooking up the micro-clips to the TigerTail II Igniter. Attach one micro-clip lead to each hole in the TigerTail II Igniter where the copper wire is exposed. The micro-clips **MUST NOT** touch each other or the blast deflector. Use the Launch Rod Stand-Off, an empty motor casing or piece of tape wrapped around the launch rod to position the rocket several inches above the blast deflector to keep the micro-clips from touching it and shorting out. For best results bring one micro-clip lead around each side of the Launch Rod Stand-Off and hook up to TigerTail II Igniter.

**COUNT DOWN PROCEDURE:** (1) When your rocket is ready to launch be sure you and all spectators are standing at least 15 feet away from the launch pad. (2) Make sure the sky is clear of low flying aircraft. Wind conditions should be gentle. Be sure you have the attention of all individuals in the launching and recovery areas. (3) Arm your Launch Controller with the Safety Key. The arming light should go on. If arming light does not go on check battery power, electrical connections and igniter installation. Clean micro-clips with sand paper if necessary. (4) With rocket armed announce to the spectators in a loud voice, "the rocket is armed, and counting...5...4...3...2...1...Lift-Off!" (5) Push the launch button down momentarily until the rocket motor begins thrusting, then release it. The rocket should lift-off from the launch pad almost instantly. (6) **BE SURE AND REMOVE THE SAFETY KEY FROM THE LAUNCH CONTROLLER AS SOON AS THE ROCKET LIFTS-OFF. KEEP THE SAFETY KEY WITH YOU AT ALL TIMES.** (7) **REPLACE THE LAUNCH ROD SAFETY CAP IN BETWEEN LAUNCHINGS.**

**RECOVERY PROCEDURE:** (1) Track the flight of your rocket until the recovery system is deployed and the rocket is returning gently back to Earth. (2) If the rocket appears to be drifting away from the launch area keep your eyes on it until it touches down. (3) If the recovery system malfunctions be prepared to alert the spectators that the rocket is returning to Earth faster than normal and to be "heads-up" and aware of the area where the rocket is falling to.

**MISFIRE PROCEDURE:** (1) Occasionally, at the end of the countdown the rocket will fail to lift-off because the rocket motor did not ignite. This usually occurs because the igniter was not making the proper contact with the surface of the rocket motor's propellant. (2) Disarm the launch controller and wait one minute before approaching the launch pad. (3) If arming light glows, but motor does not ignite, try repositioning the micro-clips on the TigerTail II Igniter and repeat the countdown procedure. (4) If rocket motor still does not ignite, disarm the launch controller, wait one minute before approaching the pad, then remove the model from the launch pad. (5) Remove the TigerTail II Igniter from the motor nozzle, clean the micro-clips and install a new TigerTail II Igniter. (6) Repeat the countdown procedure again.

**BATTERY TEST:** If batteries are weak replace them. Battery strength can be tested by attaching both micro-clips together and inserting the Safety Key. The arming light should glow brightly. Batteries are weak if light is deem. **Be sure to use alkaline type batteries for best results.**



QUEST AEROSPACE (TM)  
A DIVISION OF MARVEL ENTERPRISES, INC.  
YUMA, AZ 85384 USA

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14" PARACHUTE  
ASSEMBLY  
INSTRUCTIONS

STEP 1

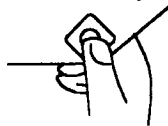
Remove the GRIPPER shroud line fasteners from the strip. Always handle GRIPPER by the edge so you don't touch the adhesive. Place the gripper on one of the six corners of the parachute as shown.

Handle on edge  
so you don't  
touch adhesive.



STEP 2

Firmly squeeze each GRIPPER and parachute material between your fingers.



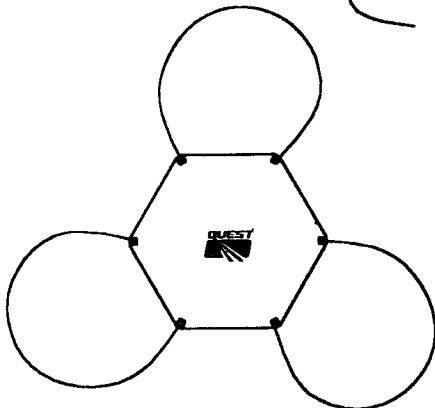
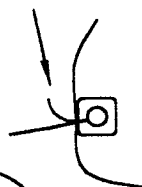
STEP 3

The shroud line is pre-cut into three equal lengths. Take one length of the shroud line, pass it through the hole in the GRIPPER and tie one end with two overhand knots. Tie the other end of the shroud line to the nearest GRIPPER. Repeat for remaining shroud lines.

Tie two Overhand knots



Tie knot here



3-28107-1000



# SCALE DATA

## NASA "NIKE—SMOKE" METEOROLOGICAL ROCKET

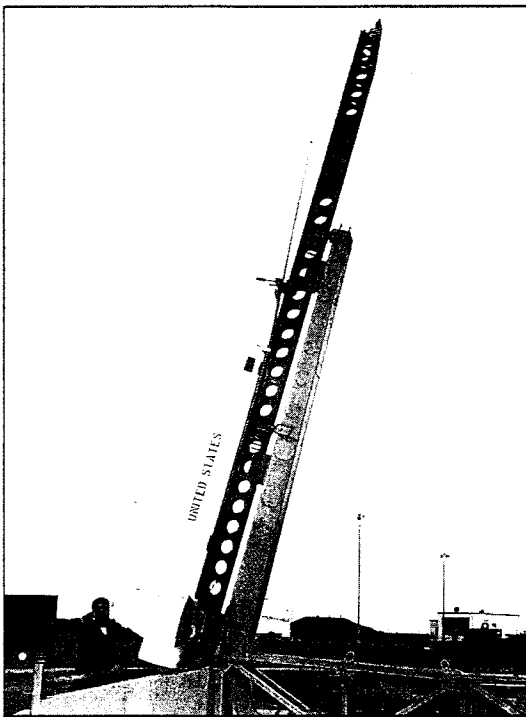
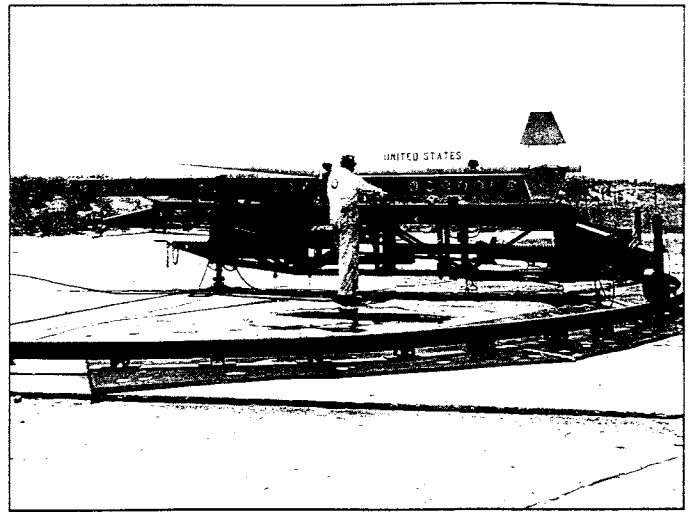
The Nike-Smoke sounding rocket is a single-stage solid-propellant sounding rocket (rocketsonde) that was developed by NASA in 1963 as an inexpensive vehicle to determine wind velocities up to an altitude of 75,000 feet. Costs were kept low by using a surplus Thiokol Nike-Ajax M-5 (X216A2) solid propellant booster. Thousands of these had been made to boost the U.S. Army's Nike anti-aircraft missiles in the 1950's. (Nike-Ajax was the ancestor of the Patriot missile.)

The payload was approximately 10 gallons (144 pounds) of titanium tetrachloride (TiCl<sub>4</sub>) contained in a tank inside a 10-degree conical nose cone fabricated of Type 341 stainless steel. Ram air pressure from an inlet port at the nose tip pressurized the titanium tetrachloride tank, ejecting the chemical into the air during flight from an orifice on the side of the cone.

Upon reaction with the moisture in the atmosphere, chlorides were formed which combined with the water vapor to form droplets of hydrochloric acid (HCl). This produced a persistent and reflective white trail which was photographed by two cameras approximately 10 miles from the launch site and 90 degrees apart in azimuth. Wind profiles were obtained by photographic triangulation techniques using time-lapse photographs.

Nike-Smoke was launched from a standard Nike-Ajax anti-aircraft missile launcher at an angle of 80 degrees from the horizontal (20 degrees from the vertical). No attempt was made to recover the vehicle which was allowed to impact in the ocean.

During the 1960 decade, 70 Nike-Smoke rockets were launched from NASA Wallops Station, Virginia and 55 were launched from Cape Canaveral, Florida. The Nike-Smoke proved to be an inexpensive and reliable method of determining upper wind profiles.



### Weights:

Gross takeoff weight: 1560.7 pounds

Propellant weight: 764 pounds

Burnout weight: 796.7 pounds

M-5 Nike booster empty weight: 431 pounds

Fins: 69.2 pounds

Nose cone assembly: 152.5 pounds

### Performance

Thrust: 48,700 pounds (216,715 newtons)

Burnout time: 3.5 seconds

Burnout altitude: 6,294 feet

Burnout acceleration: 47.2 g

Launch angle: 80 degrees

Apogee altitude: 75,200 feet

Apogee time: 65 seconds

Splash-down time: 147 seconds

Splash-down range: 56,500 feet

All Nike-Smoke rockets launched from NASA Wallops Station, Virginia were painted in standard NASA Wallops colors:

Body: Flat white

Three fins: Fluorescent red

Remaining fin: Fluorescent yellow

Lettering and nose tip: Flat black

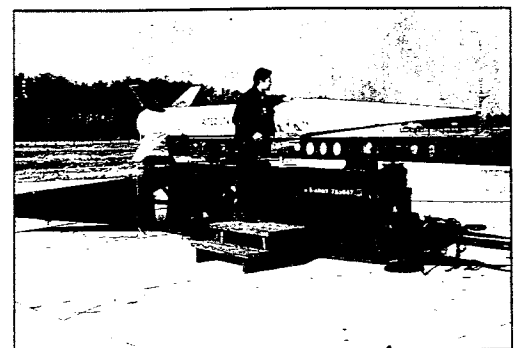
One Nike-Smoke launched at NASA Wallops Station, perhaps a prototype, had a silver nose cone.

(Nike-Smoke scale data and photographs from the archives of G. Harry Stine.)

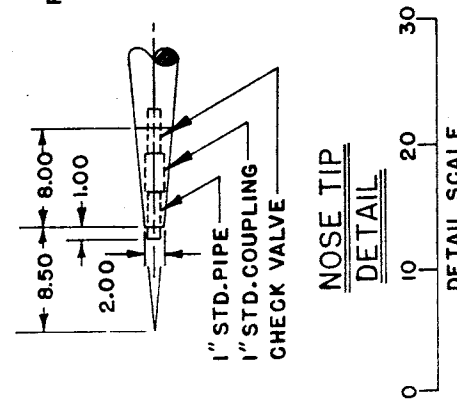
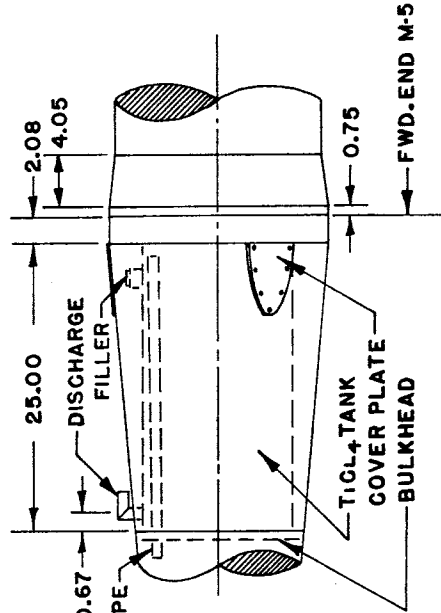
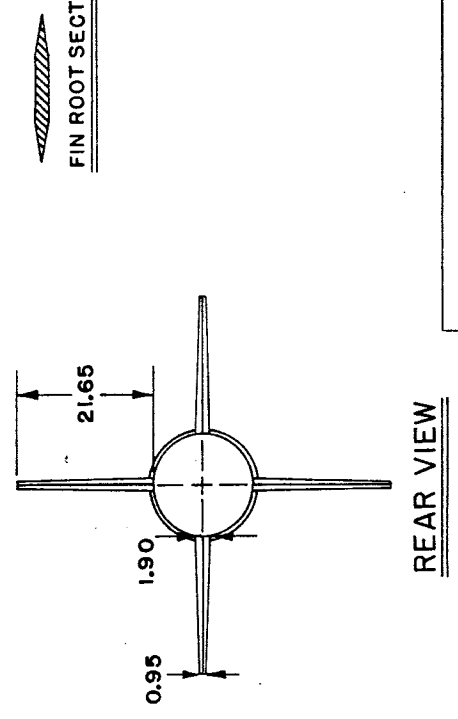
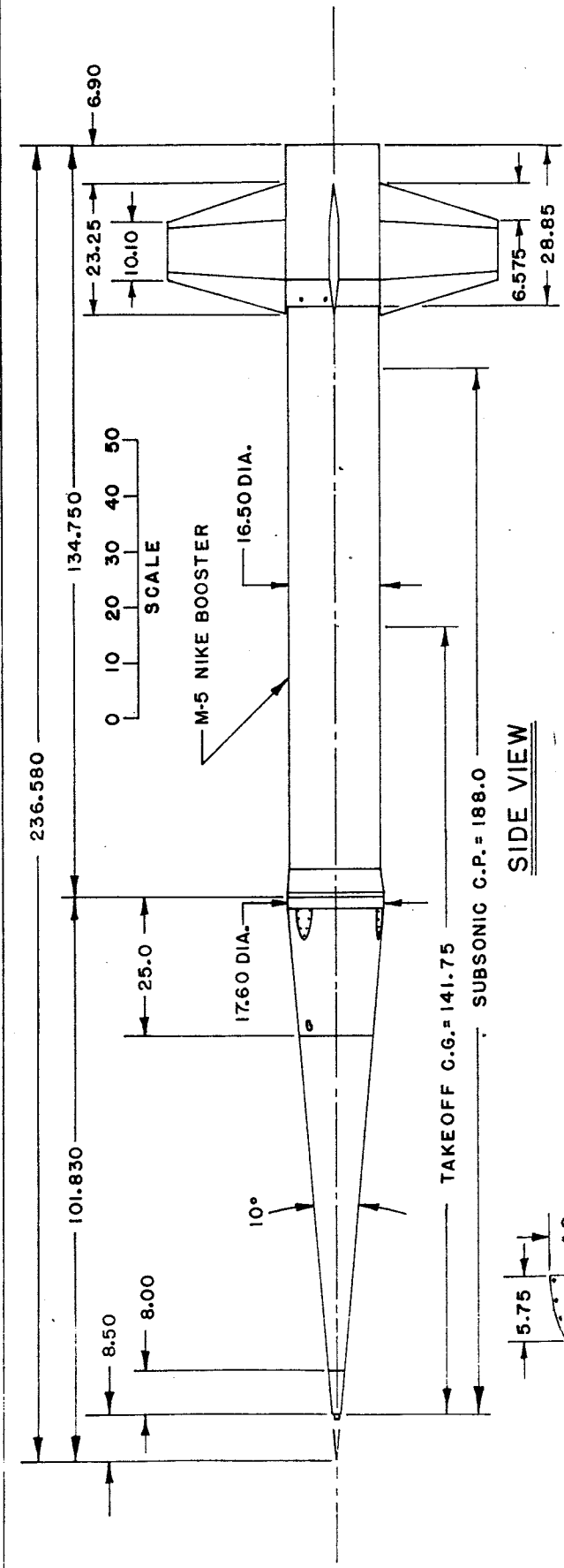
### EXPERIMENTS WITH THE QUEST NIKE—SMOKE

The QUEST Nike-Smoke scale model can be used to compare computer analyses of flight trajectories against measured flight performance of the scale model because NASA data indicates a drag coefficient (Cd) of 0.45 during thrusting and 0.85 during coasting flight. The subsonic center of pressure of the full-size Nike-Smoke rocketsonde was calculated by NASA at 192.00 inches behind the nose tip.

(**WARNING:** Do not attempt to duplicate scale operation by using titanium tetrachloride in your QUEST Nike-Smoke scale model. The chemical is toxic and the model won't carry enough of it.)







NASA  
**NIKE-SMOKE**  
DRAWN BY G. HARRY STINE 8 FEB. 1967

UNITED STATES  
UNITED STATES

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