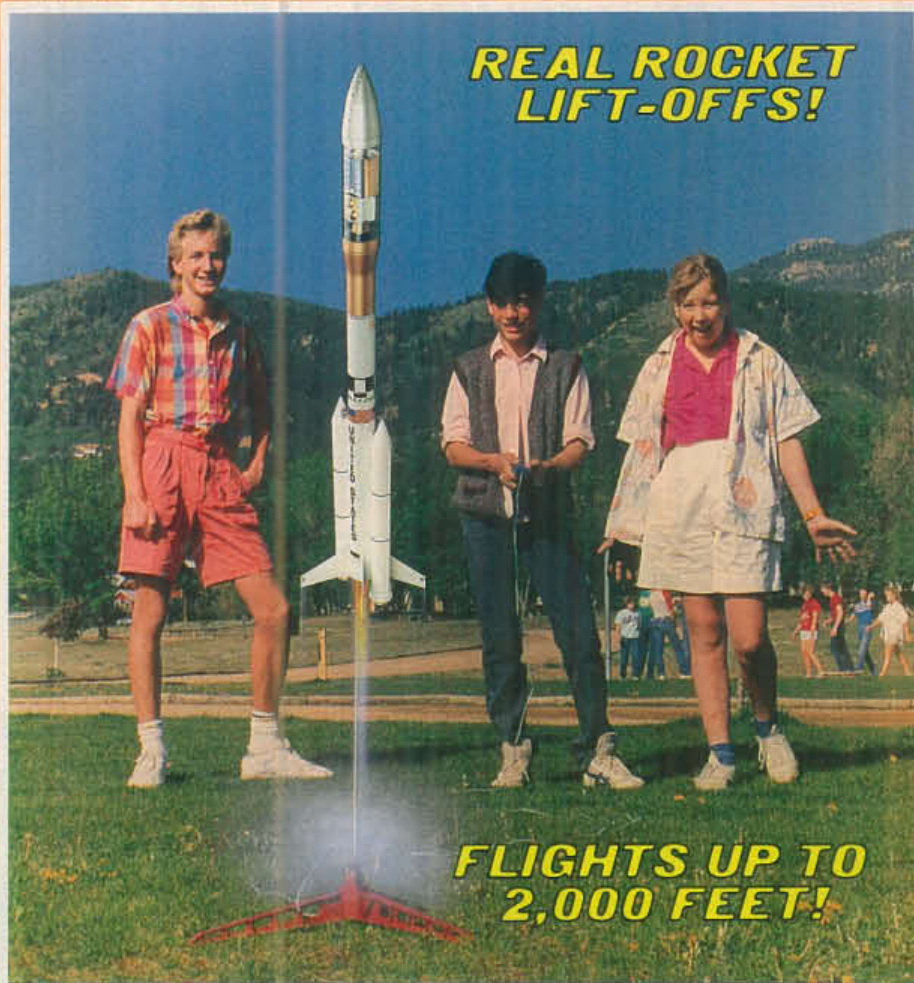


FLYING
**MODEL
ROCKET**
CATALOG



A DAVENPORT COMPANY



**REAL ROCKET
LIFT-OFFS!**

**FLIGHTS UP TO
2,000 FEET!**



**ALPHA III
FLYING MODEL
ROCKETRY STARTER SET**

SKILL LEVEL 1 Recommended for the Beginning Modeler. Includes easy-to-build Alpha III model rocket kit. Colored Parts - no painting required! Also includes Porta-Pad tripod launcher with blast deflector plate and 1/8" x 36" two-piece launch rod, assembled Electron Beam Launch Controller and Flight Pak including three NAR certified model rocket engines, recovery wadding and Igniters. (Requires 4 alkaline AA batteries, glue and finishing supplies-Not Included.)

Ship. Wt. 3 lbs.

ENGINES: 1/2A6-2, A8-3 (1st Flt.), A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.

No. 1406



**SKILL
LEVEL 1
STARTER
SET**

**THE
PLACE
TO
START!**

**NOW WITH
ASSEMBLED
ELECTRON
BEAM™
LAUNCH
CONTROLLER**



**FULL ONE YEAR
WARRANTY**



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

This warranty does not cover incidental or consequential damage to persons or property caused by the use, abuse, misuse, fail-

ure to comply with operating instructions or improper storage of the warranted product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

For repair or replacement under this warranty, please return the defective part of your Estes product with proof of purchase to: **Estes Industries, Customer Service Department, Penrose, Colorado 81240**

MODEL ROCKET FLIGHT SEQUENCE



4 MODEL REACHES PEAK ALTITUDE AND EJECTION CHARGE ACTIVATES RECOVERY SYSTEM

5 RECOVERY PARACHUTE IS DEPLOYED

3 MODEL STRIKES SKYWARD TO PEAK ALTITUDE DURING COAST PHASE

1 ROCKET IGNITION AND LIFT-OFF FROM ELECTRICALLY OPERATED LAUNCH SYSTEM

2 HIGH THRUST AND ACCELERATION FOR POWERED FLIGHT

6 TOUCHDOWN & SAFE RECOVERY

7 READY TO BLAST-OFF AGAIN!

IMPORTANT-CAUTION

The Lunar Launch Pad is Recommended For Rockets No More Than 16 Inches Long, or For Rockets With Body Tubes No Larger Than One Inch in Diameter. Rockets Should Weigh No More Than 1.5 Ounces Without Engines. Rockets Should Use Mini or Regular Size Engines Only, Not "D". The Lunar Launch Pad Should Be Used in Moderate (0-5mph) Breeze Conditions Only.

NEW



SKILL LEVEL 1 STARTER SET

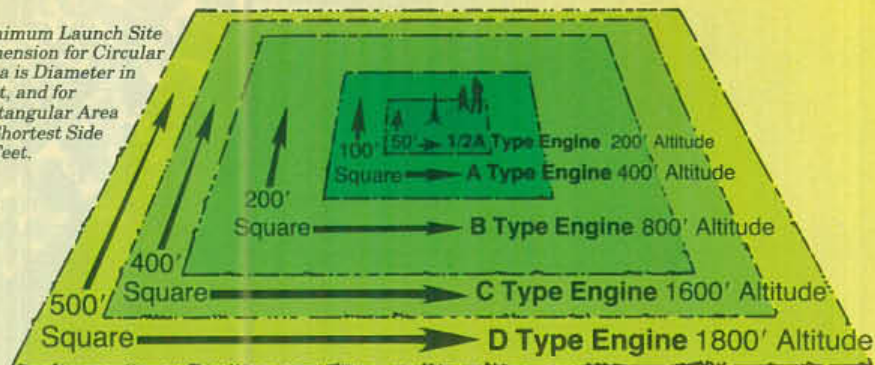
SCREAMING EAGLE FLYING MODEL ROCKETRY STARTER SET

SKILL LEVEL 1 Easy and fun. This complete set includes the Screaming Eagle model rocket with red nose cone, white body, and blue fin unit. No painting required. Flights over 1200 feet are possible and a 12" parachute provides gentle landings. Also featured in the set, the Lunar Launch Pad with blast deflector and 1/2" launch rod, and the Electron Beam™ Launch Controller with continuity light, safety key, 18 feet of cord with micro-clips, and a launch button. Plus three rocket engines, igniters and recovery wadding. Launch controller is unassembled. (Requires 4 AA size alkaline batteries, plastic cement and glue-Not Included.) Ship Weight: 1 lb. ENGINES: 1/2A6-2, A8-3 (1st Flt.), A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7. No. 1417



RECOMMENDED LAUNCH AREA:

Minimum Launch Site Dimension for Circular Area is Diameter in Feet, and for Rectangular Area is Shortest Side in Feet.



Choose a large field away from power lines, tall trees, and low-flying aircraft. The larger the launch area, the better your chance of recovering your rocket. Football fields, parks, and playgrounds are great. This diagram shows the smallest recommended launch areas. **MAKE SURE THE LAUNCH AREA IS FREE OF OBSTRUCTIONS, DRY WEEDS, BROWN GRASS, OR HIGHLY FLAMMABLE MATERIALS.**

BE SURE TO VISIT THE ESTES FLYING MODEL ROCKET DEPARTMENT AT YOUR LOCAL TOY AND HOBBY STORE



**MODEL ROCKET STARTER SETS—
EVERYTHING YOU NEED TO GET STARTED**

**MODEL ROCKET KITS—
EVERY SIZE AND VARIETY. SKILL LEVELS,
RECOMMENDED ENGINES, AND OTHER
INFORMATION LISTED ON THE FRONT OF
PACKAGES**

**MODEL ROCKET ENGINES, IGNITERS,
AND RECOVERY WADDING—
RELIABLE LAUNCH AND RECOVERY
SUPPLIES FOR ALL YOUR MODEL ROCKET
FUN!**

DELUXE

FLYING MODEL ROCKETRY STARTER SET

SKILL LEVEL 1 Recommended for the Beginning Modeler. Complete with everything you need including Alpha model rocket kit, construction supplies, finishing materials, Porta-Pad Launch Pad with blast deflector plate and two-piece 1/8" x 36" launch rod, assembled Electron Beam Launch Controller, and Flight Pak with 3 high performance NAR certified model rocket engines, igniters and recovery wadding. (Requires 4 alkaline AA batteries for operation - Not Included). Ship. Wt. 3 lbs.

ENGINES: 1/2A6-2, A8-3 (1st Flt.), A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7

No. 1407



**Assembled
ELECTRON BEAM™
Launch Controller
Included!**



MODEL ROCKET ENGINES

A Letter indicates total impulse or total power produced by the engine. Each succeeding "letter" has twice the power of the previous letter. (Example: "B" engines have twice the power of "A" engines, etc.)

8 Number shows the engine's average thrust in Newtons or the average push exerted by the engine. (4.45 Newtons = 1 lb.)

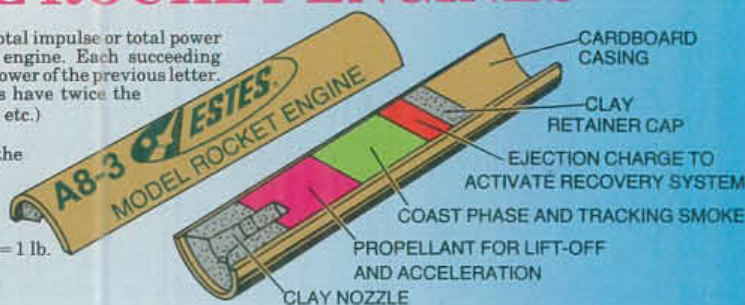
Average thrust = Newton-seconds divided by thrust duration.

3 Number of seconds between the end of thrusting and the ejection charge.

The design and development of the Estes model rocket engine was the real beginning of the safe, educational and fun activity model rocketry has become.

Twenty-nine years of Estes engineering has produced today's safety-proven model rocket engine. The pre-manufactured, solid-propellant engine provides thrust for lift-off and acceleration to high altitude, allows for a timed delay period to reach peak altitude while providing a smoke trail for easy tracking, and supplies ejection power for the recovery system to bring your rocket safely back to Earth.

Manufactured under strict, quality-controlled conditions within exacting tolerance limits, (More than 3% of all Estes engines are static-tested.) Estes engines comply with the codes of the National Fire Protection Association and are certified by the National Association of Rocketry.

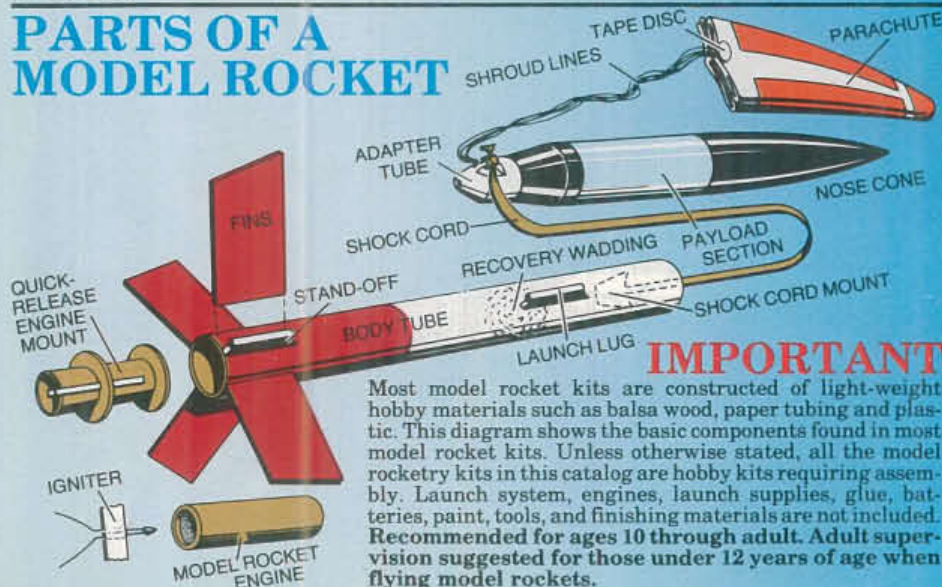


Estes model rocket engines have been proven consistent and reliable in more than 275,000,000 launchings.



Unless otherwise specified, all model rocket kits in this catalog use only one of the three sizes of engines shown here. Kits with recommended engines ending with the letter "T" use only mini-engines. Kits where "D" engines are recommended use only the larger "D" size. All other kits use the regular size engines.

PARTS OF A MODEL ROCKET



IMPORTANT

Most model rocket kits are constructed of light-weight hobby materials such as balsa wood, paper tubing and plastic. This diagram shows the basic components found in most model rocket kits. Unless otherwise stated, all the model rocketry kits in this catalog are hobby kits requiring assembly. Launch system, engines, launch supplies, glue, batteries, paint, tools, and finishing materials are not included. Recommended for ages 10 through adult. Adult supervision suggested for those under 12 years of age when flying model rockets.

SKILL LEVEL 1
STARTER

SIZZLER FLYING MODEL ROCKETRY STARTER SET

SKILL LEVEL 1 Recommended for the Beginning Modeler. Includes the 23 inch long Sizzler model rocket kit featuring parachute recovery and flights over 900 feet. Also included are the assembled Electron Beam Launch Controller and Porta-Pad Launch Pad with blast deflector plate, and 1/8" x 36" launch rod. Legs remove easily for compact storage. Flight Pak includes three NAR certified model rocket engines, recovery wadding and igniters. (Requires 4 AA alkaline batteries, glue and finishing supplies. Not Included.) Ship. Wt.: 2 lbs.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.
No. 1432



Includes State-of-the Art Launch Control Technology with Estes' ELECTRON BEAM™ Launch Controller.

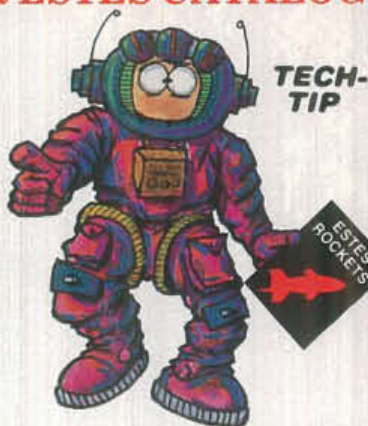
HERE'S HOW TO USE YOUR ESTES CATALOG

Information for each rocket kit is provided on the page where the rocket is displayed. This information includes:

- Skill Level number recommends the modeling skill and experience necessary for a rocketeer to successfully construct the kit. Skill Level 1 kits are suggested for beginners, Skill Level 2 kits for experienced rocketeers, Skill Level 3 kits for advanced modelers and Skill Level 4 kits are recommended for the master modeler.
- Kit Name
- Special features and additional kit information including length, diameter and weight.
- Engines lists all recommended engines to fly the rocket. Engines are listed from least to most powerful. (1st Flt.) indicates which engine should be used to become familiar with your rocket's flight profile.
- Product number for kit which should always be used when ordering.
- Price of the kit (or see Price List.) **All prices in this catalog are subject to change without notice.**
- Average Shipping Weight for kits.

Kit Feature Symbols indicate the following kit features:

- | | |
|--|--|
|  Parachute & Size |  Plastic Nose Cone |
|  Streamer Recovery |  Balsa Nose Cone |
|  Die-Cut Balsa Fins or Paper Parts |  Plastic Fins or Fin-Unit |
| |  Kit Decals |
| |  Quick-Release Engine Mount |



Also, be sure to read your catalog thoroughly to find my Tech Tips. These tips will enable you to receive greater enjoyment in all your model rocketry activities. Keep 'em flying!

Model Rocketry Is An Internationally Recognized Hobby With A Safety Record Of More Than 275 Million Successful Model Rocket Launchings.

Estes Model Rocket Engines Are NAR Certified.*

*Engines tested by the National Association of Rocketry met performance standards of NFPA 1122 and the NAR.

Estes Model Rocket Engines Have Been Tested And Approved By:

- United States Department of Transportation
- Truesdail Laboratories, Inc.
- Canadian Department of Energy, Mines, and Resources
- Government of West Germany

Estes Model Rocketry Products Meet The Standards And Requirements Established By:

- National Fire Protection Association
- U.S. Consumer Product Safety Commission
- U.S. Food & Drug Administration
- U.S. Department of Transportation
- Federal Aviation Administration
- U.S. Postal Service
- United Parcel Service
- American Insurance Association
- International Air Transport Association
- Inter-Governmental Maritime Consultative Organization
- Air Line Pilots Association

Model Rocketry Is Endorsed As A Safe And Rewarding Hobby By:

- Cub Scouts of America
- Boy Scouts of America

- YMCA's
- National 4-H Clubs
- Civil Air Patrol
- NASA
- United States Air Force
- U.S.A.F.-J.R.O.T.C. Programs
- 15,000 Elementary, Jr. High, and High Schools
- Major Colleges and Universities
- Hundreds of Camp and Recreation Programs
- Hobby Industry of America



DISCOVERY FLYING MODEL ROCKETRY STARTER SET

SKILL LEVEL 1 Recommended for the Beginning Modeler. Our most complete outfit ever. Over 2 feet tall, the Discovery launch vehicle features bright yellow plastic nose cone and fin unit, white body tube, two-color wrap-on decal and 12" parachute. Requires only minor assembly and no painting. Hitch-Hiker styrofoam glider is completely decorated and ready-to-fly. The Hitch-Hiker is carried aloft by the Discovery during lift-off and powered flight. Glider is then jettisoned from rocket at apogee for its glide back to Earth while rocket returns via parachute recovery. Also included is the new Electron Beam™ assembled Launch Controller, Porta-Pad Launch Pad with blast deflector plate, three high performance model rocket engines, rocket igniters and recovery wadding. *Requires white glue, plastic cement and 4 AA size Alkaline batteries for operation - Not Included.*

ENGINES: B6-4 (1st Flt.), B8-5, C6-5
No. 1440



SKILL LEVEL 1

Recommended for the Beginning Modeler.

COURIER

SKILL LEVEL 1 Single Stage Performance. Scale-like appearance of two-stage sounding rocket. Flights over 1100 feet. Length: 12.13" Dia. 0.736" Wt. 0.53 oz.

ENGINES: 1/2A6-2, A8-5 (1st Flt.), B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.

No. 1911



YANKEE

SKILL LEVEL 1 Easy-to-build, yet performance that will rival any rocket. Capable of flights over 2,000 feet with 30" long streamer recovery. Length: 11" Dia. 0.736"

Wt. 0.42 oz.

ENGINES: 1/2A6-2, A8-3, A8-5 (1st Flt.), B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.

No. 1381



PULSAR

SKILL LEVEL 1 Excellent first choice for beginners uses low-cost mini-engines. Easy-to-assemble, Pulsar delivers super performance flights and returns to Earth via break-apart recovery. Can be flown over and over again. Length: 9" Dia. 0.544" Wt. 0.25 oz.

ENGINES: 1/2A3-2T(1st Flt.), A3-4T, A10-3T

No. 0870



MOSQUITO

SKILL LEVEL 1 The smallest of all Mini-Brutes combines fantastic performance with feather-weight recovery. Balsa and paper construction with simple spray paint decor makes for quick-and-easy assembly. Length: 3.9" Dia. 0.541" Wt. 0.1 oz.

ENGINES: 1/2A3-4T (1st Flt.), A10-3T

No. 0801



ZINGER

SKILL LEVEL 1 This sporty little flier with 18" streamer recovery will reach "awesome" altitudes up to 2000 feet. Length: 10.25" Dia. 0.736" Wt. 0.3 oz.

ENGINES: A8-5(1st Flt.), B4-6, B6-6, C6-7.

No. 1917



Engines, launch system, glue, and finishing supplies not included. Avg. Ship. Wt. 6 oz.



SKILL LEVEL 1

SKILL LEVEL 1

Recommended for the Beginning Modeler.

STREAK

SKILL LEVEL 1 Lightweight, wind-cheating design (1/8 oz. without engine). Great for contests and records. Features simple feather-weight recovery. Length: 5.6" Dia. 0.720" Wt. 0.1 oz.

ENGINES: A8-5(1st Flt.), B4-6, B6-6, C6-7.

No. 1204



STAR DART

SKILL LEVEL 1 High performance, mini-engine powered sport rocket. Flies over 1,000 feet and returns via streamer recovery. Very easy-to-assemble. Length 8.4" Dia. 0.541" Wt. 0.225 oz.

ENGINES: 1/2A3-2T (1st Flt.), 1/2A3-4T,

A3-4T, A10-3T

No. 0860



VECTOR

SKILL LEVEL 1 Features fast assembly, economical mini-engine power, break-apart recovery, and flight-after-flight fun. Length: 7.75" Dia. 0.544" Wt. 0.25 oz.

ENGINES: 1/2A3-2T(1st Flt.), A3-4T, A10-3T

No. 0871



SPARROW

SKILL LEVEL 1 Fun to build and fun to fly, this racy little bird features mini-engine power, fiber fins, three-color decal and break-apart recovery. Length: 10.75" Dia. 0.541" Wt. 0.39 oz.

ENGINES: 1/2A3-2T (1st. Flt.), A3-4T,

A10-3T.

No. 0872



PHASER

SKILL LEVEL 1 Out-of-sight flights! Nearly one foot tall, this high-performance sport model with elliptical fins flies over 1200 feet with a "C" engine. Recovery is easy with a bright 18" streamer. Length: 11.5" Dia. 0.736" Wt. 0.41 oz.

ENGINES: A8-5 (1st Flt.), B4-6, B6-6, B8-5,

C6-5, C6-7.

No. 1984



Engines, launch system, glue and finishing supplies not included. Avg. Ship. Wt. 8 oz.



SKILL LEVEL 1

Recommended for the Beginning Modeler.

COUGAR

SKILL LEVEL 1 High performance, sleek sport flier can attain altitudes over 1000 feet. Length: 17.5" Dia. 0.976" Wt. 1.06 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5

No. 1923



LASER

SKILL LEVEL 1 Super flier featuring fast assembly and high-tech appearance reaches altitudes of 1000 feet and returns safely via streamer recovery. Length: 12.25" Dia. 0.736" Wt. 0.79 oz.

ENGINES: 1/2A6-2(1st Flt.), A8-3, B4-4, B6-4, C6-5

No. 1938



SKINNY MINI

SKILL LEVEL 1 Long and lean, this mini-engine sport flier is almost 2½ feet tall. A 30" streamer provides gentle descents for flights over 700 feet. Length: 29.4" Dia. 0.541" Wt. 0.53 oz.

ENGINES: 1/2A3-2T (1st Flt.), 1/2A3-4T, A3-4T, A10-3T.

No. 0880



WIZARD

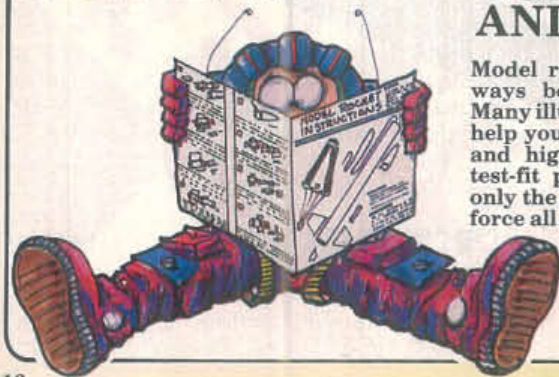
SKILL LEVEL 1 Simple and quick-to-assemble. One of the highest performing vehicles in Estes' fleet with its 1,600 foot altitude capability and huge 30" streamer recovery system that makes it easy-to-track. Length: 12" Dia. 0.736" Wt. 0.79 oz.

ENGINES: 1/2A6-2, A8-3 (1st Flt.), A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.

No. 1292



TECH-TIP #1



CONSTRUCTION AND FINISHING

Model rocket kit instructions should always be read and followed carefully. Many illustrations and tips are included to help you build a more attractive, durable and higher-flying rocket. Measure and test-fit parts before applying glue. Use only the type of glue recommended. Reinforce all glue joints. Apply several coats of sanding sealer to fill balsa wood pores, sanding each layer till it is smooth. Spray on two or three light coats of paint for a smooth, even finish on your rocket.



Engines, launch system, glue and finishing supplies not included.
Avg. Ship. Wt. 9 oz.

SKILL LEVEL 1

Recommended for the Beginning Modeler.

ECLIPSE

SKILL LEVEL 1 Reach altitudes over 600 feet with this great Mini-Brute sport flier. Very high performance design. Length: 12.1" Dia. 0.736" Wt. 0.51 oz.

ENGINES: 1/2A3-2T (1st Flt.), 1/2A3-4T, A3-4T, A10-3T
No. 0846



LONG SHOT

SKILL LEVEL 1 Almost 3½ feet tall, this easy-to-build rocket delivers exciting lift-offs to altitudes over 800 feet and descends via 12" parachute. Quality performance flight after flight. Length: 40.75" Dia. 0.976" Wt. 1.9 oz.

ENGINES: A8-3, B4-2, B4-4 (1st Flt.), B6-4, B8-5, C5-3, C6-3, C6-5.
No. 1980



ASTRO

SKILL LEVEL 1 Over 1 foot tall, this super flier can reach 1000 feet. With fast assembly and streamer recovery, Astro is fun-to-fly over and over. Length: 12.75" Dia. 0.736" Wt. 0.79 oz.

ENGINES: 1/2A6-2(1st Flt.), A8-3, B4-4, B6-4, C6-5
No. 1937



NINJA

SKILL LEVEL 1 Dark and sleek, this model speeds to heights of 800 feet and lands gently via brightly colored streamer. Length: 10.563" Dia. 0.736" Wt. 0.56 oz.

ENGINES: 1/2A3-2T (1st Flt.), A3-4T, A10-3T
No. 0882



Engines, launch system, glue and finishing supplies not included. Avg. Ship. Wt. 10 oz.



SKILL LEVEL 1

Recommended for the Beginning Modeler.

SKY HOOK

SKILL LEVEL 1 An excellent kit for your second rocket. Easy-to-build with terrific performance flight-after-flight. Length: 12" Dia. 0.765" Wt. 0.7 oz.

ENGINES: 1/2A6-2 (1st Flt.), A8-3, A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.

No. 1208



ECHO

SKILL LEVEL 1 Forward-swept, elliptical fins lend futuristic appearance to this high-performance sport model. Flights over 1000 feet with a "C" engine and recovery via streamer. Length: 10.5" Dia. 0.736" Wt. 0.47 oz.

ENGINES: A8-5 (1st Flt.), B4-4, B6-4, B8-5, C6-5, C6-7

No. 1950



MAVERICK

SKILL LEVEL 1 This sleek sport performer features streamer recovery and flights over 1000 feet. Easy-to-build and fun-to-fly. Length: 16.5" Dia. 0.976" Wt. 1.13 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5

No. 1904



TRANSTAR CARRIER

SKILL LEVEL 1 Interstellar taxis may resemble this futuristic commercial starship with optional payload bay. On Earth this model rocket can be used to fly small payloads to altitudes over 750 feet. At apogee a 12" parachute is ejected for reliable recoveries time after time. Length: 19.25" Dia. 1.325" Wt. 1.9 oz.

ENGINES: A8-3, (1st Flt.), B4-2, B4-4, B6-2, B6-4, B8-5, C5-3, C6-3, C6-5.

No. 1982



Engines, launch system, glue and finishing supplies not included. Avg. Ship. Wt. 10 oz.



SKILL LEVEL 1

SKILL LEVEL 1

Recommended for the Beginning Modeler.

SUNBIRD

SKILL LEVEL 1 High performance sport model with sunny yellow paint scheme and red sunbird decal will reach altitudes up to 1200 feet. Length: 13" Dia. 0.736" Wt. 0.64 oz.

ENGINES: 1/2A6-2, A8-3(1st Flt.), B4-4, B6-4, B8-5, C6-3, C6-5,
No.1936



MINI MEAN MACHINE

SKILL LEVEL 1 Mini-powered version of our huge Mean Machine kit. Over 38 inches long and capable of flights over 700 feet. Length: 38.5" Dia. 0.736" Wt. 1.06 oz.

ENGINES: 1/2A3-2T(1st Flt.), A10-3T.
No. 0865



SIZZLER

SKILL LEVEL 1 High performance design for flights over 900 feet. A long bird that's great for demonstrations. Length: 23.5" Dia. 0.976" Wt. 1.41 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5
No. 1906



ALPHA

SKILL LEVEL 1 The ideal kit for your first or second rocket. Swept-fin design makes it a really great performer. Features plastic nose cone and balsa fins. Length: 12.25" Dia. 0.976" Wt. 0.8 oz.

ENGINES: 1/2A6-2, A8-3 (1st Flt.), A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.
No. 1225



ROCKET RECOVERY

TECH-TIP #2



In parachute and streamer models, loosely crumple the recommended amount (about 2½ times the body tube dia.) of flame-resistant recovery wadding in your rocket's body tube to protect the recovery system from the engine's hot gases.

Lightly dust parachutes with talcum powder to prevent sticking. Fold parachutes to form a spike, fold again, and wrap loosely with shroud lines. Fold streamers in half, then roll up. Place parachute or streamer in body tube above wadding. Put nose cone and coiled shock cord into body tube. Wadding, parachute or streamer, and nose cone must not fit tightly. The engine's ejection charge must deploy the recovery system to return your model safely.



*Engines, launch system,
glue, and finishing
supplies not included.
Avg. Ship. Wt. 10 oz.*

SKILL LEVEL 1

Recommended for the Beginning Modeler.

D.A.R.T.

SKILL LEVEL 1 Looks like a high-speed tracker for data acquisition and reconnaissance. Easy to build, fun to fly. Flights to 800 feet with a "C" engine are possible. A 12" parachute provides reliable recovery. Length: 16" Dia.: 1.637" Wt. 1.76 oz.

ENGINES: A8-3 (1st Flt.), B4-2, B4-4, B6-2, B6-4, B8-5, C5-3, C6-3, C6-5.

No. 1981



MARAUDER

SKILL LEVEL 1 Easy-to-build sport flier with large payload section. Flies cargo experiments to over 750 feet. Length: 20.4" Body Dia. 1.325" Payload Dia. 1.637" Wt. 2.3 oz.

ENGINES: B4-4 (1st Flt.), B6-4, B8-5, C6-5

No. 1922



COMET

SKILL LEVEL 1 High performance sport flier over 2 feet long. Quick and easy-to-assemble. Delivers great flights over 1,200 feet. Length: 24.25" Dia. 1.325" Wt. 1.8 oz.

ENGINES: A8-3(1st Flt), B4-4, B6-4, B8-5, C6-5, C6-7

No. 1368



BLAZER

SKILL LEVEL 1 Excellent beginner's model features die-cut fiber fins, red decal, streamer recovery and 1000 foot flights with a "C" engine. No painting required! Length: 12.75" Dia. 0.736" Wt. 0.71 oz.

ENGINES: A8-3 (1st Flt.), A8-5, B4-4, B6-4, B8-5, C6-5, C6-7.

No. 1956



*Engines, launch system, glue, and finishing supplies not included.
Avg. Ship. Wt. 10 oz.*



SKILL LEVEL 1

Recommended for the Beginning Modeler.

ALPHA III

SKILL LEVEL 1 Another great first or second kit. Plastic nose cone and fin assembly make for easy, quick assembly. This rocket will deliver outstanding performance flight-after-flight. Length 12.25" Dia. 0.976" Wt. 1.2 oz.

ENGINES: 1/2A6-2, A8-3 (1st Flt.), A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.

No. 1256



MIGHTY MOE

SKILL LEVEL 1 Sleek appearance, and delta-shaped fins enable this mighty flier to achieve altitudes of 1000 feet or more. Safe returns via streamer recovery. Length: 13" Dia. 0.736" Wt. 0.44 oz.

ENGINES: A8-5 (1st Flt.), B4-6, B6-6, B8-5, C6-5, C6-7.

No. 1951



BIG BERTHA

SKILL LEVEL 1 Big and burly with dramatic lift-offs, awesome flights, and huge 18" parachute recovery, this two foot tall model is everyone's favorite. Newly updated with new decor, gigantic decal and die-cut fins.

Length: 24" Dia. 1.637" Wt. 2.2 oz.

ENGINES: A8-3, B4-2, B4-4, B6-2 (1st Flt.), B6-4, B8-5, C6-5.

No. 1948



VIKING

SKILL LEVEL 1 Great first or second model can be built with 3, 4, or 5 die-cut fiber fins. You decide! Easy-to-build, no painting required and flights to 1000 feet! Length: 12.125" Dia. 0.736" Wt. 0.71 oz.

ENGINES: A8-3 (1st Flt.), A8-5, B4-4, B6-4, B8-5, C6-5, C6-7.

No. 1949



SCOUT II

SKILL LEVEL 1 Updated version of Estes' first model rocket. Originally developed in 1959, Scout teaches elementary balance and design principles. Pre-cut fins, balsa nose cone, kit decal, out-of-sight flights and tumble recovery make this model more fun to build and fly than ever. Length: 7" Dia. 0.765" Wt. 0.3 oz.

ENGINES: 1/2A6-2 (1st Flt.), A8-3, B4-4, B6-4, B8-5, C6-5.

No. 1959



Engines, launch system, glue and finishing supplies not included.
Avg. Ship. Wt. 10 oz.

NAR/HIA MODEL ROCKETRY SAFETY CODE (EIT. 1-1-87)

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

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

Signature _____



TAKE REAL
HIGH ALTITUDE
PHOTOS!

ASTRO-CAM 110 AERIAL CAMERA WITH DELTA II LAUNCH VEHICLE

SKILL LEVEL 2 Experience the excitement of taking color photographs from hundreds of feet in the sky. Astro-Cam 110's 1/500th second shutter speed is activated at ejection just prior to parachute deployment. Features include easy-assembly, acrylic lens, plastic housing, glass first surface mirror, and high performance design. Easy to operate and shoots one full-color 110 photo per flight. Delta II features white body tube and pre-colored plastic fin-unit for stability. No painting required. Uses Kodak Kodacolor 110 color print film, ASA 400, or equivalent-Not Included. Film and developing are available locally. Camera not sold separately. Use Delta II as launch vehicle. Other launch vehicles are not recommended. *Specifications - Camera with Launch Vehicle:* Length: 19.1" Dia. 1.34" Fin Span 4.75" Wt. 3.75 oz. *Camera Specifications:* Length: 6.5" Dia. 1.39" Wt. 1.36 oz. (without film). Wt. 1.76 oz. (with film) (Engines, launch system, film, glue and finishing supplies not included.) Ship. Wt. 14 oz.

ENGINES: B8-5, C6-5, C6-7 (1st Flt.)



No. 1327

SKILL
LEVEL 2

Aerial "Astro Cam 110" Photos
Courtesy Scott Branche,
Scarsdale, NY



SKILL LEVEL 2

Recommended for the Experienced Modeler.

FOX FIRE

SKILL LEVEL 2 In the not-so-distant future interplanetary fighter ships may resemble this fantastic model able to achieve altitudes over 1000 feet. Length: 13.6" Dia. 0.736" Wt. 0.69 oz. ENGINES: A8-3(1st Flt.), A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-3, C6-5, C6-7
No. 1941



MINI TRI PAK

SKILL LEVEL 2 Three unique rocket kits in one package - for one low price! Includes:

STAR SEEKER

Interstellar speeder for short hops between galaxies. Mini-power boosts it near 1500 feet. The model breaks apart into two connected pieces for safe recovery. Length: 6.9" Dia. 0.5" Wt. 0.26 oz.

ENGINES: 1/2A3-2T (1st Flt.), 1/2A3-4T, A3-4T, A10-3T.



STING RAY

Two-stage mini performance. Out-of-sight flights to 2500 feet! Length: 8.4" Dia. 0.5" Wt. 0.33 oz.

ENGINES: Booster: A10-0T (1st Flt.)
Upper Stage: 1/2A3-2T (1st Flt.), 1/2A3-4T, A3-4T, A10-3T.



S.C.R.A.M.

Military styled surface-to-air missile. Flights over 1000 feet. Break-apart recovery. Length: 7.3" Dia. 0.5" Wt. 0.29 oz.

ENGINES: 1/2A3-2T (1st Flt.), 1/2A3-4T, A3-4T, A10-3T.



MINI TRI PAK

No. 0866

RECOVERY SYSTEMS

TECH-TIP #3



Most recovery systems depend on drag (wind resistance) to slow the rocket. Each changes the model from a streamlined object to one which the air can "catch against" and retard its descent. Six main recovery methods are used by model rocketeers: 1. Featherweight Recovery 2. Tumble Recovery 3. Streamer Recovery 4. Parachute Recovery 5. Helicopter Recovery 6. Glide Recovery.



Engines, launch system, glue, and finishing supplies not included.
Avg. Ship. Wt. 11 oz.

SKILL LEVEL 2

Recommended for the Experienced Modeler.

FIREAERO

SKILL LEVEL 2 Soaring to altitudes of 1200 feet, this beautiful sport flier includes balsa die-cut fins, quick-release engine mount, plastic nose cone, kit decal, and returns to Earth via 12" parachute. Length: 18" Dia. 0.976" Wt. 1.08 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4 C6-3, C6-5.

No. 1953



HAWKEYE

SKILL LEVEL 2 Military styling, fiber fins, and three-color decal make this a fine addition to any model rocket collection. Mini-engine flights are out-of-sight! Length: 8.5" Dia. 0.541" Wt. 0.42 oz.

ENGINES: 1/2A3-2T (1st Flt.), A3-4T, A10-3T.

No. 0873



BULL PUP 12D

SKILL LEVEL 2 Scaled down version of U.S. Air Force air-to-air missile features three-color decal, 800 foot flights and recovery via 12" chute. Length: 15.625" Dia. 1.325" Wt. 1.8 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

No. 1972



MINI SHUTTLE

SKILL LEVEL 2 Sport scale version of the space shuttle orbiter. Uses regular size engines. Length: 9.37" Dia. 1.63" Wt. 1.35 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.

No. 1391



TECH-TIP ROCKET STABILITY

#4



Stable rockets fly straight, predictable flights. Always make sure your rocket passes the "swing test" before flight if you have any doubt about its design. Never fly a rocket which fails the "swing test". Form a loop by making an adjustable slip knot in the end of a 6-10' string. With the engine in place, move your rocket backward or forward in the loop until it is balanced. Tape the loop so it will stay at the model's balance point (center of gravity) and swing the rocket overhead in a circular motion. "Straight" flight indicates a stable rocket. If the model loops or flies erratically it is not stable. Sometimes this can be corrected by adding weight to the nose or adding area to the fins.



Engines, launch system, glue, and finishing supplies not included. Avg. Ship. Wt. 12 oz.

SKILL LEVEL 2

Recommended for the Experienced Modeler.

MINI-SCALE COMBO PAK

SKILL LEVEL 2 Two scale rockets in one package feature balsa nose cones, scale decals, die-cut fiber fins and break-apart recovery. Includes:

EXOCET

Model of French ship-to-ship missile is capable of flights to 800 feet. Length: 9.5"

Dia. 0.541" Wt. 0.3 oz.

ENGINES: 1/2A3-2T (1st Flt.), 1/2A3-4T, A3-4T, A10-3T.



I.Q.S.Y. TOMAHAWK

U.S. sounding rocket model delivers great performance with mini-engine power. Length: 10.9" Dia. 0.541" Wt. 0.25 oz.

ENGINES: 1/2A3-2T (1st Flt.), 1/2A3-4T, A3-4T, A10-3T.



MINI SCALE COMBO PAK

No. 0874

ARROW

SKILL LEVEL 2 This sporty model achieves flights to 900 feet and descends beneath a 12" chute. Over 1½ feet tall, the Arrow has 6 fins and a large two-color decal. Length: 18.75" Dia. 1.637" Wt. 2.23 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

No. 1983



HITCH-HIKER GLIDER

SKILL LEVEL 2 Sleek, delta-wing design and styrofoam construction provide impressive performances. "Hitchhikes" a boost on other larger models. Then, glides free at apogee for duration times of 30 seconds or more. Can be hand-launched, too! Perfect choice for your first glider. Length: 5.97" Wing Span 9.99" Wt. 0.21 oz.

No. 9050

Booster rockets must be 18" or longer, have four fins, and a minimum body tube diameter of .976". Minimum "B" engine power required.

Engines, launch system, glue and finishing supplies not included. Avg. Ship. Wt. 12 oz.



Photo Courtesy Societe Nationale Industrielle Aerospatiale (Product of France)

MINI-SCALE
COMBO PAK

NEW



SKILL LEVEL 2

Recommended for the Experienced Modeler.

CLIPPER

SKILL LEVEL 2 High, high flights! As the boosting lower stage exhausts the last of its fuel, it ignites the upper stage and falls away to tumble safely back to Earth. Lighter now the Clipper will climb to altitudes over 1000 feet before releasing a 30" streamer to slow its long descent. Length: 22.875" Dia. 0.976" Wt. 1.59 oz.

ENGINES: Upper Stage: A8-5 (1st Flt.), B4-6, B6-6, B8-5, C6-5, C6-7.

Booster: A8-0 (1st Flt.), B6-0, C6-0.

No. 1979



FLYING SAUCER

SKILL LEVEL 2 Unidentified flying objects have been seen by thousands throughout time. Our version resembles a description given by many. This far-out space model with bright "alien" decals blasts off slowly and then flips over at apogee. The saucer shape slows its descent and it settles to Earth on its spring-bounce recovery system. Length: 3.3" Dia. 7.65" Wt. 2.6 oz.

ENGINE: C6-0(1st Flt.).

No. 1947



SPACE SHUTTLE COLUMBIA

SKILL LEVEL 2 Beautiful semi-scale model of America's newest spaceship. Assembles easily with molded plastic nose cone and orbital maneuvering system pods. Spectacular flights over 500 feet with 18" parachute recovery. Makes a great display model too! Length: 10.7" Wing Span 8.125" Dia. 1.637" Wt. 1.98 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

No. 1385



TECH-TIP LAUNCH PADS

#5



Launch pads serve many uses. The launch rod guides the rocket's first few feet of flight until the rocket is moving fast enough for the fins to provide guidance. The blast plate deflects the engine's hot gases away from the launch pad and the ground. The safety cap is always kept on the rod except during actual launch to prevent injuries. Some launch pads tilt to direct the rocket into the wind so the wind will return it. Never tilt the rod more than 30° from vertical. Don't launch if it's too windy. Some launch pads also accommodate Maxi-Rods (#2244) for giant models.

Engines, launch system, glue, and finishing supplies not included. Avg. Ship. Wt. 12 oz.

NEW
CLIPPER

CLIPPER

FLYING SAUCER

SPACE SHUTTLE COLUMBIA

USA

SKILL LEVEL 2

SKILL LEVEL 2

Recommended for the Experienced Modeler.

HALLEY'S TAIL

SKILL LEVEL 2 In honor of the comet's return, this superb sport flier features three-color chrome decals and 12" chute recovery. Capable of flights to 800 feet, Halley's Tail ejects a fun-flying "comet" with streaming "tail"! Length: 16.75" Dia. 0.976" Wt. 1.41 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

No. 1952



HALLEY'S COMET

Named in honor of Edmund Halley, who first accurately predicted the comet's return, Halley's Comet visits the Sun every 75-76 years.

The comet is theorized to be a large, "dirty, snowball" made of water, ammonia, methane, and heavier particles that traverses the Solar System in an elliptical orbit. Approaching the Sun, the comet nucleus (approximately 3.1 miles in diameter) warms and begins to vaporize creating a coma ranging from 12,000 - 120,000 miles in diameter. Solar winds push expanding vapors into an even lengthening tail which may become 120,000,000 miles long! The tail always points away from the Sun.

Halley's closest approach to Earth this visit was 40,000,000 miles in April 1986. The comet is now on its way to the outer edges of the Solar System to return again in 2061.

STARBIRD

SKILL LEVEL 2 This sleek, interstellar spaceship traverses the galaxy, seeking, observing, and exploring the farthest reaches. Our model flies over 1100 feet and descends gently to Earth via 12" parachute. Length: 19.5" Dia. 0.976" Wt. 1 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, C6-3, C6-5.

No. 1954



NOVA PAYLOADER

SKILL LEVEL 2 Cargo carrier contains clear payload bay. Great for experiments and science projects. Flies to altitudes over 1000 feet high, deploys 12" recovery parachute, and descends slowly to the ground, ready to carry your next payload aloft. Length: 21.125" Dia. 0.976" Wt. 1.33 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

No. 1960



Photo Copyright © William Obermeyer, 1986



SKILL LEVEL 2

Engines, launch system, glue, and finishing supplies not included. Avg. Ship. Wt. 12 oz.

SKILL LEVEL 2

Recommended for the Experienced Modeler.

DER V-3

SKILL LEVEL 2 A two foot rocket, comical decals, "D" power lift-offs, and a large recovery parachute add up to big, big fun! 3/16" Maxi Rod (#2244) required for launch. Length: 24" Dia. 2.6" Wt. 4.4 oz.

ENGINES: D12-3 (1st Flt.), D12-5

No. 1970



GEMINI TITAN

On March 23, 1965 astronauts Virgil I. (Gus) Grissom and John W. Young completed the first successful U.S. two-man orbital mission of a Gemini Spacecraft. Boosted into orbit by the powerful Titan launch vehicle, the Gemini capsule changed course three times during a flight lasting 4 hours, 52 minutes, and 31 seconds. They orbited Earth three times.

SKILL LEVEL 2 Estes' 1/73rd scale model of NASA's Gemini-Titan (GT-3) is over 1½ feet tall, features plastic capsule and removable display nozzles. A clear plastic fin unit is attached for flights over 600 feet high. Recovery is via 12" parachute. Length: 19.375" Dia.: 1.637" Wt. 2.15 oz.

ENGINES: A8-3 (1st Flt.), B6-4, B8-5, C6-5

No. 1978



DER RED MAX

SKILL LEVEL 2 Far-out super-fun model. Large stable design gives great sport performance. Length: 16.25" Dia. 1.637" Wt. 2.38 oz.

ENGINES: B4-2 (1st Flt.), B4-4, B6-2, B6-4, B8-5, C6-5, C6-7

No. 0651



HONEST JOHN

SKILL LEVEL 2 Updated version of this famous U.S. Army Missile. Flights to 1,000 feet. Length: 19.2" Dia. 1.325" Wt. 1.78 oz.

ENGINES: A8-3 (1st Flt.), B6-4, B6-6, B8-5, C6-5, C6-7.

No. 1919



Engines, launch system, glue and finishing supplies not included. Avg. Ship. Wt. 12 oz.



Photo Courtesy of NASA



SKILL LEVEL 2

Recommended for the Experienced Modeler.

DEFENDER

SKILL LEVEL 2 "D" Powered high performance sport flier capable of flights over 1,200 feet. Length: 25" Dia. 1.325" Wt. 1.8 oz.

ENGINE: D12-5 (1st Flt.).

No. 1924



RANGER

SKILL LEVEL 2 Big and powerful, with two-color decal, and huge 18" recovery chute, Ranger achieves 1200 foot altitudes easily. Length: 22.125" Dia. 1.325" Wt. 1.6 oz.

ENGINES: D12-5 (1st Flt.), D12-7.

No. 1955



MEAN MACHINE

SKILL LEVEL 2 Tallest rocket in the Estes fleet. "D" engine powered for spectacular flights over 800 feet. Over 6 feet long with giant 24" chute. Easy-to-assemble for a really great looking bird. Uses 3/16" launch rod. Length: 78.75" Dia. 1.637" Wt. 5.8 oz.

ENGINE: D12-5

No. 1295



SCORPION

SKILL LEVEL 2 High flying two-stage sport model with research vehicle styling. Easy-to-build and exciting to fly with all plastic fin units. Booster employs tumble recovery while upper stage streaks skyward to altitudes over 1,000 feet. Length: 26.5" Dia. 0.976" Wt. 1.8 oz.

ENGINES: Single Stage: A8-3 (1st Flt.), A8-5, B4-4, B4-6, B6-4, B6-6, B8-5, C6-5, C6-7.

Upper Stage: A8-5 (1st Flt.), B4-6, B6-6, C6-7.

Booster Stage: A8-0 (1st Flt.), B6-0, C6-0.

No. 1333



Engines, launch system, glue, and finishing supplies not included. Avg. Ship. Wt. 12 oz.



SKILL LEVEL 2

SKILL LEVEL 3

Recommended for the Advanced Modeler.

SR-71 BLACKBIRD

The first SR-71 aircraft were delivered to Strategic Air Command in 1965 for reconnaissance work. Built almost entirely of titanium (as strong as, but lighter than steel), Blackbird weighs about 140,000 lbs., has a wingspan of 55 ft., and is 107 ft. long. Able to achieve speeds of more than 2,000 mph and altitudes of more than 80,000 ft., the craft carries a crew of two with a range of 2,000 or more miles. SR-71 is painted black or dark blue to reduce the heat from high-speed friction.

SKILL LEVEL 3 Our nation's super high-altitude reconnaissance plane flies at ultrasound speeds. So high-tech nearly all information about this plane is classified. The Estes scale model features the same state-of-the-art appearance. Over 1½ feet long SR-71 Blackbird flies to 900 foot altitudes and lands via 12" parachute. Length: 19" Dia. 0.976" Wt. 3.2 oz.

ENGINES: B4-2(1st Flt.), B6-2, B6-4, B8-5, C6-5

No. 1942



STEALTH

SKILL LEVEL 3 Radar invisible fighter from the future closes in on its opponents from seemingly nowhere. Outfitted with laser weaponry it seeks and destroys in ultimate silence. Our model can reach altitudes up to 900 feet. Length: 16.25" Dia. 1.125" Wt. 2.3 oz.

ENGINES: A8-3, B4-4 (1st Flt.), B6-4, C5-3, C6-3, C6-5.

No. 1929



PHOENIX

SKILL LEVEL 3 Big semi-scale model of the famous Phoenix air-to-air supersonic missile. Impressive in the air and on display. Single "D" powered engine provides a slow, realistic lift-off and flights over 600 feet. Length: 30" Dia. 2.60" Wt. 6.6 oz.

ENGINE: D12-3 (1st Flt.)

No. 1380



Photo Courtesy Lockheed-California Company



SKILL LEVEL 3

Engines, launch system, glue, and finishing supplies not included. Avg. Ship. Wt. 12 oz.

SKILL LEVEL 3

Recommended for the Advanced Modeler.

X-16

SKILL LEVEL 3 Far in the future the Air Force may be flying this experimental model into Earth's outer atmosphere to test hyper velocity near space travel. Our version can fly to 1,000 feet. Length: 17.25" Dia. 0.976" Wt. 1.45 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-2 B6-4, B8-5, C6-5.

No. 1933



MINI MARS LANDER

SKILL LEVEL 2 Vehicle for future Martian landings. Super detailing and exotic appearance will make this one of your favorite models. Length: 5.5" Dia. 1.637" Wt. 0.81 oz.

ENGINES: 1/2A3-4T, A3-4T (1st Flt.), A10-3T.

No. 0881



NIKE APACHE

This two-stage, solid propellant vehicle is one of the United States' smallest and most used scientific research sounding rockets. The first stage is a US Army Nike M5E1. The second stage Apache is produced by Morton-Thiokol. A maximum length of 28 feet, allows Nike Apache to be fired from a transportable launcher, even from aboard a ship! This enables other nations to use Nike Apache, too. Delivering a combined thrust of 51,000 pounds and carrying nominal payloads of 60 pounds, Nike Apache is used for space research 50-150 miles above Earth.

SKILL LEVEL 3 Scale (1 to 12.25) model of U.S. sounding rocket includes two-stage appearance, three-color decal, and 12" parachute recovery. Reaches altitudes over 900 feet. Length: 22.875" Nike Dia. 1.325" Apache Dia. 0.541" Wt. 1.55 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5, C6-7.

No. 1957



Engines, launch system, glue and finishing supplies not included. Avg. Ship. Wt. 12 oz.



NEW

MINI MARS LANDER

"G.H. Stine Archives, used with permission."



SKILL LEVEL 3

SKILL LEVEL 3

Recommended for the Advanced Modeler.

INTERCEPTOR II

SKILL LEVEL 3 Futuristic concept of U.S. Air Force interceptor aircraft features large three-color decals, flights over 650 feet, and descents via 18" parachute. Length: 25.75" Dia. 1.325" Wt. 2.9 oz.

ENGINES: A8-3, B4-4 (1st Flt.), B6-4, B8-5, C6-3, C6-5.

No. 1973



DELTA WEDGE

SKILL LEVEL 3 Exotic fighter capable of ultra-light speed passes through time-windows to evade or strike the enemy. Our model of this fighter can attain altitudes over 1,000 feet. Length: 16.5" Dia. 0.736" Wt. 1.52 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

No. 1931



HERCULES

SKILL LEVEL 3 Clear payload section highlights this two-stager. Sleek design that can be flown as a single or two-stage model. Flights over 2,500 feet! Length: 21.6" Dia. 0.976" Wt. 1.84 oz.

ENGINES: Single Stage: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

Upper Stage: A8-5 (1st Flt.), B6-6, B8-5, C6-7.

Booster: A8-0 (1st Flt.), B6-0, C6-0.

No. 1377



EXPLORER

SKILL LEVEL 3 Symbol of mankind's greatest dream, this great fusion-powered ship is free to explore the universe and beyond at speeds warping the light barrier. The ship, its crew, and on-board eco-system are protected from hostile environments by ion shields and powerful defense lasers. Our model will climb to altitudes over 900 feet and return to Earth via 18" parachute. Length: 18.75" Dia. 1.637" Wt. 2.1 oz.

ENGINES: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

No. 1974



Engines, launch system, glue and finishing supplies not included. Avg. Ship. Wt. 12 oz.



SKILL LEVEL 3

Recommended for the Advanced Modeler.

NIMBUS

SKILL LEVEL 3 Above the clouded atmosphere, this winged spaceship patrols the terrain boundaries. Our model soars to 850 feet altitudes and lands gently with a 12" parachute. Length: 17.375" Dia. 0.976" Wt. 1.21 oz.

ENGINES: B4-4 (1st Flt.), B4-6, B6-4, B8-5, C5-3, C6-3, C6-5, C6-7.

No. 1971



COMANCHE-3

COMANCHE - 3

SKILL LEVEL 3 Big three-stager with mighty "D" powered booster. Can be flown in single, two-stage or three-stage configurations. Incredible flights over 2,600 feet. Length: 41" Dia. 0.976" Wt. 2.08 oz.

ENGINES: Single Stage: A8-3 (1st Flt.), B4-4, B6-4, B8-5, C6-5.

Upper Stage: A8-5 (1st Flt.), B4-6, B6-6, C6-7.

Second Stage: A8-0 (1st Flt.), B6-0, C6-0.

Booster: D12-0 (1st Flt.).

No. 1382



DRAGON FLY

SKILL LEVEL 3 U.S. record setting boost glider is an excellent competition model. Glide times of 60 seconds or more are possible. Length: 11.5" Wing Span 10" Dia. 0.541" Wt.: 0.47 oz.

ENGINE: 1/2A3-2T (1st Flt.)

No. 0875



DRAGON FLY



SKILL LEVEL 3



Scott Branche, Scarsdale, NY

Engines, launch system, glue, and finishing supplies not included. Avg. Ship. Wt. 12 oz.

SKILL LEVEL 4

Recommended for the Master Modeler.

V-2

SKILL LEVEL 4 Large semi-scale version of the World War II ballistic missile. The original German version stood 46 feet high, weighed over 14 tons and could travel as much as 200 miles at nearly 2,000 mph. 3/16" Maxi-Rod required for launch. Length: 22.4" Dia. 2.60" Wt. 4.9 oz.

ENGINES: D12-3 (1st Flt.), D12-5.

No. 1926



"G.H. Stine Archives, used with permission."

BLACK BRANT II

An outgrowth of the 1950's Black Brant I program, Black Brant II's payload capacity was increased to 6.2 cu. ft. by changing the nose cone's shape. The Canadair airframe, (17.2" dia. x 27' 8" tall), was aerodynamically stabilized by 3 fixed fins. Total fin span was 39". The motor contained 2,000 lbs. of solid propellant and delivered 16,000 pounds of thrust over a 25 second burn time. Total vehicle weight with propellant was 2,642 lbs.

The first two Black Brant IIs were launched in October 1960 at Fort Churchill, Canada. The next two were launched from Wallops Island, VA during November, 1961.

Used by the Canadian Armament Research and Development Establishment for upper atmosphere research studies, Black Brant IIs were fired mostly in Canada's Northlands, carrying up to 150 pounds of payload to altitudes of 100 statute miles.

SKILL LEVEL 4 Beautiful model of Canadian sounding rocket features a 1 to 13 scale ratio. Complete with detailed plastic parts, three-color decal, huge 18" recovery parachute, and die-cut balsa fins, this powerful D-engine model can fly well over 1200 feet. Length: 24.875" Dia. 1.325" Wt. 2.29 oz.

ENGINES: D12-5 (1st Flt.), D12-7.

No. 1958



CRUSADER SWING-WING

SKILL LEVEL 4 Our model of this NASA advanced fighter concept will soar to 800 feet. The internal power pod is ejected at apogee and the rocket becomes a winged glider with glide times of 45 seconds or more. Pod descent is via recovery streamer. Kit includes die-cut parts, balsa fins, plastic nose cone and sections, plus quick-release engine mount, and two-color decal. Length: 18" Wing Span: 11.5" Dia. 1.637" Wt. 2.2 oz.

ENGINES: B4-2 (1st Flt.), B6-2, C6-3.

No. 1961



Engines, launch system, glue, and finishing supplies not included. Avg. Ship. Wt. 14 oz.



SKILL LEVEL 4

Recommended for the Master Modeler.

GEO SAT LV

SKILL LEVEL 4 Heavy-lift launch vehicle for large satellite payloads. Kit features simulated strap-on solid rocket boosters, see-through payload section with a highly detailed visible satellite, and an 18" parachute for reliable recovery. Realistic decor and 2 feet 4 inches of rocket make lift-offs impressive. Length: 28" Dia. 1.637" Wt. 4.3 oz. ENGINES: B4-4 (1st Flt.), B6-4, C6-3, C6-5. No. 1977



JUPITER-C

The first U.S. Space Launch Vehicle was a direct descendant of the German V-2 rocket. Originating as early as 1954, Jupiter-C was designed, built, and flown by the Army Ballistic Missile Agency under the direction of Dr. Wernher von Braun. The thrust from Jupiter-C's four stages produced an orbital velocity of 18,000 mph.

Explorer I was the first U.S. Earth Satellite. Officially known as Satellite 1958 Alpha, its instrumentation was designed by Dr. James Van Allen. The satellite was constructed at Jet Propulsion Laboratory under the direction of Dr. William Pickering. A government directive issued after Sputnik, resulted in the modification of Jupiter-C and the construction of Explorer-1 in 84 days. Lift-off from Cape Canaveral occurred at 10:48 P.M. EST January 31, 1958. The flight resulted in the discovery of the Van Allen Belts, one of the outstanding discoveries of the International Geophysical Year.

SKILL LEVEL 4 Estes' first model of this historic rocket is 1/35th scale. The Explorer-1 Satellite is included but should be removed for flight. The kit features plastic parts, die-cut balsa fins, quick-release engine mount and a large two-color decal. Other features are slow, realistic lift-offs and reliable recoveries via 18" parachute. Length: 24.5" Dia.: 2.04" Wt.: 3 oz. ENGINE: C5-3 (1st Flt.).

No. 1976



Engines, launch system, glue, and finishing supplies not included.

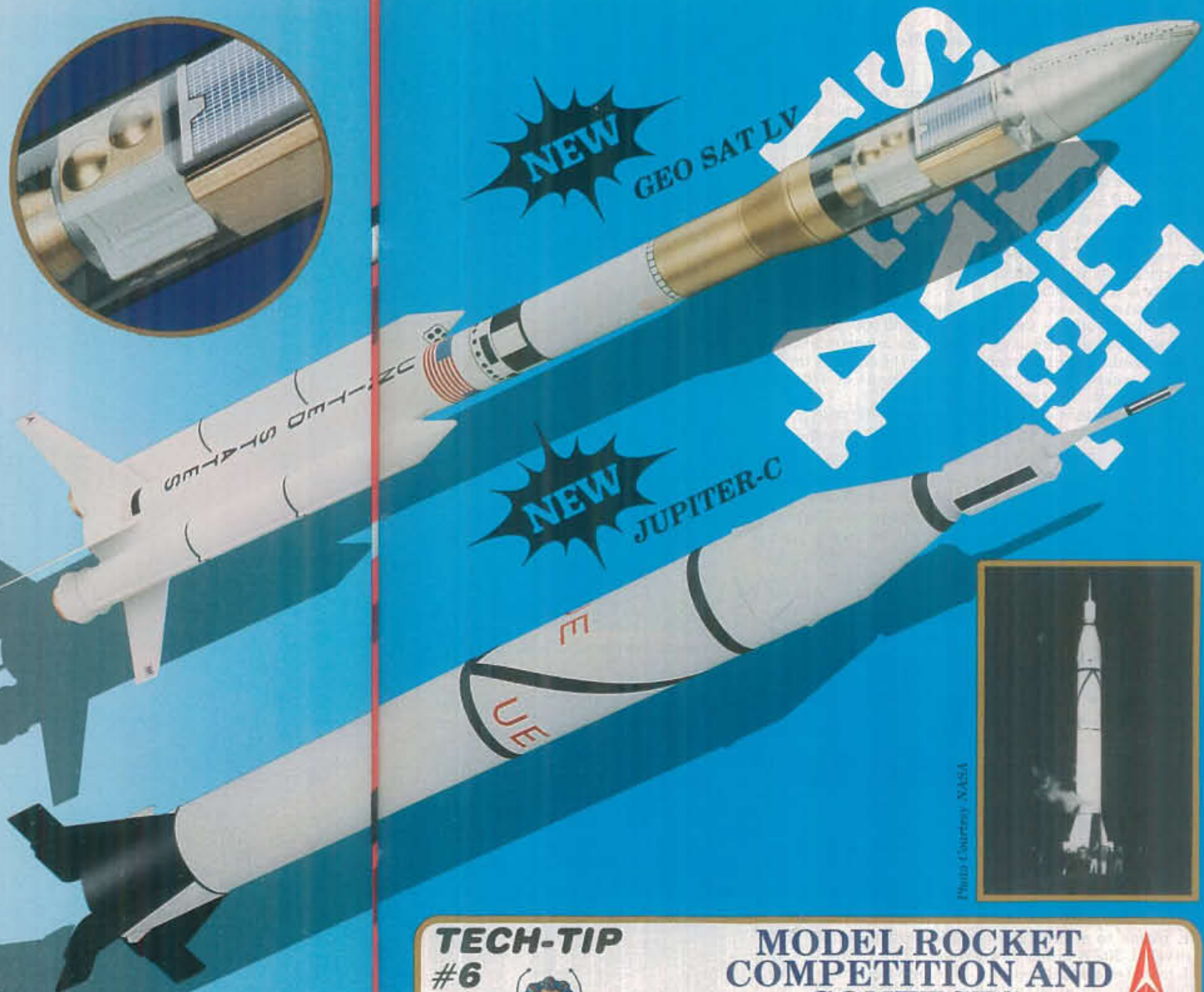


Photo Courtesy: NASA

TECH-TIP

#6



MODEL ROCKET COMPETITION AND CONTESTS



Contests are fun. See whose rocket flies the highest or stays in the air the longest. Find out who has the best looking model or whose scale model is most precise. Who can cause their rocket to land via parachute where they want it to land?

These contests are fun and educational. Compete with your friends or classmates. If you wish to compete in local, national or international events or set a national or world record, you should join the National Association of Rocketry, 182 Madison Drive, Elizabeth, PA 15037. Your membership includes many benefits such as discounts, insurance, and a monthly subscription to American Spacemodeling Magazine.

SKILL LEVEL 4

Recommended for the Master Modeler.

SPACE SHUTTLE

On a standard mission, the Orbiter will remain in orbit for 7 days, return to the Earth, land like an airplane, and be readied for another flight in 14 days. It can deploy and retrieve satellites and can place deep-space vehicles in their initial low-Earth orbit.

The Shuttle is comprised of the following three main units:

- Two solid rocket boosters (SRB's) which have a sea level thrust of 2,600,000 pounds each.
- The orbiter which is 121' long with a wing span of 79', weighs about 150,000 pounds without fuel. It has a payload bay 60' long and 15' in diameter. Payload capacity is 65,000 pounds.
- The external tank (ET) is 154' long and 28.6' in diameter. At lift-off the tank contains 1,550,000 pounds of liquid hydrogen and oxygen. These are in separate compartments of the tank and are fed to the orbiter's three main rocket engines which have a thrust of 470,000 pounds each. The tank is not reusable.

Maximum altitude of the Space Shuttle is 600 miles.

SKILL LEVEL 4 Dramatic 1/162nd scale reproduction of America's newest space vehicle. Designed as a reusable near space transportation system with satellite deployment and retrieval capability. Delivers really spectacular flights. Semi-scale orbiter employs glide recovery just like the real thing while boosters and external tank return via 18" parachute recovery. Our model features special stabilizer fins for atmospheric flight which remove easily for display. Kit components include injection molded, vacuum-formed plastic and die-cut parts. Incredible display model with authentic NASA decor. Shuttle Length: 13.6" Dia. 2.04" Orbiter Length: 9.0" Orbiter Wingspan 7.1" Wt. 4.37 oz.

ENGINES: C5-3 (1st Flt.), C6-3.

No. 1284



MERCURY REDSTONE

Between 1953 and 1958 Redstone had proven to be a reliable flight vehicle. Therefore, it was selected as the vehicle to carry the first American into sub-orbital flight. On May 5, 1961, Redstone lifted the Mercury capsule "Freedom 7" with Alan Shepard, Jr. inside to an altitude of 116.5 statute miles and traveled 302.8 miles down-range. The flight lasted 15 minutes and 22 seconds. Mercury-Redstone stood 83 feet tall, weighed (with fuel) 66,000 lbs. and delivered 78,000 lbs. of thrust.

SKILL LEVEL 4 Historical 1/35 scale model of the Mercury sub-orbital rocket used to launch Alan Shepard into space flight May 5, 1961. Authentic detailing includes large decal and injection molded Mercury capsule and tower. Rocket and capsule each return to Earth via 12" chute recovery. Length: 28.75" Dia. 2.04" Wt. 3.0 oz.

ENGINE: C5-3 (1st Flt.).

No. 1921



Photo and STS DATA Courtesy of NASA



"C.H. Stine Archives, used with permission."



MERCURY REDSTONE



Engines, launch system, glue, and finishing supplies not included.
Avg. Ship. Wt. 12 oz.

MODEL ROCKET ENGINES

Prod. No.	Engine Type	Prices 3 for	Total Impulse lb-sec ①	n-sec ②	Time Delay (±15%)	Max. Lift Wt.	Max. Thrust	Thrust Duration	Initial Weight Oz. G.	Propellant Weight Oz. G.
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REGULAR ENGINES SINGLE STAGE ENGINES GREEN LABEL

1593	1/2A6-2		0.21	1.25	2 sec.	2.5 oz.	48 oz.	0.20 sec.	0.53	15.0	0.065	1.56
1598	A8-3		0.56	2.50	3 sec.	4.0 oz.	48 oz.	0.32 sec.	0.57	16.2	0.110	3.12
1601	B4-2		1.12	5.00	2 sec.	4.0 oz.	48 oz.	1.20 sec.	0.70	19.6	0.294	8.33
1602	B4-4		1.12	5.00	4 sec.	3.5 oz.	48 oz.	1.20 sec.	0.74	21.0	0.294	8.33
1605	B6-2		1.12	5.00	2 sec.	4.5 oz.	48 oz.	0.83 sec.	0.68	19.3	0.220	6.24
1606	B6-4		1.12	5.00	4 sec.	4.0 oz.	48 oz.	0.83 sec.	0.71	20.1	0.220	6.24
1620	B6-5*		1.12	5.00	5 sec.	5.0 oz.	5 lb.	0.80 sec.	0.68	19.3	0.220	6.24
1617	C5-3		2.25	10.00	3 sec.	8.0 oz.	5 lb.	2.10 sec.	0.90	25.5	0.450	12.70
1613	C6-3		2.25	10.00	3 sec.	4.0 oz.	48 oz.	1.70 sec.	0.88	24.9	0.440	12.48
1614	C6-5		2.25	10.00	5 sec.	4.0 oz.	48 oz.	1.70 sec.	0.91	25.8	0.440	12.48

UPPER STAGE ENGINES or single stage engine if used in a very light rocket PURPLE LABEL

1599	A8-5		0.54	2.50	5 sec.	2.0 oz.	48 oz.	0.32 sec.	0.62	17.6	0.110	3.12
1604	B4-6		1.12	5.00	6 sec.	1.5 oz.	48 oz.	1.20 sec.	0.78	22.1	0.294	8.33
1607	B6-6		1.12	5.00	6 sec.	2.0 oz.	48 oz.	0.83 sec.	0.78	22.1	0.220	6.24
1615	C6-7		2.25	10.00	7 sec.	2.5 oz.	48 oz.	1.70 sec.	0.95	26.9	0.440	12.48

BOOSTER ENGINES RED LABEL

1608	B6-0		1.12	5.00	none	4.0 oz.	48 oz.	0.80 sec.	0.58	16.4	0.220	6.24
1616	C6-0		2.25	10.00	none	4.0 oz.	48 oz.	1.68 sec.	0.80	22.7	0.440	12.48

Regular engines are 2.75 in. long and 0.690 in. dia. Ship Wt. of each package of engines is approximately 4 oz.

*Series II engines have semi-core-burning grain with large propellant burning area for high initial thrust with short thrust duration.

MIGHTY 'D' ENGINES SINGLE STAGE ENGINES GREEN LABEL

1666	D12-3		4.48	20.0	3 sec.	14 oz.	9 lb.	1.70 sec.	1.49	42.2	0.879	24.93
1667	D12-5		4.48	20.0	5 sec.	10 oz.	9 lb.	1.70 sec.	1.52	43.1	0.879	24.93

UPPER STAGE ENGINES or single stage engine if used in a very light rocket PURPLE LABEL

1668	D12-7		4.48	20.0	7 sec.	8 oz.	9 lb.	1.70 sec.	1.55	44.0	0.879	24.93
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BOOSTER ENGINES RED LABEL

1665	D12-0		4.48	20.0	none	14 oz.	9 lb.	1.70 sec.	1.44	40.9	0.879	24.93
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"D" engines are 2.75 in. long and 0.945 in. dia. Ship Wt. of each package of "D" engines is approximately 6½ oz.

Prod. No.	Engine Type	Prices 4 for	Total Impulse lb-sec ①	n-sec ②	Time Delay (±15%)	Max. Lift Wt.	Max. Thrust	Thrust Duration	Initial Weight Oz. G.	Propellant Weight Oz. G.
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MINI ENGINES SINGLE STAGE ENGINES GREEN LABEL

1503	1/2A3-2T		0.21	1.25	2 sec.	2 oz.	28 oz.	0.35 sec.	0.198	5.6	0.062	1.75
1507	A3-4T		0.56	2.50	4 sec.	2 oz.	26 oz.	0.86 sec.	0.268	7.6	0.124	3.50
1511	A10-3T		0.56	2.50	3 sec.	5 oz.	48 oz.	0.25 sec.	0.277	7.9	0.133	3.78

UPPER STAGE ENGINES or single stage engine if used in a very light rocket PURPLE LABEL

1504	1/2A3-4T		0.21	1.25	4 sec.	1 oz.	28 oz.	0.35 sec.	0.212	6.0	0.062	1.75
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BOOSTER ENGINES RED LABEL

1510	A10-0T		0.56	2.50	none	5 oz.	48 oz.	0.26 sec.	0.235	6.7	0.133	3.70
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Mini-Engines are 1.75 in. long a .500 in. dia. Ship Wt. of each package of mini-engines is approximately 2½ oz.

Complete instructions and igniters are included with each package of Estes model rocket engines.

- ① Pound-seconds (Figures shown are optimum.)
 ② Newton-seconds* (Figures shown are optimum.)

*A Newton is the measurement of force required to move one kilogram of mass one meter per second. Avg. thrust in Newtons x thrust duration = Newton-seconds. Newton-seconds ÷ by 4.45 = Pound-seconds.

IGNITERS: Add increased reliability at lift-off with Estes Igniters. Features easy engine installation and is suitable for all Estes launch control systems. Unique four element design makes it the most dependable igniter made. (Six per pkg.) Ship Wt. 1 oz. No. 2301



RECOVERY WADDING:

Provides protection from hot ejection gases for parachutes and streamers. Each package contains approximately 75 4½" squares—enough wadding for up to 25 flights. Instructions for installation are included in each package. Ship Wt. 6 oz. No. 2274



BLAST-OFF FLIGHT PAK

Ideal engine assortment. Features 24 of the most popular Estes model rocket engines, plus Igniters and Recovery Wadding. Priced at an excellent savings. Includes six each 1/2A6-2, A8-3, B6-4, and C6-5 high performance model rocket engines, one pkg. Recovery Wadding, and 30 Igniters. Ship Wt. 1 lb. 8 oz. No. 1672



TECH-TIP #7



Separate igniters by cutting the tape but do not remove it. Place the igniter deep inside the engine so it is touching the propellant. Use masking tape to firmly secure the igniter in place. The igniter must be touching the propellant when the electricity heats the igniter to cause ignition. Attach clean micro-clips as close to the igniter's center as possible. To avoid a short-circuit the micro-clips and igniter leads must not touch one another or any other metal. If igniter burns in two without igniting the engine, disarm controller, wait one minute and replace the igniter.

ALTI TRAK™ ALTITUDE FINDER

Skill Level 1

Track your rocket to the top of its flight and instantly lock-in its altitude on the AltiTrak altitude finder. Displays exact model rocket altitude on metric scale—no guessing! (Conversion table included for feet.) A precision instrument made of durable plastic. Easy-to-assemble and looks like futuristic laser pistol. How high did it go? Now you'll know! Ship. Wt. 15 oz.
No. 2232

PHANTOM

Skill Level 1

Educational, See-Thru Rocket with Recovery System, 10' Parachute, Engine Mount, and Cut-Away Engine! Perfect static demonstration model for workshops and presentations. Shows all internal components of a model rocket plus special cut-away version of C6-5 model rocket engine. Ideal for displays and exhibits. Length: 12.6" Dia. 0.976" Wt. 1.35 oz. Ship. Wt. 3 oz.
No. 1207

FIN ALIGNMENT GUIDE

Position and glue fins quickly and easily. Fits body tubes up to BT-101. Designed for either 3 or 4 finned rockets, aligning fins at 90° or 120° to each other. Easily assembled with slip-together plastic parts. Adjusts quickly with plastic fin position clips. Ship. Wt. 3 lbs.
No. 2231

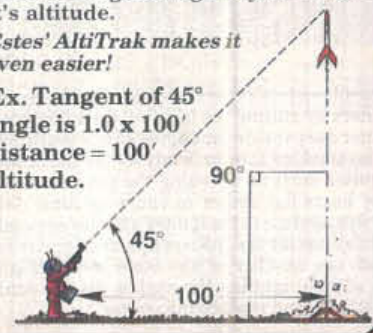
TECH-TIP #8

ALTITUDE TRACKING

One way of figuring how high your rocket flies is by triangulation. Measure the distance between tracker and launch pad and the angle between horizontal and your model's peak altitude. Then using a table of tangents figure your rocket's altitude.

Estes' AltiTrak makes it even easier!

Ex. Tangent of 45°
angle is 1.0 x 100'
distance = 100'
altitude.



ACCESSORIES

COMPUTER SOFTWARE



IN SEARCH OF SPACE

Introduction to Model Rocketry

This software explains the basics of model rocketry. The disk features dynamic full-color graphics and interactive text dealing with the following subjects:

Model Rocket Flight Profile
Parts of a Model Rocket
Model Rocket Engines
Model Rocketry Safety Code

Model Rocket Engine Classification and More!
Owner's Manual and 90 Day Limited Warranty included.

No. 9025



This computer software is for use on Apple IIe and IIc computers. A color monitor is strongly recommended to receive maximum enjoyment of the great graphics. A minimum of 64K memory is required.

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FLIGHT

Aerodynamics of Model Rockets

Discover the principles of flight. Exciting and colorful graphics, combine with interactive text to broaden your knowledge of why things fly and how the principles of flight apply to model rockets. Topics explored include:

Forces on Flying Objects
Center of Gravity
Center of Pressure

Stability
Aerodynamics and Others

This two-disk set includes Owner's Manual and 90 Day Limited Warranty.

No. 9026



Avg. Ship Wt. 1 lb.

ASTRON LAUNCH CONTROLLER

Heavy-duty Launch Controller features futuristic design and provides greater reliability with simplified assembly. Recommended for 6 or 12 volt power sources. No need to remove battery from car, simply connect launch system's battery clips to terminals. Features include arming lamp, safety key, launch button, battery clips, micro-clips, and 18 feet of launch cable. Ship Wt. 12 oz.

No. 2212



ELECTRON BEAM™ LAUNCH CONTROLLER

Years of experience and the latest product innovations are combined to bring you the best in launch control technology. Pre-assembly and pre-testing provides the most reliable launcher available. The new ELECTRON BEAM™ Launch Controller features Safety Key, Arming Light, and Launch Button for total launch control. Snap-open battery compartment makes changing batteries easy. Also included is 17 feet of launch wire with pre-soldered micro-clips. Colorful, sleek, and made of durable plastic, the ELECTRON BEAM™ is easy to hold in your hand and carry in your launch box. Requires only 4 AA alkaline batteries-Not Included. Use only with Estes Igniters (#2301). Length: 6.75" Width: 1.5" Depth 1.25" Ship Wt. 8 oz.

No. 2220



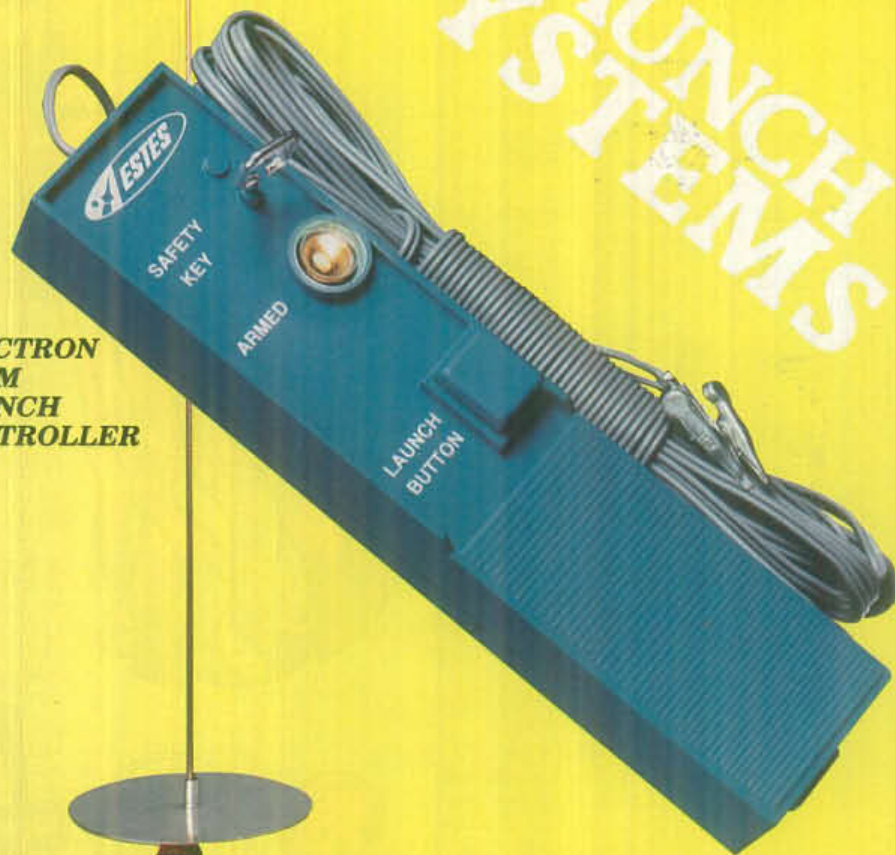
PORTA-PAD LAUNCH PAD

Designed for stability, the Porta-Pad is rugged enough to take the stress of countless launchings, yet is lightweight and compact enough for easy carrying and storage. Accommodates standard 1/8" rod (#2243) or heavy-duty 3/16" Maxi-Rod (#2244). Tilt adjustment allows you to compensate for wind direction. Ship Wt. 1 lb. 8 oz.

No. 2217

The Electron Beam™ Launch Controller (#2220) or the Astron Launch Controller (#2212) are the recommended launch controllers for use with the Porta-Pad (#2217).

ELECTRON BEAM LAUNCH CONTROLLER



PORTA-PAD LAUNCH PAD



LAUNCH CONTROLLERS

Battery-powered launch controllers provide the electricity necessary to heat the igniter for model rocket engine ignition. Removing the safety key disables the launch controller so the rocket cannot be launched accidentally. Insert the safety key only after the rocket is prepped, the micro-clips attached to the igniter in the engine, everyone has left the launch pad area, and you are ready for countdown. The continuity or arming light should glow after the safety key is inserted. At zero on the countdown, press and hold the launch button depressed until the rocket lifts off.

LAUNCH SYSTEMS

STAR BATTLE™ WINDSOCK

Colorful "Star Battle™" is depicted on a large plastic windsock. This great addition to your model rocketry collection is ideal for checking wind direction and detecting thermals at the launch site. Hang outside to rustle in the breeze or suspend from the ceiling for fun inside decor. Completely assembled with bridle. (String Not Included.) Length: 42" Dia. 6.125" Wt. 2 oz.. Ship. Wt. 8 oz.

No. 122890

3/16" DIA. MAXI-ROD: Perfect for launching giant models and other large rockets. Fits Porta-Pad Launch Pad (#2217). Two-piece construction 36" long, light-weight aluminum launch rod. Collapsible for easy storage. Includes Safety Cap & Key. Ship Wt. 12 oz.
No. 2244

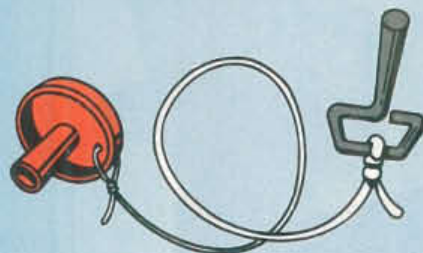
1/8" DIA. TWO PIECE LAUNCH ROD: Handy collapsible two-piece rod for portable launchers. Pieces slip together to make a 36" long rod. Base rod has a diameter of 1/8". Includes Safety Cap & Key. Ship Wt. 6 oz.
No. 2243

LAUNCH ROD SAFETY CAP with UNIVERSAL SAFETY KEY: For Launch Pad Safety! Includes plastic launch rod cap, universal safety key, and elastic cord. Fits all Estes launch control systems. Ship Wt. 4 oz.
No. 2205

MICRO-CLIPS: Equip your launcher with the best. Spring-loaded solid steel clips connect lead wires to igniters. Easy-to-clean and highly conductive contact surfaces. Only 1.1 inches long. Attach to leads with or without solder. (2 per pkg.) Ship Wt. 1 oz.
No. 2247

BLAST DEFLECTOR PLATE: Slip-on metal deflector plate fits any launcher using 1/8" or 3/16" rods. Protects launcher base from rocket blast. Four-inch diameter. Ship Wt. 5 oz.
No. 2241

BATTERY CLIPS: Hook-up to car batteries. Heavy-duty clips connect to terminals up to 1" in dia. With insulators. (2 per pkg.) Ship Wt. 5 oz.
No. 2245



**LAUNCH
SUPPLIES**

DESIGNER'S SPECIAL

Ideal parts assortment for the creative rocketeer. Develop your own R & D program. Over 75 pieces at an excellent savings! Ship Wt. 2 lbs.

- | | |
|---------------------|--|
| Body Tubes | Recovery Equipment |
| 2 BT-5 | 3 Shock Cord 1/8" x 18" |
| 2 BT-20 | 1 Shock Cord 1/8" x 36" |
| 2 BT-50 | 1 Shock Cord 1/4" x 36" |
| 1 BT-55 | 1 Streamer Material 1" x 30" |
| 1 BT-60 | 6 Screw Eyes |
| Nose Cones | Miscellaneous |
| 1 BNC-5E | 3 Engine Blocks (EB-20A) |
| 1 BNC-5S | 3 Engine Holders (EH-3) |
| 1 BNC-20B | 3 Engine Holders (EH-2) |
| 1 BNC-20R | 1 Engine Mount (EH-2050) |
| 1 PNC-50KA | 1 Engine Mount (EH-2060) |
| 1 PNC-50Y | 1 Nose Block (NB-20) |
| 1 PNC-55AC | 1 Nose Block (NB-50) |
| 1 PNC-60L | 1 Stage Coupler (JT-55C) |
| Fin Material | 1 Stage Coupler (JT-60C) |
| 2 BFS-20 | 1 Balsa Adapter (TA-2050A) |
| 2 BFS-30 | 1 Multi-Purpose Paper Adapter Set (TA-1) |
| 2 BFS-40 | Parachutes |
| Parachutes | 12 Launch Lugs (2-3/8" long) |
| 1 PK-10 | 1 Alpha Book of Model Rocketry |
| 2 PK-12 | 1 Fin Pattern Sheet No. 2 |
| 1 PK-18 | 1 Fin Pattern Sheet No. 3 |
| 1 PK-24 | |

No. 1463

EMERGENCY REPAIR KIT

A must for every range box. Features many essential materials for "on-the-spot" repair of your model rockets. Ship Wt. 8 oz.

- | | |
|-----------------------|---------------------------|
| Sandpaper | 12" Parachute |
| Screw Eyes | 1/8" and 1/4" Shock Cords |
| White Glue | 144" Shroud Line |
| Launch Rod Safety Cap | Tape Discs |
| Universal Safety Key | Launch Lugs |
| Recloseable Pouch | Shock Cord Mounts |
| Recovery Wadding | |

No. 2233

FUTURISTIC PARTS ASSORTMENT

Create your own interplanetary voyagers and space fighters with this selection of science-fiction-style parts. Over 50 parts! Includes special exotic fin patterns and design idea sheet. Ship Wt. 2 lbs.

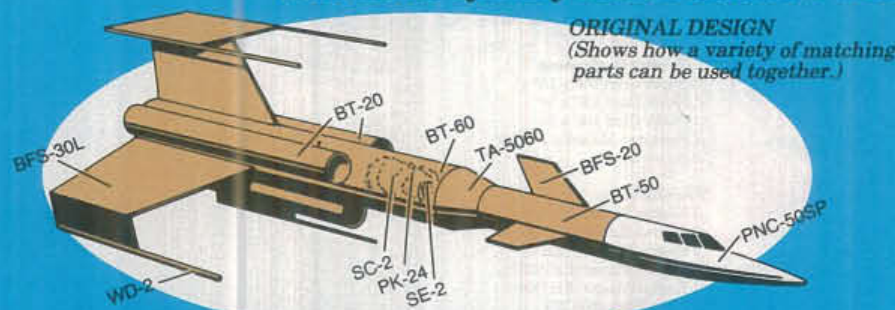
- | | |
|---------------------|-------------------------------------|
| Body Tubes | Recovery Equipment |
| 1 BT-5 | 3 Shock Cord 1/8" x 18" |
| 1 BT-20 | 1 Shock Cord 1/4" x 36" |
| 2 BT-50 | 1 Streamer Material |
| 2 BT-55 | 1" x 30" |
| Nose Cones | Miscellaneous |
| 1 PNC-50KA | 1 Nose Block (NB-20) |
| 1 PNC-50F | 1 Nose Block (NB-50) |
| 1 PNC-50SP | 1 Multi-Purpose Adapter Set (TA-1) |
| 1 PNC-50 | 1 Fin Pattern Sheet |
| 1 PNC-55B | 1 Exotic Fin Pattern Sheet |
| Fin Material | 1 Design Idea Sheet |
| 2 BFS-20 | 1 Mini Alpha Book of Model Rocketry |
| 2 BFS-30 | 3 Engine Blocks (EB-20A) |
| 1 BFS-40 | 1 Stage Coupler (JT-50C) |
| Parachutes | 1 Stage Coupler (JT-55C) |
| 1 PK-10 | 3 Engine Holders (EH-2) |
| 2 PK-12 | 12 Launch Lugs (LL-2B) |
| 1 PK-18 | 2 Engine Mounts (EH-2050) |
| 1 PK-24 | |

No. 1465



Build Your Own Design

With Estes Quality Model Rocket Parts



ORIGINAL DESIGN
(Shows how a variety of matching parts can be used together.)

Once you have constructed several model rocket kits and have become familiar with the basic Estes Technical Reports you will no doubt have a variety of ideas for unique designs of your own. In order to select the proper parts for your original design it is important for you to understand our system of parts description numbers.

Nearly all matching Estes parts have the same series description number. Those which do not feature an additional explanation as to where they can be used. Normally, parts listing the same series description number will be interchangeable with each other. For instance, a #20 body tube (BT-20) would mate with a #20A balsa nose cone (BNC-20A), a #20C payload section (PS-20C), or a #20B engine block (EB-20B). Further, a #2060 tube adapter (TA-2060) will adapt a BT-20 to a BT-60, and a #5055 centering ring (AR-5055) will center a BT-50 within a BT-55. By using balsa or paper adapters almost any combination of parts can be joined together. For ordering, be sure to use both the product number and the series description number (name).

WIN \$75.00 IN FREE MERCHANDISE!

ENTER THE DESIGN OF THE MONTH CONTEST

Have an idea for an original design? Enter our Design of the Month Competition today. Your design could be published in an issue of Model Rocket News Magazine. Simply follow the rules below.

- All entries become the property of Estes Industries and cannot be returned.
- Employees of Estes Industries and members of their immediate families are not eligible.
- Any type of model rocketry design can be entered (rockets, boost-gliders, launching or recovery devices, etc.)
- Designs should be new, original, and different, but they also need to be workable. The goal is to develop something new that other rocketeers can build and use successfully, too.
- Entries will be judged on practicality, originality, neatness, completeness, and clarity. All plans must be flight tested and proven.
- Your design entry should include a parts list and any instructions or diagrams you feel would be helpful.
- Please do not send the actual model as it cannot be returned.
- Photos of entries are greatly appreciated, but are not required.
- You may send as many entries as you like.
- New contest every month.
- All designs reaching Estes Industries during the calendar month will be entered in that month's competition. (Date of receipt, not postmark, will determine the month in which a design will be entered.)
- If two or more exceptional entries are received during any month, the judges may, at their discretion, make identical first-place awards or give additional honorable mentions.
- Designs should be sent to the Design of the Month, c/o MRNM Editor, Estes Industries, Inc. Penrose, CO 81240. However, all plans sent to us which are not specifically addressed to another contest or department will be automatically placed in the Design of the Month Competition.
- Each month the designer of the winning entry will receive a certificate entitling them to \$75.00 in merchandise and an award certificate suitable for framing. Award winners will be notified by mail.

GOOD LUCK!!!



PARACHUTE KITS

Get the best in parachute recovery! Two-color printed plastic chutes give maximum visibility with easy track design. Lightweight, durable and easily folded. These chutes are very thin, allowing the most material to be packed into the least body space. Each kit comes complete with chute material, tape discs, and shroud lines. Each weighs less than 3 oz. Ship Wt. 2 oz.

Prod. No.	Description	Parachute Diameter	Price Each
2262	PK-10	10 inches	
2264	PK-12	12 inches	
2267	PK-18	18 inches	
2271	PK-24	24 inches	

TAPE DISCS: Fasten shroud lines to plastic parachutes or streamers with these 3/4" dia. pressure sensitive Tape Discs. In sheets of 6 discs. (4 sheets per pkg.) Ship Wt. 1 oz. No. 2294

STREAMER MATERIAL: Bright orange, flame-resistant crepe paper streamers. In 7 1/2 foot lengths, enough for two to eight streamers. Specify size when ordering. Ship. Wt. 1 oz. 1" wide: Net Wt. 0.092 oz. No. 2341
2" wide: Net Wt. 0.184 oz. No. 2343

SCREW EYES: Specify size when ordering. (6 per pkg.) Ship Wt. 1 oz.

LARGE EYE:
1" long: 0.04 oz. No. 2280

SMALL EYE:
3/4" long: 0.03 oz. No. 2279

EXTRA SMALL EYE:
5/8" long: 0.01 oz. No. 2281

AR-5055 CENTERING RINGS: For centering a BT-50 body tube within a BT-55. Extra strong for "D" engine mounts. Weight 0.062 oz. ea. (4 per pkg.) Ship Wt. 2 oz. No. 3102

AR-2050 CENTERING RINGS: For centering a BT-20 body tube within a BT-50. Greater strength makes for use with high thrust engines. Weight per pair 0.285 oz. (10 per pkg.) Ship Wt. 2 oz. No. 3100

LAUNCH LUGS: Super-strength laminated launch lugs feature mylar plastic core for durability, paper outer layer for easy gluing. Inside diameter 5/32" fit 1/8" launch rod. Ship Wt. 1 oz.

1 1/4" long (12 per pkg.) 2 3/8" long (10 per pkg.)
No. 2321 2322

MULTI-PURPOSE SET: Includes a total of 20 rings for positioning BT-5 in BT-20; BT-5, BT-20, BT-30 in BT-50; and BT-5, BT-20 and BT-50 in BT-60. Also three universal tapered shrouds and instructions. Ship Wt. 2 oz. No. 85013

SHOCK CORD: Specify width when ordering. Ship. Wt. 1 oz. 1/8" wide: Net Wt. 0.039 oz. No. 2276
1/4" wide: Net Wt. 0.078 oz. No. 2277

Also 36" long for greater stretch on those larger birds, 1/8" wide: Net Wt. 0.078 oz. No. 85744

SHROUD LINES: Build reliable, durable, custom parachutes with this strong, hard surface shroud line cord. Comes in 70 yard spools. Ship. Wt. 5 oz. No. 2340

TAPE STRIPS: For top strength, low bulk and low weight, fasten shroud lines with these 1/4" x 3/4" tape strips, in sheets of 12 strips. (6 sheets per pkg.) Ship. Wt. 1 oz. No. 38412

SNAP SWIVELS: For quick changes and reduced tangling in your recovery systems, use these tiny 1" long snap swivels. Net Wt. 0.01 oz. (12 per pkg.) Ship Wt. 1 oz. No. 2292

ENGINE HOLDER: Flat spring steel design gives easy installation and low drag. Recommended for sport and demonstration models. (3 per pkg.) Ship Wt. 1 oz. For Regular and "D" engines. No. 3140

For Mini-Engines No. 3142
RA-2050 RINGS: 20 rings for centering and mounting BT-20 in BT-50. (20 per pkg.) Ship Wt. 2 oz. 3110

RA-2055 RINGS: 10 rings for centering and mounting BT-20 in BT-55. (10 per pkg.) Ship Wt. 2 oz. No. 3111

RA-2060 RINGS: 10 rings for centering and mounting BT-20 in BT-60. (10 per pkg.) Ship Wt. 2 oz. 3113

MAXI-ROD LAUNCH LUG: 2" long, fits 3/16" diameter launch rod. (4 per pkg.) No. 2328

DOWELS: Extra-strong lightweight seasoned maple dowels. (8 per pkg.) Ship Wt. 5 oz.
1/8" x 18" 1/12" x 12"
No. 3190 No. 3191

FIN STOCK

Top quality balsa sheeting for making fins for model rockets. For maximum strength, grain of wood should follow the leading edge of fin.

Prod. No.	Description	Price 3 for	Dimensions (Inches)	Weight in Oz. Net	Ship.	Major Use
32102	BFS-20		1/16x3x9	.130	4	High Performance
32106	BFS-20L		1/16x3x12	.173	6	High Performance
32108	BFS-30		3/32x3x9	.150	4	Sport Models
32110	BFS-30L		3/32x3x12	.200	6	Sport Models
32116	BFS-40		1/8x3x9	.200	4	Cluster Rockets
32118	BFS-40L		1/8x3x12	.265	6	Glider Wings

BODY TUBES



Prod. No.	Description	Price Each	Length	Inside Diameter	Outside Diameter	Wall Thickness	Weight in Oz. Net	Ship.
Spiral-Wound Paper Tube, for nose sections and strap-on payloads.								
30302	BT-5		18"	0.515"	0.541"	0.013"	.219	11
Spiral-Wound Paper Tube, for competition and sport models.								
30316	BT-20		18"	0.710"	0.736"	0.013"	.288	11
Spiral-Wound Paper Tube, for sport and high performance payload models.								
30352	BT-50		18"	0.950"	0.976"	0.013"	.378	11
Spiral-Wound Paper Tube, for sport and demonstration models.								
30382	BT-55		18"	1.283"	1.325"	0.021"	.672	11
Spiral-Wound Paper Tube, for sport and demonstration models.								
30396	BT-60		18"	1.595"	1.637"	0.021"	.960	11
Spiral-Wound Paper Tube, for monster models and tail rings.								
30424	BT-70		17.5"	2.175"	2.217"	0.021"	1.300	14
30433	BT-80KD		14.2"	2.560"	2.600"	0.021"	.637	11

ENGINE BLOCKS

Prod. No.	Description	Price 3 for	Outside Dia.	Inside Dia.	Length	Fits	Weight in Oz. Net	Ship.
3131	EB-20A		.708"	.65"	1/4"	BT-20	.009	1

BALSA ADAPTERS

Adapters give flexibility for rocket design. Switch from one size body tube to another for payload capsules, parachute compartments, propulsion sections, etc. Any adapter can be hollowed to make a passage for ejection gases. All adapters have at least 1/2" mating surface on each end.

Prod. No.	Description	Price Each	Mates Tubes	Length	Taper Length	Weight in Oz. Net	Ship.
70002	TA-520		BT-5 to BT-20	1.75"	0.75"	0.04	1
70004	TA-550		BT-5 to BT-50	2.2"	1.0"	0.06	4
70006	TA-2050		BT-20 to BT-50	3.0"	2.0"	0.15	4
70010	TA-2055		BT-20 to BT-55	2.5"	1.5"	0.22	4
70012	TA-2060		BT-20 to BT-60	3.0"	2.0"	0.20	4
70014	TA-5055		BT-50 to BT-55	2.0"	1.0"	0.60	4
70016	TA-5060		BT-50 to BT-60	3.0"	2.0"	0.23	4
70028	TA-5560		BT-55 to BT-60	2.2"	1.0"	0.25	4
70034	TA-6070		BT-60 to BT-70	2.7"	1.5"	0.65	4

STAGE COUPLERS

For multi-staging, joining body tubes, positioning adapter tubes, etc. Make perfect guides for cutting body tubes and sanding cut edges of body tubes, too. Ship Wt. for all is 3 oz. each.

Prod. No.	Description	Price Each	Outside Diameter	Inside Diameter	Length	Fits	Average Weight
30252	JT-5C		0.513"	0.455"	3/4"	BT-5	.020 oz.
30254	JT-20C		0.708"	0.650"	3/4"	BT-20	.027 oz.
30260	JT-50C		0.949"	0.920"	1"	BT-50	.051 oz.
30262	JT-55C		1.28"	1.25"	1.3"	BT-55	.088 oz.
30266	JT-60C		1.59"	1.55"	1-1/2"	BT-60	.124 oz.
30270	JT-70A		2.175"	2.115"	1-1/4"	BT-70	.140 oz.

NOSE BLOCKS

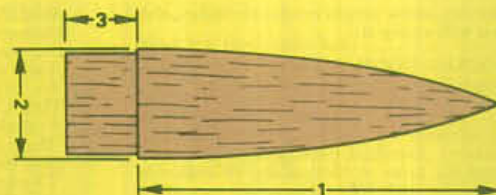
Use these top quality feather-weight balsa nose blocks in payload sections and anywhere else a solid bulkhead is required. Precision turned for exact fit in body tubes.

Prod. No.	Description	Price Each	Outside Diameter	Length	Fits	Weight in Oz. Net	Ship.
70152	NB-20		0.710"	3/4"	BT-20	.014	1
70158	NB-50		0.950"	1"	BT-50	.040	4

NOSE CONES

Nose cone dimensions listed in columns 1, 2, and 3.

In "Description" column BNC stands for balsa nose cone and PNC for plastic nose cone.



Shape	No.	Prod. No.	Description	Price Each	Dimensions			Average Weight	Ship. Wt.
					1	2	3		
	1	70216	BNC-5V		3/4"	0.541"	1/4"	0.013 oz.	1 oz.
	2	70212	BNC-5E		1-3/8"	0.541"	1/4"	0.020 oz.	1 oz.
	3	70214	BNC-5S		1-1/2"	0.541"	1/4"	0.016 oz.	1 oz.
	4	70218	BNC-5W		2-7/8"	0.541"	1/4"	0.039 oz.	2 oz.
	5	70230	BNC-20B		1-11/16"	0.736"	5/16"	0.05 oz.	1 oz.
	6	70240	BNC-20R		2-3/4"	0.736"	3/8"	0.07 oz.	2 oz.
	7	70226	BNC-20AM		2-1/2"	0.736"	1/2"	0.06 oz.	2 oz.
	8	70241	BNC-20Y		1"	0.736"	3/8"	0.02 oz.	1 oz.
	9	71000	PNC-50		3-7/8"	0.976"	5/8"	0.59 oz.	4 oz.
	10	70256	BNC-50J		1-3/8"	0.976"	1/2"	0.08 oz.	4 oz.
	11	70262	BNC-50K		2-3/4"	0.976"	1/2"	0.13 oz.	4 oz.
	11	71028	PNC-50KA		2-3/4"	0.976"	1/2"	0.13 oz.	4 oz.
	12	71001	PNC-50SP		5-11/16"	0.976"	1/2"	0.25 oz.	6 oz.
	13	70266	BNC-50Y		4-3/8"	0.976"	3/8"	0.16 oz.	6 oz.
	14	71070	PNC-55AC		5-3/8"	1.325"	3/8"	0.32 oz.	6 oz.
	15	71075	PNC-55AO		4-3/8"	1.325"	3/4"	0.43 oz.	4 oz.
	16	71038	PNC-55D		3-3/4"	1.325"	3/4"	0.36 oz.	4 oz.
	17	71020	PNC-60MS		3-1/8"	1.637"	5/8"	0.39 oz.	4 oz.
	18	71043	PNC-60AH		6-5/8"	1.637"	7/8"	1.0 oz.	6 oz.
	19	70300	BNC-70AJ		4-1/4"	2.217"	1"	0.85 oz.	6 oz.
	20	71035	PNC-80K		8-1/8"	2.555"	1-5/8"	1.68 oz.	8 oz.

ENGINE MOUNTS

Use Estes high performance engine mounts for your original designs. All engine mounts feature easy-to-assemble instructions and light-weight components. Avg. Ship. Wt. 5 oz.

Engine Type	Prod. No.	Description	Price	Fits	Net Weight Oz.
For Regular Engines—A, B, & C type 0.69" x 2.75"	3150	EH-2050		BT-50	0.1
	3151	EH-2055		BT-55	0.14
	3152	EH-2060		BT-60	0.17
For "T" Mini-Engines .5" x 1.75"	3153	EM-520		BT-20	0.09
Special Purpose Quick-Change Conversion Mount—From "D" Engines to Regular Engines	3154	EM-2050		BT-50	0.19
For "D" type Engines 0.945" x 2.75"	3156	EM-5055/60		BT-55 or BT-60	0.3

The more you know about model rocketry, the more you will enjoy it.

THE ROCKET BOOK--A Guide To Building And Launching Model Rockets For The Space Age

by Robert L. Cannon and Michael A. Banks.
A useful reference on the theory and practice of model rocketry. Excellent illustrations. Helps you understand the Laws of Motion and related concepts. Soft, full-color cover. 224 pages.
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THE LAWS OF MOTION AND MODEL ROCKETRY

The three laws of motion are explained in terms which most rocketeers eleven years of age or older can understand. 12 pages.
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INDUSTRIAL ARTS TEACHERS MANUAL FOR MODEL ROCKETRY

Very practical 52 page guide on basic model rocketry and its unique applications in the study of manufacturing, transportation, R & D, communication, and construction.
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A comprehensive teacher's guide for introducing model rocketry into the classroom or club.
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The ideal "first book" for beginners in model rocketry. 32 pages.
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**TECH-TIP #10
PAYLOADS**

Some model rockets have a special section used to carry cargo. This cargo or "payload" can be a camera, such as AstroCam 110, to take aerial photos of your launch site, or an insect, so you can study the effects of acceleration on a living organism. For competition, try launching a raw egg and retrieving it-UNBROKEN! Please do not launch mice, gerbils and other rodents as the tremendous acceleration and g forces of model rocket flight could be very frightening and harmful to them.

MODEL ROCKET LAUNCH SYSTEMS

Photographs and clearly drawn schematics make the electrical theory of launchers easily understood. 20 pages.
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Available in one volume--"Rocket Stability"; "Multi-Staging"; "Altitude Tracking"; "Rear Engine Boost Gliders"; "Building A Wind Tunnel"; "Cluster Techniques"; "Front Engine Boost Gliders"; "Model Rocket Engines"; "Is That Parachute Too Big?"; "The Fine Art of Payload Launching"; "Recovery Techniques".
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The planned sequence of activities through three levels of skill guides a model rocketeer on his path to becoming an expert.
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Explains a method by which aerodynamic drag and other effects can be taken into account in predicting rocket peak altitudes.
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AERODYNAMIC DRAG OF MODEL ROCKETS

Gives examples of ways to minimize aerodynamic drag and improve performance.
No. 2843 -

ELEMENTARY MATHEMATICS OF MODEL ROCKET FLIGHT

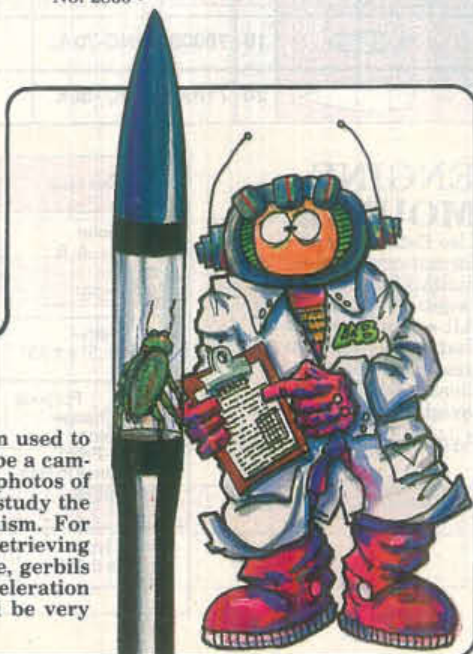
Information on how to make and use your own altitude tracker and how to calculate speeds and accelerations reached by model rockets.
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Handy guide for construction and flight of model rockets. Good tips on "scratch building", launch systems, tracking, staging, boost-gliders, and more.
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THE book about model rocketry. Over 350 fact-filled pages. Well illustrated. Paperback.
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DAMON COLORADO COMPANIES



Estes Industries-Model rocketry products and accessories. Hiflier Manufacturing Company-Keel, figure, diamond, octopus and dragon style kites; cord, reels and spools; gliders and windsocks; and Master Motion novelty clocks.

IMPORTANT-CAUTION

The Lunar Launch Pad is Recommended For Rockets No More Than 16 Inches Long, or For Rockets With Body Tubes No Larger Than One Inch in Diameter. Rockets Should Weigh No More Than 1.5 Ounces Without Engines. Rockets Should Use Mini or Regular Size Engines Only, Not "D". The Lunar Launch Pad Should Be Used in Moderate (0-5mph) Breeze Conditions Only.

NINJA™

NEW

忍者科学ロケット



NINJA FLYING MODEL ROCKETRY STARTER SET

SKILL LEVEL 1 Just right for the beginner. This exciting set features the high-performance NINJA rocket with flight speeds approaching 100 feet per second, and recovery via brightly-colored streamer. Also featured is the new, easy-to-assemble Lunar Launch Pad with blast deflector and 18" launch rod, plus the Electron Beam™ Launch Controller, two 1/2A3-4T engines, igniters, and recovery wadding. Launch controller is unassembled. (Requires 4 AA size alkaline batteries, paint, glue, and finishing supplies-Not Included.) Ship. Wt. 1 lb.

ENGINES: 1/2A3-4T (1st Flt.), A3-4T, A10-3T.

No. 1412



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